INTEGRATED FIELD AND OFFICE EDITING IN BLAISE: OPCS'S EXPERIENCE OF COMPLEX FINANCIAL SURVEYS

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1. CAI surveys which need to retain an office editing stage

In principle, computer assisted interviewing (CAI) allows the coding and editing stage of the survey process to take place during the interview. The advantages this brings over paper-and-pencil methods, which can only run computer edits on the interview data when they have been returned to the office, have been rehearsed in many papers in recent years: improved data quality, and faster and cheaper processing after the interview.[1]

These advantages are greater the more that any coding and editing that needs to be done is completed in interview. OPCS's first CAI survey, the Labour Force Survey (LFS), comes very close to achieving fully coded and edited data before return to the office.[2] All coding and editing is completed in the interview except for some coding from large classifications (occupation, industry, placenames), which are coded by the interviewers at home. In the near future, it should be possible to code from large classifications during the interview itself, using computer assisted coding (CAC) such as the Blaise trigram system. In the LFS, only some between-case checks, such as the detection of duplicate serial numbers, remains to be carried out in the office, where the data from many different interviewers are accumulated. With the new case management tools announced by the Netherlands Central Bureau of Statistics for Blaise III and LIPS-SPIL, it may be possible to remove the necessity for any central checks at all.

The design of the LFS is conducive to achieving fully coded and edited data in the field. It contains, almost exclusively, simple questions on which all respondents can be expected to be sufficiently well informed to be able to give an answer. Given the objectives of the LFS, it is not cost-effective to give special treatment to the very rare instances where a respondent is

not sufficiently well informed to answer a question, but can give a description of related circumstances from which an expert in the office might be able to recognise the correct answer.

For many surveys, however, their subject matter is so complex that non-ignorable proportions of the total respondents can give only approximate answers to some of the questions, if they can give any answer at all. For example, in a complex financial survey, respondents who receive several welfare benefits may not know or make the administrative distinctions between the benefits that the survey needs (and the distinctions may be too complex to translate into a reasonable number of simple questions). They are even less likely to know precisely how much of the total income they receive from the welfare benefits is administratively ascribed to each benefit type. They may, however, be able to give relevant information from which the correct answer can be recognised by an expert.

One solution to this problem might be to treat the answer as wholly missing and impute the answer statistically. This would have the advantage of avoiding the need for scrutiny by an expert. The advantages in speed and cost of obtaining data from the field which need minimal office processing would be realised. For some surveys, however, where such imputation would have to be used frequently, the cost in loss of data quality would be unacceptable to the survey's customers.

In such cases, and others where statistical imputation is regarded as undesirable or unavailable, the survey design solution is to arrange for the interviewers to gather as much information as possible about the welfare benefits received and the circumstances associated with them, so that an expert in the survey office can make a decision about the appropriate coding. On paper questionnaires, such information is usually written in the margin beside the question concerned. In Blaise, the note facility can be used, with automatic referencing provided as a square shape next to the question name in the lower half of the interviewer's screen.

Gathering information for later scrutiny implies an additional editing stage.

In principle, this might be carried out by the interviewers, if the information they would need to resolve the query cases were available to them at home. Usually, the practical solution will be an office editing stage.

Another major reason for retaining an office editing stage for some complex surveys is that otherwise the number of credibility checks required in the interview might increase the respondent burden to an unacceptable degree. For example, in a financial survey, the ranges for valid answers are often very wide — from zero to thousands, or higher orders, of the currency units. Interviewer keying errors are a serious risk, but to have soft checks on every question involving a financial sum could become very tedious for the respondent. They would spend much of the time simply confirming that the answer they had just given was indeed correct. A partial solution to this problem might be to run the soft checks as part of an office edit. The solution is not a full one because it relies on an office editor to resolve the problem cases, rather than the respondent as would happen if the check were triggered in the interview. In practice, it is a matter of judgement and testing as to how many credibility checks can be tolerated in the interview, and which are the most important ones.

In versions of Blaise prior to Blaise III, there may also be software limitations on the number of checks that can be included if the interview instrument is to run at an acceptable speed, even with an 80386 processor. An office editing stage may be needed in order to run the checks which could not be included in the interview.

This paper discusses OPCS's experience of combined field and office editing in two of its continuous financial surveys, the Family Expenditure Survey (FES) and the Family Resources Survey (FRS).[3]

The FES has run continuously as a paper-and-pencil survey since 1957. It is an expenditure and income survey, sponsored by the Central Statistical Office. Chief among its many uses is provision of weights for the national Retail Price Index. It comprises an interview with all adults in a household, averaging about 90 minutes, and a 14-day expenditure diary for each adult.

There are just over 7,000 responding households each year. It will convert to being a CAPI survey in April 1994. The FES collects information on incomes, but the Department of Social Security has commissioned another survey, the FRS, to collect further and more detailed income information, from a larger sample (25,000 responding households per year). Unlike the much older FES, the FRS was a CAPI survey from the start (October 1992).

The two surveys share many characteristics, and FRS developed from the income section of the FES. Each has learned from the other in the course of developing effective CAPI systems in Blaise. One important similarity is that both need the CAPI instrument to allow "concurrent interviewing", that is, the flexibility to interview at least two people (who might follow different routing from each other) at the same time, on the same screen. This is important in financial surveys where there may be shared income and expenditure, to avoid omissions and double counting. It was difficult to develop an efficient system of concurrent interviewing, and the assistance received from Netherlands CBS in overcoming this problem is gratefully acknowledged.

The editing strategies in OPCS for the two surveys are designed to meet different objectives. For the FES, the aim is to deliver fully edited data to the customer. This includes imputation, which is largely clerical, of item non-response. For the FRS, the aim is to edit data to a degree agreed with the customer to be suitable for the latter to complete the editing with statistical imputation. The consequences of these strategies for editing design are described below.

Historically, however, the first design problem faced by the two surveys in 1991 was that they were too large for the current version of Blaise. OPCS's solution needs to be outlined, to aid understanding of the total processing system.

2. OPCS's solution to the problem of Blaise limits on questionnaire size in versions prior to Blaise III: The use of two questionnaire instruments, linked in Clipper

Traditionally, single instrument questionnaires, such as the LFS, have accessed the questionnaire by keying in a serial number. All hierarchies within the data are then handled within Blaise code. However, the size and complexity of these financial surveys has meant that, with Blaise version 2.4, it has been necessary to separate the interview into two instruments with a hierarchical division between household and individual level data.

The interviewer collects household level information first and then the household data files are read as external files to the individual level instrument in order to determine routing and checks. Therefore it is vital that both instruments are opened with the same serial number applying to the case. Early ·pilots on the FRS required interviewers and editors to key the serial numbers for both instruments. However, keying serial numbers, particularly part way through a lengthy interview, was found to be error prone and disruptive to the smooth flow of the interview.

A system was devised using Clipper software to create a set of· logical menus at different levels from which the interviewer and editor may select first an address from a list of preallocated serial numbers and then the required household and individual questionnaires within that· address.

The Clipper handling program reads Case Management blocks within the Blaise instruments so that the on-screen menus will display relevant information on the progress of the case, such as whether the interview has been started ·or completed, and then at the edit stage to confirm that editing· has been carried out.

This information has also been particularly important for producing case management reports to monitor the progress of fieldwork and editing for any particular month.

3. A Blaise editing system for field and office

The FES and the FRS are both surveys of the type defined above as needing an office editing stage. The FES involves a more complex editing task than the FRS in the following respects:

1. it delivers fully edited data to the customer, and the edit itself includes many more checks than the FRS;

2. it asks responding adults to keep 14 day expenditure diaries (which involve checking and collection calls by the interviewer, giving the chance to add more information to the interview data); and

3. interview data are cross-edited with the expenditure diaries

The system described in this section was developed for the FES, and some findings from a pilot study are included. The FRS uses a subset of the elements of this system, to meet its simpler editing requirements. Some particular features of the FRS system, and the experience of its first 9 months of use, will be described later.

Both surveys use multi-stage random samples of addresses, and interview all households found at the selected addresses. The address are selected from the Post Office's national list, the Postcode Address File (PAF), and serial numbers are assigned to them. For every sampled address a "skeleton" Blaise questionnaire instrument is created for household 1 at the address. These skeleton interviews form the basis for work allocation and control at the interviewer level, and for address level reporting in the case management system. Work is allocated to interviewers by means of paper address lists, and by means of a data disk. The data disk contains all the skeleton Blaise interviews for addresses within that interviewer's quota.

The Blaise questionnaires contain case management blocks where administrative information is recorded — current state of the case, calls information, final outcomes, and comments. This information is used extensively to control the handling of the data and to produce management reports.

The suite of programs on the laptop is designed to help the interviewer control what is going on. It reads the case management information from the data files and presents to the interviewer a list of those cases that are already in the system (initially, just household 1 at the sampled addresses). On selecting and entering a particular case, there is an option to enter a comment; this comment will be displayed on the address menu next time and helps the interviewers keep track of which case is which.

When additional households are discovered at an address, it is necessary to generate a new case in the field. This can be done easily by the interviewer; the system allows for the extra interview and for the case management information for the new case.

After each interview the case management blocks are re-read by the system. The menu of addresses will now contain all the addresses currently on the laptop, including any new cases. The interviewer can see on the screen the full list, with comments attached (for easy identification), and with codes to indicate whether work has been completed for that case.

Interviewers transmit their data back to the office on a regular basis. The office receives the case management system (CMS) information for all cases that are in the field, enabling reports to be run to monitor current progress and response. Progress is easily measured, as the skeleton records will exist for those cases that have not been progressed.

There will inevitably be a few cases left over at the end of the month for which no data has been received. The CMS information will tell us the status of these cases, and provide information to allow field managers to chase interviewers. Any cases that have not been transmitted can nevertheless be recovered from the interview disks when they are returned at the end of the month.

During the interview inconsistencies in the data are indicated to the interviewer by means of hard and soft checks. Hard checks require the interviewer to change an answer to resolve the inconsistency whereas soft checks can

be over-ridden by the interviewer. Hard checks are used for situations that are logically impossible, such as people stating early in the questionnaire that they are self employed and later that they are employees. Soft checks stop the questionnaire when unusual but possible answers are entered. The answer may be changed or the check may be suppressed if it proves to be correct when checked back with the respondent. If the soft check is suppressed then the interviewer makes a note on the laptop explaining the situation.

The FES interview itself is not completed on a single occasion. Each adult in a responding household keeps a diary of all expenditure for 14 days. The interviewer visits them at least once during that period to make sure they have understood what is required. On these checking visits, and at the final pick-up visit, the interviewer fills in gaps in the interview information from receipts and other documents that the respondent has had time to look up. Thus considerable flexibility must be built into the CAPI instrument to allow the interviewer to find quickly the questions which are still unanswered and complete them, and to make and recover access to notes.

At home interviewers examine the questionnaire again, activating checks that were not triggered during the interview. They note the check details and validate the information with the respondent at the diary checking call. This procedure is repeated after the diary checking call. If any more checks are activated then the interviewer checks the information at the diary collection stage. It is important that the interviewer codes the information directly onto the laptop as the new data may prompt more checks.

The next editing stage takes place in the office, on networked PCs. The incoming cases are grouped into batches (typically of a week's data) for the editing team. Cases within a batch are identified in the system so any retransmitted cases are not accidentally edited twice, and edited data is not overwritten with unedited data. Editors access cases using Clipper menu systems in the same way as interviewers. The division of the questionnaire into two instruments can be inconvenient for editors who may need to check key information from one instrument while working in another.

Therefore for each case a paper information sheet is printed out, known as a 'factsheet'. This sheet contains basic information about the household content and other data considered important for editing. It also contains a printout of all comments made by the interviewer linked to a particular question name.

The main point of the factsheets is to bring together in a convenient place as much information as the editor is likely to need in order to deal with specific edit problems. Without the factsheets, they would have to search around the Blaise interview data. In a complex survey, this would be very time-consuming. The factsheets have also provided a useful method of allocating batches of work to staff, raising queries to research staff and monitoring individual progress.

For the FES, the 14-day expenditure diaries kept on paper by all responding adults have to be coded and cross-checked with the CAPI interview data. The main information in the diaries comprises items of expenditure and the associated monetary values, but there is also information about such matters as use of credit cards and certain shops. Various ways of coding and capturing the diary data have been considered. In the pilot study of February 1993, the diaries were coded and cross-checked clerically, and then fast keyed in a specialist unit. In the most recent pilot study (July/August), the office editors are to capture all the diary information directly into a Blaise CADI instrument, using computer assisted coding with the Blaise trigram module.

A dataset is finally produced containing all the interviewed, transmitted and edited cases. Structural checks are run on the information to ensure that everything has been correctly accounted for.

In summary, a large part of the PAPI FES edit is concerned with checking hard ranges and routing. In CAPI, all these checks are transferred to the interview instrument as part of its basic definition. There are also checks on consistency and credibility: in Blaise, these become hard and soft checks. It

would be impracticable to run all the consistency and credibility checks from the current PAPI FES during the CAPI interview.

The FES solution is to apply increasing numbers of checks at each of the editing stages which follow the initial interview. There are essentially three stages:

1. the initial interview, which includes as many checks as possible without threatening the conversational flow and becoming too burdensome for respondents;

2. "home checks", run by the interviewer after the initial interview: they comprise all the checks of stage 1, plus checks which were too complex to sort out in the interview but which highlight inconsistencies and unlikely values which can be resolved when the interviewer returns to see that the diary-keeping is going successfully or to pick up the completed diaries;

3. the office edit, which reactivates all checks from the previous 2 stages and adds all the remaining checks required.

The method of achieving this is to create a Blaise questionnaire (for practical reasons, as explained earlier, this is actually two instruments linked by Clipper) which has all the ranges, routing and checks required for the survey, and to use this in office editing. This same questionnaire, with fewer checks, is used in the interview and "home checks". Interview data can be read, without any transformation, at each of these editing stages since the structure of the Blaise questionnaire is unaffected by the number of checks.

4. Experience in the FRS

An interviewing and editing system very similar to that described above has been used successfully for the FRS since October 1992. The office editing stage is limited to the following actions:

— · any queries raised by interviewers using the notepad facility are considered and the correct code entered.

— Some checks suppressed at the interview stage are reactivated for further editing. The number of such checks has been reduced over time following evaluation of how much action can reasonably be taken in the office, given that the interviewer has already investigated the inconsistency or error with the respondent.

— Values for certain fixed rate benefits or taxes are entered using agreed editing instructions.

— Current values of investments such as stocks or shares are verified against information in national press and government information.

Paper printouts have also been used to improve the speed of checking investments or government holdings. Rather than working on a case by case basis, it has proved more efficient for all investments held by respondents in a batch of say 20 cases to be printed out on one sheet which an editor can then check in one session against office held information.

5. Experience in the FES

In the course of developing a CAPI system for the FES, OPCS has carried out a series of field trials, culminating in one month's parallel running with the main survey. Results from the parallel surveys will be compared when processing of the main, PAPI, survey has been completed. This paper will examine the impact of the CAPI interview and edit system described above.

The FES CAPI pilot study used an interpenetrating sample design in 51 of the 56 interviewer areas selected for the main FES sample in February 1993. There was no statistically significant difference between the response rates for the two modes (CAPI, 69% of 780 eligible households; PAPI, 70% of 768 eligible households).

Interviewer reactions to the FES on the laptop were highly favourable. All the interviewers were impressed with the ease with which the FES questionnaire could be handled in the field. Two interviewers with long experience of the FES, who had expressed considerable doubts about the feasibility of such a complex survey being carried out in CAPI, said at the end of the pilot that they were now convinced it was both feasible and advantageous.

Interviewers triggered checks both in the interview and at home. Scrutiny of the data at the editing stage indicated that interviewers had coped well in the field and had made adequate notes when suppressing soft checks.

Office editing was carried out as described earlier. The questionnaires were edited using Blaise in CAPI mode, as in the FRS. The CAPI edit was completed in one cycle as opposed to an average of 6 cycles per month on the main FES. The editors worked to the main FES written instructions. A query system allowed any problems to be referred to subject matter specialists, as for the main FES.

As noted earlier, the interview data and diaries must be edited together. Any diary items that were assigned a code for a business expense had to be cross referenced with the interview data for possible deduction or entry. The Blaise edit questionnaire containing the interview data stopped at specific variables that required deductions, depending on the answer to questions regarding employee and self employed business expenses. For example, if the respondent had a telephone and got 50% of their telephone bill refunded by their employer, a check instructed the editor to deduct 50% from the amount entered for telephone expenditure.

The deduction procedure had some drawbacks, as the editors had to keep paging backwards and forwards through the questionnaire to find the relevant information. This was particularly difficult in the CAPI module used (see below). In future, the information required for deductions will be printed on the factsheets, where strictly necessary. This will enable the editor to glean information from the factsheets and hence only pass once through the questionnaire.

Although the office edit finished on time, it proved to be rather cumbersome in practice. Use of the CAPI module, for an editing task for which it was not designed, had significant disadvantages. In particular, it prevented free movement in the questionnaire to search for relevant information. Circumventing this problem with factsheets led to too much paper handling. Although factsheets will remain a necessity for cross-checks between diary and interview data, at least until Blaise III allows a single instrument for interview and diary, they will be kept to a minimum in future. Instead, the Blaise editing module (CADI) will be used. There is another important reason to use CADI. The cumbersome nature of the CAPI module when used for editing, and the use of editors who had only just been recruited and trained, led to a small number of errors remaining in the data at the end of the CAPI pilot. The CADI module provides an automatic monitor of the error status of interviews, so it can readily be ensured that all errors in the data have been dealt with.

Finally, the pilot study confirmed that use of CAI for the interview greatly reduces the amount of office editing required, by comparison with the main PAPI survey. Data for the two modes can be compared at the point of their return to the office, to see the mean number of routing and consistency (credibility) checks per household that remained to be resolved. This comparison underestimates the improvement in data quality from using CAPI because it omits the resolution during the interview of data inconsistencies brought to light by checks triggered in the field instrument.

Table 1 shows that CAI reduced the amount of editing of this type required in the office by more than 75%. The PAPI estimate includes errors subsequently corrected by autoedit (accounting for about 0.6 errors per household).

Table 1. Unresolved credibility errors at entry to office, per household

CAPI (Feb 1993)	PAPI (October-December 1992)
1.4	6.2
n=538 households	n=1826 households

6. Conclusion

Commentaries on use of CAI for surveys which involve long interviews on complex subject matter, with difficult requirements like "concurrent interviewing", sometimes concentrate only on the problems they present for the interview, and overlook the fact that they also tend to involve large and complex edit processes. With CAI, interviewing and editing are no longer separate processes. However, for complex surveys it may be impossible to complete the processing in the interview, since information is required that is not available to either interviewer or respondent. OPCS's experience with the FES and the FRS shows the importance of an integrated design for all stages of the interview and editing process. It is anticipated that Blaise III will make such a design much easier to implement than current versions, which limit the size of questionnaire and edit instruments.

Notes

1. For example:
   Bethlehem, J G & Keller, W J. *The Blaise System for Integrated Survey Processing*. Netherlands Central Bureau of Statistics (1990)
   Byckling, T. Finnish National Health Interview Survey Using Blaise CATI. *Essays on Blaise* (1992) Netherlands Central Bureau of Statistics
   Noordhoek, J A & Bochis, L. Blaise in a Danish Context. *Essays on Blaise* (1992) Netherlands Central Bureau of Statistics
   Weeks, M F. Computer-Assisted Survey Information Collection: A Review of CASIC Methods and their Implications for Survey Operations. *Journal of Official Statistics,* 8, 4, 1992, Statistics Sweden
2. Manners, T. The Development of Computer Assisted Interviewing (CAI) for Household Surveys: The Case of the British Labour Force Survey. *Survey Methodology Bulletin,* 27, 1990, OPCS, United Kingdom
3. The FRS is conducted jointly with Social and Community Planning Research (SCPR). This paper describes the systems established in OPCS.