

Recording Interview Sound Bites Through Blaise Instruments

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1. Introduction

In any data collection effort, survey managers need to be concerned about the conduct of the interviewers with respect to following protocol and the possibility of falsification.¹ In the past, field operations have been at a disadvantage compared to telephone surveys due to the inability of field supervisors to perform silent monitoring during interviews. Now that mobile computing devices (MCD's) such as notebook or handheld computers offer digital sound-recording capabilities, it becomes practical to record sound bites from field interviews for later review, providing an audio sample of the actual interchange between field interviewer and respondent.

Because the recording captures the verbal exchange between interviewer and respondent, it provides an auditory snapshot of the situation at the time of the interview. At any time afterwards, a monitor or supervisor can review the recording and rate the interviewer's performance, effectiveness of the item, and likelihood of authenticity of the interview. The review can take place shortly after completion of the interview and transfer of case data to the central site, providing a rapid mechanism for verification and feedback. Concerns about falsification of response data, instrument usability or interviewers' lack of adherence to protocol can be addressed effectively by this unobtrusive approach.²

The technique, known as computer-assisted recorded interviewing (CARI), involves hardware, software and work processes:

- Field computers or MCD's are equipped with internal or external microphones.
- Survey specifications note items for recording.
- Blaise programs include audio recording commands.
- If randomized recording is desired, that logic is added to the questionnaire.
- The data transfer system transports the audio files along with the case data, or some alternative method is devised to capture and manage the sound files.
- Monitors are trained to review the recordings and assign ratings.
- Tracking and report programs enable central staff to manage the CARI review process and workload for monitors.
- Potentially falsified cases are referred for more intense investigation through call-back or field re-interviewing.

At the heart of the process is the questionnaire. The survey instrument controls the sound recording, with procedure calls to generate the audio files.

In this paper, we discuss the basic issues involved in implementing CARI through a Blaise questionnaire, including decisions about CARI uses, item selection and hardware. Audio recording is a powerful new tool for capturing information that cannot be obtained through other methods, valuable for quality assurance, field staff management and questionnaire evaluation.

2. Benefits of Using CARI to Verify Interview Authenticity

Although there are several advantages offered by instituting CARI, possibly the most compelling reason is for confirming the authenticity of data. CARI can act as a deterrent to curbstoning and

as a tool for detecting questionable interviews. Interviewers who are aware that monitors may listen to parts of each interview are less likely to falsify data, because the audio file acts as a “witness” to their actions. In this way, the simple presence of CARI can reduce cheating.

Audio files are generated in the field, but sent to a centralized team of monitors for objective review. When monitors review the CARI recordings, they categorize the interview as likely to be authentic, questionable, or probably falsified. Questionable files can be referred to a second monitor for review, or the cases can be routed to a traditional verification process such as re-interview or callback.

Speech patterns heard in audio files provide information about the veracity of the interview, as indicated by the timing and phrasing of questions and responses. In a normal interchange, people pause between words, phrases or sentences, as they consider their answers or express their views.^{3, 4} CARI monitors quickly become adept at distinguishing between recordings of normal interviewing circumstances and suspicious ones.

If the interviewer acts alone when falsifying data, there may be no voices at all in the recording or only that of the interviewer, without the expected pausing, inflection or clarity of voice to have been part of a two-way exchange. If the interviewer enlists an accomplice to pose as the respondent, the accomplice may display inappropriate attitudes or emotions, may make unexpected remarks, may respond without pausing to understand the question or may pause at unnatural places while inventing an answer. Figure 1 lists some possible indicators of questionable authenticity, which may be noted through CARI review. Monitors can assign a rating for the perceived authenticity of the interview, based on hearing all available sound bites from that case, and noting any technical problems with the recording quality.

Figure 1. CARI monitors listen to the recordings, expecting to hear two distinct voices – the interviewer and the respondent.

CARI Indicators of possible falsification

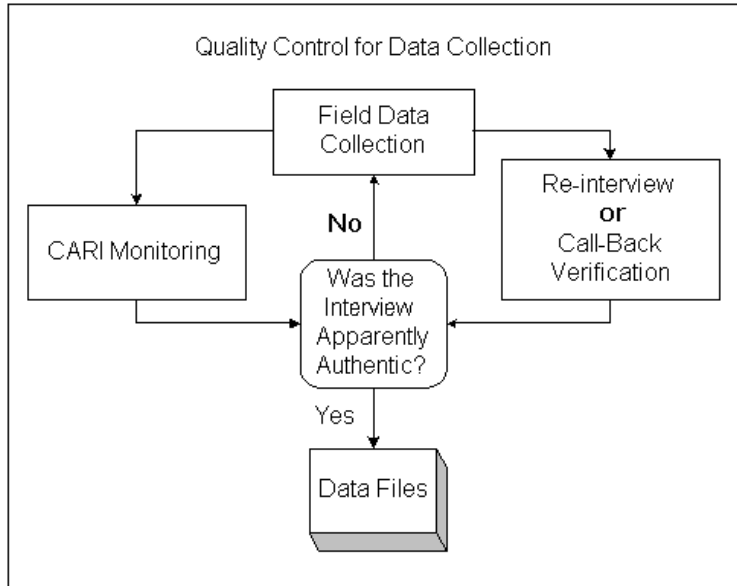
- No voices can be heard, although room noises are audible.
- The interviewer can be heard, but appears to be speaking to himself or herself.
- The respondent answers too quickly or laughs in inappropriate places.
- The respondent makes comments suggesting the interview is being falsified.
- The same respondent’s voice is heard in recordings of multiple interviews.

By using CARI, a survey organization may be able to reduce its re-contact and re-interview effort substantially, though not entirely. CARI monitoring can be used in place of most telephone verification calls or field re-interview, if implemented as a means of deterring falsification. However, it remains important to have a second means for following up, since some respondents may refuse to allow audio recording. Also, an alternative method may also be needed for gathering evidence when falsification is indicated by the CARI files, in which case it is desirable to send the case back to the field, as indicated in Figure 2. The number of cases which need to be refiled or re-contacted for these reasons is small.

In addition, it is good practice to route a percentage of all cases to traditional verification alongside CARI monitoring. The benefits of this are twofold: first, it tells the interviewing staff that they cannot avoid monitoring, even if they discourage their respondents from allowing CARI, and second, it allows comparison of the results of the two approaches to confirm the validity of the monitoring processes. The diagram in figure 2 shows the two systems working in

parallel, but the cases flowing through the CARI process would substantially outnumber the cases flowing through traditional verification.

Figure 2. CARI monitoring can replace much of the traditional effort of verifying interview authenticity.



By conducting the majority of authenticity monitoring through CARI, the effort is reduced compared with traditional methods because of the centralized nature of the monitoring process and the greatly reduced need for re-contact with respondents. Thus, adding CARI processes reduces the burden on interviewing staff and respondents alike.

3. CARI for Enhancing Interviewer Performance

Field staff do not always conduct interviews in an optimal manner, and it is difficult to obtain reliable information about their performance. Personal observation provides a wealth of information, but the presence of an observer may bias the evaluation by affecting the behavior of the interviewer or respondent. CARI offers a unique opportunity to listen to the interview exactly as it took place, without observation effects. From the sound bites, a monitor may be able to provide feedback, either as praise or constructive criticism, about the way in which the interview was conducted. If used in the first few weeks in the field, feedback can be an important tool for reinforcing lessons learned during training. Figure 3 indicates the some types of behavior that are amenable to review through CARI monitoring.

Figure 3. Review of CARI files can provide insight into field staff performance.

<i>Indicators of improper questionnaire administration</i> <ul style="list-style-type: none">ParaphrasingImproper probingSuggesting responsesPoor enunciationInappropriate commentary
<i>Behaviors to reinforce</i> <ul style="list-style-type: none">Precise adherence to protocolAdept handling of difficult situationsConsistency, honesty and professional behavior

4. CARI for Evaluating Questionnaire Items

CARI can also be used to evaluate the usability of questionnaire items. The audio recording of an interviewer's presentation of an item and the subject's response provides a clear indication of whether the item succeeds in several ways:

- readability – based on the interviewer's fluency in presenting the item
- clarity of content – based on the respondent's ease of understanding

Items which evoke negative reactions or require frequent explanations are detrimental to the response rate and increase the level of burden on both interviewer and subject. Using CARI, especially during field testing of an instrument, allows the survey specialist to evaluate the success of the questionnaire items in eliciting the desired information.

5. Selecting Questionnaire Items to Record

How much of a questionnaire to record depends on the purpose for which the audio files will be used. If the goal is verifying authenticity, a few brief sound bites will suffice.⁵ If the purpose is monitoring staff performance, providing feedback on techniques or evaluating the usability of specific items or sections, longer recordings may be needed. For some purposes, the entire interview may need to be recorded, perhaps entire sections will be needed, or it may be desirable to record many individual items.

When selecting items to record, the mechanism of transmitting the files from the field to the monitoring site also must be considered. Audio files tend to be large, and if the interviewer uses a low bandwidth channel (such as 56K baud dial-up modem), it is important to limit the number of kilobytes to transmit. For long recordings, an external removable storage medium with high capacity may be necessary, such as a Zip disk, compact disk or memory stick. These removable data stores can be shipped or carried to a central site. Figure 4 lists some of the uses of CARI, the expected audio file quantity, and appropriate transmission methods.

Figure 4. Item selection for CARI must take the transmission method into account, if dial-up lines are used.

Purpose of Recording	Number of Items, Length of Recording	Transmission by Dial-Up	Transmission by Broadband or Removable Storage
Authenticity check	Few, short	Yes	Yes
Interviewer conduct	Few, short	Yes	Yes
Interviewer feedback	Many, long	No	Yes
Selected item usability	Few, short	Yes	Yes
Section usability	Few or many, long	No	Yes
Whole interview	Many, long	No	Yes

After the quantity of recording has been determined, there remains a choice of which items to record. For item usability, the choice is clear -- only those items that need review should be recorded, along with a set of comparable items to act as a control sample. At the other extreme, if the entire interview is to be recorded, or specific sections, CARI will be activated at the start of the interview or section and continued to the end (or to breakoff), at which point the instrument deactivates the recording process.

For monitoring authenticity and/or interviewer conduct, however, there are more options to consider, especially when trying to limit the overall length of recording for transmission by dial-up line. One might choose three items from the beginning, middle and end of the questionnaire. Alternatively, it might be best to choose a few items of high importance or high likelihood of curbstoning. One can cover both bases by selecting an important item from the beginning (such as asking the respondent if they have read, understood and agreed to the informed consent), one from the middle (such as a gateway question for an important section), and one from the end (such as asking the respondent if they have received the specified incentive). With this combination, one can check authenticity of voices and confirm important responses spanning the interview session.

Sometimes it may be useful to have additional items recorded for a fraction of the cases instead of all of them. This can be accomplished by generating a random number before the item, and then checking to see if it falls within a certain range. If the item is selected in this manner, CARI is activated, but if not, the item is not recorded.

6. Selecting Cases to Record

Although it may be too time-consuming to review CARI recordings from all interviews, there are advantages to collecting audio files whenever the respondent agrees. First, for CARI to act as an effective deterrent, the interviewer must not know which cases will be reviewed; each interview must seem to be as likely to receive verification as any other one. Second, if CARI monitoring raises suspicions about an interviewer's honesty or professional behavior, recordings from additional interviews (or from all interviews) may need review. Finally, if all interviews are recorded, selection of which ones to monitor can be made by the monitoring staff or by a post-data-collection sampling method, providing additional flexibility to the survey staff.

7. Technical System Overview

The entire process of CARI includes sound recording on the laptop or MCD, file transmission and subsequent playback by CARI monitors. Blaise statements within the instrument invoke a dynamic link library (dll), which in turn activates or deactivates software to run the computer's sound recorder. The laptop case management system or a custom application packages the audio files for transfer to a central monitoring location, as shown in Figure 5. At the central site, monitoring staff play the audio files and rate the interview's authenticity, the interviewer's performance and/or the questionnaire's usability, as shown in Figure 6. The monitor's ratings determine subsequent acceptance of the data or remedial action.

Figure 5. Audio files are recorded during the interview, by implementing calls from Blaise to a custom dll which activates the laptop's sound recorder.

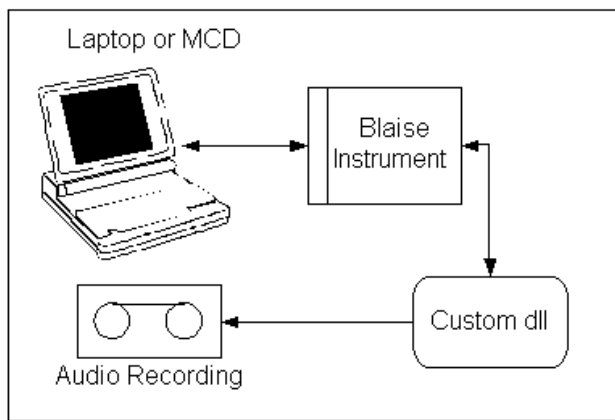
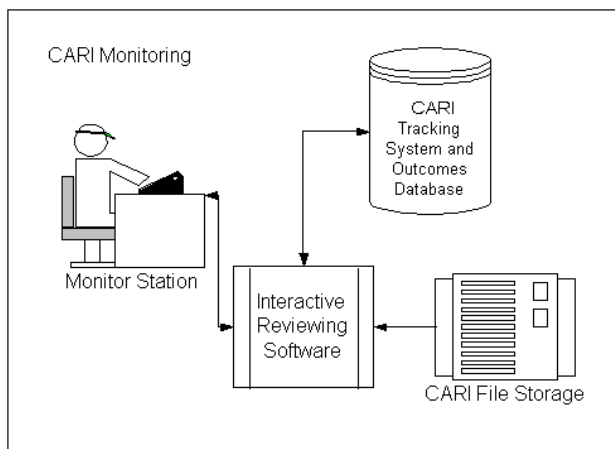


Figure 6. After the audio files are transmitted to a monitoring site, CARI monitors listen to the sound bites and evaluate the authenticity of the case and/or the interviewer's performance.



8. Programming CARI Calls Through Blaise

There are several steps to take when setting up a new survey for CARI. The specifications detail which items or sections will be recorded, and instrumentation must be programmed with appropriate logic and control structures to capture the designated portions of the interview. Several audio files may be generated for each respondent, and so the files should be named in a systematic manner to identify the case and item or section. Adding a timestamp to the filename can prevent confusion, if the respondent backs up and then returns to the same item a second time. In the example below, the letters “A” and “B” are appended, as a simple example of how to distinguish among recordings for a specific case.

Coding a Blaise instrument to perform CARI is much like coding any instrument with a call to any external program, except that the CARI instrument should include a revocable consent flag, and certain items will be marked for audio recording. Figures 7 - 12, when taken together, provide a complete example of a CARI-enabled instrument. For presentation here, this demo instrument is divided into several figures to call attention to specific features in the code.

Most studies will include a CARI consent screen as part of the instrument, just as telephone interviewing generally has a statement that the call may be monitored. In the example below, the consent screen is programmed as a parallel block, so that it can be presented as the first item and also accessed at any time during the interview, through a hot key or menu item.

Figure 7. By making a parallel block for the CARI consent flag, the respondent can consent to recording or withdraw consent as often as required.

```
DATAMODEL CARIExample
{ CONSENT is a routed parallel block; it is asked at the outset but can also be jumped to via
menu command or hot key }
PARALLEL CONSENT

PRIMARY QID

TYPE
STR6 = STRING[6]
```

Figure 8. Calling the StartStopRecording procedure activates or deactivates the sound recorder, through a call to external software.

```
PROCEDURE StartStopRecording
{ Starts and stops audio recording
IMPORT PARAMETERS
X -- either 1 (start) or 0 (stop)
Y -- if starting a recording, then duration of recording in secs; set equal to 0 if no time limit.
QID -- string used by recorder.dll to name the resulting audio file, part of which is the case ID
EXPORT PARAMETER
ERRORFLAG -- indicates if a problem occurred }
PARAMETERS
IMPORT
X, Y: Integer
QID: STR6
```

```
EXPORT
```

```
  ErrorFlag : Integer
```

```
  ALIEN('Recorder.DLL', 1) { Delphi DLL which calls an application that starts/stops  
recording of a wav file }
```

```
ENDPROCEDURE
```

Two pieces of software are necessary in addition to the Blaise code, to enable CARI questionnaire administration. First, an application is needed which will call the laptop or MCD's sound recording system, activating it for the duration specified in a parameter, or turning it on or off explicitly. Second, a custom dll is required to call the sound recording application. Figure 8 above shows how the instrument calls the dll, which in turn calls the sound recording software.

The following lines of code present the consent question. Note that any time the consent is withdrawn or refused, an explicit call to the StartStopRecording procedure cancels any recording which had been started. This precaution is necessary, since the respondent may initially consent, but later decide to refuse. If that refusal takes place within a recorded section, it is important to stop recording at that time, rather than waiting for the next preprogrammed end to CARI.

Figure 9. Informed consent is an important part of the CARI process.

```
{ CONSENT is a routed parallel block; it is asked at the outset but can also be jumped to via  
menu command or hot key }
```

```
{ bCONSENT contains one question, a consent question about recording }
```

```
BLOCK bCONSENT
```

```
  FIELDS
```

```
  Q1 "@/Do you consent to being recorded?" : (yes "Yes", no "No")
```

```
  RULES
```

```
  Q1
```

```
  { If consent is not given or is revoked, be sure to stop any recording in progress }
```

```
  IF Q1 = NO THEN
```

```
    CONSENTFLAG := no
```

```
    StartStopRecording(0,0,'DUMMY',ErrorField)
```

```
  ELSEIF Q1 = YES THEN
```

```
    CONSENTFLAG := yes
```

```
  ENDIF
```

```
ENDBLOCK
```

The demo instrument shown here contains two calls to CARI. The purpose of the demo is to exhibit the capability of the CARI timer to record from one point in the rules to another or optionally to stop after a specified time interval, as well as to show how to embed CARI calls within the instrument. Because of those goals, the text of the items tells the user when CARI is being activated and terminated. In a normal interview, neither the interviewer nor the respondent would be aware of which segments of the interview were being recorded.

Figure 10. This section of the demo presents the Blaise field definitions and additional information to be stored.

```

FIELDS

QID "Case ID": STRING[5]
CONSENTFLAG : (yes "Yes", no "No")

StartRecord "Start Time" : STRING[30]
EndRecord "Stop Time" : STRING[30]
StartRecord2 "Start Time" : STRING[30]
EndRecord2 "Stop Time" : STRING[30]

INTRO "@/Case ID : @B^QID@B
@/@/Welcome to the Blaise CARI demo instrument! In a moment you will be asked to read a
passage aloud. Press [ENTER] to continue." : string[1], empty
ITEM1 "@/@/Type 1 and then press [ENTER] when you are ready to begin." : 1..1
ITEM2 "@/Please read the following aloud:
@/@/@B For the purposes of this demo, you are aware that you are being recorded, so that you
can see that the timer feature of the software is functioning. This recording has been given
unlimited time, and it will continue recording for as long as the item remains on screen. In a
normal interview, the respondent would not be told about the occurrence of audio recording, and
therefore would not be aware of which items were recorded and which were not.@B
@/@/When you are finished, type 1 and then press [ENTER]. This recording will terminate
when you press the [ENTER] key." : 1..1
ITEM3 "@/Great! In a moment you will be asked to read another passage aloud.@/@/Type 1
and then press [ENTER] when you are ready to begin recording." : 1..1
ITEM4 "@/Please read the following aloud:
@/@/@B This item will be recorded for 30 seconds, regardless of how long the item remains
on screen. As stated before, if this were an actual questionnaire, neither the interviewer nor the
respondent would not know whether recording was taking place.@B
@/@/When you are finished, type 1 and then press [ENTER]. Otherwise, the recording will
terminate after 30 seconds." : 1..1
THANKS "@/Thank you for your cooperation. @/@/Type 1 and then press [ENTER] to exit."
: 1..1
ErrorField "Error flag": 0..4

QIDA "CASEID + A" : STRING[6]
QIDB "CASEID + B" : STRING[6]
CONSENT : bCONSENT

```

Item one simply begins the interview. Item Two is the first CARI recording, and it is set up to record as long as the item remains active on screen. In this demo, recording is stopped when the user advances past Item Two, but the audio recording could have continued for several additional items or even for the entire interview. Item Four hosts a second call to StartStopRecording, with a time parameter of 30 seconds. Because of this, the audio recording will cease at 30 seconds after it starts, regardless of whether the respondent has finished. An explicit call to terminate the recording could be set at the start of Item Five, if the need was to have CARI for a maximum of 30 seconds, but only include the single item for which it was called (Item Four). Instrument fields can make note of the length of the sound bite by storing the start and stop times, to track the actual duration of each sound bite.

Figure 11. This section of the Blaise rules presents the first item, which is allowed unlimited recording time.

```

RULES

{ keep values so that they'll be there when resuming a breakoff }
QID.KEEP

StartRecord.Keep
EndRecord.Keep
StartRecord2.Keep
EndRecord2.Keep

QIDA.KEEP
QIDB.KEEP
QIDA := QID + 'A'
QIDB := QID + 'B'

INTRO

CONSENT

ITEM1 { start recording after this field has been answered }

  if CONSENTFLAG = YES THEN
    if STARTRECORD = EMPTY and ITEM1 <> EMPTY then
      STARTRECORD := Str(Hour(systime)) + Str(Minute(systime)) + Str(Second(systime))
      { Activate CARI with no end time specified and then de-activate CARI at the start of the
next
      item, to terminate recording that item}
      StartStopRecording(1,0,QIDA,ErrorField)
    endif
  endif

ITEM2 { Stop recording after this field has been answered }

if CONSENTFLAG = YES THEN
  if ENDRECORD = EMPTY and ITEM2 <> EMPTY then
    ENDRECORD := Str(Hour(systime)) + Str(Minute(systime)) + Str(Second(systime))
    StartStopRecording(0,0,QIDA,ErrorField)
  endif
endif

```

Figure 12. This section of the Blaise rules illustrates a timed call to CARI software and closing out the questionnaire.

```
ITEM3 { start recording after this field has been answered }

if CONSENTFLAG = YES THEN
  if STARTRECORD2 = EMPTY and ITEM3 <> EMPTY then
    STARTRECORD2 := Str(Hour(systemtime)) + Str(Minute(systemtime)) + Str(Second(systemtime))
    { Activate CARI for 30 seconds }
    StartStopRecording(1,30,QIDB,ErrorField)
  endif
endif

ITEM4

THANKS
{ stop recording after this field has been answered, since we are about to exit the instrument }
if CONSENTFLAG = YES THEN
  if ENDRECORD2 = EMPTY and THANKS <> EMPTY then
    ENDRECORD2 := Str(Hour(systemtime)) + Str(Minute(systemtime)) + Str(Second(systemtime))
    StartStopRecording(0,0,QIDB,ErrorField)
  endif
endif

ENDMODEL
```

9. Potential Issues

Technical barriers or difficulties may arise with CARI, as with any other form of technology. In addition to technical issues, there may be field management or human factors issues. Some of the common technical and staffing problems are listed in Figure 13, with an indication of how to address them.

There may be confidentiality, privacy and legal concerns as well. In most places, CARI recordings are treated the same as telephone monitoring. Specific localities may have restrictions on the allowable length of time for retaining the audio files, association of identifying information with the files, requirement for encryption during transmission, or other concerns related to privacy. For a survey to adhere to the strictest restraints, the following guidelines should be enforced:

- All respondents should explicitly consent to the recording at the start of the questionnaire and should have an option of retracting that consent at any time.
- Files should not contain personal information, such as recording the respondent's name or sensitive information, and the file naming convention should use an assigned ID number or other method to affiliate the sound bites with the questionnaire, without revealing the identity of the respondent.
- Audio files should be encrypted before transmission and stored in a secure place at the central and reviewing sites.

These considerations must be weighed carefully in developing a CARI process.

Figure 13. Potential problems that may arise when setting up a CARI system.

Problem	Type	Resolution
Audio quality is poor on playback	Technical	Evaluate microphone and laptop volume control settings, and check laptop sound card. If external microphone, check plug. Check playback settings. Use headphones during monitoring. Select alternative playback software.
File storage space	Technical	Allow sufficient disk space for audio file storage, on the MCD and in the central site. Significant space may be needed, depending on the file format used, number of interviews and length of storage. Select a compression method or alternate format if files are too large to handle.
Transmission failure	Technical	Check file size and transmission bandwidth. Check case management or file control system.
Matching audio files to case data	Technical	Use a naming convention for CARI files that includes a case ID and sequence number or item name.
CARI is detectable during the interview	Technical	Select recording algorithm that does not strain system performance. Postpone compression and encryption if necessary.
High respondent refusal rate for CARI	Human	Train interviewers or reword consent question. Monitor refusal rates by interviewer, and use an alternate form of verification for those with high rates (re-interview or call-back).
Interviewer dissatisfaction	Human	Provide a benefit such as positive feedback from CARI. Emphasize CARI as a tool for rewarding honesty, as opposed to a tool for catching cheaters.
Revocation of respondent consent	Technical and Human	Provide a hot key that changes the consent variable from yes to no. Check the flag at each potential call to CARI.
Location and selection of monitoring staff	Technical and Human	Select file storage and playback interface for ready access by monitoring staff. Consider possible bias among monitors: field supervisors may not be fully objective.
Privacy concerns	Technical and Human	See notes above.

10. Future Opportunities

Use of CARI will become commonplace as benefits are recognized by the survey research community. Once the initial introductory decisions and development effort have been completed, survey shops may notice a reduction in reinterview effort, reduced reliance on respondent phone numbers and lower respondent burdens due to receiving fewer call-backs. As technology advances, CARI may move from laptops to additional platforms, such as handheld computing devices or pen-based computers. The Blaise language offers good control of the process of recording sound, making CARI a viable tool for improving field performance and authenticity.

11. References

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