

# Configuration and Research Manual

## PROUST for PalmOS v1.0

(Programmable Recording Of User-friendly Self-report through Time)

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**SECTION I: Introduction**

This program is designed to permit research participants, largely on their own, to report discrete events or experiences that occur over time in a user-friendly Palm Pilot-based interface. The program can be configured to record events of nearly any kind at varying levels of time resolution (e.g., 15 minutes, 30 minutes, etc), and for varying lengths of time. The program is based on graphical menus that make it unnecessary for the user to have any experience with Palm Pilot graffiti or any other method of data entry. The menus are designed by the investigator to ask the questions he/she desires, in the order desired, with configurable icons and help text, for each study. The data entry environment can also be customized to the individual, and up to six alarms can be set to remind the participant at various points during the day to update his/her records. Pilot work thus far suggests that, with appropriate training, encouragement and careful interface design, adult and older child research participants tolerate quite well the moderate burden of tracking experiences in this manner. (Article currently in preparation.)

This manual assumes basic familiarity with the operation of PalmOS PDAs (personal digital assistants/hand computers). Thus, in describing how to use the program, the general details of how to operate a PDA are omitted. If you are not familiar with the use of your PDA, please refer to the manual that came with the hardware before attempting to configure or install PROUST.

**SECTION II: License and Distribution**

Emory University retains the copyright to PROUST, which is available for download at the web site: <http://www.emory.edu/COLLEGE/ANTHROPOLOGY/CHB/PROUST.html>, or through a CD-ROM distribution. The program may be used free of charge for research purposes, with appropriate citation(s), such as:

DeCaro JA, Worthman CM, Ternullo NJ, Brown R, and the Laboratory for Comparative Human Biology (2002) Configuration and Research Manual: PROUST for PalmOS v1.0. Atlanta: Emory University. Available at:  
<http://www.emory.edu/COLLEGE/ANTHROPOLOGY/CHB/PROUST.html>

and/or

Worthman CM, DeCaro JA, Ternullo NJ, Moody J, Brown R, and the Laboratory for Comparative Human Biology (2002) PROUST for PalmOS v1.0 [computer program]. Atlanta: Emory University. Available at:  
<http://www.emory.edu/COLLEGE/ANTHROPOLOGY/CHB/PROUST.html>

As described elsewhere in this manual, the PROUST system is highly customizable. However, should changes be needed in order to fit a particular research project that are beyond the scope of the program's configurability, license is granted to modify and re-compile the source code included in the PROUST distribution, for personal or lab group use only, and on the condition that Emory University retains copyright to the modified program, unless there is a written agreement to the contrary. Modified programs may not be distributed without explicit written permission from Dr. Carol Worthman ([worthman@emory.edu](mailto:worthman@emory.edu)), LCHB director.

The PROUST system as downloaded or received on CD-ROM should also not be re-distributed, nor should its component parts be re-packaged as part of any other distribution, without explicit written authorization from Dr. Worthman.

The PROUST system is made available free of charge at users' own risk. Neither Emory University nor the programmers/designers are responsible for any loss of data or financial loss resulting from the use of this program.

By downloading or installing the PROUST system, you agree to these licensing and distribution conditions.

In lieu of e-mail communications, traditional mailing addresses for Dr. Worthman and Mr. DeCaro are, respectively:

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**SECTION III: Requirements**

This program is designed for, and has been tested on, the PalmOS platform only. The program has been tested on PalmOS versions 3.5.1 and 3.5.2, and on the Palm IIIxe, Palm m100, and Palm m105. The original specifications called for PalmOS 3.5.x compatibility only. Nonetheless, the program may function normally, but has not been tested, on other PalmOS platforms. Some problems were encountered in preliminary testing when switching between display zoom levels with PalmOS v4.0, although all other functions of the program seemed to work. As of the publication date of this manual, work to update PROUST to work correctly with PalmOS v4.0 was underway, with a new build including this fix (PROUST v1.2) expected in December, 2002. Including both the executable and the data files, PROUST uses approximately 100 kilobytes of memory on the Palm.

The desktop/laptop computer synchronization system, which is used to configure and download data from PROUST, can only run on a PC-compatible computer running Windows NT/XP/2000. There are no special requirements for the PC, other than a port for the data connection, as per the specifications of your Palm model.

## SECTION IV: Downloading Components

Three downloadable files are required to install and configure PROUST v1.0:

- 1) The full PROUST distribution, available from <http://www.emory.edu/COLLEGE/ANTHROPOLOGY/CHB/PROUST.html>
- 2) The latest Java 2 Platform Standard Edition Software Development Kit (SDK) from [www.javasoft.com](http://www.javasoft.com). As of the time this document was written, the latest version was J2SE v1.4, available at: <http://java.sun.com/j2se/downloads.html>.

Item #2 is third-party software, currently made available for free from Sun Microsystems.

Icons (20x20 pixel) for the data recording menus may be designed in any bitmap-producing graphics program. At the time of this writing, PROUST comes with the icons designed for our initial application. For configuration of new icons by users, it is also necessary to acquire:

- 3) The PalmOS Software Development Kit (SDK) version 3.5 from [www.palmos.com](http://www.palmos.com). As of the time this document was written, this file was available from <http://www.palmos.com/cgi-bin/sdk35.cgi>. It is important to acquire the correct version of the PalmOS SDK. Do not simply download the newest version. Item #3 is third-party software, currently made available for free from Palm Computing.
- 4) CodeWarrior for PalmOS, available from Metrowerks (<http://www.metrowerks.com>). As of the time this document was written, the CodeWarrior software cost \$499. CodeWarrior is the "Development Environment" required to re-compile the PROUST executable with the new icons included.

Within the limits of his time, Jason DeCaro (see contact information in Section II) may be able to complete the icon configuration as a service without cost for other lab groups, especially in the early stages of the release of this program. Particularly for groups that wish to use this program on a small-scale or trial basis, this would simplify configuration, and avoid the need to purchase CodeWarrior. Please contact Mr. DeCaro if this service is needed.

If a CD-ROM distribution is preferred, this can be arranged by writing to Jason DeCaro at the address listed above. Third-party software cannot be distributed as part of the CD-ROM distribution, because of licensing restrictions. To acquire this software other than by downloading, please contact Sun Microsystems or Palm Computing directly.

**SECTION V: Installing Components**

Follow these steps to install PROUST onto your computer and Palm Pilot:

- 1) On the PC that will be used to configure PROUST, install the Java 2 Platform Standard Edition Software Development Kit (SDK).
  - a. Download the software, as described above.
  - b. Open the installer. You will be asked to agree to their license, and then to select a location to install the program.
  - c. Follow the prompts to install the program. Install all components.
- 2) On the PC that will be used to configure PROUST, install the Palm Desktop and Hotsync software for your Palm Pilot model, if they are not in place already. The process will differ slightly by model, and usually involves an installation CD-ROM that came with the hardware. Refer to your Palm Pilot user manual for detailed instructions.
- 3) Using the ZIP archive extractor of your choice, unzip the PROUST distribution file, PROUST1.0.zip, into any temporary directory. If you do not have a ZIP archive extractor installed, as of the time of this writing, it was possible to download functional evaluation versions from [www.pkzip.com](http://www.pkzip.com) or [www.winzip.com](http://www.winzip.com). The remainder of these instructions assume that the temporary directory you choose is "c:\proustinstall".
- 4) From the command line, execute install.bat from that temporary directory. Access the command line by selecting Run under the Start Menu on your taskbar, typing "cmd" or "command" (depending on your version of Windows), and pressing enter. Change to the temporary directory by typing "cd [full temporary directory pathname]". Type "install.bat" and press enter to begin the installation process.
- 5) Follow the prompts.
- 6) Choose the default installation path c:\eat. Changing the installation path may cause serious problems with the installation.
- 7) Allow for the installer to exit (signified by the return of the prompt).
- 8) Complete icon configuration if desired, according to the instructions in Section VI, below.
- 9) From the Palm Desktop menu under Programs in the Start Menu, open the Install Tool. Select "add" and locate the PROUST.prc file in the c:\eat directory. Select "open" and then "done". The install tool will inform you that the program will be uploaded to the Palm at the next Hotsync.
- 10) Create an XML configuration file for the current study in the c:\eat directory, according to the instructions in Section VII, below.



- 11) From the command line, in the c:\eat directory, type “process [name]”, where [name] is the name of the XML file you have created (including the .xml extension). Press enter. This will prepare the computer to Palm conduit with the correct configuration file. This will also perform a rudimentary check of the syntax of the XML file you have created. If you receive an error message, re-open your XML file in a text editor and look for syntax errors.
- 12) With the Palm Pilot attached to the computer, push the Hotsync button to install the PROUST application.
- 13) With the Palm Pilot attached to the computer, push the Hotsync button a second time to allow the conduit to configure the PROUST application.

## SECTION VI. Icon Configuration

The program comes with a variety of pre-installed icons that may be used in configuring the menu structure of the study (see section VII below). However, in most cases, these pre-installed icons will be inadequate for the purposes of new studies. The pre-installed icons are listed in Appendix A to this document. If you are using only the pre-installed icons, skip ahead to the next step in the installation process (installation step 9, in Section V, above).

As discussed in Section IV, icon configuration requires purchase and installation of Codewarrior from Metrowerks. Within the limits of his time, Jason DeCaro (see contact information in Section II) may be able to complete the icon configuration as a service without cost for other lab groups, especially in the early stages of the release of this program. Particularly for groups that wish to use this program on a small-scale or trial basis, this would simplify configuration, and avoid the need to purchase CodeWarrior. Please contact Mr. DeCaro if this service is needed. However, labs that expect to make heavy use of this program, or who expect to use the program for multiple studies that require separate icon configuration, are urged to purchase the Codewarrior software and learn the icon configuration process.

- 1) On the PC that will be used to configure PROUST, install Metrowerks Codewarrior, according to the instructions that come with the installation CD-ROM.
- 2) On the PC that will be used to configure PROUST, install the PalmOS Software Development Kit (SDK).
  - a. Download the software, as described above.
  - b. Open the installer. You will be asked to agree to their license, and then to select a location to install the program.
  - c. Follow the prompts to install the program. Install all components.
- 3) Launch Codewarrior.
- 4) In Codewarrior, under the file menu, choose “open,” and open the PROUST project file (c:\proustinstall\eat\src\palm\eat.mcp).
- 5) Configure Codewarrior to use the PalmOS Software Development Kit.
  - a. Under the “edit” menu, select “eat – debug settings.”
  - b. In the window that appears, under “target” select “access paths.”
  - c. Select the “System Paths” radio button.
  - d. Click on whatever path is given in the System Paths window. This should look something like “{Project}..\Palm OS 3.5 SDK Files\Palm OS 3.5 Support”
  - e. Select the “Change” button.
  - f. In the Browse for Folder window that appears, make sure Project Relative Path is selected in the pull-down window.
  - g. Browse to the location of the “Palm OS 3.5” directory under the directory where you installed the Palm OS 3.5 SDK files. Select this directory and click “OK.”
  - h. Click “OK” again.

- 6) In the eat.mcp project window, double-click to select the palmicons.rsrc file.
- 7) A new “Constructor for PalmOS” window will appear called “Resource Type and Name.” After a moment’s wait, two windows will appear, one of which is a list of resources. In this window, scroll down and click on “Bitmaps”.
- 8) Press CTRL-R to create a new bitmap resource. In the window that appears, give your new icon a name (under “resource name), and an ID number (under “resource ID). The ID number can be any number over 7000 that has not already been used in the resource list for another icon. Choose “create.”
- 9) Open your new icon by double-clicking on its name in the resource list.
- 10) Change the size of the bitmap to 20x20: under “options,” select “set image size,” and then enter 20 for height and width. Then select “resize.”
- 11) Design the icon using the drawing tools provided. It is also possible to cut-and-paste the icon from another bitmap editing program, such as Microsoft Paint, so long as the same bitmap size is used. The number of colors you may use in designing the icon will depend on the model of Palm or Palm-compatible hand computer you intend to use in your research.
- 12) When you are done designing the icon, close the icon window.
- 13) Under the “File” menu, select “Save” to make your changes permanent.
- 14) Repeat beginning with Step 7 until all icons have been created.
- 15) Recompile the project in Codewarrior.
  - a. Close “Constructor” and return to Codewarrior.
  - b. In Codewarrior, under project, select “Make.”
- 16) Copy the new executable (c:\proustinstall\eat\src\palm\obj\PROUST.prc) into the c:\eat directory. This will replace the version that came with the distribution.

## SECTION VII. Study Configuration

The specifics of your study are configured using a text configuration file with the .XML file extension. In the c:\eat directory, you will find two sample .XML files, called TestCase1.xml and TestCase2.xml. These can provide a template that will, in addition to the instructions below, help you understand the configuration process.

Like HTML used to describe web pages, XML files are broken up into a series of “tags.” A “tag” begins with the character “<”, followed by the name of the tag. Any amount of configuration information may follow, prior to the character “>”, which completes the tag. In some cases, another tag is necessary to indicate that the information in a previous tag no longer applies. In this case, the second tag will simply be “</”, followed by the tag name, and then “>”.

These instructions take the form of an annotated version of TestCase1.xml. The XML code in the instructions below is **red and bold**. The annotations/instructions are *italic*. Use any text editor, such as Notepad in Windows, to generate the XML file for your study.

```
<?xml version="1.0"?>
<!DOCTYPE study SYSTEM "c:\eat\EATXML.dtd">
<study start_date="06/25/2002" stop_date="06/28/2002"
  participant_name      ="John Q. Participant"
  participant_id        ="12345"
  participant_sex       ="male"
  participant_password  ="1234"
  manager_password     ="5678"
  study_name           ="Anthropology-test"
  last_sync_date       ="8/29/2001 21:10"
  slots_per_day        ="96">
```

*Study Definition:*

*This section of the XML file defines the general parameters of the study. The first two lines, which define the xml version and doctype, should not be changed.*

*The next few lines constitute the study tag. The general format is:*

```
<study start_date="date" stop_date="date" participant_name="name"
  participant_id="number" participant_sex="[female|male]"
  participant_password="number" manager_password="number" study_name="name"
  last_sync_date="timestamp" slots_per_day="number">
```

*The two dates used should be the days that this research participant will begin and end data collection, respectively, and are in the format MM/DD/YYYY. The participant name is a string that can either represent the actual name or some coded form of the name of the participant. The participant ID is a unique integer that will identify this participant in the database. The participant sex is the fully-spelled-out word "male" or "female." The participant and manager passwords must be numeric only. The study name should be short and descriptive, as it will be displayed on user screens when participants enter data. The last\_sync\_date field is updated automatically by the program when it is used, and should not be edited manually. The slots\_per\_day setting controls how many blocks of data are collected in each 24 hour period and, thus, how long each block is; the*

options are 24 (1 block for each hour), 24 (1 block for each half hour), 72 (1 block for each 20 minutes), or 96 (1 block for each 15 minutes).

```
<AlarmSettings repeat="3" delay="5">
  <Alarm>10:45</Alarm>
  <Alarm>12:30</Alarm>
  <Alarm>15:27</Alarm>
  <Alarm>18:25</Alarm>
  <Alarm>20:00</Alarm>
  <Alarm>21:00</Alarm>
</AlarmSettings>
```

Alarm Settings:

The `alarmsettings` tag defines up to six alarms that will remind the participant to enter data each day at the designated times. The general format is evident from the example above. The "repeat" setting defines how many times each alarm will repeat if there is no user response. The "delay" setting defines how much time in minutes will pass between repeats. The alarm times are in HH:MM, using the 24-hour format for hours.

```
<AskContinuedActivity
  SameBmp="2210" SameText="Same"
  SimilarBmp="2330" SimilarText="Similar"
  DifferentBmp="2230" DifferentText="Different">
  <question>Compared to %previous_time;, were your activities between
  %entry_time; and %next_time; the</question>
</AskContinuedActivity>
```

Continued Activity Option:

The `askcontinuedactivity` tag defines the first menu option that the participant will see when he/she selects a time to enter data. If data are already entered for the immediately preceding time block, the participant will be asked if he/she wishes to replicate this previous data for the new time block. The program is configured to offer three options: "same," in which the data are replicated and the user is not automatically given the option to edit them; "similar," in which the data are replicated but the user is immediately put into the edit mode in order to make changes, and "different," in which the user is put into the edit mode to enter new data. This tag defines precisely how the question is asked. The general format is:

```
<askcontinuedactivity samebmp="number" sametext="text" similarbmp="number"
  simillartext="text" differentbmp="number" differenttext="text">
<question>QUESTION TEXT</question> </askcontinuedactivity>
```

The "samebmp," "similarbmp," and "differentbmp" settings, respectively, define the icons that will be used for the "same" "similar" and "different" options. The "sametext," "simillartext," and "differenttext" settings, respectively, define the text descriptions associated with those three icons. Note that the text descriptions must be quite short, normally no more than 6 or 7 characters long, in order to be displayed properly.

The "question" tag defines the actual text that will be used to ask the question in the pop-up window that the participant sees. Note that the

*question text is located OUTSIDE of the "question" tag, and before the "question" end-tag (</question>).*

```

<data_page maxselections="1">
  <question>What was your PRIMARY ACTIVITY between %entry_time; and
    %next_time;?</question>
  <selection name="Working" value="3" description="Money, money,
    money" largebmp="7040"/>
  <selection name="Sleeping" value ="4"
    description="Unconsciousness" largebmp="7090"/>
  <selection name="GamePlay" description="Time filler"
    largebmp="6000" medbmp="3200">
    <question>More specifically, what were you
      playing?</question>
    <selection name="Monopoly" value="5" description="Zero-sum
      game, except for that pass Go thing"
      largebmp="6100"/>
    <selection name="Sorry" value="6" description="No problem"
      largebmp="6000"/>
    <selection name="Risk" value="7" description="World
      conquest" largebmp="6100" medbmp="3200"/>
    <selection name="Operation" value="8" description="The
      wacky doctor's game" largebmp="6000"/>
    <selection name="Chess" value="30" description="Various
      gambits" largebmp="6100" medbmp="3100"/>
    <selection name="Checkers" value="31" description="Jump
      Jump King" largebmp="6000" medbmp ="3200"/>
    <selection name="Chutes" value="32" description="Chutes and
      Ladders" largebmp="6100" medbmp="3000"/>
    <selection name="Life" value="33" description="Formula"
      largebmp="6000" medbmp="3100"/>
    <selection name="Euchre" value="34" description="Dumbed-
      down bridge" largebmp="6100" medbmp="3200"/>
    <selection name="Hearts" value="35" description="Make
      friends!" largebmp="6000" medbmp="3000"/>
    <selection name="Poker" value="36" description="Bluff"
      largebmp="6100" medbmp="3100"/>
    <selection name="Solitaire" value="37" description="Pyramid
      or Vegas rules" largebmp="6000" medbmp="3200"/>
  </selection>
  <selection name="Eating" value ="9" description="Yum"
    largebmp="7100"/>
</data_page>
<data_page maxselections="1">
  <question>What was your SECONDARY ACTIVITY between %entry_time;
    and %next_time;?</question>
  <selection name="Nothing" value ="0" description="No secondary
    activity" largebmp="2230" medbmp="3200"/>
  <selection name="Transit" value ="11" description="In transit"
    largebmp="7070"/>
  <selection name="Spiritual" value ="12" description="Spiritual
    activities" largebmp="7110"/>
  <selection name="Phone" value ="13" description="Chatter"
    largebmp="7120"/>
</data_page>
<data_page maxselections="1">

```

```

    <question>What was your TERTIARY ACTIVITY between %entry_time;
    and %next_time;?</question>
    <selection name="Nothing" value ="0" description="No tertiary
    activity" largebmp="2230" medbmp ="3000"/>
    <selection name="TV" value ="15" description="Idiot box"
    largebmp="7130"/>
    <selection name="Groom" value ="16" description="Grooming and
    personal care" largebmp="7140"/>
</data_page>
<data_page maxselections="100">
    <question>Select ALL of the people who were with you between
    %entry_time; and %next_time;.</question>
    <selection name="Spouse" value ="17" description="Spouse"
    largebmp="7150"/>
    <selection name="Dad" value ="18" description="Father"
    largebmp="7170"/>
    <selection name="Mom" value ="19" description="Mother"
    largebmp="7180"/>
    <selection name="SO" value ="118" description="Focal"
    largebmp="7190"/>
    <selection name="Sibling" value ="119" description="Sibling"
    largebmp="7200"/>
    <selection name="Family" value ="120" description="Other family"
    largebmp="7210"/>
    <selection name="Friends" value ="218" description="Friends"
    largebmp="7220"/>
    <selection name="Peers" value ="318" description="Peersr"
    largebmp="7230"/>
    <selection name="?" value ="418" description="Strangers"
    largebmp="7240"/>
</data_page>
<data_page maxselections="1">
    <question>Where were you between %entry_time; and
    %next_time;?</question>
    <selection name="Home" value ="20" description="Where the heart
    is" largebmp="7250"/>
    <selection name="Work" value ="21" description="Rat race"
    largebmp="7260"/>
    <selection name="Out" value ="22" description="Not home"
    largebmp="7270"/>
</data_page>
<data_page maxselections="1">
    <question>How did you feel between %entry_time; and
    %next_time;?</question>
    <selection name="Sad" value ="23" description="Melancholy"
    largebmp="7290"/>
    <selection name="Glad" value ="24" description="Exultant"
    largebmp="7280"/>
    <selection name="Bad" value ="25" description="Malicious"
    largebmp="7300"/>
</data_page>
</study>

```

*Data Pages:*

*The remainder of the configuration file comprises the data page(s), which define the sequence of menus that the participant will see while entering data. The general format for each data page is:*

```
<data_page maxselections="number"> <question>QUESTION TEXT</question> <selection
name="name" value="number" description="text" largebmp="number"
[medbmp="number"]/> </data_page>
```

*Each data page defines one menu screen, and as many data pages as are needed can be defined. Within each data page, every selection is defined separately. The number of selections is limited to 12 on any menu, due to the limitations of the small Palm screen. It is, however, possible to create nested menus, in which after the participant selects the icon for some general category (in the example above, "gameplay"), he/she is presented with a sub-menu with more specific options within that category.*

*In the general format, "maxselections" defines the number of selections that the user can make simultaneously from that menu. If "maxselections" is equal to 1, then as soon as he/she picks a single selection, the program will automatically advance to the next menu. If "maxselections" is greater than 1, the program will allow the user as much time as needed to make selections, and advance only when the user selects "next" or "done" at the bottom of the menu screen. Note that on any data page that contains nested menus, the logic of the program is such that maxselections always must equal 1.*

*As elsewhere in the configuration file, the text of the question to be asked at the top of the menu defined by this data page is bracketed between the question tag, and the question end-tag. Then, the individual selections are defined one-by-one using the "selection" tag. Each selection is given a name, that may not usually exceed 6 or 7 characters to display properly. It is given a value, which is a unique number for that selection which will be used internally by the program in constructing the study database. The description text will be displayed when the user selects the name of the icon for that selection, rather than the icon itself. The "largebmp" setting defines what icon, from the resource library compiled into the program, will be used for this menu choice. Each icon is indicated by its number, not its name. Pre-installed icons, and their numbers, are displayed in Appendix A to this document. The "largebmp" must be a 20x20 pixel bitmap. Finally, the "medbmp" setting defines what icon, from the resource library compiled into the program, will be used in the miniaturized view of the icon used on certain screens after data have been entered. The "medbmp" must be a 10x10 pixel bitmap. Please note that this is an optional setting. If it is not included, the program will automatically generate a miniaturized version of the "largebmp." The program actually does an excellent job in this miniaturization, and it is recommended that when defining a new study you try letting the program generate the smaller icon automatically, and see if this is satisfactory, before constructing one manually.*

*After all data pages have been defined, the configuration file is always closed with the </study> tag. Any information placed after the </study> tag will be ignored.*



## SECTION VIII. Administrative Functions

Once the PROUST application is configured correctly and installed on the Palm or Palm-compatible hand computer, it should appear as an option in the main menu. Choose the PROUST icon to start the program. As the program initializes, it will display an initialization message, followed by a copyright notice. A password screen should then appear (figure 1). It should NOT display a message indicating that no configuration file was found, and a sample study is being generated. If this happens, then the XML configuration file was not correctly downloaded from your PC to the Palm. This most frequently happens because you did not successfully complete the “process” command (see Section V, step 11), or because you did not perform the second hotsync operation (see Section V, step 13).



Figure 1: Login Screen

From the password screen, you may access the administrative (manager’s) functions by entering the manager’s password defined in the study configuration file and selecting “login” at the bottom of the password screen. You will then have access to the manager’s screen, which permits you to change certain elements of the configuration of the program (figure 2). The configuration options provided are as follows:

- 1) **Study name.** You may change the name of the study.
- 2) **Study start and stop dates.** You may change the start and stop dates for data collection.
- 3) **Participant data.** You may change the name, ID number, and sex for the participant.
- 4) **Password.** You may change the participant’s password. This is accomplished using the “Password” setting in the center of the manager’s screen.
- 5) **Alarms.** You may change the number of alarms and the times when they go off, up to a maximum of six alarms (figure 3).
- 6) **Manager’s password.** You may change the password used to access the manager’s screen. This is accomplished using the “Passwd” setting at the bottom of the manager’s screen.

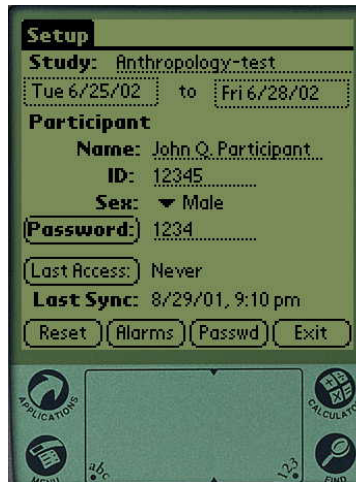


Figure 2: Manager's Screen



Figure 3: Alarm Screen

You may also use the RESET button to erase all participant data (although not the current configuration), or the LAST ACCESS button to view the access history for this participant. This screen will display, but not allow you to change, the last time and date when the data were synchronized (uploaded to the PC). Finally, you have the option to EXIT, which exists the ENTIRE PROGRAM, not just the manager's screen, although it does not erase any data. If you wish to LOG OFF the manager's screen without exiting the program, choose the pre-printed menu button located in the lower left corner of the display and data entry area (it looks like a two-colored bar with an arrow pointing downwards). From the menu that appears at the top of the display, choose "Logoff" (figure 4).



**Figure 4: Log-off Menu**

The other administrative function is synchronization (data upload). This is performed by attaching the Palm to the PC used to configure it by the Hotsync cradle or cable that came with the unit. The cradle or cable will contain a Hotsync button which you must push, with the Hotsync manager running on the PC. All the data will automatically be uploaded to the PC, but it WILL NOT BE ERASED on the Palm. The data are stored in the “c:\eat\output” directory, with the file name: StudyName\_UserID\_DateTimeStamp\_STUDYDATA.txt (StudyName, UserID, and DateTimeStamp are substituted by the actual name of the study, the actual UserID, and the actual date and time when the synchronization occurred, respectively). Note that a new file is created with each synchronization; thus, old data from previous uploads will not be destroyed. Synchronization will also create a file named: StudyName\_UserID\_DateTimeStamp\_CONF.xml, which contains a full copy of the current configuration of PROUST, including any changes that you have made in the manager’s screen.

The data file is a comma-delimited text file, and comprises a series of entries, one per line, and one for each block of time for which data were collected. (E.g., in the sample studies that come with the distribution, one per 15-minute block.) Each line contains the following information in the following order:

StudyName, UserID, ParticipantName, ParticipantSex, Date, BlockNumber, Data1, Data2, Data3,...

The date is the date FOR WHICH data were entered for that block of time, not the date when the data were entered, or when the data were uploaded. The block number is an integer between 0 and the total number of blocks in each day, minus one (in the example configuration file provided with the distribution, there are 96 blocks per day, so the BlockNumber would range from 0 to 95). Note that only this blocknumber will indicate the TIME for which data were entered. There is one data entry for each possible selection on ALL the menus that the user encounters. Each data entry is either “0”, indicating that the selection was not chosen, or “1”, indicating that it was. The data entries appear in the file in the SAME ORDER as the selections appear in the XML configuration file. This means that sub-menu choices will appear prior to subsequent main menu choices. The ordering of data entries can be confusing at first, and it is

highly recommended that new managers of this program experiment with data entry and the data files that are produced before deploying PROUST.

Once the synchronization is complete, PROUST will exit. You must restart the program if the participant will continue to use it after the synchronization. You will not lose any data by restarting the program.

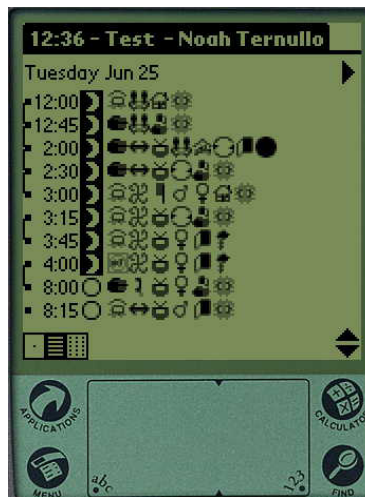
NOTE: Once PROUST has been configured, it is NOT POSSIBLE to change the configuration through the PC. The configuration must be changed through the manager's screen. If changes are required that cannot be performed through the manager's screen, then you must DELETE PROUST from the Palm, and re-install it with the new configuration. To delete PROUST, first make sure that you have uploaded all data, and that the uploaded files are in place and accurate on your PC. Then, exit PROUST through the manager's screen. Select the pre-printed menu button, as described above, and from the pull-down menu that appears, choose "delete." You will see a list of installed programs including PROUST. Select PROUST, and then the delete button. You are now ready to re-install the program.

## SECTION IX. Participant Functions

Access the participant functions of PROUST by entering the participant's password at the password screen, and clicking "login."

### a. Data Overview Screen

The first screen displayed after the participant logs in is the Data Overview Screen (figure 5). At the top of the screen, you will see a dark bar containing the current time, the name of the study, and the participant name (if there is enough room). After that is a display of the schedule, broken up into blocks of the appropriate length, and centered upon the CURRENT day and time. If, however, you access the program before or after the beginning or end of the study period, respectively, the display will reflect a date and time inside the study period.



**Figure 5: Data Overview Screen/Main Participant Screen**

At the top of the schedule, the day of the week and date are displayed. Then there is a list of times, with either an open circle or a crescent next to them. The crescent indicates "at night," and the open circle "during the day." Note that this is NOT the same as AM or PM. The program is configured to recognize 12am-5:45am and 6pm-12am as "nighttime," and all other times as "daytime." Not all times will display, as there is not enough room on the screen for the entire day to be visible at once. To scroll up to earlier times, or down to later times, use the up or down arrows, respectively, located in the lower right corner of the display. To scroll forward to subsequent days, or backward to previous days, use the right or left arrows, respectively, located in the right top corner of the display.

If data have been entered, there will be a row of miniaturized icons representing that data adjacent to the time for which they were entered. All selections will be listed in the order they appear in the data cascade menus as defined by the study configuration XML file, unless there is not enough room on the screen for them all (in which case, the list will be truncated). For each time block in the schedule, the START time is displayed. The STOP time is implicit as the next start time, minus one minute.

From the data overview screen, it is also possible to “zoom in” or “zoom out” to see more or less of the data on the screen at once. To “zoom in,” select the box with a single dot, found in the lower left corner of the display. Fewer blocks of time will be visible at once, but for those blocks that are visible, any data already entered will display using the large rather than the miniaturized versions of the icons. If there are too many icons for any time block to display them all on the screen, before they are truncated, first one by one icons at the end of the list will be miniaturized (figure 6). Alternately, to “zoom out,” select the box filled with fifteen dots in three columns, found in the lower left corner of the display. In this view, the entire day will be displayed all at once. However, since there is not room to display icons in this view, instead you will see a series of open (blank) or closed (blackened) boxes, next to times separated by one-hour intervals. Each box represents one time block. If any data have been entered for that time block, the box is closed; otherwise, the box is open. The boxes are arranged sequentially for each hour interval; thus, if each block represents 15 minutes, the first box after 12:00 would be for 12:00-12:15; the second for 12:15-12:30; etc (figure 7).

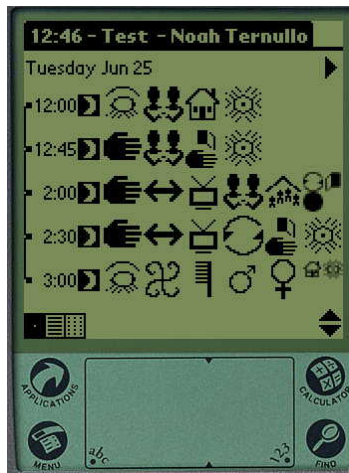


Figure 6: Close-up View

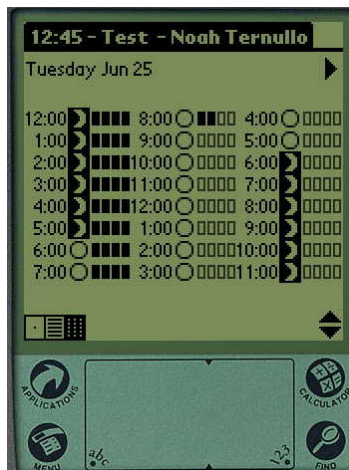


Figure 7: Full Day View

In the close up and medium (normal) views only, a shorthand device is used if more than one time blocks in a row contain PRECISELY the same data. In order to save room on the screen, such time blocks are collapsed, and all times but the very first one disappear from view. This is indicated by a vertical line on the left side of the display, which begins at the first time with identical data, and ends at the next time block with DIFFERENT data. All intervening times are hidden from view. However, by selecting the first time in this set of time blocks with identical data, the list is expanded and all time blocks are once again revealed to the participant's view. This is critical insofar as editing intervening time blocks after data are initially entered for them requires first expanding the list so that the time block is visible independent from its neighbors.

In any of the three views, it is possible to select a time to enter or change already entered data. This is done by simply tapping once with the stylus on the time block to be changed.

#### *b. Data Entry Cascade*

Once the participant has selected a time for which he/she would like to enter or modify data, the Data Entry Cascade will appear. Depending on the circumstances, the form of the first prompt that the user sees will differ slightly.

Normally, the user will be routed directly into the data entry cascade, as described below. If data were already entered for that time block, they will be pre-selected, and may be modified. Otherwise, no options will be pre-selected, and new data may be entered.

However, there is one special circumstance in which another menu will appear before the data cascade. If no data have been entered for the time block the user has selected, BUT data HAVE been entered for the PREVIOUS time block, a question will appear, the precise form of which is defined in the study configuration XML file. This question gives the participant three options: to indicate that the data for the current time block are the same as, similar to, or different from the data from the previous time block. If the participant indicates that the data are the SAME, then the data from the previous time block are replicated for the new time block, and the participant returned directly to the data overview screen without proceeding through the data entry cascade. If the participant indicates that the data are SIMILAR, then the participant is routed through the data entry cascade, but with the choices from the previous time block pre-selected, as for editing. If the participant indicates that the data are DIFFERENT, then the participant is routed through the data entry cascade without any choices pre-selected, as with normal new data entry. This is an important function, as participants may have long periods of time during which their experience does not change (e.g., sleep). It is frustrating and tedious for participants if they must re-enter all the data for every time block during that period of no change; this provides a short-cut.

Once the participant enters the data entry cascade, he/she will encounter the menu structure as defined in the study configuration XML file. At the top of the screen, the current time, the name of the study, and the name of the participant will still be displayed. Following that will be the question defined in the configuration file, followed by a list of icons representing the different selections they may choose. If the participant chooses the icon for a selection,

he/she will either advance to the next menu (if only one choice was permitted from this menu), or a box will appear around the selection chosen. If, however, the participant chooses the NAME of the selection rather than its icon, a help screen will appear that contains the brief description from the study configuration file. Then, they may either choose “select” if they determine they did intend this selection, or “cancel” otherwise to return to the list.

If the menu uses sub-menus, the sub-menu will automatically appear when the appropriate selection is chosen. If the menu permits multiple selections, then the menu will not disappear until the participant chooses “next” or “done.” If, however, any menu permits only one selection, as soon as a selection is made the program will advance to the next menu. The one exception is that the data cascade will not exit without the user selecting “done.” That is, if the final menu in the cascade allows only one selection, once that selection is chosen, the menu will not disappear; the user must select “done” to exit. At any point in the data cascade, it is possible for the user to move forwards or backwards by choosing “next” or “back,” respectively. The program will not prohibit the user from skipping a menu (that is, choosing “next” without choosing any of the selections on that menu.) In this case, it will record in the data file as all zeros; that is, nothing was selected for that menu. Depending on your instructions to the participant, for analytical purposes this can either be treated as “none of the above,” or as missing data.

In any menu where multiple selections are permitted, when editing entries already containing data, UNCHOOSE a selection by clicking on its icon; the black box surrounding the icon will disappear. In any menu where only one selection is permitted, it is not necessary to unchoose a selection; simply choose the new selection, and the previous one will automatically be voided.



## SECTION X. Research Techniques

This section comprises a series of suggestions for how this program can be effectively deployed, based upon our experience in research using PROUST in a predominantly middle-class population in the United States. This is a set of suggestions only; alternative approaches may, indeed, be possible, especially with some ingenuity. Further, successful research techniques are bound to differ somewhat in other sociocultural contexts.

- 1) **AGE OF SUBJECTS.** It has been our experience thus far that children under the age of 10 do poorly in entering their own data. Although they often have the requisite general technological savvy, the complex menu structure and the possibility for logical contradictions to be entered as data (see Section XII, below) often serve as a source of confusion. We strongly recommend that, with young children, children and adults jointly enter the data. In some cases, with very small children, adults may need to take over data entry entirely.
- 2) **INTERMEDIATE VISITS.** In our studies, American participants have been asked to keep 24-hour activity records for 7 consecutive days. In this context, we found that AT LEAST 2 intermediate check-up visits, or at a bare minimum telephone conversations, are required between the initial visit when instructions are given for using the software, and the final visit when the data are downloaded. This serves four critical purposes: first, it provides a constant reminder and impetus to continue updating the records; second, it provides an opportunity to download data periodically, in case something goes wrong during the latter part of the data collection period; third, it provides an opportunity for participants to ask questions regarding any problems they've had with the program; and fourth, it provides an opportunity for investigators to review data with participants while their memories are still fresh. The first follow-up visit (which should occur no later than 1.5 days after data collected has started) in particular serves the critical purpose of training participants in the meaning and use of the icons so that their report of daily life is accurately channeled into the terms of the study.
- 3) **ALARM SETTINGS.** In our studies, three alarm settings per day have generally proven sufficient for a good 24-hour recall of the day. Participants can also be encouraged to take the Palm Pilot with them, and enter data during breaks in their daily schedule, even when the alarm has not sounded. However, alarms could be timed and a priori set randomly or on a fixed schedule to prompt cross-sectional reporting at the moment, or over the previous specified time interval (e.g., prior 5 min, or previous hour).
- 4) **SAMPLE PALM.** When explaining to participants how to use the program, it is usually critical to have one "extra" Palm Pilot on hand that they can practice with. It is important that this Palm *not* be one that they will be using, because of the record deletion issue described in Section XII, which will prevent "dummy" sample data from easily being expunged.
- 5) **SAMPLE SCENARIOS.** Investigators are advised that it is usually critical to come prepared with a series of somewhat complicated sample scenarios that participants would

need to be able to code. Allow the participants to code them on their own as a practice run, once they have received instructions in the overall coding procedures. Also allow participants to dream up a few sample scenarios of their own, and make sure they know how to code them correctly.

- 6) **CHEAT CARDS.** It may be helpful to create a wallet-sized laminated card with reminders for the participants on basic program usage. While built into the program is a help function that will remind users of the DEFINITIONS of various icons they can choose in the data cascade screen, there is no help function that will remind users how to operate the program in general.
- 7) **BACKUP TECHNOLOGY.** Although we have found this to be quite rare in our computer-tech literate population, occasionally a participant is simply unable or unwilling to operate the Palm Pilot. This may be due to physical limitations, or due to extreme discomfort with computers. We found it useful to have an entire backup technology based upon stickers with grid sheets, checklists, or some other technique available that these rare individuals can use. For advice on creating a simple backup technology that is compatible with the data generated using PROUST, write to Jason DeCaro or Carol Worthman (see contact info in section II).
- 8) **CLEAR GUIDELINES.** The soul of successful use of this program is VERY CLEAR guidelines provided to the participant, not only for how to use the program itself, but also for all icons/categories/selections that you have created in the configuration process. The program has only a limited ability to provide the user with help if the guidelines are not clear and memorable. Consider in advance such issues as: how short in duration can an event or experience be and still remain “codeable?” For example, in a study tracking activities at a 15-minute resolution, a 30-second phone call may still be important to record, as ONE OF the activities that took place during that 15 minutes. Or, depending on the design of the study, you may prefer that participants ignore short-duration events. The combination of new software on new technology (for some participants) and an actual study construct can be daunting if the instructions are vague in any way.
- 9) **FUDGE PERIOD.** The first 24 hours is often the period in which participants have the most problems, before they become familiar with the program and the study. It is advisable to sift through data from this first day especially carefully, to make sure it is accurate, and not biased by the participants’ initial discomfort with study procedures. An effective technique is to translate the participant’s data record into a verbal narrative that reconstructs their day, and to solicit clarification, elaboration, and completion of any gaps as the narrative proceeds. It may even be advisable to add one extra day of data collection onto the study, and automatically reject the first 24 hours of data as unreliable, although we have not found this approach necessary.
- 10) **POWER SUPPLY.** Note that if the power supply to the Palm Pilot fails for more than a brief period, all data will be lost. Therefore, provision of power to the Palm Pilots needs to be carefully tailored to the needs of the study protocol. In most cases, it will be best to use batteries, and to supply the Palm Pilot with new batteries each time it is used. Use of

batteries avoids the possibility of power failures associated with use of cradles (e.g., users may forget to use the cradle, or the cradle may become disconnected). Fresh batteries easily support collection of a week's worth of data for the uses that we have deployed so far, but we suggest that investigators determine length of use constraints carefully before fielding their protocols.

Because this program is highly configurable, it may be used for nearly any research that tracks discrete events or experiences across the entire day. It is most useful when the priority is to capture recollection of events in a structured, sequential manner – in effect, a guided narrative. It is less useful when recall bias would be a serious limitation in the study. It has the advantage of capturing and even highlighting key, salient events (that is, it takes advantage of the bias inherent in the memory process), while providing sufficient structure that even minor events are usually recalled. It also can capture important events or experiences of very short duration, which might be missed using a random sampling approach. However, when objective accuracy of the event sequence is the highest priority, and therefore a recall-based process is undesirable, spot-observations or techniques such as the Experience Sampling Method may be more appropriate (Betzig and Turke, 1985; Borgerhoff Mulder and Caro, 1985; Gross, 1984; Larson and Verma, 1999).

#### Section References:

Betzig LL, and Turke PW (1985) Measuring time allocation: observation and intention. *Current Anthropology* 26:647-650.

Borgerhoff Mulder M, and Caro TM (1985) The use of quantitative observational techniques in Anthropology. *Current Anthropology* 26:323-335.

Gross DR (1984) Time allocation: a tool for the study of cultural behavior. *Annual Review of Anthropology* 13:519-558.

Larson RW, and Verma S (1999) How children and adolescents spend time across the world: work, play, and developmental opportunities. *Psychological Bulletin* 125:701-736.

**SECTION XI. Troubleshooting**

This section describes some of the common problems that you may encounter with PROUST, and suggests some solutions. If you have problems that this section cannot resolve, please contact Jason DeCaro (see contact information in Section II) for assistance. Also please contact Mr. DeCaro if you encounter other problems for which you determine the solution, and that you believe should be included in this list of troubleshooting suggestions.

<b>PROBLEM</b>	<b>DIAGNOSIS</b>
When I process a new XML configuration file, I receive an error message.	There is a syntax error in the XML file. Re-open it with a text editor and look carefully for problems.
When I start PROUST, I receive a message indicating that no configuration file was found.	You have not successfully configured PROUST. This most frequently happens because the process command was not successful, or the second hotsync operation was neglected (see Section V). Delete PROUST from the Palm as described in Section VIII and re-install.
When I exit the manager's screen, the program exits.	You have chosen the "exit" rather than "logoff" function from the manager's screen. See Section VIII.
The Palm responds very sluggishly to commands inside the program, and/or initialization takes a long time.	Some older or lower-end versions of the Palm platform use rather slow processors that take some time to perform certain functions of the program. This should not affect data entry, however.
When I tap on the screen using the stylus, the program incorrectly recognizes which option I have selected.	The Palm digitizer is miscalibrated; refer to your hardware owner's manual.
I cannot see anything on the screen; it is all blank or all dark.	Your contrast or brightness may be off. See your hardware owner's manual.
The Palm will not turn on.	Your battery may have run down. You <b>MUST</b> be aware of the possibility this will happen, and check the battery status periodically (refer to your hardware's owner manual for how to check and replace or recharge battery power). If the battery power is totally exhausted for more than a short time, all data will be lost. You will not receive a warning inside the program.

## SECTION XII. Known Bugs and Limitations

The following bugs or limitations have been identified in this version of PROUST. Others issues may also exist that have gone undetected thus far, or are inherent limitations not made explicit in this document.

- 1) **CONDITIONAL MENU ISSUE.** Currently, the configuration does NOT permit any kind of looping or conditional structure in the menus. Thus, for example, if you have constructed a menu that allows the user to choose several options, and one of those options is “Nothing” or “Nobody” or another affirmative null response, there is no way to prevent the user from ALSO selecting one or more other icons. This also means that if you have several menus in a row with the same options, with the intent that users can choose more than one of them sequentially, nothing prevents the user from selecting the same option on multiple menus. Thus, take care with the participants to make sure they understand the logical contradictions that can result, and review data carefully while the participant is still available to make sure you can resolve any logical contradictions that the participant has created.
- 2) **TIME RESOLUTION ISSUE.** It is not currently possible to select a time resolution for data entry smaller than 15 minutes, or greater than one hour.
- 3) **BATTERY POWER ISSUE.** This program intercepts most alarms that would normally warn users of problems with the equipment, including low battery power. Make certain to check the equipment periodically for adequate battery power, by exiting the program, and looking at the battery gauge on the Palm’s main menu. If the battery runs down completely, you risk losing all data since the last synchronization.
- 4) **HARD RESET ISSUE.** This program was designed to “take control” of the Palm Pilot, including intercepting a “soft reset,” such that a user cannot exit the program without the password. However, the program will not intercept a “hard reset.” If a user completes the “hard reset” sequence, the program and all its data will be lost.
- 5) **ICON SIZE ISSUE.** On the large icon view screen, if there are more icons than can fit in a row, some of the icons will be miniaturized to allow them all to fit. There is no way to scroll left or right in any of the data views.
- 6) **DAILY LAYOUT ISSUE.** As presently designed, the data overview can only be presented in terms of calendar days (i.e., 24 hour segments beginning at midnight and ending midnight the following day). It is not possible to configure this program to only collect data for the daytime, for example, or to have each screen begin at 6am and end at 6am the following day.
- 7) **ICONS PER SCREEN ISSUE.** In any single menu (screen) in the data entry cascade, there can be no more than twelve choices. If additional choices are programmed into the configuration file, there will NOT be a “scroll bar” allowing the user to select them. Instead, choices in excess of twelve will simply be cut off.

- 8) NO TIMESTAMP ISSUE. Although a record is kept of when data are synchronized between the computer and Palm Pilot (downloaded), no record is kept of *when* the user enters or modifies data. If it is important to know the precise time of data entry for each time block, it will be necessary to have participants track this separately, or to write additional code to allow such recording.
- 9) RECORD DELETION ISSUE. Currently, there is no way to delete a record, once data have been entered for any given time slot, without clearing the ENTIRE database. Thus, if users inadvertently enter data, they can change and correct that data, but they cannot return the time slot to the “blank” (no data) condition.
- 10) SIMPLE ICONS ISSUE. Presently, due to inherent limitations of the display hardware, icons must be very small and simple (20x20 pixel bitmap). As logically follows, the automatically rendered miniature icons used in certain views by the program (10x10 bitmaps) will be even more elementary, although the program contains good algorithms for miniaturizing 20x20 icons without losing too much recognizability.
- 11) REQUIREMENT FOR DEVELOPMENT PLATFORM ISSUE. Presently, as described in earlier sections of this document, it is necessary to purchase the CodeWarrior development platform in order to customize the total pool of icons available for the program.
- 12) PC-ONLY SYNCHRONIZATION ISSUE. A PC-compatible computer running Windows must be used to configure the program and download data from the Palm. Support for Apple MacIntosh or other platforms is not currently available.
- 13) FORWARD COMPATIBILITY ISSUE. Some problems may be encountered using PROUST on PalmOS versions later than 3.5.x. A bug-fix release (PROUST version 1.2) specifically addressing this problem is currently in development, and hopefully will be available shortly. In the meantime, however, please make certain that you have purchased equipment for use in your project that is capable of running PalmOS 3.5.x.

















Should a subsequent version of this program be released, these are amongst the issues we may try to address, with the exception of the “hard reset issue,” which is a necessary feature as well as a limitation (there must always be some way for a frozen Palm Pilot to be reset if all else fails).




















If in your use of the program you come across either bugs that must be fixed, or functions you would like to see added to overcome limitations of the program, please let us know by writing to Jason DeCaro ([jadecar@emory.edu](mailto:jadecar@emory.edu); or see full mailing address in section II). While we cannot guarantee that we will incorporate your suggestions, or that a subsequent version of the program will be developed, we will take your feedback very seriously.

**APPENDIX A**

**PRE-INSTALLED ICONS**

The following icons, which met the needs of the first study for which PROUST was deployed in the field, are already installed. Although each study will most likely need its own custom-designed set of icons, should the following icons prove sufficient for a new research application, it would be unnecessary either to purchase CodeWarrior or to follow the icon configuration procedures described in section VI.

<i>Icon ID Number</i>	<i>Graphic</i>
7000	
7010	
7020	
7030	
7040	
7050	
7060	
7070	
7080	
7090	
7100	
7110	
7120	
7130	
7140	
7150	

7160	
7170	
7180	
7190	
7200	
7210	
7220	
7230	
7240	
7250	
7260	
7270	
7280	
7290	
7300	
7310	
7320	
7330	
7340	
7350	