Interne notater

STATISTISK SENTRALBYRÅ

IN 79/4 20. juli 1979

ADVANTAGES AND DISADVANTAGES OF ALTERNATIVE TIME DIARY TECHNIQUES: A WORKING PAPER

by

Susan Lingsom

CONTENTS

1. INTRODUCTION

The purpose of this working paper is to evaluate the advantages and disadvantages of alternative time diary techniques. The Central Bureau of Statistics of Norway conducted its first time use survey in 1971-72. (NOS Time Use Survey 1971-72.) A new survey is scheduled to be conducted in 1980. An evaluation of the time diary used in 1971-72 as well as other feasible techniques is one of the first steps in planing the new survey.

This paper is divided into 7 sections with this introduction as the first. In this section the types of information desired and the central role a time diary has for that collection is discussed. In section 2 the criteria used in evaluating the various techniques are presented. Three principal alternatives in diary design are outlined in section 3: 1) Open and fixed interval diaries, 2) self-administered and interviewer administered diaries and 3) precoded and non-precoded diaries. The advantages and disadvantages with these alternatives are discussed in section 4 to 6, respectively. Section 7 contain a summary and conclusion as to which alternatives are best suited the Central Bureau of Statistics' purposes.

The primary purpose of the diary exercise is to measure how much time per day different groups in the population spend on major groups of activities and how large a percentage of persons participate in various activities. We wish also to measure time spent in different types of locations and in different social settings . A secondary but still important consideration for us is to study different dimensions of time use - activity, location, social setting - in temporal context.

These types of information can best be collected with the help of a time diary. Some of the information we are interested in can be collected with other methods, particularly activity check lists. However it is only through the use of a time diary that it is possible to collect all the information simultaneously. Traditional activity check lists remove activities from the context in which they occur. One collects information on participation in a few selected activites, without regards to where, when and with whom they occured and without regard to preceding and succeeding activities. While there are no absolute limits to how many activities which may be included in an activity check list one can obviously not include the same wide specture of activities with the attendent variations in context that can be covered in a time diary.

Information on participation in various activities can be obtained by direct questioning in a normal questionaire. It is however very difficult to collect information on the amount of time spent on these activities using survey questions. Direct questioning can only be used in connection to activities which are not performed often in the course of the time period under study or are of varing durations each time they are performed. The activities should also be ones that most people are accustomed to conceive of in terms of hours spent such as income producing work, journey to work etc.

Survey questions on how much time is spent on housework have, in our opinion, little value. In order to answer such a question a person must mentally reconstruct the entire time period, select out all episodes of housework, estimate duration of each of these and add them together. The task the respondent is confronted with is greatly simplified when a time diary is used. The respondent has then the time of day and the sequence of activities to aid him in the recall process. Location and social setting are also important memory aids (Ås 1978). The computer of course takes care of all addition problems.

The strength of the time diary method is that it provides the most accurate measurement of time spent on different activities. Recall problems are minimalized because activities are not removed from context and because the time periods studied are clearly defined and short.

The mean weakness with the method is that it is applicable to only a short period of time. Our experiences from a pilot study using time diaries of varying lengths is that diaries covering more than 2-3 days are little suited to general time use surveys. The quality of the diary entires decreases and non response rate increases with longer periods (Høst 1973).

We often desire information on time use covering a longer time span than 1-3 days. This is particurlarly the case when we are interested infrequent activities or longitudenal data. It is therefore often desirable to supplement time diary information with selected information covering a longer period.

2. CRITERIA FOR EVALUATION OF ALTERNATIVE DIARY TECHNIQUES

In sections 4-6 we shall discuss advantages and disadvantages with different diary techniques. In these discussions 6 criteria are used: the consequences of the alternatives on 1) the information collected, 2) interview situation, 3) non-response rate, 4) data collection costs, 5) data processing and 6) comparability with our previous time use survey.

2.1. Consequences for data

The different techniques enable collection of different types of data and provide data of different quality. Comparatively few methodological studies have been conducted testing different techniques. Results from time use surveys employing different techniques give us however an idea of the techniques consequences for information collected. Data quality will be evaluated in terms of how demanding the technique is on the respondent and the interviewer and what possibilities we have for data kontroll. Data quality will be discussed in terms of how many different aspects of time use are registered in the diary and how much supplemental information can be collected in the accompaning questionaire.

2.2. Interview situation

The manner in which the diary exercise is structured should not conflict with a natural recall process but should rather build upon such processes. The information collected on time use should also be meaningsfull for the respondent and give in his/her perspective an adequate picture of how the time was spent. Ways of structuring time use data which are adequate for the researcher can be artifical and alien for the respondent and should therefore be avoided.

We assume that the respondent is cooperative and wishes to be a "good" respondent by answering our questions etc. We must not violate these good intensions by posing questions that are too difficult to answer or by overloading the respondent with too many questions.

The quality of the interview situation has important implications for data quality, and will therefore often be discussed in connection to criteria 2.1. Consequences for data. Under criteria 2.2. we will discuss primarily those aspects of the diary exercise which conceivably can alienate the respondent.

2.3. Non-response

It is very difficult for us to estimate how large an effect on non-response the various diary techniques may have. In our discussions of non-response we will therefore limit ourselves to making assumptions as to whether non-response will decrease or increase in relation to the level of non-response in our 1971-72 survey (42 per cent). The type of non-response most likely to be influenced by the alternative techniques discussed in this paper is non-response due to refusals. As we have shown in an earlier paper (Lingsom 1978 a) the high non-response rate in our 1971-72 survey was largely due to a rigid sampling design in which not only respondents but also diary days were randomly sampled. Sampling design will not be discussed in this paper.

2.4. Data collection costs

Data collection costs are determined by a number of factors such as the length of the interview, travel time, procedures for follow up of persons not found at home, use of telephone, postal interviews etc. In this paper we will concentrate our attention on travel time and the number of required visits per respondent. In the 1971-72 time budget survey interviewers used approximately twice as much time traveling as they did interviewing. The more normal pattern for us for hour long interviews is approximately one half-hours travel time per respondent.

2.5. Data processing

Time diary data in general requires considerable processing before tables can be run using

our standard programs. Some techniques require however more extensive programing than others and in this paper we have tried to simply indicate the relative amount of processing necessary.

2.6. Comparability with earlier studies

Considerable effort has been invested in the analysis of the results from our 1971-72 time budget survey. (NOS Time Budget survey Volume 1 and 2, SA Time Spent on household work and family care, SA The day's 24 hours.) It is quite natural that we wish to build further upon the work that has already been done. The value of a new time use survey will clearly be increased if it can be used to describe changes in time use since 1971-72. In order to acheive comparability however, few changes in technique can be allowed in the new survey. The desire for comparable results must therefore be weighed against the advantages of alternative techniques.

In general we require strong arguments before we change a survey design which has previously been successfully employed. The more surveys that have been conducted the stronger these arguments must be as we lose more in terms of comparisons over time. The survey being planned for 1980 will be our second time use survey with more likely to follow. If a change in technique is desirable it is advantageous to make the changes now before a time series is established.

3. ALTERNATIVE DIARY DESIGNS

Many different types of time diaries have been used in time budget research. In our opinion the most important differenses in design have been:

1. whether or not the diary is divided into fixed time intervals
2. whether the diary is kept by the respondent or by the interviewer
3. whether or not the activities are precoded

Different types of information on time use have also been collected in different studies. We will not discuss this here but will in a later section try to evaluate the different diary techniques in realtion to the types of data we wish to collect.

3.1. Open and fixed interval diaries

In diaries divided in fixed time intervals the activity to be recorded is the one taking the longest time within the interval. In the Central Bureau of Statistics Time Budget survey 1971-72 fixed time intervals 15 minutes in length were generally employed. (The intervals were longer in the early morning hours from 00.00 a.m. - 06.00 a.m.) What was to be recorded was then the activity taking the longest time between for example 08.00 and 08.15.

Intervals of different lengths have been choosen in different studies. Finland plans to use intervals 10 minute long. In a Danish study on freetime activities (Kuhl, Munch 1976) intervals lasting a half hour were used. The Central Bureau of Statistics in the Netherlands is currently conducting a pilot study in which they are comparing the results from diaries with 5 and 15 minute intervals.

In open diaries ie. diaries not divided into fixed time intervals, activities are recorded in chronological order and starting/stopping times are recorded. Each new activity is entered on a new line in the diary. Open diaries were used in the multinational comparative time use project, and in many later surveys.

3.2. Self administered and interviewer administered diaries

When interviewer administered diaries are used the interviewer questions the respondent about his/her time use the day before. One begins often with a question such as "What did you do yesterday at midnight?" After the interviewer has recorded activity, location etc. he/she then asks "What did you do after that?" and continues in this fashion until time use for the entire day has been recorded.

Self administered diaries are delivered to the respondent prior to the day they are to be kept, with instructions as to how the diary is to be filled out. The respondent is requested to fill out the diary several times during the diary day.

Of the sample diaries presented in figures 1-4, nr. 1 and 3 were self administered diaries, nr. 2 and 4 interviewer administered diaries.

Figure 1. Fixed interval, self administered diary: Time Budget Survey 1971-72

I

TIDSDAGBOK FOR _____DAG DEN _____/_____ KL. 00.00-10.00

For Byrået

PERIODE	VIKTIGSTE AKTIVITET I PERIODEN	PERIODEN BLE SAMTIDIG BRUKT TIL				1;10-13
00.00-00.30						
00.30-01.00						
01.00-01.30						
01.30-02.00						
02.00-03.00						
03.00-04.00						
04.00-05.00						
05.00-05.30						
05.30-06.00						
06.00-06.15						
06.15-06.30						
06.30-06.45						
06.45-07.00						
07.00-07.15					2; 13	
07.15-07.30						
07.30-07.45						
07.45-08.00						
08.00-08.15						
08.15-08.30						
08.30-08.45						
08.45-09.00						
09.00-09.15						
09.15-09.30						
09.30-09.45						
09.45-10.00						

Figure 2. Precoded, fixed interval, interviewer administered diary: The survey on leisure time 1975 from Denmark's statistic and the Social Research Institute

HJEMME (i bolig) Klokkeslæt:	5.00	5.30	6.00	6.15	6.30	6.45	7.00	7.15	7.30	7.45	8.00	8.15	8.30	8.45	9.00	9.30	10.00	10.30	11.00	11.30	12.00	12.15	12.30	13.00	13.30	14.00	14.30	15.00	15.30	16.00	16.15	16.30
01. Søv	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01
02. Toilette	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02
03. Spisning	03	03	03	03	03	03	03	03	03	03	03	03	03	03	03	03	03	03	03	03	03	03	03	03	03	03	03	03	03	03	03	03
04. Husligt arbejde	04	04	04	04	04	04	04	04	04	04	04	04	04	04	04	04	04	04	04	04	04	04	04	04	04	04	04	04	04	04	04	04
05. Andet praktisk arbejde i hjemmet	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05
06. Erhvervsarbejde hjemme	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06
07. Hjemmearbejde vedr. uddannelse	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07
08. Læste avis	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08
09. Læste andet end avis	09	09	09	09	09	09	09	09	09	09	09	09	09	09	09	09	09	09	09	09	09	09	09	09	09	09	09	09	09	09	09	09
10. Musik (grammofon/båndoptager)	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
11. Hørte radio	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
12. Så TV	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
13. Samvær med ægtefælle/børn	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
14. Havde besøg af familie	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
15. Havde gæster (udover familie)	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
16. Hobby	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
17. Afslapning (hvil)	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
18. Andet	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
UDE																																
19. Erhvervsarbejde	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
20. Transport til/fra arbejde/skole/o. l.	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
21. Afhentning af børn	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
22. Besøg på offentligt kontor/læge/o. lign.	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
23. Indkøb/ærinder	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
24. Skole/uddannelsessted	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
25. Teater/biograf	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
26. Bibliotek	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
27. Kirke	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
28. Kulturelle interesser iøvrigt	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
29. Møder	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
30. Motion/sport	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
31. Tur	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
32. Besøg hos familie	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
33. Besøg hos andre end familie	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
34. Forlystelser/restaurant	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
35. Havnearbejde	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
36. Andet	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
Ved ikke	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88
	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99

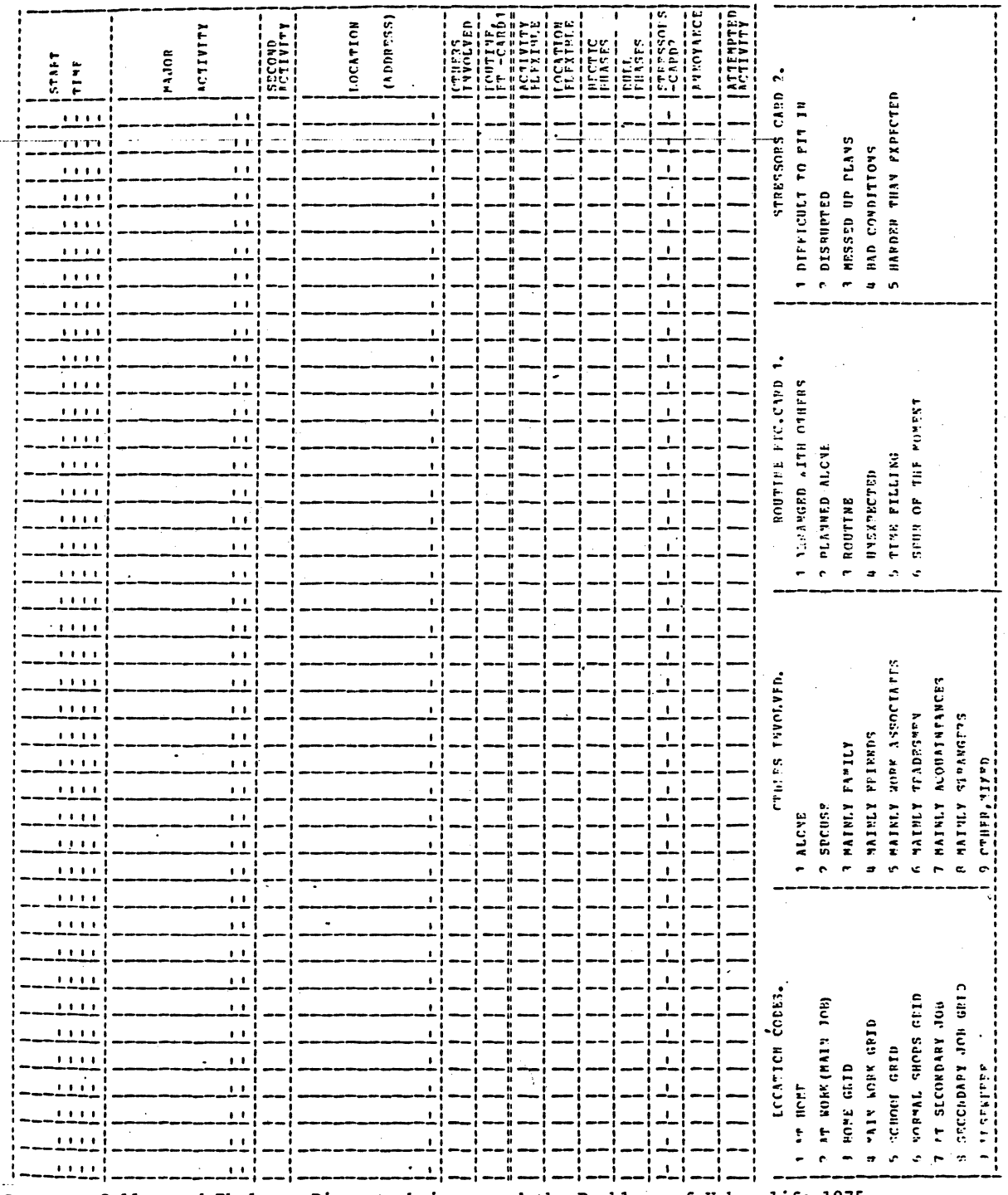
Figure 3. Open, self administered diary

What you did from 9 in the morning until 5 in the afternoon

What did you do?	Time Began	What else were you doing?	Where	With Whom	Remarks

Source: Harvey, Elliot and Stone Review of analytical and descriptive methods of time use data. 1977

Figure 4. Open, interviewer administered diary



Source: Cullen and Phelps. Diary techniques and the Problems of Urban life 1975

3.3. Precoding of alternatives

Most time budget studies do not precode activities. The respondents are allowed to describe activities in their own words. In some studies however the activities of interest are precoded either in the sense that the respondent or interviewer is given a list of activities to choose among when describing time use or in the sense that the activities are listed in the diary form. Sample diary nr. 2 is an example of the latter type of precoded diary. Interviewers using sample diary nr. 4 were responsible for coding activities and used relevant coding categories in recoding the respondents time use (Cullen & Phelps 1975). In the studies in which sample diaries 1 and 4 were used, activities were not precoded.

4. USE OF FIXED TIME INTERVALS

4.1. Consequences for data

In the discussion which follows we will distinguish between the terms 'activity' and 'episode'. An episode is an activity performed by an individual at a particular time and place and in a particular social setting. (We will return to this in section 6.) We use the term activity when we remove episodes from the context in which they have occured, as for example when we look at time spent in the course of the day. Eating breakfast from 08.00 to 08.30 a.m. at home with the family may be called an episode. The activity eating includes time spent on all meals the person has consumed in the course of the day. It is possible to specify activities in such detail that there is little difference between activity and episode. One could for example specify as an activity eating breakfast and assuming that one only eats breakfast once a day time spent on the episode 'eating breakfast' would be identical with the time spent on the activity - 'breakfast eating'. Even though duration can in such extreme cases be the same there are still very significant differences between the two concepts. Information on when, where, with whom and in what activity sequence the activity is performed are intrigal parts of the episode concept but are usually lacking in the definition of activities.

Most time budget researchers are primarily interested in studying activities, not episodes. One is generally interested in giving a broad overview of time spent per day on a number of different categories of activities. These activity categories are generally quite broad. What we register in time diaries however are not activities but episodes - in so far as we also record - the temporial and social context of the activity.

Time diaries divided into fixed intervals record only a sample of all episodes. Only one episode, the longest, is recorded for each interval. Episodes of short duration are then not recorded. What will be considered 'short duration' is dependent upon the lenght of the time intervals. With 15 minute intervals activities lasting less than 8 minutes will for most practical purposes be too short to be recorded.

How large an effect the non representation of short episodes will have on estimates of time spent on different activities in the course of the day will depend on 1) how many episodes of a particular type are performed in the course of the day and 2) duration of these episodes.

Table 1 shows a distribution of episodes by duration as registered in the Halifax study using open diaries. Episodes are defined here on the basis of 1. main activity 2. secondary activity 3. physical setting 4. social setting. If one of these 4 dimensions of time use changed a new episode was defined.

If one uses intervals which preclude the registration of episodes lasting 10 minutes or less one will according to the figures in table 1, register approximately 27 per cent fewer episodes than one would in an open diary. The average number of episodes registered per person in the Halifax survey was 28.3, median 25. One would then register on the average 7.6 episodes fewer per person.

On the basis of a small sample of 288 time diaries from our 1971-72 time budget survey the average number of episodes per person per day was 26.6, median 21.0 episodes. It is difficult to compare these figures with the results from the Halifax survey. We have defined episodes solely on the basis of the main activity while Harvey, Elliot and Procos also used information on activity context. Activity coding schemes on the other hand were sufficiently similiar to rule out coding as an

important cause of the observed differences. We can reasonably conclude that fewer episodes are registered in diaries with fixed time intervals 15 minute or longer in length than in open diaries. The difference is however probably some what less than 27 per cent.

Table 1. Distribution of episodes by duration

Duration minutes	Number of episodes	Percentages	Cummulative percentage
Total	60 607	100.0	-
0 - 5	8 871	14.6	-
6 - 10	7 458	12.3	26.9
11 - 15	9 871	16.3	43.2
16 - 25	6 388	10.5	53.7
26 - 30	8 333	13.7	67.4
31 - 60	8 850	14.7	82.1
61 - 180	7 587	12.5	94.6
181 - 360	1 553	2.6	97.2
360 and more	1 696	2.8	100.0

Source: Andrew Harvey, David Elliot and Philip Stone. Review of analytical and descriptive methods of time use data: A working Paper 1977.

How many episods we are able to register is of little importance as long as our primary interest is in broad categories of activities. What is important is the bias introduced in the data by the loss of episodes of short duration. Results from the Halifax survey (Harvey, Elliot, Stone 1977) showed that most episodes lasting 0-5 minutes were episodes of personal care and further that most episodes of child care and a third of travel episodes were under 6 minutes. These activities will then be particularity underestimated in diaries not recording short episodes.

It is difficult to determine how large an over or under estimation of time spent on different activities is with fixed interval diaries. We can identify certain activities as typically being of short duration and thereby not likely to be recorded in the diaries. Underestimation of time spent due to this underreporting can however to a certain extent be compensated for by another type of measurement error. We do not register actual duration of the activities recorded but ascribe to them a duration equal to the total length of the interval. If a short episode is first recorded on the diary, time spent on it will likely be overestimated thus compensating at least parially for the initial under-reporting of the activity. To say this with other words the use of time intervals will probably have a larger effect on how many times an activity is reported in the course of a day than on how much time is registered being spent on that activity.

Diaries divided into fixed time intervals are less suited to analysis of activity sequences than open diaries are. Logically important but short links in a sequence are not registered. We have however placed a low priority on analysis of activity sequences and therefore are little concerned by this limitation of interval data.

Open diaries can teoretically register all episodes performed although one must realistically assume that some episodes are forgotten, others willfully not reported. Nevertheless open diaries provide a better starting point for analysis of episodes duration and frequency than do diaries with fixed intervals. It is often desirable to supplement information on time used per day on a particular activity with information on how many times the activity was performed. There are still however a number of problems to be resolved even with open diaries before one can confidently study how many times an activity was performed. One must be able to distinguish between completed and interrupted episodes etc. The number of episodes registered will to a large degree also be dependent upon how carefully the diary is kept. This is perhaps one of most serious weaknesses with an open diary

- particularily self administered open diaries. In the Halifax survey the number of episodes registered varied from 3 to 94 episodes per person (Harvey, Elliot and Stone 1977). The extreme cases where only a few episodes were registered involved bedridden persons. (This was also the case in our 1971-72 Time budget survey.)

The number of episodes recorded varied by the number of times entries were made in the diary. The average number of episodes registered in cases where the respondent filled in his/her diary only once was 23.3. When the diary was filled in 2 or 3 times the average number of episodes recorded was 28.6 and when the diary was filled in 4 times or more in the course of the day the average was 33.5. (Harvey, Elliot and Stone 1977.)

Systematic differences in how carefully diaries are kept, for example by level of education, would complicate interpretation of the results. The more carefully the diary is kept, the more episodes of short duration will be recorded. This will have an effect on average time spent on particular activities such as personal care, child care etc.

Most diaries - both those which are open and those divided in fixed time intervals - contain an example of how the diary is to be kept. The purpose of this is to give the respondent an idea of how detailed the diary should be kept. (This will be discussed in section 6.) Nevertheless one must expect considerable variation in the number of recorded episodes - variation which will not necessary correspond to actual differences in time use.

Up to now we have been most concerned with the registeration of activities. In most time use surveys one also wishes to record location, persons present etc. A distinction is often made between primary and secondary activities. We have been interested in registering the responsibility for caring for dependent persons. As mentioned earlier episodes are defined not only by primary activity but also by these other dimensions. If one dimension should change for example if the person changed location or a new person joined in the activity, a new episode would be defined regardless of whether or not the primary activity changed. For each episode one registeres when the episode started and when it was concluded. This means that the respondent must not only report when main activities started and ended but also starting/stopping times for <u>all</u> changes in the context in which these activities occurred.

Figure 6. An example of specifying episodes in an open diary

Episode no.	Primary activity	Time began	Time ended	Secondary activity	Where	With whom
1	cleaned house	1420	1434	listen to radio	at home	alone
2	"	1435	1439	"	"	with children
3	"	1440	1509	none	"	"
4	"	1510	1525	"	"	with children and spouse

This must be said to be a very demanding task especially when there are frequent changes in persons present, secondary activity etc. In our opinion it is unlikely that the respondent will be capable of this kind of precision. It is more reasonable to assume that the respondent will concentrate his/her attention on primary activities. Durations of other dimensions of time use will therefore be less carefully reported and our estimates of these of poorer quality than estimates of time spent on primary activities. The responsibility to defining episodes would most probably rest on the researcher and entail considerable correction of the completed diaries.

4.2. Interview situation

It is presumably easiest to remember changes in location and the events associated with these and the sequence of activities performed. Activity's duration is much more difficult to remember and

estimates of duration will vary by characteristics of the experience such as how interesting, and demanding the activity was etc. (Se Fraisse 1968.) Remembering exactly wher activities occurred is also difficult. Despite the fact that wrist watches and clocks are commonplace we are not always aware of the time. "Clock consciousness" is probably strongest in those situations where the person is bound by fixed time commitments. One advantage with open diaries is that they start with that which is easiest to remember - the sequence of activities performed. The respondent can build upon this when in the next stage he/she is confronted with the far more difficult task of estimating both when the activity began and how long it lasted.

Fixed interval diaries make less use of activity sequences as a recall aids as all activities are not recorded in the diary. The first task confronting the respondent is to estimate duration of the various activities performed within a time interval to determine which activity took the most time. Despite this fact however we feel that the fixed interval diary is less demanding on the respondent as he/she is not required to estimate actual duration of each activity reported.

A disadvantage with fixed interval diaries is however that an artifical structure is placed on time use and the respondent may feel that resulting description of time use is inadequate.

4.3. Non-response

The use of fixed time intervals has presumably little direct influence on the non-response rate. Few persons refuse to participate first after they have studied the design of the diary. As will be discussed in a later section there can however be an indirect effect on non-response in that fixed intervals are best suited for use in self administered diaries and that the non-response rate is higher when diaries are self administered.

The use of time intervals particularly short intervals requires a high degree of "clock time consciousness". The longer the time between performing and reporting the activities the more difficult it is to remember exactly when an activity was performed. Activity sequences and approximate duration are easier to remember and open diaries which are based on these types of information are therefore to be preferred if one is collecting information on time use the day before.

4.4. Data collection costs

The use of fixed time intervals has little effect on data collection costs. It is possible that such diaries require less-follow up from the interviewers in the case of self-administered diaries - as the level of specification desired can be more easily read from the diary form itself. To the degree that fixed time intervals are unsuitable for use in interviewer adminstered diaries there will however be indirect effects on data collection costs. (See 5.4.)

4.5. Data processing

Data control is somewhat simplier with fixed interval diaries due to the lesser amount of information which is to be punched, controlled for error etc. In fixed interval diaries the time of day is given by the diary structure while with open diaries the time of day an episode occurs (starts, stops) is information which must be collected and processed. Interviewer or respondent errors in recording the time of day and punching errors can be difficult to locate and correct.

Data processing is also simplier due to fixed record length. Tables showing activity (location, persons present etc.) at different times of the day can be more readily produced from fixed interval diaries than from open diaries.

On the other hand, it is possible to produce more different types of tables from open diaries than from diaries using fixed intervals. One can for example produce tables over duration of particular types of episodes.

Irregardless of which diary technique is employed it is desirable to establish several data files in order to be able to utilize standard table programs. The extra programming which open diaries require is not assumed to be overly difficult or expensive but nevertheless somewhat more demanding than that needed with fixed interval diaries.

Practical data files produced from fixed intervals and open diaries:

Fixed interval diaries:

1. Time of day file (rawdata) (Activity, location etc. at different time periods in the course of the day)
2. Aggregate file (Time per day spent on different activities, time per day spent in different locations, etc.)

Open diaries:

1. Episode file (raw data) (Activity/location/duration etc. per episode)
2. Episodes per day file (Activity/location/duration etc. for each episode in the course of a day) fixed record length
3. Aggregate file Time per day spent on different activities, time spent on different location etc.
4. Time of day file (Activity, location etc. at different times/time periods in the course of the day)

4.6. Comparability

We wish to be able to compare results from a new time use survey with those from our 1971-72 Time Budget survey. In our opinion comparability would be seriously weaked if open diaries were used. It would be very difficult to establish how much of observed differences/simularities were due to data collection techniques and how much were due to actual changes/or the lack of them in time use. More episodes of short duration would be registered in an open diary. It is possible to form hypothesis as to which activities are typically of short duration. It is however more difficult to determine activities one would register less time for. The method choosen will not likely affect all or even a majority of activities, but comparisons will nevertheless be difficult because of the unknown few activities sensitive to diary design.

4.7. Summary

The advantages and disadvantages of diaries divided into fixed time intervals can be thus summerized:

Advantages

1. Less variation in how detailed diary is kept.
2. Less demanding on the respondent as one does not have to record starting/stopping times for all changes of activity and context.
3. Information on activity plays a less dominating role in the registration of information on context.
4. Less demanding data processing, fewer files needed, simplier programming.
5. Comparable with the Time Budget survey 1971-72.

Disadvantages

1. Short episodes are not recorded in diary, approximately 10 per cent fewer episodes are recorded when 15 minute intervals are used.
2. The duration of an episode is taken to be equal to length of the interval - an assumption which increases uncertainty of estimates.
3. The data is little suited for analysis of activity sequences.
4. The data is not suited for analysis of episode's duration and frequency.
5. Information is structured in a manner which may seem artifical and alien to the respondent.

5. SELF AND INTERVIEWER ADMINISTERED DIARIES

5.1. Consequences for data

Self administered diaries have the advantage that recall error is minimalized. The respondent is encouraged to fill in the diary several times in the course of the diary day. In our pilot study Time use and caring activities 24 per cent of the respondents reported filling in their diaries 1-2 times, 34 per cent filled in the diary 3-4 times and 38 per cent filled in the diary 5 times or more in the course of the day. It is of course easier to remember what one did, where, when and with whom the more frequently the diary is filled in.

With interviewer administered diaries time use on the day previous to the interview is recorded. The time lapsed between performing and reporting the activities is not great and the majority of persons presumably will have little difficulty in recalling how they spent their time. Some activities are however more likely to be forgotten than others. Everyday activities which involve little action such as conversations with family members and activities of short duration such as personal hygiene, or child care activities will be easily forgotten. It will also be easy to forget which family members were present, particularily in families with children who are constantly going in and out of the house.

Our interviewers do not work on Saturdays and Sundays. This represents a serious problem for surveys using interviewer administered diaries. We would have to wait until Monday to interview the respondent about his/her time use the preceeding Friday or Saturday. The quality of these diaries would unquestionably suffer by this time lag. We would have great difficultity accepting a method which did not provide information on time use for Fridays and Saturdays or which collected this information under different conditions than for the other days in the week.

In the Multinational Comparative Time Budget project 10 per cent of the respondents completed diaries for the "day before" and for the day after the diary form was delivered. Robinson (1979) has compared the results from these two methods for the American samples. Less time was registered spent on income producing work and housework and more time was registered spent on journey to work, visits and child care in the diaries for the "day before".

These results conflict with the hypothesis we had concerning what types of activities would be most easily forgotten. Income producing work and although to a somewhat lesser degree the journey to work are generally highly routine facts of life for the individual and most persons are likely to be conscious of time spent on them. It is therefore surprising that the two methods register different amounts of time on these activities. It is also surprising that more time was registered spent on child care in diaries for the day before as such activities are often of very short duration.

For most activities there was little difference in time registered by the two methods. The correlation between the methods was 85. Walker (1970) also found a high correlation between these methods in time spent on household work and family care.

One source of error in self administered diaries that is rarely addressed is the fact that keeping a diary itself takes time. In our pilot survey Time Use and Caring Activities approximately 30 per cent reported using less than a total of 15 minutes on filling in the diary, 48 per cent between 20 and 30 minutes, 16 per cent over 30 minutes and 14 per cent failed to answer the question. We have little way of knowing what activities are postoned, cut short or dropped to make time to participate in our research exercise.

In comparing diaries for the "day before" and the "day after" Robinson found that more activities are reported in the "day after" diaries (27.7 as opposed to 25.0 activities per day, a difference of approximately 10 per cent).

There will be some degree of interviewer or research effect with all time diaries. Little sexual activity, alcohol consumption etc. is reported in diaries. With self administered diaries however the tendency for overreporting socially acceptable activities and under reporting less acceptable activities and activities which the respondent finds embarrassing to talk about is likely to be minimalized. With interviewer administered diaries the interviewers sex will quite possibly effect what activities the respondent reports. Men would for example probably report more household work and

family care to a female than to a male interviewer, women might conceivably do the opposite.

Table 3. Comparison Between Aggregate Time Estimates for Activities Reported "Yesterday" versus "Tomorrow" (per cent of time)

Activity	1965-66 National and Jackson Study Data Combined		Activity	1965-66 National and Jackson Study Data Combined	
	Day before (N = 192)	Day after (N = 2024)		Day before (N = 192)	Day after (N = 2024)
00. Work	14.4	14.9	51. Other classes	.0	.1
01. Work at home	.2	.3	52. Special lectures	.0	-
02. Overtime	-*	.1	53. Political and union courses	.0	-
03. Travel at work	.5	.2	54. Homework and research	.4	.3
04. Waiting	-	.1	55. Technical reading	.0	-
05. Moonlighting	.3	.3	56. Other	.1	.2
06. Meals at work	.6	.7	57. No activity	.0	.0
07. Other	.2	.3	58. No activity	.0	.0
08. Coffee breaks	.3	.5	59. Related travel	.1	.1
09. Travel to and from work	2.1	1.5			
Total	18.6	18.9	Total	1.2	.9
10. Preparing food	2.9	3.1	60. Organization work	.0	.1
11. Meal cleanup	1.5	1.5	61. Work as officer	.0	-
12. Indoor chores	2.1	2.2	62. Other activity	.0	-
13. Outdoor chores	.3	.3	63. Volunteer work	.1	-
14. Laundry	1.5	1.6	64. Religious clubs	.4	.2
15. Mending	.1	.1	65. Religious services	.3	.6
16. Other repairs	.5	.4	66. Union-management	.0	-
17. Animal and plant care	.3	.2	67. PTA, VFW, etc.	.1	.1
18. Heat and water upkeep	.1	.1	68. Other	.1	.1
19. Other	.4	.8	69. Related travel	.3	.3
Total	9.7	10.3	Total	1.3	1.4
20. Baby care	1.0	.9	70. Sports events	.0	.1
21. Child care	.7	.6	71. Nightclubs, fairs	.0	.2
22. Helping homework	.2	.1	72. Movies	.1	.2
23. Reading to children	.2	.1	73. Theatre, concerts	.1	-
24. Indoor entertaining	.3	.2	74. Museums	.0	-
25. Outdoor entertaining	.1	-	75. Visits with friends	3.3	2.8
26. Medical care	.0	-	76. Parties with meals	.8	.9
27. Other (baby-sitting)	.2	.1	77. Bars, tea rooms	.3	.3
28. No activity	.0	.0	78. Other gatherings	.1	.1
29. Related travel	.3	.3	79. Related travel	.9	1.0
Total	3.0	2.3	Total	5.6	5.6
30. Everyday needs	.8	1.0	80. Playing sports	.6	.4
31. Durable goods	.3	.1	81. Hunting, fishing	.5	.2
32. Personal care	.1	.1	82. Taking a walk	.1	.1
33. Medical care	-	.1	83. Hobbies	.1	.1
34. Government service	.1	.1	84. Sewing, canning	.6	.5
35. Repair services	.1	.2	85. Artistic work	.0	.1
36. Waiting	.1	.1	86. Making music	.1	.1
37. Other services	.8	.8	87. Games, cards, etc.	.3	.4
38. No activity	.0	.0	88. Other active leisure	.1	.1
39. Related travel	1.3	1.3	89. Related travel	.2	.1
Total	3.6	3.8	Total	2.6	2.1
40. Washing and dressing	3.5	3.4	90. Radio	.1	.2
41. Medicinal care	.6	-	91. Television	6.6	6.6
42. Helping adults	.3	.4	92. Records	.1	.1
43. Meals at home	4.5	4.1	93. Reading books	.2	.3
44. Restaurant meals	.6	.7	94. Reading magazines	.1	.4
45. Night sleep	32.2	32.1	95. Reading newspapers	1.2	1.7
46. Naps	.8	.8	96. Talking (on phone)	1.1	1.2
47. Resting	.3	.4	97. Letters	.2	.4
48. Private, other	.5	.9	98. Relaxing, thinking	.3	.3
49. Related travel	.8	.6	99. Related travel	-	-
Total	44.1	43.4	Total	9.9	11.2
50. Full-time classes	.6	.2	Grand Total	99.6	99.9

* A dash indicates less than .05 per cent.

Source: John Robinson: How Americans Use Time: A social-psychological Analysis of Everyday Behaviour 1977.

It is difficult in our opinion to make any clear cut conclusion as to which method gives the best data quality. With self administered diaries the respondent is to a large degree responsible for data quality. Since the respondent has time to study instructions, obtain an overview of the diary's structure, check the different types of entries for consistency etc. he/she is in a reasonably good position for assuming this responsibility. The respondent can also take advantage of a greater flexibility in the order in which episodes are recorded-entering first episodes where he/she is certain of starting and finishing times and later filling in the holes before and after these certain episodes. With interviewer administered diaries the respondent must generally follow a strict chronological order starting from the beginning of the diary day. (Dagfinn As is working on a design for an interviewer administered diary which largely overcomes this limitation by recording first time of key location and actvity changes before recording other activities in detail.)

With interviewer administered diaries it is the interviewer who has the overview over what information is required and it is he or she that must make consistency checks etc. The interviewers can make significant contributions to increased data quality by posing additional questions, clearing up misunderstandings etc. (We will come back to this in section 6.) This assumes that the interviewers are well acquainted with the purposes of the study, activity codes, etc. as well as, of course, the diary itself.

Our interviewers are trained to use closed questionaires. They have little or no experience with improvising additional questions in order to obtain desired information. An interviewer administered diary can not be made into a closed questionaire and it is questionable whether our staff of interviewers would be able to handle such interviewers without extensive training.

Self administered diaries must be easily comprehenable for the respondent. There are limits to how many different types of imformation we can collect with this method. The diary form itself must not appear too demanding. We must also be able to adequately explain in very brief instructions what it is we wish to register. A registeration of time spent caring for children in the sense of being available or on-call for them was dropped from our pilot survey Time use and caring activities precisely because it was too difficult to explain in few words what we meant by being "on-call". With interviewer administered diaries one can register more types of information on time use and one can register types of information requiring longer explanations. Questions can also more easily be directed to specific target groups.

One advantage with the self administered diary is that the interviewer time which is not utilized to record time use on a particular day, can be used to pose a number of questions on background characteristics, and on time use over a longer period (activity check lists) etc. Such data is in our opinion a very important supplement to diary data. In our studies we have had a one hour interview. An interviewer administered diary would take certainly at least an half hour. As we have policy whereby we limit total interview time to ca. one hour, we would have to delite approximately one half of the questions we have had in our interview were we to chose an interviewer administered diary.

Interviewer administered diaries are largely limited to the registeration of time use on the day previous to the interview. Self administered diaries can on the other hand run over several days limited only by the respondents willingness to participate in the exercise.

5.2. Interview situation

How the diary is administered is assumed to have little effect on how artifical the research exercise seems to the respondent. Our interviewers are trained to use standardized questions and adaptions to fit individual respondents are avoided. If interviewers administer the diary they can however answer or try to answer the respondent's questions which would make the exercise less foreign for the respondent.

5.3. Non-response

The non-response rate is assumably higher with self administered than with interviewer administered diaries as they are more demanding on the respondent. When the diary is interviewer administered the respondent does not need to take the time to acquaint him/herself with the structure of the

diary. Respondents unfamiliar or uncomfortable with written presentations - such as many elderly persons, persons with little education, persons with poor eyesight etc. will find it easier to participate in a study which does not require them to write anything. Some persons will on the other hand prefer the greater anonymity of the self administered diary.

When self administered diaries are used the respondent must agree to participate in two seperate exercises, the background interview and the time diary. The fact that the study consist of several exercises makes it appear more complex with the consequence that more persons are likely to refuse to participate in both exercises.

Additional cases can be lost if the respondent forgets to keep his/her diary on the agreed upon day, loses the diary etc. With interviewer administered diaries all data collection is conducted in the course of one visit, ruling out non-response due to such reasons.

5.4. Data collection costs

Travel time consitutes a major part of data collection costs. Travel time is of course dependent on how many visits to the respondent are required. With self administered diaries a minimum of two visits are necessary, one to conduct the background interview and deliver the diary and one to collect and controll the completed diary. Both visits are necessary in our opinion as the diary is too complicated to explain in a letter and one should have an opportunity to correct misunderstanding, and, if necessary, help a respondent complete the diary. The interviewers returning to collect the diary probably has a positive effect on the care the respondent takes in keeping the diary. If completed diaries were to be mailed in non-response rate would certainly be higher.

Interviewer administered diaries require only one successful visit to the respondent. On the average two visits are necessary to make contact with the respondent for the first interview . An appointment can then be made for the second contact elimating or significantly reducing the number of unsuccessful visits. If we assume that a self administered diary would require on the average of 3 visits to the respondents residence and the interviewer administered diary 2 visits, choosing the latter method would reduce travel costs by approximately one third.

5.5. Data processing

The choice between self administered and interviewer administered diaries has little effect on data processing. Coding of the diaries would possibly be easier (less time consuming) with interviewer administered diaries as we would have greater control over diary entries, and the interviewers could be trained to use category labels. Further data processing - the establishing of data files etc. - would be the same irregardless of who administers the diary.

5.6. Comparability

As mentioned in section 5.1. the time registered spent on different activities will vary somewhat by who administers the diary and by the time period the diary is kept for. In a study of factors effecting response effects Sudman and Bradburn (1974) found that of all the aspects of survey design studied the method of survey administration, that is either self administered or interviewer administered, had the greatest response effect. It would therefore be difficult to compare results from an intervewer administered dairy with results from our 1971-72 self administered Time Budget survey. The differences are not expected to be large - but on the other hand we do not expect actual changes in time use patterns since 1971-72 to be large either.

5.7. Summary

The advantages and disadvantages of self administered diaries in relation to diaries administered by interviewers can be summarized in the following manner:

Advantages

1. Recall problems are minimalized. The diary is kept several times during the day.
2. Better information on time use on Fridays and Saturdays.
3. Ca. 10 per cent more activities are registered.
4. Time use data can be collected for several consecutive days.
5. Interviewer effect is minimalized.
6. Interview time is saved and can be used for posing questions on background characteristics, infrequent activities, etc.
7. The results are comparable with our 1971-72 Time Budget Survey.

Disadvantages

1. A limited number of different types of information can be collected.
2. The types of information collected are limited to ones requiring little explanation.
3. Less control over how diary is kept.
4. Filling in the diary disturbes the individuals use of time. Time spent on this must be taken from other activities.
5. Higher non-response rate.
6. Higher travel expenses.

6. PRECODING OF ACTIVITIES

6.1. Consequences for data

We have earlier defined episodes as activities in context, that is to say performed by an individual at particular time, place and in a particular social setting and activity sequence. A stream of behaviour can be divided into meaningful units in many different ways. As Dickman (1963) has shown there is some degree of regularity in how persons will divide up a stream of behaviour into meaningsful units, but there are also considerable differences in how they will do this particularily with regards to how encompassing the preceived units are. Small episodes are parts of larger episodes which are again parts of still larger ones. (See Barker 1963.)

In our studies of time use the respondent is requested to divide up his/her behaviour in episodes. This exercise can yield statistically usable data if regularities exist as to how behaviour is divided up. Our language gives us some basis for consensus. The units of behaviour we perceive will be units for which labels exist. Language in practice will generally set a lower limit and in some cases an upper limit as well as to how encompassing units of behaviour will be identified. A language will however usually contain concepts (labels) for many levels of specification between these outer points. A common language is therefore not an adequate basis for obtaining common preception of episodes.

Information is needed on what degree of specification we desire. In diaries divided into fixed time intervals the intervals themselves give the respondent important information on how small or how encompassing episodes we are interested in. The individual is requested to characterize his/her behaviour within a time period and will then choose a label adequate to cover a number of episodes which occured in the period. One reports making breakfast - not opening the icebox door, taking out the butter etc. As mentioned earlier there will be times when not all of the episodes performed in the interval are parts of the same larger unit of behaviour and finding the most appropriate label can therefore be difficult. If the episodes can not be characterized by a common label the respondent is instructed to record the episode (set of episodes) taking the longest time.

In open diaries the respondent has no time period references and therefore no set guidelines for now small episodes are to be recorded. Variation in the number of episodes registered can therefore be very large.

Diary entries are coded in accordance to relatively detailed coding lists. (Our list contains 93 different activity codes.) It is of course essential that episodes reported in the diaries are

described in sufficient detail to enable us to distinguish between the various codes.

There are several strategies to ensure this. The most direct strategy is to give the respondent the coding list, and request that he/she choose the most appropriate code. The various codes are sufficiently neutral discriptions of everyday behaviour that it is unlikely that there would be significant differences in how different persons would code the objectively same type of episode. This method would minimalize some types of coding error and reduce the time we spent on coding. The problem with the method is that it is not suitable for the level of specification of episodes that we have employed in the past. It would be extremely cumbersome and time consuming for the respondent if he/she were to search through a coding list with 90-100 activity codes each time an entry was to be made in the diary. It is much easier for them to describe these activities in their own words.

Some coding error is likely even if the respondent and the researcher did to a large degree share a common frame of reference. The respondents coding is likely to be sensative to the structure of the coding lists, sequential ordering etc. as they will have a tendency to choose the first adequate but not necessarily best code.

Studies using precoded activities have generally been special studies of a particular activity areas such as for example Walker's study of household work (1976) or studies using a few selected broad categories of activities. (Kuhl, Munk 1976.) A coding list with more than 20-30 activities would in our opinion be unsuitable for respondents to use.

Another strategy is to present examples of the level of desired specification as an introduction to the diary exercise. Special instructions can be given concerning the types of activities which require special care. It is our experience that this strategy is sufficient to enable the majority of persons to record their activities in adequate detail. Certain activities such as trips and different types of travel are however often poorly specified.

By presenting examples of how diaries are to be kept rather than a complete coding list one runs some risk of overestimating the activities contained in the example. Another risk is of course that the example may not give the respondent adequate information with the consequence that he/she does not report activities in sufficient detail for our purposes.

A third strategy is to give the interviewers responsibility for making the entries codable and even for coding the diaries themselves. Under all circumstances it is advantageous for the interviewers to be well acquainted with the coding list particularily if an interviewer administered diary is choosen. The interviewers should not however be asked to assign numerical codes in the course of the interview as this would be time consuming and preclude possibilities of controlling coding procedures afterwards. An advantage with having interviewers code the diaries is that they can easily contact the respondent if serious coding problems arise. Our interviewers have however little experience with coding work and this solution is likely to be an expensive one as they would need much more time than experienced coders. It would also be necessary for the researchers to have close contact with the interviewers during the coding process and as we use 100-300 interviewers spread over the whole country this could be a formidable task.

6.2. Interview situation

Respondents will naturaly identify themselves more with a description of time use in which their own words are recorded than one in which coding labels or numerical codes are used. This is particularily the case in societies which different languages, regional dialects etc. Some of the codes we use in analysis of time use data are residual categories which would have little meaning for the respondent such as for example the code "other freetime" and would therefore function poorly as a memory aid.

6.3. Non-response

Precoding is not expected to have any effect on the non-response rate.

6.4. Data collection costs

Data collection costs are not expected to be influenced to any substantial degree by precoding.

6.5. Data processing

Coding of diaries from our pilot study survey Time Use and Caring Activities took on the average approximately 15 minutes. This time could be reduced somewhat if the respondent fully or particially coded his/her own activities. Full coding would entail the entry in the diary of numerical codes from a coding list or checking off for precoded alternatives printed in the diary form. Partical coding would entail use of common labels. Coding costs are likely to be higher if coding is performed by the interviewers rather than by experienced coders.

6.6. Comparability

A coding list suitable for use by the respondent would have to be short and limited to broad general types of activities. We would be unable to make comparisons with our 1971-72 survey regarding highly specified activities. Interviewer coding would assumably have little effect on comparability.

6.7. Summary

The advantages and disadvantages of precoding and self coding can be summarized thus:

Advantages

1. Clear information on how detailed the diary is to be kept.
2. Reduction in number of cases where inadequate information is recorded.
3. Questionable cases decided by the person with most knowledge of intention, context etc., the respondent.
4. Use of common labels would reduce time needed for coding.

Disadvantages

1. The number of activity codes is strongly limited by practical considerations.
2. Comparability is limited to major activity types.
3. Time comsuming and most probably irritating for the respondent to refer back to a coding list for each entry in the diary.

The advantages and disadvantages of giving interviewers the responsibility for technical coding can be summarized in this manner:

Advantages

1. Interviewers can easily take contact with respondent if coding problems arise.
2. Interviewers are in a better position, particulary if it is an interviewer administered diary, to make difficult classifications due to their knowledge of the respondent, the diary day etc.
3. Interviewers will possibly feel a greater responsibility for data quality.

Disadvantages

1. Researchers have less control over coding and will have to maintain contact with many more persons under coding than would be the case using centralized coding.
2. Time spent on coding would be likely to increase (increased data processing costs).

7. SUMMARY AND CONCLUSION

In this paper we have attempted to evaluate the advantages and disadvantages with different types of time diaries. We have discussed 1) open and fixed interval diaries, 2) self and interviewer

administered diaries, and 3) various coding procedures. These alternatives have been evaluated with respect to their consequences for 1) data type and quality, 2) interview situation, 3) non-response rate, 4) data collection costs, 5) data processing and 6) comparability with our 1971-72 Time Budget survey. Lacking in many cases methodical studies upon which to base our evaluation we have had to make assumptions as to the most likely effects of alternative techniques. The advantages and disadvantages with each diary type are listed in the summaries for the respective sections. These lists contain important and less important considerations. In this section we shall attempt to assign priorities to the different considerations and choose which methods are most suitable to our purposes.

We are interested in producing statistics which give a general overview over how different groups in the population allocate their time. We are interested in figures for time spent per day on different activities, how much time is spent in different locations and with different persons. Our main emphasis is on registering primary activities and caring for children, sick and elderly. (See Lingsom 1978.)

In our evaluation of alternative techniques primary consideration has been placed on data type and quality. The diary design which is choosen must provide us with the types of information we are interested in and they must be of acceptable quality. Opportunities for controlling the data are therefore very important. A secondary consideration is that of comparability with our earlier study. We feel that it is important to study changes in time use patterns over time, provided that the design required for comparability satisfies our goals regarding type of information and data quality.

Data collection and processing costs are of course of central importance as in all studies and the economic consequences of the various alternatives must be carefully weighed against other considerations.

The various techniques discussed in this paper are all viable alternatives which can give useful data on time use. The consequences of the techniques presented here are in many instances marginal differences which can be important enough when one is designing a study but which do not mean that one technique or another is unusable.

The types of information we are interested in can be collected with either an open or a fixed interval diary. Activities of short duration are however not registered in the interval diaries and this has special implications for our study of caring activities. There is also somewhat more uncertainity connected to estimates of time spent on different activities when fixed interval diaries are used. The quality of data on other aspects of time use (location, persons present etc.) is assumed to be better with fixed interval diaries. In order to ensure comparability with the 1971-72 survey fixed interval diaries should be choosen.

The choice between self administered and interviewer administered diaries has greater implications for what types of information can be collected. Self administered diaries must be simple in structure with few and easily explanable types of measurements. This method is in our opinion little suited for registering time spent on caring activities particularily when we try to distinguish between concrete services performed (active care) and time spent simply being available for the dependent person (passive care) (Lingsom 1978 b). On the other hand if self administered diaries are chosen, interview time can be utilized to collect supplemental information, diary periods can be stretched over several days and the information we would be able to collect on time use on Fridays and Saturdays would be of better quality. There are greater opportunities for controlling data quality with interviewer administered diaries. The rate of non-response will probably also be lower with this method. It is however difficult to draw a clear conclusion as to which method gives the best data as self administered diaries are filled in several times during the diary day thus minimalizing recall problems. Interviewer effects are also minimalized. In order to obtain results compariable with the 1971-72 study self administered diaries should be choosen.

We wish to measure the amount of time spent on many different activities. Precoding techniques are better suited to studies concentrating on few activities. Data quality can be improved by using precoding as one has as far as possible a common frame of reference and coding problems are elimated or significately reduced. Precoding of activities would not seriously effect comparability in relation to broad general categories of activities but it would preclude collection and thus comparability of data on time spent on a wide spectrum of activities.

We do not feel that we can choose between an open and a fixed interval dairy on the basis of the arguments presented in this paper. Open diaries have in our opinion several advantages but also some disadvantages. Before choosing open diaries we need field experience with their use and therefore propose to conduct a pilot study in which one half on the sample will use open diaries, the other half fixed interval diaries. If fixed interval diaries are choosen on the basis of this pilot supplemental measures of time spent on caring activities must be developed.

The advantages of self administered diaries in our opinion outweight the disadvantages. With self administered diaries we can use interview time to collect supplemental information on time use. Data quality is assumed to be higher as entries are made several times in the course of the diary day thus minimalizing recall problems. Time use data can also be collected for several consecutive days.

Some consideration can be taken to the need for data control by having the interviewers review the diary when it is collected. At this time the interviewers can also register those types of information considered to be too difficult to be included in a self administered diary - such as for example constraints due to caring for a dependent person.

On the basis of the advantages and disadvantages of precoding activities presented in this paper we feel that precoding is not desirable. We propose as, in our earlier survey, to introduce the diary with a sample diary and with special instructions concerning activities which are most often poorly specified. Coding will be performed centrally.

8. Literature

Barker, Roger (1963) The Stream of Behaviour as an Empirecal Problem i Barker (ed) The Stream of Behaviour, Merideth Publishing, NY.

Cullen, Ian og Philps, Elizabeth (1975) Diary Techniques and the Problems of Urban life. Unit for Planning Research. University College. London.

Dickman, Harold (1963) "The Perception of Behavioural Units" i Barker (ed). The Stream of Behaviour, Merideth Publishing NY.

Elliot, David, Harvey, Andrew and Procos, Dimitri (1973) An Overview of the Halifax Time Budget Study. Institute for Public Affairs. Dalhouise University, Halifax, Canada.

Harvey, Andrew, Elliot, David and Stone, Philip, (1977) Review of Analytical and Descriptive Methods of Time Use Data: A Working Paper. Institute for Public Affairs. Dalhouise University, Halifax. Canada.

Høst, Sigurd (1973) Tidsnyttingsundersøkelse 1971/1972, Stencil (SigH/GH, 9/5-73).

Kühl, P.H., Munk, Jens Kristian (1976) Døgnrytme - Tidsanvendelse. Socialforskningsinstituttet, Meddelelse 15. Danmark.

Lingsom, Susan (1978a) Frafall ved Tidsnyttingsundersøkelsen 1971-72, Stencil SPL/ANI, 10/5-78.

Lingsom, Susan (1978b) Rapport om prøveundersøkelsen Tidsbruk og omsorg. Working paper 78/29.

Robinson, John (1977) How Americans Use Time: A Social-psychological Analysis of Everyday Behaviour. Praeger, NY.

Statistisk Sentralbyrå (1975) Time Budget Survey 1971-72 Vol 1 NOS A 692.

Statistisk Sentralbyrå (1975) Time spent on Household work and family care. SA nr. 19.

Statistisk Sentralbyrå (1977) The Day's 24 hours. SA nr. 30.

Sudman, Seymour and Norman Bradburn (1974) Response Effects in surveys. National Opinion Research Center. Monographs in social Research, Aldine, Chicago.

Szalai, Alexander, (red)(1972) The Use of Time, Mounton, Paris.

Ås, Dagfinn (1978) "Studies of Time Use. Problems and Prospects" in Acta Sociologica Vol 21 nr. 2.

Walker, Kathryn (1970) "Time Spent by Husbands in Household Work". Family Economics Review ARS (June).

Walker, Kathryn and Margret Woods (1976) Time Use a Measure of Household Production of Family Goods and Services. Center for the Family of the American Home Economics Association.