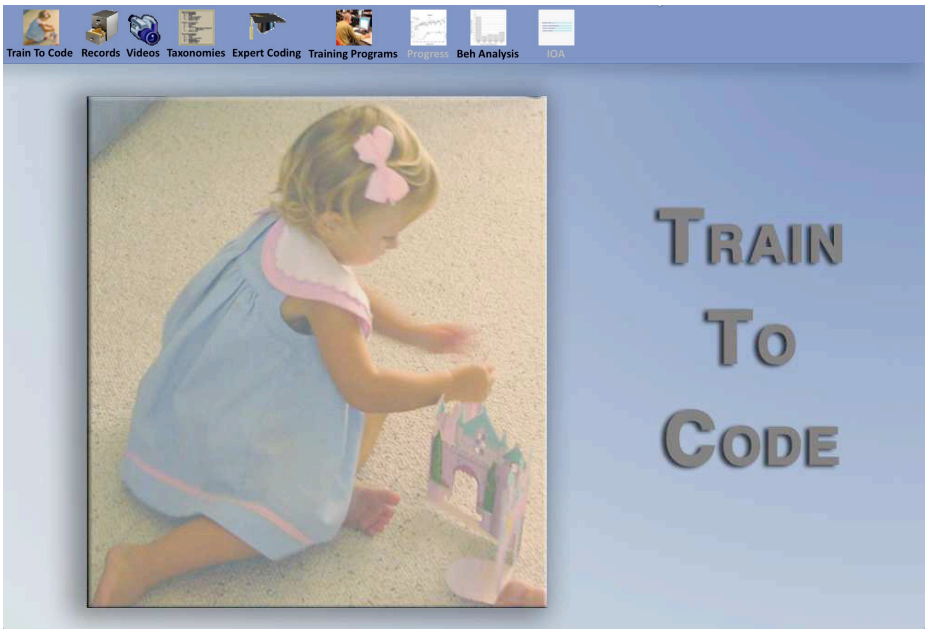
Administrative User's Guide

for

Train To Code



Roger D. Ray, Ph.D.

(AI)^2, Inc.

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1. *Train To Code*'s Administrative Mode

Welcome!

Train To Code **(*TTC*)** is a powerful expert-systems application for training observers to reliably describe via a coded "taxonomy" of labels the ongoing behaviors of almost any targeted individual or group of individuals. It is very flexible, in that it allows administrators to create training programs specific to their needs; whether that administrator is an instructor offering one or more courses and/or sections in an academic setting, a Research Program's Principal Investigator administering various observation-based research projects, an individual training staff members good observation and performance skills in work settings, or even someone wanting to train and certify judges for sports or other performances that rely upon expert evaluation of performance or refereeing of rule infractions.

The program includes two specialized interfaces: one for Adminstrators and the other for Trainees.

1) The ***Administrative Mode*** is used for creating customized content and managing training programs, and is the main topic of this ***User's Guide***.

2) The ***Training Mode*** is experienced by observer/coding trainees as they complete a ***TTC*** **training program**.

This ***User's Guide*** describes and illustrates the ***Administrative Mode*** and is meant as a reference guide for all training developers and administrators. The ***Guide*** details all steps in creating customized training programs that are based on an expert's labeling of events in videos chosen by or created by the developers so that students or trainees can be taught to label these events as the expert did.

The ***Training Mode*** is also explained in this ***Administrative User's Guide*** so administrators may fully understand: 1) ***TTC***'s training design logic, 2) the nature of their trainees' experiences during training, and 3) the analyses the program provides to administrators for tracking trainee progress through the assigned training program. ***Train To Code*** also offers highly informed feedback to administrators for *formative evaluation* and guidance regarding the effectiveness of the training and where they might need to modify the instructional content or parametric settings to improve that effectiveness. There is also a separate document, called the ***Train To***

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Code Trainee's Guide, that is designed to inform and guide student trainees as they undertake ***TTC Training***.

Demonstration programs: For everyone's benefit ***TTC*** comes preconfigured with example content and brief training programs based on that content to illustrate training that addresses different areas of research or training application. These training programs provide examples of the components and the processes used by ***TTC***, which include: 1) a tutorial for trainees to use as they learn the ***TTC*** interface, 2) vocabulary training on two 10-word sets of gestural communications approximating American Sign Language, and 3) an example of one Applied Behavior Analysis (ABA) technique called Errorless Teaching—a technique commonly used for teaching individuals with special needs (which is the procedure followed by ***TTC*** in delivering adaptive training for ***TTC*** trainees) .

Upon launching ***TTC*** the first screen asks for a **Login ID**. The default information in the **Login** field is "**Visitor_Trainee**." ***TTC*** uses this default to allow free access to the three programs described above even prior to adoption. Once they have downloaded and installed the software, logging in as Visitor allows individuals to experience the sample training programs using the student/trainee mode of ***TTC***. Any data entered while logged in using this Visitor mode will not be saved and thus the program reverts back to its original state upon the next login. However, all progress data and internally generated reports remain accessible to the trainee so long as the program remains open during a given login session.

Similarly, anyone wishing to experience the Administrative view of these example training programs can do so by substituting "**Visitor_Admin**" for the login ID in the opening screen. This login allows you to browse the components of these programs, including; a) the Taxonomies that were created, b) the videos that were integrated with these taxonomies to generate c) the Expert Coding Records that guided training and feedback, and finally d) the actual Training Programs that were composed and posted for the training. A Visitor_Admin may even make changes to these components, though the changes will NOT be saved after their session, so evaluators may feel free to try their hand at changing or editing any components or parameters they wish, if they wish to see how the various Administrative interfaces work.

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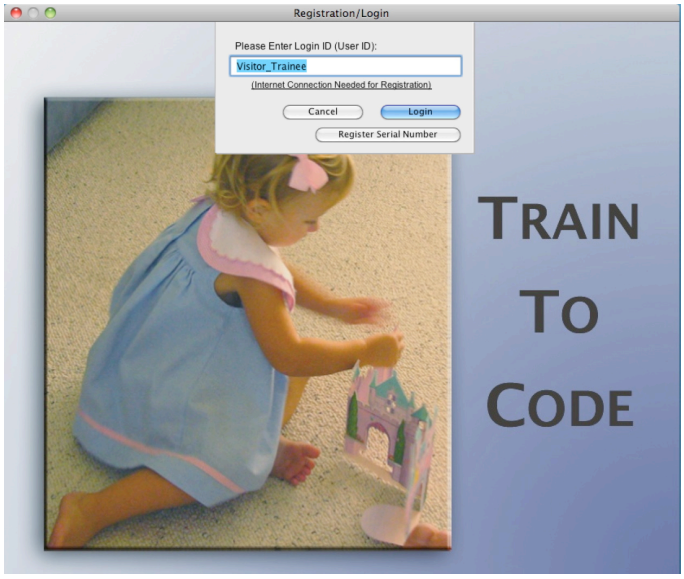

The login screen, already populated with the default Visitor_Trainee login ID, which may be edited to your own login ID for personal use.

All instructors/administrators who wish to adopt ***TTC*** for their training activities are asked to e-mail **sales@ai2inc.com** and ask us to establish an administrative record that will allow you to save your activities and settings for your use of ***TTC***. During this process you will be asked also to supply a preferred personal Login ID that we will use in your account setup. All subsequent logins will require use of this unique personalized Login ID to access your Administrative account.

Once you have an Administrative Login

Each login distributed to Administrators/Instructors is immediately recognized by ***TTC*** and brings up the ***Administrative Mode*** of the application showing details of their account.

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Upon first Administrative Login, the system will contain the example content and training programs, but needs to be configured for your own specific training needs by adding similar material suited to your applications and training. Under these conditions, most menu icons are "active" and available for use from your very first use.

The "*Train To Code*" Menu Icon:

"About TTC," "Change Background," and "Quit"

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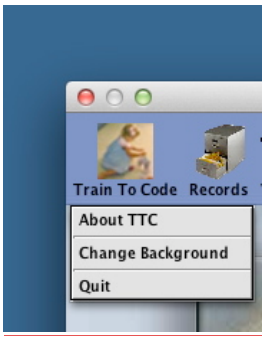

The icon at the top left of the screen is the ***Train To Code*** menu icon, which offers: **1)** a selection that shows "**About TTC**" information (version and contact information), **2)** a selection that allows you to set alternative backdrop colors (and as an Administrator, you also have the option to

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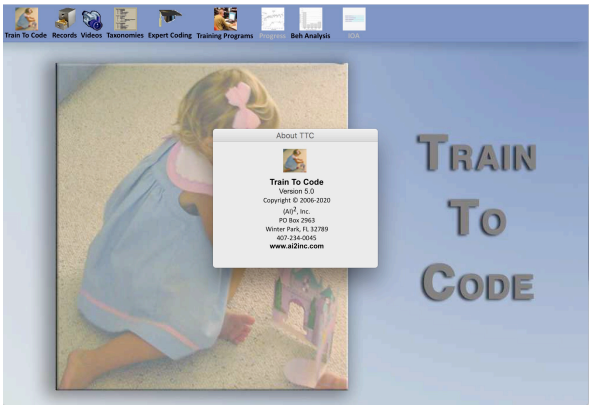
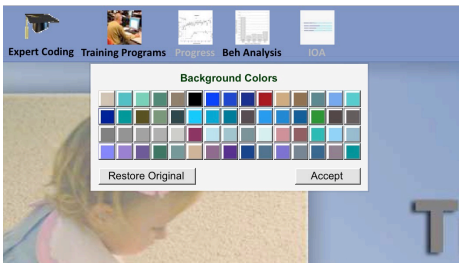
remove the backdrop *for a given session* by clicking on the backdrop area while holding the **SHIFT** key down), and **3)** an option to "**Quit TTC**" when you wish to exit the application. This and all other menu icons also display information about its action if you "hover" your cursor over the icon. These options are illustrated below:

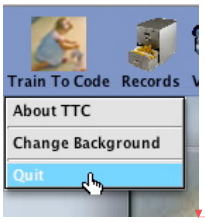
1) The "**About TTC"** option field (version number, company contact information, etc.) Click the contact information field to close it).



2) Change Background colors from a matrix of alternative colors.



3) the **Quit** option for closing the application.



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The Steps in creating a Training or Assessment Program:

The second through sixth icon in the top row of the Administrator Account screen represent steps in the creation of a training/assessment program. The following five chapters of this document will provide information for each of these steps. The list provides a brief description for each step, including:

Chapter 2) The personal ***Administrative Record(s)*** that you will establish for your research and training activities via the Records menu.

Chapter 3) The various associated ***Digital Video Files*** that you will create and upload to the TTC servers (see the chapter on **Managing Video Source Files** for details). Eventually these video files will be downloaded to each computer used for training. Either uploading or downloading is accomplished by using the **Videos** menu in order to synchronize the list you see on the right-side of your screen (the ***TTC*** server listing) and the **Video Files** available on the computer in use (contents listed in the left panel on this screen). Videos needed for the Training Program(s) you wish to use must be in the TTC video folder for any computer to be used for the training (see **Managing Video Source Files section in the chapter** for details).

Chapter 4) The various ***Taxonomies*** (coding categories) used to define the terms used by trainees in labeling events and items in the video they are learning to observe. Besides the full category name for each item in the taxonomy, abbreviations (codes) and their operational definitions are also created.

Chapter 5) The **Expert Coding** Records that you have created to specify the start time and end time in the video for each event or item your trainees will be learning to identify. This coding process pairs a given taxonomy with videos to establish when the expert has designated targeted events or items have started and ended. These code-lines provide the basic elements of the adaptive **Training and/or Assessment (Certification) Programs** you will create.

Chapter 6) Finally, you will create your training or assessment programs by including one or a sequence (typically several) of these **Expert Coding Records** into one or more ***Training and/or Certification Programs*** that you want each of your students to complete as assignments. These Expert Coding

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Records may be used for either training or evaluative certification "**Units**" representing each of your video files. Each **Expert Coding Record in the sequence** defines a separate **Unit** within the training or certification program. **Units** may be arranged in any sequence you wish and may be repeated in the sequence. Student ***Progress*** across each of these **Units** will be accessible for your review anytime you wish, simply by using the trainee access tools that will be described in Chapter 8 of this ***User's Guide***.

Thus the next five chapters of this ***User's Guide*** detail how each of the specialized 5 components just described are established and managed.

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2. Administrative Records

The Concept of Primary Use

Train To Code* (*TTC*)** is designed to accommodate a variety of real-world training applications. Thus you, as an administrators may incorporate your own customized selection of videos and appropriate taxonomies, and you may also select the organizational metaphor that best suits your purpose and training context. ***Train To Code accomplishes this by offering several alternative "primary use" categories to describe your unique application. The program automatically includes an example record reflecting an academic teaching setting using the organizational structure typically found in Academic settings: including School, Instructor, Course, Course Section(s), Semester/term, and Year. This is designed to accommodate settings where you are training academic students to carry out procedures or to collect data using direct behavioral observation procedures. You may use this option if this academic structure is compatible with your primary purpose. But you have other options as well. You might, for example, prefer an organizational arrangement based on the administrator being a Principal Investigator in an ongoing research Program composed of various research Projects. Alternatively, you may be training employees or staff members for specific job-related tasks such as behavioral interventions in a residential treatment facility or refining sales and presentation techniques in a corporate environment. You might even be interested in training and/or in certifying judges responsible for judging individual performances in carrying out their professional practice, for judging performances in sports such as gymnastics and diving, or for refereeing sporting events (baseball, basketball, etc.).

Thus *Administrative Records* are categorized by training purposes, with categories separated into academic courses, research projects, job skills, or sports training. Each of your trainees grouped by a common need or goal will "register" for their specifically established Administrative Record. Through your selection of the most appropriate description of "primary use," your trainees will have a context compatible with the training for which they are registering.

For purposes of illustration we will step through only one example of the process that is required to establish a training program via ***TTC***. We'll assume our intended training is for college students enrolled in a single **Course** (we'll call it *PSY 22 Research Methods*) that has placed its students into two separate laboratory **Sections**. This assumption implies that we need to create two courses with the same title (*Psy 22 Research Methods*) but with different section identifications (we'll call them *PSY 22*

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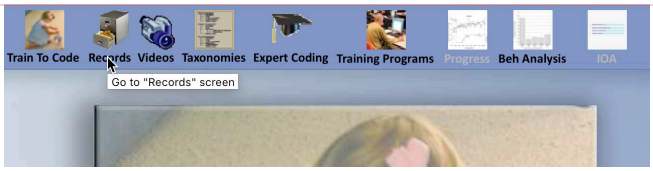
- *Lab 1* and *PSY 22 - Lab 2*). We thus need to create two **Administrative Records** that allow students to register for one and only one of these two alternative sections of this course. Working your way through this one example should prepare you to complete the process using the other "primary use" categories as well.

Creating Administrative Records

To begin, click on the **Records** "File-Cabinet" icon, which is second from the left of the main (upper) menu bar.



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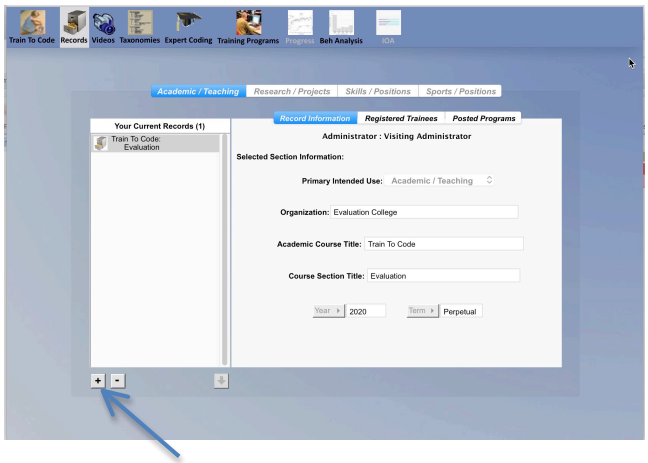
Clicking once on the menu icon highlights that icon to remind you of the active screen you are using—in this case, the **Records** screen. As our example takes the Academic Course metaphore, in this screen you will specify your Organization, your course name and the section of the course the student will register for:



Clicking once on the **"+"** button at the lower left of the working area begins the process that adds your new course **Administration Record**. This process begins with the presentation of a drop-down panel requesting information for the new administrative record you are adding. Because our example uses an Academic/Teaching metaphor our panel includes fields to specify the Organization (i.e., school), the Course, and the Course Section,

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thus allowing registration for separate sections of the same course. Note: This Section field must be filled, even if only one section exists.
If we selected an alternative **Primary Intended Use,** these options would change to reflect the intended use.

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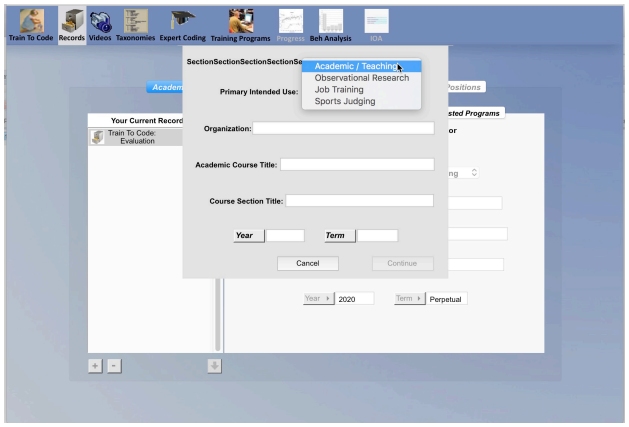
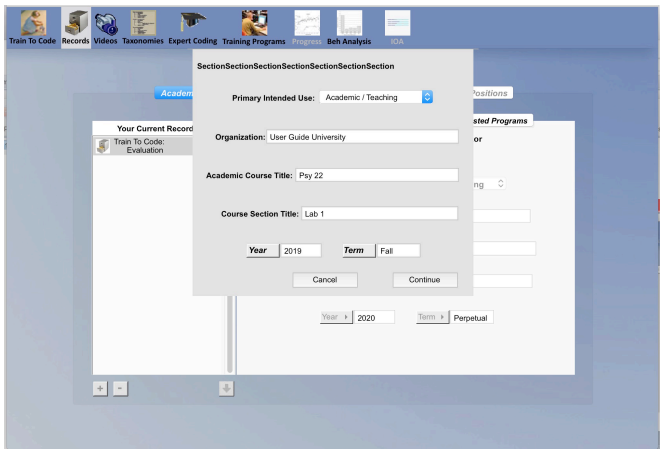


When all information has been supplied, the panel will activate (darken) the previously "greyed out" action button, allowing you to "**Continue**" (or **Cancel**) the record creation process.



After clicking to "**Continue**" you will now see your first course listed in the left panel, with the right panel showing all associated information for that course.

Before we discuss other ways to progress further (as in the next chapter), let's review a couple of final points concerning **Record Management**.

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CRITICAL NOTE:
No Editing of Administrative Records Allowed

*Any **Administrative Record** that has been created by or for you has established a specific **SET** of properties that are used collectively to define that specific training group (for example, an academic training project includes information for Instructor /Use/ Institution/ Course/ Section/ Year/ and Term). Other uses call for different sets of identifying information. Each registered student will be assigned these specific descriptors in their individual record as they register for your project. Editing any of these fields in the administrative record would **detach** trainees from that record. Implications of this are the following:*

*No editing is allowed once a record has been established. If you find ANY information that you wish to change in your record, you must delete the record (using the "-" button at the bottom left after selecting the Record name in the listing field on the left). Use this approach if no students have yet registered, then you may add a new and correct record. If students have already registered, please request a change by **contacting us via email at:** sales@ai2inc.com **Therefore, please confirm the accuracy of your setup prior to registering your first trainee for your project.***

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Deleting an Administrative Record

At the end of your project we will archive all database records using separate files that will no longer be accessible by internet. We will inform you before we make this archive.

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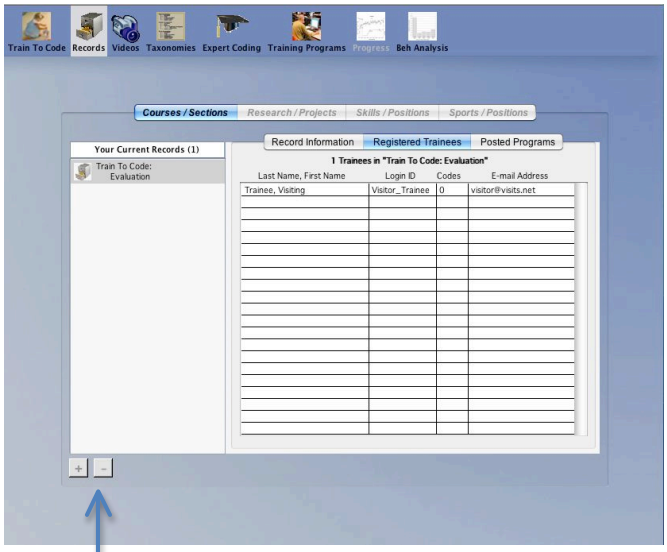
The Registered Trainees (Students) Tab

Upon first establishing each unique **Administrative Record**, the **Registered Trainees** tab at the top of the information panel of the Records screen is dimmed as you will have no trainees yet registered for your project. Only when you have Students/Trainees actually registered for a given Administrative Record will this tab become active. Selecting it will show you a spreadsheet-style listing of currently registered student names and contact information. In the illustration below, only one registered student is listed, with the Login ID of "**Visitor_Trainee**" and the name of "**Trainee, Visitor**":



If you wish to delete a student from your listing, you may do so simply by selecting (i.e., clicking on) one or more student names and then clicking on the "-" button at the lower left of the entire panel. (Aside: after selecting the first name you can add others that follow to the selection by holding the shift key and clicking on the student name at the bottom range of those you wish to select; likewise, you may select multiple names more randomly by holding down the control key (on Windows) or command key (on MacOS)). HOWEVER, be aware that ALL DATA accumulated by any deleted student will also be deleted and are not recoverable. Other actions you can take using this screen are described later in this ***User's Guide*** in the section titled **Administrative Tracking and Evaluating Trainee Progress (Chapter 8)**.

NOTE: The process for registering a student/trainee in your Training Program is described later in this **User's Guide** in the section titled **The Student/Trainee Experience in *Train to Code* (Chapter 7)**. Though that chapter is written as though the student is registering him/herself, you may register your trainees by going through the same process. You would contact sales@ai2inc.com to obtain a serial number for each trainee you wish to register.

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Comment [2]: Question: Does this also work on Win version?

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3. Managing Video Source Files Used for Coding and Subsequent Training

Video Source File Requirements

Train To Code was designed to allow Administrators to include any desired video source files for any desired observational training. However, the software (i.e., LiveCode) used to build ***TTC*** does not include a "shared" video player for playing all videos within programs like ***TTC***. Instead, LiveCode offers separate OS/Platform-specific players. Thus applications designed for use on Windows require video formatting that is different from video formats for use on MacOS computers. As such, the required video source format for playing within ***TTC*** is ***PLATFORM SPECIFIC***.

IMPORTANT: Videos for Windows users must be .avi formatted files. On the other hand, MacOS users are required to use either .mov, .mp4, or m4v formatted files. We recommend that Administrators and/or other Training Program developers consider saving their videos in BOTH formats so their Trainees may use either platform. Such copies in different formats, however, MUST USE THE SAME FRAME RATE in order to allow ***TTC*** to calculate appropriate times for the Expert Coding Records duplicated for each format. Thus ***TTC*** **can** accommodate the distribution of training programs on mixed platforms. For Administrators producing videos for distribution in **mixed** OS trainee environments involving both Windows and MacOS computers, please consult the Appendix to this Guide for technical details concerning not only video formatting, but also the generation of corresponding **Expert Codings** (see next chapter) describing those video events, as each video format alternative has implications for start/stop time in such codings.

Finally, it is important to note that videos may be either in a 3x4 or 9x16 aspect ratio.

Because the video files must be present on each computer being used for training, keeping the video files small is advantageous to make downloading them less time consuming. And, since the videos will be shown on computer monitors, there is often no real advantage in using high definition video formats. There is, however, an advantage in having the frame-rate be at least 15 to 30 fps, and 15 fps will save significantly on storage and transfer sizes. This frame rate will also typically produce

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Comment [4]: I'm eager to learn details of how we would accomplish this.

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Comment [5]: I suggest we use Expert Coding Records for the records that result from the expert codings.

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Comment [6]: I think "create for separate" would be better than "migrate"

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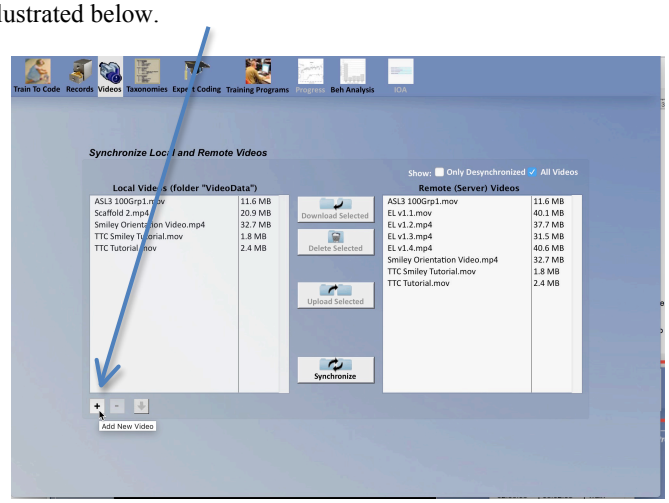
sufficiently smooth playback for effective training. If you would like counseling on how to choose and create a video format appropriate for use with TTC, contact us sales@ai2inc.com.

Storing Your Own Video Files for TTC's Use

Whether you are using **TTC** on a dedicated computer or a public-access computer, ***videos are stored locally within TTC before use***. Thus to enable any given computer for use of ***TTC*** you must have the required video files associated with your ***TTC training/assessment program*** *within the copy* of ***TTC on that computer. If you add your own custom videos you MUST copy each video file into the VideoData folder within TTC as your first step (as described below). Therefore, you should upload each of these video files to the* **TTC** *server so easy for them be downloaded to any computer you wish to use for* **TTC** *training. Please note that only file format versions compatible with the OS (i.e. MacOS vs. Windows) of the computer you are using will appear in your remote server's folder. If you shift from one OS to another, you may thus see totally different lists of uploaded videos.***

If you wish to add a new video at any time to ***TTC***, that video's file MUST be placed into ***TTC's* VideoData** folder. This is accomplished by clicking on the "+" button at the lower-left of the "Local Videos" listing, as illustrated below.



Clicking on the "+" button brings up a system-dialog asking you to select the file that you wish to copy into the ***TTC VideoData folder***. Also note that ***you will need to download each file to the TTC VideoData folder on any computer that you wish to use for training that uses the video***. This

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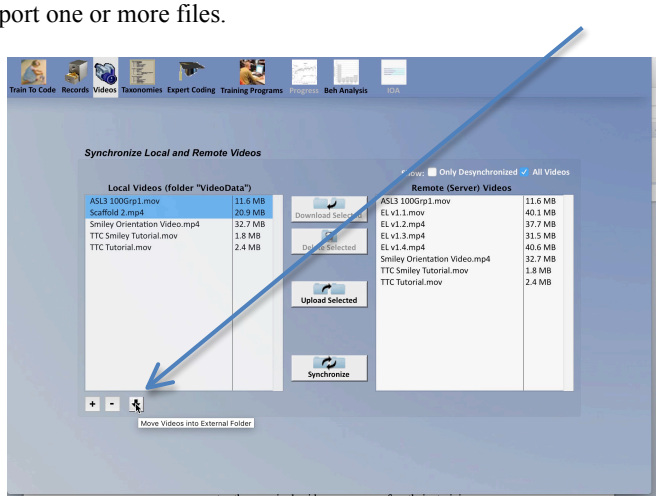
download is accomplished using the "Synchronize videos" process described later in this User's Guide.

Exporting or Backing Up Videos currently in your *TTC* VideoData folder.

If you have videos within your local ***TTC*** VideoData folder and wish to export them to another location for whatever purpose (e.g., backups, edits, reformatting for alternative OS, etc.), the "Down Arrow" at the bottom of the Local Videos field allows you to do so. First select one or more file names you wish to export. Then, click on this Export arrow. A system dialog will then appear asking you to show the location to which you wish to export one or more files.



Synchronizing Videos Between Your Computer and TTC's Video Servers

Once you have your videos properly copied into the ***TTC VideoData folder on the computer you are using,*** you may upload these video files to the ***TTC*** distribution server so that any computers being used for your ***TTC*** training programs will have immediate download access to the required video resources for those training programs. Synchronization is accomplished by first using the **Videos** menu to access the video management screen in **TTC**, as illustrated below:

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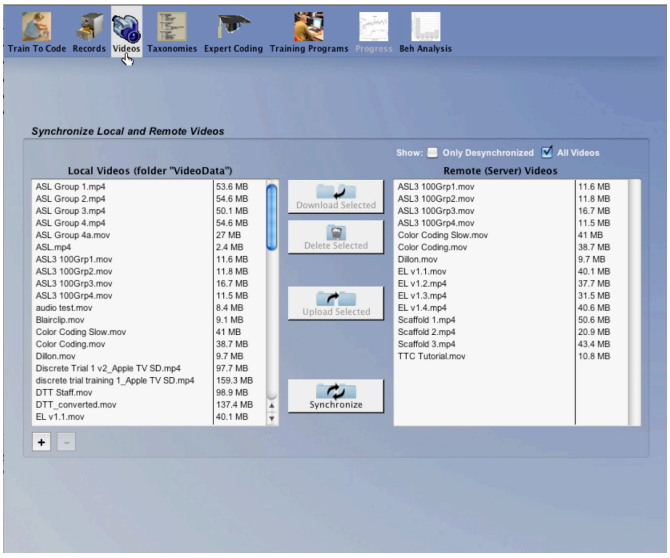

As labels suggest, the left-most field shows all "Local" video files that are in the **local *TTC*** VideoData folder that resides inside the main **TTC** folder *on the computer you are using*. Selecting any of the video file name(s) in this left field will activate the **Upload Selected** button for uploading those files to the **Remote (TTC) Server**. Likewise, if there are any video files on the *Remote Server* that you are missing in your local **VideoData** folder, you may select those files in the right-most field and then click on the **Download Selected** button for downloading those server-based files to your current computer's **VideoData** folder. You must have such files stored in the VideoData folder of the computer you are currently using in order carry out training or in order to work with any new training program composition or editing. If you no longer wish to have specific videos on either your local computer's VideoData folder and/or the Remote Server, you can select those files on the Remote Server and then click the "Delete Selected" button to remove the selected files. Note: the **Synchronize** button may be used to assure that all video files are shared both locally and at the remote server. And once again, a reminder that ***only file format versions compatible with the OS (i.e. MacOS vs. Windows) of the computer you are using will appear in your remote server's folder. If you shift from one OS to another, you may thus see totally different lists of uploaded videos.***

IMPORTANT NOTE: Any files you place on the TTC Remote Server and considered to by owned and controlled by you and by you only. If approved by all parties, we at $(AI)^2$ can share **Expert Coding Records**

and/or even share full **Training Programs** between **Administrators**, or, on rare occasions we might ask for permission to share with others such assets that belong to you. Shared assets will appear in the remote server listing of video file names in the account of the added administrator, but will appear in a grey (vs. black) font for administrators sharing the video. Attempts to delete shared video files bring up an explanatory information field stating that you may not delete such videos. If you have received (as opposed to sent-out to others) such videos, if you delete the Expert Coding records that rely upon those "borrowed" videos, you will find the video also has been deleted from your Remote Video listing.

The Process of Integrating your Video into Training/Assessment Programs that you create in *TTC*

This section offers an overview of the information available in the next two Chapters that describes the process of creating video-based ***TTC*** training.

Creating a Taxonomy: Once you have your videos properly copied into ***TTC,*** you may actively utilize those video files to create training programs within ***TTC*** through three additional menu icons in the menu row at the top of your Administrative account screen. Clicking on the **Taxonomies** menu icon allows you to create the list of descriptive terms your trainees will learn to use to label events or items in your video (*see Chapter 4 below for details about the process of creating that list*). **Note:** It is sometimes helpful to view a video while you are composing that list. Chapter 4 will also describe how to access that video while you are creating the list. If you wish to view one or more video files as you compose a coding taxonomy (as described in the next section of this User's Guide) within the **Expert Taxonomies** tab, you may do so by using the menu-button labeled "**Open Video**" that is at the bottom of the Taxonomy screen (see below). Being able to view the video may be helpful to you as you compose a new taxonomy. It is not, however, required for taxonomy creation and the video you select may be an as-yet un-coded video or an already coded video.

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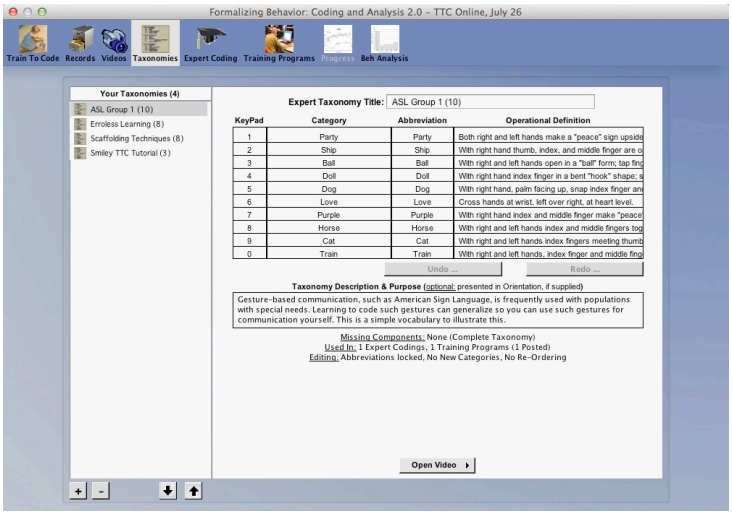
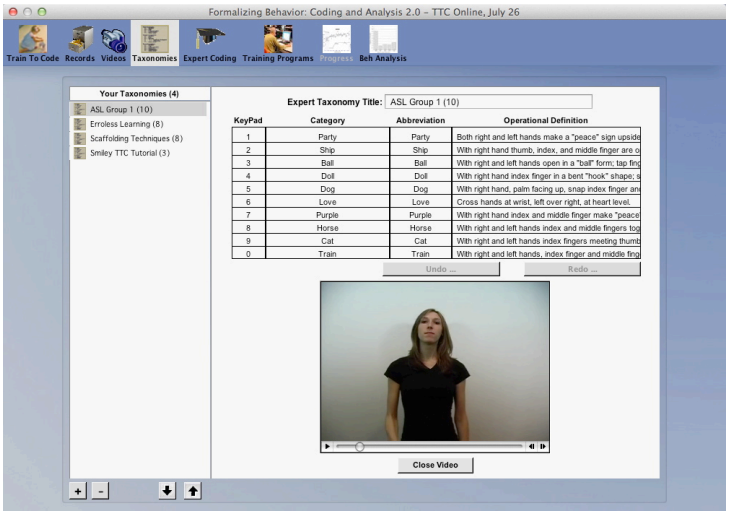


This will open the requested video in the space just below the taxonomy listing, as illustrated below:



Creating an Expert Coding Record: You use the fifth icon along the menu bar at the top of your ***TTC*** account screen to create the Expert Coding Records that are the building blocks of your training/assessment program. In the Expert Coding screen that appears when you click on this icon, you select the video file and Taxonomy you will use for that Record. Chapter 5 will provide the details for this process. The first screen you

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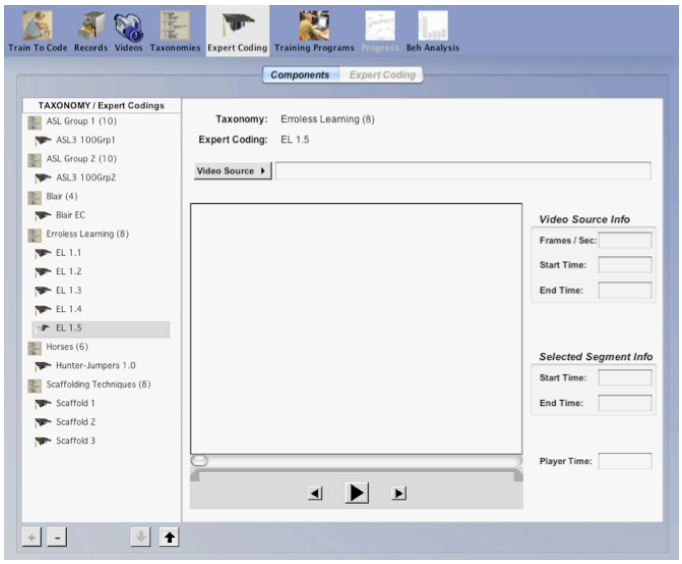
encounter is the Components Tab, where you enter a name for the Expert Coding Record and identify the video and the taxonomy you will use. When this information is selected, you can click on the Expert Coding Tab to bring up the screen where you will play the video and enter the start and end times for each successive event or item that your trainees will learn to identify.



TTC training is accomplished by having the trainee view your chosen video and at the same time, code (i.e., label) the events or items in the video that you have specified using your Taxonomy. This **Expert Coding Record** can then be included in any **Training Program** you may wish to compose.

The process of creating Training Programs begins by selecting the sixth icon in the menu bar. As explained in Chapter 6 of this **User's Guide,** you specify a name for your new module and which Expert Coding Records it should contain and set parameters that determine the specific details of your training.

4. Behavioral Coding Taxonomies

What Codes to Use and By Whom?

Train To Code (***TTC***) can train observers to use almost any coding scheme that you deem appropriate for describing events or items shown in the video. The list of terms used in this description is called a Taxonomy. A Taxonomy, then, is a controlled vocabulary of descriptive terms that should be kept as brief as possible (hence these terms are often referred to as "categories"). You should also create a mnemonic "abbreviation" that will serve as the actual "code" for this term if it isn't sufficiently brief (usually 3-7 letters are preferred) to be used as abbreviated "codes" for the category. Avoid special characters other than + or – in these codes, as they may not be easily interpreted by the *TTC* application itself. For each term you should also create a very precise and longer operational definition to guide the trainee by pointing to the attributes that should determine their label for an event or item. Further, your terms should label mutually exclusive categories where at any one time in the video only one descriptive term should apply. Still further, as we require all moments in the video to have a label (i.e., the Expert Coding Record must provide a continuous coding of the video), your list of terms should also provide an exhaustive list so that all moments in the video fall into one and only one of these categories. Thus, the Taxonomy is a list of descriptive terms that can be used to create a mutually exclusive and exhaustive record of events or items in the video. We will describe in this chapter how such expert coding is accomplished.

One further restriction should be mentioned. Train to Code uses the ten digits between 0 and 9 as potential numeric codes for the behaviors in the Taxonomy. Thus, a taxonomy is restricted to ten total categories. This limit simplifies the trainee's task of entering their code and often makes practical sense as it limits the number of distinctions that a trainee is learning to distinguish at any one time. Training of longer lists of descriptors can be accomplished through training more granular distinctions in different descriptive domains and then combining these elemental terms into more global categories to produce generalization. You will see examples of this approach later in this User's Guide.

We should emphasize, however. that it is NOT a requirement that the entire list of terms in any taxonomy be used by trainees. Many times an expert will use the convenient device of creating an "Other" category to fill the descriptive voids separating the truly "mutually exclusive" events or items (i.e., digitized events) of primary interest in the continuous

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(analog) stream of events in the video. In almost all such cases, trainees may simply ignore these voids and thus are required simply to code the primary events of interest (often called a "frequency coding" based on the resulting "count" accumulated in the recording for each category in the taxonomy). Immediately after we first describe how a continuous Expert Coding using a given Taxonomy is created within ***TTC*,** we will describe how this "Other" event coding may be eliminated from the list of codes that trainees will actually use.

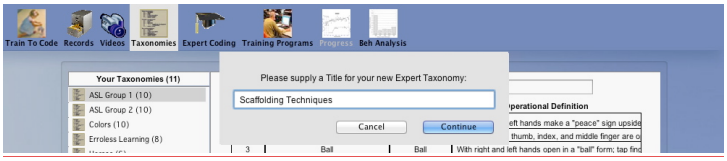
Adding a New Expert Taxonomy

An administrator in **TTC** may create as many alternative Expert Taxonomies for as many disparate descriptive tasks as desired. Such taxonomies may be created within **TTC** itself or may be imported from a **TTC**-exported file, as will be described in a subsequent section. For the present, we will illustrate how the *Scaffolding Techniques* taxonomy was created within **TTC**.

The process begins by using the Taxonomies icon in the upper-left menu bar to navigate to the Taxonomies screen:

The first **Taxonomies** screen that appears when the icon is clicked shows the first of two Tabs that may be selected at the top of the working panel. The default-selected tab, labeled **Expert Taxonomies**, gives access to a form, which will be blank if you are just beginning to create a taxonomy. To illustrate how the ***Train To Code* Expert Taxonomy** for coding *Scaffolding Techniques* was created, we'll start from such a blank form and step through the process of creating this taxonomy.

As with the Record's section, we add a new **Expert Taxonomy** by clicking on the "**+**" button at the lower left of the work panel. This act brings up a form requesting a new taxonomy name. We called this one "Scaffolding Techniques".



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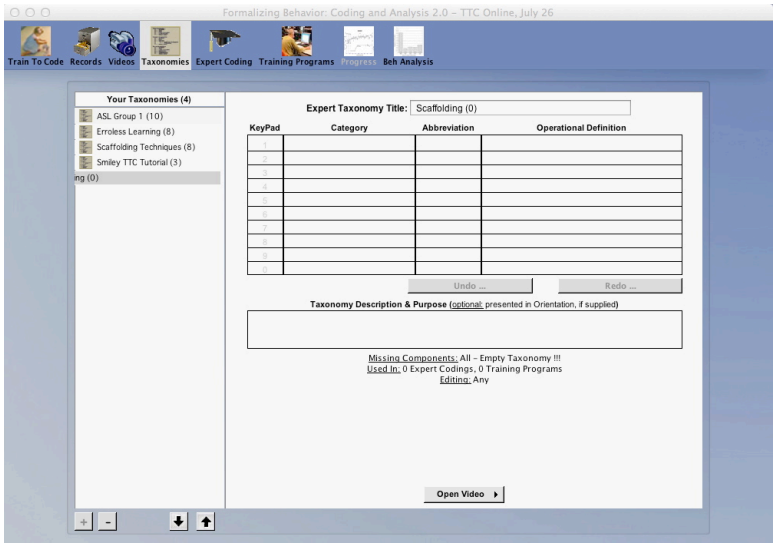
As soon as we complete typing this into the drop-down form and clicking on the "**Continue**" button, we see our new title selected/highlighted with a (0) beside it to indicate how many categories currently exist for this taxonomy. We also now see immediately to the right of this title a spreadsheet-type form with column labels supplied and our typing cursor placed into the first empty **Category** cell:



To begin creating our **Expert Taxonomy**, we'll type in a full name of our first category, "**Identification Question.**" Once again, try to keep these names relatively short, and use the Operational Definitions field noted below for explanatory expansion. Using the standard feature for spreadsheets, we can use the tab key to advance to the next cell in that row where we will type an abbreviation that will be shown on the ***TTC*** Training screen for this category (reminder: try to keep codes within 3-7 letters in length). Tabbing again will bring us to the **Operational Definition** field, where we will type the following text (Note: This operational definition will be read by computer-generated speech to the trainee if you choose to include the Orientation phase of training for your training – see Chapter 6).:

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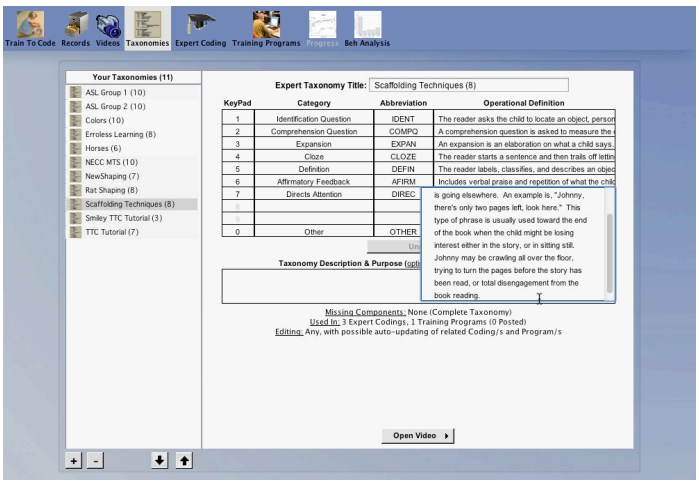
> *The reader asks the child to locate an object, person, place, or activity in the pictures in the book. For example, the reader might ask, "Which is Alexander?" The child, in all likelihood, will then either point to or describe the location of Alexander, although follow-up actions of the child do not define the technique being used by the reader.*

Because this text is somewhat longer than the field itself, when we reach the end of each line the field expands to allow further typing.



When we have completed typing the Operational Definition, pressing "return/entry" will place us at the beginning cell of the next row, just as it would in most spreadsheets. You may also note that completion of this first category has added a (1) to the name of the *Scaffolding Techniques (0)* Taxonomy in the left column. We would then repeat this same series of steps to complete entering and/or editing through the eighth category in the *Scaffolding Techniques (8)* Expert Taxonomy of our example. Note in the illustration of the completed set that "Other" has been associated with the (0) keypad input as a descriptor for all the moments in the video that are NOT scaffolding techniques of interest for coding.

Importing an Expert Taxonomy File

As noted in the previous section, an administrator in **TTC** may also create Expert Taxonomies by using any spreadsheet application, such as Microsoft's Excel, SPSS, or Apple's Numbers, that allows saving a spreadsheet table in tab-delimited plain text (.txt) file formatting. The exact specifications of such files and how they are imported is our present topic. To aid in our discussion, a Microsoft Excel spreadsheet containing our **ASL Group1 (10)** taxonomy is illustrated below.

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	A	B	C	D
1	ASL Group 1 (10)	0		
2	KeyPad	Category	Abbreviation	Operational Definition
3	1	Party	Party	Both right and left hand
4	2	Ship	Ship	With right hand thumb,
5	3	Ball	Ball	With right and left hand
6	4	Doll	Doll	With right hand index fi
7	5	Dog	Dog	With right hand, palm fa
8	6	Love	Love	Cross hands at wrist, let
9	7	Purple	Purple	With right hand index a
10	8	Horse	Horse	With right and left hand
11	9	Cat	Cat	With right and left hand
12	0	Train	Train	With right and left hand
13				

As illustrated in this example, your spreadsheet **MUST** have a first row where cell 1,1 contains the name of the taxonomy and the number of categories (up to 10 and INCLUDING "other" as a category if used) inside a parentheses. The name of this file must be exactly the same as this line, plus the word "Taxonomy," and should also include the parentheses component, as illustrated by this example: "**Taxonomy ASL Group 1 (10).txt**" The next row **MUST** be a header row labeling your columns. The first column should be the word **keypad**, followed by Category, then Abbreviation, and finally Operational Definitions. Of course, the keypad column must contain the simple sequence of 1-0 to establish a number you wish assigned to each row's category for number row or numeric keypad coding (required, even if you will not actually use number row or keypad coding). The second column should be the full name of the Category. The third column contains the 3-7 letter abbreviation, or Code, for the category that will be displayed on the TTC screen during training. Finally, the fourth column contains the full operational definition of the category. This operational definition will be read to the trainee during the Orientation phase of training (using computer speech). Again, it is critical that this file be saved as a **tab-delimited .txt file** to be properly read by ***TTC***.

The illustration below shows how one imports such files into ***TTC***. Clicking on the **Up-Arrow** button at the lower right of the taxonomies listing brings a File Manager window for locating the file you want to import. Selecting a selected file imports it into ***TTC.***

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Comment [8]: Roger – I'm thinking the advice for these labels should be included above rather than here.

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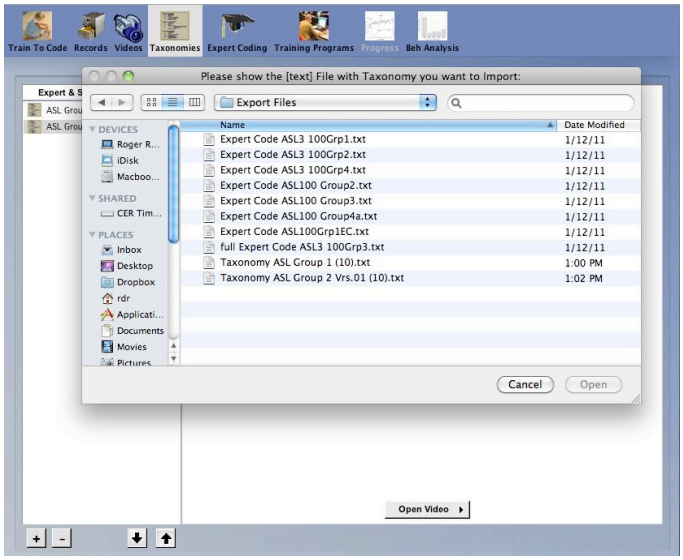
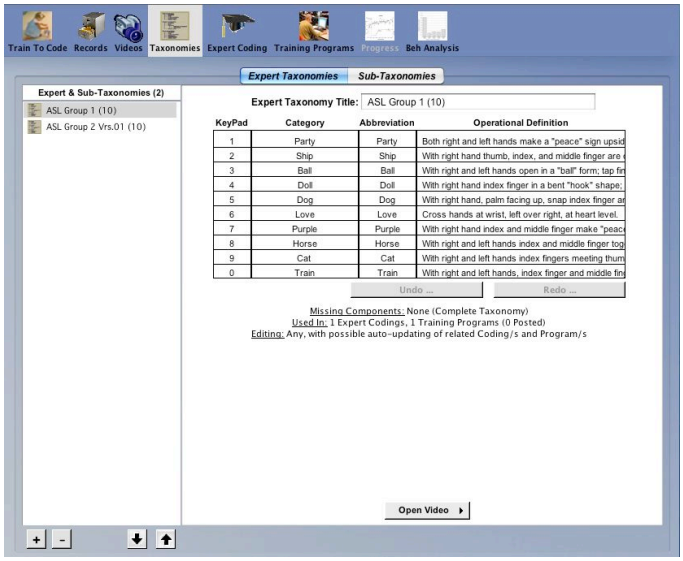


Your imported file should appear fully formatted and properly labeled, as illustrated below.



If your alignments are incorrect within **TTC** then you have improperly formatted your spreadsheet, and should delete this Taxonomy, correct your formatting in the original file, and re-import it.

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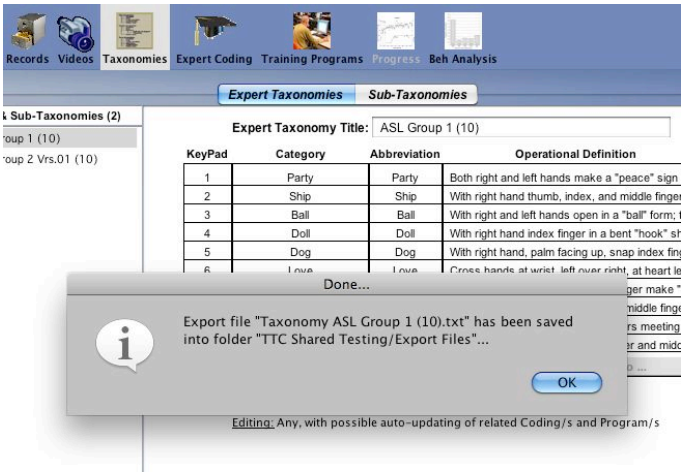
Importing an Expert Taxonomy From Another Administrator

You may also import Expert Taxonomies that have been created by other **TTC** Administrators through the same mechanisms described in the section above. This is especially useful when researchers wish to share a Taxonomy with colleagues or when, say, two or more researchers in a common laboratory complex wish to transfer taxonomies between separate **TTC** applications. The process begins by one administrator using the "Down-arrow" to export the file. Doing so will show a feedback message showing name and location of the exported file, as illustrated below:



This file may then be transferred to a new administrator, and then using the "Up-arrow" to find, select, and import the TTC-generated file, as illustrated in the previous section on **Importing Taxonomy Files**.

Editing the KeyPad Number of an Expert Taxonomy

You may at some point wish to edit an Expert Taxonomy in some way. The spreadsheet cells are not locked, so content may be changed under certain conditions. You would NOT be allowed to change names or numbers of a Taxonomy that is already in use for trainee coding, as this would have significant ramifications for those trainees who either have completed their training or those who are only partially finished with posted training programs. But in the earliest stages of Taxonomy development, changes are allowed and those made on the primary taxonomy will also be reflected in any associated Sub-Taxonomies (see

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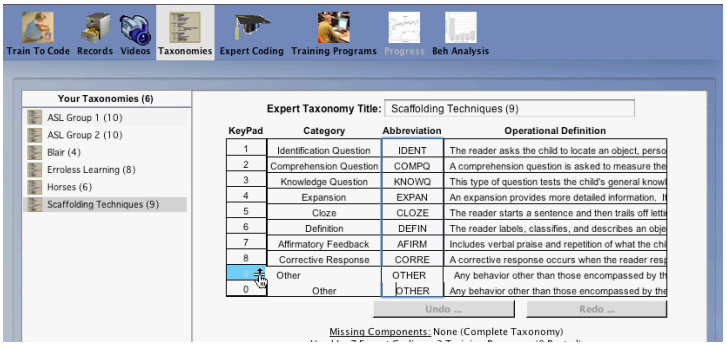
below for details on what these are and why they are used). But the keypad number fields are **locked**. Thus to change the row, and thus the associated keypad number assigned to a category, simply drag-and-drop the row of information you wish to change to the row you wish it to become. In the illustration below, the "**0**" assigned to "**Other**" is being changed to make it the "**9**" key. If you drop it on a row already used, the program will displace that row's information and all subsequent rows by adding "**1**" to each previous keypad value.



*As already noted, during training, students or trainees need **not** be required to use all of the categories of a taxonomy while coding. Thus TTC makes it possible to use what it refers to as "Sub-Taxonomies" that are sub-sets of this "Expert" taxonomy. How this is accomplished is explained in the section "Setting Sub-Taxonomy Use for Training" in Chapter 6 – Creating a Training Program.*

Introducing your Taxonomy to Trainees

You may wish to produce some introductory voiced explanation, and/or even a video, to help your trainees understand the purpose, context, and/or terms represented in their training. ***Train To Code*** allows for this as the very first event experienced when a new Training Program is encountered. There are thus several options for including this presented on the Taxonomy screen.

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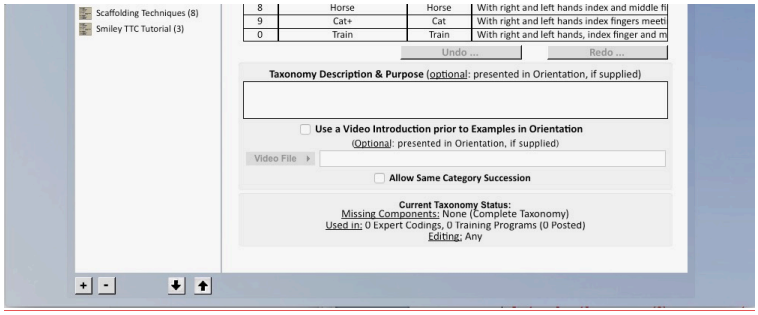

First, there is a field for adding a textual description of the purpose of the Taxonomy that *will be read as computer-generated voicing at the time the trainee first encounters the Taxonomy during training*. If this field has any text within it, that text will be read as a part of the Orientation. In addition, there is a check-box and Video File selection button that allows you to begin with an orientation or introductory video to be played prior to the computer-generated voiced introduction to categories and presentation-plus-description of examples for each category during orientation. The video is played prior to any reading of a textual contextual explanation and/or categories-plus-definitions with subsequent video examples. Alternatively, the video may be used alone as your orientation by using a "parameters" feature that allows you to "turn off" any context reading and category-plus-examples presentation in the Training Program setup as described in Chapter 6 (p 61).

Finally, there is a button enabling you to allow the same category to "follow itself" in the training video. This is in case an event is repeated in your video but should be counted not at one continuous event, but rather as two back-to-back repetitions of the same category of events, as might happen when two different questions are asked in sequence, for example. Otherwise, it is good practice to avoid displaying two examples of the same category to avoid confusion about how it should be treated, thus ***TTC*** defaults to ***NOT*** allowing successive entries of the same code.

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5. Creating an Expert Coding Record

What is an Expert Coding Record?

"Expert Training Systems" are modeled after what an expert does or knows regarding the task or subject being taught. This model then serves as a reference for the system to guide and evaluate a trainee's ongoing performance. Such "guidance" to a trainee is referred to as pre-performance stimuli that instruct, prompt, or otherwise guide performance and to provide post-performance feedback. Both guidance and feedback may take alternative forms, and in adaptive training systems such as ***TTC***, guidance and feedback are constantly changing in how, or if, they are provided. This allows the system to tailor services to a given trainee's developing expertise based on a performance-based student model.

In ***TTC***, the expert system is based on an "**Expert's Coding Record**" derived from an expert's actual coding of the video (or audio) data source to be used for training. Typically the "expert" is a researcher or instructor who is skilled in reliably and accurately producing coding records for live events or video recordings using the desired taxonomy (coding scheme). It is assumed that the taxonomy used is able to describe the relevant actions depicted in each video resource. Further, we have determined that the frequency of each category's occurrence has a significant impact on training effectiveness. Rare events offer little practice for trainees to learn to identify those events. Hence it is important to assure relatively equal exposures to all types of events to be coded.

As detailed in Chapter 3 (p 19), Videos imported into ***TTC*** must be in either of two formats: Apple Computer's .mov, .mp4, or m4v formatted files for Mac computers; or the .avi format for Windows computers. These videos serve as resources both for expert coding and for training programs. Any Taxonomy (see Chapter 4) may be used for coding any video file to create the required reference ***Expert Coding Record*** for subsequent training. Further, the same video file may be used in combination with any Taxonomy and in any number of Expert Coding Records. The requirements of this coding are described in the "**Expert Coding Requirements**" section of this chapter.

How is an Expert Coding Record Used?

Train To Code uses an expert's coding for several important functions:

First, each expert coding record provides information for presenting the prompting messages utilized to help a trainee learn to correctly label/code

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relevant events in the video. These prompts are provided at the outset of training but are progressively/adaptively removed by the ***TTC*** program as the trainee learns to successfully code successive events.

Second, the expert coding record is used to compare, on a frame-by-frame basis, how a trainee's codings agree with the expert's codings. Based upon whether the trainee is in agreement with the expert's coding, guidance and/or feedback is presented to improve the trainee's coding accuracy and reliability.

Finally, a detailed record of trainee performance, measured as percent agreement with the expert's reference records, is provided. This analysis allows ***TTC*** to generate reports and coding reconstructions based on a moment-to-moment time-series analysis. Also available from such detailed performance analyses are session-by-session composite descriptive analyses of accuracy and category-specific error summaries for each trainee, as will be described later in this Guide (Chapter 8) when we describe how student training progress is tracked for Administrators.

Adding a New Expert Coding Record

Now that you have some perspective of the role your expert codings will play, let's consider how such records are created. First, you ***MUST*** have already created or imported a suitable **Taxonomy** within ***TTC*** (see **Chapter 4** on how this is accomplished). Until such a record is available, the **Expert Coding** icon stays dimmed, thus indicating that you do not currently have the tools needed to begin creating your **Expert Coding** record.

Once you have created or imported one or more completed Taxonomies and have at least one video file on your local computer, you may access the **Expert Coding** screen via its Menu icon:

In the **Expert Coding** environment you will find a listing of established expert taxonomies and the now familiar "+" button at the bottom of the field that is used for adding a new record. This button becomes "active," however, *only after you select a parent* **Taxonomy** that you intend to use for coding in your new **Expert Record**:

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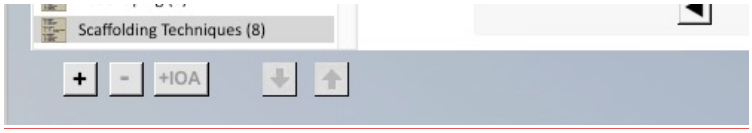
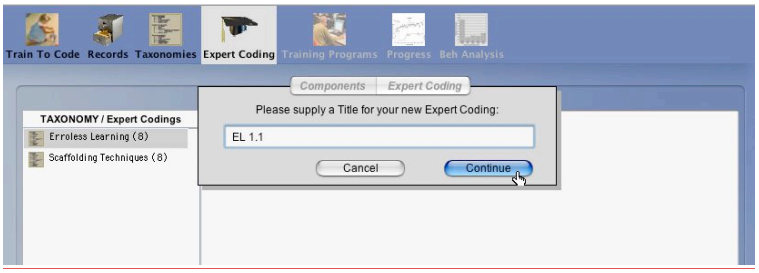


Clicking on the **"+"** button begins the creation process for your new Expert Coding by asking you to give your new record a name. In the example, we selected the **Errorless Learning (8)** Taxonomy. To name the Expert Coding Record we chose an easily recognizable acronym that also reflected the name of the video to be coded (in our case we were utilizing a series of four different videos for each of three different training tasks, and thus used a #.# scheme to indicate both the video and the task, e.g., 1.1). The record name started with "EL" to represent "Errorless Learning," so our example shows the name of the first Expert Coding as "EL 1.1"



Users may apply a brief (2-3 words or abbreviated terms) naming scheme that makes sense with respect their applications or needs.

Expert Coding Requirements

Immediately after confirming that you wish to complete the naming of your new **Expert Record** (by clicking on "**Continue**"), you will see both your selected **Taxonomy** and your **Expert Coding** record's name listed when the **Components** tab is active. These items may be deleted, but the names are cannot be edited thereafter. Next you must select a "Video Source" to be used for this specific **Expert Coding Record**:

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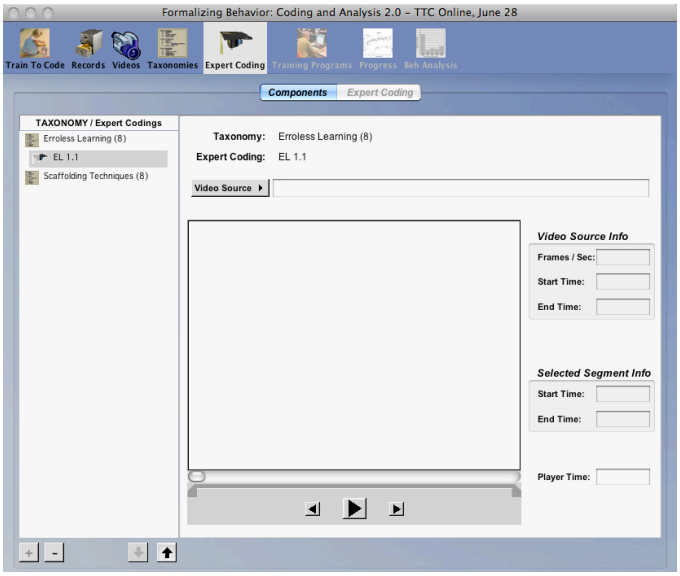
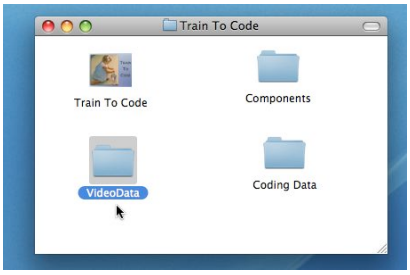


We have already noted that the **Expert Coding** screen is not accessible until you have established at least one **Taxonomy**. Thus having a Taxonomy suited to the video you plan to code is the first crucial requirement. The second crucial requirement is having the ***video that you plan to code available in the TTC Video Data folder on the specific computer you are using.***

IMPORTANT NOTE ABOUT YOUR VIDEOS: ***Train To Code*** *requires you to keep all of your videos within a common folder. You may* ***NOT*** *use sub-folders to further organize multiple projects, as the Components menu for linking videos builds its options based upon the contents of the* ***VideoData*** *folder only. Thus all video files must be within the master folder called* ***VideoData*** *that resides inside the* ***Train To Code*** *main folder.* ***REMEMBER****, all videos must be in one of the two specified formats, determined by the type of operating system used by the computers you will use for training! (see previous section of this User's Guide).*

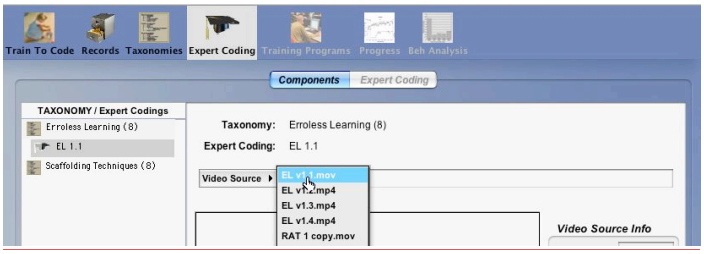


IMPORTANT NOTE ABOUT YOUR TAXONOMY (this statement is repeated again in the "How to Code in the Expert Coding Screen" section of this chapter):

"*Expert Coding of all videos* ***must*** *be accomplished with a* ***mutually exclusive and fully exhaustive*** *taxonomy, or set of behavioral categories. If an "****Other****" category must be created as a "bucket" category for describing all "events of non interest", then do so. The critical thing to remember is that the expert coding record must be continuous in order to offer a trainee feedback on* ***ANY and ALL FRAMES*** *of the selected video source. Thus* ***EVERY FRAME*** *in the video must have a coding. Such a coding procedure is typically called "****Continuous Coding****" and it relies upon designating* ***BOTH*** *the beginning time and the ending time of each successive behavioral event or item depicted in the video."*

The Components Tab

To fulfill all requirements of the Components screen, you must now select the video you plan to code from the **Video Source** menu, which shows all videos included within your **Video Data folder** that are available to use with the operating system of the computer you are using to create the **Expert Coding Record** (i.e., either a Macintosh or a Windows operating system):



When you have made a video selection, the first frame of the video will open in the video player within the Components screen and all "parameter" fields that describe the frame rate and start/end times of your video will auto-populate as well as the default "Selected Segment" start/end times (more on this feature below):

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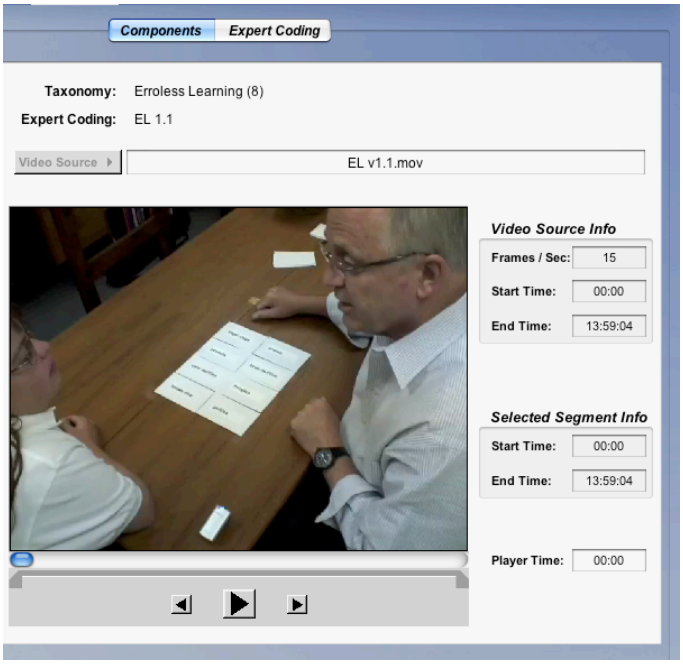

Trimming a Video Source

You may wish to use a common video clip multiple times, but with only selected portions being shown in any given use. Of course the common way of achieving this is to edit a long video into multiple clips using an editing/clipping tool. ***Train To Code,*** however**,** allows you to trim a video into a shorter clip even after you have placed a clip into your VideoData folder. To illustrate, we will use the Video Source "EL v1.1.mov" we just selected and will trim it to use only the first 5 minutes, rather than using the entire length of approximately 14 minutes. To accomplish this, in the Components tab of the Expert Coding Record screen, we simply click-and-drag the right-most grey play-marker (this will "grab" the blue play-head bubble and change it to its "deactivated" grey color). We want to drag the play-marker to the point where the "Player Time" at the right of the video reads 5:00:00. Dragging the play-marker is a bit "crude" in its precision, so we'll approximate the 5 min location and then "refine" the selection by using back/forward arrows on the keyboard, *while the play-marker is still BLACK (selected/active),* to move ahead or to move back until we reach the precise time we want. Holding the arrow down will "repeat" for gross/fast movement, and single presses will give single-frame precision:

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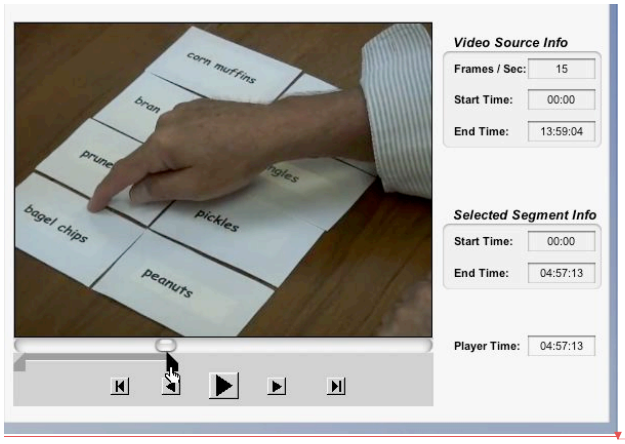

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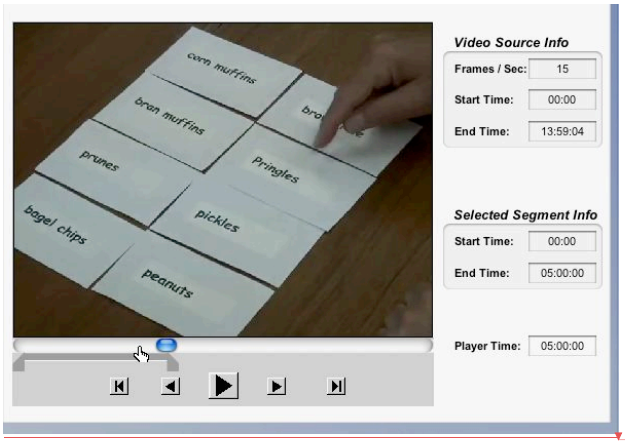
When our player time field shows 5:00:00, we'll then roll-over the play-head slider-area to "deselect" the marker (the bubble returns to blue) to assure it isn't moved by accident:



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Had we wished to change the start time as well, we would repeat the same process, but using the left-most grey play-marker. Thus any start / end time may be established for this particular **Expert Coding**.

IMPORTANT NOTE: *The subsequent **Expert Coding** that yet remains to be accomplished will include only the trimmed video segment, if you have established one. Otherwise coding the entire video source will be required. Nevertheless, this doesn't have to be accomplished in a single session, and thus the Expert Coding "graduation cap" icon associated with each record stays half grey and half black until all coding is finished for the video or video segmen. The icon turns all black when all available*

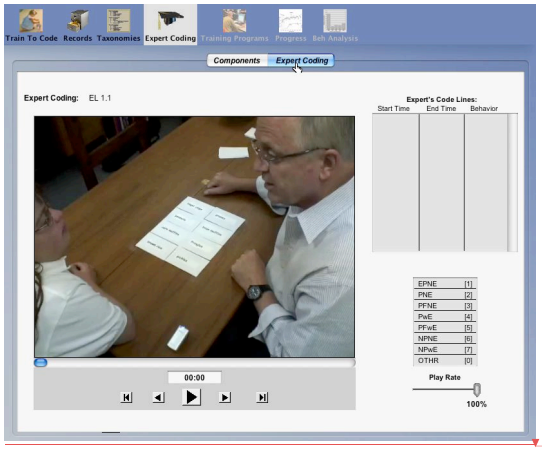
*frames have been coded. Thus you can quickly tell which Expert Coding Records are "in progress" and which are complete simply by noticing the state of the icons next to the names in the **TAXONOMY / Expert Coding** field – half black means coding has not been completed while all back means coding is complete.*

SECOND IMPORTANT NOTE: *Because TTC allows for a post-event "tolerance window" for coding just after the completion of an event (such as might be needed to identify whether a verbal event was a statement or a question), the very last event in any video and coding is not presented (as it cannot allow for a subsequent tolerance window). Thus developers should plan to include a "throw-away" (i.e., ignored or lost) event as the last codable event in their video and expert coding.*

It is possible to trim a video source that has already been partially coded by using the above steps. However, you may only trim sections of the video that have not yet been coded. ***Train to Code*** will not let you trim any coded material. If you decide you do not want some of the material you have already coded, you may use the "Save as New Coding" option under the expert coding menu. This function is detailed later in this chapter.

The Expert Coding Tab

Having defined the **Taxonomy**, the **name** of the **Expert Record you are creating**, the specific **Video Source,** and the desired video start/stop time parameters, we are now ready to begin to populate our **Expert Record** by actually coding the video clip using our selected taxonomy. To do this, click on the **Expert Coding Tab** to go to the actual **Expert Coding** screen:



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On this **Expert Coding** screen you will see an enlarged video player loaded with only the video you have identified on the **Components** screen (and may have trimmed). ***This video player has standard arrow and play/pause controls beneath the video window, but these are also mapped to the keyboard to allow more precise control of the play head (space bar is play/pause, right/left arrow keys are single frame forward/back respectively).*** There is also a variable play rate controller for playing the video at slower speeds, a listing of your taxonomy and the associated digit from the keyboard number row (Note: each line in the displayed table can also be clicked to register the associated category).

So you are now prepared to code the video. Let's begin coding this video to illustrate how everything works.

How to Code using the Expert Coding Screen

As we pointed out in the Coding Requirements section, and will repeat verbatim here:

*"Expert Coding of all videos **must** be accomplished with a **mutually exclusive and fully exhaustive** taxonomy, or set of behavioral categories. If an "**Other**" category should be included as a "bucket" category for describing all "events of non interest", then one of the codes should be designated for this function. The critical thing to remember is that the expert coding record must be continuous to allow trainee feedback to be provided on **ANY and ALL FRAMES** of the selected video source being played. Thus **EVERY FRAME** must be included between the start time and the end time for one of your coding lines. Such a coding procedure is typically called '**Continuous Coding.**'"*

Train To Code automates as much of the input of start/stop time recording requirement as is possible. Let's explore how it works.

First, consider an obvious, but sometime overlooked point. To know that a given behavioral event has ended, you typically must play a video until you recognize that a new behavioral event has begun. This means that in CONTINUOUS CODING procedures, you typically "play through" the end and pause, then backup the video frame-by-frame until you find the **ENDING FRAME** of the event being coded. Let's do this for the *first* behavioral event that begins when the video begins. To be clear, by the **ENDING FRAME**, we mean the very last video frame that still depicts the initial event (behavioral event, initial item, or "Other"). The very next video frame after this "last" frame will depict the **BEGINNING FRAME** of the subsequent category.

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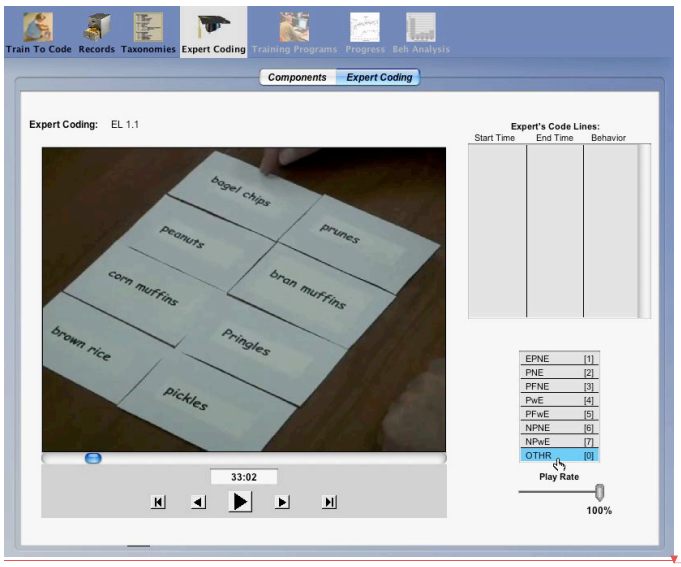
In our illustrative example based on a specific video showing Errorless Learning teaching techniques, the first behavioral event is actually a depiction of a teacher explaining the learning task requirements to the student. Since this explanation is not one of the teaching techniques we have defined in our taxonomy, it is considered to be an "Other" event (one not to be coded by trainees) accommodated by our taxonomy via an "Other" category that is listed as the last category in the list (and designated as code "zero"). As anticipated above, eventually we will have our trainees ignore this event (i.e., not code it), and will thus select a Sub-Taxonomy when choosing parameters for the training program that includes this Expert Coding Record. We explain and illustrate how this is done in Chapter 6 when we describe how to create a Training Program using your Expert Coding units. But, as we have already pointed out, the EXPERT's coding must describe ***every*** moment in a video. So our first entry will be **OTHR** and it ends in the frame that immediately precedes when the teacher presents a stimulus cue to the student by touching a specific cue card to start a teaching trial (as described in the operational definitions for the taxonomy being used).

We thus look for the frame showing the first contact between finger and card, back up one frame (using back-arrow key), and enter the category **OTHR** either by using the keypad equivalent we assigned (in this case **0**) or by clicking on the category in the taxonomy listing to the right of the video player:



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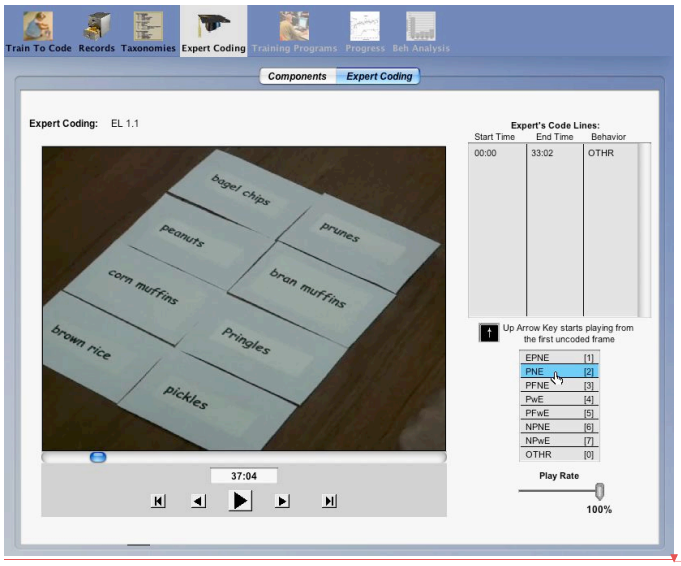
This results in automatic entries into each of the three data columns directly above the taxonomy coding list. The first entry should read 00:00, which is the beginning of the trimmed video clip we created earlier. The second entry is 33:02, which is 33 seconds and 2 frames (of 15 frames per second total…the frame rate set for this particular video). The third and final entry for that code line is the abbreviated name of the category we just designated. Now we are ready to play through the first training trial to find its ending frame in order to code it with the category that describes what type of trial it was. In our case the end frame is the termination of the auditory praise offered by the teacher, which must be found "by ear" rather than by the picture. We enter this code it by clicking on "PNE" for "Prompt No Error" (since the teacher presented an auditory prompt as he touched the cue card, and the student responded correctly).



Because this video depicts a "trial-by-trial" teaching procedure, the subsequent code line is also an **OTHR** event, and the termination of this event is one frame prior to the beginning of the next teaching trial…so we continue this process until all events in the entire video have been coded. When we code the last event in the Expert Coding Record the graduation hat icon that is shown in the Components tab for this Record, will become fully black, indicating that this Expert Coding Record is now complete. *Once again, we remind you that the very last event coded to end the video coding will NOT be presented or counted because the required trailing "tolerance window" does not exist. Using "Other" as the last event will not avoid this if "Other" is not included in the "sub-taxonomy" when posted (see Chapter 6)*

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Comment [11]: Roger – We should probably remind the reader that the last coded event is not the last event.

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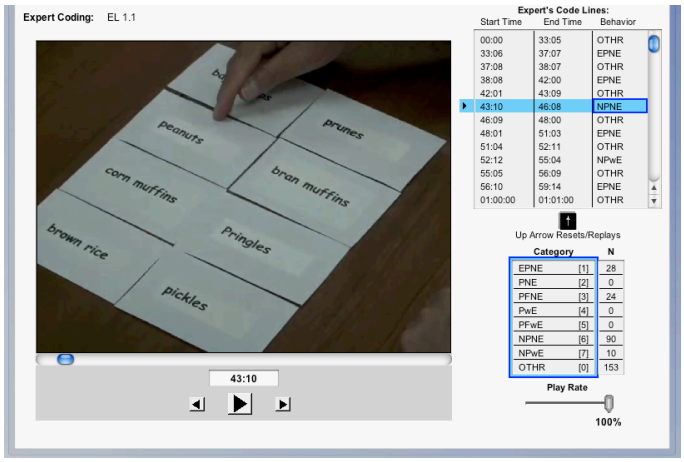
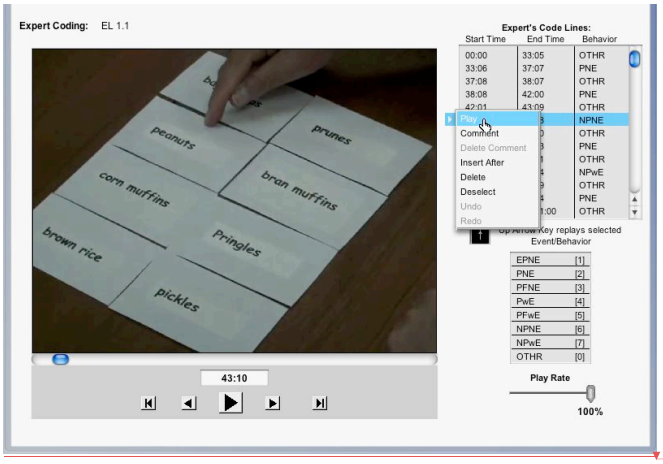
How to Review Entries in Expert Codings

You may review any single coding line you wish by clicking on the start time in the row of the coding you wish to review. That code line will be "selected," as illustrated below by the blue highlight :



By clicking in the **START TIME** column, the entire row corresponding to that selected time will be highlighted, but no column becomes "boxed in" to indicate selection of a specific attribute of that code line. On the other hand, if you clicked on the **END TIME** column or the **CATEGORY** column to *select your row*, the corresponding row item *IN THAT COLUMN* becomes "boxed in" to highlight a type of selection that allows you to edit the time or the category shown in that column. In the above illustration, the **Category** column was clicked. We will return to this editing function in the next section that addresses editing the coding data. For the moment, however, we remain focused on the "Play/review" feature of your selected row.

Once a coding row is selected you may click on the small triangle that appears at the left of the selected row. This action brings up a menu that offers several options for working with the selected row. The first option is to "Play" the video, beginning at the starting frame for the selected code line. The other options in this menu will be addressed later in this Chapter.



You will also see an "Up-Arrow" icon located just below the window showing the list of code lines. You may click on this arrow icon or press the up-arrow on your keyboard to "play" ***only the event or item that is represented by the selected line***. Using the up-arrow allows you to play the video for just this selected row from its beginning frame to its ending frame. Such replay of a code line allows you to review any given coding to satisfy yourself that you have accurately coded its beginning time, ending time, and corresponding type of behavior. If you are not fully satisfied with the accuracy of your end time or the behavior, you may edit these items, as described in the next section.

IMPORTANT: *When you are satisfied with your selected code line it is **CRITICAL** to deselect that line before continuing with further coding. To deselect any selected data row, merely click anywhere in the open "white space" of the screen. Such a de-selection is **REQUIRED** prior to coding any **NEW** segment of video. A selected row **ALWAYS** receives the inputs you make with keyboard or clicks. Thus, always de-select the row as you shift your focus to another row or end your editing.*

How to Edit Entries in Expert Coding: Behavior

Let us assume that you have made one of several possible errors in your **Expert Coding**, and thus want to **EDIT** that entry. Such editing may be accomplished at any time, *but should be done prior to posting any given record in a training program* (to be described in the next chapter).

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Depending upon which *COLUMN* and *ROW* you have selected, *THAT COLUMNxROW CELL* is "hot" and can be changed. Thus in the above example, because the row was selected by clicking in the *CATEGORY* column, pressing any respective number key on the keypad or clicking on any line in the coding list will change the recorded *CATEGORY* to reflect that entry.

How to Edit Entries in Expert Coding: End Time

Because all *START* times are derived from preceding *END* times, editing the *TIMING* of a given coding line always focuses on the *END* time. *Thus if you need to edit a start time, you do so by editing the preceding row's end time.* To edit the end time for any given coding line of data, first click on the *END* time cell you wish to change. Use the arrow keys (on the screen or your keyboard) to step frame-by-frame backward or forward and you will see the corresponding/selected time cell its value as you move forward or backward. As noted above, altering the end time of a given coding row will automatically yield a new start time for the subsequent coding row. Thus you may *ONLY* change a start time by editing the preceding end time. Once again, when you are satisfied with the new time, click anywhere in the white space outside of the coding panel to deselect the row and "accept" the time edit.

The Coding Edit Menu

CODING COMMENTS. We have already described how to review a selected code line by use of the menu **PLAY** option that becomes available when a row is selected. We will now consider the other options available in this menu. Let's begin by considering an important feature that allows the expert to post comments that can be read by future trainees regarding any special considerations critical in deciding what code to assign for an event or item. We will describe a situation where such a comment might be useful.

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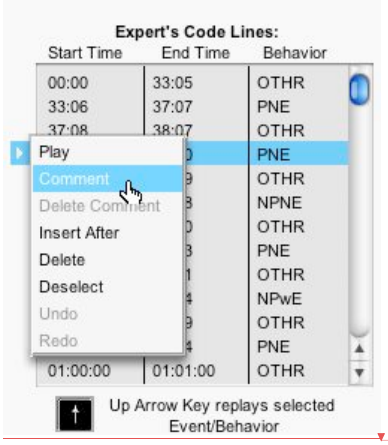
Say, for example, that we have two teaching procedures involving a verbal "prompt" whereby a teacher tells the student what word is printed on a card. In the initial case, the teacher may simultaneously point to the printed card and say the word(s). In the taxonomy of this example, a "Prompt" is defined as having a zero delay between pointing to the card and saying the word written on the card. But a second category, "Prompting Fade" is defined as saying the word a full 2 seconds after pointing to the card. Of course this pair of definitions now implies that a "Prompt" is the correct coding for any reading of the word by the teacher

that occurs between 0 and 2 sec., regardless of the teacher's intent to give a "simultaneously presented" Prompt. Therefore, consider an example event where the prompt is given too early to be considered a "Prompt Fade." If a trainee isn't meticulous in tracking the time of the spoken prompt, that trainee might well interpret this as a "Prompt-Fade" while it is still within the time period the expert considers the correct coding to be "Prompt." In this case the expert might consider it likely that the student might make such an error —especially if the expert had to labor over the interpretation. In such cases, the expert coder may enter a comment noting the specific properties of the event in question that led to the assigned code. This is the function of the "Comment" option.



To insert such a comment, first select the code line in question, click on the trianglular icon to access the Coding Menu, and select "Comment." A comment field will appear beneath the coding data field. Type the explanation for the selected coding in that field and then save that entry. That code line will then be "marked" as a "commented event" for trainees to discover either when reviewing examples during the orientation phase of their training or when reviewing their coding accuracy following their training (see section on Trainee Accuracy):

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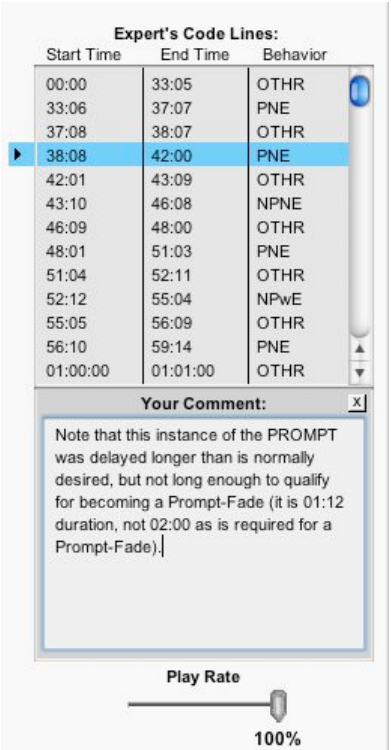
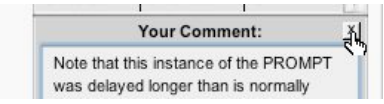
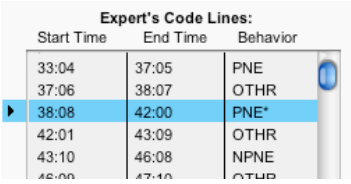


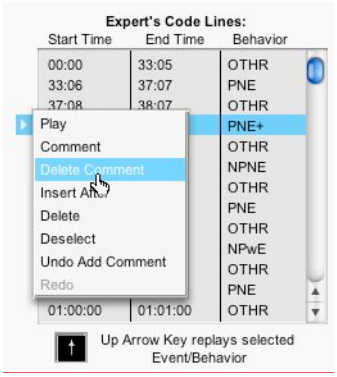
To close the comment field, simply click on the small "X" box in its upper right corner:



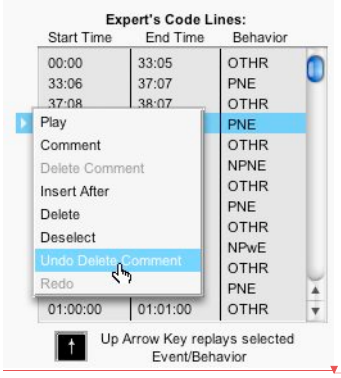
Closing the comment field saves it and attaches it to the code line, which now reflects the presence of a comment by adding an asterisk to the category in that row:



Selecting any line marked with an asterisk will show a **Delete Comment** option in the Coding Menu that will remove the related comment:



Note: there is always an **Undo** and/or **Redo** option for retrieving any edit you may change your mind about within a single session. The picture above illustrates an available **Undo Add Comment**…which is another means for deleting an unwanted comment if it has been added within the current coding session. Otherwise, the **Delete Comment** will always delete an associated comment. As is common with such interface options, you only have within-session opportunities to **Undo Delete Comment** actions, otherwise you will have to construct a new Comment from scratch:



INSERT / DELETE. Other options in the menu shown after the triangle is clicked allows you add a code line by clickinig "Insert After" or to "Delete" a coding line that has been selected. *Delete removes the selected data row and adjusts the start time of the subsequent behavior to the deleted code line's original start time.* Using the "Insert" option allows you to insert a new coding line, and as the option suggests, it does so immediately AFTER the selected code line. It also fills the behavior cell corresponding to the inserted line with question marks to remind you that

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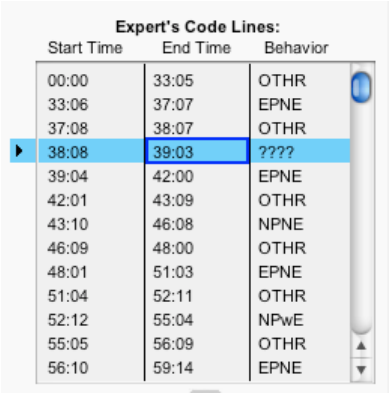
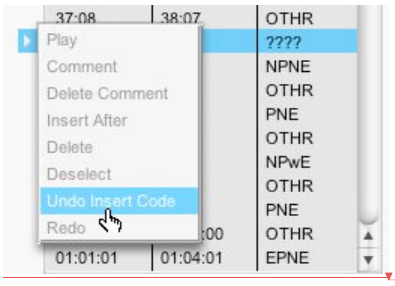
you must first edit the behavior cell by coding the newly inserted behavior. The inserted code line will automatically default to 10 frames in length, thus its real END time will need to be edited using the arrow keys as described previously (see How to Edit Entries in Expert Coding: End Time above).



Expert's Code Lines:

Start Time	End Time	Behavior
00:00	33:05	OTHR
33:06	37:07	EPNE
37:08	38:07	OTHR
38:08	39:03	????
39:04	42:00	EPNE
42:01	43:09	OTHR
43:10	46:08	NPNE
46:09	48:00	OTHR
48:01	51:03	EPNE
51:04	52:11	OTHR
52:12	55:04	NPwE
55:05	56:09	OTHR
56:10	59:14	EPNE

As with other editing options, you have an opportunity to undo your last type of edit until you move on to another:



SAVE AS NEW CODING This function allows you to select multiple code lines and save them as an independent coding. You may decide after creating a coding that you do not wish to retain all of the content or, that you have a separate use for a continuous sub-section of the coding you have created. First select the lines you wish to include in your new coding by holding down the mouse and dragging either up or down. Release the mouse button when you have your selection. Access the menu by selecting the triangle next to the first selected code and find the "Save As New Coding" option.

You will be asked to supply a title for your new expert coding. After submitting a title, you will be directed to the components menu where you will see this new expert coding and video. Please Note: This new expert

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coding is a copy of the codes and video you selected from the original coding source. The option to save as a new coding will not remove the selected codes from the original nor will it alter the original video.

Deleting an Expert Coding Record

Let us assume that you have finished your work with one or more of your expert codings and wish to purge them from your TTC. In this case you will want to Delete your Expert Coding. But beware:

CRITICAL: *If you have ANY training programs that rely upon an expert coding you delete, you will destroy the integrity of that program altogether. It will not "splice" between existing coding records to compensate for the missing program, but rather will simply fail to function properly. So you should always be sure that you are truly finished using any Expert Coding (or a Video, a Taxonomy, or a Training Program) prior to removing anything from the* ***TTC*** *system!* ***Train To Code IS A SYSTEM****, and it relies upon the integration of its various structural component elements for its functional integrity.*

Having considered the above caveat, to delete an Expert Coding Record involves first navigating to the Components tab and simply using the "-" button at the bottom of the Records list to delete any selected Expert Coding Record. ***Train To Code*** will ask you to confirm that you wish to delete any expert coding that is currently used in one or more training programs.

What Do You Do with an Expert Coding Record?

By this stage you have created a meaningful taxonomy, have placed all the videos you want to use for training into your VideoData folder, have applied the taxonomy to each video by entering codes specified by your expert, so what is next? As the status of the menu icons at the top of the

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screen will suggest, as soon as you have your first **COMPLETED Expert Coding Record,** the **Training Programs** menu icon becomes activated. So what is a **Training Program**? That is answered in the next chapter that describes the composition and posting of training programs that assure all your trainees complete the same assignments for training.

6. Creating a Training Program

What is a Training Program?

As established in the last Chapter, ***TTC*** relies upon Expert Coding records that are the codings of specific videos with specific Taxonomies. Together this expert coding record and its corresponding video are presented to trainees as "a Training Program to be coded." However, it is rare that a single video source will be sufficient to completely train an individual to code the variety of behaviors under sufficiently varied circumstances to make the trainee an "expert" in coding utilizing a particular taxonomy. Thus TTC allows for multiples of Expert Codings and associated video source files to be "composited" into any desired "compounded" sequence and/or repetitions, and to define this sequence as a singular Training Program that is likely to be adequate for complete training on a given taxonomy. In such cases, each video and its expert coding is described as a "Training Unit." Thus Training Programs are a means for assuring that each trainee completes the same sequence of units, and also assuring that the coding for one video is completed prior to a subsequent video being presented.

Train To Code Training Programs may carry out training in a variety of ways. There are always at least six levels of training support (i.e., prompting and feedback) during training. Level 1 provides more prompting and a higher density of feedback than subsequent, "higher" levels. Level 6 provides only an announcement that a coding opportunity has been missed or a coding is incorrect and a correct coding must be entered before moving forward in the video. There is an optional Level 7 that provides a "Probe" (also called a "Mastery Certification" or "CERT" level) where no prompting or feedback is given. In addition, for Levels 5 through 7 a "fluency" requirement can be set disabling the capability to pause and resume the video thus requiring "real time" coding.

How is a Training Program Used?

Any given Training Program is intended to be a self-contained and prescribed sequence of training experiences designed to assure the development of "mastery" or "expert" levels of coding skill. As such, a program may be designed to include "mastery certification" segments that involve no coding support or feedback whatsoever, so that a "progress evaluation" can be obtained to assess a trainee's ability to accurately code under unaided circumstances. Accuracy scores, as well as Cohen's kappa values, are made available for each posted video/expert-coding "Unit" that

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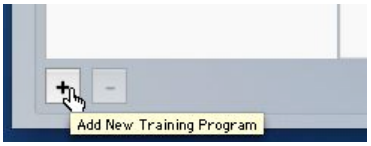
Deleted: Level 6 the only support offered is that of prompting the trainee that a coding needs to be corrected, and the correction is required to move forward to subsequent codings. There is an optional setting, as will be illustrated below, for including a "Probe" (also called a "Mastery Certification" or "CERT" level) as the highest level of the training program. In this level, no prompting or feedback is given. There is also a setting for adding a "fluency" requirement once a given coding skill level-of-support is reached (Level 5 and higher). This fluency requirement disables the capability for pausing video play to allow coding entries to be made, and thus requires "real time" coding within defined tolerance periods.

defines a Training Program, whether that unit is a "Training" unit (i.e., a unit providing prompts and feedback delivered adaptively, with the Level of support depending on the trainee's performance) or a "Certification" unit (i.e., a unit that is designed to assess performance without these adaptive support training features).

Adding a New Training Program

To compose a new Training Program, the administrator begins by "Adding" a new Program using the "+" button below the Training Programs list field:



Adding a new Training Program begins with a dialog asking you to "name" this new program. You are advised to use a mnemonic that will make sense both to you as an administrator and to your trainees, as most of the conversation between administrator and trainees will be about progress and performance on specific training programs that the trainee is assigned to complete.

Composing a Training Program: The Composition Tab

After naming your new Training Program, you must select the Taxonomy that will be shared by all training units that make up the program (note, however, that you may specify a Sub-Taxonomy for the program that is derived from the specified Taxonomy, as described below). Selecting this Taxonomy will then populate the "source" field on the left of the compositing arrows with all Expert Coding Records that have been created using the selected parent taxonomy. You will compose your new training program by selecting one or more Expert Coding Records and clicking the first right-pointing arrow to move those selections to the right-hand "compositing" field as a series of Training Units. You may then simply drag any unit within this right hand field up-or-down to change the order in which the Expert Coding Records will appear to the trainees. Note that you may include any given Expert Coding source as many times as you wish, and in any order with respect to other sources as desired.

You may also use the second arrow to add an Expert Coding Record as a Certification unit, rather than a Training unit. Again, Training units will be experienced by your trainee as an adaptively supported training unit that

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Deleted: thereby affording "progress evaluation" reflecting a trainee's ability to code under unaided circumstances. Accuracy scores, as well as Cohen's kappa values, are made available for each posted video/expert-coding "Unit" that defines a Training Program, whether that unit is a "Training" unit (i.e., a full unit that includes prompts and feedback delivered adaptively, depending on ongoing trainee performance) or a "Certification" unit (i.e., a full unit that is designed to assess performance without adaptive support training features).

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Comment [12]: Roger – Is it wise to use the word "post" both for this action and for the action of assigning a TP to a Record? Might be confusing.

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Comment [13]: Roger – Seems a good place to note that Level 7 provides an opportunity to determine that the trainee has reached a criterion level of accuracy during unassisted coding – much like the Certification Units described below.

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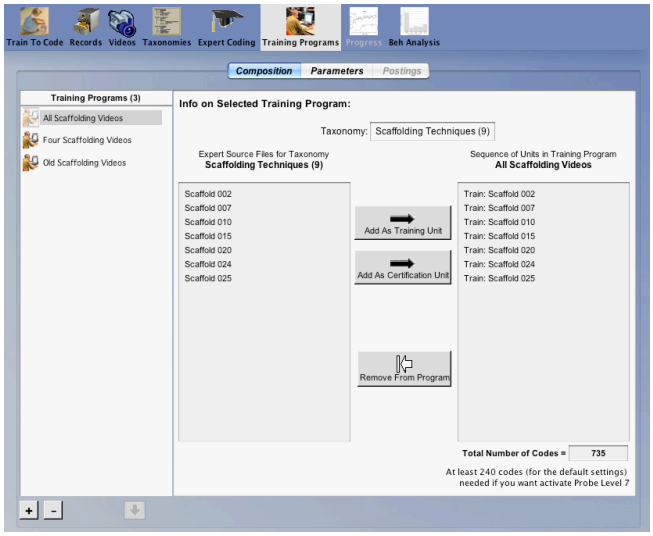
includes prompting and feedback, while Certification units afford no such support, thus providing a means for evaluating a trainee's progress by a "test" unit. These Certification Units may also be placed in any order and used in as many locations in the training sequence as desired, including the possibility of placing one as the very first unit experienced if a "baseline" evaluation is desired (as might be the case with staff training where degree of prior training or evaluation of current performance might be of interest).



At the bottom right of the composition screen, there is a box that counts the total number of codes in the training program using the selected expert codings. ***Train To Code*** recommends having at least 240 codes in a training program if you intend to include level 7 (i.e., the probe level) in the training program. While a very skilled coder who makes zero errors may complete all seven levels of a training program in only 160 codings using default 10-codings per support-level prior to level advancement (see next section describing Training Parameter settings), it is unrealistic to expert such an outcome for trainees. Thus, TTC's recommended 240-code minimum gives trainees room to make errors. And, of course, administrators may deem that far more than 10 codings are needed prior to advancing to less supportive levels, thus requiring even more examples be available.

The Parameters Tab

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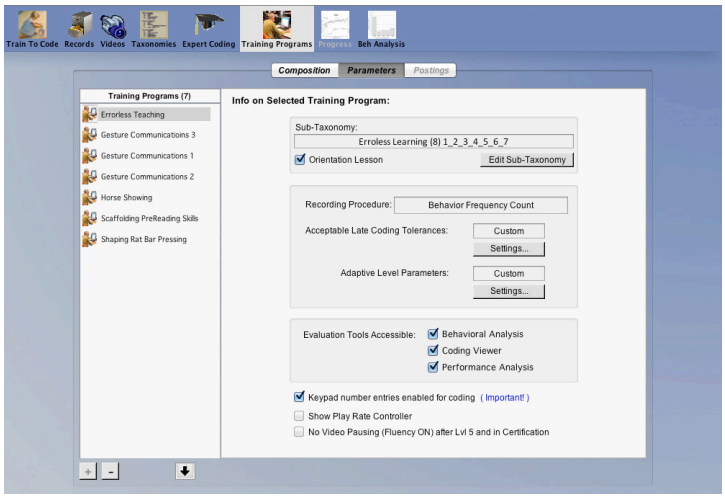
Once a Training Program has been created, you will need to set (or confirm acceptance of default) parameters and other conditions under which the adaptive training will be administered.



Adding a New Sub-Taxonomy: The first of these parameters and conditions is the option to use only a subset of the chosen taxonomy during training. Establishing such a subset is referred to as Applying a Sub-Taxonomy. The default setting shows the Expert Taxonomy used during the creation of your Expert Coding Record. This default requires all trainees using the Training Program to code all categories included within your Expert Coding Records using this taxonomy. Many circumstances may lead an Administrator to desire using only some subset of the full Taxonomy. He or she may wish simply to "eliminate," say, an "Other" category that might have been used to meet the "exhaustive" demands of continuous-coding procedures required in the Expert Coding. Or, for training, one may wish to first train a simpler "trimmed-down" taxonomy of only 2-3 categories before adding others. Your Sub-Taxonomy selection panel will appear with ALL of the original "parent" taxonomy categories selected (radio buttons checked) by default. You would de-select at least one of the radio buttons to utilize a Sub-Taxonomy. The example below shows the scaffolding taxonomy with "Other" de-selected:

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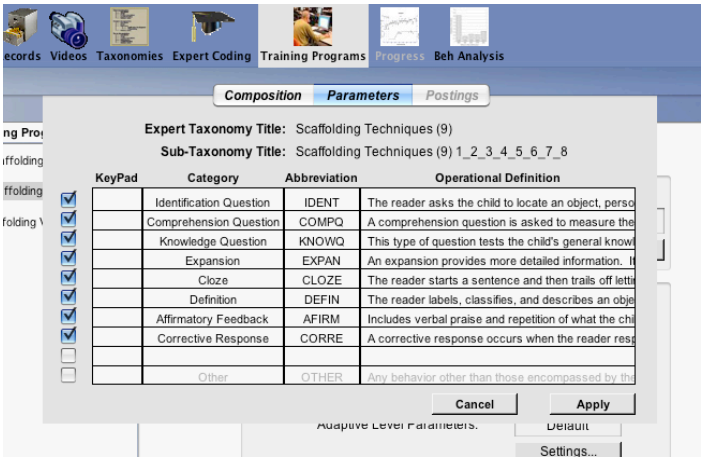
Deleted: This default requires all trainees using the Training Program to code all events included within your Expert Codings using this taxonomy. Many circumstances may lead an Administrator to desire using only some subset of the full Expert Taxonomy. He or she may wish simply to "eliminate," say, an "Other" category that might have been used to meet the "inclusive" demands of continuous-coding procedures required in the Expert Coding. Or, for student training, one may wish to first train a simpler "trimmed-down" taxonomy of only 2-3 categories before adding others. Your Sub-Taxonomy selection panel will appear with ALL of the original "parent" taxonomy categories showing selected (ON) radio buttons at the left of the spreadsheet. You would de-select at least one of the radio buttons to utilize a Sub-Taxonomy. The example below shows the scaffolding taxonomy with "Other" de-selected:



Train To Code also allows Administrators to include an optional Orientation Lesson each time a new Taxonomy is introduced to a trainee upon his or her first login to a Training Program. This orientation lesson is composed of a computer-voiced reading of each Category Name, the keypad number used to enter the category, and the operational definition. Following this reading, the first available example of that category in the Training Program is shown to illustrate the category. When all categories in the taxonomy have been so illustrated, a second example is then shown for each category along with the Category name, abbreviation, and operational definition, but no textual reading is given. To activate this option, check the Orientation Lesson check-box within the Sub-Taxonomy parameters box.

Acceptable Late Coding Tolerances: The second selection option in the Parameters tab sets the late-input "tolerance window" values for each of the support levels in the training. The illustration below may help to define this concept. The top line depicts an expert's defined start and end-time for a specific event (considered to be the "actual behavior"). When the dark blue turns to the light-blue/green, the behavior is judged by the expert to have ended. However, the two additional lines reflect possible coding inputs by a second expert coder, the top being "accepted" because it occurs "close enough" in time to the actual end that it can be considered "an acceptable match" with the expert's code (i.e., within the specified tolerance time window). The bottom line depicts a similar coding, but one that occurs too late to be considered "in agreement" with the expert's code because it is after the designated tolerance window. It is not uncommon to allow at least .5 second if not a full second delay to have the coding be considered "in agreement" with expert's Continuous Coding (see Ray, R. D., Ray, J. M., Eckerman, D. A., Milkosky, L. M., & Gillens, L. J. (2011). Operations Analysis of Behavioral Observation Procedures: A Taxonomy for

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Deleted: ***Train To Code*** also allows Administrators to include an optional Orientation Lesson each time a new Taxonomy is introduced to a trainee upon first logins for a given Training Program. This orientation lesson is composed of a computer-voiced reading of each Category Name, keypad number associated with it, and the operational definition. Following this reading, the first available example of that category is shown to illustrate the category. A second complete exposure then follows the completion of the initial presentation of all categories, but no textual reading is given, only the example. To activate this option, be sure to check the Orientation Lesson check-box within the Sub-Taxonomy parameters box.

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Deleted: The second selection option in the Parameters tab is for establishing late-input coding "tolerance window" values. The illustration below may help to define this concept. The top line depicts an expert's defined occurrence and end-time for a reference behavior (considered to be the "actual behavior"). When the dark blue turns to the light-blue/green, the behavior is judged by the expert to have ended. However, the two additional lines reflect possible coding inputs by a second expert coder, the top being "accepted" because it ends "close enough" (i.e., within some specified tolerance time period, or "window") to the actual end that it can be considered "an acceptable match" with the expert's code. The bottom line depicts a similar coding, but one that ends too late to be considered "in agreement" with the expert's code because it lies beyond some designated tolerance window. It is not uncommon to allow at least .5 second, if not a full second, of mismatched timing to have two codings be considered "in agreement" with start/end times in the expert's Continuous Coding (

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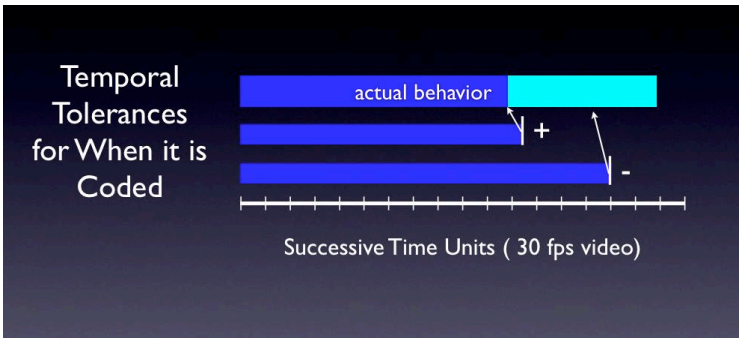
Modeling in an Expert Training System. *Behavior Research Methods*. *43*(3), 616-634. DOI: 10.3758/s13428-011-0140-6.



But in addition to allowing a "window of agreement" with Continuous Coding, there are other reasons to allow a tolerance period for late codings. For example, when using a Behavior Frequency Count procedure as is used in TTC, many behavioral events are "functionally" defined by their effect and thus an observer can only determine the appropriate coding for the event after it has been completed (e.g., the final voiced inflection that turns a statement into a question). For functionally defined behavioral events such as these, the correct coding can only be made after the behavior ends. While expert coders may be able to fluently code such events "in real time" (e.g., within .5-1 sec of the end of a target event), most trainees will need to pause the video during this tolerance window to allow sufficient time for them to reflect upon and/or key-in the correct coding. A "tolerance" window allows that brief period. Thus you may decide that only after such a tolerance window is exceeded, do you wish to consider the trainee has having missed the opportunity to code the prior behavior (and thus make the coding error of "failure to code"). Judgment is required in setting the appropriate length of this tolerance window because there is a danger that an excessively long tolerance window would allow the video to advance so far into the next-behavioral event that the trainee might become confused about which behavior they are coding. We have sometimes found it necessary to insert blackout gaps or "freeze frame extensions of an event into the video to resolve such a confusion.

Train To Code's adaptive default parameters have a somewhat larger tolerance window at initial-levels of support, with a progressively narrower tolerance window for later levels of support as illustrated below:

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Deleted: ***Train To Code***'s adaptive default parameters will start with a larger-than-normal tolerance at initial-levels of training, and progressively narrow the tolerance window to .5 sec for expert-level coding as illustrated below:

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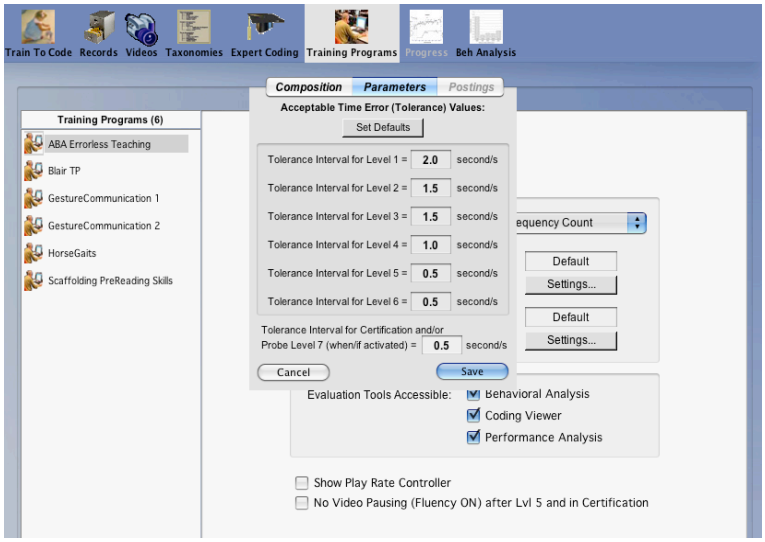

These default parameters are editable to accommodate varying types of taxonomies and observational conditions. To edit, simply move the mouse into the setting's field to select it. Then type the new value desired.

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Adaptive Level Parameters: Here, the number of entries considered in moving between the support levels is set., as well as the degree of correctness required to move either up or down a level. There are six levels of training support, where initial (or lower) levels have more prompting and a higher density of feedback than "higher" levels. When a trainee is coding at Level 6, for example, the only training support offered is that of stopping the video and prompting for the need to correct a coding input error if one is made or requiring a code to be entered if none has been made by the end of a tolerance window. At all support levels 1 through 6 a correct code must be entered before the video resumes play.

In addition to the six levels of training, administrators have the option of including Level 7, or Probe. This mode mimics the way a separate "Certification" unit would work in a Training Program. In Level 7 or Certification, no prompting and virtually no feedback or error-correction messaging is given. Individuals coding within this Probe mode may edit only the last entry made if they catch themselves having made an error, but there is no prompting to do so. *The Probe level allows for training to terminate when a prescribed level of performance accuracy is achieved.* Thus certification is based upon individualized performance measures taken during continuing training. Another strategy for arranging Certification is to use a separate Certification Unit following training, thus

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providing a fixed-number of entries during the Certification process. There are good reasons for using either strategy for certifying a trainee's skills. A) Including Level 7 within the regular adaptive training allows Certification to be achieved within the context of training, while B) ends training only when the Program is complete after a pre-determined number of units, but Level 6 also allows Certification to be assessed within that Training Program. One caution regarding the use of the Level 7 approach is that the Administrator should be careful to set the parameter for number of entries in Level 7 to a sufficiently large number so that a thorough assessment of performance can be achieved (in the example above, the number of entries was set to 40 for this level while the number was set to 20 for lower levels). Setting this parameter to a high number does increase the number of trials that need to be included in the Training Program in order for a Training Program using Level 7 Certification to include enough entries to accomplish this result.

Simply put, more required entries in Level 7 necessitates that more entries be available for this testing phase. The separate Certification Unit approach will allow fewer entries to be included in the training phase and sets a specific, fixed set of entries for the testing phase. This Certification Unit approach, then, provides the same "test" for all trainees who are being evaluated for Certification in a specific Training Program. This equality might be viewed as important for a Research Project. Further, the fixed-Certification Unit approach might be preferred in situations where a specific amount of additional training is recommended once a specified level of accuracy is attained. Such additional training might be recommended in order to strengthen performance sufficiently that it will transfer to novel contexts. Regardless of the type of certification chosen, we strongly suggest that student/trainees be advised about the type of training evaluation that is in effect and what to expect when notified that the training phase is complete.

Pictured next is the panel where these changes are made:

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Comment [14]: But – all entries must be made until entries are exhausted if Level 7 is not selected.

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Comment [15]: Yes.

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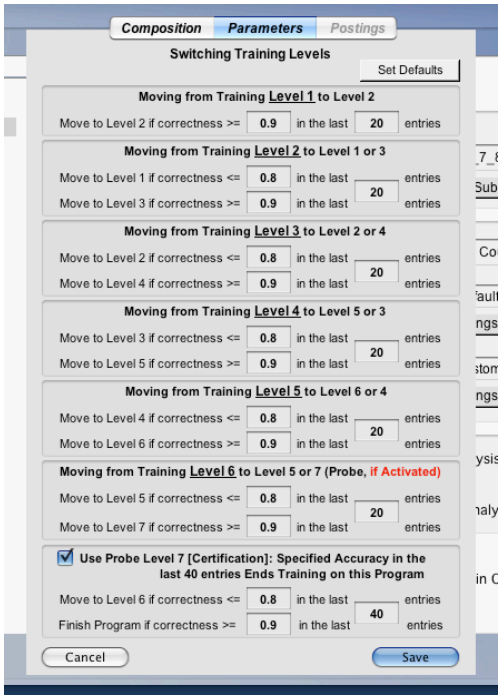
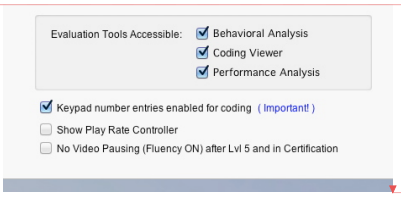


As illustrated below, there is a check-box setting for including or excluding the display and associated use of Keypad number entries, thus allowing you to restrict coding to the act of clicking on the actual category abbreviation used. Further, there is also a check-box for showing/hiding a variable play rate controller during training sessions. This controller allows trainees to decrease the speed of the video. Trainees can then adjust the play rate while the video is paused. There is also a check-box setting for adding a "fluency" requirement once a specific coding skill level-of-support is reached (Level 5 and higher). This fluency requirement disables the ability to pausing video play by pressing the Spacebar. Pausing is actually "taught" via prompting at the levels that give the greater degree of training support, since pausing allows added time for coding entries to be made. Starting at Level 5 and higher (including Probe/Certification), with Fluency checked to "ON," **Train-To-Code** requires "real time" coding within the defined tolerance periods by disabling video pausing.



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s illustrated below, there is a check-box setting box setting for including or excluding the display and associated use of Keypad number entries, thus allowing you to restrict coding to the act of clicking on the actual category abbreviation used. Further, there is also a check-box for showing/hiding a variable play rate controller during training sessions. This controller allows trainees to decrease the speed of the video. Trainees can adjust the play rate whenever the video is paused. There is also a check-box setting for adding a "fluency" requirement once a given coding skill level-of-support is reached (Level 5 and higher). This fluency requirement disables the capability for pausing video play. Pausing is actually "taught" via prompting at the levels that give the greater degree of training support, as pausing gives added time for coding entries to be made. Starting at Level 5 and higher (including Probe/Certification), with Fluency checked to "ON," **Train-To-Code** requires "real time" coding within the defined tolerance periods by disabling video pausing.

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Comment [16]: It is my belief that this allows or disallows the use of the keypad section of a keyboard – the number row keys are available with or without this checkbox being selected.

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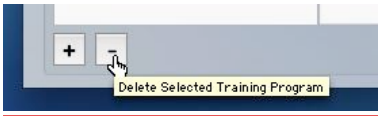
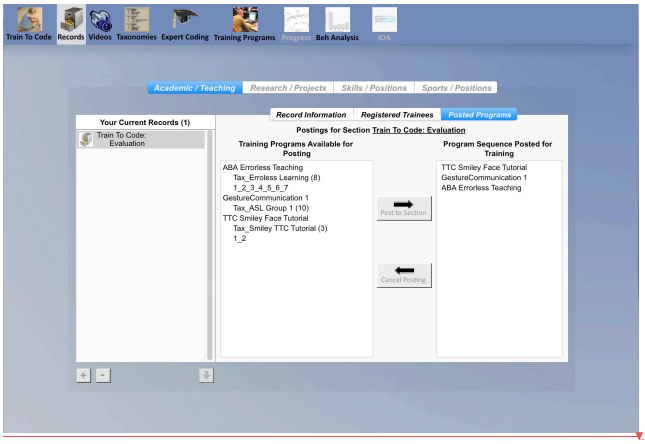
Deleting a Training Program

It is important to keep Training Programs active in order to allow data for your trainees to be accessed. Individual data may be exported for archiving by selecting the "Progress" screen, and you are advised to archive data that you wish to access after the end date for a specific training. Note, however. that exported data can be accessed via spreadsheet programs like Excel, SPSS, or Numbers. If you are certain that you no longer are interested in retaining data within TTC, you may wish to simplify your Administrative Account storage by deleting Training Programs that are no longer of interest. To delete any given Training Program from your list, first make sure it isn't posted for use by any active trainees, then with the desired Training Program title selected, simply click on the "-" button at the bottom of the field listing all your program titles, as illustrated below:



Posting a Training Program to an Administrative Record

TTo make a program available to any given trainees, you will need to assign the Training Program to the class, section, project, or other Administrative Record enrolling those trainees. This process is referred to as "posting" your Training Program as an "assignment" for all those trainees belonging to that Administrative record. Thus postings are accomplished via the Records menu using the Posted Programs tab, as illustrated below:



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Microsoft Office User 11/4/2018 12:48 PM
Comment [17]: Should the importance of the end date set in the Information tab of a Record be emphasized here?

Microsoft Office User 11/4/2018 12:48 PM
Comment [18]: Comment – I have not found a way to have tab-delimited text populate cells of a Numbers spreadsheet in the same manner as done by Excel. Do you know a way?

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As the illustration suggests, once you have selected a specific Administrative Record with which to work, you will see a listing of the titles for all available Training Program compositions along with their associated taxonomy in the left-hand column. There are two arrow buttons in the middle column (one pointing right, one left). Selecting any given Program in the "Programs Available for Posting" field on the left allows you to use the "Post to Section" arrow. Likewise, you may remove any posted program from the right-hand column by selecting the title in the Program Sequence Posted for Training field and then clicking the "Cancel Posting" button. You may drag/drop any title in the right-hand column up or down to rearrange the required completion order. As this implies, ***each trainee must complete the units in the order of your postings***, thus eliminating the possibility that a trainee will do them in an order different from the one intended for best training.

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7. The Student/Trainee Experience in *Train To Code*

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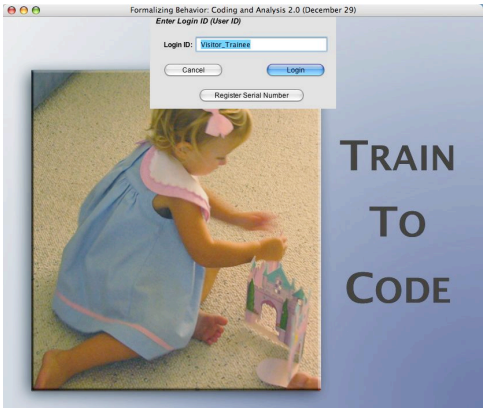
Student/Trainee Purchase and Registration

Train To Code is financially supported by "seat" licenses wherein each and every individual trainee is required to purchase an Activation/Access Code that must be activated by a registration process. Thus, as with Administrators, immediately after making a license purchase for ***Train To Code***, the first screen a student/trainee experiences following the splash screen asks for the **User** to register for their assigned course/section and to also establish their individual **Login ID**. The default information in the **Login** field is "Visitor_Trainee," which allows anyone to experience the sample programs of the student/trainee mode of ***Train To Code***



Typically. administrators have purchased some block of trainee activation codes or trainees make their own online purchases and are e-mailed, usually within 24 hours of purchase, their student/trainee use license/activation number. Such activation/license codes should be typed into the Login ID field to begin the "one-time-only" trainee registration process that must be completed prior to use of TTC. Both at the end of this registration, and for all subsequent logins, this trainee will use a unique Login ID established by during the initial registration process.

Each license activation number distributed to trainees is typed into the Login ID field and should be immediately recognized by ***Train To Code*** as being a *Trainee User License*, as illustrated below:.

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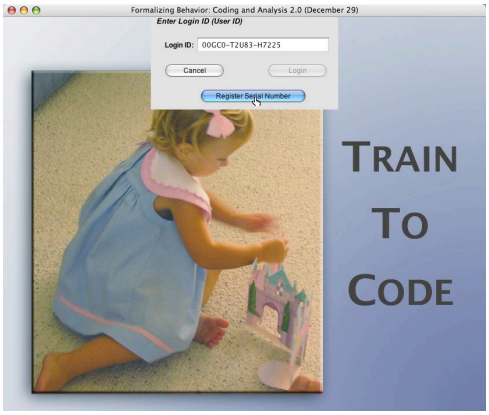
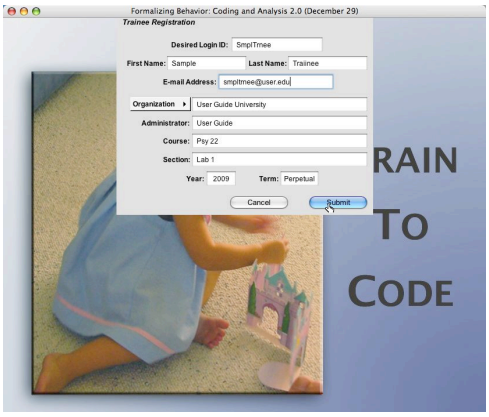


Submission of an activation code that is recognized as valid and as-yet-unregistered brings up a **Trainee Registration Panel** as illustrated next:



It is via this panel that the trainee supplies his or her preferred personal **LoginID** as well as **name** and **e-mail address**. he student subsequently supplies a desired **LoginID**, first/last name, e-mail contact, and then identifies the Organization in which the application will be used along with the Administrator and course/section or other "assigned unit" for which s/he is registering. After completing and/or selecting all required information, the Submit button completes registration and creates a unique student/trainee record for this individual in the Administrators Record of Trainees.

If the activation code has already been used by another trainee, the system reports this prior registration and warns of the need to obtain an unused activation code for any new registration.

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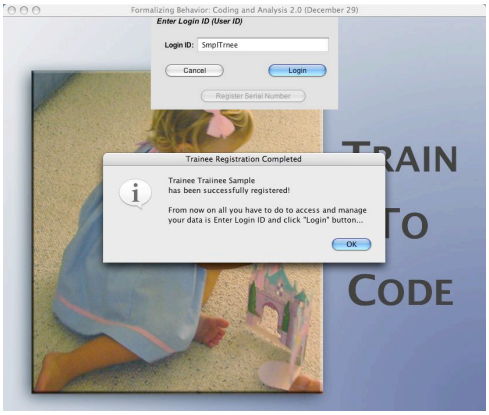
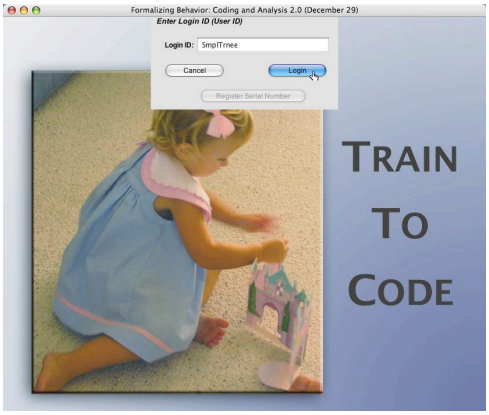
Logging In

As with Administration Registrations, the personal **LoginID** being created by the Trainee during registration will be used for all future logins and will always present the *Trainee Mode* of ***Train To Code***. Successful registration will be acknowledged when the form is completed, the Trainee will need to Login using their new Login ID if they wish to continue the session.



Future **LoginID** requests use only the single login panel:



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NOTE: Student/Trainees who have not previously used ***Train To Code*** will gain an understanding of the program and how to use it by completing all or part of the Training Units that are offered if the Login Button (Blue) is clicked when the default "Visitor Login" is shown in the Login ID window. Likewise, **anyone wishing to experience most of the features described in this Chapter may do so by downloading a free copy of *Train To Code* and** as suggested above, logging in using the default "Visitor_Trainee" ID, A sequence of three Units is then presented as a sample and introduction to how training in TTC works. This Training Program sequence is as follows: 1) Smiley/Frowney Face Training -- An orientation to the screen displays, levels of prompting, and response options, including training in use of the space bar for pausing the video, 2) ASL Sign Gestures – Training to identify 10 ASL signs being made by students-in-training, and 3) Errorless Training in Functional Reading Skills – A brief training to identify the procedures being used to train a client to have "Grocery Store" reading skills. This sequence begins with each use of Visitor Login. A Visitor Login session may be terminated at any time by selecting Quit from the menu shown by clicking on the top left Icon, and no data are retained from such a session.

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A Pre-Selected Training Program

Upon first login, students/trainees will be directed to the **Orientation** screen (unless they are first required to take a **Certification**, as discussed below). Students will also see the **Programs** menu active:

Clicking on this menu icon will offer a menu with all programs currently posted for the course/section (or comparable unit of assignment) for which the student/trainee is registered, *but only completed Training Programs and the first uncompleted Training Program is active for selection—the remainder of programs not-yet begun are dimmed*. Thus Training Programs must be used and completed in the posted order of composition, as determined by the student's Instructor/Administrator. The ***Train To Code*** menu at the far-left offers access to the "About TTC" information panel, the "Change Background" option for changing the color of the backdrop, and the "Quit" command for exiting ***Train To Code***. Selecting the previously completed available posted program will allow the student to review Accuracy results achieved during training for that program. Beh Analysis of training progress based on accuracy of coding for any given program is also available by selecting that Training Program from the

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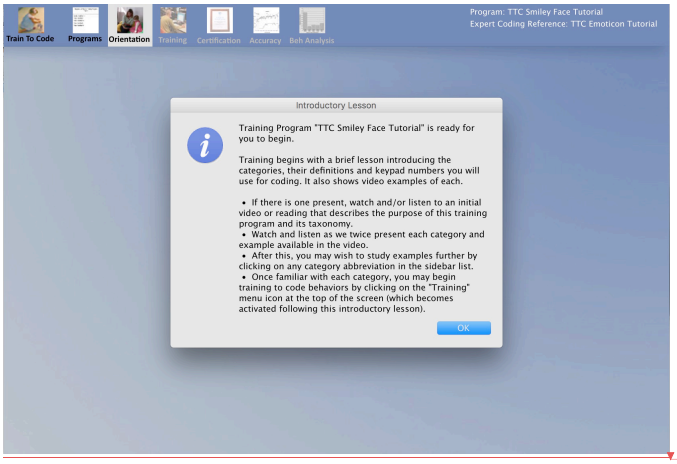
Programs menu, If the student is just starting a new program, the student is automatically taken to the **Orientation** screen for reviewing the coding taxonomy and available video illustrations of each category in that taxonomy, as illustrated in the next section.

The Orientation Screen

When a student launches TTC for the first time, the student is automatically moved to the **Orientation** screen. If prior training of other programs has been completed, the Programs menu allows inspection of performance accuracy across the training session for any selected Training Program that has been completed. *If no prior training* has been experienced using a currently active Training Program, the first screen experienced upon selection is the Orientation screen. *If training has already started*, the student is taken directly to the point in training or certification that they had stopped at in their last use of the Program). When Orientation is the resultant screen, the immediate experience is one of two events, depending upon how an Administrator has setup the Orientation. The most common first experience is to see an information panel labeled "Introductory Lesson" and describing the sequence that is about to occur after its "OK" button is clicked, as illustrated below:



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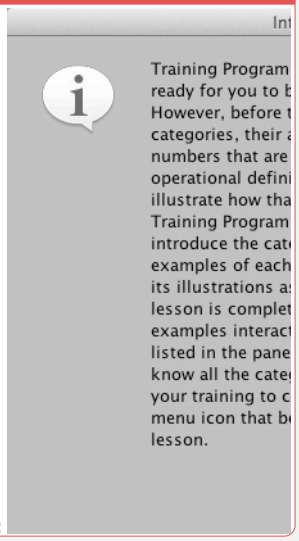

Clicking on the OK button closes and if the Administrator has included it, the trainee is then read a description of the taxonomy and its purpose, via the computer voice set on the users computer. A text of what is being read also appears in the upper panel above the video window, After this introduction to the purpose of the taxonomy, the trainee is shown an example and read the operational definition for each category in use in the

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posted training program. This sequence is repeated a second time without the reading aloud by computer voice, and then the student is prompted to select the Training menu to begin actual training. If the Administrator has not included the purpose of the taxonomy, that stage is skipped and the trainee begins directly with the examples and definitions stage.

IMPORTANT EXCEPTION: *It is important for Administrators to be aware of the fact that if, for some "baseline" data collection purpose or any other reasons, a "**Certification**" session is the first posted student experience in the **Training Program**, the **Orientation** screen is not available during **Certifications**. Thus if **Certification** is the first posted training experience, "first access" sessions result in students immediately experiencing the **Training/Certification Coding** (testing, using no feedback or guidance/training) screen instead of experiencing the **Orientation** screen.*

The Concept of a Training Session

For purposes of tracking the time-series measures of a student's coding accuracy, all login/logout cycles are referred to as separate "sessions" of student practice or coding. This process of depicting progress by sessions allows Instructors to have a more concise summary of the amount of training a student is experiencing, and how that practice is distributed across time. Likewise, each separate session is timed, and this information may be accessed to evaluate how much time is being spent, either per session or for total completion of all posted units of a given Training Program. *But it is also important to note that the "sampling window" that determines the number of successive codings used for each summary plot in the "Progress" screen will always truncate, or ignore, any "partial sample" that might define the last plotted point of a session* (see Chapter 8 for details on Evaluating Trainee Progress in learning to code). Ignoring this final partial sample of a session assures that the same "level of measurement resolution," or sampling size (which may be changed while viewing the data), is represented in every plotted value on the student's Progress graph. If a relatively large number of codings is truncated, administrators (or students, if viewing their own progress) are advised to select a smaller sampling window that will likely decrease the number of unused data in the session. As will be made clear in Chapter 8, the student's Progress graph is easily updated to reflect this change in the sampling window's sampling size. Alternatively, instead of having a session by session analysis, users may select to "combine" all data as a single series (and thus ignore session separations). This form of analysis

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will hide how sessions are distributed in length and numbers, but will also eliminate truncation except for a partial sample that might occur in the very last sample of data values.

What is Adaptive Expert Guidance in Training?

***Train To Code*'s** design is inspired by the idea of "errorless discrimination training" (Terrace, 1963a, 1963b). Thus a trainee begins with sufficient instructions and other stimulus "prompts" to allow anyone who is attending to these prompts to show from the very beginning of training. high accuracy in coding the events designated by the expert. As noted in the prior section of this chapter, it is advisable to provide a pre-training experience to the trainee to allow them to become familiar with TTC's computer interface and how they interact with it. This prior experience will make it easier for them to be controlled by the TTC prompts from the start of their training to code the targeted events. Each of six alternative "levels" of prompting and feedback "support" is dynamically selected by the TTC program itself for the training. Which of these levels is currently active is determined by a moving average in the coding accuracy achieved by the trainee. This average determines the level of current support required to maintain the trainee's accuracy of coding within the adaptive parameters selected by the administrator. These adaptive control parameters designate criteria for decreasing or increasing the level of prompting and feedback (see Chapter 6, The Parameters Tab)

The default values of ***Train To Code*'s** parameter settings are 90% or above accuracy for moving to the next higher level and 80% coding accuracy or below for returning to the adjacent lower level of support. If accuracy is between 80% and 90% then TTC continues training at the current level of support. To be considered as accurate, the code entered by the trainee must match the code entered by the expert for the behavioral event taking place at that point in the video. In the default settings for TTC, percent agreement is calculated for each 20 successive coding events. This progression of adjustments in level of support continues until the sixth level is achieved and maintained (see subsequent paragraph for a description of the Probe level (Level 7) which an administrator has the option of choosing to have TTC move to when the trainee has met the standard of training set for level 6. , In level 6 there are no prompts given to guide coding and the only feedback given is designed to inform the trainee that an error has occurred and must be corrected. As you would expect, somewhere within previous support levels, prompting and feedback has been used to teach the required editing procedures for making self-detected corrections.

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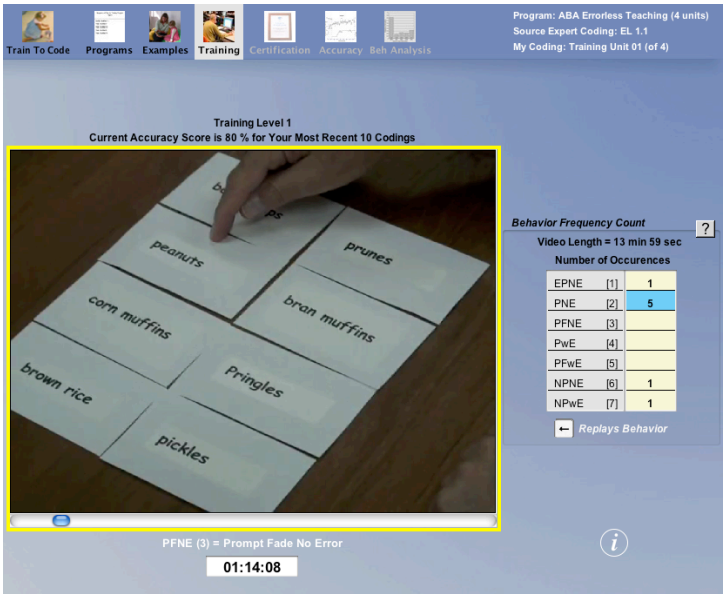
The four illustrations that follow in succession below depict the specific prompts and feedback incorporated into the beginning level (Level 1) of training. The prompts are as follows: a) **Video Frame**. As any codable behavioral event begins, a yellow frame appears surrounding the video display. Directly above this frame is information concerning the current support/expertise level and the current moving average accuracy for the most recent moving sample of codings (sample size, you will recall is a parameter set by the administrator). This moving accuracy begins calculating with the first coding of the session indexes by one for each successive coding until the chosen sample size is reached (20 successive codings in our assumed default parameters). Thereafter the value shows the calculated moving average for the sample size set.



b) **Correct Code for Current Event**. Appearing immediately below the Yellow Prompt frame is the abbreviation and the corresponding keypad shortcut entry for coding the current behavioral event being observed in the video. This display, of course, allows for a coding input to be made by the trainee at anytime during the occurrence of the behavioral event. c) **Tolerance Window for Coding After the Event Ends**. If the student fails to code the event during the its real-time occurrence, the Yellow frame changes to Green during the post-behavior "coding tolerance" window, as illustrated below. During the presentation of the Green frame the Prompt/Instruction immediately beneath the video tells the student to "Use the Spacebar to Pause" for coding input. If the student correctly

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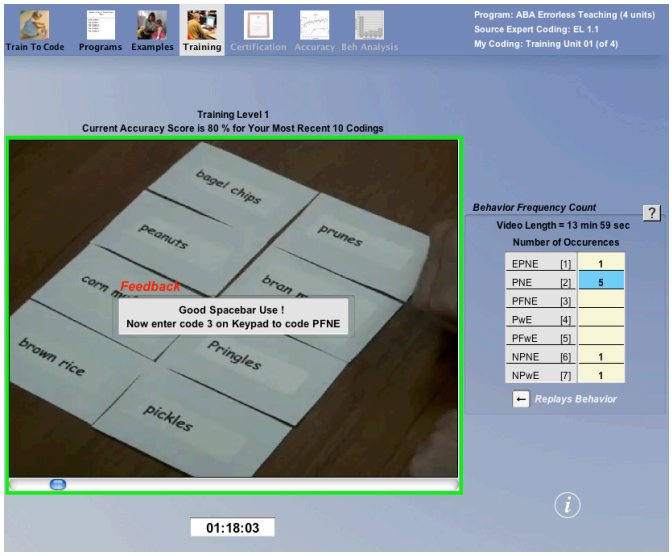
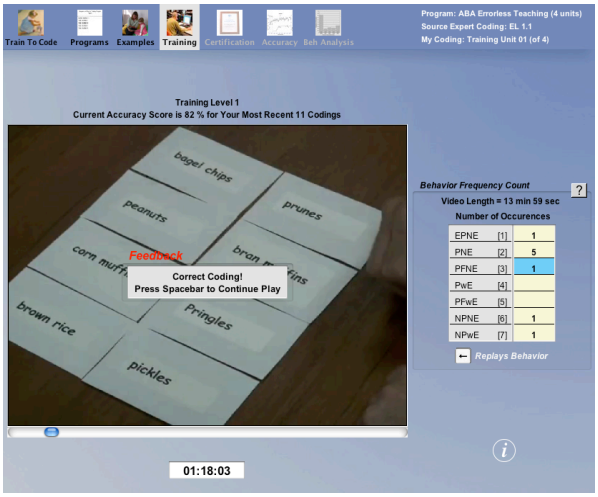
responds to this instruction by pressing the spacebar to Pause, then a Feedback panel appears that 1) Reinforces the proper use of the Spacebar to Pause, and 2) Instructs the student as to the required coding input to be made:



Proper coding, as per these instructions, gives another positive feedback with the prompt to use the spacebar to continue play and to prepare for the next coding, as illustrated below:



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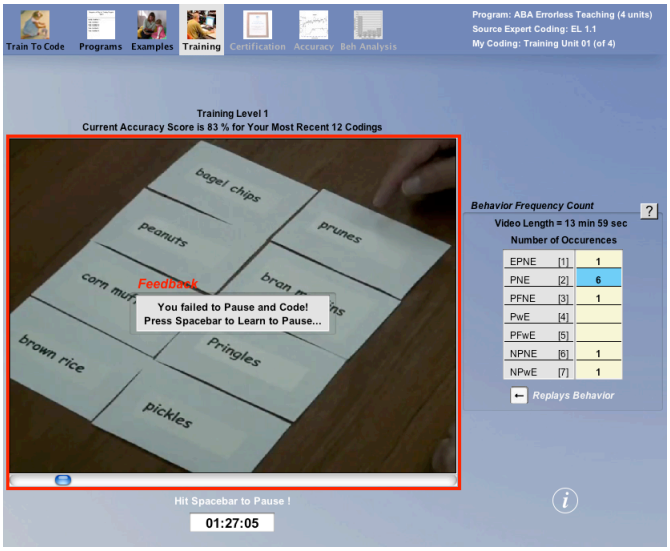
d) Correction of missed opportunities for coding the event. Should the student fail to follow the instructions given at any point during the Green frame period, feedback is used to correct the form of error via additional prompts. One such event is when a student totally ignores the appearance of the Green tolerance prompt and its associated "pause" instruction, and lets the video continue play to the end of the coding tolerance window. Upon the execution of this error (i.e. a failure to respond as instructed), a Red frame appears surrounding the video, play of the video is automatically paused, and a corresponding instruction field tells the student that "You failed to Pause and Code! Press the Spacebar to Learn to Pause….":



So long as this Feedback is displayed no keyboard interaction, other than pressing the spacebar, is accepted by the program. Upon correct spacebar use, the instructions change and prompt the student to code the behavior that was missed by using the proper abbreviation key or keypad entry, after which the prompt to use spacebar for continued play appears:

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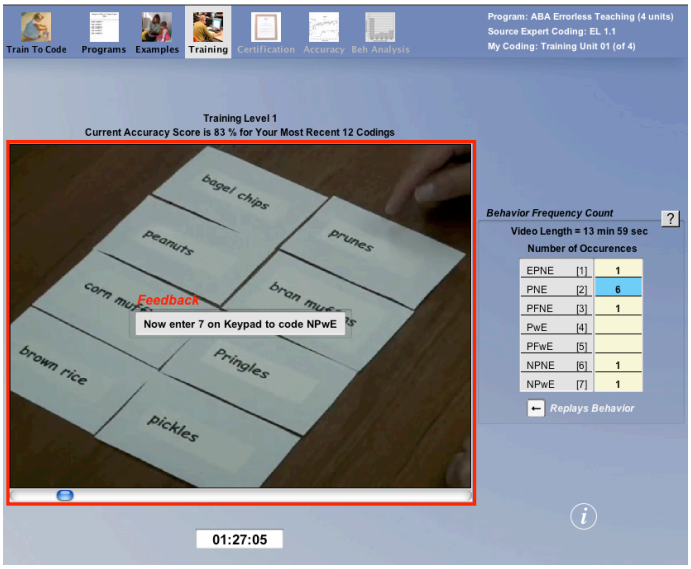

As will be described further in the next section, beginning at support Level 5 and higher the student will be prompted to make edits to correct any coding error at the time such an error is made. Prior to that Level, the program auto-corrects as a part of the feedback. Self-editing instructions are introduced that ask the student to "edit" by using the "minus" key to remove the incorrect frequency count, followed by either a correct re-keying or a replay/recoding of the event to correctly code it, just as if real frequency count data were being collected in a research setting.

The Six Levels of Training Support and How They Fade

All of the prompts and feedback support detailed above is for the first, or lowest expertise, level of training. A graphic summary of these features is always available to remind the student of the services that are currently "in force." When the video is paused, this summary graphic can be accessed simply by rolling over the label that tells the student the current level (immediately above the video frame). This summary graphic is also accessed by clicking the "*i*" icon at the bottom right of the window. The graphic tells the student their current level, as is illustrated below:

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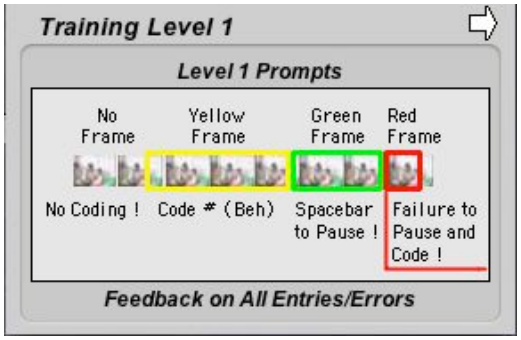
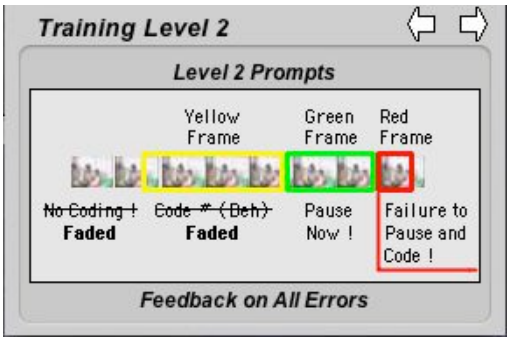


This graphic shows what was detailed above. Namely—reading left-to-right—that if a "no coding" (i.e., excluded expert category, such as "other") event precedes a behavior that is to be coded, there will be no "frame" surrounding the video, and the lower label will say "No Coding" as a means for helping the student to learn to identify events that are not to be coded. a) As soon as a codable event begins, the yellow frame appears along with b) the behavior's categorical label and keypad number for coding. After the behavior ends, c) during the coding tolerance window, the green frame and prompt to use the spacebar to pause for coding appears. This, if ignored, d) results in a red frame, an auto-pausing of the video play, and the feedback that a Failure to Pause and Code has occurred. This feedback also tells the student how to correct this error.

Subsequent graphic summaries will be used to describe here how various prompts and/or feedback elements change with changes in support/expertise levels. Training Level 2 is summarized in the graphic immediately below:



The terminology for successively and gradually removing supportive instructions and stimulus supports for training is the term "Fading" of prompts. As the above graphic illustrates, only one stimulus element is

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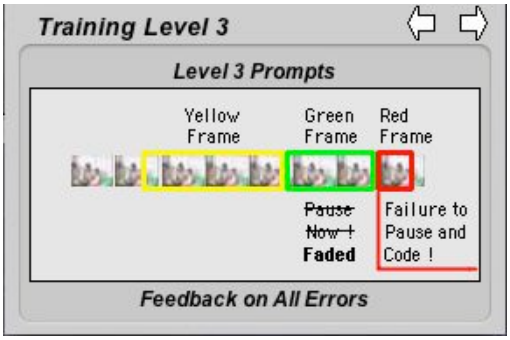
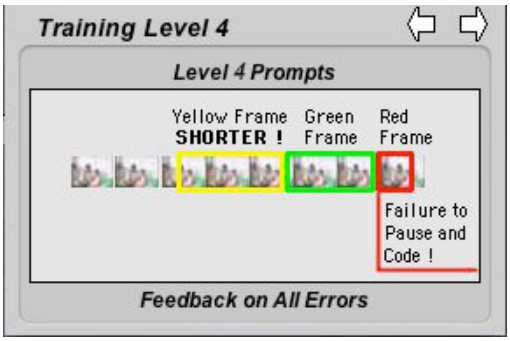
faded at Level 2: the behavior's abbreviation label and coding keypad number. Thus the user is given the opportunity to demonstrate that the proper category and/or keypad entry number has been learned by actively coding the behavior during the yellow frame period. All other prompts remain intact. At all levels of training, the abbreviation and coding keypad number for each of the items in the active taxonomy continue to be shown in a listing to the right of the video window to allow these list items to serve as a means of entering the codes through simple clicks on a given category in the list.

Training Level 3 adds another fade by removing the prompt to use the spacebar to pause for coding during the green frame, or "tolerance" window. Also faded at this level is any prompt as to what coding category or keypad number should be used for coding the corresponding event during this green frame period:



Training Level 4 delays by half of each event's duration the yellow prompting frame's appearance (another form of prompt-fading), thus allowing the student to discriminate that a codable behavior has started before that discrimination is confirmed by the frames subsequent appearance, as illustrated below:



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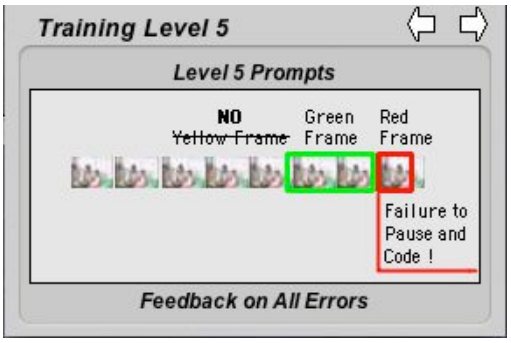
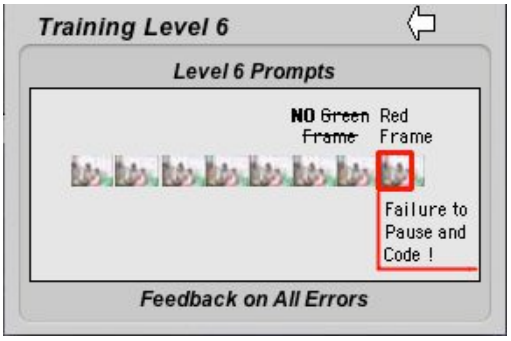
By Level 5, all use of the Yellow frame and labeling has been faded, as are any prompts to pause and code during the Green framed tolerance period:



At this level, the instructions given in response to the missed (red frame) event is to "Replay and code" as required. Further, if a coding input error has been made, instructions are given to "edit" by using the "minus" key to remove the incorrect frequency count, followed by either a correct re-keying or a replay/recoding of the event.

At the final level of Training support (Level 6), the only remaining use of feedback or prompts is the red frame and its associated auto-pause of video play. Feedback given at this point involves only instructions to replay the missed event and code it properly, or if an incorrect coding has been used, to "edit" that mistaken input with no further instructions as to how such editing is to be accomplished:



Training continues at Level 6 unless, or until, accuracy performance drops below the established value for adaptive support. At this level, all timely and correct coding is under the same non-prompted conditions as when an expert is coding events with no support at all. Only when/if an error is made is that error noted via feedback to the trainee that an error has been

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made and the trainee needs to correct the error. To evaluate a trainee's performance without such error-correction support, administrators may use occasional insertions of a Certification unit (see next topic), or may even post a subsequent "training program" that consists *only* of one or more certification units.

What is Probe and/or Certification?

As with all teaching circumstances, instructors will periodically want to evaluate a student's performance under "testing" conditions, as opposed to "tutorial" or training conditions. ***Train To Code*** accommodates this need by distinguishing between postings of any given Expert Coding unit as either a Training or a Certification unit within the Training Program. Students experience any Certification units as "test" coding circumstances, which means all aids, such as examples, prompts, feedback, and progress accounting are not available during certification until the entire unit has been coded by the student. Instructors may even post a Certification unit as the very first element of a Training Program, should a "baseline" measure be desired (as, say, with trainees or staff who claim prior experiences with a given taxonomy in a given situation). *Note: instructors should make sure that trainees are given proper training on computer interface issues under these circumstances to assure that a fair pretest is being made. Since much of the initial Level 1 training in* **Train To Code** *is focused on development of effective interface skills, such skills should be trained prior to giving a pretest to a person seeking to pre-certify*

Besides Certification Units, administrators may choose to include Probe (Level 7) conditions into their training. Including the Probe level allows for Certification-like conditions to occur within the training itself rather than in separate units that present some "fixed" number of codings This allows for training to terminate or certification to be reached based upon individualized performance measures rather than after a fixed-number of exposures. There are good reasons for using either strategy for terminating and/or certifying a trainee's attained skills (sometimes even "over-training" is needed to produce "distant-transfer" effects that impact a trainees' abilities to use the training in a wider range of contexts. In these cases a fixed-number of exposures is often used. (Note: these options are described more fully in Chapter 6, The Parameters Tab (esp. p. 63-65). We strongly suggest that trainers should advise the student/trainee as to which type of training evaluation is in effect and what to expect about notifications that training is "complete."

Reviewing Training Progress

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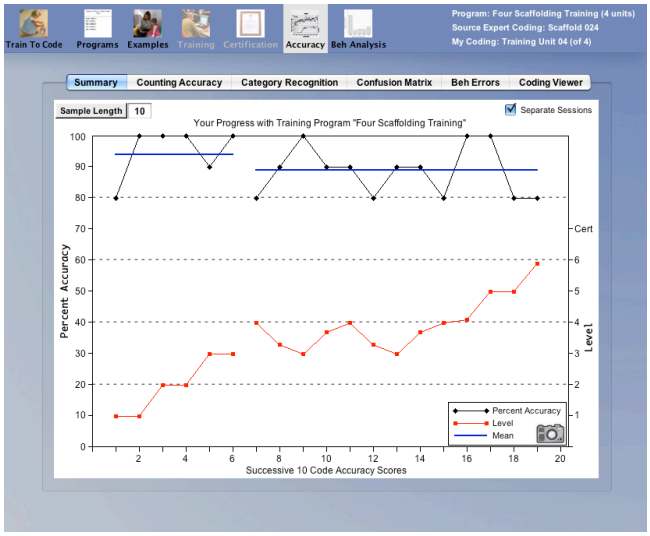
There are several distinct measures of a student's coding accuracy available to students and instructors in ***Train To Code***. The first to be considered is the moment-to-moment time-series measure, based on the percent of trainee codes that agreed with the corresponding expert reference codes, including both missed and miscoded trainee entries. (i.e., errors of omission and commission). This time series plot is available from the **Accuracy** menu via the **Summary** tab, as illustrated below by the black line connecting data points:



The default sample length is based on 10 successive events, but is adjustable by clicking on the Sample Length button at the upper-left of the graphing area. The graph also defaults to show breaks between successive login/logout sessions as well as a blue line that shows the average accuracy for each session (see section titled **The Concept of a Training Session** on p 72 of this chapter for further details concerning sessions and rules followed for truncating partial data samples at the end of each session plot). There is another button at the upper-right that allows you to toggle the graphing to continuous plots, thus ignoring session breaks and any data truncations associated with them. Also shown in red on this graph is the running average of the Training Level (right-hand Y axis) associated with the Accuracy Percentage plots. As illustrated above, Level plots typically reflect a "learning curve" associated with a student's advancement through the various increasing expertise levels, with higher levels of performance reflecting coding that is increasingly independent of prompting and feedback support.

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IMPORTANT CONCEPTUAL NOTE: *Despite its importance in research reports and data collection, it is not useful to think of the accuracy score as a measure of a trainee's success in training, given the fact that* ***Train To Code*** *has been designed to maintain the highest accuracy possible throughout training. The better reflection of a trainee's progress is thus the development of that trainee's "independence" from prompts and feedback in coding accurately. In fact, it is useful to think of* ***Train To Code****'s support levels of 1-6 not as numbers that reflect support, but rather as numbers that reflect increasing independence as the Levels advance.*

The title for the graph also presents the total duration for the training being shown in the graph. Clicking on a line segment opens a window that shows additional information regarding that session, including the date, the duration of that session, the total number of codes included in data points comprising the line, number of codes that were not included in a data point (truncated) since the number was smaller than the required sample to create a point (sample length as shown at the top-left corner of the graph), total correct and total codes for that session plus their ratio (proportion correct)

Browsing Counting Accuracy Analyses

The second tab under the **Accuracy** menu option is **Counting Accuracy**. This is a table composed of two sections: 1) the Registered Codings section shows the category-by-category counts of the Expert Reference Coding file as well as the Student's coding counts; and 2) the Analysis of Codings section that breaks all student codings down into correct vs. incorrect codings based on whether these are initial (i.e., first entry) codings or prompted re-codings to correct an error. [***[NOTE: as of 09/2012 the specific measures shown in the table are being reviewed. Contact eckerman@ai2inc.com for current status of this review]*** At the top label of this table is a selectable menu for showing the table based upon either actual numbers of corresponding events or relative proportion measures, as illustrated below:

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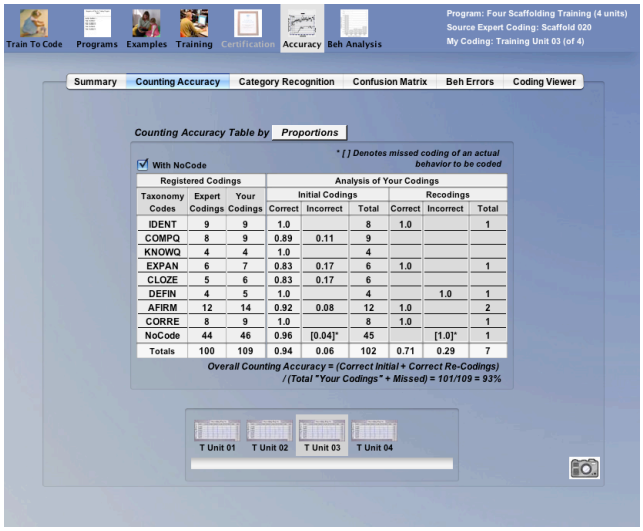

Students or Instructors may browse the Counting Accuracy Table for each successive posting of each expert coding unit by selecting the desired unit's icon in the browser below the table. Any units that have yet to be completed are dimmed, thus reflecting how many units remain to be coded by the trainee

Browsing Category Recognition Analyses

The third tab under the **Accuracy** menu option is **Category Recognition**. This is a table composed of two sections: 1) the Registered Codings section shows the category-by-category counts of the Expert Reference Coding file as well as the Student's coding counts; and 2) the Analysis of Codings section that breaks all student codings down into correct, incorrect codings, and missed opportunities for coding based on whether these are initial (i.e., first entry) codings or prompted re-codings to correct an error. . [[NOTE: as of 09/2012 the specific measures shown in the table are being reviewed. Contact eckerman@ai2inc.com for current status of this review] In addition, there is a column for Extra Codings – additional codings entered for a behavior that had previously been coded. At the top label of this table is a selectable menu for showing the table based upon either actual numbers of corresponding events or relative proportion measures, as illustrated below:

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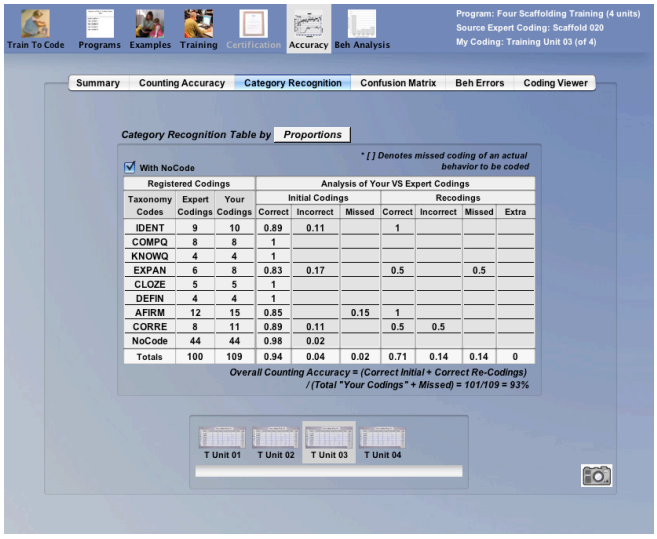

Students or Instructors may browse the Counting Accuracy Table for each successive posting of each expert coding unit by selecting the desired unit's icon in the browser below the table. Any units that have yet to be completed are dimmed, thus reflecting how many units remain to be coded by the trainee

Browsing Confusion Matrix Analyses

The fourth tab under the **Accuracy** menu option presents the **Confusion Matrix** analysis. This analysis yields a matrix that compares each student's coding entry with the corresponding entry of the expert throughout each entire expert's coding unit that is posted in a training program. Both simple percent agreement scores as well as Cohen's (1960) *kappa* scores are given as summaries, and each cell in the matrix shows the distribution of student codes for each expert-defined category, as illustrated below:

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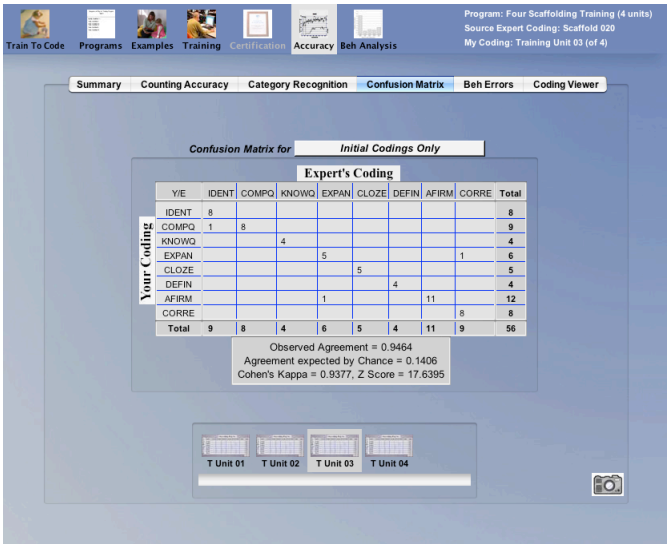

This table defaults to initial (first coding) entries only, but has a menu within the Table Legend that allows one to add prompted-recodings to the matrix as well. Likewise, this menu allows for the inclusion/exclusion of events that are not to be coded (i.e., NoCodes), because students may also make coding entries under such circumstances, even though they are instructed not to code some events. As with the **Counting Accuracy** Tables, each successive unit's **Confusion Matrix** is analyzed "as a whole" and may be viewed via the Browser window below the Matrix simply by selecting any unit that has been coded.

Browsing Behavior Errors

The Counting Accuracy Tables and the Confusion Matrix reflect analyses that treat all "errors" alike. But trainees may make a variety of different kinds of errors. They may also make some types of errors consistently for only selected behavioral categories. To aid in attaining a precise understanding of problems during training, a breakout of errors by type and by category is available via the **Beh Errors** tab:

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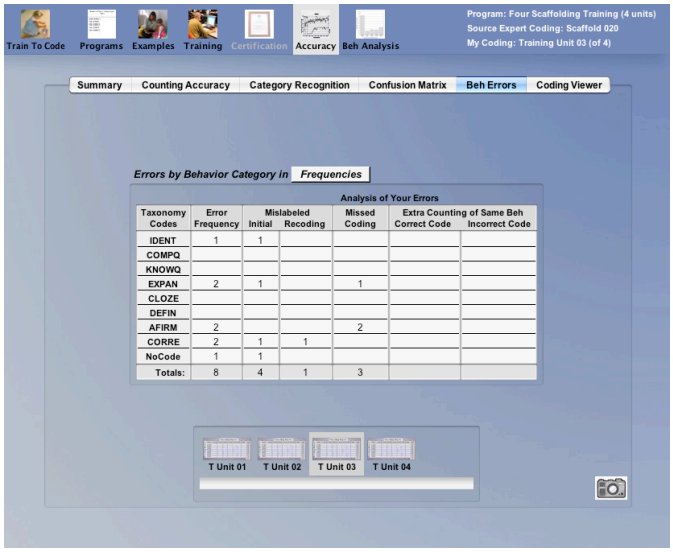

The first column of this table lists each Taxonomy code, or behavioral category. The second column reflects the frequency of *all* error types combined that is associated with each respective category. Then the table presents Mislabeled category errors, both in initial codings and during recodings, as well as occasions when a student missed coding a behavior and errors that derive from coding the same single behavioral event more than once (and whether by using the same category or a different category).

Browsing Coding Error Details via the Coding Viewer

If desired, a total reconstruction of each entire coding unit is available. This reconstruction is available via the tab **Coding Viewer**. This **Coding Viewer** shows the original video source while illustrating a frame-by-frame comparison of the expert's continuous coding and the momentary inputs of the student, as well as how each student input was "graded" by the expert-system regarding correctness or error (and types of error). As illustrated below, the Coding Viewer not only allows a real-time continuous playback, but also allows selections of all errors or errors-by-type for review:

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The "**Browse Errors by Category**" section allows for "**All**" vs errors by specific behavioral category, while the lower "**Coding Errors**" selection allows one to browse one-by-one successively through the type of errors selected. When a student coding input is made, it is depicted either by a small frame marker on the lower timeline marked with a "**C**" for "correct" or an "**x**" (and in red) for error inputs. Rolling over any error marker brings up details that include the expert's coding, the sequence of coding entry (first, second, etc.), and the category used. Also, the corresponding Level of independence (based on amount of prompting and feedback) during that specific coding is shown. Use of the Play button or spacebar plays/pauses the video with the recording tracking in real time. Use of back/forward arrows in the window (as well as corresponding keyboard arrows) "step" through the video frame-by-frame in a self-paced fashion.

The Behavioral Analyses Menu

Should either the instructor or the student wish to fully analyze the expert's coding of any given training or certification unit, they may do so by using the **Behavior Analysis** menu (in the program, behavior is sometimes abbreviated as **Beh**). Below is an illustration of this menu and its default Beh Frequencies graph:

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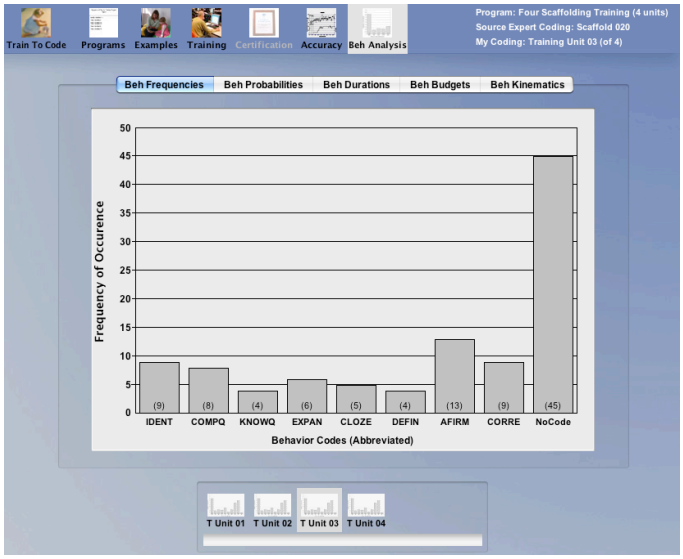
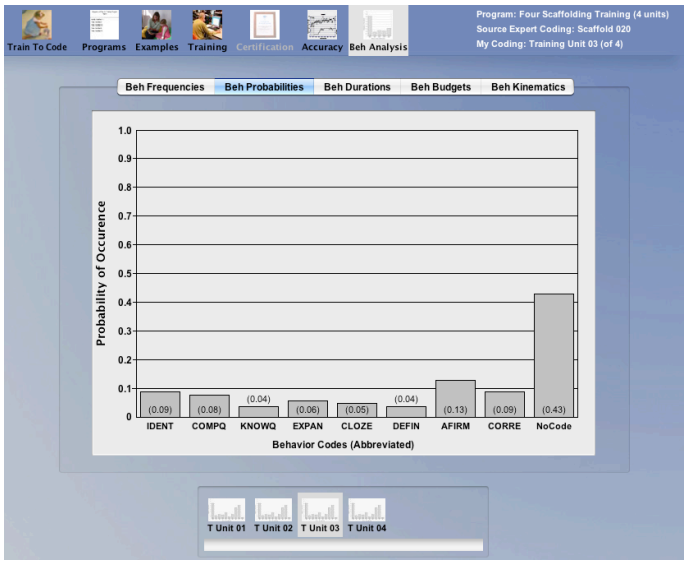


This graph represents one of the various ways that one may determine how many instances of each category appears in any given video unit. The comparable graph based on Beh Probabilities will give this same information as percentage distributions, rather than absolute frequencies. A Beh Probabilities graph is pictured below:



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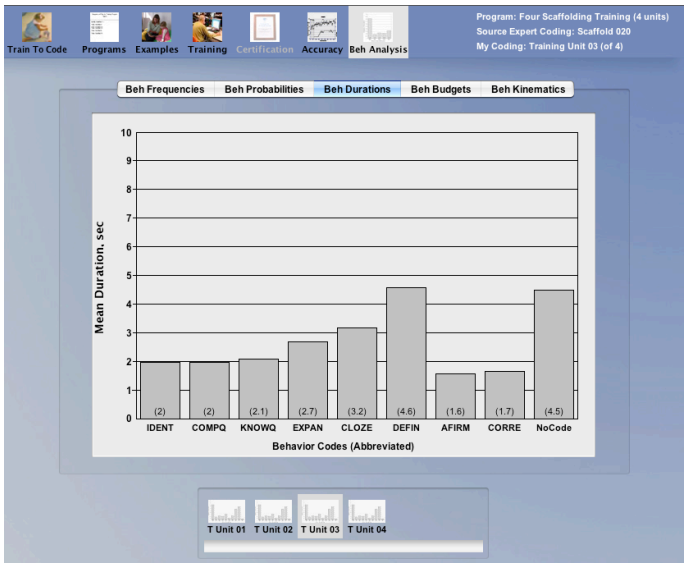
The Beh Durations graph displays the average amount of time in seconds that an instance of each behavior lasted. As shown below, an AFIRM behavior takes a short amount of time, on average, 1.6 seconds. The behavior DEFIN takes the longest amount of time, with an average of 4.6 seconds in duration.



The Beh Budgets graph shows the percentage of total time spent engaging in each behavior category. The example below shows that the reader in this unit spent most of the most time by a slight margin on AFIRM behaviors (that is, if we ignore the “NoCode” category).

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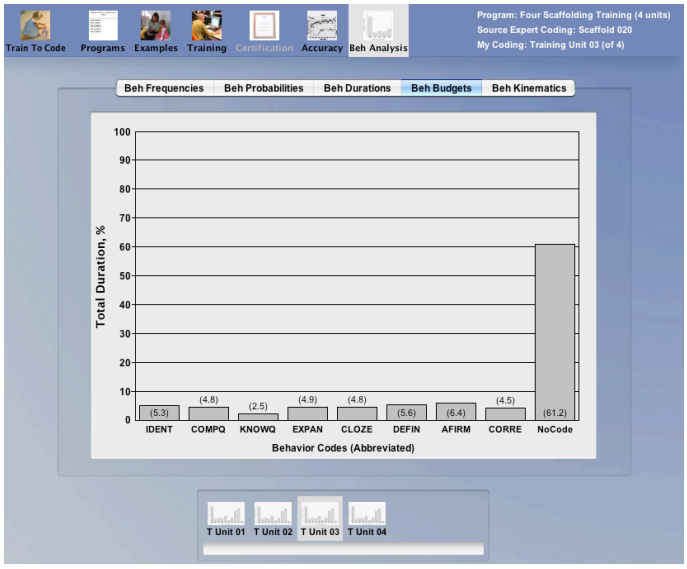
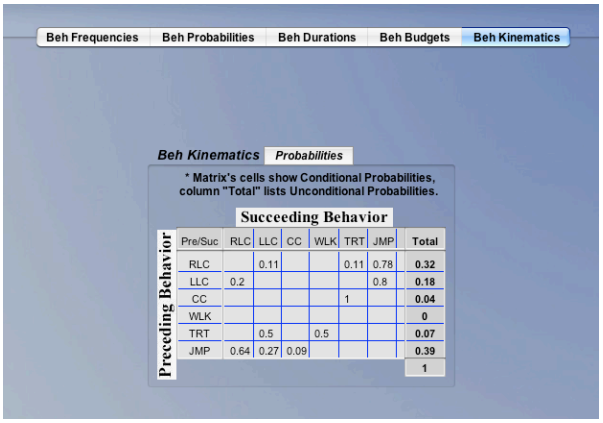


The Beh Kinematics tab displays a matrix providing the conditional probabilities of one category following another in time and sequence. As shown in the Horse Gaits example below, the conditional probability of a JMP following a RLC is .78. This is to say that of all the possible behaviors that could follow a RLC, JMP is the most likely to follow.



Pre/Suc	RLC	LLC	CC	WLK	TRT	JMP	Total
RLC		0.11			0.11	0.78	0.32
LLC	0.2					0.8	0.18
CC					1		0.04
WLK							0
TRT		0.5		0.5			0.07
JMP	0.64	0.27	0.09				0.39
							1

The "total" column on the right, displaying the unconditional probabilities, is equivalent to looking at the Beh Probabilities graph. As mentioned above, this number represents the frequency of the particular behavior relative to the total number of behaviors. The matrix can be transformed

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into simple frequencies by selecting the Probabilities icon and highlighting the Frequencies selection, as demonstrated below:

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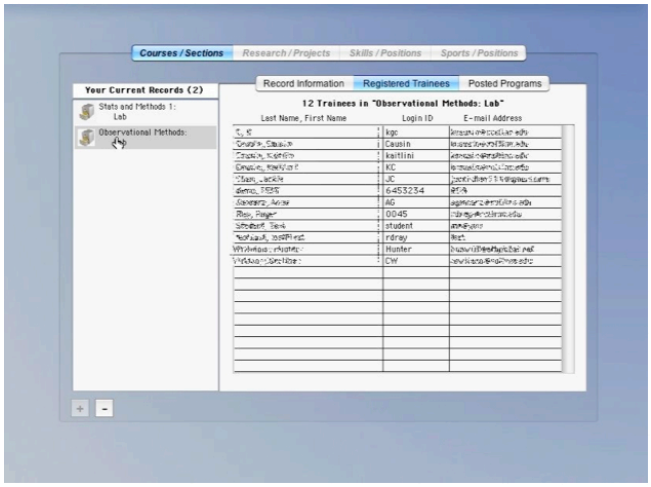
8. Administrative Tracking & Evaluating Trainee Progress

What Happens When Trainees Train?

As noted in the last chapter, as student trainees progress through successive posted units of expert codings, they also create numerous forms of tracking data for subsequent performance analysis. These data are available not only within the student login mode, but also within the Administrative mode as well. In this brief chapter we will describe the fundamentals of accessing student progress summaries for each unit in each Training Program that has been completed by that student.

Finding Your Registered Trainees

First you will need to be view data for all students assigned to a given administrative record. To do this, use the **Records** menu to access the screen showing all your records, then select the desired **Record** in the "**Your Current Records"** field at the left. After selecting the desired record, select the **Registered Trainees** tab to see the list of all students assigned to that record. You also may use the **Posted Programs** tab to see what Training Programs you have posted and their sequence:



NOTE: Multiple Expert Coding Records may be used to build each separate Training Program. These Expert Coding Records are referred to

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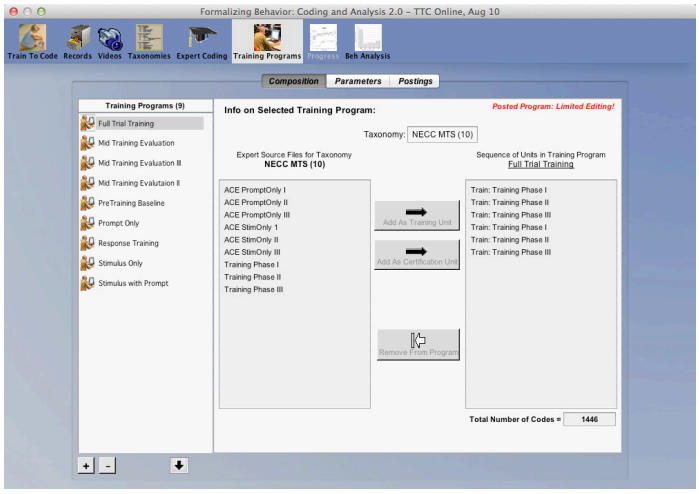
as "Units" of the Training Program, and if you wish to see the "unit composition" of any posted Training Program, you will need to go to the Training Programs screen and select the name of the program of interest, making sure you have the Composition tab active, as illustrated below:



The above illustration contains a listing of 9 different Training Programs, each of which may be posted in any order for a PRESCRIBED SEQUENCE of Training, but as illustrated, the selected Training Program itself includes three units of Expert Coding Records, with the series of three being repeated a second time to allow sufficient numbers of codings to enable Probe to be likely achieved for self-termination of this Training Program.

Selecting a Registered Trainee for Review

Clicking on any given student's name (or any item in that student's row) in the **Registered Trainees** table will select that student as the focus of your subsequent actions (see next section).

The Progress Menu

Once you have selected a student, you may then select the **Accuracy** menu and see that selected individual student's **Accuracy Summary** graph, **Counting Accuracy**, **Confusion Matrix**, **Behavioral Errors**, or even view frame-by-frame coding comparisons between the student and

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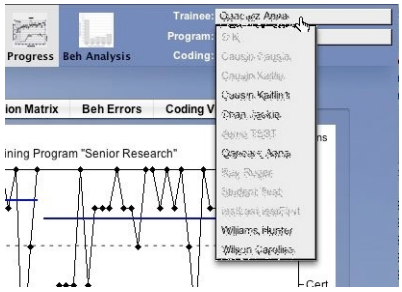
the expert via the **Code Viewer**, all of which are detailed in the preceding chapter in the section on **Reviewing Training Progress** as well as all subsequent analysis sections available to students and instructors in ***Train To Code***. Going to the **Registered Trainee** tab will activate the **Progress** menu option *even without selecting a specific student*. In this case, the first student in your roster will appear as the focal student when you select the **Progress** menu.

Selecting Other Students from within Progress Screens

Regardless of which route you have taken, when you are in the **Progress** screen section you will see a current "focal student" and your "Selected Training Program" indicated in the upper-right menu area. *These listings are also menus for changing your focal student or Training Program,* as illustrated below:



Simply roll-over the label and a drop-down menu will appear to allow you to select any available alternative student and/or Training Program Only those students who have completed a given unit and/or program will be activated for possible selection.

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9. Some Final Administrative Issues

How Reliable is Your Expert Coding?

There are several conceptual challenges embedded in systematic observational recording methodology. Almost all of these are far beyond the purpose or scope of this simple User's Guide, and are thus merely assumed to be issues of which most administrators are already aware as a result of professional training. However, there are a few that especially relate to effective use and training expectations that are worthy of note. One of the most important of these is the actual coding reliability of those who create expert training reference coding records. We believe so strongly that this is an issue that impacts potential uses of ***Train To Code*** that we not only make it possible to evaluate this, but also strongly encourage all administrators to use this feature. We cannot overemphasize the following statement too strongly: ***It is unreasonable to expect trainees to learn to code any more reliably than one expert can code and later recode, or multiple experts can independently code, any given video source using any given taxonomy.*** Let us emphasize this again by noting that this is true whether the issue is intra-observer reliability for a single expert coding the same video multiple times or inter-observer reliability between multiple experts coding the same video independently, or both. And it is also worth noting that such measures will vary from video to video, even given generically equivalent focal behavioral events being depicted. It is also true of different taxonomies applied to events within the same video. Thus, for example, language is typically far more complex and unreliably coded than are structurally-defined behavioral movements or even environmental impacts of behavior. Training objectives therefore need to be calibrated, and ***Train To Code*** enables you to calibrate using either of two strategies, or using both in concert.

Two Approaches to Measuring Observer Reliability for the Expert

As just noted, whether you are calibrating training expectations based on two experts independent codings of the same source video or on a single expert coding the same video source at different times, ***Train To Code*** affords two distinct procedural strategies to accomplish this. These include 1) having the expert(s) code the same video using the same recording procedures used by the expert for establishing an expert reference file (i.e., creating multiple expert codings of the same video using *Continuous Coding, or CC,* procedures), or 2) having the expert(s) code the same video using the same recording procedures that will be used by all student trainees during their training (i.e., coding the same video using the

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standard *Behavior Frequency Count*, or *BFC* procedures after having coded it using *CC* procedures). Most readers are likely to see immediately the relative implication of each strategy. Use of continuous coding tells you about the reliability of one or more experts in *establishing the references for training* (the Continuous Coding procedure), while the other is more representative for establishing *expectation ceilings for trainee performances* (BFC procedures). Both are critical for judging the effectiveness of training, of course. On the one hand, any lack of reliability in expert coding will translate into faulty training guidance and/or feedback, and thus imprecise training for all trainees. Thus learning about such unreliability is a key to preventing such mis-training. On the other hand, any detected deviations in coding while using the same procedure is likely to point directly to where the problems occur. This information will help the administrator to correct the problem. Perhaps category boundaries have been poorly defined ; perhaps the video perspectives is poor with respect to the behavioral events, etc.. We recommend that any and all posted training programs take these issues into account prior to interpreting the progress of any student trainees, as they may easily change how one judges training program effectiveness.

Implications of Event vs. Time of Agreement when Comparing Two Continuous Coding Files

Both in the prior sections of this Chapter and in our previous discussion of issues attending the setting of various Training Program Parameters in Chapter 6 (see pp. 59-65), we introduced the incorporation of a *Continuous Coding* procedure that can be posted as the Expert Coding reference file for the student "training" mode. There are some occasions when it is desirable to assess the degree of agreement between two Expert Coding reference files, and ***Train To Code*** does provide a way to measure agreements and disagreements between two observers who have do that. Be aware, however, that this process has its complexities, and ***Train To Code*** attempts to stay somewhat "neutral" regarding positions taken on some of these complex issues. It does so by providing users with options for selecting which solution a given user prefers. The primary source of complexity follows from choosing to focus your comparison on event-defined entries vs. a focus on time-in-agreement-defined entries when you enter the agreement statistics into a Confusion Matrix for calculating either simple percent agreement scores or Cohen's *kappa* scores. Since these two options may be a bit obscure, we will expand a bit on their critical features.

Consider the following series of illustrations. The one immediately below depicts two independent codings of a single event. The top line may be assumed to be a "true" measure for purposes of discussion, although what is "true" is, itself, a very complicated issue. In ***Train To Code*'s** case,

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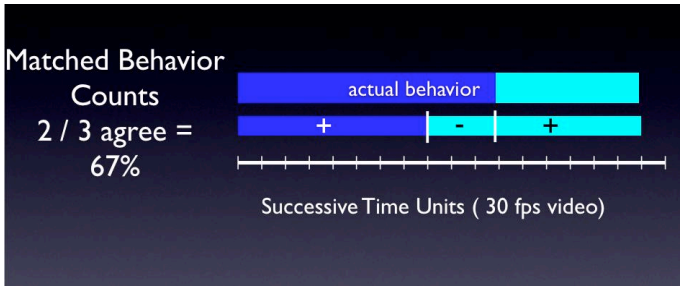
"true" is taken to be the specific reference coding that you have selected to be the standard, so consider the top coding line a representation of your chosen expert.



In this illustration the behavioral event of interest is labeled as the "actual behavior" event, and is depicted in dark blue. This event is followed by a subsequent behavioral event depicted in light aqua coloring. The second line may be considered a representation of any second continuous coding (i.e., a second coding by the same expert or a coding by another expert/trainee), and the "agreement" areas are illustrated by "+" signs while disagreement areas are marked by "-" signs. For purposes of illustration, there is a corresponding time line marked off into conceptual "video frame" units of 1/30th of a second.

Now, consider, as the above illustration depicts, that we compare our codings based on simple "event" counts. Put another way, how many coding agreements ("+" markings) vs. coding disagreements ("-" markings) result from comparing the top and bottom codings for these two successive behavioral events? Clearly there is a 2/3, or 67% agreement here, where the two codings match, then mismatch, then match again across time. This is what we refer to as calculating agreements based upon "*event defined*" comparisons.

To make clear the alternative method that one might choose, consider this same diagram from the perspective of time-in-agreement. The illustration for this perspective is given below, where the exact same behavioral events are depicted, but where the "match" is calculated on a "frame/time" comparison rather than on "categorical" event units. That is, there are 14 frames for which our two observers agree, and only 3 frames during which they are in disagreement about the label for the events being observed. That simple percent of agreement calculation results in a 82% agreement score for the exact same codings!

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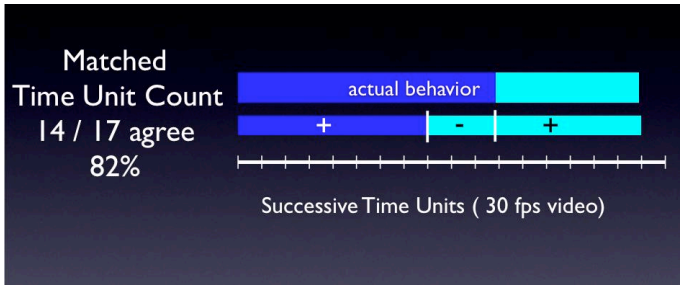
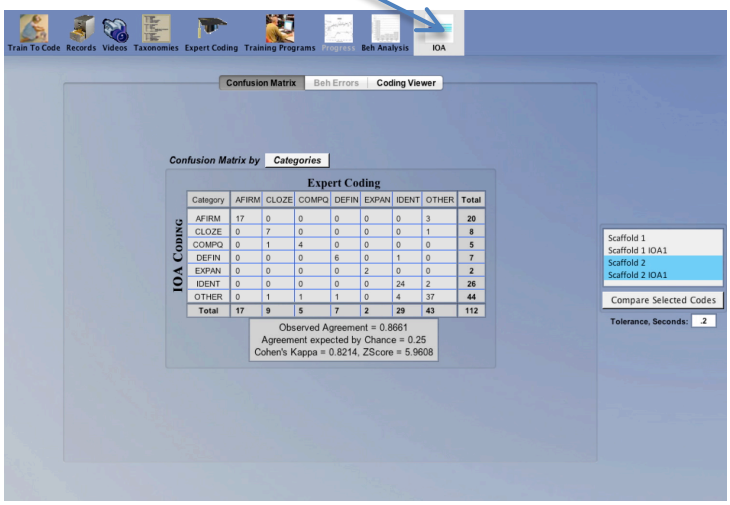


There are strong theoretical arguments for using either one or the other of these alternative perspectives when calculating observer agreement, so ***Train To Code*** merely gives users the option of changing the basis for calculation to whichever procedure is preferred across all forms of accuracy measurement and/or representation of these two continuous coding records. ***This is accomplished within the Administrative system via the IOA menu that only is activated if two copies of the same Video using the same Taxonomy exists:***



Selecting any two associated Expert Coding files for calculating an associated Inter/Intra-Observer Agreement statistic and detailed analysis generates both a standard confusion matrix with associated simple percent agreement and Cohen's kappa calculation as well as a Coding Viewer presentation of all disagreements found. Also available within the label is the option to compare either behavioral categories or time-in-agreement (typically depicted in seconds), as illustrated below:

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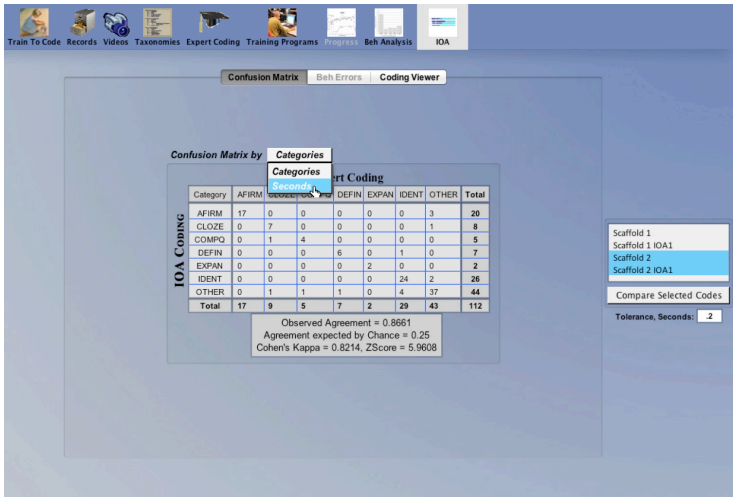

Administrators or research PI's may also establish a tolerance value that will apply to all error analyses available in associated tabs. It is not uncommon to allow at least .5-1.0 second differences as differences in start/end time recording that should be treated as "no-difference" in coding times. After all, Bessels' famous "personal equation" is a full second of expected difference in human reactions to event timing (Hollis, 1938). *However, more cautious or demanding researchers might well wish to assure that any Expert Coding record to be posted to guide training is an absolute (zero temporal tolerance) representation of the corresponding video, and thus should view all disagreements via the Coding Viewer to compare to the actual video and to resolve those disagreements via discussion, refinement of operational definitions, or other typical means used to "calibrate" research criteria.*

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