

# CDC EZ-Text: Software for Management and Analysis of Semistructured Qualitative Data Sets

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## **Introduction**

Many research projects require collecting semistructured qualitative data. This includes situations where interview guides containing a series of open-ended questions are consistently administered to each person in the sample, even though the content, length, and complexity of responses to the questions may vary widely between respondents. One advantage of semistructured interviews is that they are flexible enough to allow interviewers to explore complex issues or questions that do not have a finite or predetermined set of response categories. In such cases, it would be difficult to design fully structured interview instruments with closed-ended responses (e.g., true/false, agree/disagree, or multiple choice).

Another advantage is that semistructured instruments can be standardized to a sufficient degree to allow for comparability of data collection methods and findings between respondents. In contrast, it's often difficult to attain comparability when using unstructured ethnographic interview techniques. This feature of semistructured interviews is especially useful in large studies involving more than one interviewer, or where the time for collecting data from any single respondent is constrained (Bernard 1994:209–210).

The results from semistructured interviews may be used for various purposes. For example, HIV/AIDS risk-behavior studies sponsored by the Centers for Disease Control and Prevention (CDC) frequently use semistructured interview instruments. These instruments typically include 20–50 open-ended questions, and sample sizes may include several hundred individuals who live in multiple communities. Some projects use as many as 20 or 30 different interviewers. Researchers generate written summaries or verbatim transcripts from tape recordings after each interview, and the final computerized data set contains hundreds or perhaps thousands of pages of text. Results from semistructured interviews can be used to design fully structured instrument questions and response categories. Findings from semistructured qualitative data sets can also provide theoretical insights and applied programmatic recommendations (e.g., Carey et al. 1997a).

In spite of these advantages, one challenge in working with semistructured qualitative data concerns the organization and management of the data before analysis. In studies that require collaboration by a large team of researchers, different interviewers may have various Windows- or Macintosh-based word processors; conversion of files between systems can be time consuming. Even when all data-collection staff use the same word processor, variation in margin, font, use of tabs, and other preferences affect the data organization. Response segments relevant to a specific question may be located in different locations within the write-up for each respondent. Further complications occur when interviewers make independent changes to the data-collection protocol, such as altering the number, wording, or intention of the questions on the interview guide. Similar time-consuming data-management difficulties occur in small studies. And small studies have fewer staff available to perform data

management tasks.

In either large or small studies, it's difficult for researchers to monitor and ensure the consistency of data collection and write-up across the sample, regardless of the size of the study or the number of interviewers collecting the data. Even when interviews are conducted in a comparable manner, inconsistent organization of the interview notes may mean that someone must reformat the data into a standard layout prior to analysis. This not only wastes financial resources and time, it causes delays in generating research findings. Occasionally, these barriers are so large that the data are never fully analyzed.

### **CDC EZ-Text Software**

"CDC EZ-Text" (version 3.05) is a new qualitative software tool specifically designed to assist researchers create, manage, and analyze semistructured qualitative databases (Carey et al. 1997b). Although we initially developed EZ-Text to help the CDC conduct HIV/AIDS behavioral research, it's not limited to public health applications. We estimate that approximately 100–120 scientists in four countries are now using this software for a diverse array of research and teaching purposes.

EZ-Text can be used either by a single investigator or on multisite projects involving a large team of interviewers and other research staff. The ultimate goal of EZ-Text is to reduce or eliminate many of the problems encountered when working with semistructured interview data. For example, it helps solve the problem of consistency across interview write-ups by allowing a researcher to design a series of qualitative data entry templates tailored to their questionnaire. Data can be typed directly into the templates or copied from word processor documents. Following data entry, investigators can interactively create on-line codebooks, apply codes to specific response passages, develop case studies, conduct database searches to identify text passages that meet user-specified conditions, and export data in a wide array of formats for further analysis with other qualitative or statistical analysis software programs. Project managers can merge data files generated by different interviewers for combined cross-site analyses. The ability to export and import the codebook helps coordinate the efforts of multiple coders simultaneously working with copies of the same database file.

A central assumption behind our design of EZ-Text is that the user wants to learn about the same set of topics with each individual in their sample. As noted above, this may entail using the same semistructured interview instrument with each respondent. EZ-Text might also be used to manage and analyze semistructured behavioral observation data collected for a sample of individuals. As far as we know no one has attempted it to date, but it's conceivable that EZ-Text might be used with some types of focus group studies (i.e., where a consistent set of discussion topics were raised with a sample of different focus groups).

However, EZ-Text is not likely to be very helpful to researchers administering highly unstructured ethnographic studies where the set of discussion topics or behavioral observation categories vary greatly between each person in the sample. Similarly, EZ-Text is not a substitute for statistical analysis software. In our view, EZ-Text helps address a specific set of needs related to semistructured qualitative data, especially when it's collected and coded by different individuals following a common protocol on a multisite research project. If investigators don't want to generate and analyze a semistructured qualitative database, we recommend that they choose a different software tool that better matches their needs (Weitzman and Miles 1995).

### **Technical Features**

The program that's currently available for EZ-Text is a 16-bit application written in Visual Basic. We are planning to develop an upgraded 32-bit version in 1998. Although it may not be apparent to the average user, EZ-Text stores data in Microsoft Access database files (which means all database files names have a ".mdb" extension). However, EZ-Text is a completely self-contained software package; users don't need any knowledge or experience with Visual Basic or Access. Moreover, EZ-Text users don't have to own or install any other special software to run the program. Although the present 16-bit version of EZ-Text runs on Windows 3.1 or Windows for Workgroups 3.1 operating platforms, we recommend that the program be used with Windows 95 or Windows NT (versions 3.51 and

4.0). There are no plans to develop versions for Macintosh or other systems.

To avoid problems caused by weak hardware, we recommend that EZ-Text be installed on computers with moderately fast Pentium processors (e.g., 100 MHz or higher speed) and have at least 16 MB of RAM. The program may work on less-powerful computers, but users may exceed system resources when working with large files. Databases can become large, and the computer must be able to work with large files. For example, a database for a study with 30 open-ended questions containing all the coded response text passages for 70 respondents may be at least 1 or 2 MB in size.

As with other applications, we strongly recommend that users always copy their data files to back-up locations on a regular basis (e.g., copy the database to a separate file named for the date or day of the week after each work session). When closing a file, EZ-Text automatically asks the user if they would like to make a back-up copy. Other file management features help users copy, delete, move, rename, or restore back-up files.

Version 3.05 of EZ-Text is not designed for simultaneous use by multiple users on a LAN. Future versions of EZ-Text may address this and other current limitations. However, the program can be independently installed on the local hard drives at different work sites or multiple computers on a LAN. Files created on separate computers can be merged provided that each user has employed identical data entry templates and there is no overlap of respondent ID numbers. Once a template file has been finalized and copies are distributed to research team members, a password system prevents unauthorized personnel from making independent modifications. This helps guarantee that templates used for data entry on different computers remain comparable and can later be merged. A second password system protects the content of the codebook, which helps ensure that multiple coders use identical coding instructions during data analysis.

## **General Operations**

When EZ-Text starts, an opening credits box appears and automatically closes. Following this, the user has the option to access the Help file via the Menu Bar at the top of the screen. This ASCII file (named "eztext30.hlp") is automatically installed with the EZ-Text program and provides basic instructions on how to use the program. Paper copies can be printed directly from EZ-Text or brought into a separate word processor. An "example.mdb" database file is also installed, which new users can examine to get a sense of the program's capabilities. A detailed and fully indexed *User's Guide* (106 pages) is also available.

Below the opening credits box, other instructions describe the initial steps for defining a new database or accessing an existing database. Assuming a database has been previously defined, the file is retrieved by selecting "Open Database" option after clicking the File pull-down list from the Menu Bar at the top of the screen. Users browse through their directories to retrieve a previously created EZ-Text database. In most cases, a separate database file will be created for separate studies; the organization of each database file closely reflects the content of the semistructured interview guide used in each study. After selecting the desired file, an "Interview Information" screen will load, and the first respondent record, if it exists, appears on the screen (Figure 1).

[place Figure 1 about here]

On the Interview Information screen, users have two sets of control functions. At the top of the screen is a Menu Bar listing the available menus: File, Record, Coding, Help, Agents, and About. Each menu accesses a list of commands or functions, which we describe further below.

A second set of control functions, the "Command Buttons," is located at the bottom of Interview Information screen. Five of these (labeled First, Last, Previous, Next, and Goto) allow the user to move between records for different respondents in the database. Four other Command Buttons are used to move to the open-ended question data-entry screens, add or delete respondents, and save changes made to the database before closing the file. Another way to save changes or to add and delete respondents is to select these functions through the Record menu

on the Menu Bar.

Located between the Menu Bar and the Command Buttons is a series of Interview Information fields that describe key features of the study and the respondent. Two of these fields are required for all EZ-Text database files: a descriptive study name, and a respondent identification number. The length and content of these two fields are user defined. The other fields are optional, and might include variables such as the interviewer's name, date and location of the interview, age and gender of the respondent, etc. The user-defined names (up to 20 characters long) of these fields appear to the left of the corresponding box. The boxes are filled in for each respondent during data entry. Users can design as many of these Interview Information fields as they need; a scroll bar appears on the far right if the number of fields exceeds the available space on a single screen.

### **Data Entry**

To add a new respondent to the database, start by clicking the New button at the bottom of the screen or by selecting the same function from the Record menu. This brings up the New Respondent ID dialog box, where the user provides a unique respondent identification number (ID). It may be up to nine digits in length. The ID must be a number (i.e., no letters or special characters). Once saved, ID numbers can't be modified in the current version of EZ-Text. This helps avoid accidental changes being made to the ID. However, ID numbers along with their corresponding data can be deleted from the database. After entering a new ID, it's compared against the existing records. If the number has already been used or isn't within a user-defined permissible value range, the user is prompted to correct the ID before it can be saved.

Assuming the new ID is valid, EZ-Text returns to the Interview Information screen. Entering data into these fields is very simple: fill in the blank boxes with the appropriate data for the respondent and click the Save Command Button. If the user forgets to save the data and attempts to add a new ID or move to a different ID, EZ-Text prompts the user to save their data before moving on.

To enter responses to the open-ended questions, the Questions Command Button is clicked. This brings up the first open-ended question screen (Figure 2). The top of the screen shows the respondent's ID, the text of the question, and a new Menu Bar, which accesses various editing functions. Below this is an empty box where the user types the text of the response to the first question. If the data have been typed into a word processor document (e.g., a verbatim transcript of an interview), the user can toggle back and forth between the word processor and EZ-Text to copy and paste blocks of text relevant to the question. A scrolling feature allows for long passages if the length of the response exceeds the initial space shown in the box on the screen.

[place Figure 2 about here]

Depending in part on their computer's hardware limitations, most users will probably be able to save as much as 35,000–40,000 bytes of information into the response box for one question for one respondent (e.g., a text passage roughly equivalent to a WordPerfect 6.1 file containing 8–10 single-spaced pages). However, long responses for a single question are cumbersome during subsequent coding and analysis. We strongly recommend that users enter smaller response segments into a response box for a specific question. If necessary, multiple templates can be created for managing complex open-ended questions that have subtopics. Based on our experience using EZ-Text, response segments equivalent to half page or less in length within a single-spaced word processor document are easy to enter, code, and analyze.

When entering data on the Question Screen, records are automatically saved before moving to a new respondent, another open-ended question, or returning to the Interview Information screen. If a user incorrectly modifies a response, a Restore Original Command Button can be used to bring back the original text before moving from the screen. However, once changes to a response have been saved, the previous text cannot be restored. A spell-check feature can be accessed via a Command Button at the bottom of the Question Screen; users can add new words or special terms to the spell check dictionary.

After completing data entry for the first open-ended question, the user goes to the next question by clicking on a Command Button at the bottom of the screen. Data entry for the Interview Information variables and the other open-ended questions is repeated until all the information has been entered for all the respondents. Users can edit, add, or delete records as needed.

### **Creating a New Database**

Creation of new templates contained in a database should be done by a single researcher (e.g., the study project manager). This entails six steps: (1) getting into the Administration screen, (2) giving EZ-Text a new database file name, (3) completing the Study Information fields, (4) designing a template for each open-ended question from the questionnaire, (5) defining the Interview Information variables, and (6) setting unique passwords to protect the templates and the codebook from unauthorized changes.

To start this process, the user closes any open database and selects Administration from the File menu on the Menu Bar. The program then prompts for the password to enter the Administration Screen (default password is "Admin"). After pressing the Enter key or the Continue button, the Administration screen appears, including a new Menu Bar at the top.

Instructions at the bottom of this screen direct the user to name a new database file by using the Admin menu to open the "Create a New Database" dialog box. Any standard eight character DOS file name and path is acceptable, although all file names must have the ".mdb" as their extension. If a user enters the name of an existing database, the program provides a warning prompt before it is overwritten.

After defining the name for the new file, the user completes four forms for the database; these are all accessed by selecting among four corresponding tabs visible on the Administration Screen. The study name and the codebook password are entered on the first form called the "Study Information Tab." EZ-Text automatically fills in Date Created and Date Modified fields on this form.

The next step is to add open-ended questions to the EZ-Text database. The user does this by selecting the second form entitled "Open-ended Questions Tab" from the Administration Screen and clicking the "New Question" button. For each question in database, EZ-Text prompts the user to complete three fields: Question Sequence, Question Number, and Question Text. The Question Sequence field is a unique decimal number that controls the sequence in which the data entry screens will appear to the person entering the interview data (e.g., a screen with 2.5 as its Question Sequence number appears after a screen with a Question Sequence number of 2.0). In most cases, the values of these numbers will reflect the order of the questions on the original questionnaire.

The Question Number field accepts any combination of letters and numbers (e.g., "1," "2a," "2b," "IV," etc.). These labels correspond to the question numbering system used on the original interview questionnaire. Finally, the Question Text field is used to store the actual text of the open-ended question as it appears on the questionnaire. The Save button is used to store the question template in the database file. Following similar procedures, the user provides information for the other open-ended questions from the questionnaire. The information may be modified at any time after they have been defined. This feature is especially helpful during questionnaire development and interview pilot testing phases of the research.

After creating the screens for the open-ended questions, the next step is to define the Interview Information variables. This is accomplished using a third form, the "Interview Information Tab," selected on the Administration Screen.

Adding a new variable starts by clicking on the "Add Field" button on this form. EZ-Text then asks the user to provide several pieces of information to define the format of the variable. The Field Order Number is a decimal number that controls the placement of the variable on the Interview Information Screen (e.g., a variable with 2.5 as its Field Order Number appears below a variable with a 2.0 Field Order Number). Second, the Field Name stores the name of the variable (e.g., "Age," "Sex," "Interviewer Name," "Date of Interview," etc.). Third, the Field Type

is used to tell EZ-Text whether the item is a numeric variable (e.g., age) or a text variable (e.g., interview location). Users are given the option of creating a pull-down list of responses. For example, a variable called "Interview City" might have Atlanta, Chicago, New York, and Los Angeles included in the pull-down list of possible responses that can be selected during subsequent data entry for a respondent. Fourth, the Field Display Length controls the width of the field on the Interview Information screen subsequently seen by data entry personnel (up to 60 characters). If the user has set the Field Type to be a number, two additional types of information will be requested on the "Add Field" screen: the "Minimum" and "Maximum Values." These items control the minimum and the maximum value that can be entered into the field. This is helpful for ensuring valid data entry of numeric variables. As with the open-ended questions, users can later edit, add, or delete any of the templates for the Interview Information variables.

The fourth form on the main Administration screen is used to create the codebook. We will discuss this in greater detail below.

The final Administration function entails setting passwords for the database. As noted earlier, the codebook password is set on the Study Information form. Changing the general administrative password, which protects entry into the Administration functions, is done by selecting the password option from the Admin menu. These two passwords may be different (default for both is "Admin"), and different passwords should be used for different database files.

### **Data Coding**

Users interactively create a codebook with an unlimited number of defined codes corresponding to themes present in the responses (Miles and Huberman 1994). For example, one EZ-Text codebook being used in an on-going HIV behavioral study at CDC (70 respondents, 29 semistructured question topics) contains nearly 350 separate codes. Any combination of codes can be assigned to a specific response. For each code in the codebook, the following information can be defined: a seven-character mnemonic, a short definition, a long definition, further instructions for when to apply or not apply the code, and a text passage showing an example where the code should be used (Figure 3).

[Figure 3]

The coding process starts by clicking the Coding menu on the Interview Information screen. This brings up the Coding Form (Figure 4). Using pull-down lists visible on the Form, users select which question and ID they wish to code; two more boxes display the original question and corresponding response text passage for the selected respondent. Below these boxes are two more boxes that show lists of Available Codes and Assigned Codes. The Available Codes list is used to scroll through the mnemonics and short definitions in the codebook. After reading and identifying themes in the response passage, the user highlights an appropriate code in the Available Codes list and clicks on an arrow button to move it to the Assigned Codes box. This process is repeated until the Assigned Codes box contains a list of codes corresponding to all the themes in the response. Similar steps are used to remove a code from the Assigned Codes box.

[Figure 4]

The codebook can be printed in abbreviated or complete formats by selecting one of the choices under the Reports menu at the top of the Coding Form screen. Users can also view the complete codebook on screen by double-clicking on a specific code in the Available Codes box.

The codebook is modified in either of two ways. First, codebook editing functions can be accessed by clicking on the Codebook Tab shown on the Administration screen. Or, users can select "Modify Codebook" from the Menu Bar on the Coding Form. After providing the codebook password, a Codebook Maintenance screen appears. Once changes are made and saved, the user returns to the Coding Form to continue the coding process. Appropriate buttons are clicked on the Codebook Maintenance screen to add new codes, delete codes, or edit the current

codebook definitions. Caution should be used when deleting codes. If a code has been used and is subsequently deleted from the codebook, all previous points of assignment to response passages are also removed from the database.

To export the codebook into a separate file, select another Menu Bar item on the Codebook Maintenance screen (which always have .cdb file name extensions). To replace an existing codebook associated with a database, use the Import Codebook function available under the File menu on the Interview Information screen. Project managers use these features on multisite studies to help ensure that the same codebook gets used by all coders. To do this, project managers should (1) be the only person with knowledge of the Administration and Codebook Passwords, (2) facilitate cross-site consensus regarding codebook revisions (e.g., via conference calls or email), and (3) distribute revised versions of the codebook file to each coder as needed. Coders at each site replace their old codebook with the revised version by using the Import Codebook feature. To minimize confusion regarding which codebook version currently is in use, a date and time field for the codebook is automatically provided by EZ-Text. It is viewed by clicking on the "About" menu item on the Interview Information screen.

A search option on the Coding Form's Menu Bar assists in conducting Boolean searches of the database. Searches are designed using combinations of ID numbers, open-ended question numbers, and assigned codes. Search results can be printed, copied to a word processor document, or viewed on screen. The search feature may be used to find and replace inappropriately assigned codes. After coding is completed, it can be helpful for selecting text passages to use in ethnographic case studies.

### **EZ-Text Agents**

The Agent menu, located on the Interview Information screen, guides the user through four different tasks. The first item on the menu is the Report Agent. This gives the user a series of step-by-step instructions for generating two types of reports. The first report shows all the questions and responses for individuals chosen from a pull-down list of ID numbers. The other report reorganizes the data to show the responses from all the individuals to one or more of the open-ended questions. Either report can be printed or previewed on screen.

The Data Export Agent is used to export information from the database in either of two formats. One format copies some or all of the data to an ASCII text file. This file can be viewed in a word processor or brought into other qualitative data-analysis software. The agent's dialog screens help users specify the desired content of the file by requesting combinations of ID numbers, open-ended question responses, Interview Information variables, and assigned codes along with their short definitions.

Another data-export format produced by the Data Export Agent creates files containing comma-delimited ASCII matrices. The matrix file can be imported later into spreadsheet or statistical software for further analysis. By using a common ID number, researchers might link EZ-Text matrices with other quantitative data generated for the same respondents with another program such as SPSS (e.g., merging an EZ-Text matrix with a second file containing socioeconomic, medical, psychometric, or other similar variables). In creating the matrix, users request combinations of ID numbers, Interview Information variables, and codes assigned to open-ended question responses. The output file contains one row for each requested ID and one column for the selected Interview Information variables and codes.

Matrix cell values either contain the data that were entered for the Individual Information variables or they contain "1s" and "0s," which indicate whether or not a code was assigned to an open-ended question response. Each column is labeled with the original Interview Information variable name or a slightly modified version of the mnemonic code used in the codebook. When requesting coding data for more than one open-ended question, EZ-Text places single letters ("A," "B," "C," etc.) as a prefix to the mnemonic code. For example, suppose that an EZ-Text codebook contains three codes called Code1, Code2, and Code3; each code might be assigned to responses for either or both Question 1 and Question 2. Matrix column labels for the two questions in this example would be Acode1, Acode2, Acode3, Bcode1, Bcode2, and Bcode3. Because codes in the codebook can be no longer than seven characters, insertion of the single-letter prefixes yields column labels no longer than eight characters. Since

the matrices may be imported into statistical software, this convention corresponds to the eight-character variable name limit within programs such as SPSS or SAS.

The third option on the menu is the Database Merge Agent. This agent is used to append another EZ-Text file into a currently open database (e.g., merging files containing two sets of interviews collected in two cities in a multisite research project). The merge process is successful only if two conditions are met: (1) there is no overlap in the ID numbers used in the two files, and (2) identical template versions have been used to create the two files.

To ensure that data files created on separate computers can be merged, project managers should assign different ID number series to each interviewer. In addition, each interviewer should check the date and time information for their copy of the database (available under the "About" menu on the Interview Information screen). By comparing the dates and times when the templates were last modified, project managers can verify that all interviewers have exactly the same revision on their computers before data entry starts.

The Subset Agent lets a user select a subset of the records and copy them to a new EZ-Text database file. One option provided by the agent is to select specific individuals by browsing a pull-down list of ID numbers in the original database. A subset can also be created based on Interview Information variables (e.g., use a gender variable in the original database to make a new file containing the records for women).

Finally, in addition to the checking the spelling of a single response on the Question Screen, spelling can be simultaneously checked for the entire database by using the Spell Check Agent.

Although not part of Version 3.05, we are presently developing another agent to help assess intra- and intercoder reliability, based on the methods previously described in *CAM* by Carey, Morgan, and Oxtoby (1996). The new version, including the reliability agent, is expected to be available sometime during the first half of 1998.

### **How to Obtain Copies of CDC EZ-Text**

"CDC EZ-Text" is a public-domain software program, and may be freely copied and distributed without restriction. University instructors can give copies to each of their students, and researchers can make copies for their entire study team as needed. However, potential users should understand that there is no formal mechanism available for technical support beyond the help files included with the program installation diskettes and the *User's Guide*. To obtain a copy of "CDC EZ-Text, Version 3.05" as well as the *User's Guide* free of charge, researchers can download files from the CDC Internet web site: [http://www.cdc.gov/nchstp/hiv\\_aids/software/ez-text.htm](http://www.cdc.gov/nchstp/hiv_aids/software/ez-text.htm).

### **Notes**

1. Behavioral Intervention Research Branch, Division of HIV/AIDS Prevention, Centers for Disease Control and Prevention, 1600 Clifton Road, N.E., Mailstop E-37, Atlanta, GA 30333.
2. Conwal, Inc., 6858 Old Dominion Drive, Suite 200, McLean, VA 22101.

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