

Computer assisted interviewing using home computers

Recently the Sociometric Research Foundation has developed an interview program for a home computer which has been tested by a panel over a period of six months. The procedure is now used for a consumers panel by the Dutch Gallup institute, NIPO. In this paper we would like to comment on some of the advantages of this system and indicate some useful applications.

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The procedure

The newly developed procedure is based on a situation in which the person who has to answer the questions (respondent, or interviewee) is provided with the following facilities:

- a home computer with a disk drive,
- a modem for communication, and
- a diskette with an interview and communication program.

It is supposed that in the room where the questions are answered a tv set is available for projection of the questions and answers on the tv screen and that the telephone can be used for communication.

Furthermore there has to be a central computer somewhere which contains the text of the interviews and can build up a file of the data which are collected. In frame 1 a pic-

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ture of the communication network in this system is given.

Given these facilities, the interview goes as follows:

- (1) The interview diskette is installed in the disk drive.
- (2) The respondent puts on the tv and the home computer.
- (3) The program automatically makes contact with the central computer and the text of the interview of that day is sent automatically to the home computer of the respondent. In the text it is also indicated which member of the household should answer the questions.
- (4) The home computer is automatically disconnected from the central computer. This means that the telephone connection only exists during the short period that the interviews are transmitted.
- (5) The communication program indicates who has to answer the questions and asks whether one of these persons is at home or not. If none of them is at home the interview is stored on the diskette and the next time the interview diskette is put in the computer, the program starts again at that point.
- (6) When the respondent indicates that the interview can start, the interview program starts to pre-

sent the questions on the screen and stores the given answers.

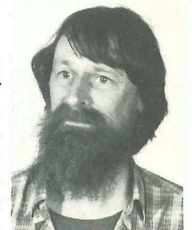
- (7) When the interview is finished the communication program takes over again and indicates that another person also has to answer the questions. In that case phase (5) begins again. When all interviews are done the communication program automatically contacts the central computer and sends over the collected data.
- (8) These data are automatically stored in a data file.

From this description it will be clear that the procedure is extremely simple. Evidence for this is also that hardly any questions were asked by a random sample of the Dutch population about this procedure although we had organized a telephone service for eventual problems.

Some technical details

The procedure is developed for an *MSX2* computer which can be connected to a tv or monitor. The *MSX2* computer is an extremely powerful home computer with 64 or 128K RAM and 128K Video RAM. Both types of memory are used. This allows for interviews of 128K which

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is sufficient for any type of research and leaves 64 or 128K for the interview program or the communication program and the data. The *Philips* MSX2 computer which is used has a built in disk drive for 360K diskettes. Communication with a central computer is organized through an auto-dial/auto-answer modem developed by *Micro Technology*. In the past the Viditel computer of the Dutch PTT has been used as a central computer. The *NIPO* uses its own computer for communication. It is also possible to use an *IBM PC* or a compatible for this purpose.

The interview program developed by the *SRF* for MSX2 home computers presents interview questions directly on the tv-screen of the respondent and registers the answers.

The answers can be given by choosing a numeric category or a category on a rating scale, by drawing lines, specifying numbers. Verbal answers are also possible within a limited range.

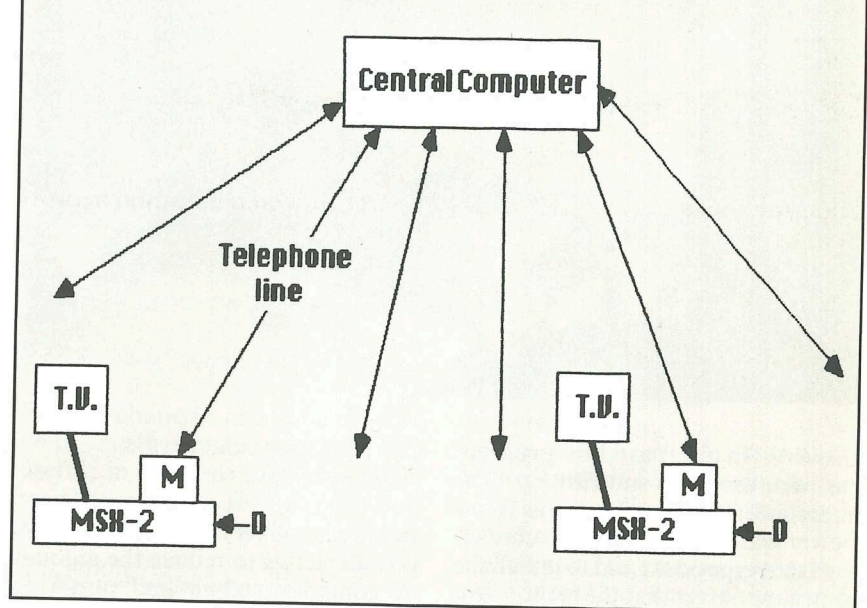
Stimuli or items can be presented in a random or fixed order and the questions about these items can be grouped in various ways. Digitized photographs can be presented in the interview.

The program can check the consistency of answers. It can provide information, for example, instruction, and it can help people in answering the questions. The routing is automatically done by the program without errors.

A second program running on the MSX home computer can specify who should answer the questions and will *administrate* whether these persons have answered or not. This program also takes care automatically of the *communication* which occurs between the home computer and the host computer if the interview program is started and when all interviews have been answered.

FRAME 1

The MSX2 home computer network as it can be used for different forms of computer-assisted interviews. The telephone connection allows for sending the interviews and data automatically through the system. M is de modem and D is the disk drive.



There is a third program which automatically provides the *data files* in such a form that the data analysis can start immediately. In fact, analyses can be done all the time so that one can check whether further data collection is necessary.

The *analyses* can be done by standard statistical packages like *SAS*, *SPSS* or *Lisrel*. For individual data analysis a program *Percase* can be obtained from the *SRF*.

A *print* of the interviews with the names of the variables and the routing instructions can be obtained from another program running on the MSX.

A special program for formulation of the interviews is not necessary because the formulation is very simple. A manual with many examples

can be obtained from the *Sociometric Research Foundation* [3].

Possible applications

Originally this interview program was developed to improve the measurement procedures in face-to-face interviews [3]. These improvements were obtained (1) by measurement on continuous scales which makes a lot of difference in the results as has been shown by Van Doorn et al. [9], (2) by use of different response modalities for correction of random measurement error [6], and (3) by the common facilities of computer assisted interviewing such as automatic routing and consistency checks on the



answers. In the past this program has been used as a substitute for the interviewer. The task of the interviewer was only to make the contact with the respondent and to install the computer. After that the respondent could, in 99% of the cases, do all the reading and answering without any intervention by the interviewer. This means that by use of this device the interviewer effects can be minimized.

Due to the fact that home computers and communication facilities have recently dropped in price, other possible applications have also become feasible. Below we will give an overview of the possible applications we can see at the moment.

The MSX computer as portable in face-to-face interviews

In different types of face-to-face interviews the interview program can be of great use. Three different possible applications will be given. There may be many more.

1. Very large scale surveys (mini census)

In the case of very large scale surveys it is attractive to reduce the amount of controls, coding and punching by the use of computer assisted interviewing.

The consistency checks can be built into the interview. The coding and punching can be avoided by telecommunication or by mailing the diskette to the main office. The data can automatically be stored in a file which is immediately available for analysis. In this way a considerable reduction of research time and research work can be obtained.

2. Product or advertising tests

If one wishes to test products or evaluate the effect of advertising, one could use a procedure by which interviewers contact a number of respondents for this purpose, provide them with the products and ask questions about it immediately or some time later.

A very attractive possibility which is within reach is that one can present a random sample with advertising material and ask in detail about these objects. This is even possible within the interview, as digital forms of photographs can be put on the diskette of the MSX.

3. Pilot studies

Before full automatic interviews are used it is necessary to test these interviews in practice on a small scale. In these pilot studies, the interviewer can register the difficulties the respondents have with the questionnaires. In the definite study these possible problems can be avoided by reformulation of the questions or by providing help facilities to the respondents.

An important attraction of the CAI system is that the interviews are easily corrected during the interview and one can immediately test the new version.

The MSX computer as a decentralized station for CATI

In Computer-Assisted Telephone Interviewing the MSX computer and the interview program can be used as a 'stand alone' work station from which an interviewer can ask questions to people close to this station. In this case the central computer is contacted only incidentally in order to provide telephone numbers and interviews and to send back the data which have been obtained during the interviews.

The major advantage of this decentralized system is the reduction of the telephone costs. Another advantage is that no high investment is necessary for installation of a minicomputer and rooms for interviewing. In this system a big computer is not needed any more and the

interviewers can do the work while they are sitting at home.

The MSX computer in Tele-interview

A very attractive application of the interview program for the MSX is its use in panel studies. In this case each household which cooperates gets a MSX computer and a modem. The procedure is the same as the one described above. As the interviews and data are sent back and forth by tele-communication, this type of research has been called Tele-interview. The major advantage of this approach is that the interviewer is not necessary any more.

The procedure is extremely simple, while the program allows for measurement on continuous scales and provides procedures for time budget research and consumer research which are far more efficient than the usual diary procedures. By tree-structured questions the activities and consumers expenditures and other variables like occupations can be coded on the basis of responses of a few simple questions. This makes the work of the respondents much simpler and therefore the data much better. Given these advantages this procedure is extremely efficient for panel studies.

Possible future applications

Possibilities which will arise in the very near future are:

1. The use of a bar code scanner

If most products are provided with a bar code it is useful to connect to the computer a scanning device which can read the bar code. The interview program can then register this infor-

FRAME 2
NON-RESPONSE IN THE TELE-INTERVIEW PANEL

	Absolute	%
<i>Non-response due to:</i>		
Technical problems	8	5
Computer	14	9
No time	21	13
No interest	23	15
<i>Cooperation</i>	90	58
Possible participants	156	100

mation, identify the product and ask questions about these products.

2. The use of voice synthesizers

For analphabets and blind people a voice synthesizer would be very useful; in that way it is possible to read the questions for them and they are also able to answer the questions.

3. The use of information in the form of moving pictures

The computer can be connected to the video recorder or compact disc player. Such a combination makes it possible to provide information in a very natural way. Questions can be asked while the information is visible as well as afterwards.

Some experience with the system

Computer-assisted interviewing has already been done with this program for many years. Respondents seldom expressed unwillingness to work with the computer themselves. When they see how simple the procedure is, they take on this task even after a little hesitation. Afterwards they are proud that they could work

with a computer. An important advantage of the CAI system above normal interviewing is that people concentrate on answering the questions and do not start to tell all kinds of stories.

The CATI system mentioned above is not different from the procedures normally used except for the aspect of decentralization.

With the Tele-interview system an experiment has been done during a period of six months by the *Sociometric Research Foundation* [7]. In order to evaluate the quality of the sample a stepwise procedure was used:

- first a random sample was asked to cooperate in a normal face-to-face interview in which some background variables and some other questions were asked;
- then the respondents were asked whether they were willing to answer a second interview on the computer. If they accepted this and they had themselves answered a number of questions, they were asked for a panel study in which the computer was used as we have described above.

By this design we could determine the differences between the sample

of a face-to-face interview and the sample for the Tele-interview and the reasons for non-response could be determined as is indicated in frame 2.

Frame 2 shows that 9% refused to cooperate in the second step when the computer was introduced. Another 5% refused because at the time the interviewers were not well trained in technical matters so that sometimes the procedure did not work. The majority of the non-response however, occurred in the third phase when the interviewer mentioned the panel study and asked their cooperation over a long period. This means that the respondents did not refuse because of the computer.

The next question is of course whether the Tele-interview sample was systematically different from a sample from the face-to-face interview. Of both samples we have the characteristics and we can therefore compare them. As we expected possible differences for the variable size of the family, age and education, we checked the results for these variables. It can be expected that households with children, younger and higher educated people are more

interested in cooperation as they are more willing to explore the possibilities of the home computer.

For all three variables there was indeed an effect in the expected direction but the effect was very minimal. In frame 3 we give the results for the table with the largest differences.

This frame shows that the effect is in the expected direction but the effect is so small that it is possible to correct for it.

A remarkable result was that for the variable Income, which is of course an important variable in consumer panels: no effect at all was found, as can be seen in frame 4.

Given these results we think that the conclusion should be that some small deviations occur due to the procedure used but that these deviations are easily corrected.

During the six months the household had to answer an interview every weekend. For this period we also checked the frequency with which they answered the questions. This could be done in two steps. On Monday morning we checked which households had not answered the questions and these people were

reminded to answer the questions before Wednesday. On Wednesday the response for each week was determined.

The response on Wednesday was in general above 90% each week. There were various reasons why people skipped an interview once in a while, but there were only two households out of the hundred which replied so irregularly that the computer was taken away. All the other households answered regularly. It is also significant that after this half-year period we asked the households in the sample whether they were willing to continue this work with another computer. On this question only four out of 98 households reacted negatively. And out of these four, two were negative because they had bought a lot of accessories for the computer we had used first and did not want to change the computer.

The reason for this high level of cooperation is of course the fact that they were given a home computer for their own use. They also got several games in return for their work. It seems that these rewards were sufficiently high for most of them to accept the limited burden of filling in a questionnaire each weekend.

The results of this pilot project were promising enough for the Dutch Gallup Institute, *NIPO*, to start a Tele-interview panel with 500 households. Interest in the use of this data collection procedure was so large that the sample was extended to 1000 households within a month after the official start of the study.

Conclusions

Many different procedures for computer-assisted interviewing have been developed, but none of them is programmed for the relatively cheap home computers which are now pro-

FRAME 3
THE DIFFERENCE BETWEEN THE SAMPLE IN A
FACE-TO-FACE INTERVIEW AND THE TELE-INTERVIEW
PANEL FOR THE BACKGROUND VARIABLE AGE FOR
WHICH THE DIFFERENCES BETWEEN THE TWO DESIGNS
WAS THE LARGEST.

Age	Face-to-face		Tele-panel	
	Absolute	%	Absolute	%
< 34	40	26	25	28
35-54	64	41	44	49
55-70	41	26	18	20
> 70	11	7	3	3
Total	156	100	90	100

duced in large quantities. The use of home computers has several advantages:

- The large number of home computers produced makes the price of these computers rather low.
- This allows for cost effective use of these computers on a large scale as data collection devices.
- The procedure is so simple that all respondents can work with the computer without the intervention of an interviewer. Therefore, interviewer effects are reduced.
- Also the work with the home computer is sufficiently rewarding for most households to cooperate if the procedure is introduced in the proper way. This also means that the bias in the sample due to the use of the computer will be minimal and is correctable.
- These procedures also allow for more complex routings than interviewers are able to use without errors. In this way one can perform more complex and more precise interviews.
- The 'intelligence' of the home computer allows improved measurement on continuous scales. In other publications it has been shown that the precision of measurement has a considerable effect on the results which are obtained.
- In very large scale surveys the use of these computers for computer-assisted interviews (CAI) leads to a large reduction of work with respect to coding, punching and consistency checking. As a consequence the turnaround time of research will be much shorter.
- In computer-assisted telephone interviews (CATI) one can reduce the costs by decentralizing the point from which the telephone calls are made if these home computers are used.

FRAME 4
THE DIFFERENCES WITH RESPECT TO INCOME BETWEEN
THE SAMPLE OF THE FACE-TO-FACE STUDY AND THE
TELE-INTERVIEW PANEL

Income	Face-to-face		Tele-panel	
	Absolute	%	Absolute	%
< 1500	21	14	11	13
1500-2500	66	44	40	46
2500-4250	48	32	27	31
> 4250	14	9	9	10
Unknown	7		3	
Total	156	100	90	100

- The use of this procedure in panel studies (Tele-interview) leads to a considerable reduction in the amount of work for the respondent and therefore to better data.

The counterpart of all these advantages is the relatively large investment one has to make if one wants to use these procedures on a large scale. However, the relatively low exploitation costs compensate rather quickly for these high initial costs.

Summary

The most commonly used computer assisted interviewing procedure is the computer assisted telephone interview. So far no interview procedure for home computers has been developed. Such a system has a number of advantages. One of these is that the price of these computers is relatively low, as they are produced in large quantities. Recently, the *Sociometric Research Foundation* has developed an interview programme for a home computer which has been tested by a panel over a period of six months. The procedure is now used by the Dutch Gallup institute, *NIPO*.

Résumé

Le procédé d'interview automatisé le plus couramment appliqué est l'entrevue par téléphone assistée par ordinateur. Jusqu'à présent, il n'existait aucune méthode d'interview à base d'ordinateur personnel. Or, un système de ce genre présente de nombreux avantages. En particulier, ces ordinateurs sont relativement bon marché car ils sont produits en grandes quantités. Dernièrement la *Sociometric Research Foundation* a mis au point un programme d'interview pour ordinateur personnel qui a été testé par un groupe de chercheurs pendant six mois. Désormais le *NIPO*, institut Gallup aux Pays-Bas, recourt à ce procédé.

Zusammenfassung

Das meist gebrauchte computergestützte Interviewverfahren ist das computergestützte Telefoninterview. Bisher ist noch kein Interviewverfahren für Heimcomputer entwickelt worden. Ein solches System hat eine Reihe von Vorteilen. Einer davon ist der niedrige Preis dieser Computer, die in grossen Mengen produziert werden. Kürzlich hat die *Sociometric Research Foundation*

ein Interviewprogramm für Heimcomputer entwickelt, das von einer Forschergruppe sechs Monate lang getestet worden ist. Das Verfahren wird vom Niederländischen Gallup Institut, dem *NIPO*, angewandt.

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