1. Software installation and examples.

Go to our support website and download the latest Windows Display Software https://www.sr-support.com/forums/showthread.php?t=6. After the installation, you'll find some E-Prime examples at "C:\Program Files\SR Research\EyeLink\com\examples".   You may run any of the "eprime_simple", "eprime_picture", or "eprime_gcwindow" for an EyeLink experiment programmed with E-Prime.

2. Basic framework of integration.

A typical experiment using the EyeLink eye tracker system will use some variation of this sequence of operations:

a) Pre-experiment preparation. This includes,
• Initializing the EyeLink system, and opening a link connection to the EyeLink tracker.
• Sending any configuration commands to the EyeLink tracker to prepare it for the experiment
• Getting an EDF file name, and open an EDF data file (stored on the eye tracker)

b) Performing a calibration at the beginning of the experiment (for multi-block experiments, preferably at the beginning of each block).

c) Performing a drift correction/drift checking at the beginning of each trial.

d) Starting the eye tracker recording for each trial.

e) Sending out message to the EDF file report the exact time of the stimulus events.

f) Stopping the eye tracker recording, and sending out Data Viewer integration messages.

g) End-of-experiment tracker operations. This includes,
• Closing the EDF data file and copying it via the link to the display computer.
• Closing the link connection to the eye tracker.

3. Adding EyeLink related inline and user script.

Assuming that you already have your own E-Prime experiment, please following the steps below to add the EyeLink related inlines and user scriot.

   a) SessionProc.

   Add an InLine "EyeLinkConnect" before the Instructions node. Add an InLine "EyeLink Close" after the GoodBye node.   The "EyeLinkConnect" InLine is used to Initialize the EyeLink connection to the EyeLink tracker, open and EDF file, and send out configuration commands to the EyeLink tracker. You may copy and paste the entire "elconnect" inline from the Simple example (C:\Program Files\SR Research\EyeLink\SampleExperiments\com\e-prime\simple).

    The "EyeLinkClose" InLine is used to close the EDF file, transfer the file to the display computer, and close the EyeLink connection. You may copy and paste the entire "elclose" inline from the Simple example.
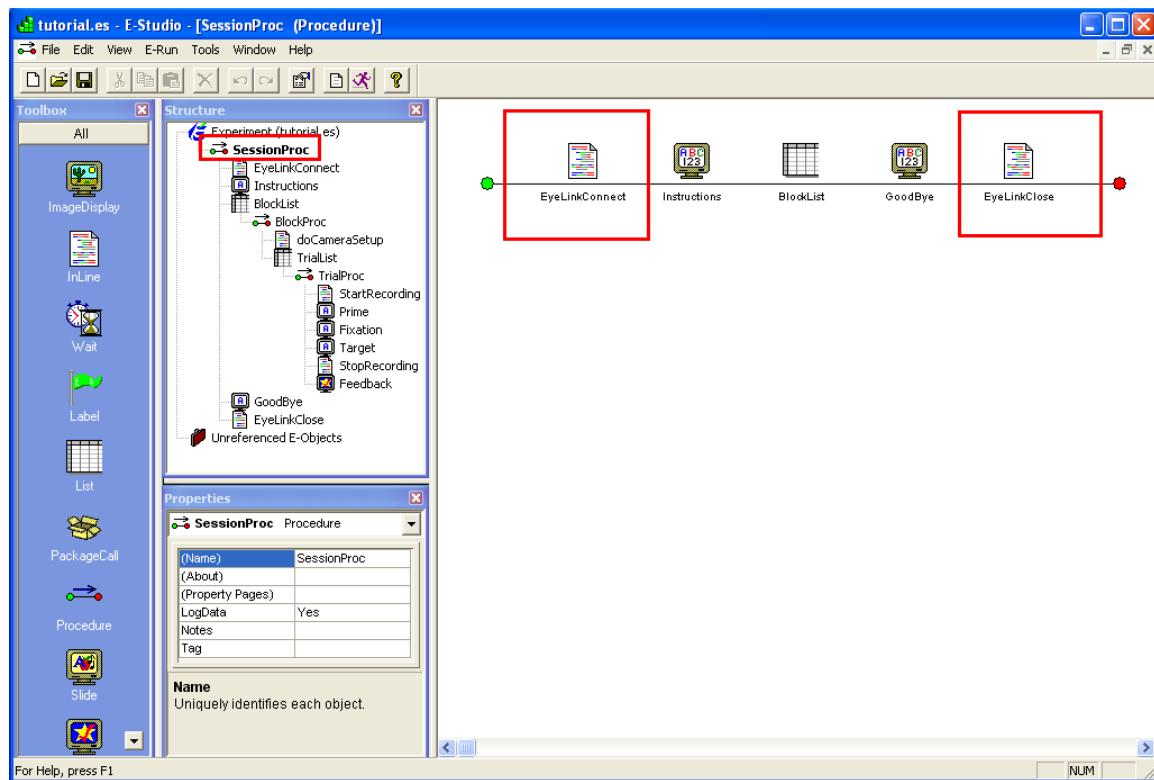
b) BlockProc.
   Add a "DoCameraSetup" Inline before the TrialList node.   This is used to perform a pre-block calibration/validation. You may copy and paste the entire "elCameraSetup" inline from the Simple example.

   Please note that you will not be able to transfer the camera image to the display computer when setting up the cameras; this is a known limitation with E-Prime programming.
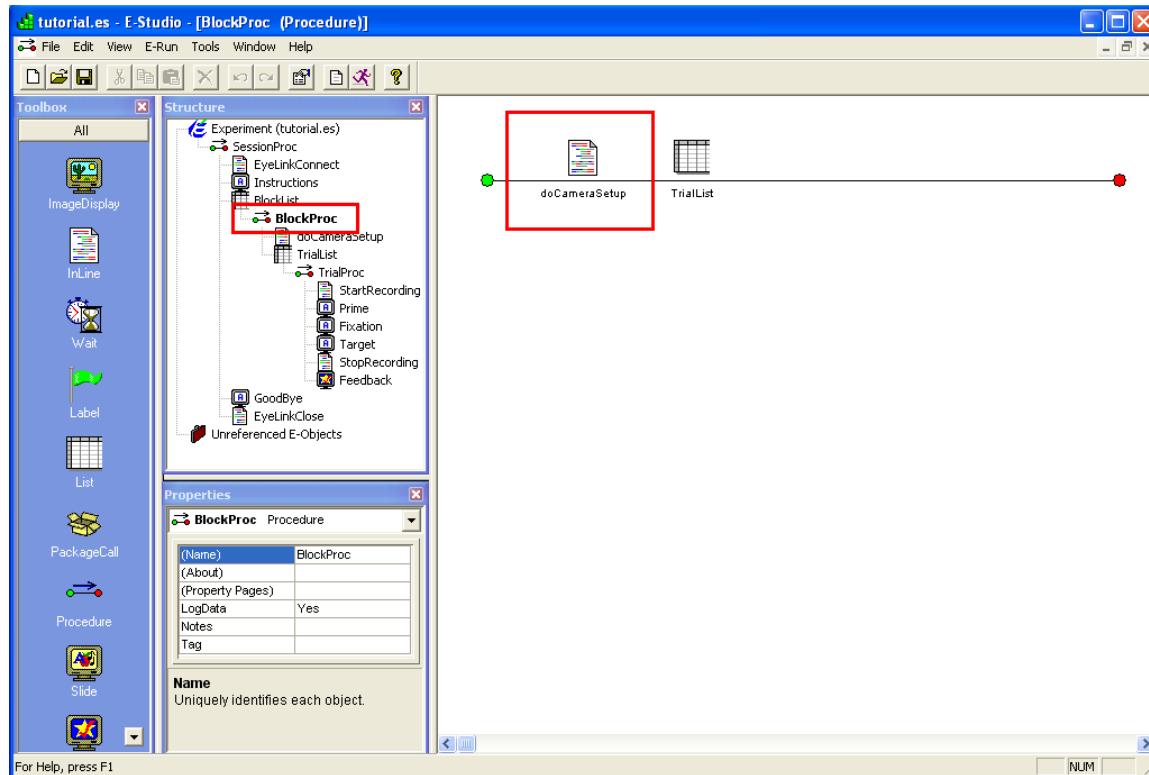
c) TrialProc

Add a "StartRecording" InLine before the Prime node and add a "StopRecording" InLine after the Target node. The "StartRecording" InLine is used to perform a drift correction/drift correction at the beginning of each trial and then start the eye tracker recording. The "StopRecording" InLine is used to stop the eye tracker recording and send out Data Viewer integration messages.

You may study the "startRecording" and "stopRecording" inline from the Simple example we supplied.   Please read the comments in the inlines carefully as they documents some of the important aspects with regard to integration to the Data Viewer and marking the event time into the EDF file.
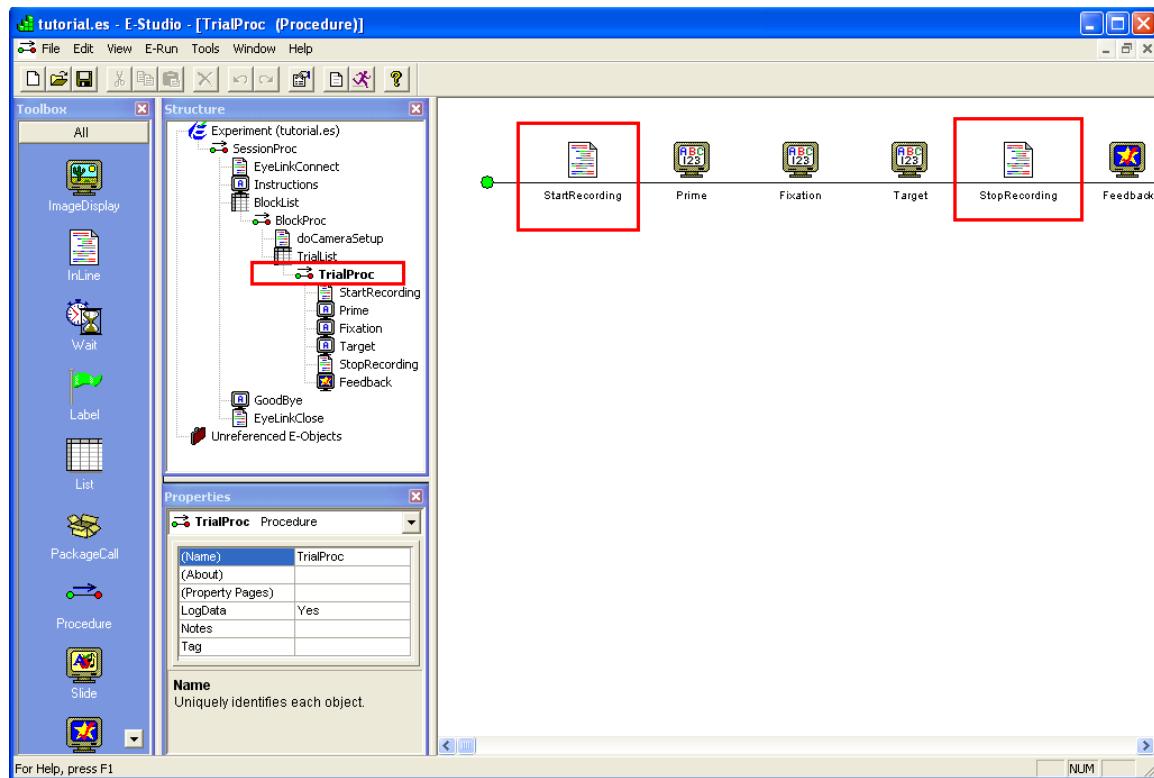
d) User Script

Click View -> Script to show up the scripts. Select the user tab and copy in the content of the user script. You do not have to make any modifications to the User Script.
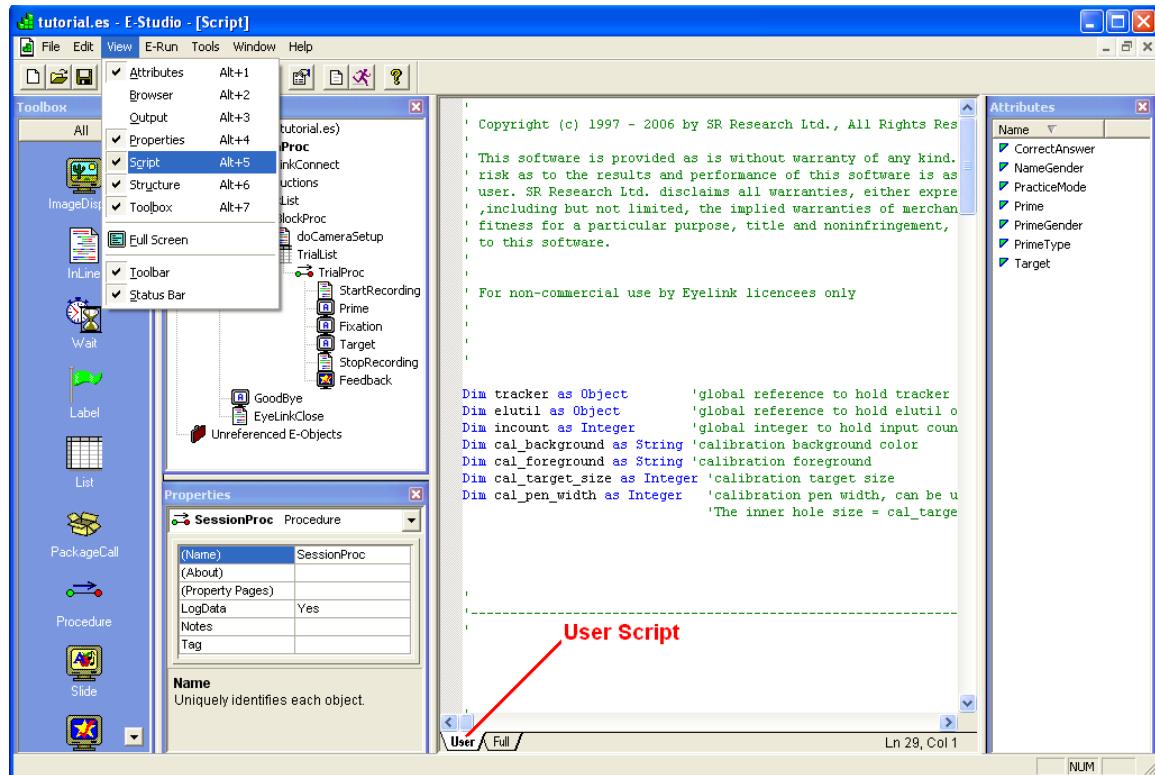
4. Eye Tracker Integration.

You shall be able to run the E-Prime project now to control the EyeLink eye tracker. Please be advised that during calibration, validation and drift correction, the background color should be as close to that of the recording screen as possible.   The calibration background colors can be controlled by the following line in the "EyeLinkConnect" InLine. The following example illustrates setting the background color to white.

```
cal_background = "255,255,255"
```

During recording, a text message can be displayed at the bottom of the tracker screen so that the experimenter is informed of the progress of the experiment. This message may also contain trial condition information so that the experimenter knows immediately which condition is being tested and therefore may be able to evaluate the performance of the participant. This is done through the 'record_status_message' command. For an example, see the following line in the "StartRecording" InLine.

```
tracker.sendCommand "record_status_message 'Priming " &
TrialList.GetCurrentAttrib("Prime") & "' "
```

5. Data Viewer Integration.

When the critical display is shown, a message should be sent to the EDF file so that the exact time of the critical event can be pinpointed. This message is used to line up the data from the EEG recording and the data from the eye tracker recording. The message may be written to the EDF file after the critical display is removed following a response or the maximum display time has reached; accordingly, an offset for the exposure duration or response time latency should be applied so that the exact time of display onset can be determined. Offset is an integer value and is subtracted from EDF_time to generate the real message time. For example, a message line of "MSG 4251660 437 synctime" suggests that the event the message was referring to (synctime) actually happened at time 4251223 (=4251660 - 437). "Message_text" can be any string up to 100 characters in size that starts with a non-numeric character.

For example, the critical display is removed after an RT event. The synchronization message may be written as:

```
tracker.sendMessage "" & Target.RT & " synctime"
```

If the display is removed by a maximum duration without expecting a response from the subject, then the message may be written as.

```
tracker.sendMessage "" & Target.duration & " synctime"
```

In addition to the synchronization message, the following messages may also be sent out for the ease of data analysis with EyeLink Data Viewer software. You may take a look at section "Protocol for EyeLink Data to Viewer Integration" of the EyeLink Data Viewer User Manual for a full list of integration messages.

i)   Trial Condition Variables
The trial condition variables are import for purpose of knowing the condition under which a trial was recording. During a Data Viewing session, the trial condition variables and values can be viewed from "Analysis -> Trial Condition Value Editor".   This integration can be done through the "!V TRIAL_VAR" messages.

```
tracker.sendMessage "!V TRIAL_VAR Prime " & TrialList.GetCurrentAttrib("Prime")
tracker.sendMessage "!V TRIAL_VAR CorrectAnswer " &
TrialList.GetCurrentAttrib("CorrectAnswer")
tracker.sendMessage "!V TRIAL_VAR NameGender " &
TrialList.GetCurrentAttrib("NameGender")
tracker.sendMessage "!V TRIAL_VAR PrimeGender " &
TrialList.GetCurrentAttrib("PrimeGender")
tracker.sendMessage "!V TRIAL_VAR PrimeType " &
TrialList.GetCurrentAttrib("PrimeType")
tracker.sendMessage "!V TRIAL_VAR Target " & TrialList.GetCurrentAttrib("Target")
tracker.sendMessage "!V TRIAL_VAR RT " & Target.RT
tracker.sendMessage "!V TRIAL_VAR ResponseKey " & Target.RESP
```

ii)   Image of the critical display.
Critical images can be loaded in the Data Viewer session as the background for overlay view or animation view. Overlay image integration is done through the "!V IMGLOAD" message.

```
Dim imgname as String
imgname = "img" & TrialList.GetCurrentAttrib("Target") &".bmp"
Display.Canvas.SaveImage imgname
tracker.sendMessage "!V IMGLOAD FILL " & imgname
```

iii) In addition to the above integration, users may also consider recording the interest area information for each trial by using the "!V IAREA" messages.

6. Known Limitations.
Please be aware of some known limitations with the E-Prime integration.
  i)   You will not be able to transfer the camera image to the display computer when setting up the cameras.
  ii)   You cannot transfer one of the display screens to the host computer for recording feedback.
  iii)   Keyboard may be locked up during drift correction. You may have to use the keyboard of the host computer or the big button on the EyeLink response box to accept the fixation.