GazeTracker Reference Manual

Chapter 3: Analysis and Visualization

Chapter 4: GazeTracker Menu Structure

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Appendix A: Eye-tracker Setup

CHAPTER 1
An Introduction to GazeTracker

Overview

GazeTracker allows you to easily conduct eye movement studies and to analyze the many different types of data that GazeTracker collects.

GazeTracker serves three important functions. GazeTracker:

1. **Presents and records stimuli.** GazeTracker may present and record stimuli to test subjects in a variety of formats, including sequences of still images, video files, or graphical user interfaces operating on a computer.
2. **Synchronizes the data it captures.** GazeTracker not only synchronizes eye-tracking data to stimuli it displays or records, it also captures computer state data, such as where test subjects click on the screen.
3. **Allows analysis and visualization of the data it collects.** GazeTracker provides powerful tools for navigating and interpreting all of its captured data.

This manual will guide you through installing and using your GazeTracker software. The manual is organized as follows:

- This chapter describes installation of the GazeTracker software.

- Chapter 2 details how to setup each of GazeTracker's analytical modes for capturing and analyzing data.

- Chapter 3 describes the reports and graphs that GazeTracker produces.

- Chapter 4 provides a breakdown of each of GazeTracker's menu commands. When using the GazeTracker software, if you are unsure what a command does, look it up in this chapter. Chapter 4 cross references more detailed explanations from Chapters 1 through 3.

- Chapter 5 provides basic troubleshooting support. More detailed troubleshooting may be found on the web at www.eyeresponse.com/support, by contacting technical support via e-mail at support@eyeresponse.com, or via phone at 866-EYE-TRACK (866-393-8722).

Installation

If you received an installation CD, insert the CD into your CD or DVD drive. Setup should begin automatically. If setup does not begin, run setup.exe from the CD.

If you downloaded the installation files from the Eye Response Technologies website, unzip the installation files into a directory of your choice. Then run setup.exe from that directory.

You will need administrative rights on your computer to install the software. Also, please ensure that all other applications are closed. GazeTracker integrates with Internet Explorer for web page studies, so it is especially important that Internet Explorer be closed.

Follow the directions in the Installation Wizard. Early in the wizard, you will see the screen shown below:
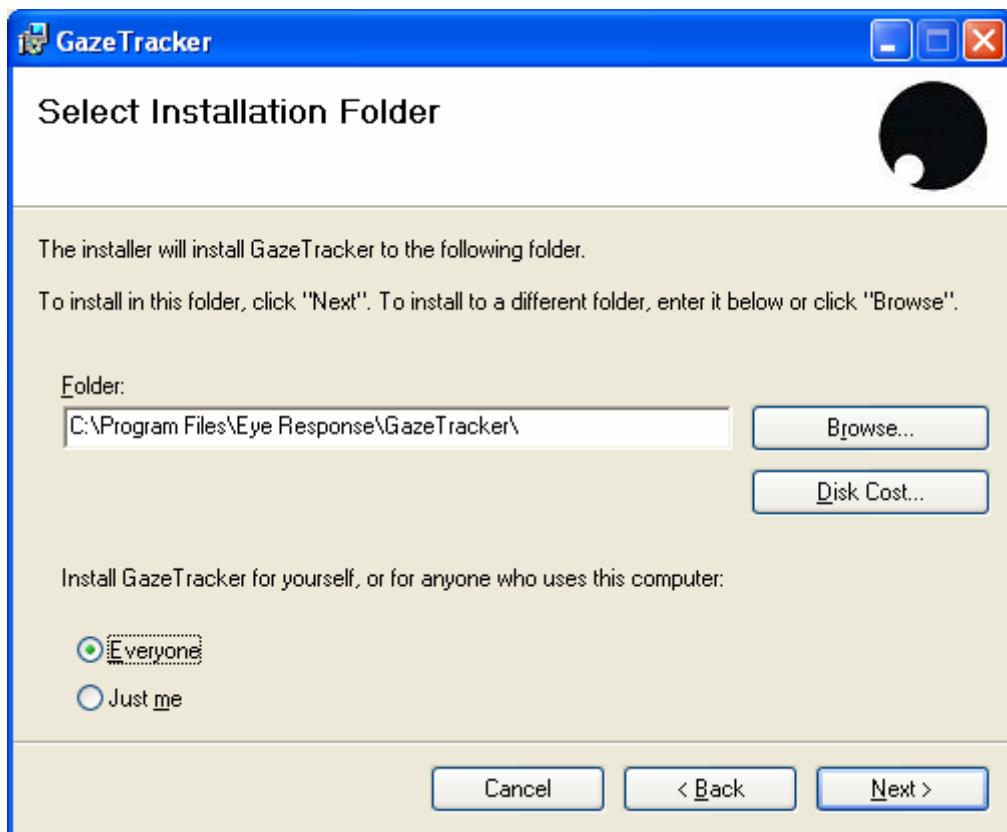

Figure 1. Specifying Install Directory and User Installation Options.

This screen lets you specify where to install GazeTracker and what users have access to the installation. It is recommended that you install GazeTracker for everyone on the computer. After completing this screen, installation will begin.

After installing GazeTracker, launch it by double clicking on the icon located on the desktop or press the Start button, choose the All Programs menu, then the Eye Response menu, and click the GazeTracker menu item.

GazeTracker.e
xe

Figure 2. GazeTracker Icon.

Activation

You must activate your GazeTracker software to be able to use it. Each copy of GazeTracker may be installed on one machine. To activate GazeTracker, follow the directions in the Activation Wizard that appears when GazeTracker is executed. The Activation Wizard will not appear again after GazeTracker is activated.

During the Activation Wizard, it is highly recommended that you choose the option to activate your software through the Internet. This allows instantaneous activation of your software. If you choose not to activate GazeTracker directly through the Internet, you may fax, e-mail, or call with your hardware id number. The activation key that you receive from Eye Response Technologies is case sensitive.

It is also highly recommended that you complete the user contact information section of the Activation Wizard; however, this is not required. Your information will not be shared with any third parties, and by completing the contact information section, Eye Response will know how to keep you informed of product updates.

Installing Media Components

GazeTracker employs Microsoft Windows Media technologies to accomplish its more advanced functionality. If GazeTracker detects that these technologies are not installed, GazeTracker will prompt to install them. Failure to install these technologies will result in reduced functionality of your GazeTracker software.

When GazeTracker detects that installation of these technologies is needed, it displays this message:

Figure 3. Microsoft Windows Media Components Installation Notification.

Setup Assistant: Introduction and Analysis Mode

GazeTracker provides a setup assistant that facilitates configuring GazeTracker for new recordings and for data analysis. The setup assistant appears after activation and installation of media components. The assistant provides a brief explanation of GazeTracker and its different analysis modes.
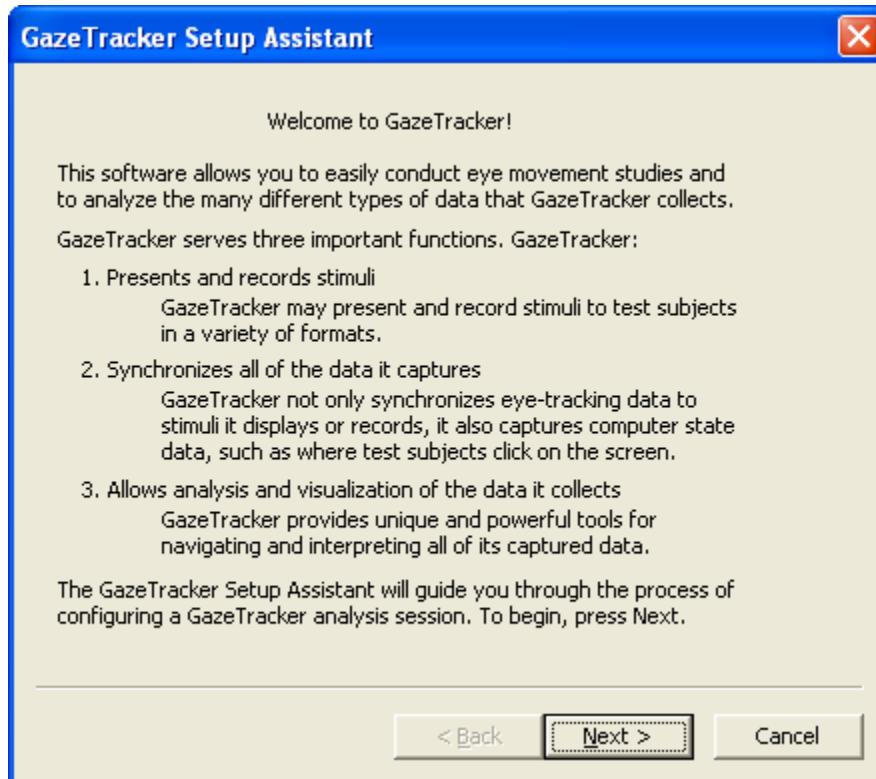

Figure 4. GazeTracker Setup Assistant.

If you have GazeTracker: Basic, you will not have access to the Setup Assistant. You will only be able to use Image Analysis mode. You will instead be presented with the dialog box below when launching GazeTracker:
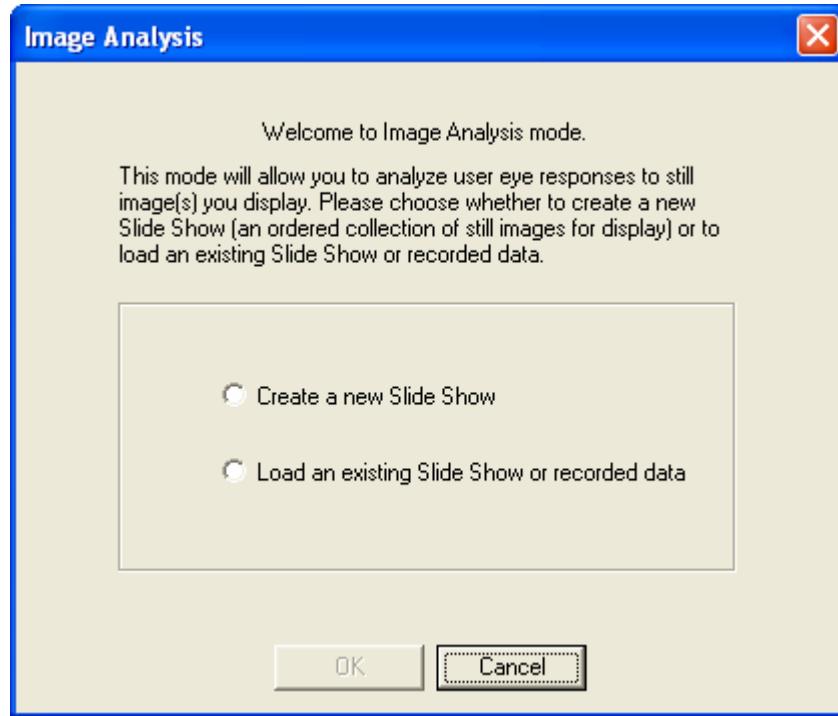
Figure 5. Selecting an Image Analysis Mode selection in GazeTracker: Basic.

For GazeTracker: Basic, if you choose to create a new slide show, which is an ordered collection of images to display, proceed to the **Configuring Image and Video Analysis** section on page 2.4. If you choose to load a slide show or test subject data, proceed to the Load Data command for the File menu on page 4.1 of Chapter 4 for an explanation detailing how to load data.

In the Setup Assistant, the first task is to choose which analysis mode you wish to use – Still Image, Software Application, or Video.

- Still Image mode records the reactions of test subjects to sequences of still images that GazeTracker displays.

- Software Application mode passively records how test subjects interact with the computer executing GazeTracker. GazeTracker sits in the background, and test subjects use the computer as they normally would.

- Video Analysis mode presents video clips, such as AVI files, on the computer screen. Video Analysis is also used to synchronize eye tracking data to external scene camera data.

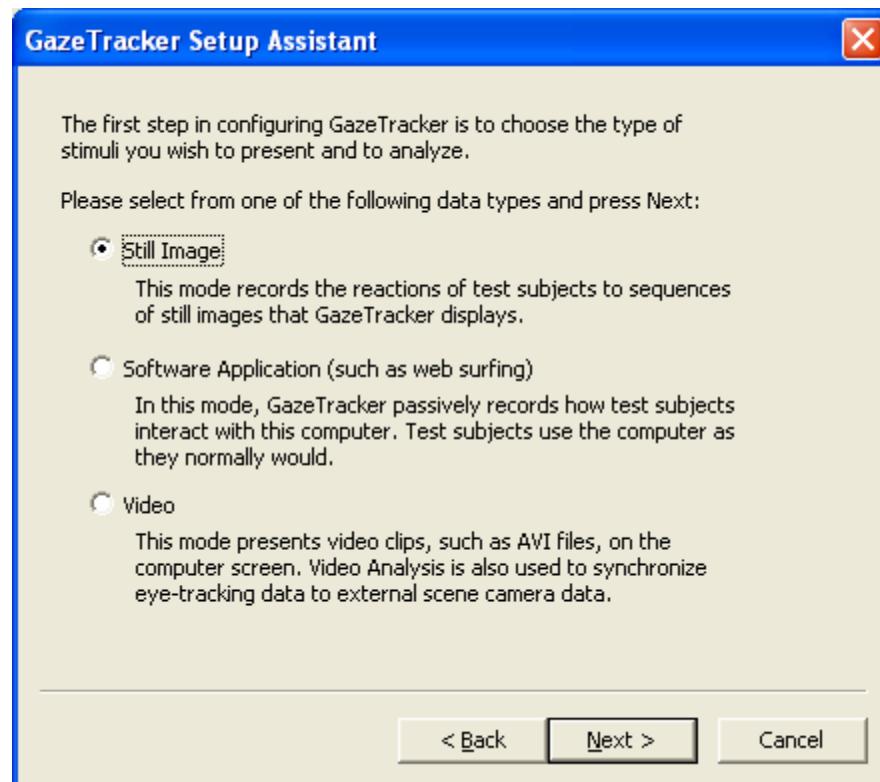Select the mode you wish to use and proceed to Chapter 2.

Figure 6. Selecting an Analysis Mode in the Setup Assistant.

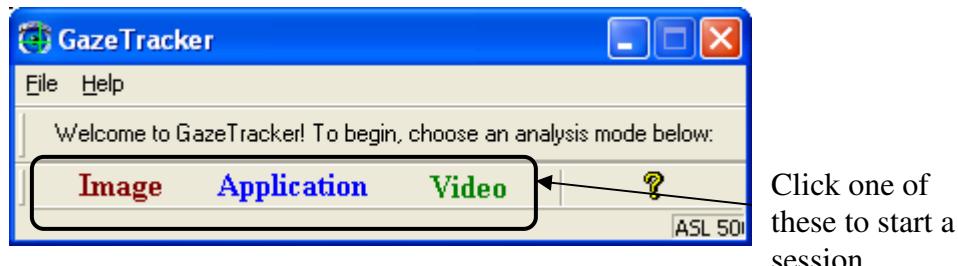If the setup assistant is not enabled, you will be presented with the toolbar below:

Click one of these to start a session

Figure 7. Selecting an Analysis Mode with the Toolbar.

Click the button for the mode you wish to open and proceed to Chapter 2.

CHAPTER 2
Configuring and Recording with GazeTracker

Setup Assistant: Analysis Mode Options

As described in the previous section, the Setup Assistant guides you through configuring your GazeTracker software.

After you have selected the analysis mode, you will be presented with a screen asking you how you wish to configure GazeTracker. A configuration specifies the options governing what stimuli are displayed or recorded and how data is stored.
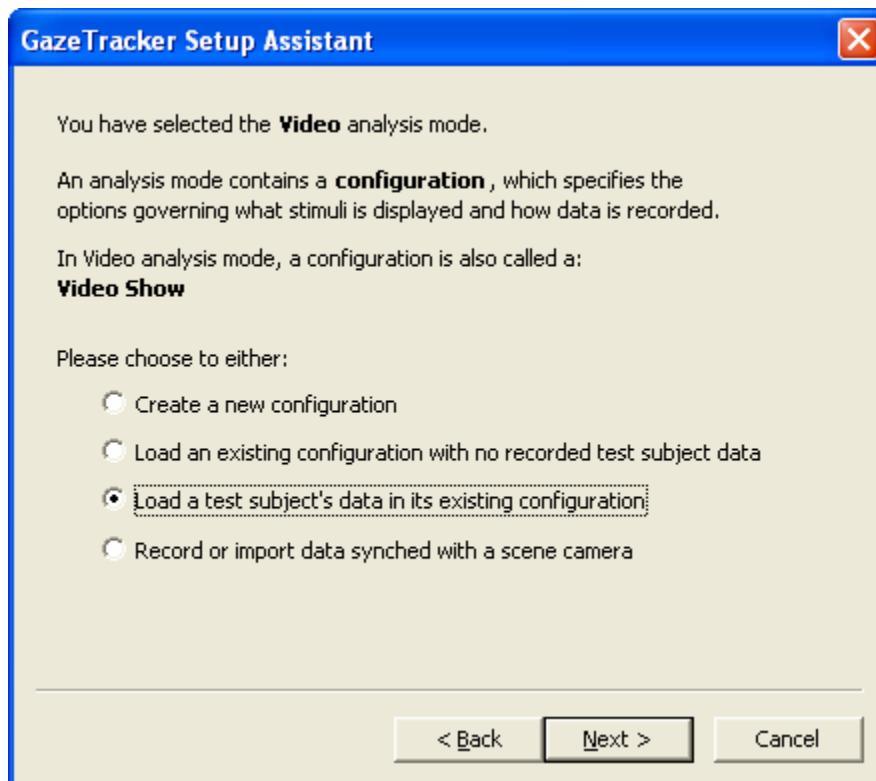
Figure 8. Selecting Mode Options.

Creating a new configuration

If you choose to create a new configuration and press Next, the Setup Assistant launches the Setup Wizard for the analysis mode you chose in the previous step. If you previously chose Image or Video analysis, proceed to the **Configuring Image and Video Analysis** section on page 2.4. If you previously chose Application Analysis, proceed to the **Configuring Application Analysis** section on page 2.11.

Loading an existing configuration

If you choose to load an existing configuration and press Next, you will need to select the configuration to load:

Figure 9. Loading a Configuration.

The Demo configuration ships with all GazeTracker software. After pressing Next on this screen, you will be given a summary of your choices as detailed in the next section.

Loading test subject data from an existing configuration

If you choose to load test subject data and press Next, you will need to select the test subject to load:
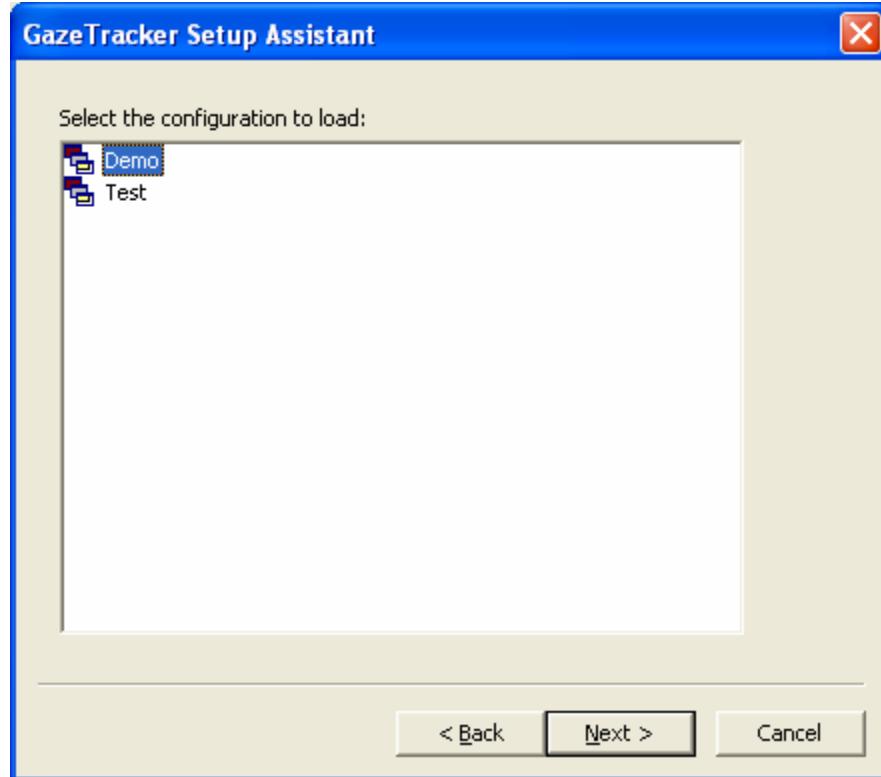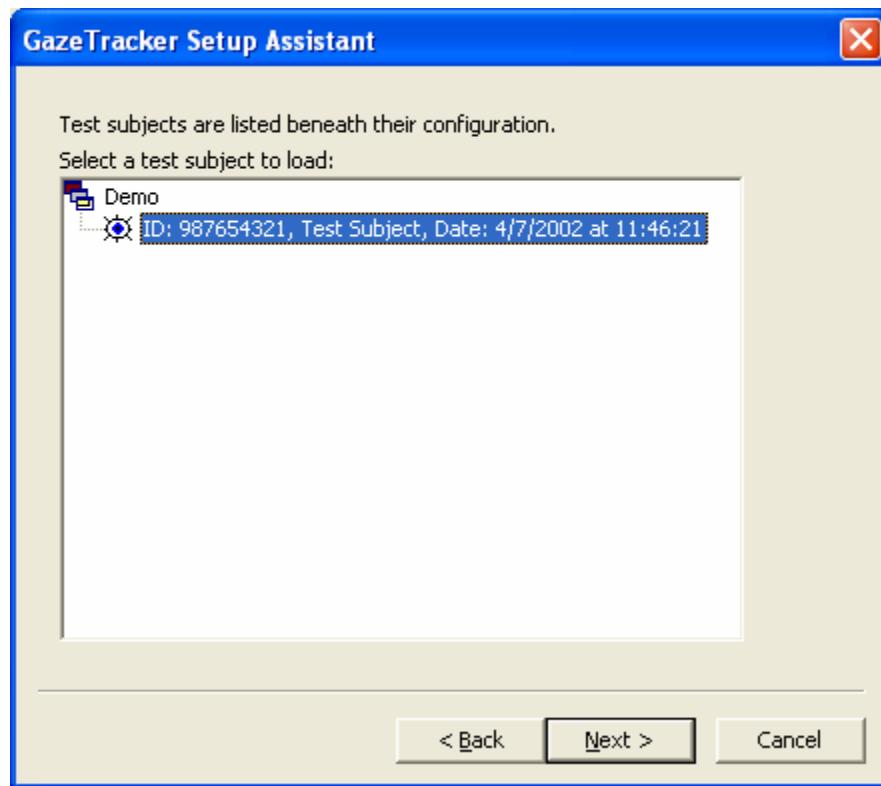
Figure 10. Loading a Test Subject.

Test subjects are listed beneath their configuration. The Demo configuration ships with all GazeTracker software and lets you analyze prerecorded test subject data. After pressing Next, you will be given a summary of your choices as detailed in the next section.

Recording or inputting data synched to a scene camera

This option is only available to users of GazeTracker: Premium. Video Analysis mode must also be selected for this option to appear. If you choose this option, the Setup Wizard for Scene Synchronization is loaded. Consult the separate GazeTracker: Premium Specific manual, Premium.pdf, for a detailed discussion of how to configure and to record data with scene synchronization. Premium.pdf is located in the Manual subdirectory where GazeTracker is installed. The default installation directory for GazeTracker is C:\Program Files\Eye Response\GazeTracker.

Setup Assistant: Summary

If you chose to **Loading an existing configuration** or to **Loading test subject data from an existing configuration** in the previous section, you will be presented with a summary of your choices:
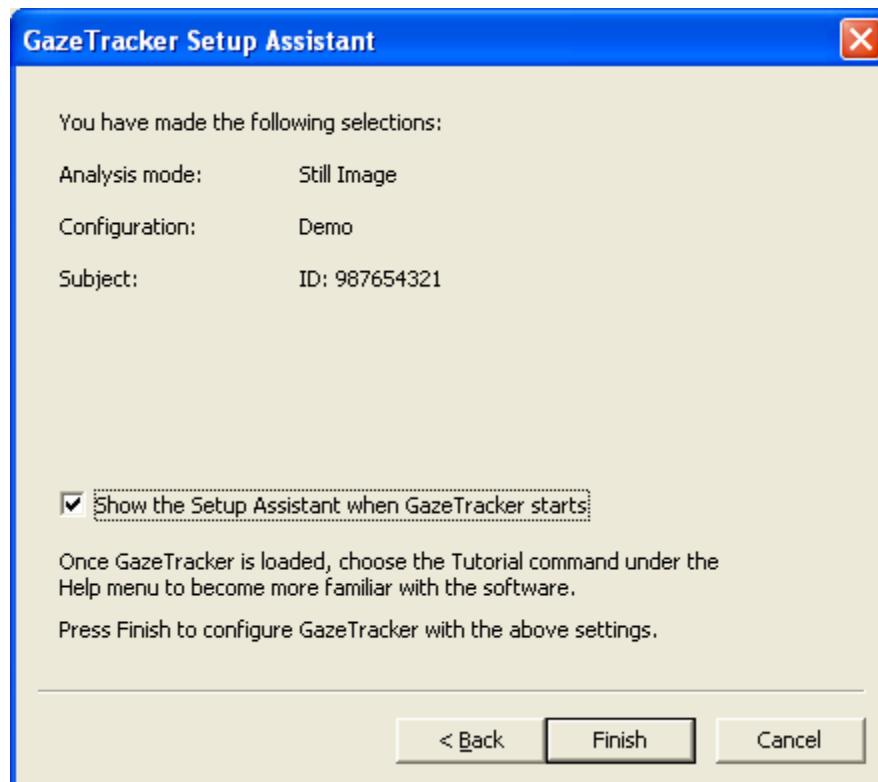
Figure 11. Setup Assistant Summary.

This screen also lets you specify whether or not the Setup Assistant launches when GazeTracker starts. If you disable the checkbox, GazeTracker will load the GazeTracker toolbar described at the end of Chapter 1. In this toolbar, you will select the mode you wish to use, and the Setup Assistant will launch into the Analysis Mode Options page for that particular mode.

After pressing Finish, proceed to the **Data Navigation** subsection of either the **Configuring Image and Video Analysis** section or the **Configuring Application Analysis** section below.

Configuring Image and Video Analysis

Setup Wizard

A configuration specifies what stimuli are presented and how data is recorded. In Image Analysis, configurations are called Slide Shows. In Video Analysis, configurations are called Video Shows. The Setup Wizard allows you to specify the options for your slide or video show.

The options in the Setup Wizard for Image and Video Analysis are nearly identical. The only difference is that movie files are specified for Video Analysis and image files are

chosen in Image Analysis. Therefore, the remainder of this section will provide pictures for just the Setup Wizard of Image Analysis.

Step 1 – Select Slides

After the introduction screen of the Setup Wizard, you specify the stimuli to show in your configuration:
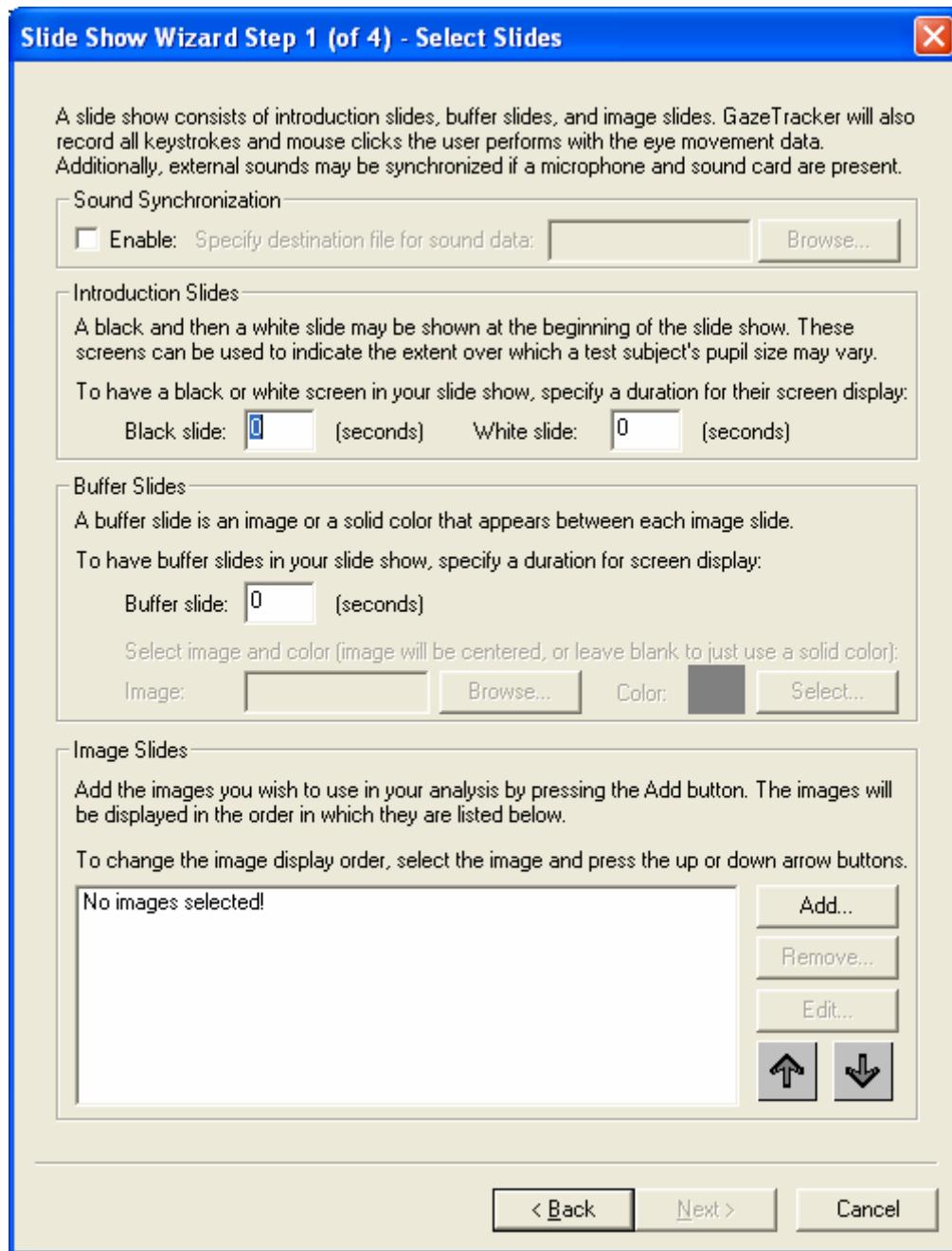
Figure 12. Configuration Options.

Slide (or Video) Shows consist of introductory slides, buffer slides, and image slides (video slides for Video Shows).

Introductory slides are black and white screens that you may show at the beginning of your configuration. Their purpose it to show the range over which the pupil may dilate or constrict. To show a black slide, specify a duration for it to be displayed. To show a white slide, specify a duration for it to be displayed.

Buffer slides appear between each image or video slide. A buffer slide may be an image or a solid color. To have buffer slides, specify a duration for it to be displayed. You will then be able to select the image or color to use. The image displayed will be centered on the screen and displayed at its default size and aspect ratio.

The final section of this screen contains the listing of images you wish to show in the order in which you wish to show them. Press the Add button to add new images. Image Analysis supports bitmap, jpeg, or gif images. Video Analysis supports any file type compatible with Windows Media Player. The image display order may be changed by selecting an image and then using the up and down arrow buttons to move the image up and down the list. If you wish to randomize presentation of the images, that option is present under **Step 2** below.

Step 2 – Control and Display Options.

Next, you must specify the options governing the control and display of your slides.

Image slides must have an advancement mode set. Video slides will advance once the video has ended, so Video slides do not require a separate advancement mode.

Two general advancement modes are available. The first has the slide advance with the press of a keyboard or mouse button. To change the keys or buttons that change the slide, press the Choose button. The second advances the slide after a particular time the slide has been shown.

A decrement mode allows you to return to a previously displayed slide.

Randomize slide presentation order will cause GazeTracker to randomly present each image slide. Slides will not be repeated.

Under the Display Options group, you may choose to stretch the images and the background color. The background color is the color GazeTracker uses to fill in the border around the picture if it does not cover the entire screen.

When choosing to stretch the images, you may stretch the images to fit the screen or stretch them a percentage of the screen size. You may also choose to preserve the aspect ratio of the stretched image. If stretching to the screen, this will cause the largest side to

be stretched to the screen size. If stretching a custom percentage, only a horizontal stretch percentage is available if preserve aspect ratio is enabled.
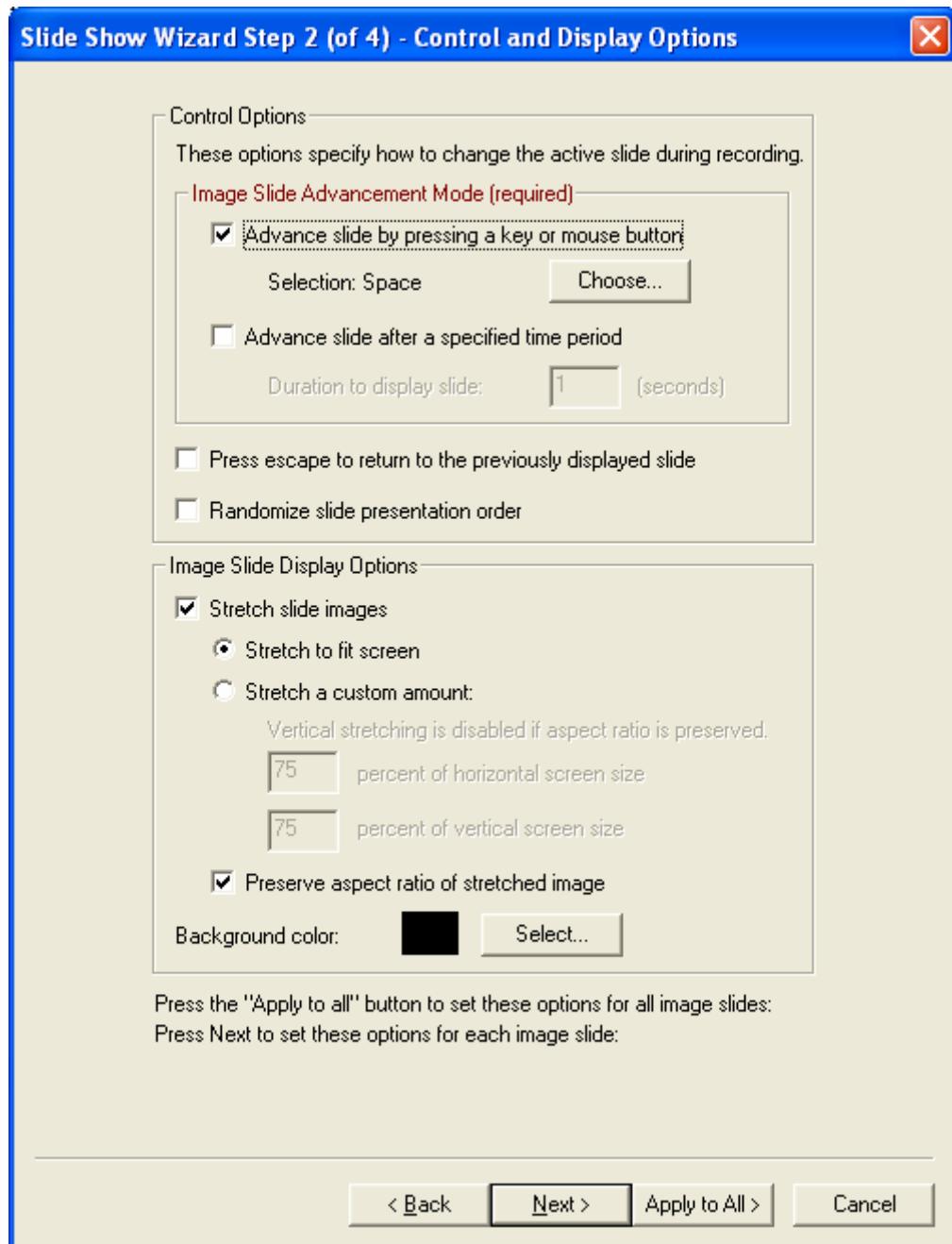
Figure 13. Setup Wizard Control and Display Options.

Press the Apply to All button to have each image slide use these control and display options. Apply to All will take you to Step 4.

Pressing Next will allow you to specify control and display options for each image slide. The options set on this page will be the default options for each slide.

Step 3 – Individual Slide Options

If Next was pressed in Step 2, you will now specify the individual control and display options for a slide. These options are identical to the options in Step 2. The default values for these options are the values chosen in Step 2.

Figure 14. Individual Slide Options.

If randomization was chosen in Step 2, you will have the option to specify the slides that appear immediately before or 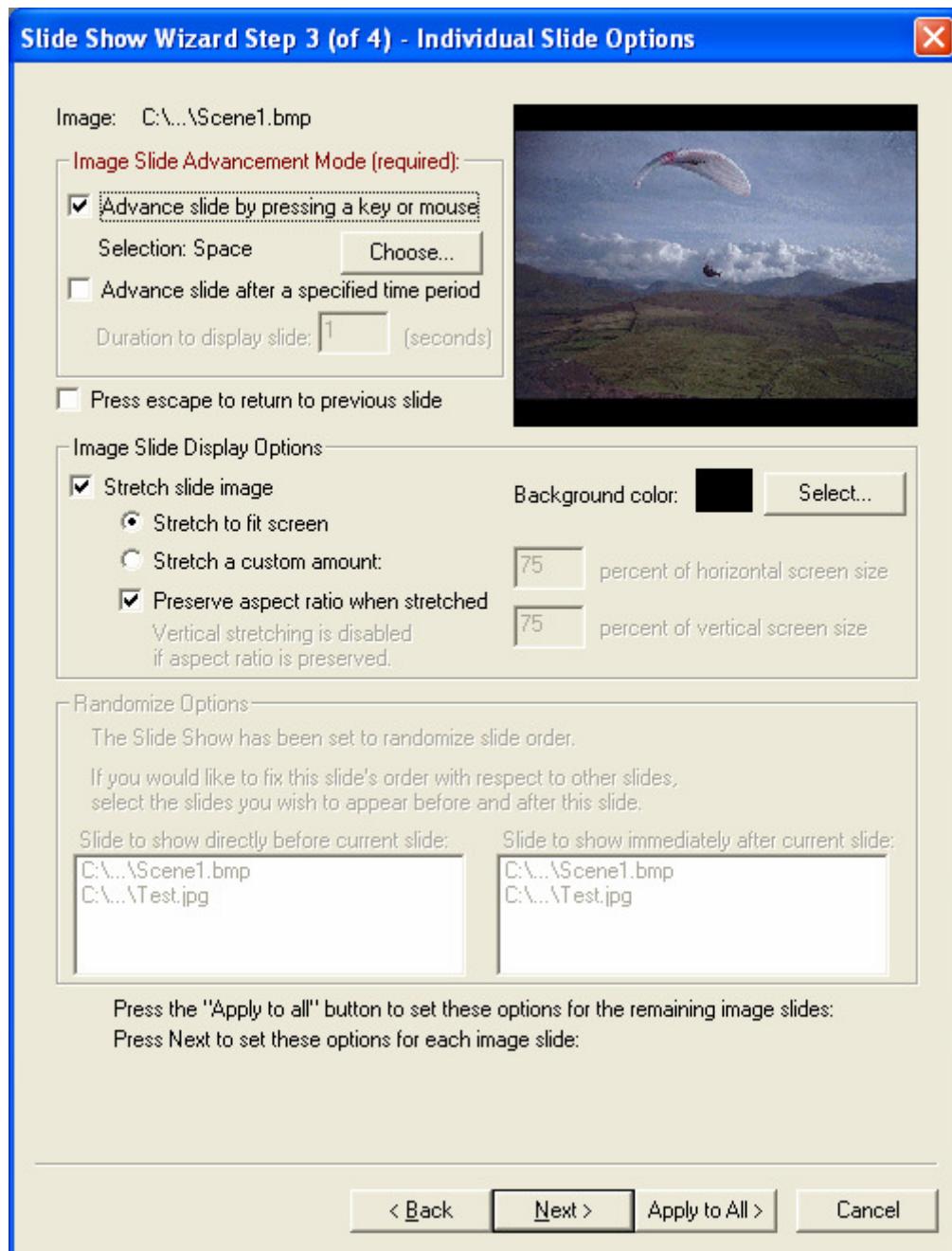after the current slide. This allows you to preserve particular clusters of slides. Note that if you set a slide as preceding the current slide, for the individual slide options of the preceding slide, you need to set a following slide. Preceding and following slides must be linked in this manner.

For example, if you had a slide show consisting of 20 slides, randomization was enabled, and you always wanted slide 18 to appear before slide 19, on slide 18's individual options page, you would set slide 19 as the slide to show after 18, and on slide 19's individual options page, you would set slide 18 as the slide to show previously.

After all individual slides are set or after you have pressed the Apply to All button, you will be presented with a summary of your options.

Step 4 – Summary

The summary page simply contains a listing of all settings you have chosen for your configuration. A listing of all slides you have selected will be present. Note that a black slide always appears at the end of the slide show. It does not store data; it only appears when a slide show terminates. Note that if no introductory or buffer slides were chosen, a black slide will appear at the beginning of the slide show. It will not be shown to the user; it is only used as a placeholder at the beginning of the show.

Press Finish in the Setup Wizard to create the configuration with the attributes you have chosen.

Data Navigation

After pressing Finish in the Setup Wizard or Setup Assistant, GazeTracker will begin loading the configuration with your chosen attributes. You will be prompted to save the configuration if you are creating a new one. The GazeTracker toolbar will appear in the form shown below. Note that if the GazeTracker toolbar is not onscreen, you may always make it appear by pressing F2.
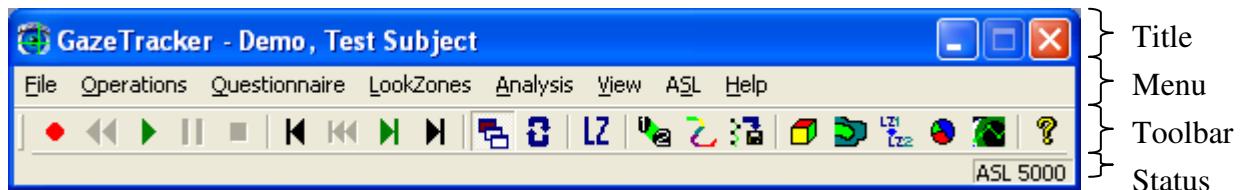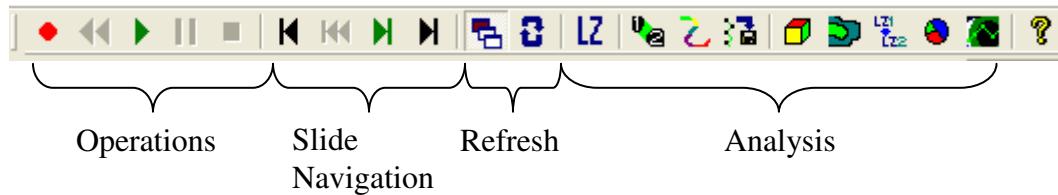

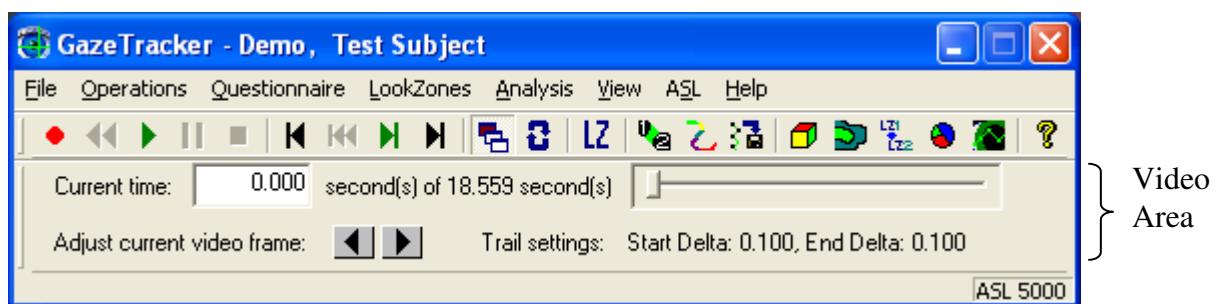**Figure 15.** GazeTracker Image Analysis Toolbar.

By default, a help window providing a brief overview of the functions of this toolbar will appear when the configuration loads. If it does not appear, choose the Toolbar assistant command under the Help menu. A more detailed explanation of each area of the toolbar follows:

- **Title:** This displays the name of the configuration followed by the name of the test subject if the subject exists. A star in the title area will appear if the data needs to be saved.
- **Menu:** The menu area contains the menu commands for GazeTracker. Chapter 4 gives a step-by-step breakdown on each menu command.
- **Toolbar:** The toolbar area contains shortcuts to various menu commands. The toolbar area is divided into several sections:

        Operations   Slide   Refresh   Analysis
                     Navigation

- **Operations:** This controls data recording and playback.
- **Slide Navigation:** These buttons move the active slide from one position to another when you are not recording. During recording, slides change according to their advancement and decrement mode properties. The green button provides playback for just the current slide, and the black double arrow rewinds just the current slide.
- **Data Refresh:** The slide button toggles display of the slide window. This lets you access the computer as you normally would because the GazeTracker Data Window will cover the entire computer screen when it is open.
- **Analysis:** This section contains a shortcut to creating LookZones and to many of the different analysis actions available under the Analysis menu. See Chapter 3 for more details.
- **Status:** This provides additional notices to the user, such as explanations of toolbar or menu commands.

Video Analysis has an additional area of the GazeTracker toolbar, called the Video Area:

The Video Area allows you to navigate through your video. The slider adjusts the current video frame displayed. You may jump to a particular video time by specifying a time in the Current time area.

Clicking the left or right arrow buttons in the Time Area will cause the video to advance or decrement by a single frame.

At this point, you should know how to:

- Use the Setup Assistant and Setup Wizard to create new configurations, load existing configurations, and load test subject data. If you are a GazeTracker: Premium user, you should consult the separate GT: Premium specific manual for details concerning how to configure GT: Premium for scene camera synchronization.
- Use the GazeTracker toolbar to navigate your slide or video show.

If you wish to provide questionnaires to your test subjects, proceed to the Questionnaires section on page 2.16. If you wish to learn more about LookZones, proceed to the LookZones: Regions of Interest section on page 2.19.

Go to the Data Recording section on page 2.32 to learn more about recording data.

Go to Chapter 3 to learn more about analyzing collected data.

Configuring Application Analysis

Setup Wizard

In Application Analysis, a configuration specifies the methods GazeTracker will use to track interactions with the computer. The Setup Wizard allows you to specify the options for your analysis configuration.

Step 1 – Options

After the introduction screen of the Setup Wizard, you specify the options used for tracking open windows on the computer screen:
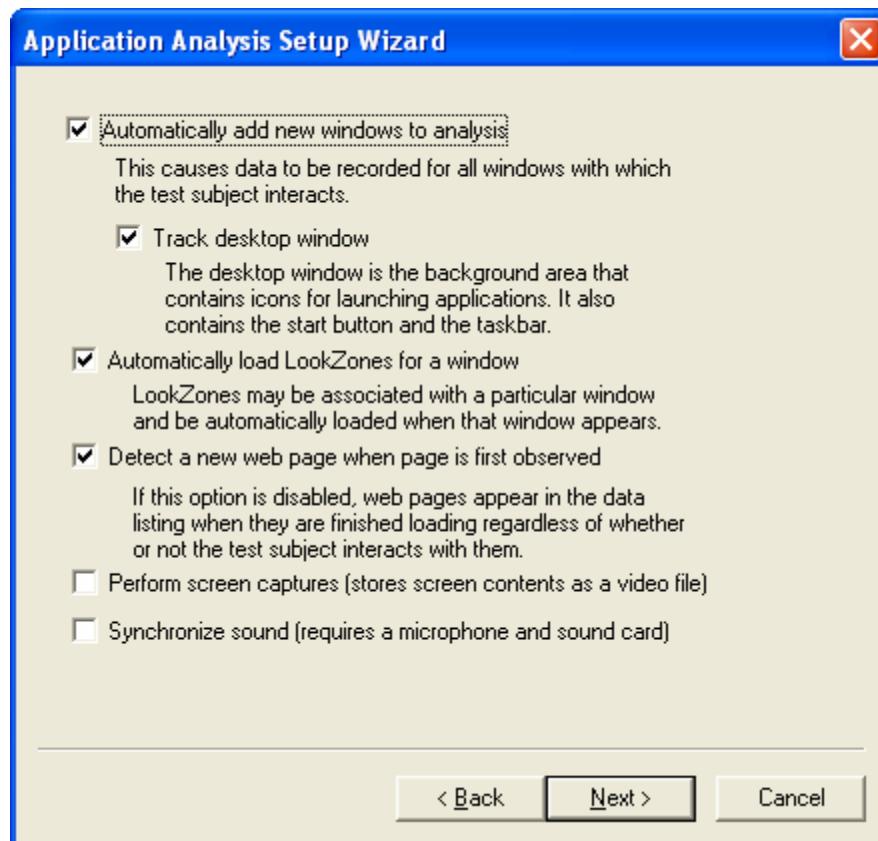
Figure 16. Application Analysis Setup.

Automatically adding new windows to analysis makes GazeTracker track every application with which the user interacts. If you uncheck this option, you must specify the applications to track in **Step 2**. If you leave this option checked, then pressing Next takes you to the setup confirmation screen.

Tracking the desktop window causes GazeTracker to store how users interact with the Windows desktop. The desktop area contains the taskbar, which includes the Start button, and the icons that users double click to launch programs.

In Application Analysis, LookZone layouts may be associated with particular windows and load automatically when those windows have data recorded for them. LookZones are regions of interest in GazeTracker. For more detail, see the LookZones: Regions of Interest section on page 2.19.

Web pages may start to have their data recorded when users first observe a new webpage or when the page finishes loading. If you uncheck the "Detect a new web page when page is first observed" option, all pages that load regardless of whether or not the user interacts with the page will be listed in the analysis.

Step 2 – Selecting Specific Applications

If you chose not to automatically add new applications, you will select the applications to track here:
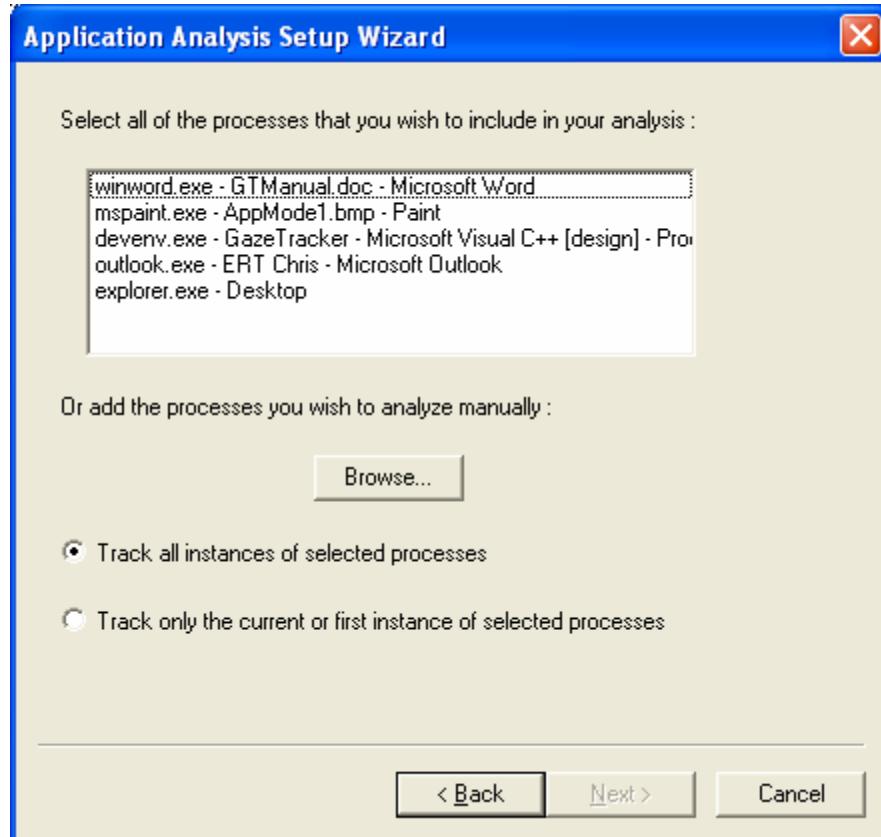

Figure 17. Select applications to track.

Currently open application appears in the list. To add an application that is not currently open, push the Browse button and navigate to that application's executable.

You may also choose to track only the first instance of the application or all instances. Tracking all instances means that even if the application is executed several times during a recording, GazeTracker will record data for each window that appears for the application.

Pressing Next will take you to the setup confirmation screen.

Data Navigation

After pressing Finish in the Setup Wizard or Setup Assistant, GazeTracker will begin loading the configuration with your chosen attributes. You will be prompted to save the configuration if you are creating a new one. The GazeTracker toolbar will appear in the

form shown below. Note that if the GazeTracker toolbar is not onscreen, you may always make it appear by pressing F2.
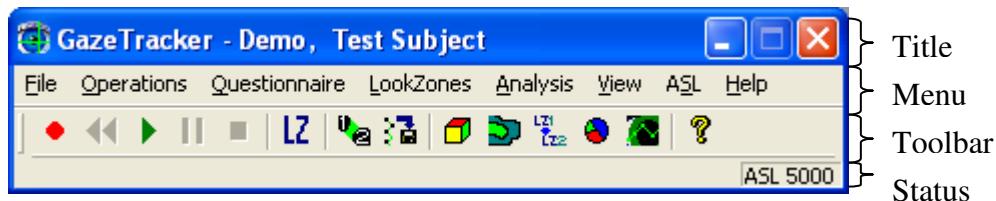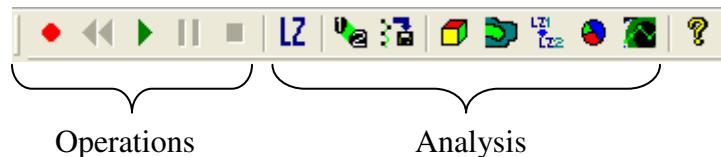

Figure 18. Application Analysis Toolbar.

By default, a help window providing a brief overview of the functions of this toolbar will appear when the configuration loads. If it does not appear, choose the Toolbar assistant command under the Help menu. A more detailed explanation of each area of the toolbar follows:

- **Title:** This displays the name of the configuration followed by the name of the test subject if a test subject exists. A star in the title area will appear if the data needs to be saved.
- **Menu:** The menu area contains the menu commands for GazeTracker. Chapter 4 gives a step-by-step breakdown on each menu command.
- **Toolbar:** The toolbar area contains shortcuts to various menu commands. The toolbar area is divided into several sections:

Operations   Analysis

    o **Operations:** This controls data recording and playback.
    o **Analysis:** This section contains a shortcut to creating LookZones and to many of the different analysis actions available under the Analysis menu. See Chapter 3 for more details.
- **Status:** This provides additional notices to the user, such as explanations of toolbar or menu commands.

Unlike Image and Video Analysis, Application Analysis does not have predefined data slides for which data is recorded. Application Analysis dynamically tracks how test subjects interact with the computer and automatically adds data slides representing the windows with which the subject interacts to the analysis.

Therefore, the toolbar does not have a slide navigation area like Image and Video Analysis. To navigate through the windows for which GazeTracker has recorded data, you must use the Recorded Data dialog box. This dialog box is invoked through the View Data command on the toolbar, circled in red below, or the View command under the Data submenu of the Analysis menu:
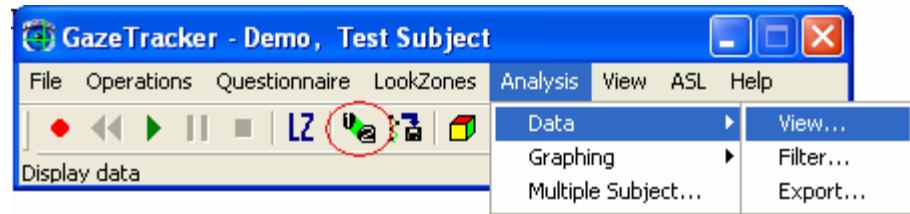
Figure 19. The view data command allows navigation of collected data.

When the dialog box opens, the GazeTracker Data Window also opens and creates a display of any captured data for the selected window in the Recorded Data dialog. To change what is displayed, change the selection in the Recorded Data dialog by clicking on the windows in the listing:

Figure 20. Recorded data dialog.

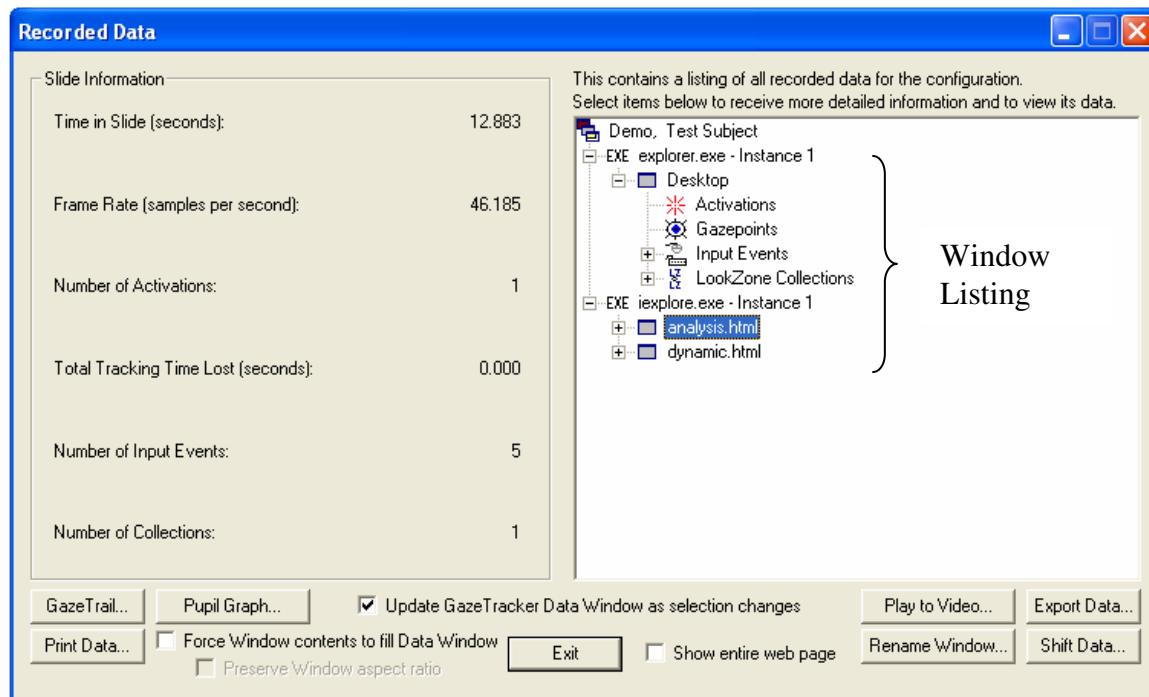For more information concerning how to view captured data, proceed to the Viewing Data section of Chapter 3 on page 3.1.

At this point, you should know how to:

- Use the Setup Assistant and Setup Wizard to create new configurations, load existing configurations, and load test subject data.
- Use the GazeTracker Recorded Data dialog to navigate through the windows the test subject interacted with.

If you wish to provide questionnaires to your test subjects, proceed to the Questionnaires section on page 2.16. If you wish to learn more about LookZones, proceed to the LookZones: Regions of Interest section on page 2.19.

Go to the Data Recording section on page 2.32 to learn more about recording data.

Go to Chapter 3 to learn more about analyzing collected data.

Questionnaires

Overview

Questionnaires provide a flexible method to gather information about your test subjects. Prequesionnaires appear after the Record button is pressed but before data actually starts to be recorded. Postquestionnaires appear after recording finishes.

Creating

To create a questionnaire, choose the New option under the Questionnaire menu. You will be prompted to choose what type of questionnaire you would like to create:
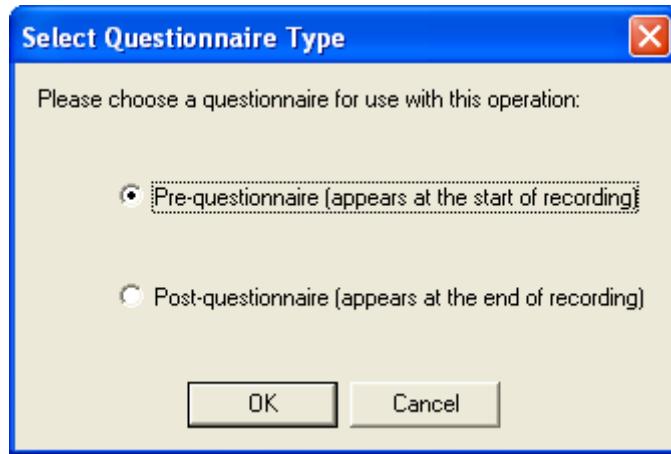

Figure 21. Selecting questionnaire type.

After choosing the questionnaire type, you will be presented with the Edit Questionnaire dialog. This will let you specify the information to show and questions to ask your test subjects:
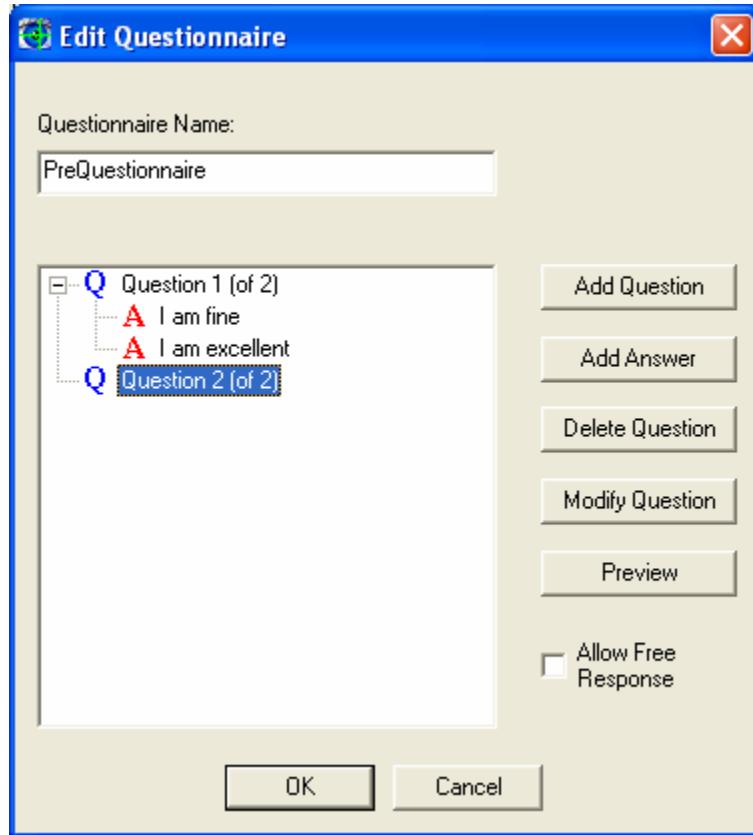
Figure 22. Edit questionnaire.

Press Add Question to create new questions for the questionnaire. After creating a question, you may then add answers to it. Answers appear as radio buttons. The free response option puts a general edit box at the questionnaire for a customized answer by the user.

You may preview your questionnaire by pressing Preview. A sample question appears below:

Figure 23. Questionnaire preview.

Press OK when you are finished modifying your questionnaire.

Saving

To reuse a questionnaire, you need to save it. Choose the Save command under the Questionnaire menu to present the dialog box shown below:
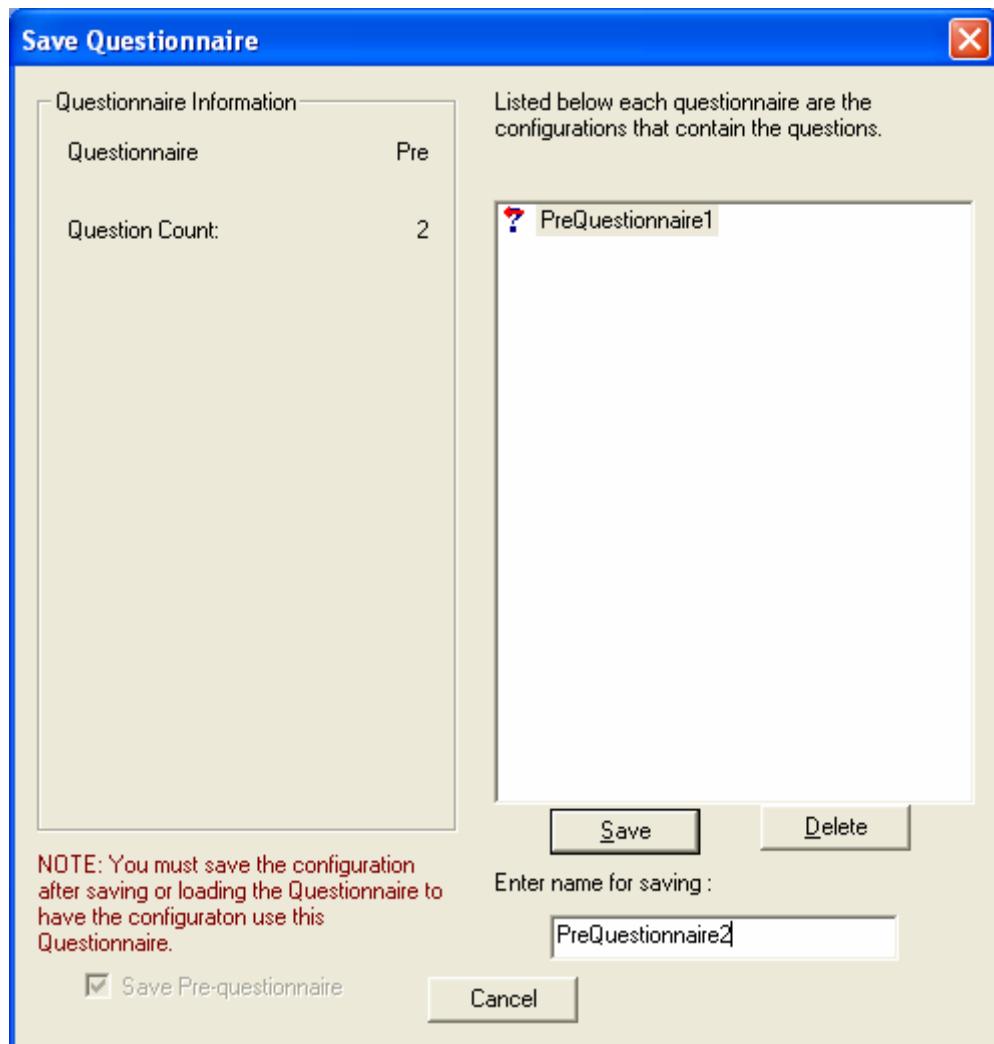
Figure 24. Save questionnaire.

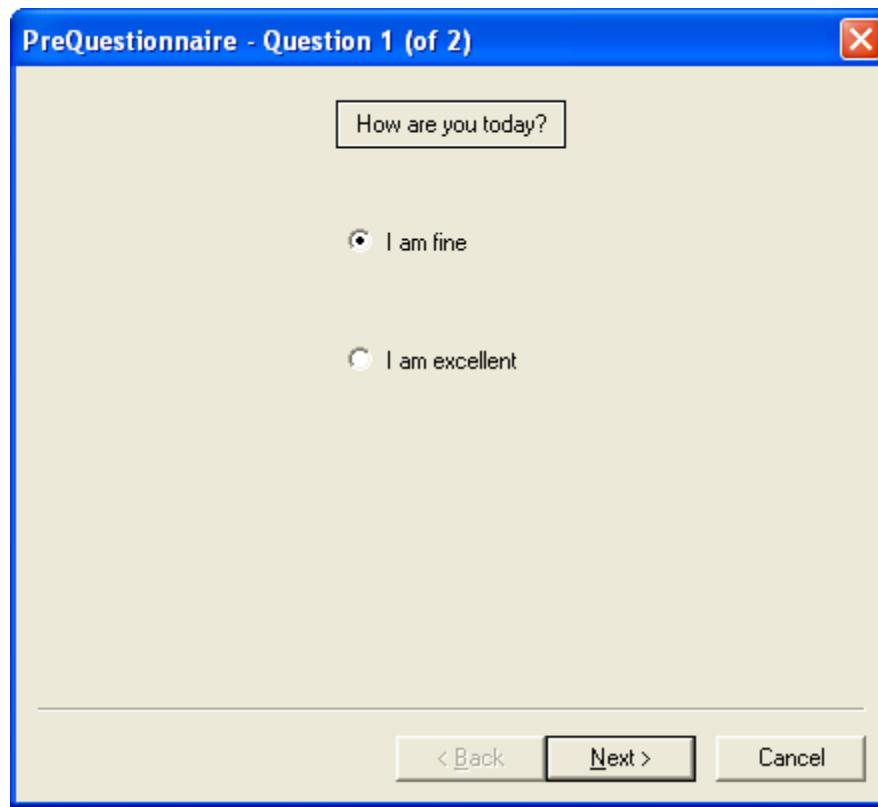In this dialog box, you will see a listing of all questionnaires you have saved. Below each questionnaire, you will see a list of the configurations using that questionnaire. Note that after saving the questionnaire, you must save the configuration to have it use the questionnaire.

LookZones: Regions of Interest

Overview

A LookZone, or region of interest, generates statistics only for the section of a stimulus that the LookZone covers. LookZones may be any size or shape. There is no limit to the number of LookZones that may be created, and you may create LookZones either before or after you collect data. LookZones serve as the basis for the statistics used in many of GazeTracker's analytical tools.

Creating

To create LookZones, choose the LZ icon on the GT toolbar or choose the Apply command under the LookZones menu. The following dialog box will appear:
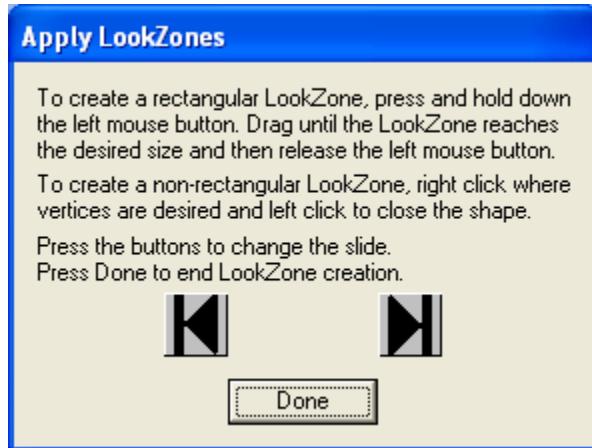
Figure 25. Apply LookZones dialog box.

In Application Analysis, the arrow buttons are not present. The arrow buttons change the active data slide. In Image and Video Analysis, LookZones are drawn directly on the stimulus shown in the GazeTracker Data Window. In Application Analysis, just select the desired application and draw the LookZone directly on the application window. Press Done when you have finished creating all of your LookZones.

To draw a LookZone, move the mouse to the desired location of study. Click the left mouse button on the desired upper left hand corner of the LookZone and drag the mouse to the opposite corner to create a rectangular LookZone. To create a LookZone of another shape, right click on the desired vertices for the shape. Press the left mouse button to close the shape. Releasing the left mouse button causes the LookZone Properties dialog box to appear:
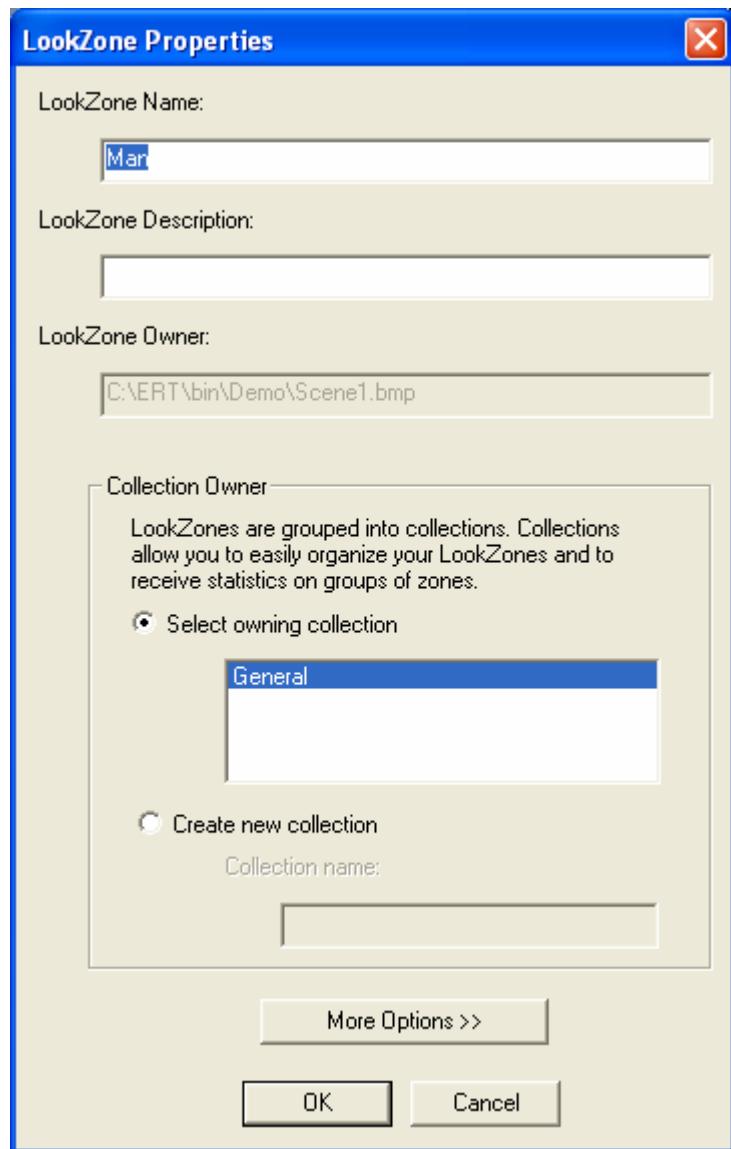
Figure 26. LookZone Properties dialog box.

When you draw a new LookZone completely enclosed by an existing zone, the new zone is ordered after the first zone, making it inaccessible to further adjustments. To manipulate the new LookZone, you must move the top zone with the mouse to gain access to the bottom one. To avoid this difficulty, draw the smaller zone first and then enclose it with a larger zone.

LookZones are consecutively numbered unless you choose another name for the zone. The LookZone name is used as a heading in many GazeTracker reports and graphs, so a description field is also available to allow you to more thoroughly describe your zone. In Application Analysis, GazeTracker may parse a web page to automatically setup zones over features of interest. If GazeTracker creates a LookZone over a hyperlink, the hyperlink's destination webpage is automatically entered in the description area.

LookZone Collections are used to group LookZones for easier data analysis. Collection level statistics are also provided. All LookZones by default go into the General collection. New collections can be specified by selecting Create new collection and typing the new name into the Collection name box; otherwise, select an existing collection from the list.

Choose the More Options button for access to advanced LookZone settings. These settings are described below.
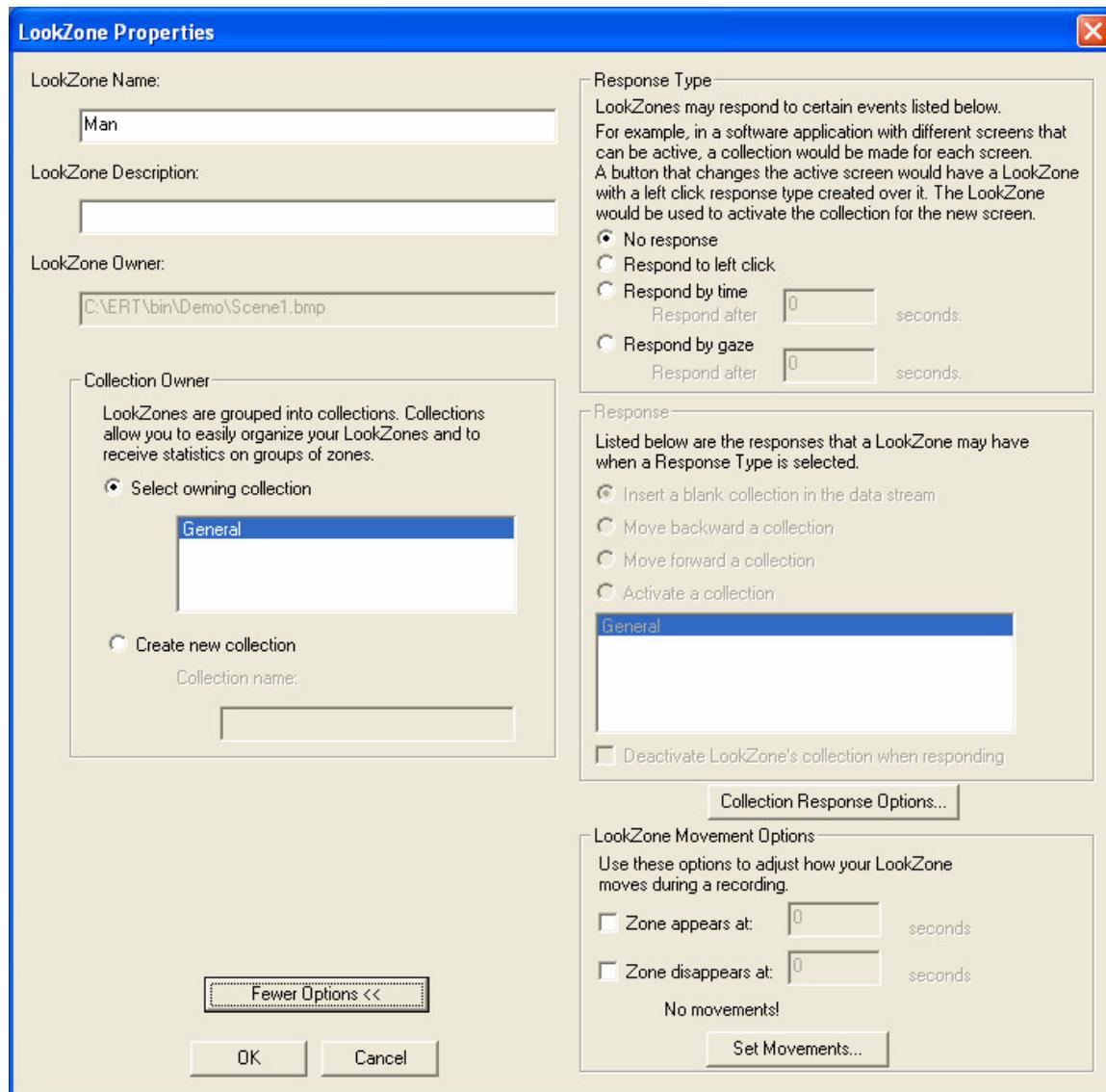

Figure 27. Additional LookZone options.

Contingent and Moving LookZones

Contingent LookZones are zones that respond to particular events. To make a zone contingent, you must first specify a response type.

The response type is the event that invokes a response from the LookZone. LookZones may respond to receiving a mouse click inside of the zone, to being observed for a particular amount of time, or to simply being active on the screen for a particular amount of time. An active LookZone tracks when observations occur within it.

After specifying a response type, the particular action of the zone needs to be set. Typically, a LookZone will just activate another collection of LookZones. For example, in a software application with different screens that can be active, a collection would be made for each screen. A button that changes the active screen would have a LookZone with a left click response type created over it. The LookZone would be used to activate the collection for the new screen.

Moving LookZones change size, position, and shape over time. Moving LookZone may be specified in any analysis mode, but they are most often used in Video Analysis. For Video Analysis, LookZones that are created in a video are applied to every frame of that video. Typically, the content of that video is dynamic; it changes from one frame to the next. To track objects that move through the video, a Moving LookZone must be specified.

Check the "Zone appears at" checkbox to specify the time at which the zone you have delineated first appears in the video. Check the "Zone disappears at" checkbox to specify the time at which a zone you have delineated last appears in the video.

Press the Set Movement button to specify movements for the zone. After pressing the button, the following dialog box will appear:
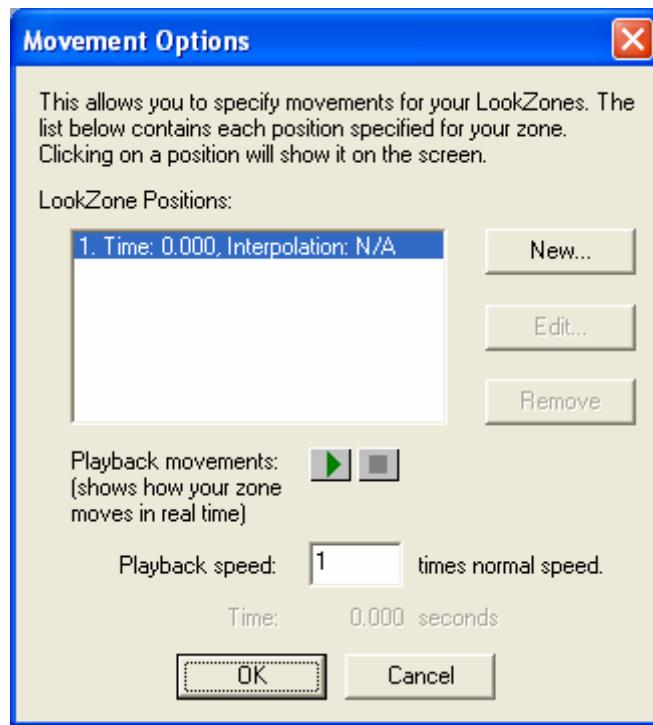
Figure 28. Movement Options dialog box.

This dialog box allows you to create new movements for your LookZone. The LookZones Positions section of the dialog box lists all movements that you have defined. As you select the movement, the LookZone will change how it is displayed:

Figure 29. LookZone appearance when movement options dialog box is open.

The number at the center of the red circle signifies the movement number.

You may press the play button to play back your movements.

To create new movement, press the New button. You will be presented with the dialog box below:
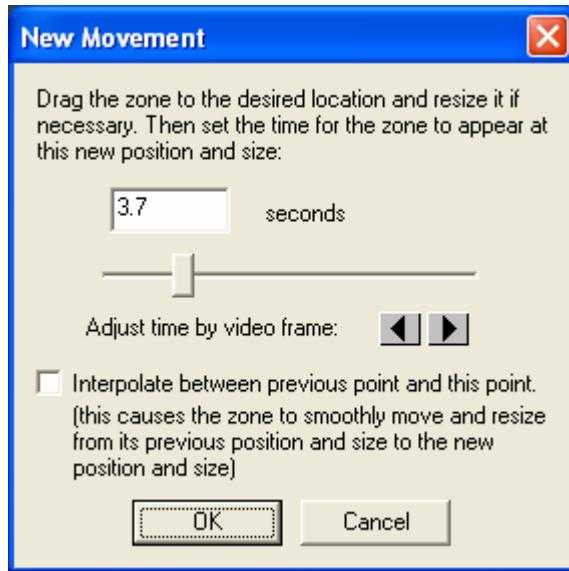
Figure 30. New movement dialog box.

Interpolation allows you to minimize the number of LookZone positions you have to specify. Interpolation will smoothly move and resize the zone from its previous position to the new position. This will be shown when you play back the movements. If interpolation is not enabled, the zone will jump from one position to the next.

In Image and Application Analysis, the slider and buttons for frame advancement are not present. As you adjust the time, in Video Analysis the current video frame shown will change. The LookZone will change its display to its normal state:

Figure 31. LookZone appearance when new movement dialog is open.

Once you have adjusted the time to the desired value, resize and move the zone as you to the new desired location. To move a zone, put the mouse cursor over the zone and hold the left mouse button down. Then drag the mouse cursor to the desired location and release the left mouse button. To resize or reshape the zone, hold the left mouse button down over one of the small squares at the corner of the zone. Drag the handle to the desired location and release the left mouse button.

After moving and resizing the LookZone, press F2 at anytime to bring the new movement dialog box back onscreen. Press OK in the new movement dialog box to create the new movement and return you to the Movement Options dialog box.

When you have finished creating movements and the movements follow the feature of interest on the stimuli, press OK in the movement options dialog box. Press OK in the LookZone Properties dialog box to complete creation of your LookZone.

This finishes the description of how to create LookZones. The following section will describe how to manage the LookZones you have created.

Managing

After you have created your LookZones, you may adjust them in several ways. The picture below shows a stimulus with LookZones applied:

Figure 32. Stimulus with LookZones applied.

To move a zone, put the mouse cursor over the zone and hold the left mouse button down. Then drag the mouse cursor to the desired location and release the left mouse button.

To resize or reshape the zone, hold the left mouse button down over one of the small squares at the corner of the zone. Drag the handle to the desired location and release the left mouse button.

You may right click on the LookZone to receive a context menu:
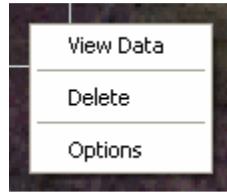
Figure 33. LookZone context menu.

The View Data command invokes the Recorded Data dialog box with the selection set to this LookZone. See the Viewing Data section on page 3.1 for more information about the Recorded Data dialog box.

Delete destroys the LookZone.

Options launches the LookZone Properties dialog box described in the Creating section on page 2.20.

Another way to manage your LookZones is through the LookZone Management dialog box. This dialog box is invoked through the Manage command under the LookZones menu:

Figure 34. LookZone menu.
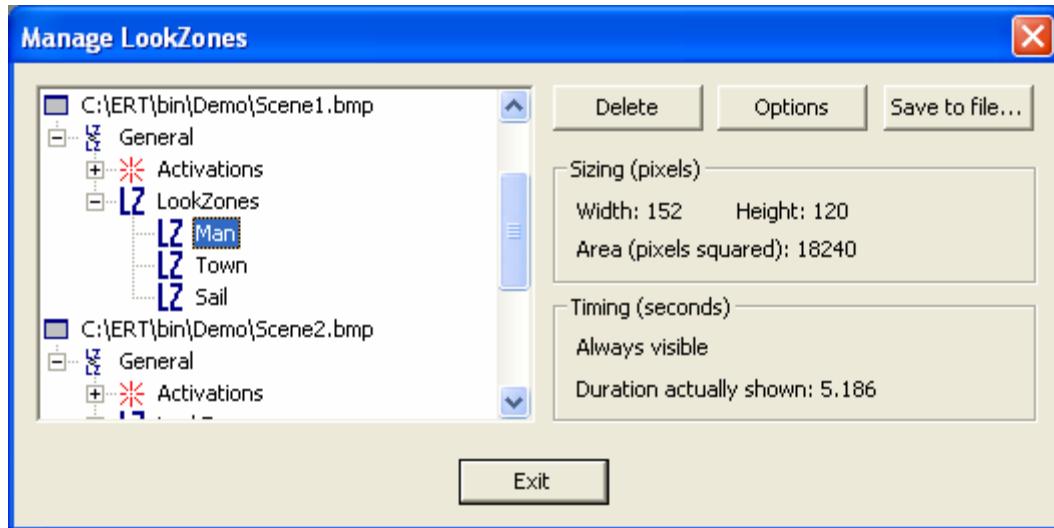
Figure 35. Manage LookZones dialog box.

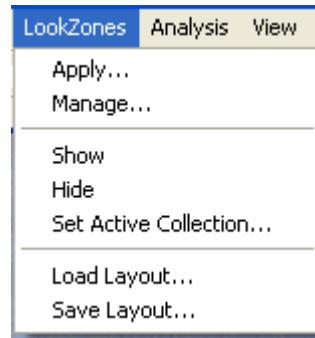This dialog box lists all stimuli, and the collections with LookZones contained on those stimuli. When a LookZone is selected, you receive basic data concerning the setup of that LookZone.

The Delete and Options buttons function as described above.

The Save to file button saves the configuration of all LookZones to a text file. This is helpful when programming your own custom analysis of the captured data. The text file lists the zones along with the positions and areas of each zone.

In Application Analysis, two other LookZone management options are available under the LookZones menu:

Figure 36. Application Analysis LookZone menu.

The LookZone Layout Manager allows you to specify what LookZone layouts are considered default layouts. Default layouts load automatically when a particular window or web page appears in the analysis:
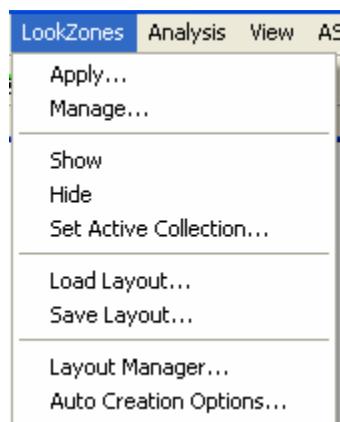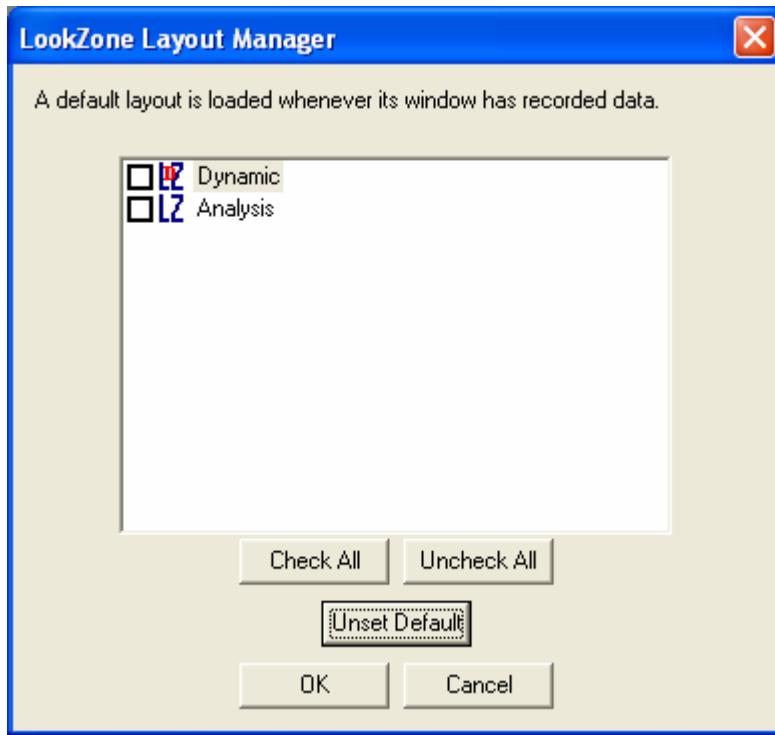

Figure 37. LookZone Manager dialog box.

A default LookZone layout has a red D over the blue LZ icon. Select the layout you wish to change and press the Make Default or Unset Default button. Check multiple layouts to change multiple layouts at one time.

Auto LookZone Creation in Application Analysis

Additionally, Application Analysis allows you to automatically parse HTML and have LookZones automatically created over select parts of the page. Parsing occurs during recording as test subjects navigate to new web pages. The Automatic LookZone Creation Options dialog box specifies the settings for this parsing and also allows you to parse currently active pages:

Figure 38. Automatic LookZone creation options dialog box.

The Identification Options section contains the different elements of a web page that GazeTracker can identify. These include hyperlinks and images. GazeTracker can identify hyperlinks that are just text, that are images, and that are part of Image Maps. Image Maps are images where differ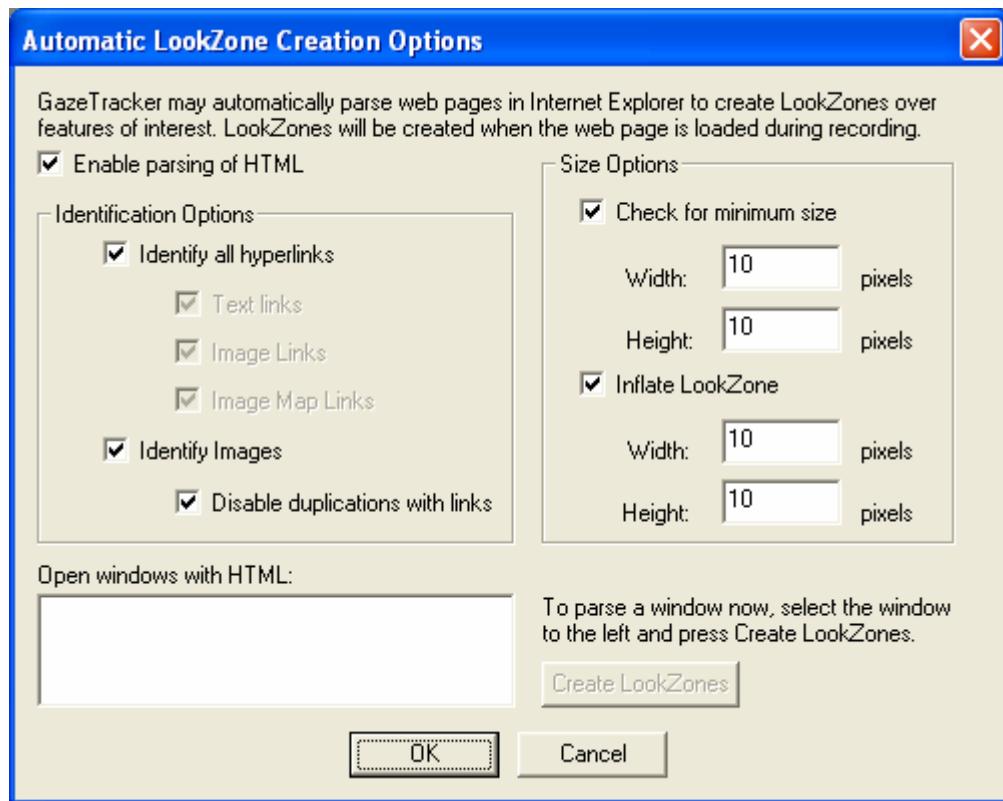ent sections of the image navigate to different pages. When identifying images, you may also have GazeTracker remove any duplicates it finds with the hyperlinks area.

The Size Options section contains some automatic sizing adjustment information that can be used while GazeTracker is parsing the page.

The check for minimum size ensures that all images or hyperlinks found are within a minimum size. This is helpful because many websites use transparent images as spacers in their layout. The images help maintain the consistency in the user interface, but they are invisible to the user. These images are typically very small.

The inflation feature expands the edges of the LookZones by the fixed pixel amount to create a buffer area. This is used to compensate for the inaccuracies in eye-tracking systems.

The bottom section of the dialog box lists all of the currently open windows with HTML. Press the Create LookZones button to parse the HTML on the page and create LookZones over the features of interest.

Saving

After creating your LookZones, you may save your layout through the Save Layout command under the LookZones menu. This will invoke a dialog box similar to the Save Questionnaire dialog box:
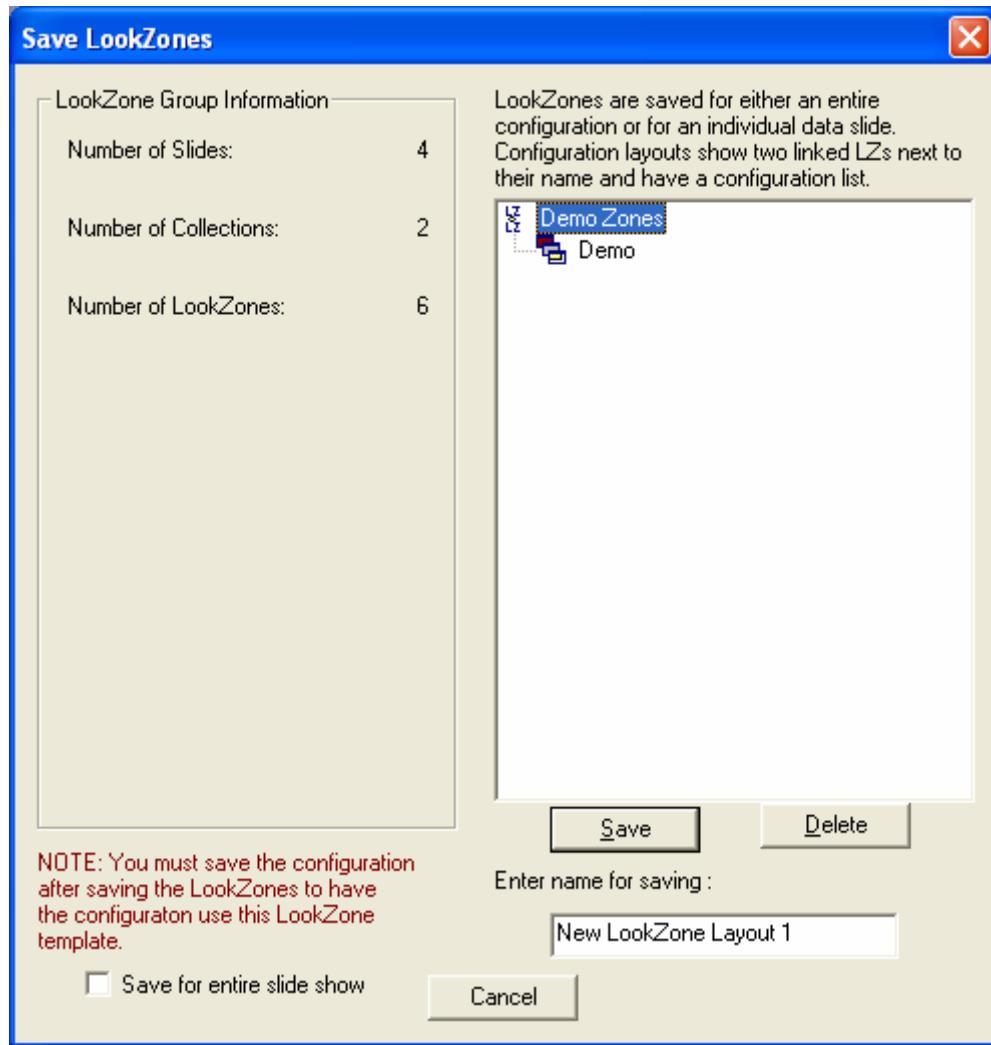
Figure 39. Saving LookZones in Image or Video Analysis.

In this dialog box, you will see a listing of all LookZone layouts you have saved. Below each layout, you will see a list of the configurations using that layout. Note that after saving the layout, you must save the configuration to have it use the layout.

In Image and Video Analysis, layouts may be saved on a per configuration basis or a per data slide basis. Layouts saved for the entire configuration will contain the LookZones for each slide or video in the configuration. Layouts not saved for the entire configuration contain only the LookZones for the currently active data slide. LookZones not saved for

an entire configuration are easily loaded onto other data slides. This speeds creation of subsequent LookZones.

Application Analysis supports the saving of LookZones for only for a particular window. Setting a layout as the default layout in Application Analysis will cause that layout to always be loaded when its associated window has data recorded for it. Additionally, you may access the URL associated with a particular LookZone layout by clicking on the URL located at the left part of the dialog box.

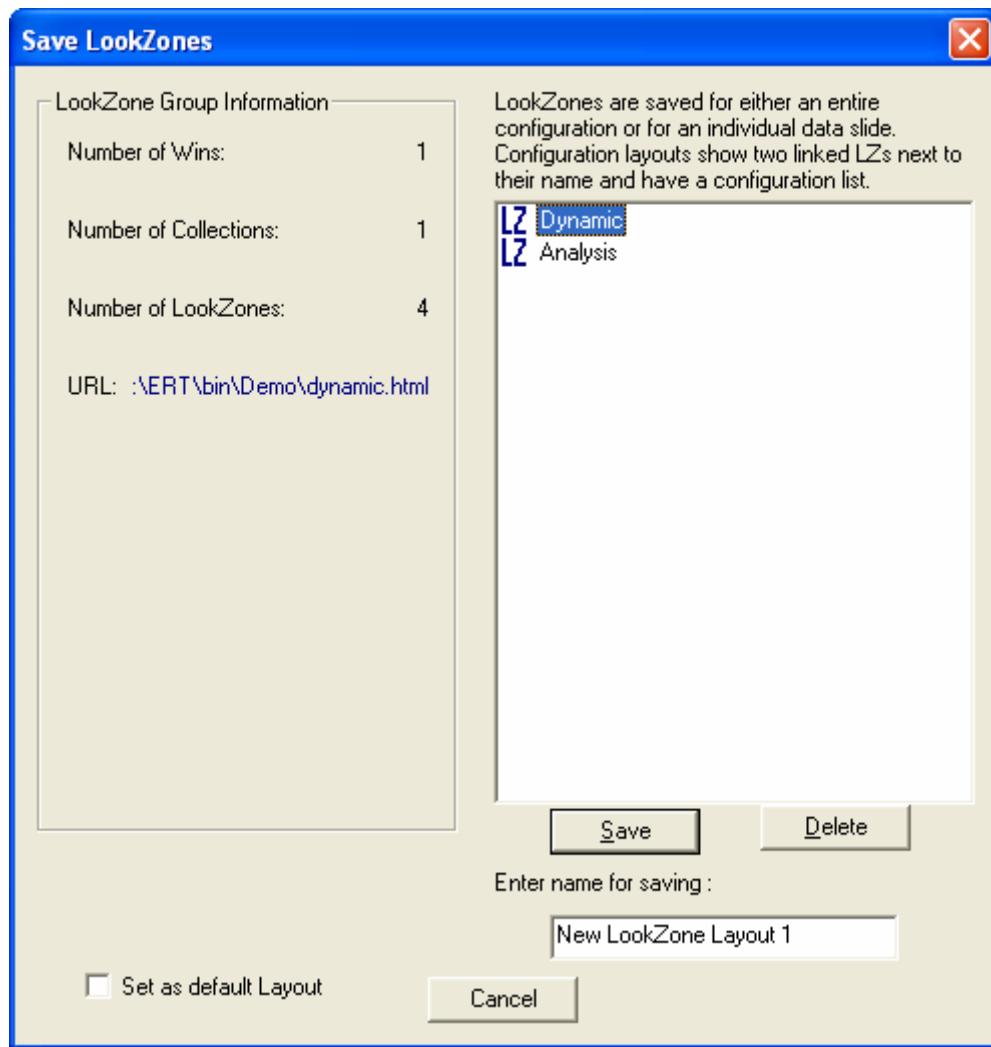
Figure 40. Saving of LookZones in Application Analysis.

Data Recording

Starting

Prior to recording data, ensure that the test subject has completed calibration with his or her eye-tracker and that the eye-tracking system is enabled.

To begin recording data, either select the Record icon on the operations area of the toolbar, shown below, or choose Record from the Operations menu.

Record Rewind Play Pause Stop
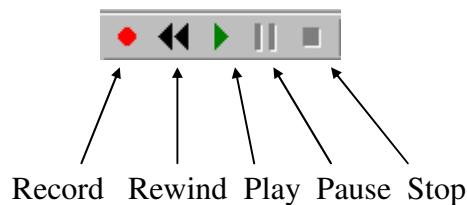
Figure 41. Operations area of the toolbar.

Stopping

Data recording will stop automatically in Image and Video Analysis when you reach the end of the configuration. To stop recording prematurely or to terminate recording in Application Analysis, press the Stop button on the toolbar shown above, or press F2. You may also choose the Stop command under the Operations menu.

You will then be prompted to save the recorded data, and to save the configuration if it is not already saved:
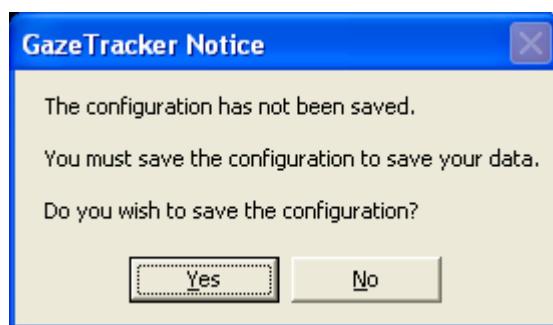
Figure 42. Configuration saving prompt.
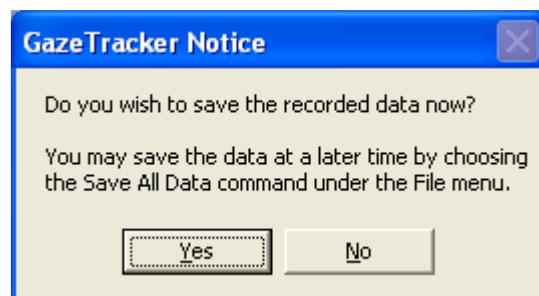
Figure 43. Save data prompt.

Saving

When saving data for a configuration, you will be presented with a dialog box similar to the saving dialog box for Questionnaires and LookZone Layouts:
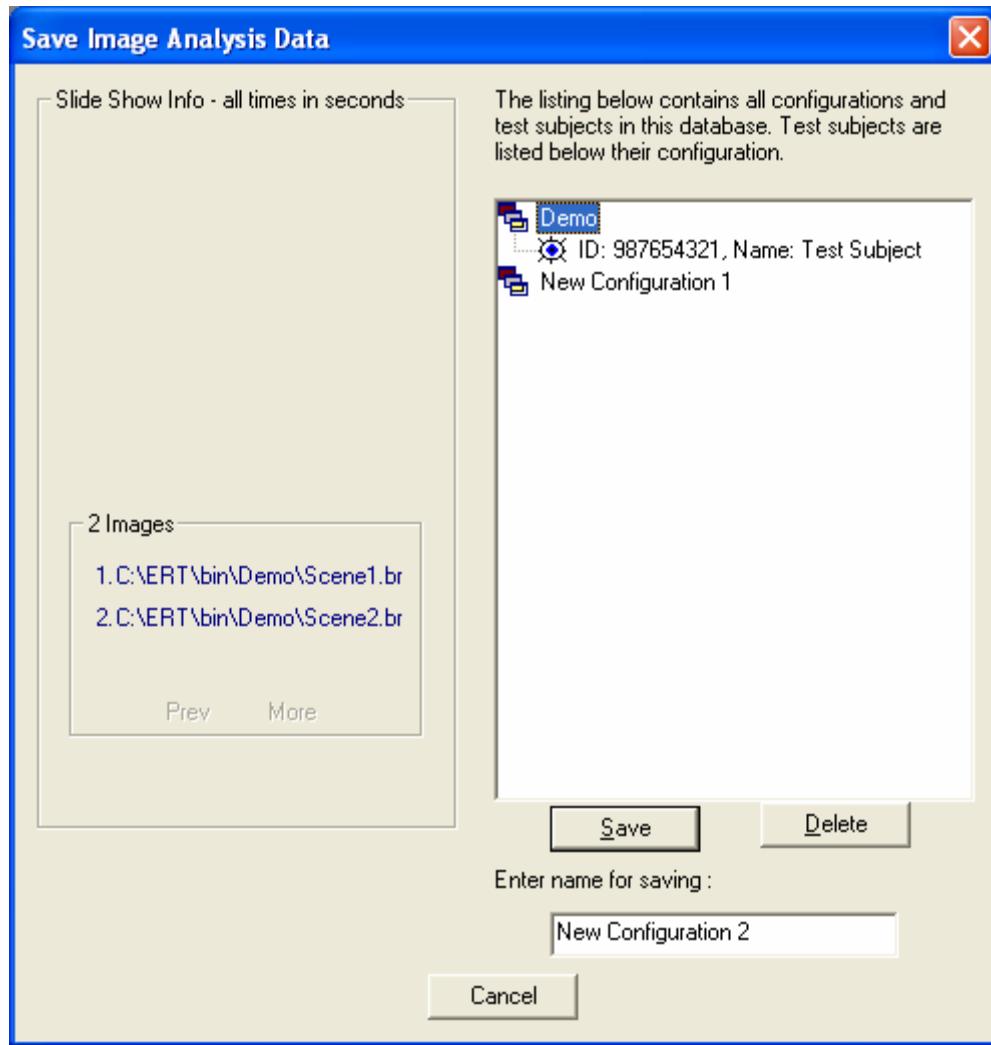
Figure 44. Configuration saving dialog box.

In this dialog box, you will see a listing of all configurations you have saved. Below each configuration, you will see a list of the test subjects who have data saved for that configuration.

When saving data for a test subject, you must first enter a 9 digit test subject identification number. 3 digits are entered into the first text box; 2 digits are entered into the second text box, and 4 digits are entered into the last text box.
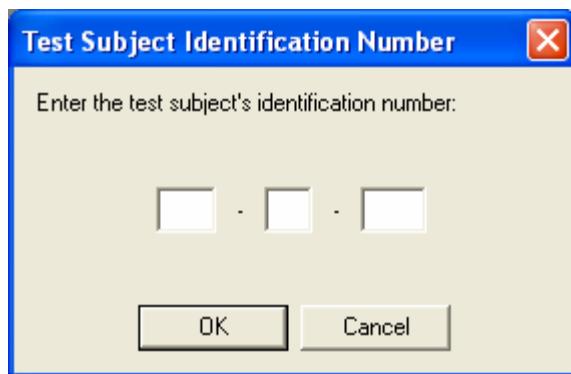
Figure 45. Test subject ID number.

After entering the test subject identification number, you have the option to enter demographic information about the test subject. The identification number is what GazeTracker uses to uniquely identify a particular test subject. If you reuse an identification number, GazeTracker assumes the same test subject is observing the configuration again, so the demographic information dialog box shown below will have that test subject data entered inside of it:

Figure 46. Test subject demographic info.

After pressing OK, the test subject data will be saved under the configuration name. All data stored by GazeTracker is saved to a Microsoft Access database file. Choose the Manage Database command under the File menu to change the database that GazeTracker uses to save and to load its data:

Figure 47. Manage database dialog box.

The Create button allows you to create new databases to store data.

Edit allows you to change test subject demographic information. After pressing the button, you enter the test subject ID number and then change the demographic information as shown above.

Split allows you to create a new database with some or all of the information from the current database transferred to the new database.

Backup creates a duplicate copy of your existing database in the location of your choice.

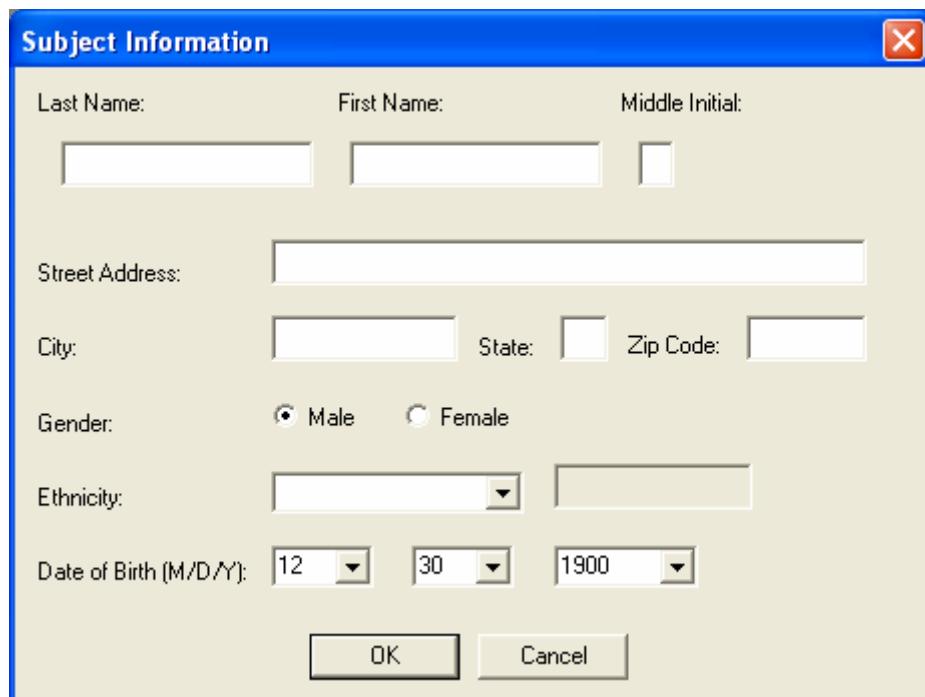Delete removes a database from your computer. This will completely delete your database file; the information is unrecoverable.

Preview shows what configurations and test subjects are in the currently selected database.

At this point, you should know how to:

- Use the Setup Assistant and Setup Wizard to create new configurations, load existing configurations, and load test subject data. If you are a GazeTracker: Premium user, you should consult the separate GT: Premium specific manual for details concerning how to configure GT: Premium for scene camera synchronization.
- In Image or Video Analysis, use the GazeTracker toolbar to navigate your slide or video show.

- In Application Analysis, use the GazeTracker Recorded Data dialog to navigate through the windows the test subject interacted with.
- Create, manage, and save Questionnaires.
- Create, manage, and save LookZones, including Contingent and Moving LookZones.
- Record and save data.

CHAPTER 3
Analysis and Visualization with GazeTracker

Overview

GazeTracker provides many tools for analyzing and visualizing the capture data. These tools greatly reduce the time needed to analyze the information that GazeTracker records. This section will describe the most often used tools. Additional tools are described in Chapter 4 under the GazeTracker menu structure.

LookZones: Regions of Interest

LookZones may be setup either before or after data is recorded. For more information about defining LookZones, see the LookZones: Regions of Interest section on page 2.19.

Viewing Data

Image and Video Analysis Specific Features

After recording data in Image and Video Analysis, the data will be superimposed on the stimuli in the configurations. Use the Slide Navigation Area of the GazeTracker toolbar to change the active slide. For more details on the Slide Navigation Area, see the Data Navigation section on page 2.9.

General Features

The data displayed is called a GazeTrail. The GazeTrail shows the individual measurements from the eye-tracking system along with the fixation data. An example stimulus is shown below:
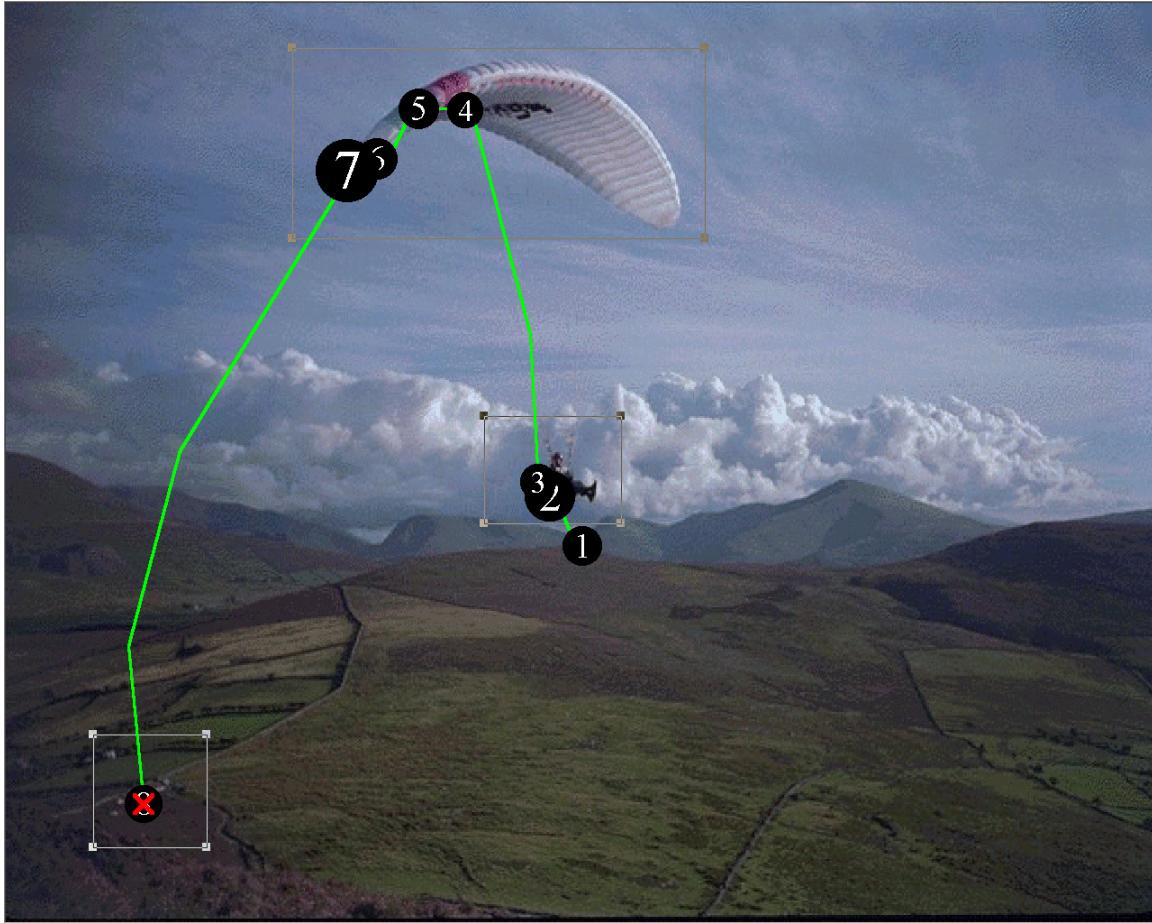
Figure 48. Stimulus with recorded data.

The GazeTrail is highly customizable. In Image and Video Analysis, choose the GazeTrail Options command under the Analysis menu to adjust the display of the GazeTrail:

Figure 49. Analysis menu for Image and Video Analysis.

Clicking on the icon will also invoke the GazeTrail Options. In Application Analysis, the GazeTrail is only shown in the Recorded Data dialog. Clicking on the GazeTrail button of the Data Viewer dialog will invoke the GazeTrail Options dialog.
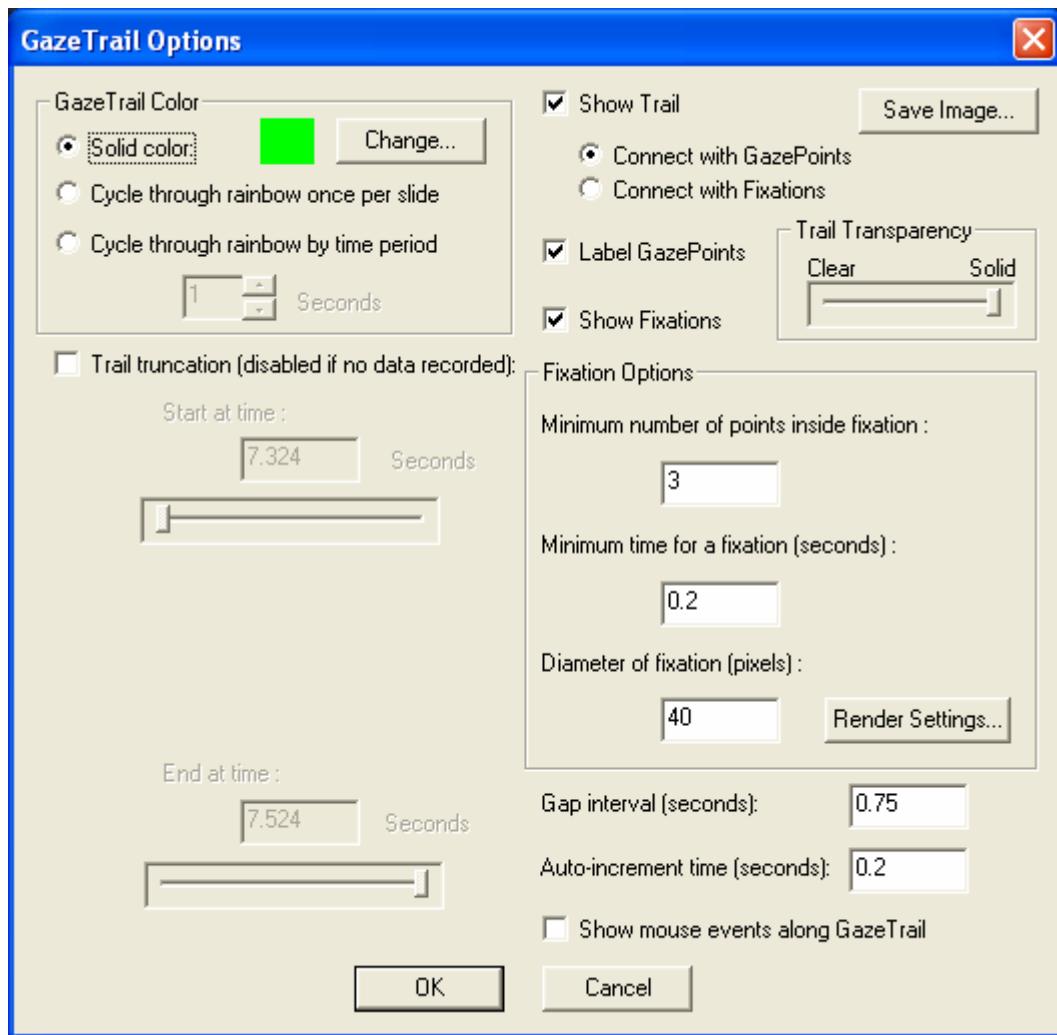
Figure 50. GazeTrail Options dialog box.

The GazeTrail options dialog box contains all options that govern rendering of the GazeTrail.

The GazeTrail Color section contains options for adjusting the color of the GazeTrail. The rainbow feature of the GazeTrail will cause the colors to cycle over the length of the trail. This feature may also be used to indicate the duration of time covered by a trail if the rainbow colors cycle over a specified time period.

The trail truncation section is used to show only portions of the GazeTrail.

The Show Trail, Label GazePoints, and Show Fixations options adjust what data the GazeTrail shows. GazePoints are the individual samples ac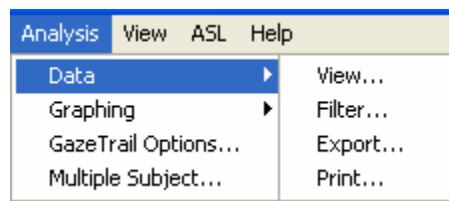quired from an eye-tracking system. Fixations are computed from the GazePoint data. The GazeTrail itself may be connected by either the Fixations or the GazePoints. Connecting via the Fixations will remove many of the saccades that would otherwise be visible. Trail transparency allows you to see the stimulus content underneath the GazeTrail.

The Fixation Options section contains the settings for how fixations are computed, and the Render Settings button invokes a dialog box that controls how the fixations are displayed.

The Gap Interval refers to how GazeTracker handles gaps in the data. The Gap Interval defines the minimum time between GazePoints. If the time between two GazePoints exceeds the gap interval, a data gap has occurred. GazeTracker will not connect the GazeTrail between the points, and if the break occurs inside of a Fixation, calculation of that Fixation's properties, meaning position and duration, will stop.

The auto-increment time defines the interval by which trail truncation increments or decrements the start or end time when in the auto-increment mode for truncation. When looking at the GazeTrail on the stimulus, keyboard shortcuts allow you to quickly change the GazeTrail truncation settings. Press T to toggle truncation from being on or off. When truncation is on, press S to adjust the start time of the GazeTrail. Press E to adjust the end time of the GazeTrail. Then press the plus (+) or minus (–) key to increment or decrement the start or end time.

You may receive in-depth information on the data recorded by choosing the View command under the Data submenu of the Analysis menu. This invokes the Recorded Data dialog box. Recall that in Application Analysis, the Recorded Data dialog box is used to show the data recorded for particular windows and to change the active window shown:
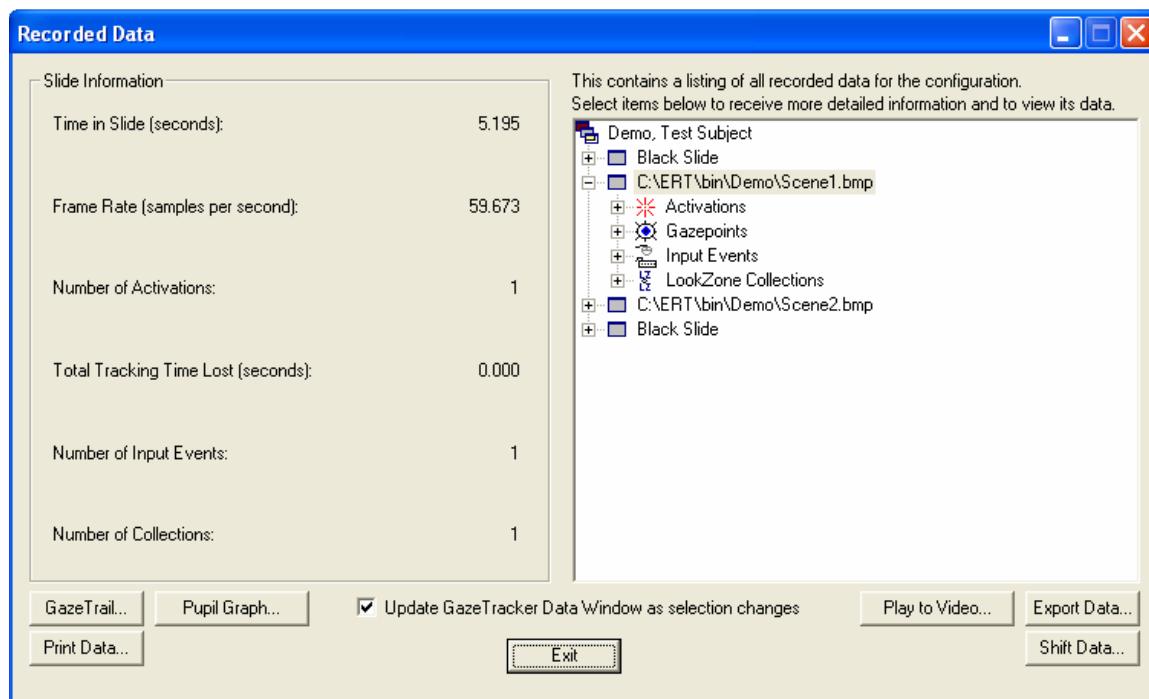

Figure 51. Recorded Data dialog box.

This allows you to navigate quickly from one slide to the next. Selecting a slide provides more in-depth information concerning the data recorded for the slide.

Application Analysis Specific Features

GazeTracker currently supports web page analysis using Microsoft Internet Explorer 5.5 or newer versions. When viewing data, GazeTracker automatically compensates for scrollable content using Scroll Sets.

Because the entire length of many web pages will not fit within a single window, GazeTracker offers special scroll support features to facilitate data analysis. Each position of the scroll bar for which data is recorded corresponds to a scroll set. All the GazePoints that are recorded while the scroll bar is fixed at a specific position are stored in a single scroll set.   If users scroll with the mouse wheel, by dragging the scroll bar, or by repeatedly pressing the arrow keys, many scroll sets may be created. These scroll sets may be condensed and displayed at one time. The Scroll Set Options dialog shown in Figure 54 describes how to condense scroll sets. The scroll set text shown would indicate that "Scroll Sets 1..20 of (50)" are being displayed if the first 20 scroll sets were condensed. Use the scroll set arrow keys shown below and found in the upper left-hand corner of the **GazeTracker Data Window** to move through the scroll sets.

Figure 52. Scroll set text.

Advancing to the next scroll set will display the GazePoints that were recorded for the current web page at the next position of the scroll bar. It will also change the appearance of the web page image in the **GazeTracker Data Window** to match the scroll position for which the data was recorded. If the *View Entire Web Page* option is checked and the *Force Window Contents to Fill Data Window* option is checked, the web page image does not need to change. To update the position of the scrollbar for the web page image displayed in the **GazeTracker Data Window**, the web browser window that was used for the recording of the data must remain open. The image in the **GazeTracker Data Window** mirrors the appearance of the browser window that was used in recording, so updating the scrollbar position in the browser window will also update the appearance of the image in the data window.   Consequently, the web browser window must have the same address as the web page you wish to display in the **GazeTracker Data Window**. GazeTracker will prompt to change the web browser to the correct page. Clicking back to the **GazeTracker Data Window** after changing the browser's scroll position will cause the new content to appear in the data window.
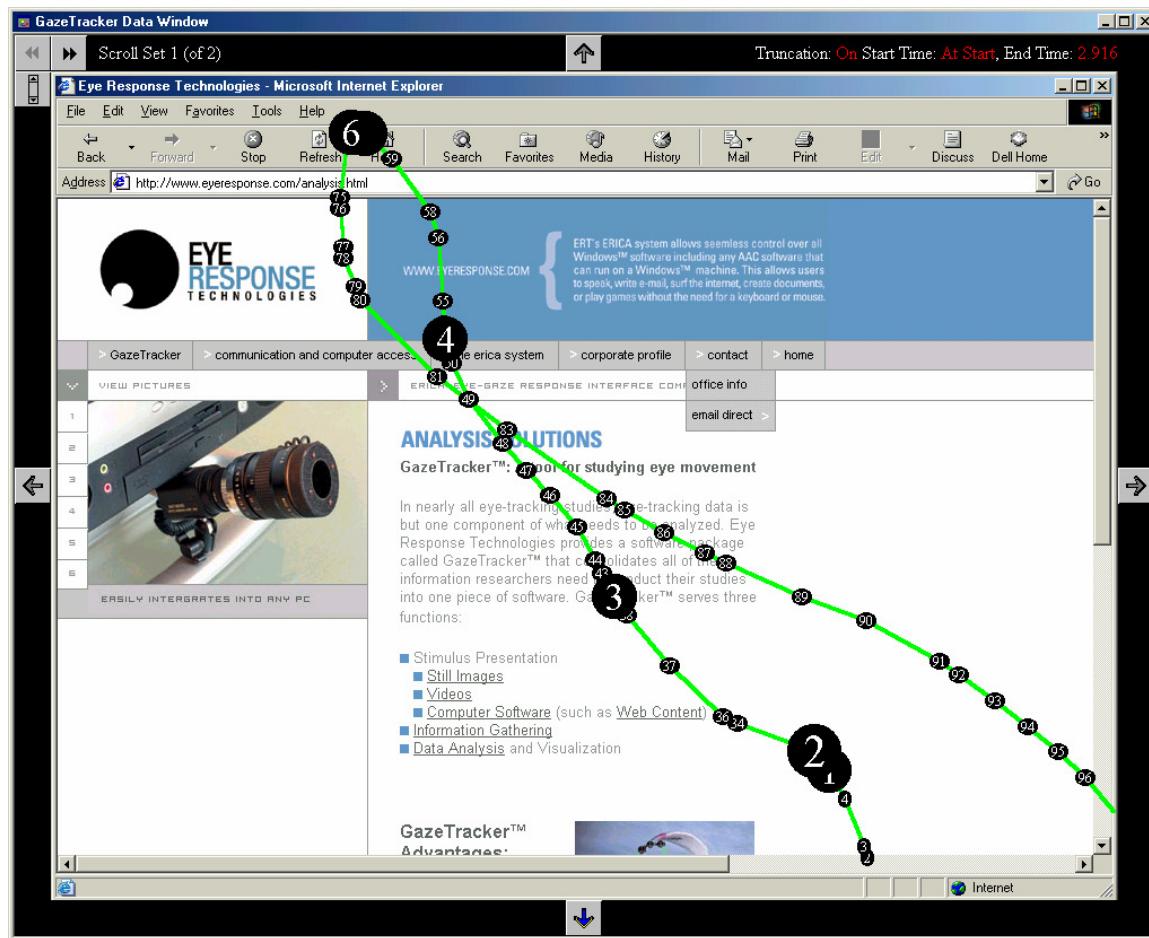
Figure 53. Data display in Application Analysis.

To advance to any specific scroll set, adjust the combination time for short duration scroll sets, and to specify the scrollable region to use when viewing recorded data, invoke the Scroll Set Options dialog box shown below. This dialog box may be accessed by double clicking on the scroll set text or by clicking the button with the scroll bar on it directly below the scroll back arrow.

GT records scroll data for every scrollable region; however, it can only display scrollable data for one scroll region at a time. This situation needs to be addressed when multiple regions are scrollable due to frames or inline frames (iframes) being present and entire web pages views for each region are desired. When selecting a scrollable region, users may have GT detect the first scrollable region it finds, specify a particular frame to use, or force use of the overall page as the scrollable region. Typically, detecting the first scrollable region is an appropriate setting. The other settings only apply when frames or iframes are present and more than one of them are scrollable. Forcing use of the overall page may be helpful in situations where iframes are used, and the parent page scrolls independently of the iframes.
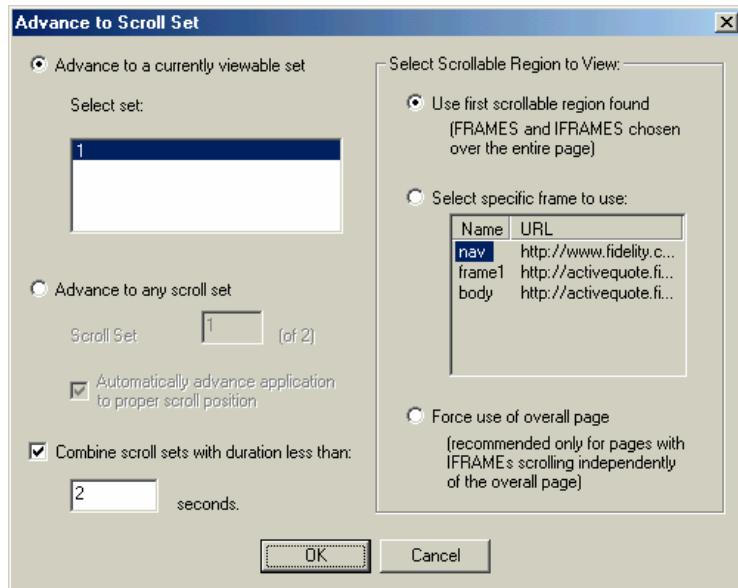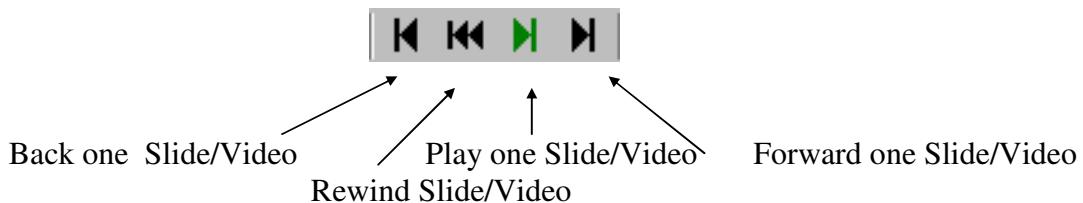
Figure 54. Scroll set options.

Data Playback

Onscreen

As soon as gaze data has been recorded, GazeTracker is ready to replay the gaze information. In order to play gaze data, select either the *Play* icon from the Toolbar or select the *Play* options in the **Operations** menu.

During playback, a red ✗ will represent the user's eye movement.

One of the options affecting playback is *GazeTrails*. These colored trails trace the eye's recorded path as it moves across screen. For more details see the Viewing Data section on page 3.1.

☞ | To bring up the GazeTracker menu bar at any time, hit the *F2* key.

For image analysis, press the Pause button or use the Pause command from the **Operations** menu to pause playback. The Stop button or menu command advances to

the end of the current slide and then stops playback. Resuming after stopping will return the recording to the position where the stop occurred. Press the Play icon or use the menu command Play to resume. The Rewind button takes you to the beginning of the entire Slide Show, while the Rewind Slide button takes you back to the beginning of the current slide.

Similar to image analysis, in video analysis you can press the Pause button or use the Pause command from the **Operations** menu to pause playback. The Stop button or menu command advances to the end of the current video and then stops playback. Resuming after stopping will return the recording to the position where the stop occurred. Press the Play icon or use the menu command Play to resume. The Rewind button takes you to the beginning of the entire Video Show, while the Rewind Slide button takes you back to the beginning of the current video.

In Application Analysis, playback will replay mouse clicks at the exact location and time for which they were recorded. Replay may not exactly match what happened during data recording if web pages load faster or additional applications are open and appear on the taskbar. The computer must be set to the same initial state prior to playback as it was prior to data recording. In other words, if a test subject observed a web page but did not navigate to it, the web browser must be open and on that page prior to data playback.
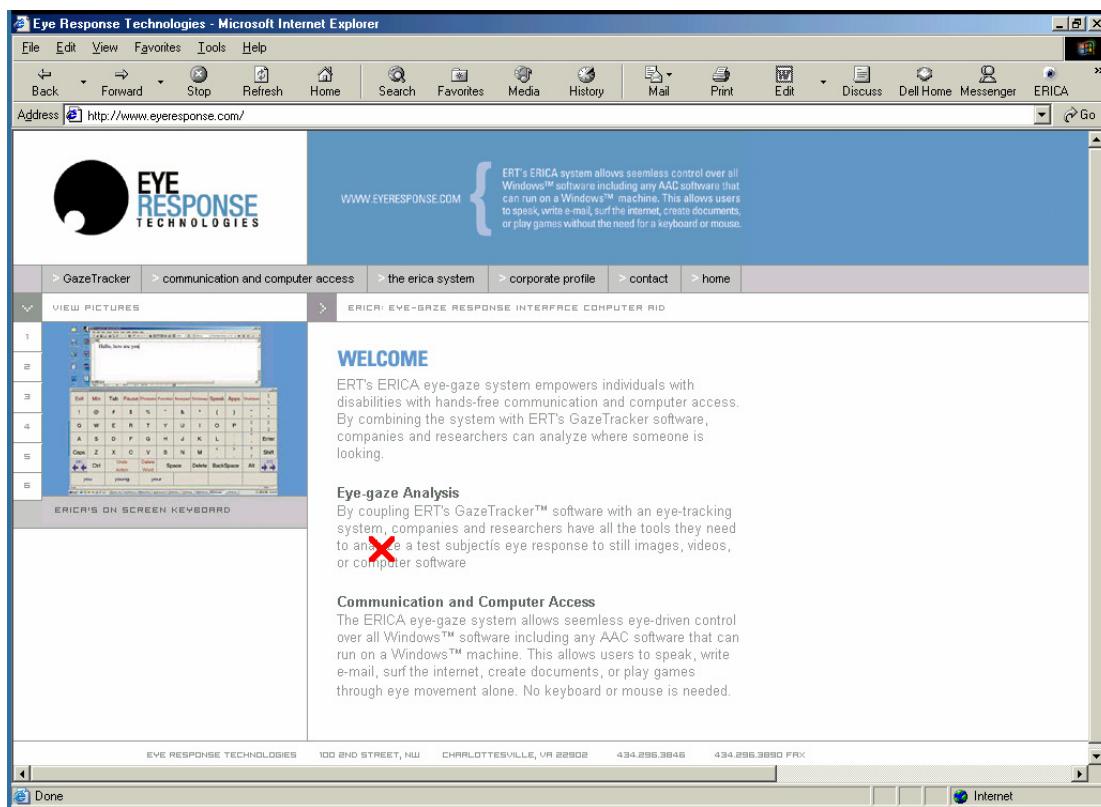

Figure 55. Application Analysis playback.

Creating a video file showing playback

This allows users to create an AVI video of the data playback. Other graphs, such as LookZone Order or Pupil, may also appear in the AVI video. A wizard guides the user through the video creation process. MPEG-IV or Intel Indeo version 5.05 compression is recommended.

Reports

Export

This wizard provides options to export raw data and fixation data directly into Microsoft Excel or into text files formatted for easy import into statistical software of your choice. Data export may be invoked with the ⌗ icon in the Analysis section of the GazeTracker toolbar or through the Export command under the Data submenu of the Analysis menu.

Print Viewed Data

Prints the data that is currently displayed onscreen. If data has been recorded and GazeTrails and fixation points appear on the screen, they will also appear on the printed slide. This is invoked from the Print command under the Data submenu of the Analysis menu.

Save Viewed Data

Choose the Save Image command from the GazeTrail Options dialog box to save a bitmap image of the stimulus with the GazeTrail.

Multiple Subject

See the Help Manual, available through the *Contents* command under the *Help* menu, for more information about this feature.

Graphing

3D LookZone

GazeTracker's 3D Analysis combines a 3D bar graph with the actual window image from an application. 3D Analysis may be selected by clicking on the **3D Cube** button from the toolbar or by selecting **Analysis**, then **Graphing** and then *3D* from the pull-down menu. In this mode, the LookZones will appear raised up from the image, based on the time spent in each LookZone. If the first toolbar button, the rotate button, is enabled, the blue arrows or keyboard keys enable the user to adjust the rotation of the 3D graph. If the

rotate button is disabled, the blue arrows and keyboard keys adjust the position of the graph. The zoom-in and zoom-out buttons move the 3D view closer and farther away. Pressing and holding the left or right mouse buttons also accomplishes this. A save button allows you to save the analysis to either a bitmap file or an AVI file. The AVI file shows the analysis view from multiple perspectives.

In the **View** pull-down menu of this window, you have the option of displaying text on each LookZone detailing the amount of time and percent of the total time spent in each particular LookZone. In Application Analysis, if you are viewing a web page, you also have the option to view the entire view of a web page in the 3D analysis or to specify the scrollable region for the web page. The view will piece together images of the page that are off screen due to scrolling effects.
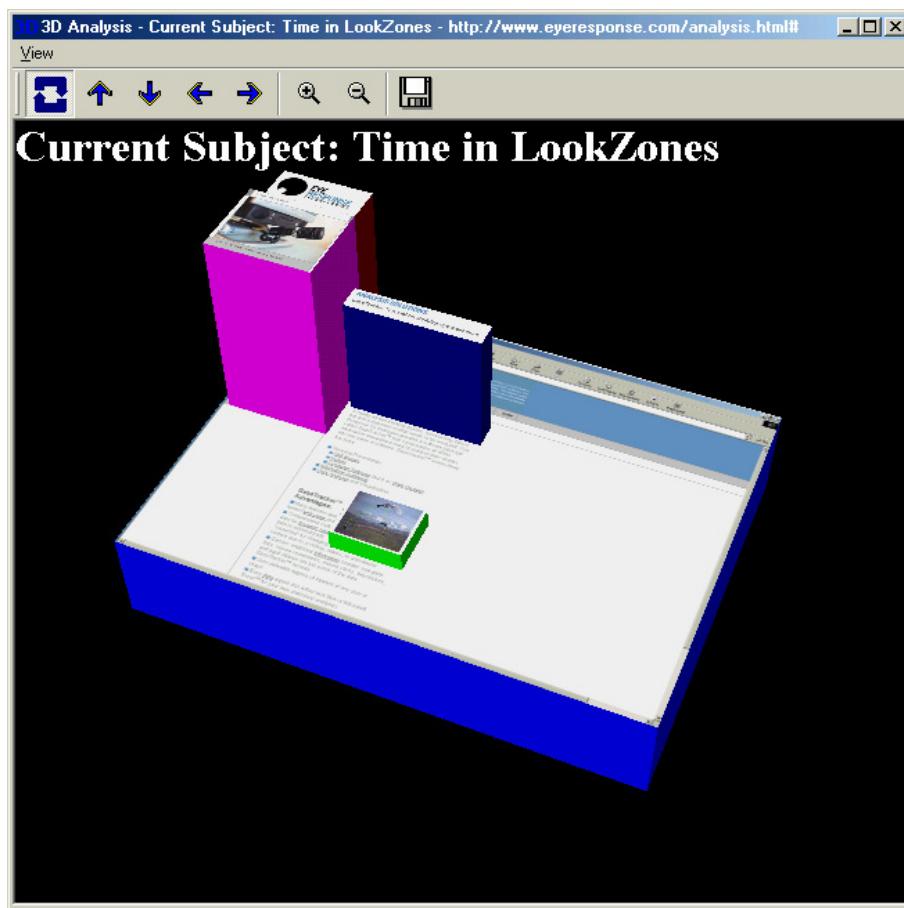

Figure 56. 3D Analysis.

Contour

This option is similar to 3D Analysis except it generates a 3D topographical map of the eye-gaze data instead of a view based on LookZone positions; this map accentuates the

regions around which eye-gaze data was collected. It gives an indication as to where LookZones should be placed for more in-depth analysis.

LookZone Order

This option shows the order in which each LookZone was observed. It is invoked through the LookZone Order command of the Graphing submenu of the Analysis menu. This graph may also be loaded by pressing the ![LZ icon] icon

By default, a dark blue bar shows when the eye is in a particular zone. A light blue bar means the zone has been observed previously but is not currently observed. A gray bar means the zone has never been observed over that time.

The colors signifying when zones have been observed and other options governing the display of the LookZone Order graph, such as the time span shown, may be easily changed through the *Options* menu.

The data displayed in the graph may be saved or printed from the *File* menu.
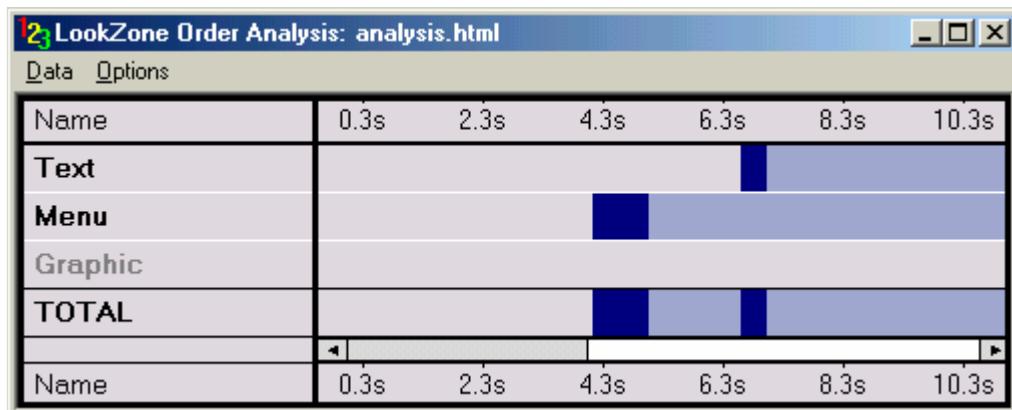

Figure 57. LookZone Order Graph.

Excel

GazeTracker offers many different options for the analysis and visualization of your data. This section discusses the Excel Graph Wizard. Additional options are available under the **Analysis** menu.

To access the Excel graphs, select *Graphing* from the **Analysis** pull-down menu and then select *Excel…* You may also click the *Excel Graph* icon to have the Graph Wizard guide you through the graphing process.

☞ GazeTracker uses Microsoft Excel 97™ or higher to graph data. One of these applications must be present in order for graphing to work correctly. If this software is not installed, you will receive the message shown below.

Figure 58. Graph Wizard Error.

☞   If you have drawn any overlapping LookZones, you must disregard the data shown for "All Other Areas" due to simultaneous eye movement in multiple zones.

Step 1:   Select the plot data.
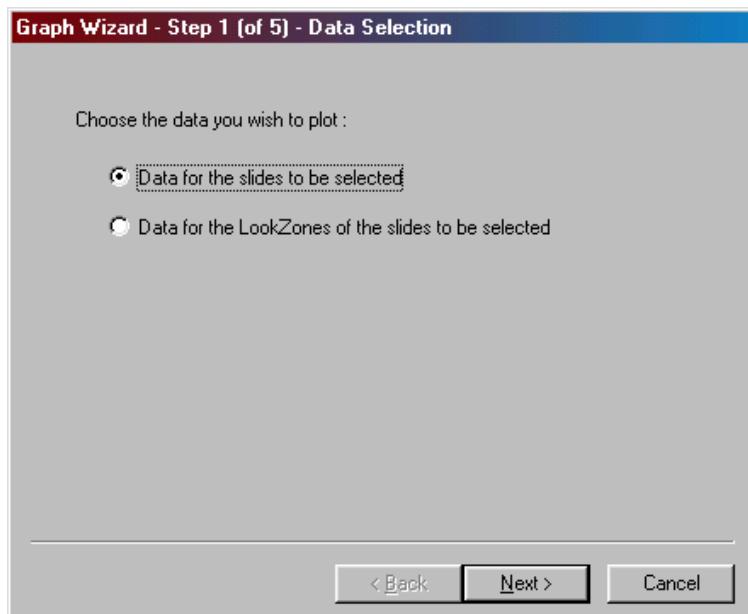
Figure 59. Graph Wizard Step 1.

Step 2: Select *Graph Data for all Slides* to use data from all the slides or select individual slides from the box below to graph data from only those slides.

Figure 60. Graph Wizard Step 2.

If you choose *Data for the LookZones of the slides to be selected* in step 1, then you will have the option of including data about portions of the slides outside of LookZones in an "All Other Areas" category.

Step 3: Select whether to display actual time spent in a region or the percent time spent in a region.
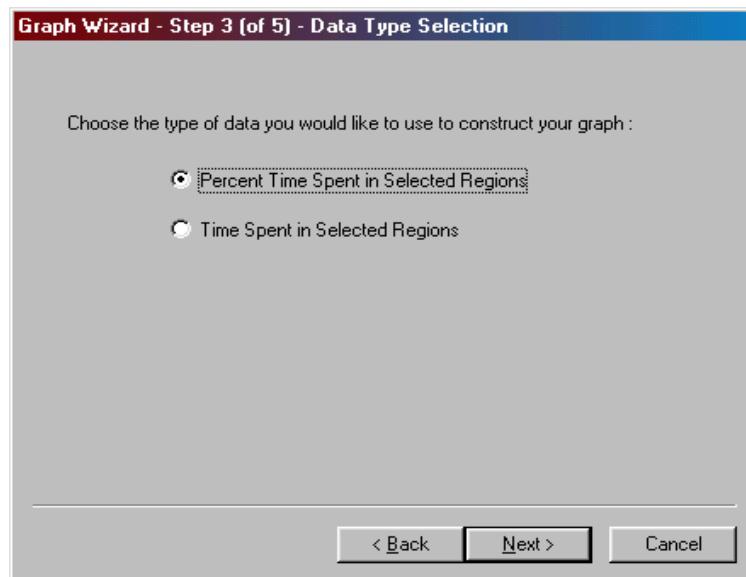
Figure 61. Graph Wizard Step 3.

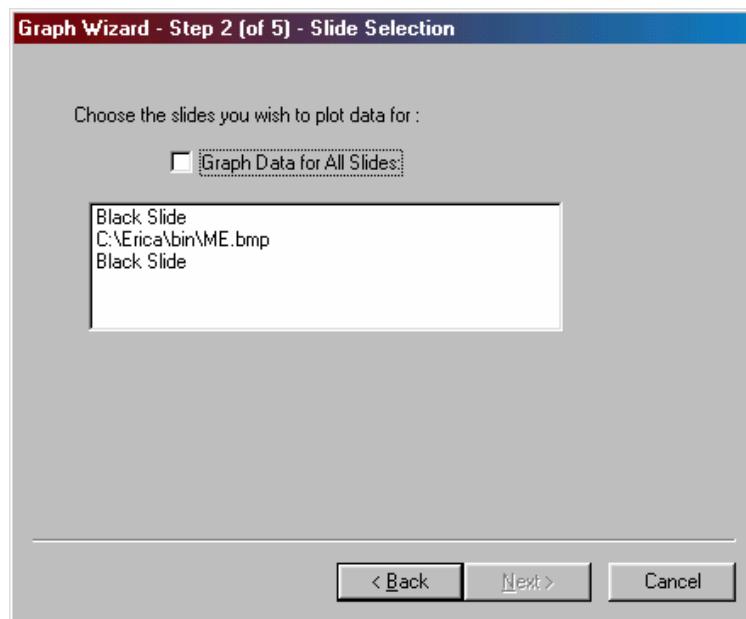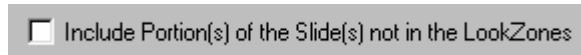**Step 4:** Select the type of graph. Bar graphs may be plotted by either rows or columns.

Figure 62. Graph Wizard Step 4.

Step 5: Summary of the graph options which were selected.
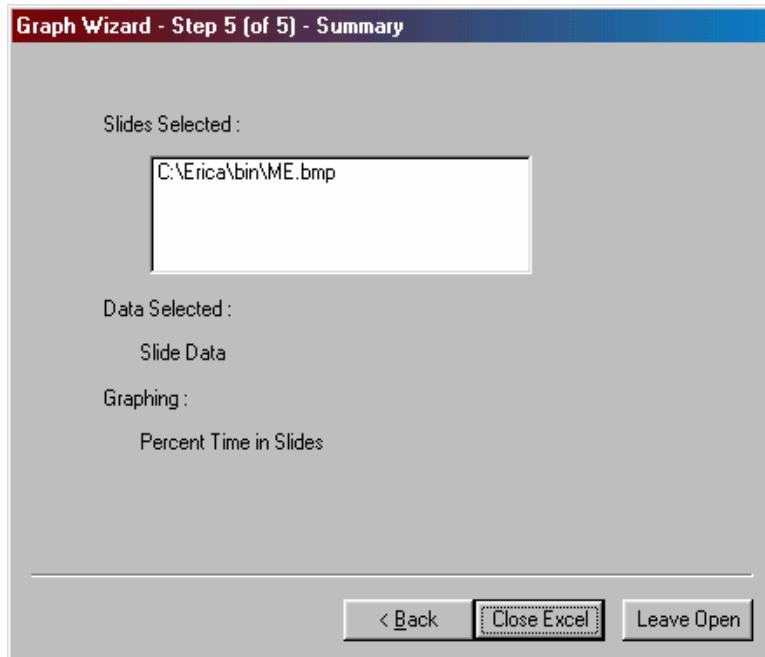
Figure 63. Graph Wizard Step 5.

Excel will now open and create a graph using the requested data. Selecting *Leave Open* allows you to close the Graph Wizard while leaving the Excel graph open. To close the Excel graph, you may either click the *Close Excel* button or close within the Excel application.

Pupil

Provides access to a graph showing the change in pupil diameter over time. This can also be accomplished by using the ![icon] icon.
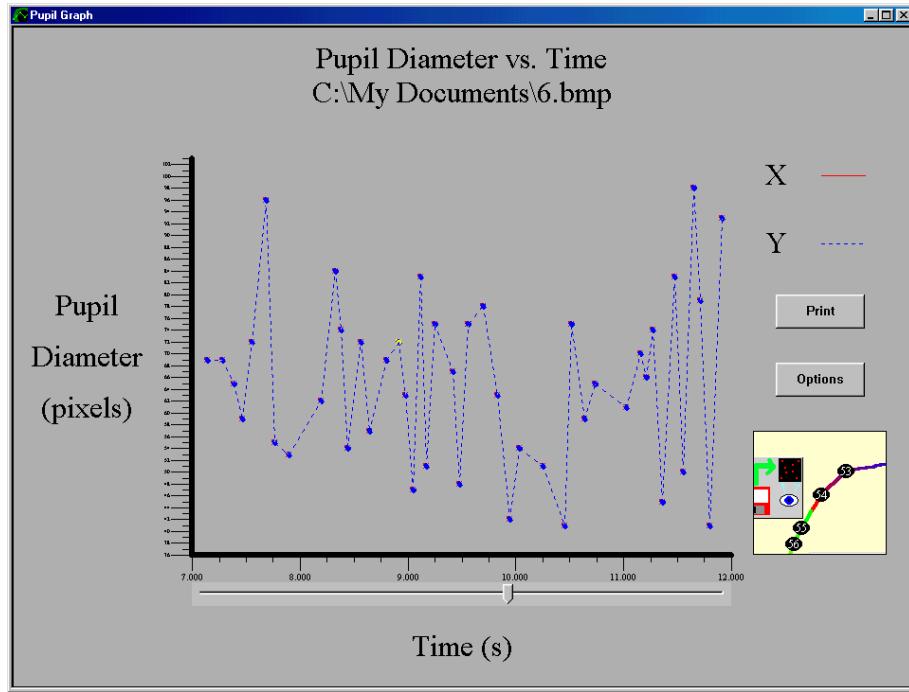
Figure 64. Pupil Graph.

The graph displays the pupil area or diameter over time in seconds. The *Print* button brings up the print dialog to print the pupil graph. The *Options* button brings up the pupil graph options dialog for adjusting the look of the pupil graph. The slideba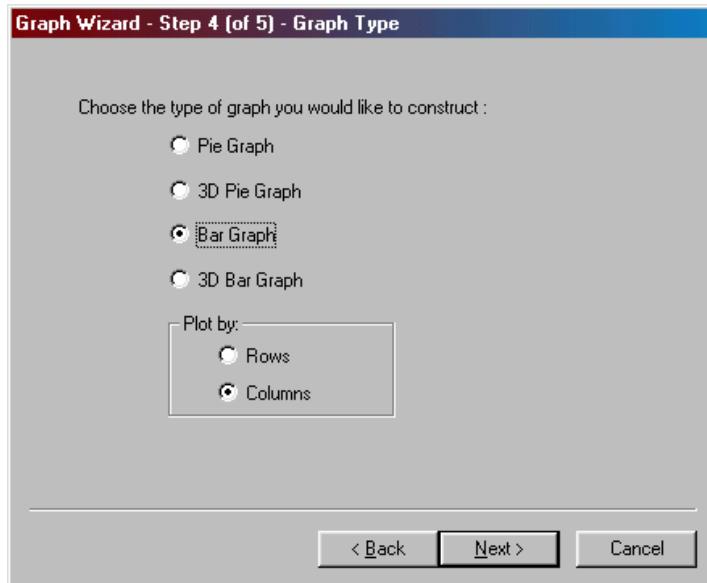r at the bottom adjust the time period for which data is graphed. Clicking on a data point will display where the user was looking in the application or slide when the data was recorded.

- *Print*

Opens up the *Printing Options* dialog for printing pupil data.
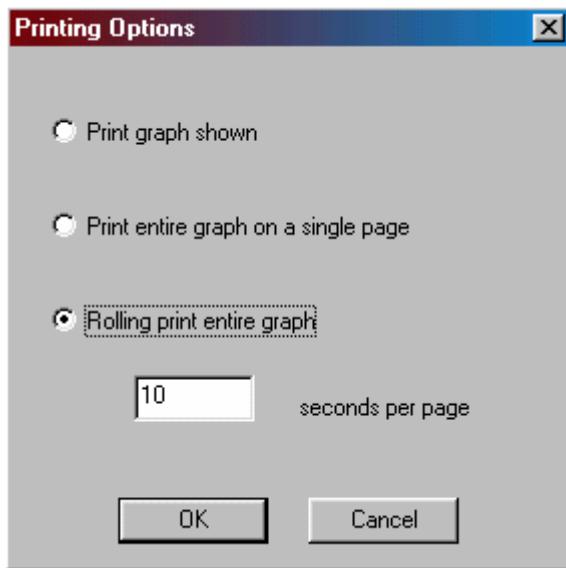
Figure 65. Pupil Graph Print Options.

The *Printing Options* dialog provides 3 methods of printing the collected pupil data. The first option is to print the currently shown graph, with its given time frame. The second option is to scale the graph so that all recorded data fits on a single page. If the entire graph is already being viewed, this option is disabled. The final printing option is to print the graph in a series of sections. Each section covers a time period set in the *seconds per page* input box and is printed on a separate page.

- *Options*

Brings up the pupil graph options dialog.
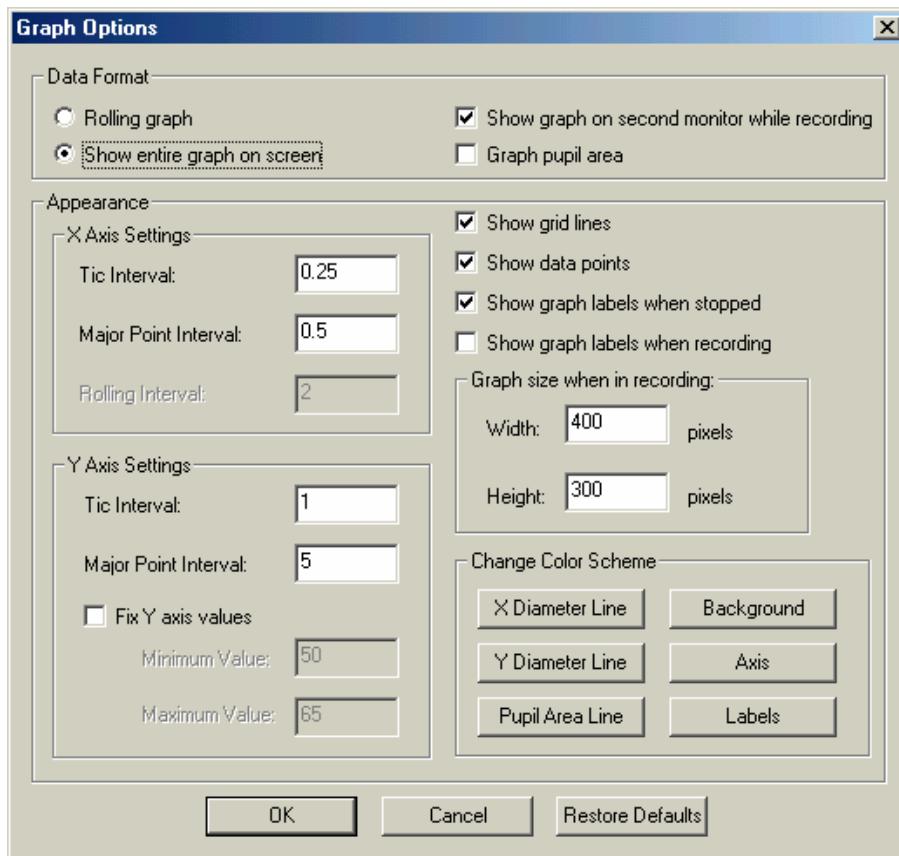
Figure 66. Pupil Graph Options.

The *Data Format* section provides various options for selecting how much pupil data should be displayed, and in what form. The *Rolling Graph* option will display the pupil area over a certain period of time. Selecting *Show entire graph on screen* will scale the graph so that all captured data points are displayed on one screen. Selecting *Graph pupil area* will graph the pupil's area instead of the diameter of the pupil.
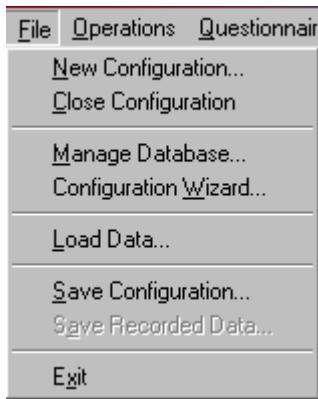
The *Appearance* section alters the look of the graph. Various graphing options may be toggled on or off, and the color scheme may be altered.

Pull-Down Menus
File

- *New Configuration*

    Launches a session wizard for creating a new session, which will be of the same type as the current session. In *Image Analysis* mode, the *Slide Show Setup Wizard* is launched. In *Video Analysis* mode, the *Video Show Setup Wizard* is launched. Finally the *Application Analysis Wizard* is launched in *Application Analysis* mode.

- *Close Configuration*

    Closes the current session, allowing for either a new *Image Analysis, Video Analysis,* or *Application Analysis* session to be opened. Before closing a session containing unsaved data, the user will be given the option of saving this data.

- *Manage Database…*

    Allows the user to change the database GazeTracker uses to save and load data. New databases may also be created, and a database may be split into multiple databases to decrease the size of any particular database file.

- *Configuration Wizard…*

    Returns the user to the summary stage of the current setup wizard. At this point he or she may go *Back* and re-edit the settings.

- *Load Data*

    Launches the data selection dialog from which user gaze data may be selected and loaded.

- *Save Configuration*

    Saves the current *Slide Show Analysis*, *Video Show Analysis* or *Application Analysis* setup created by the respective session setup wizard.

- *Save Recorded Data*

    Saves the analysis data collected for a given subject. The subject must be assigned a unique subject identification number by which the data will be saved. Additional contact information is stored along with the gaze data for each user.

- *Exit*

    This option will close the GazeTracker application.

Operations

- *Record*

    This option will start recording gaze data. In *Image Analysis* mode, this begins the display of the slide show. In *Application Analysis* mode, Gaze Tracker is minimized and the next application gains the focus. The recording of data begins immediately after these events. To end recording in either mode, switch back to Gaze Tracker and select the *Stop* button. In application analysis, you can stop by pressing the *F2* key. Data recording in *Image/Video Analysis* mode will also end

once the display of the slide/video show is completed. Recording data can also be accomplished by selecting the ⬤ icon from the menu bar.

- *Rewind*

  Resets the current recorded gaze data to play from the beginning. After playing back collected data, it must be rewound before it may be played again. This can also be accomplished by selecting the ⏪ icon from the menu bar.

- *Play*

  Plays back the recorded gaze data. Eye movement is indicated by a red **✗** on the screen. In *Application Analysis* mode, the captured mouse and keyboard events are played back in the given applications at the exact position and time for which they were recorded. This can also be accomplished by selecting the ▶ icon from the menu bar. See the **Data Playback** sections of an *Introduction to GazeTracker* for more details and warnings concerning data playback.

- *Pause*

  Pauses the playing of the current gaze data. Playing may be resumed by pressing the play button. The GazeTrail will be shown from the starting point up until the time at which play has been paused. Pausing play can also be accomplished by selecting the ❚❚ icon from the menu bar.

- *Stop*
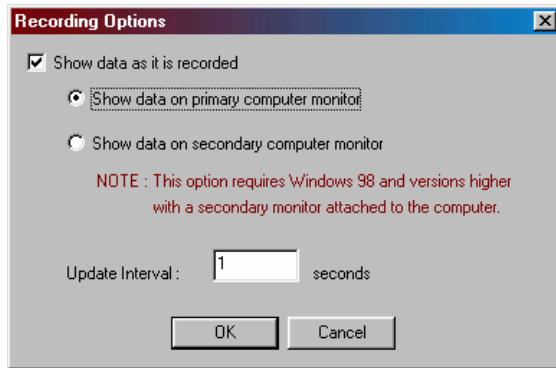
  This option will stop eye data recording or data playback. This can also be accomplished by using the ■ icon or by pressing the *F2* key.

- *Play to Video File…*

  This allows users to create an AVI video of the data playback. Other graphs, such as LookZone Order or Pupil, may also appear in the AVI video. A wizard guides the user through the video creation process. MPEG-IV or Intel Indeo version 5.05 compression is recommended.

- *Recording Options…*

  Launches a dialog for configuring GazeTracker to work with two monitors.

Selecting *Show data as it is recorded* will display the GazePoints as they are collected. In *Image Analysis* mode, data may either be shown on the primary or the secondary monitor. In *Application Analysis*, data may only be displayed on a secondary computer monitor while it is being recorded. The data is always collected from the primary monitor. The interval at which the collected data is displayed may be adjusted.

- *Remote Control…*

  This allows users to set options governing remote control of the GazeTracker software. The remote control occurs through a link over a serial port from one computer to the GazeTracker computer. The controlling computer needs the GTRemote application, provided for free by Eye Response Technologies, to manipulate the GazeTracker software on the other computer. The serial port settings in GTRemote and GazeTracker must match.

- *Shift Data…*

  This allows the viewed data to be shifted up, down, left, and right to compensate for any system inaccuracies. The Data Shift Wizard will guide you through the data shifting process.

Slide Navigation Bar

Found only in *Image Analysis* and *Video Analysis* modes, the *Slide Navigation Bar* handles movement between slides/videos and the playback of recorded data for each slide/video.

- *Previous Slide:*

  Moves to the previous slide in the slide show.

- *Rewind Slide:* ◄◄

    Rewinds the slide so that the GazeTrail will playback from the beginning of the slide.

- *Play Slide:* ▶|

    Plays the GazeTrail of the current slide. A red ✗ indicates the movement of the eye across the screen.

- *Advance Slide:* ▶|

    Advances to the next slide in the slide show.

Questionnaire

- *New Questionnaire*

    Selecting this option will display a wizard for creating a questionnaire that can be automatically administered to test subjects at the beginning or end of their sessions.

- *Edit Questionnaire*

    Selecting this option will allow you to make changes to an existing questionnaire using the **Edit Questionnaire** Dialog Box.

- *Load Questionnaire*

    Select this option to load a saved questionnaire.
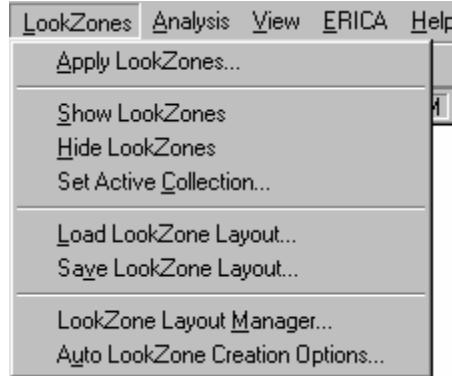
- *Save Questionnaire*

    Once a questionnaire is complete, select this option to save it for future use.

- *View Answers*

    Select this option to view the answers that a test subject has entered for the questionnaire.

LookZones

- *Apply LookZones*

    Select this option to create new LookZones. Creating LookZones can also be accomplished by using the LZ icon.

- *Show LookZones*

    Displays and refreshes the LookZones on the current slide or window.

- *Hide LookZones*

    Hides the LookZones on the current slide or window.

- *Set Active Collection*

    Selects the LookZone collections that should be active during computation of the analysis metrics. If LookZones activate other collections, the collections that should be activated should be disabled through this command. Collection activation options for a particular LookZone are available under the *Additional Options* portion of the LookZone Properties dialog.

- *Load LookZone Layout*

    Loads a group of LookZones from disk, replacing the current group of LookZones associated with the current slide or application.

- *Save LookZone Layout*

  Saves the LookZones associated with the current slide or application. In *Application Analysis* mode, it is necessary to first select the application for which LookZones should be saved.
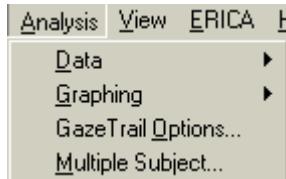
- *LookZone Layout Manager (application analysis only)*

  Allows users to adjust which LookZone Layouts are the default layouts for particular application windows. A default layout will be loaded automatically whenever its associated application window is found in the recorded data.

- *Auto LookZone Creation Options (application analysis only)*
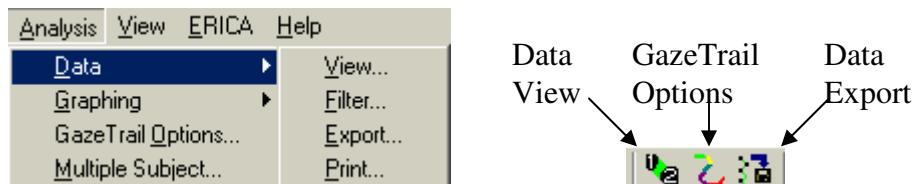
  The Automatic LookZone Creation dialog box creates LookZones for use with webpages.   Using this feature, you can automatically generate LookZones for all hyperlinks and images in a webpage. The automatic LookZone creation features are available only in *Application Analysis* mode.   The *Enable Parsing* option must be selected in order to use automatic LookZone generation for webpages.

Analysis

- *Data*

  A subset of menu items that allow the user to interact with the gathered gaze based data.

- *View*

  Launches the *Recorded Data* analysis dialog.

  The *Recorded Data* dialog may also be brought up with the ⬛ icon.

- *Filter*

   Brings up the filter dialog box for adjusting the parameters used to filter out individual GazePoints that have been gathered. Any data points not within the specified filter parameters will be excluded from the set of data points used for graphing and data analysis purposes.
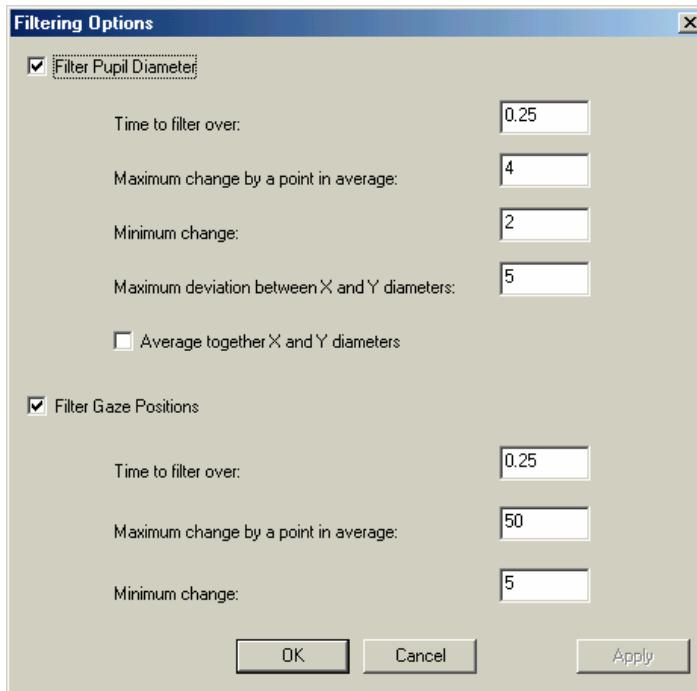
Filtering Options

☑ Filter Pupil Diameter

Time to filter over:	0.25
Maximum change by a point in average:	4
Minimum change:	2
Maximum deviation between X and Y diameters:	5

☐ Average together X and Y diameters

☑ Filter Gaze Positions

Time to filter over:	0.25
Maximum change by a point in average:	50
Minimum change:	5

OK   Cancel   Apply

The *Filter Pupil Diameter* option allows the recorded pupil data to be filtered. The *Time to filter over* indicates the time period for which the noted minimum and maximum changes apply. If a captured GazePoint changes from the previous captured point by less than the *Minimum Change*, then the current GazePoint is recorded as having the same position as the previous point. *Maximum change by a point in average* and *Maximum deviation between X and Y* will remove any points not meeting these criteria from the data sets used for exporting and displaying data. The option to *Average together X and Y diameters* will apply the filter criteria to the average of the X and Y diameters.

The *Filter Gaze Positions* option allows the gaze based data to be filtered. The *Time to filter over* is the time from which the maximum and minimum changes apply. All data points recorded within the given time period must change by at least the *Minimum Change* amount, yet cannot change by more than the *Maximum change* amount.

- *Export*

  This wizard provides options to export raw data and fixation data directly into Microsoft Excel or into text files formatted for easy import into statistical software of your choice. Data export may also be invoked with the ⬚ icon.

- *Print*

  Prints the data that is currently displayed onscreen. If data has been recorded and GazeTrails and fixation points appear on the screen, they will also appear on the printed slide.

- *Graphing*

  A collection of menu options for graphing the recorded gaze based data.

  - *3D*

    Brings up a 3D display of the LookZones. Individual LookZones are elevated based upon the time spent viewing them. This graph may also be loaded by pressing the ⬚ icon.

  - *Contour*

    This option is similar to 3D Analysis except it generates a 3D topographical map of the eye-gaze data instead of a view based on LookZone positions; this map accentuates the regions around which eye-gaze data was collected. It gives an indication as to where LookZones should be placed for more in-depth analysis.

  - *LookZone Order*

    This option shows the order in which each LookZone was observed. This graph may also be loaded by pressing the ⬚ icon

  - *Excel*

Launches the *Excel Graph Wizard*, which will produce *Excel* graphs of the gaze data. The *Excel Graph Wizard* can also be summoned by clicking on the ⬤ icon.

- *Pupil*

    Provides access to a graph showing the change in pupil diameter over time. This can also be accomplished by using the 🖼 icon.
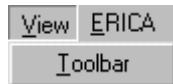
- *GazeTrail Options*

    Launches the *GazeTrail Options* dialog that allows the user to adjust the display of the GazeTrail.

    Clicking on the ↲ icon will bring up the *GazeTrail Options* dialog. In *Application Analysis* mode, the Gaze Trail is only shown in the data viewer. Clicking on the GazeTrail button of the Data Viewer dialog will bring up the GazeTrail Options dialog.

- *Multiple Subject*

    See the Help Manual, available through the *Contents* command under the *Help* menu, for more information about this feature.

View

- *Toolbar*

    A ✓ by this option indicates that the icon toolbar will be displayed inside the Gaze Tracker window.

Eye-tracker Menu

NOTE: This is a menu specific to your eye-tracker. Consult *Appendix A*.

Help

- *Contents…*

    This option displays the contents of the Help Manual. This can also be accomplished by using the icon.

- *Search…*

    This option displays the search window in the Help Manual.

- *Index…*

    This option displays the index of the Help Manual.

- *Tutorial…*

    This option will display a tutorial that guides new users through GazeTracker's many features.

- *About GazeTracker…*

    This option displays program information, version number and copyright.

Appendix A: Alternative Eye-tracker Setup

Special versions of GazeTracker function with the Applied Science Laboratories (ASL) eye-trackers, the Seeing Machines faceLAB System, and the SensoMotoric Instruments (SMI) eye-trackers. For these versions of GazeTracker, once a session has been launched, the ERICA menu option is replaced by the ASL, faceLAB, or SMI menu option, which is described below.

ASL System Setup

The computer GazeTracker operates on needs a serial link to the ASL hardware.

The ASL software needs to be set to demand mode operation for data output. For the 4000 system, ASL must send 22 bytes of information. For the 5000 system, ASL must send 8 bytes of information. Consult the ASL documentation for how to make these system settings.

In GazeTracker, the **Port Settings**, **Data Transform**, and **System Type** values need to be set. The baud rates between the two machines must match. See the following section of this manual for more information.

faceLAB System Setup

The computer GazeTracker communicates via an Ethernet link to the faceLAB computer. faceLAB transmits data over a UDP port. GazeTracker functions with faceLAB versions 3 and above.

To setup GazeTracker to communicate with faceLAB, ensure that the UDP port specified in GazeTracker matches the port used to transmit data in faceLAB. By default, port 2002 is realtime data, and 2001 is accurate data.

Also, ensure that the screen resolution in the world model editor for faceLAB matches the monitor display resolution for GazeTracker's computer.

In GazeTracker, choose the **Settings** command under the **faceLAB** menu when a configuration is loaded to setup the communication link. See the following section of this manual for more information.

SMI System Setup

The computer GazeTracker operates on needs a serial or Ethernet link to the computer executing SMI's iView software.
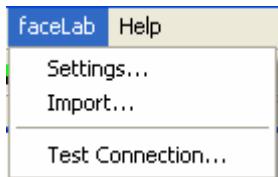
SMI's iView software needs to have the Online | Enable Remote Control option enabled

The Remote setting of the Setup | Preferences | Hardware dialog box in the iView software needs to have analogous settings as the Port Settings dialog box in the GazeTracker software (this is found under the SMI | Port Settings command).

If you are communicating via the serial port, the serial port baud rates much match. If you are communicating via the Ethernet port, the Listen address in the iView software must match the Target address in the GT software. The Target address in the iView software must match the Listen address in the GT software. All port numbers must match.
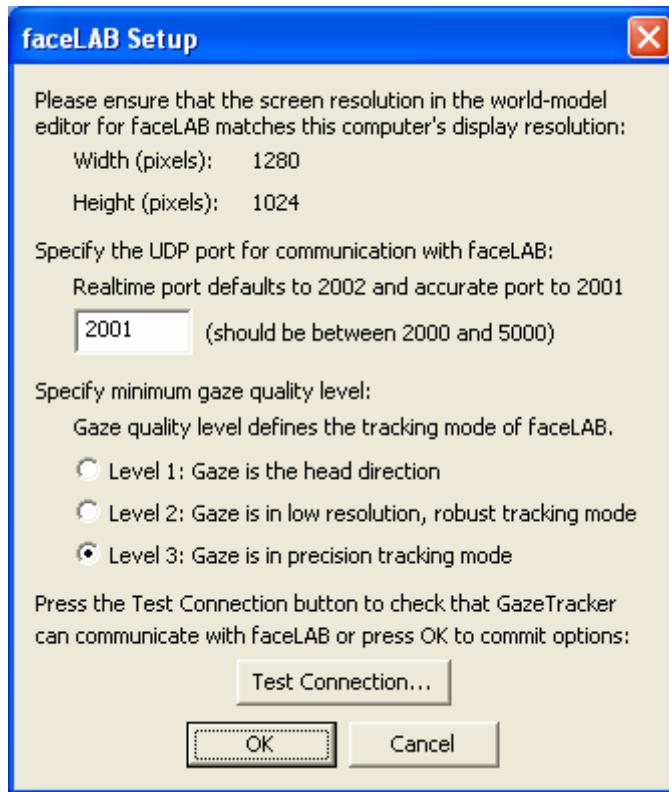
In GazeTracker, the **Port Settings** and **Data Transform** values need to be set. See the following section of this manual for more information.

faceLAB Menu

- *Port Settings*

    This invokes the dialog box for configuring GazeTracker to communicate with the faceLAB system.
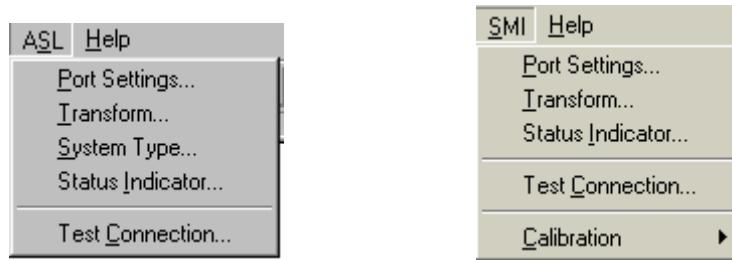
- *Import (Image or Video Analysis modes only)*

    The Import command allows you the user to import previously recorded faceLAB
    data into GazeTracker for analysis. This command is only available in Image or
    Video Analysis modes. Users specify the directory from which they wish to
    import the fll files. Scaling operations are then specified to convert the data from
    the faceLAB coordinate system to the GazeTracker coordinate. Finally, users
    specify the timeline for the display of the simuli in GazeTracker. The imported
    data is then synchronized to the specified stimulus display options.

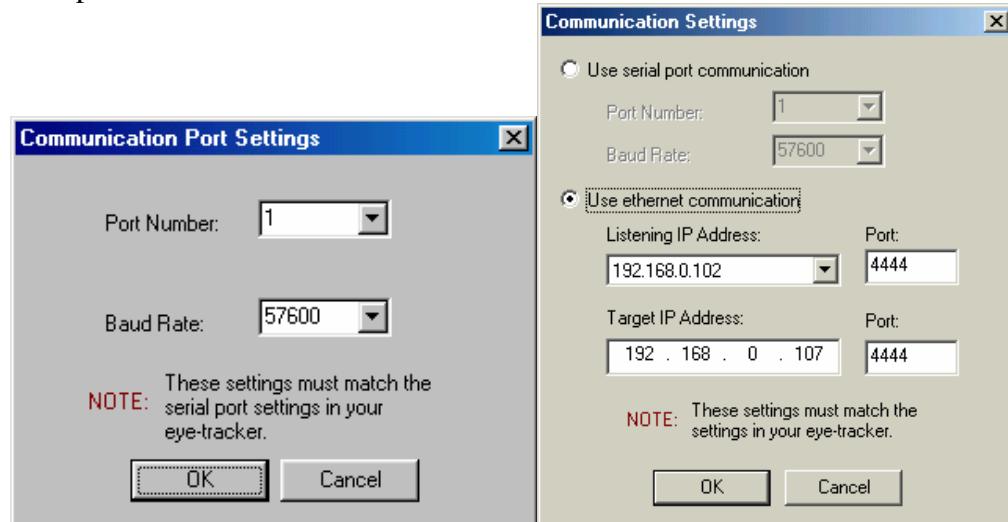- *Test Connection*

    This command allows users to test communication between the faceLAB and
    GazeTracker systems. Invalid samples occur when the faceLAB data is off the
    screen. Check the screen resolution setting in the world model editor for faceLAB
    to ensure it matches the monitor display resolution in GazeTracker. Connection
    failures mean that GazeTracker cannot receive data from the Ethernet port or
    faceLAB is not transmitting data.

ASL and SMI Menus

- *Port Settings*

    Brings up a dialog box for adjusting the port from which eye-tracking data should be captured.
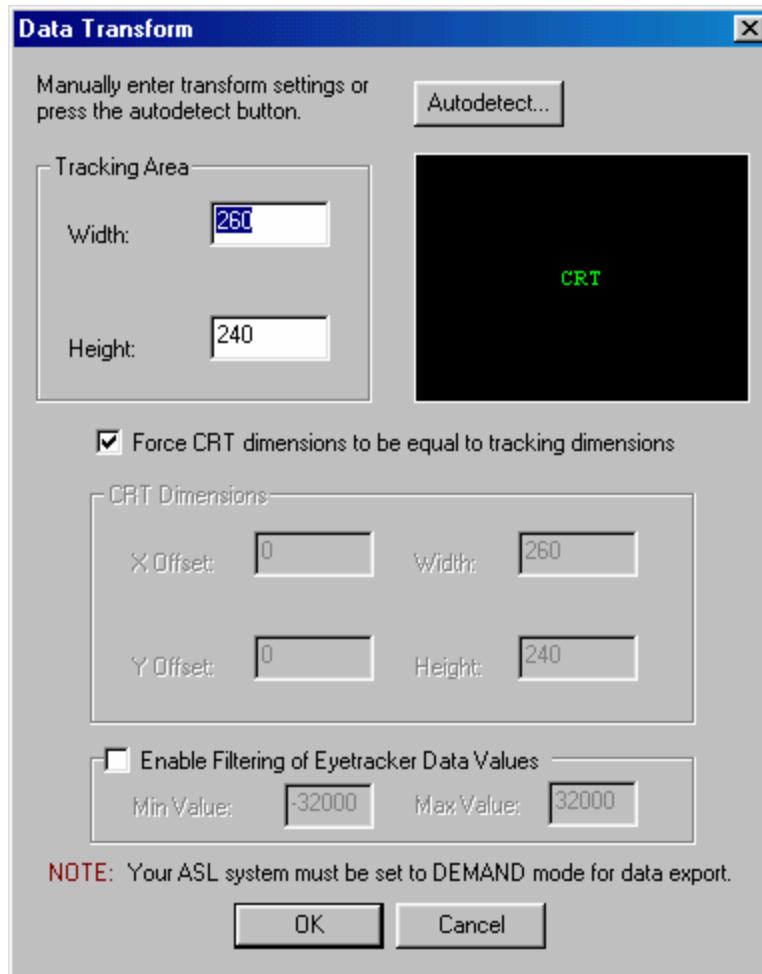

    Port Number selects the serial port that the eye-tracker is attached to. Baud Rate selects the rate at which data may be captured. Capturing at extremely high rates may result in the loss of transmitted data. The eye-tracking system must be set up to transmit data out of the serial port. The baud rate of the eye-tracking system should match the baud rate selected here. Refer to the ASL or SMI documentation for further information. A baud rate of 19200 results in 30 samples per second while a baud rate of 38400 results in 60 samples per second.

    For the SMI system, users may instead transmit data via an Ethernet connection. The Listen address must match the Target address in the SMI iView software, and the Target address must match the Listen address in the SMI iView software. All port numbers must also match.

- *Transform*

    Brings up the *Data Transform* dialog for translating the eye-tracking coordinates into screen coordinates.
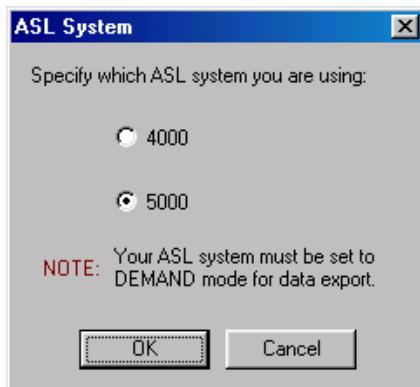

The tracking area is the area over which the eye-tracking system is tracking the eye. The tracking area is the maximum width and maximum height that may be tracked by the eye-tracking system. The graphic in the upper right should be set to correspond to the size of the computer monitor (CRT) in the ASL scene camera when using the ASL system. The position of the CRT may be adjusted by dragging and resizing the box labeled CRT or by adjusting the CRT dimensions. The entered data must be in ASL or SMI tracking units. The Autodetect mode allows you to easily set the transform options. If *Enable Filtering of Eyetracker Data Values* is selected, GazeTracker will remove any eye-tracking data that is recorded with x or y values less than the min value and greater than the max value. This helps remove false eye identifications from the eye-tracking data.

For the SMI system, *Force CRT dimensions to be equal to tracking dimensions* should always be checked. The tracking area width and height values should match the calibration area setting under the Setup | Calibration command in the SMI iView software. Press Autodetect to ensure that this is the case.
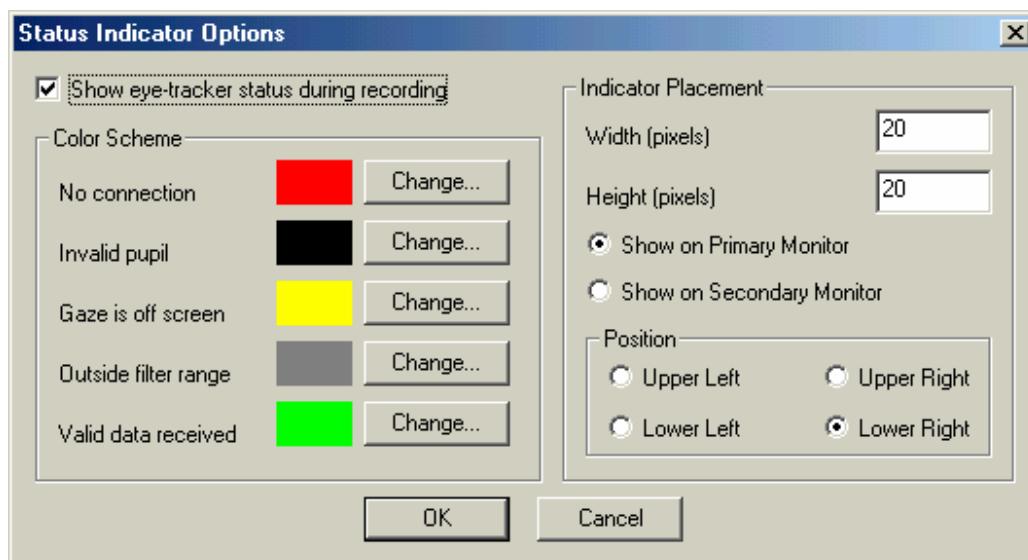
- *System Type (ASL system only)*

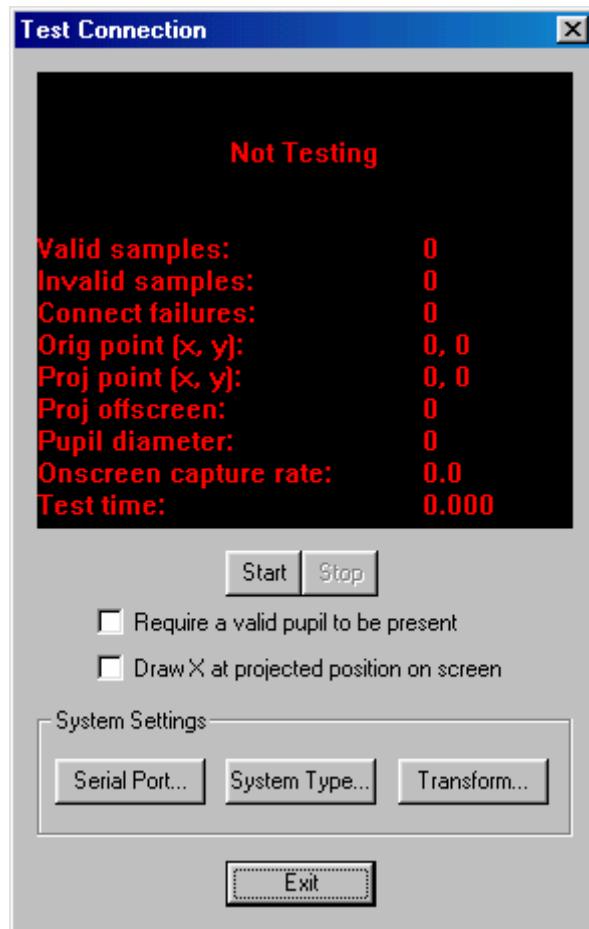 This allows you to select which system you are using.

- *Status Indicator*

  This dialog box displays specifies options governing the display of the communication status with the eye-tracker that may occur during data recording. A small rectangle will appear at the desired location. The color of the rectangle indicates the communication status.
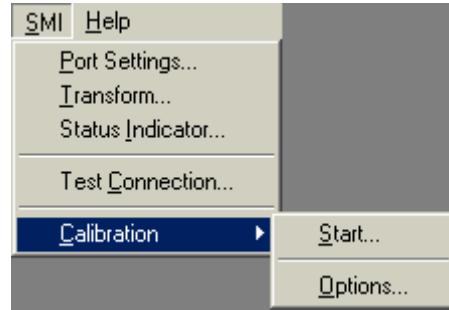
- *Test Connection*

    This dialog allows testing of the communication status with the eye-tracker. It displays metrics concerning valid connection attempts and gazepoint projections with the eye-tracker. If you are using an ASL system, it is recommended that your ASL system be set to the Set Target Points mode when testing your connection. Consult your ASL documentation for more details on the Set Target Points feature. Connection failures or invalid samples may indicate a problem with the serial port or system type settings. Consistent projections offscreen imply invalid transform settings.
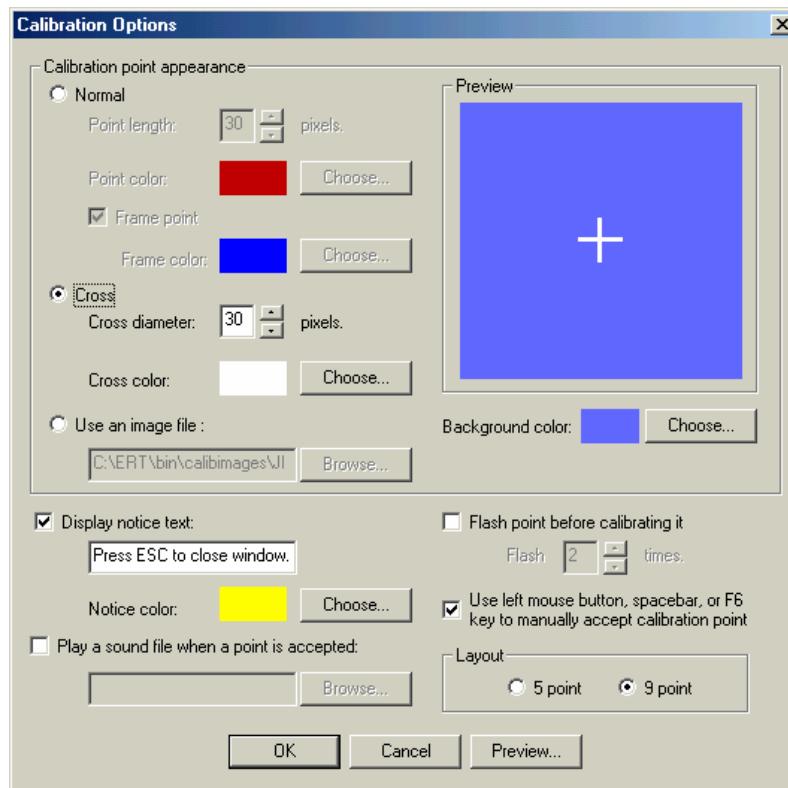
- *Calibration (SMI system only)*

- *Start…*

  This invokes the calibration process with the options specified in the Calibration Options dialog box. If manually accepting the calibration point is not enabled, the researcher must press the spacebar or F6 on the PC running iView to advance the points. Note that even if Auto Accept is enabled in the iView software, the spacebar or F6 must be pressed for the first point.

- *Options…*

  These options govern the appearance of the calibration points.

CHAPTER 5
Troubleshooting for GazeTracker

1. *Problem:* **Web page data I collect is not scroll compensated, or the LookZones I create do not adjust with the scroll bar position.**

   Solution:

   1. Was the GazeTracker install program used to install GazeTracker? The installation program must be used for GazeTracker to function properly.

   2. Does GazeTracker scroll compensate sites like www.eyeresponse.com or www.cnn.com? If yes, then please contact customer support for GazeTracker with the name or the URL you are studying. If no, ensure that there is only one ericaie.dll file on your machine, and it resides in the windows system directory (usually C:\Windows\System32).

   3. Which version of Internet Explorer are you using? Scroll compensation is not supported in other browsers, and only IE versions 5.5 or higher are supported.

2. *Problem:* **The web page I collected data over has changed its content, so my viewed data is not being displayed properly.**

   Solution: It is recommended that you save local copies of the web pages you wish to study if the site undergoes frequent changes (such as the CNN site). Use the File | Save As feature in Internet Explorer or the Work Offline feature to save a local copy of the site.

3. *Problem:* **I have collected data on a web page active over the Internet. I have now saved a local copy of the page. How do I redirect GazeTracker to link to the local copy?**

   Solution: Load a test subject who has viewed the page in question. Choose the **Analysis | Data | View** command. Click on the web page in the Recorded Data window. Then click on the *Rename Window* command on the Recorded Data window. You may change the title text and the URL for the page in the resulting dialog.

4. *Problem :* **My database file is getting very large. How do I save data to a new database?**

  Solution : Choose the **File | Manage Database** command from any active analysis session. Press the *Create* button to create a new database file, and then navigate to that file to have GazeTracker use the new database. Use the *Split* command to copy content from your existing database, such as a configuration, into a new database.

5. *Problem :* **I am using GazeTracker in conjunction with an ASL eye-tracker. I do not appear to be recording data.**

  Solution :

1. Choose the **ASL | Test Connection** command. This dialog box allows you to determine the reason behind any connection failures with the ASL eye-tracker.
2. Choose the **ASL | Status Indicator** command. The color of the indicator, which only appears during data recording, indicates the reason for connection failure.
3. If the above options do not help, please contact customer support.

6. *Problem :* **I have the Scene Sync version of GazeTracker. Are there help files for this version of GazeTracker?**

  Solution : There is no HTML help for the Scene Sync version, but in your Manual directory, there should be a PDF file called SceneSyncManual.pdf. This file contains instructions on how to operate the SceneSync and GazeTracker: SceneSync.