

Use of the CAPI instrument in a blind test of the UK 2001 Census form

Introduction

This paper describes how Blaise III was used in the Census Quality Survey (CQS). The Census Quality Survey was commissioned by the Census Division of the Office for National Statistics in England and Wales. The survey had two principal aims:

- Firstly, to provide details of any questions on the Census form that were not working well and might need to be re-thought;
- Secondly, to provide end users of Census data with some information about the accuracy of the answers given to each of the Census questions so that they could gauge the level of error involved with any analysis that they were to carry out.

In order, to achieve these aims, we needed to compare the answers given on the Census form by respondents filling in the form themselves, in conditions as similar as possible to those they would experience when filling in the real Census form, with the answers they gave in an interview, where details given can be fully probed and checked by the interviewers. We felt this could most effectively be achieved by carrying out a “blind test” where respondents were re-asked the questions on the Census form without access to their original answers. However, it was also important that where the answers differed between the Census form and the interview, that the interviewer would be able to ask which answer was the better answer, given the situation on Census night and also be able to ask why the answers differed.

We decided that using the Blaise instrument we would be able to achieve all these aims. By storing the original Census form data in the Blaise instrument in a particular way, neither the respondent or the interviewer would have access to the original form data until they had given an answer in the interview. This paper gives details of how this process was carried out.

Methodology

The first part of the survey involved delivering test Census forms to 4640 addresses. 58 addresses in each of 80 areas were randomly selected. Interviewers called at each of these addresses and acted as far as possible as Census enumerators. They established how many households there were living at each address and ensured that at least one form was delivered per household. The interviewers then explained to a member of the household that the form was to be completed on the test Census night, 16th May, and then posted back to the office, using a pre-paid envelope. This was the same routine that enumerators would have to follow on the real Census night. Interviewers were asked not to give detailed instructions or advice on how to fill in the form. This aimed to ensure that there were no inequalities in the level of help given to different households. If interviewers were unable to make contact with a particular household, they were asked to simply deliver a form through the letter box, as enumerators would.

Once the Census forms had been delivered, respondents were left to complete them on their own. A help desk telephone line was provided, but it dealt mainly with practical issues such as lost forms. Where respondents were unsure of what a question meant or where they had difficulty answering a question, they were generally told to fill the form in as best they could and then to send it back, leaving out those questions which they felt they could not answer. A week or so after the test Census night, a reminder letter was sent to all those who had yet to return a form.

The forms that had been returned were keyed into a Blaise data entry programme. In the real Census it is hoped that the forms will be scanned. However, this was not possible for the survey and so all forms were double keyed. Where there was a discrepancy between the first and second key of a form, this was referred to supervisor who would resolve which was the correct entry.

Once the forms had been keyed, the data from them could be read into the CAPI instrument and sent to the relevant interviewer. The interviewers received cases which had all the keyed data read into them, but they did not have direct access to this information. When the interviews were carried out, respondents were asked the answers to a variety of questions which related to the Census form. In some cases, they were simply re-asked the Census form question. In other cases, where the question had a higher priority or where the Census question seemed complicated, a variety of questions were asked which would ultimately seek the same information as on the Census forms. Where discrepancies occurred between Census and Survey answers, respondents were told what their Census answer had been and were asked which was the better answer and this was taken to be the “true” answer. This final answer is referred to as the reconciled answer. Respondents were then generally asked for any reasons for discrepancies. They were also given an opportunity to give their opinions on the Census form and answer some general questions about the look and layout of the form. Throughout the interview, interviewers were encouraged to make notes if there were circumstances where the question did not seem appropriate to the individual’s circumstances.

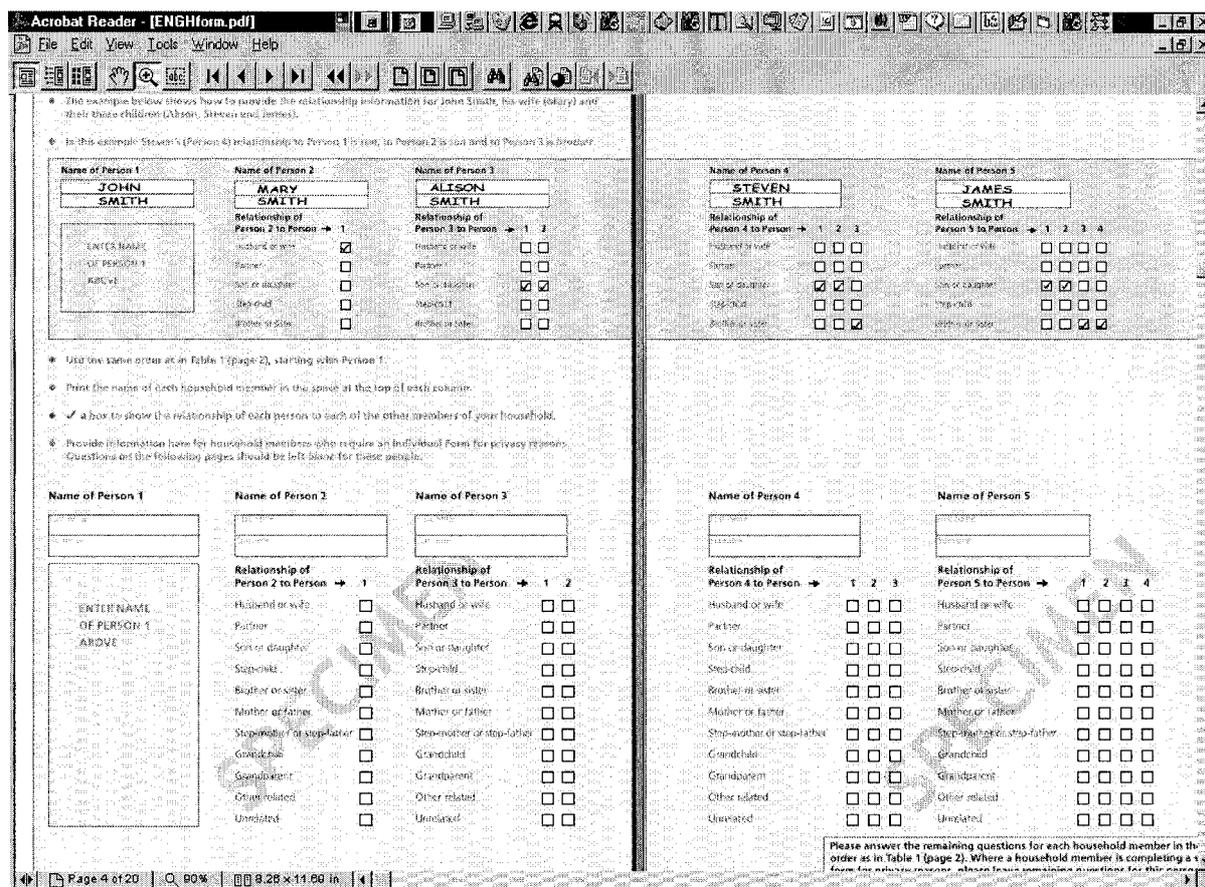
The aim of the analysis of this data was to provide a comparison between the original answers given on the Census form and the final answers given during the interviews. The analysis also gave details of why particular questions had caused difficulties for respondents.

The Census Form

The Census form was a twenty page document that asked a variety of questions about the individuals who formed the household and the accommodation they lived in. Instructions about how to fill in the form were given on the first page along with the household’s address details and the signature of the householder. Respondents were asked to fill in the names of all members of the household on a table on the inside of the front cover. They were also asked to fill in the names and addresses of any visitors present on Census night. A household questionnaire asked nine questions about accommodation and cars. This was meant to be completed by the householder.

For the first time in any Census, respondents were asked to complete a relationship grid. The grid spanned two pages and asked for the first name and surname for each household member as well as the relationship of each household member to other household members. Person 1 was simply asked for their name; person 2 was asked about their relationship to person 1; person 3 was asked about their relationships to persons 1 and 2 and so on. This is shown in diagram 1. The relationship grid was thought to be an ambitious idea because although it was thought from earlier studies, that some 10% of the population would have trouble completing a grid in this way, it would provide a rich source of data about household composition that had simply not been collected before.

Diagram 1 – The Relationship Grid



The form also contained questionnaires for up to five individuals. Each individual questionnaire contained thirty five questions and spanned three pages but routing instructions on the form meant that respondents would not have to answer all these questions.

Respondents answered these questions by ticking one or more of the answer categories provided or by writing in their answers in the spaces provided, according to the question. Respondents were given instructions as to whether they could tick one or more box at each question and where they were expected to write in an answer they were instructed to do so.

Although it was hoped that each adult member of the household would fill in their own individual forms, there was no explicit instruction to do this. It was known from earlier testing that in some households, there would be one form filler who would fill in the details for all other household members. This main form filler may or may not ask the relevant individuals for details they were not sure about. In other households, each individual concerned would fill in their own form (with obvious exceptions for small children or very frail household members). In other households, some people would fill in their own individual sections whilst others would leave it to the main form filler.

Planning for Integrated Keying and Interview Programmes

In order for the details filled in on the Census forms to be used in the survey it was important to develop a Blaise programme which would hold all this information in a way that would be accessible to the interview programme. This involved planning for both programmes at the same time.

Naming Conventions

In order to facilitate programming and for ease of reference at the analysis stage, we decided to apply a naming convention to the variables in both the keying and the interview programmes. The naming convention had to be able to quickly identify whether the variable related to individual, household or relationship grid data and also whether it related to form data or interview data. To this end, a five character code was devised. The first character was either a C, an S or an R which denoted whether the variable related to the Census form (C) or the Interview (S for all questions asked and R for calculated reconciled variables which would be used in the final analysis). The Second digit indicated whether the data was from the household section (H), the relationship grid (R) or the individual section (P). The third and fourth digits related to the question number on the form. Finally, a fifth digit was reserved for denoting parts of questions. In the keying programme this could indicate that there was an “other – write in” part of the question. During the interview, respondents were generally asked more than one question in order to get the final reconcile answer. These questions were referred to by a letter. Thus SP02b would refer to the second question about question 2 on the individual section of the interview programme. By keeping the naming convention to five characters, there was room to allow for multiple responses and arrays.

Types

The interview programme would compare the answers given on the Census form with those given during the interview. This involved using a “Types” paragraph for enumerated type questions and this paragraph had to be consistent across both the Census form keying programme and the interview programme. All enumerated type questions where the answers were going to be compared had the answer categories listed in the “Types” paragraph. Since the interview programme was developed in parallel with the keying programme, it was important that any changes to these sets of answer categories were changed in both.

Reading in Data

In order to carry out the blind testing required, the data from the keyed Census forms would have to be read into the Blaise interview programme. Two ways of doing this were considered:

- Reading in the data at the top level of the data model and putting all the external data into locals at this level;
- Reading the external data at the lowest level, into each individual block.

Because we had to read nearly all the keyed data into the Blaise interview programme, we had to consider the implications of the size of what we were reading in. Reading everything in at the top level of the data model was simply too slow and meant it would take interviewers too long to load up each programme. We therefore decided to read the data in at the lowest possible block level. It was felt that this would speed up the programme considerably. Although this was the best solution at the time, the interview programme remained slow but usable.

Developing a Keying Programme

The Programme Design

However well designed a self completion questionnaire is, there will inevitably be times when respondents do not follow instructions and as a result, tick two or more categories when they should only tick one, do not follow routing instructions and answer questions when they should not or do not answer questions when they should. Some respondents might decide that a question they were not routed to applied to them and then answer it anyway.

The keying programme had to reflect the way people might actually respond to the Census form, rather than the way they should have. Therefore, multiple responses were allowed for all enumerated type questions. The exception to this rule was for yes/no type responses. It was anticipated that respondents would rarely answer both yes and no for a particular question. In addition, it was thought that in the unlikely event of someone answering that way, it would be same as if they had not given an answer at all. Blanks were allowed for all questions, as there was always a possibility that the a respondent elected not to answer a question. Finally, there was very little routing between questions in the keying questionnaire. This meant that the programme could cope even with someone who had just answered a random selection of questions and paid no heed at all to the routing instructions on the form.

It was possible, therefore, to keep the keying programme relatively simple, with separate blocks for each of the sections of the form namely:

- A block indicating whether or not the front of the form had been signed by the primary form filler and if so, who had provide the signature (this was captured in order to give interviewers some information about who they should interview);
- A block which allowed all the names given in the table for the list of household members, to be entered;
- A block which allowed all the names given in the table for the list of visitors, to be entered;
- A block allowing all the information in the household section of the Census form to be entered;
- A block which allowed all the information in the relationship grid to be entered;
- An array of blocks which allowed all the information in all the individual forms to be entered.

The blocks the household members and visitors and the household information section, were relatively simple to devise. The naming conventions and rules about types were followed throughout and very little routing was used.

The relationship grid proved to be the most complicated part of the keying programme. As well as having to write some fairly complicated code so that the keying programme followed as closely as possible the paper Census form, additional code had to be written to record “consistent errors”.

It was known that some people could not fill in forms presented in this grid-like fashion and such people, if they attempted the question at all, would make a large number of mistakes. Testing had shown that these mistakes fell into three broad types:

- Reverse logic mistakes – here the respondent gets the relationship the wrong way round and instead of recording the relationship of John to Ann, the respondent would record the relationship of Ann to John.
- Relationship to person one only – it was known that some respondents would be able to cope with working out the relationships of each person to person 1 but the grid layout of the form would mean they have difficulty working out what to put in the columns for the relationships of person 3 to person 2.
- Not entering a person 1 – Tests had showed that some people would not fill in any details for person 1 because there were no boxes to tick for this person. However, not filling in these details would make the rest of the grid difficult to complete.

We decided that if a respondent had made anyone of these mistakes, it was likely that the whole of the relationship grid would be incorrectly filled in and rather than asking the respondent why they had made an error every single time there was a discrepancy between the Census form and the interview data, we would just ask these respondents why they had made the overall error.

In order to do this, we would have to be able to spot these types of errors at the keying stage. This could be done by asking keyers to spot these types of mistake while keying in the form and indicating if any of them had occurred at an appropriate question in the Blaise programme. This was done for the pilot but at the main stage, we decided to let the Blaise programme double check. If there was no information at person 1 but details had been filled in for all other people then we could calculate that one of the consistent errors had been made. Similarly, if the only boxes ticked were for the relationship to person 1, another of these errors had been made. Finding out if the respondent had got the relationships the wrong way round was more complicated. However, in the individual sections of the form, respondents were asked to fill in details of their date of birth and so if these two sections could be linked it would be possible to use signals to alert keyers to situations where fathers were older than their children or other unfeasible situations.

It was possible to link the data in each individual form to the relevant part of the relationship grid by having a screen which appeared every time a keyer wanted to enter data for a new individual which asked which person from the relationship grid you wanted to enter individual data for. The answer categories used text substitution to give all the names of the people mentioned on the relationship grid and a further category which said “Person not mentioned category” which would then require you to enter the name of the person. This had to be an option as people were frequently left off the relationship grid but included in the individual questionnaires.

By linking the relationship grid and the individual sections in this way, it was possible to identify individuals who were not included on the relationship grid so that they could be asked why that had happened during the interview. Similarly, it was possible to tell if there was no individual information for someone who had been mentioned on the relationship grid.

Double Keying

In the real census, forms will be scanned and the data will be double checked as part of the scanning process. Scanning was not a possibility for the CQS, partly because the apparatus for the Census scan was not yet in place and partly because keying seemed to be a more appropriate way to enter the data into Blaise.

It was extremely important that all the data entered was accurate and in order to achieve this, the data needed to be double keyed. This was done using one programme to key the form twice into two separate datafiles and then using a Manipula programme to verify that each key had resulted in the same data being entered.

Ten keyers worked on entering all this information. They worked from the same programme on the same file server and each Census form was keyed by two different interviewers.

One problem that arose out of this was the keying of text fields. All the keyers were given instructions ensuring that they always used capital letters, always left one space between each word and always typed exactly what they saw, even when spelt incorrectly or when abbreviations were used. Despite the instructions, many second keys were failing because of tiny differences at these text fields. This was delaying the keying process and it was felt that these small differences would have no material effect on the interviews or subsequent analyses.

It was therefore decided that it would be best if the second keyer simply had to confirm that what the first keyer had entered was correct. This meant reading in the data from the first key. As soon as the first keyer had entered all the information from one Census form, they saved it all as a datafile which would then be accessible straight away to a second keyer. This would mean all the information from the first key would have to be read into the second key. However, with so many different keyers working from one file server, which was kept on a different site, reading in large chunks of data became unacceptably slow.

It was decided that the best way around this to create a separate datafile which only contained the string fields. This was the only thing read into the second key. Because we had to extract data from the first key, it was only possible to carry out the second key after this had been done. This small disadvantage was easily outweighed by the improved speed of the keying process.

Serial Numbers

We anticipated that some interviewers would enter incorrect serial numbers for particular addresses. This was an extremely serious issue as it meant that the data from the form would be scattered to the wrong interviewers or interviewers would try and interview at the wrong households. Beyond the practical implications for us, such as time wasted interviewing at the wrong household, this had very serious implications for confidentiality. Although respondents would not see the data keyed from the form for their address, they would, under certain circumstances, hear what had been written for certain questions. It was therefore extremely important that no mistakes were made because of serial number error. This problem was generally picked up when forms were booked in but we needed to be completely certain. To this end, a checking procedure was established. The serial numbers were based on the area number (2 digits) the address number (2 digits) and the household number (2 digits). A check was used so that for any given area number, the correct postcode had to be used.

Making Notes

Some respondents dealt with the Census form in ways that had not been anticipated. Rather than answering some questions, they had written a full explanation of their circumstances in the space around the tick boxes. Others had simply written "same as person 1" beside on the top of individual forms. Many other unusual ways of filling in the form were discovered as the forms were keyed. Guidelines were established, and added to in order to ensure consistency in dealing with these problems. At the same time, keyers were asked to use the notes facility in Blaise whenever they had to deal with unusual situations. This allowed the keyers to describe the types of difficulties they experienced and this information was in turn passed on to the client in Census division and has been useful for them in planning the scanning operation for the actual Census.

Developing the Interview Programme

Once all the data had been keyed it would have to be read into an interview programme which would be used to carry out a blind trial of the Census form. The interview programme would be required to re-ask the respondents about all the information on the Census form and compare the answers given on the form with those given in the interview and, where necessary reconcile the two answers and probe out reasons for discrepancies.

Structure of Programme

Gathering all this information would require a significant amount of routing within the programme. This problem was exacerbated by the routing on the Census form. We decided that all routing in the interview should be based on final reconciled answers.

The structure of the programme could be broken down as follows:

Household level. One “include” file was used for the household level information. That “include” file called on four further “include” files – one relating to the members of the household and; a second include file contained all the information in the household questionnaire; two other include files were used to time how long it took interviewers to complete this part of the questionnaire.

Relationship Grid This consisted of one “include” file.

Individual level. It is possible to think of the individual level questionnaire in a number of sections. These sections were based on routing breaks so that wherever there was a routing instruction, a new section would start. Each of these sections was represented by one block. One “include” file was called at the datamodel level and this “include” file called a number of other include files and each file contained one block. Routing at the highest person level meant that these blocks were called only for the appropriate groups of people, as indicated by the Census form. This system simplified what would have been very complicated routing.

The household questionnaire, the relationship grid and each of the individual questionnaires were stored as parallel blocks.

Format of questions

For each Census question on the form a basic pattern was formed:

- One or more questions were asked in order to gather the information required at each question on the Census form. This had to take into account all the definitions that Census wanted to apply.
- The answers from these questions were then calculated into a hidden variable which was designed to be in exactly the same format as the question and answer categories on the Census form.
- This interview answer was then compared with the answer or answers given on the Census form. If the answer was the same in the interview as on the form, respondents were asked about the next question on the form.
- If the answers differed from each other, they were then asked “On the Census form, you told me that _____, but you have also said _____. Which would you say was the better answer?” Generally they would be expected to say the interview answer was the better answer but sometimes they would think the Census form answer was more correct for the circumstances on Census night. The way the keyed data was read in meant that the text substitution could be simply achieved by typing `^CENSUS.Qperson.Bperson[Lper1].CP01` or whatever was appropriate for the Block or Question names.
- A final, reconcile variable was calculated but not shown to the interviewer. This recorded the final answer given by the respondent in a form which could be easily compared with the answers given on the Census form. Calculating derived variables within the Blaise programme saved large amounts of time at the analysis stage.
- If the interview answer was the better answer, respondents were asked why they had given the answer they did on the Census form.

In addition, if respondents had not followed the routing on the Census form correctly, we wanted to know why that was.

This basic pattern was used for the household section, the relationship grid and the individual section. However there was an added level of complexity in the individual section that related to who filled in the form for that person.

For all adults, we were only interested in interviewing the actual person to whom the individual data related but for children under sixteen, we wanted to ask parents for that information. Initially we thought that information about the respondent’s age would be available from the form, but past testing had revealed that date of birth is often filled in incorrectly, with respondents frequently putting the current year rather than their birth year on the form. Proxy interviews would have slightly different routing to adult interviews and so if a respondent entered a date of birth that suggested they were under sixteen, interviewers were asked to check if this really was so. Where the respondent really was under sixteen, interviewers were provided with an on-screen instruction to only take a proxy interview.

In the interview, we always wanted to ask the individual questions to the person to whom they related. This was not always the same as the person who actually filled in that section of the form as many individual sections were completed by proxy. It was important to establish whether the respondent had filled in the form themselves or if had been filled in by proxy at the beginning of the individual interview as this would determine to what extent it was relevant to examine the motivations behind the answers given on the form. All adults were therefore asked if this section of the form was:

- filled in by you
- filled in mainly by you but with someone else's help
- filled by someone else who asked you about some or all of the questions
- filled in entirely by someone else?

Whether they filled in the section themselves would also determine later routing. If a question had been filled in by proxy on the Census form we would assume that the answer given during the interview was always the better answer. Similarly there would be no point asking the respondent why there was a different answer on the form. If the form had been filled in entirely by the respondent or entirely by someone else, we could extend that to any particular question. Where forms were partially filled in by someone else and a discrepancy occurred, we would have to check who actually filled in that question on the Census form. The answer to this would then determine what further questions needed to be asked in order to gain a fully reconciled answer.

Thus for each question in the individual section, rules had to be written which would take account of whether:

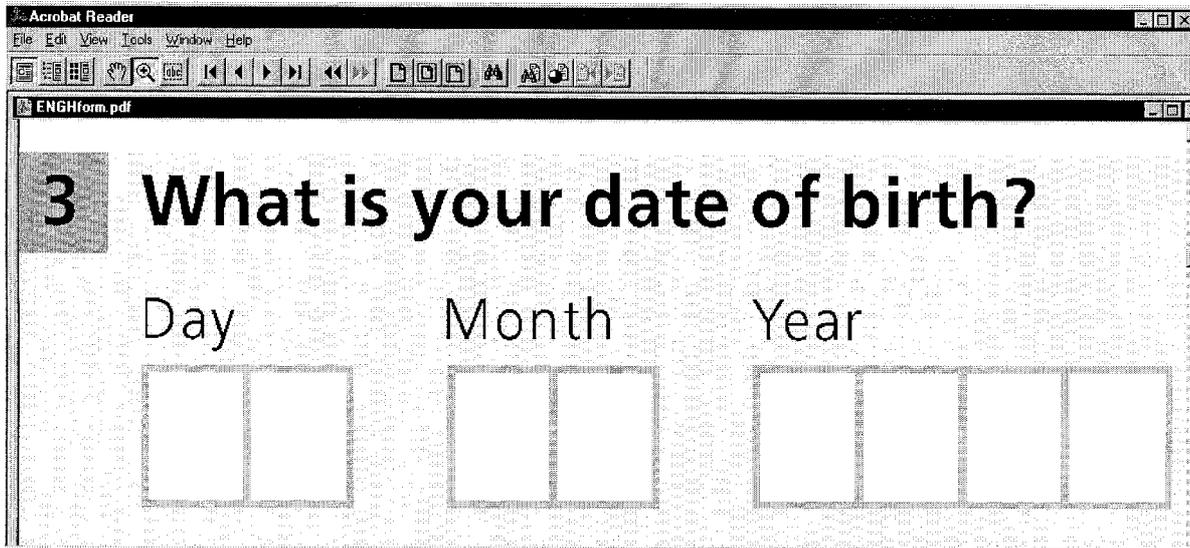
- The respondent was aged over sixteen or not;
- The routing on the Census form;
- The answer on the Census form was the same or different to that given in the interview;
- The question on the Census form had been completed by the respondent

Conclusions

The fieldwork for this survey was carried out relatively smoothly and a good response rate was achieved. Preliminary analysis has already been carried out and showed that respondents were answering most questions with few problems. There were, however, one or two questions that were slightly redesigned to take account of the problems highlighted by the survey. Census Division now hope to scan and edit the original forms. We will then compare those answers with those given in the interview to see how well these processes work.

Appendix

Example of Question on the Census form



The image shows a screenshot of an Acrobat Reader window displaying a PDF form titled 'ENGHform.pdf'. The form contains a question numbered '3' in a grey box: 'What is your date of birth?'. Below the question, there are three input fields labeled 'Day', 'Month', and 'Year'. The 'Day' field has two boxes, the 'Month' field has two boxes, and the 'Year' field has four boxes.

Example of Code on Keying Programme

BLOCK Bperson

```
FIELDS {Bperson}
  CP03 "What is your date of birth?"
      :DATETYPE, EMPTY
```

```
RULES {Bperson}
  CP03
ENDBLOCK {Bperson}
```

Example of Code on Interview Programme

BLOCK Bindiv

```
EXTERNALS
  CENSUS: CQSFORM('CQSFORM')
```

```
FIELDS {Bindiv}
  SP03a    "^CENSUS.QPerson.BPerson[LPer1].CP01 @/@/
           What is your date of birth?"
           /"Date of Birth"
           :DATETYPE, RF
```

```
  SP03b    "^CENSUS.QPerson.BPerson[LPer1].CP01 @/@/
           Can I just check, how old were you on your last birthday?"
           /"Age"
           : 0..120, RF
```

SP03c "^CENSUS.QPerson.BPerson[LPer1].CP01 @/@/
On the Census form you don't seem to have filled in the question about date of birth.
Do you remember why that was? @/@/
INTERVIEWER: SHOW BLANK CENSUS FORM"
/ "DOB - Reason for not answering"
: STRING[150], RF

SP03d "^CENSUS.QPerson.BPerson[LPer1].CP01 @/@/
On the Census form, did you write in or give an answer to this question or did someone
else answer this question for you?"
/ "DOB - who answered question"
:(Self "gave an answer to this question myself",
other "someone else answered it on my behalf"), DK

SP03e "^CENSUS.QPerson.BPerson[LPer1].CP01 @/@/
INTERVIEWER ASK OR CODE @/@/
On the Census form you said your date of birth was
^CENSUS.QPerson.BPerson[LPer1].CP03.
Can you remember why you put that?" / "DOB - reason for discrepancy"
:(thisyear "put this year rather than year born",
forget "can't remember why I put that",
notme "someone else wrote in the answer to this question",
other "other - specify")

SP03f "^CENSUS.QPerson.BPerson[LPer1].CP01 @/@/
Write in other reason"
/ "DOB - other reason for discrepancy"
:STRING[150]

RP03 "^CENSUS.QPerson.BPerson[LPer1].CP01 @/@/
What is your date of birth?"
/"DOB - Reconcile"
:DATATYPE

RULES {Bindiv}

SP03a
SP03b
LIndiv1:= SP03a.AGE

CHECK
SP03b = LIndiv1 OR SP03a = RF
OR SP03b = RF INVOLVING (SP03a)
"The computer calculated your age as ^LIndiv1 from your date of birth. This does not seem to be the same
as the age you have given me"

IF QIntroInd.Under16 = yes THEN SP03b < 16
"You have entered that this person is aged Under 16. You must make sure of this person's age and make
the necessary changes to the questionnaire"

ELSEIF QIntroInd.Under16 = no THEN SP03b > 16
"You have entered that this person is aged over 16. You must make sure of this person's age
and make the necessary changes to the questionnaire"

ENDIF

RP03:= SP03a

IF (RP03 <> CENSUS.QPerson.BPerson[LPer1].CP03) AND (SP03a <> RF) THEN

 IF (QIntroInd.SP03a = consult AND QIntroInd.Under16 <> Yes) THEN
 SP03d
 ENDIF

```
IF ((QIntroInd.SPa = Self OR SP03d = Self) AND QIntroInd.UNder16 <> Yes) THEN  
    SP03e
```

```
SIGNAL
```

```
IF (QIntroInd.Spa = self or SP03d = self) THEN SP03e <> notme  
    "You have said that you filled in this question yourself"
```

```
ENDIF
```

```
IF SP03e = other THEN  
    SP03f
```

```
ENDIF
```

```
ENDIF
```

```
ENDBLOCK {Bindiv}
```