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Your First IAT

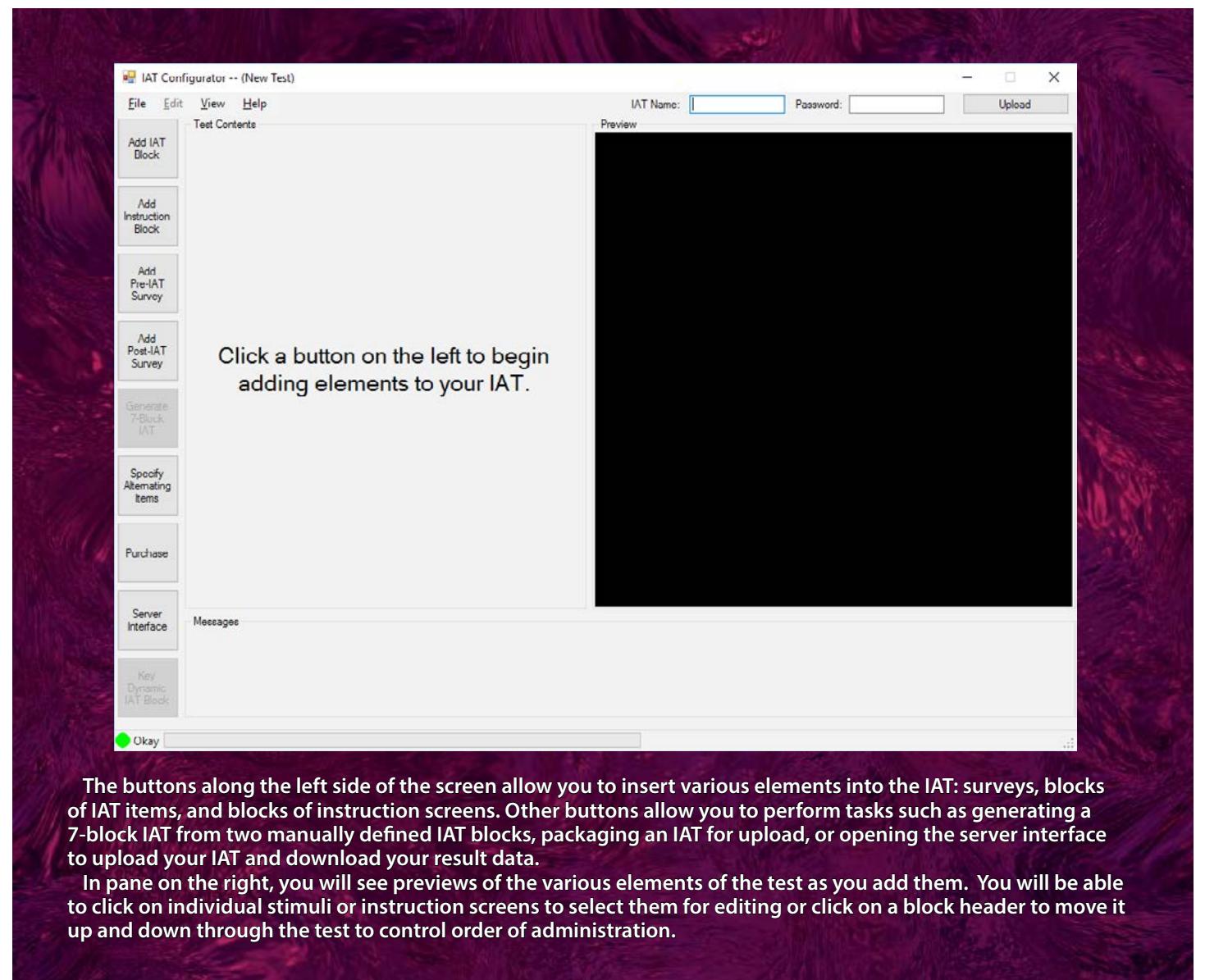
Thank you for purchasing **IAT Design**. Before launching into an explanation of how to use the program, perhaps a bit of background into implicit association tests would not be amiss. A standard 7-Block IAT consists of two sets of stimuli and two scoring keys. The scoring keys contain labels for the concepts that you wish to measure implicit associations between. For the example in this walkthrough, we will construct an IAT that measures preference between insects and flowers. One response key shall consist of the word “Insect” and the word “Flower.” The other response key shall consist of the word “Good” and the word “Bad.” Each scoring key shall have a set of sixteen stimuli associated with it. In the first block of the IAT, the Good/Bad response key will be displayed to the test taker with words that can easily be categorized as either good or bad. The test taker will press the E key to associate the stimuli with Good or the I key to associate the stimuli with Bad. The second block of the IAT will contain the response key with the words Flower and Insect. The stimuli for this block will consist of pictures of flowers and insects. In the third and fourth block of the IAT the two response keys will be joined by the word “or.” The two response values will then be “Good or Flower” and “Bad or Insect.” In these blocks, the test taker will be shown the words and images from the first two blocks, pressing either the E key to categorize the stimulus as Good if it is a word that is “good” or as a Flower if it is a picture of a flower. Alternatively, the test taker will press the I key if the stimulus is a “bad word” or if the stimulus is an image of an insect. For the fifth block, the test-taker will be shown the flower and insect pictures with the Flower/Insect response key, only this time, the response key will be reversed so that the test taker will press E if the image is of a Insect or I if it is of a Flower. The sixth and seventh block are similar to the third and fourth except that the response keys will be “Good or Insect” and “Bad or Flower.”

The point of this is that, for those who associate Flower with Good and Insect with Bad, they will be quicker to supply the correct response when Flower is paired with Good in “Flower or Good” and slower to respond when the response keys read “Flower or Bad” and “Insect or Good.” The result is a test of attitudes or associations that is very difficult to falsify.

What this software does is allow you to design implicit association tests and surveys with a simple point and click interface and then upload them to a server for Internet administration. So, we will now step through the creation of a simple IAT and survey. Before beginning, you must download the materials pack located at <http://www.iatsoftware.net/Materials/Materials.zip>. Once you have downloaded the file, extract its contents somewhere easily locatable on your computer, such as on the desktop or in the Pictures folder.

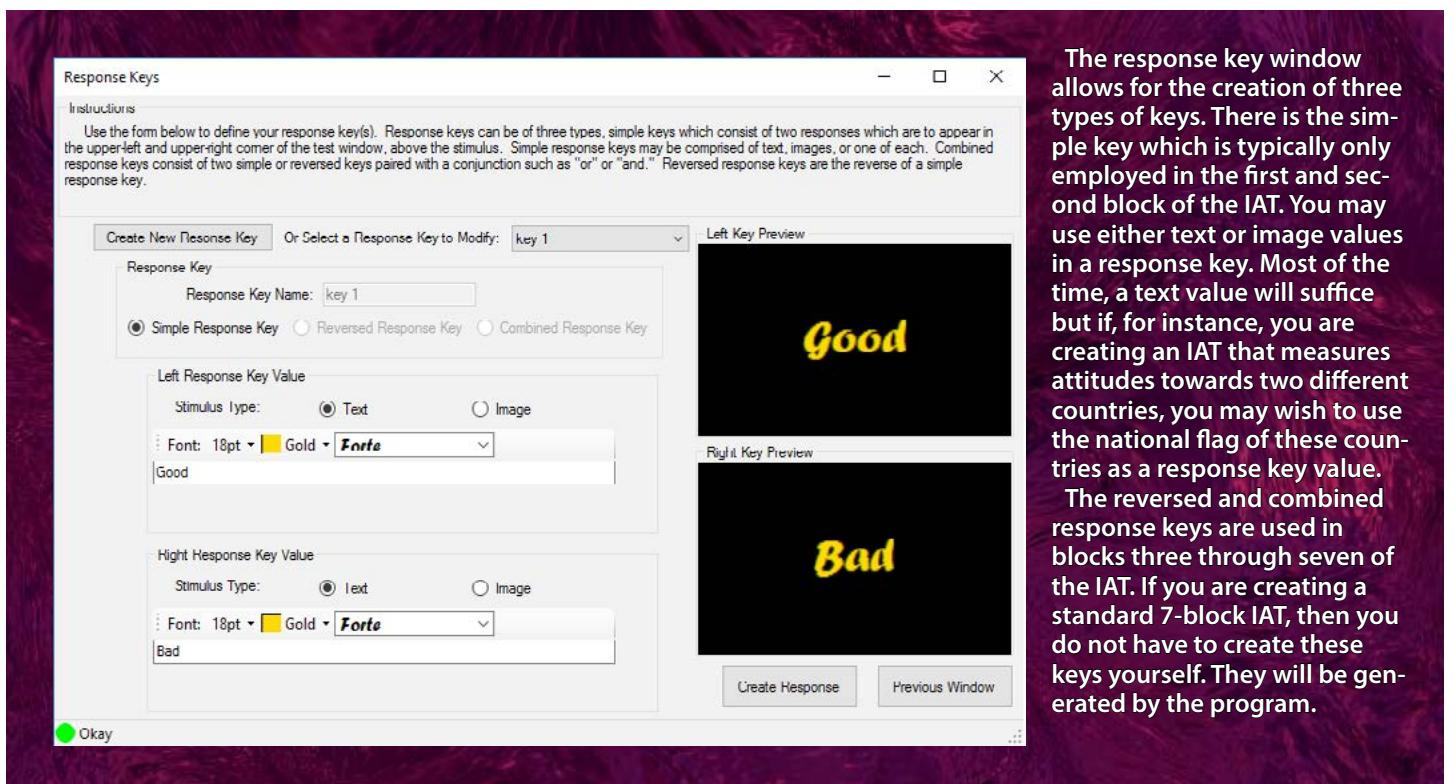
If you have not already done so, start the IAT Client program now. If this is the first time you are using it, you must activate the software. To do so, simply copy and paste your activation code into the product key blank and fill in the remainder of the form then click the Activate button. A window should pop up stating that your software was successfully activated. If you experience difficulties with product activation, please contact us at admin@iatsoftware.net.

To create the IAT, it will not be necessary to create all seven blocks. The program is designed to take the two initial blocks of the IAT, the stimuli and scoring keys you define for them, and generate the remaining five blocks of the IAT. The test structure is comprised of blocks and surveys. Blocks are either either IAT blocks or blocks of instruction screens. We will begin by creating an IAT block.



When the program starts for the first time, it will collect a list of all fonts you have installed on your system. Then a screen similar to the one above will be displayed. You will begin by creating an IAT Block. Click the Add IAT Block button in the upper-left then select “IAT Block #1” from the contents pane by left-clicking on it. The preview window on the right will display an empty IAT block with no stimuli. Click the edit button to open the IAT Block panel. Before adding any stimuli to the IAT Block, first define the response keys. To do this, click the Create/Manage Keys button in the upper right. A new window will appear. Click Create New Response Key and then fill out the form until it appears similar to the one on the next page.

Your First IAT

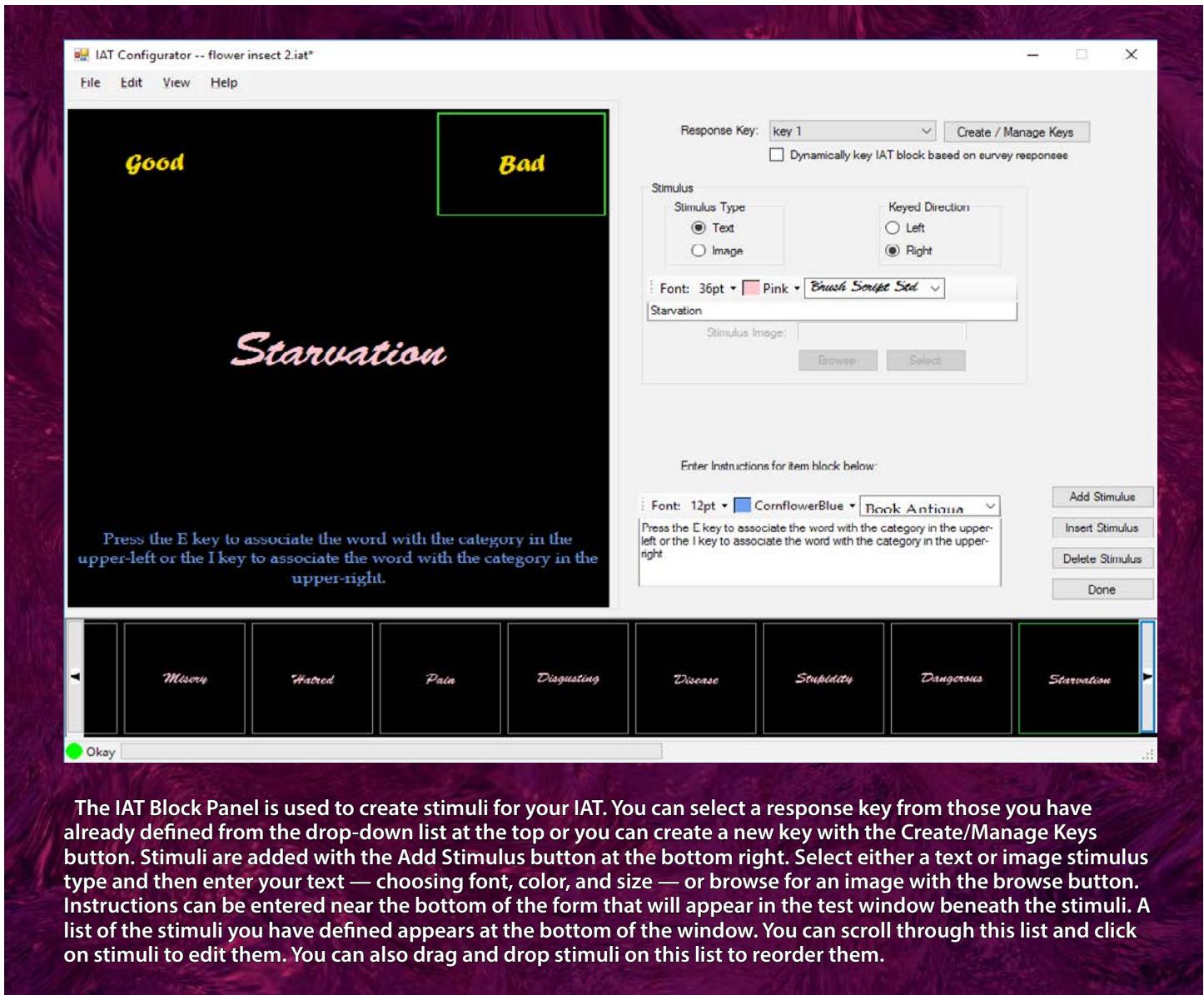


After filling out the form as shown, click the Create Response button in the lower right and then either close the window or click the Previous Form button. Now, on the IAT block design form, click the drop-down list at the top and select “key 1.” After that, begin adding stimuli. Do so by clicking the Text option under stimulus type. Before entering your first stimulus, select a font, size, and color. The choices you make will be saved and applied to subsequent stimuli. You will want eight “good” words and eight “bad” words. You can use the following words in the table to the right or choose your own. For each stimulus, select the left or right keyed direction as appropriate, keying the “good” words Good and the “bad” words towards Bad.

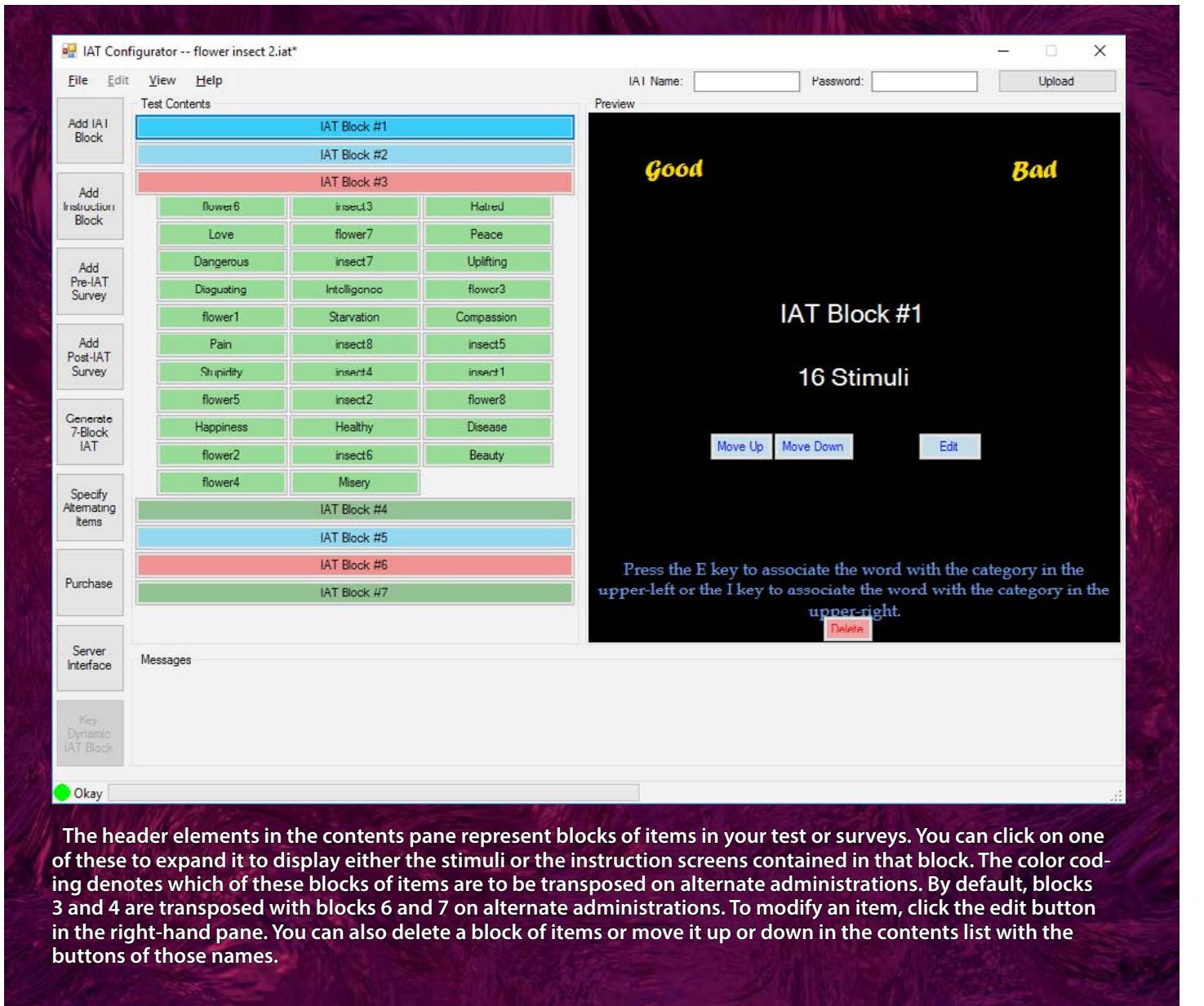
After entering your stimuli, enter the instructions that will appear at the bottom of the test window. To do this, select a font, font color, and font size at the top of the instruction blank. Then enter the following instructions: “Press the E key to associate the word with the category in the upper-left or the I key to associate the word with the category in the upper-right.”

After entering these instructions, your IAT block panel should appear similar to the one that appears on the next page.

Good Words	Bad Words
Happiness	Misery
Peace	Hatred
Love	Pain
Beauty	Disgusting
Compassion	Disease
Uplifting	Stupidity
Intelligence	Dangerous
Healthy	Starvation



Now click the Done button to return to the main form. Click Add IAT Block again to add a second IAT block, select it, and click the Edit button in the right-hand pane. Before adding your stimuli, create a response key for this block by clicking the Create/Manage Keys button. Create a key named “key 2,” denote its type as Simple and then enter “Flower” for the left key value and “Insect” for the right key value. Remember to click the Create Key button in the lower right before closing the response key window. Once you have returned to the IAT Block form, begin adding stimuli. This time, instead of creating text stimuli, denote the stimulus type as image and then click the Browse button and navigate to the location you extracted the Materials.zip file to. One at a time, create stimuli using the images in that folder, keying the images of flowers towards “Flower” and images of insects towards “Insect.” Once you have created all sixteen stimuli, enter the following sentence in the instructions blank at the bottom: “Press the E key to associate the image with the word in the upper-left corner or the I key to associate it with the word in the upper-right corner.” Click the Done button to return to the main form. At this point, you may wish to save your work by selecting Save from the File menu at the top. Afterward, click the Generate 7-Block IAT Button to create blocks 3 through 7 of your IAT. Accept the default options by clicking OK. The main form will now appear similar to the figure below.



As of yet, there are no instructions for blocks 3 through 7. Generating a 7-block IAT will create the items and scoring keys necessary, but will not generate instructions for those blocks. Add those manually now by highlighting each block and entering the instructions below. The font, color, and font size you previously selected for the instructions for blocks 1 and 2 will carry over automatically.

Blocks #3 and #4 -- "Press the E key to associate the word or image with the category in the upper-left or the I key to associate it with the category in the upper-right."

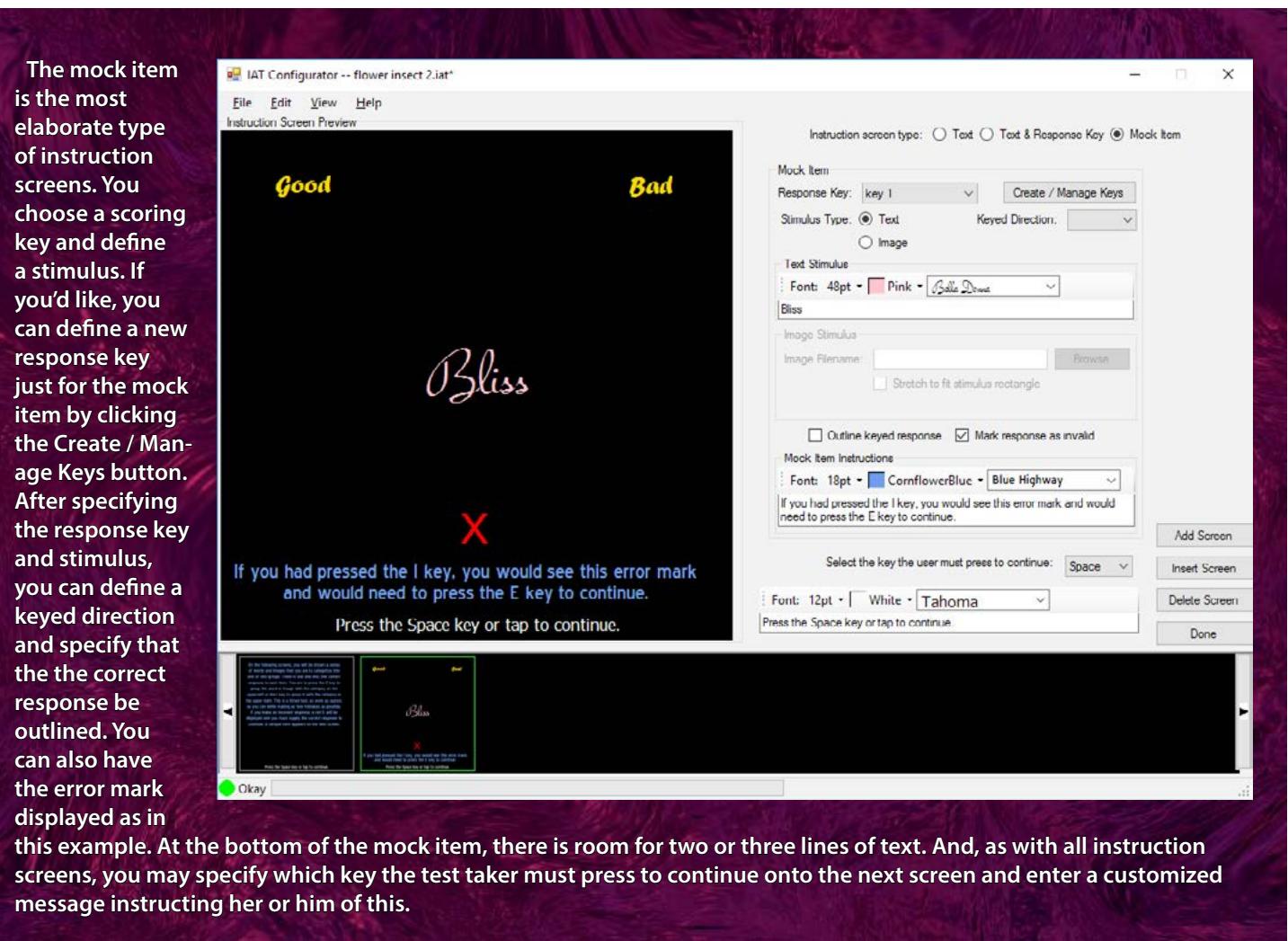
Block #5 -- "Press the E key to associate the image with the category in the upper-left or the I key to associate it with the category in the upper-right."

Blocks #6 and #7 -- "Press the E key to associate the word or image with the category in the upper-left or the I key to associate it with the category in the upper-right."

Next, it's necessary to add instruction screens to your IAT. Click the Add Instruction Block button on the left and select the Instruction Block #1 Header at the bottom of the contents list. Click the Move Up button until the item is at the top of the contents list. Then click the edit button in the right hand pane. First, it might be best to add an instruction screen that consists solely of text to introduce the test-taker to the IAT he or she is about to take. Select "Text" next to Instruction Screen type and choose your font, font size, and font color. Then enter the instructions shown below:

On the following screens, you will be shown a series of words and images that you are to categorize into one of two groups. There is one and only one correct response to each item. You are to press the E key to group the word or image with the category on the upper-left or the I key to group it with the category in the upper-right. This is a timed test, so work as quickly as you can while making as few mistakes as possible. If you make an incorrect response, a red X will be displayed and you must supply the correct response to continue. A sample item appears on the next screen.

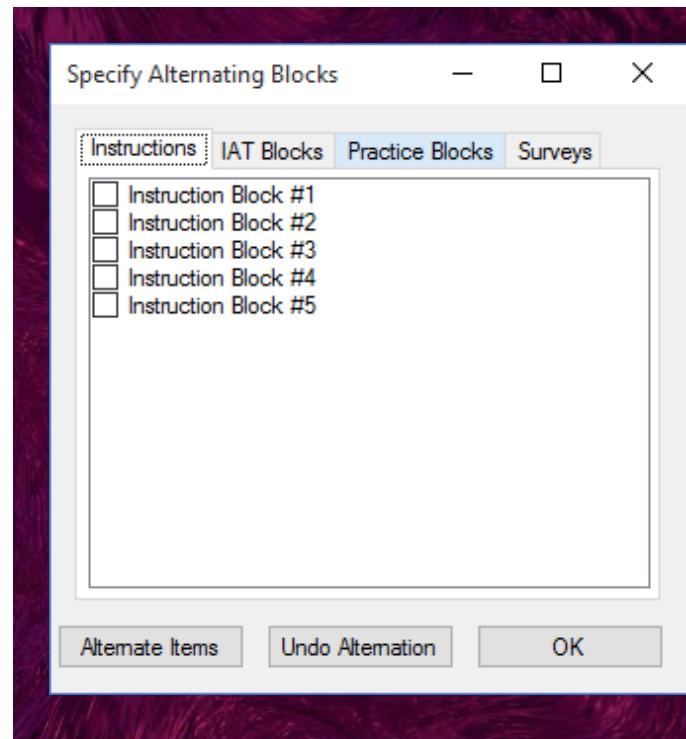
Now, to add the sample item, click the Add Instruction Screen button in the lower right and, this time, select Mock Item as the instruction screen type. Fill out the form as shown below:



Click the Add Screen button again to create a final instruction screen for this block. Denote the type as Text & Response Key. Select “key 1” from the drop-down list of response keys the select your font, font size, and font color before entering the following text: “For the first portion of the test, you will be shown words that can be categorized as either good or bad. Press the E key to categorize the word as Good or the I key to categorize the word as Bad.”

Now create instruction screens for the remainder of the test. Add instruction blocks before IAT blocks 2, 3, 5, and 6 similar to the last instruction screen for block one. For the instruction screen that appears before block 2, use key 2. For the screen before block 3, use Generated Key 1. For the screen before block 5, use generated key 3, and use Generated key 4 for the screen before block 6.

Now that you have created your instruction blocks, you need to specify that instruction block #3 will alternate with instruction block #5 on even administrations so that the correct instruction screens appear before the correct IAT blocks. To do this, click the Specify Alternating Items button. The interface below will appear. Select Instruction Block #3 and Instruction Block #5 from the list and then click the Alternate Items button. Click OK to return to the main form.



The last thing you will add to your IAT is a questionnaire. Click the Add Pre-IAT Survey button to insert a blank questionnaire before the IAT then highlight it by left clicking upon it in the contents pane. Click the edit button in the preview pane to define items for it. The first thing you might want to do is to add a caption to the survey. Click the Include Survey Caption checkbox in the panel on the right side and then enter “Questionnaire of Attitudes” at the top of the screen. If you desire, you can select a font-size or color scheme for the caption other than the default. Before adding questions to your survey, add a brief set of instructions. To do this, click the Instructions button on the right and an instruction blank will appear in the survey panel. Click in it and type, “Please answer each of the following questions honestly. All responses are anonymous.” Now begin adding items to your survey. First, add a question to request the test-taker’s gender. Click Multiple Choice on the right panel and in the blank that appears, type “I am.” Then click the Add Choice button below and to the

This form allows you to specify items in your IAT that are to be transposed or rotated on alternate administrations. IAT blocks and instruction blocks can only be selected to swap out or be transposed on alternate administrations while any number of surveys can be selected. If one survey is selected and set to alternate, it will alternate between appearing before and after the IAT. If more than two surveys are selected, they will rotate. IAT elements will alternate before survey elements. For example, if you have blocks that alternate in your IAT and one survey that is set to alternate, then the IAT elements will alternate on administrations #2 and #4 while the survey will alternate on administrations #3 and #4.

The survey design screen allows you to create questionnaires with several different response types. As you add questions by clicking on the response type, they will appear in the panel on the left. To modify these items, click on the text you wish to edit. For items which require the test taker to choose one or more selections, you can add or remove choices by clicking on the Add Choice button or the red X's next to the choices.

The questions can be collapsed by clicking the up arrow at the top right of the rectangle that appears around the question when you move your mouse over it. The currently selected question will appear with green bars on either side. You can select multiple questions using the Shift and Ctrl keys and can copy and paste questions using the buttons to the right. You can also Insert new questions before the currently selected question by clicking Insert before selecting your response type.

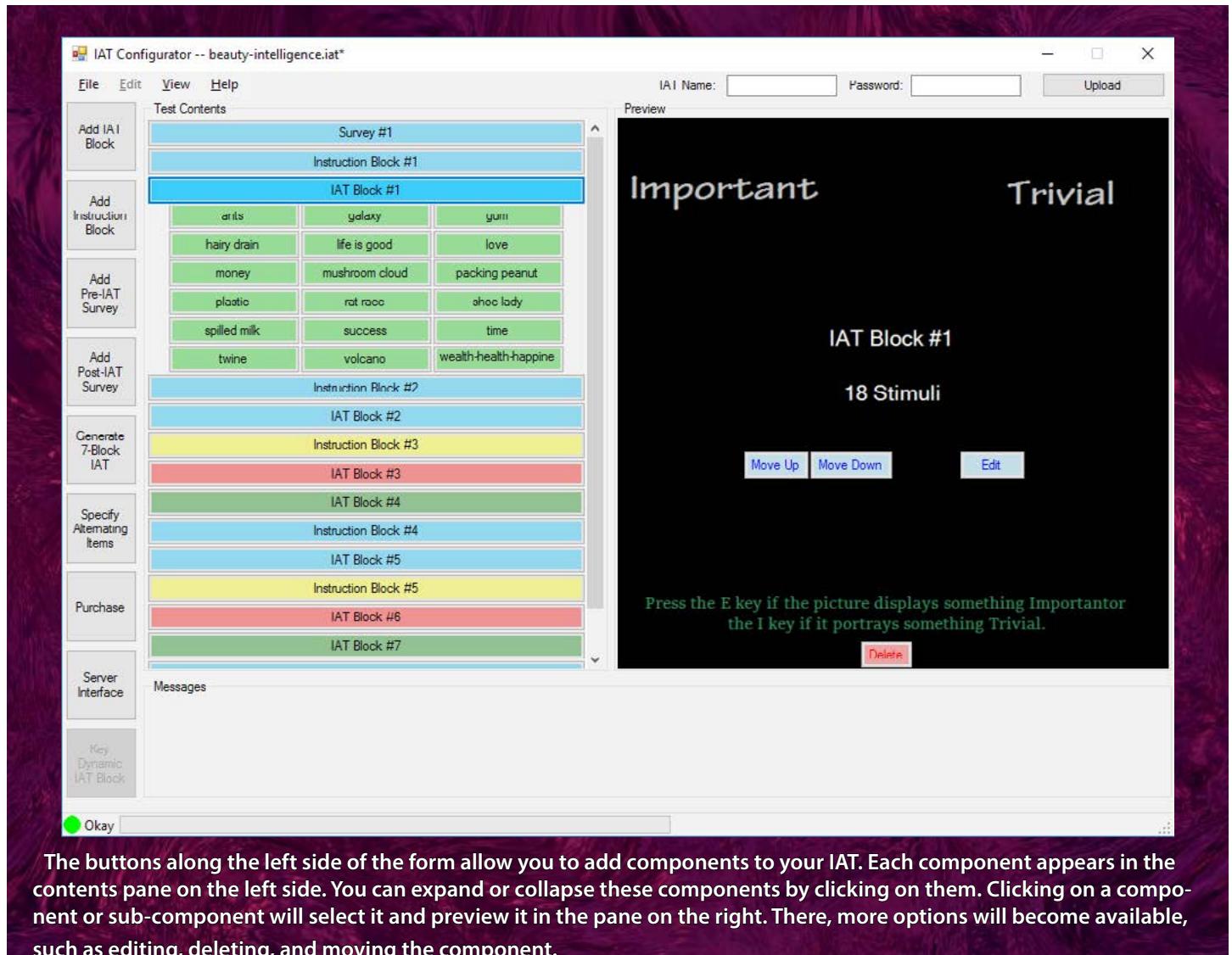
If you wish to denote a question as option, simply click the “Optional” rectangle. You may also click the “Format Text” rectangle for a variety of formatting options.

Add as many items as you’d like and then click Return to Contents. Now, to upload your IAT, simply enter a name that consists of alphanumeric characters and a password and click the Upload button. You will be prompted to enter a URL to redirect the test-taker to when the IAT is complete as well followed by a prompt asking if you wish to store your password to your computer’s registry. Your password is necessary to decrypt your result data as detailed elsewhere in this manual and is not stored on the server to insure your privacy. If you lose or forget your password, your data is lost. It is *strongly recommended* that you choose to save your password to the registry.

When you are ready to retrieve your data, open the server interface from the main form. Specific instructions can be found in the Server Interface section of the manual.

Main Interface

This is the form you will see when you first start the program. The main form is used to manage the components of your IAT, including adding and deleting surveys and blocks of stimuli and instruction screens. The main form also provides accessibility to the Server Interface which allows you to upload an IAT or to manage the IATs you currently have deployed on the server, performing tasks such as uploading and deleting IATs and retrieving test data. You can also specify which blocks of your IAT are transposed on alternate administrations by clicking the Specify Alternating Items button. Clicking the Generate 7-Block IAT button will open a form that will allow you specify two IAT blocks you have created manually that the program will use to generate a 7-Block IAT.



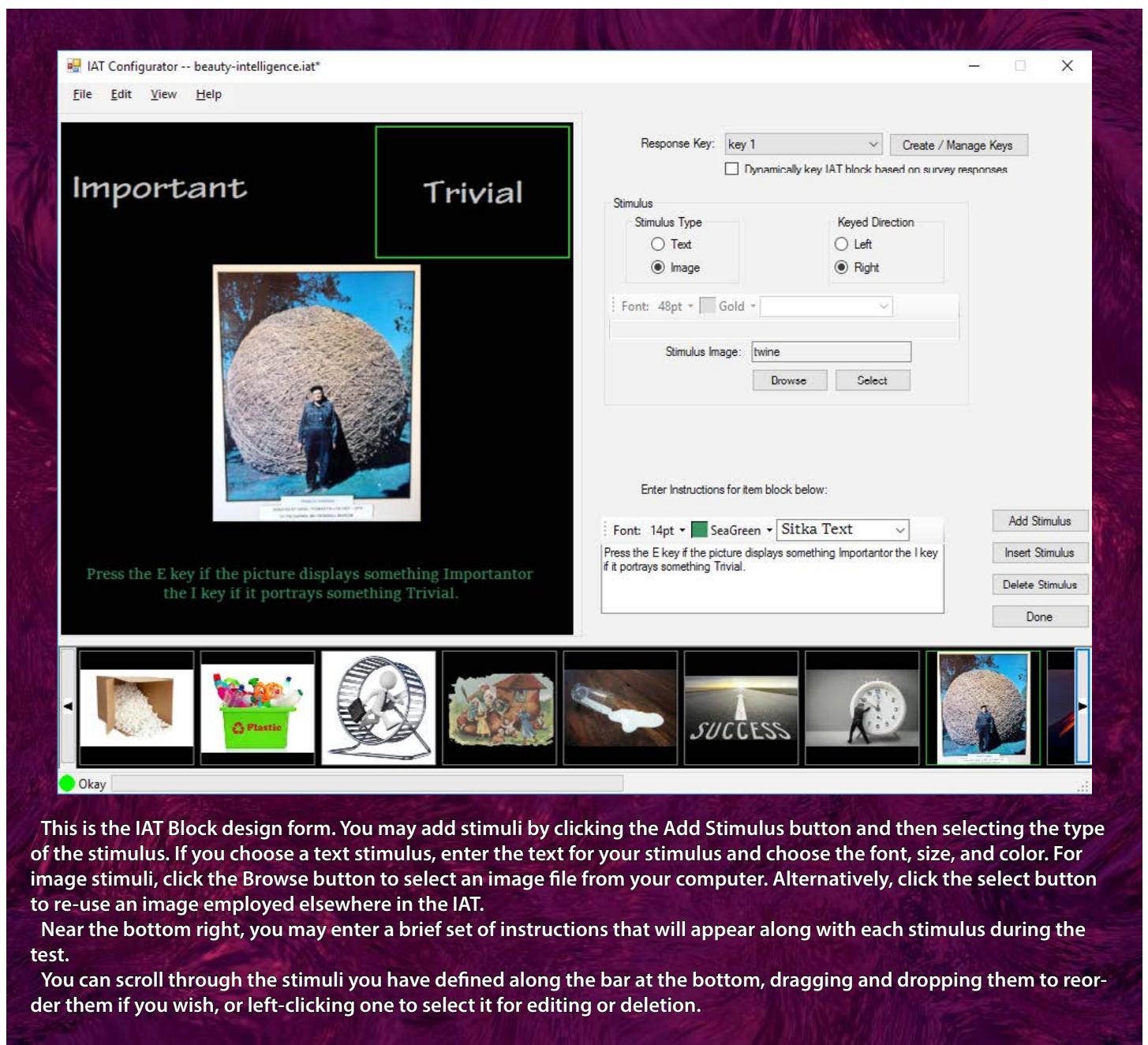
The buttons along the left side of the form allow you to add components to your IAT. Each component appears in the contents pane on the left side. You can expand or collapse these components by clicking on them. Clicking on a component or sub-component will select it and preview it in the pane on the right. There, more options will become available, such as editing, deleting, and moving the component.

Components that appear in a color other than blue are set to alternate with other components of the same color.

At the bottom of the form is a panel for error messages. If you do not completely define an element of your IAT, you will be unable to package it and an error message will appear here. Click on the error message to navigate to the source of the error and correct it.

IAT Block Design

A standard IAT consists of seven blocks. Of these seven blocks, only four are used in scoring. Blocks one and two consist of the initial presentation of the stimuli from each category to the user. Block five repeats the group of stimuli in block two, transposing the two response key values in the upper-left and upper-right corners of the test window. In blocks three, four, six, and seven, the stimuli from both categories are intermixed. Blocks three and four contain different pairings of the response keys from blocks one and two than do blocks six and seven. It is through these two different pairings of the response keys that it is possible to determine bias.



This is the IAT Block design form. You may add stimuli by clicking the Add Stimulus button and then selecting the type of the stimulus. If you choose a text stimulus, enter the text for your stimulus and choose the font, size, and color. For image stimuli, click the Browse button to select an image file from your computer. Alternatively, click the select button to re-use an image employed elsewhere in the IAT.

Near the bottom right, you may enter a brief set of instructions that will appear along with each stimulus during the test.

You can scroll through the stimuli you have defined along the bar at the bottom, dragging and dropping them to re-order them if you wish, or left-clicking one to select it for editing or deletion.

Once you have finished adding stimuli to your IAT block and keying them, click the Done button to return to the main form. It is usually only necessary to create the first two blocks of your IAT and then click the Generate 7-Block IAT button in the main window to generate the remaining five.

Later on in the IAT design process, when you package your IAT, you will be asked how many stimuli you wish to present to the test taker in each block. The standard values are 10 stimuli in blocks one, two, three, five, and six and 20 stimuli in blocks four and seven. Again, you may specify any values you wish but it is these values which have been proven to produce the most meaningful results. The stimuli that are presented are chosen randomly from the pool of the stimuli for each block, as if the stimuli for each block were tossed into a hat and one stimulus was removed at a time, presented to the test-taker, and then tossed back in the hat.

Response Keys

Response keys are the sets of categories stimuli are associated with. Each response key consists of two values, one that appears in the upper-left corner of the test window and one that appears in the upper-right. There are three types of response keys that you will utilize in the design of your IAT, though if you are creating a traditional 7-block IAT, you will only have to deal with one of these types.

Simple Response Keys are utilized in blocks one and two of the IAT. These are the blocks in which you present your stimuli to the test taker to familiarize him or her with them. They are to categorize each stimulus with one of the two response key values.



Above is a stimulus that the test taker should associate with the response key "Flower." The test taker will not see the green outline around the correct response. If the flower stimulus appears in block two of the IAT, it will appear again in block five with the response key values in the upper-left transposed with the response key in the upper-right.

Suppose the picture on the left is an item block two. Then its response key is a Simple Response Key, which you must define using the Response Key Form. The picture on the right is then from block five of the IAT. Its response key is a Reversed Response Key. It is not necessary to manually create response keys, though you may. The others are generated by the program when you click the Create 7-Block IAT button on the Main Form.

Combined Response Keys are a product of either two Simple Response Keys or a Simple Response Key and a Reversed Response Key. Though it is possible to create a Combined Response Key that is the product of two Reversed Response Keys, this is of no use in a traditional 7-Block IAT.



In the two pictures above, you see examples of Combined Response Keys. These appear in blocks three, four, six, and seven of the IAT. Suppose the flower comes from a group of images of flowers and insects that the user categorizes as Flower or Insect as the images appear. Then suppose a second set of stimuli exists which the user categorizes as Good or Bad. Then these response keys would be used in those four blocks of the IAT to measure bias. If the test taker associates Flower with Good, he would likely respond correctly to the item on the left faster than to the item on the right.

Combined Response Keys can be created by conjoining any two Simple Response Keys or Reversed Response Keys with a conjunction, usually "or." As with Reversed Response Keys, it is not necessary to manually create Combined Response Keys, though you may. They are typically generated automatically by the program when the Generate 7-Block IAT button is clicked on the Main Form.

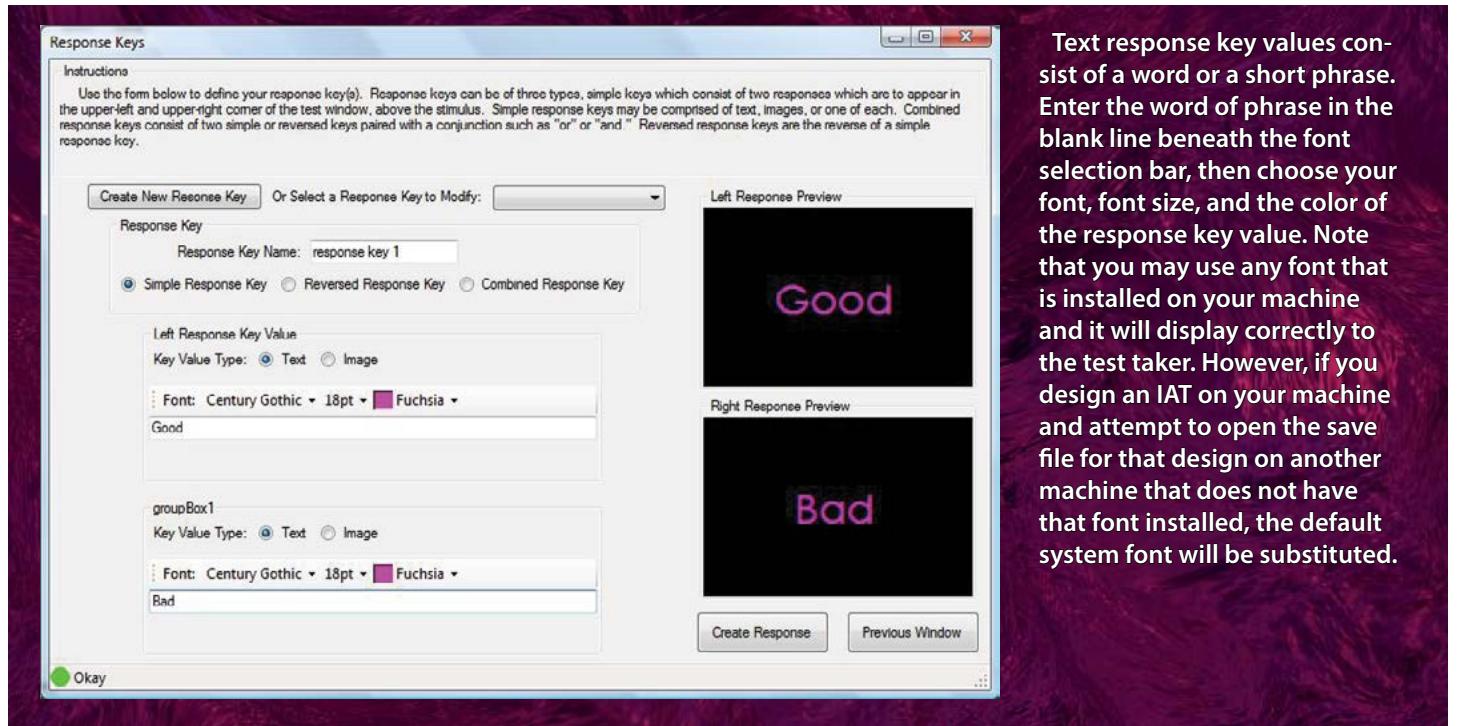
Creating Response Keys

The Response Key form is accessible from the view menu and also via the Create / Manage Keys button within the IAT Block design window.

Simple response keys consist of two values, either text or images. These values appear in the upper-left and upper-right corners of the IAT during administration. Response keys vary from one IAT block to another. Each IAT block must be assigned a response key. Simple response keys are comprised of two values, one that will appear in the upper-left corner of the IAT window and one that will appear in the upper-right corner. These values may be text, or they may be images.

Response Keys

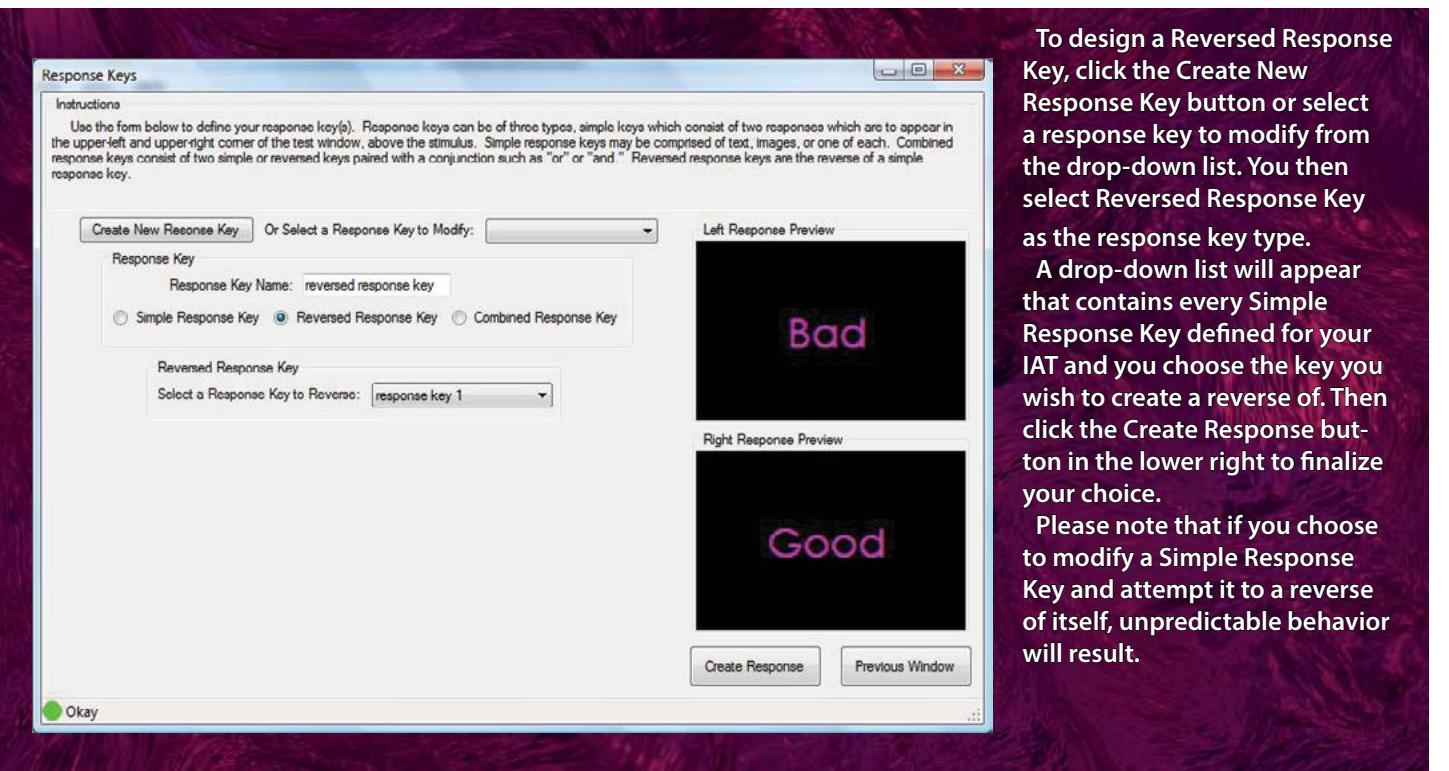
Response Keys



For most IATs, you will use text response keys, but in some instances an image conveys a more robust meaning to the test taker than a word. For instance, if you were attempting to measure attitudes towards different nations, you might wish to use images of national flags. Images will consume the entirety of the response key area when added to a simple response key but are automatically sized later in the design process when incor-

Text response key values consist of a word or a short phrase. Enter the word or phrase in the blank line beneath the font selection bar, then choose your font, font size, and the color of the response key value. Note that you may use any font that is installed on your machine and it will display correctly to the test taker. However, if you design an IAT on your machine and attempt to open the save file for that design on another machine that does not have that font installed, the default system font will be substituted.

Reversed response keys are the reverse of simple response keys, meaning the response key value in the upper-left corner is transposed with the response key value in the upper-right corner. In a traditional 7-Block IAT, it is by reversing one of the response keys and then incorporating that reversed response key into combined keys that you achieve meaningful results. You can generate a reverse of any simple response key. It is not possible to directly generate the reverse of a combined response key as current theory does not indicate a reason to do so, yet it is possible to create a combined key that consists of two reversed keys.



To design a Reversed Response Key, click the Create New Response Key button or select a response key to modify from the drop-down list. You then select Reversed Response Key as the response key type. A drop-down list will appear that contains every Simple Response Key defined for your IAT and you choose the key you wish to create a reverse of. Then click the Create Response button in the lower right to finalize your choice.

Please note that if you choose to modify a Simple Response Key and attempt it to a reverse of itself, unpredictable behavior will result.



When selecting images, you may browse for images on your computer by clicking the Browse button or use an image that has been utilized elsewhere in the IAT by clicking the select button. When the select button is clicked, an image browser will open that contains thumb nails of all images used so far in the IAT currently being worked upon.

Combined response keys are typically used in blocks 3, 4, 6, and 7 of the IAT. There is no need to create your own combined response keys if you are creating a traditional 7-block IAT. You may simply create the first two blocks of the IAT and then click the generate a seven block IAT from the main form. This process will generate blocks 3, 4, 5, 6, and 7 as well as creating the response keys for these blocks. In the event you are using your own IAT design, you may create your own combined response keys using this option on the Response Key form. You may also use this form to modify combined response keys generated by the program. By default, the word "or" is used to cojoin the response keys from blocks one and two in the construction of the combined response keys for the other blocks. That will obviously remain unchanged in most circumstances, but you might wish to change the color, font, or size of the conjunction. You may also change the padding above and below the conjunction. When response keys are generated upon clicking the Generate 7-Block IAT button, their names take the form, "Generated Response Key #1," "Generated Response Key #2," etc. Five such keys will be generated, one for each block produced by the process, even though the response keys for blocks three and four will be identical, and likewise with the response keys for blocks six and seven.

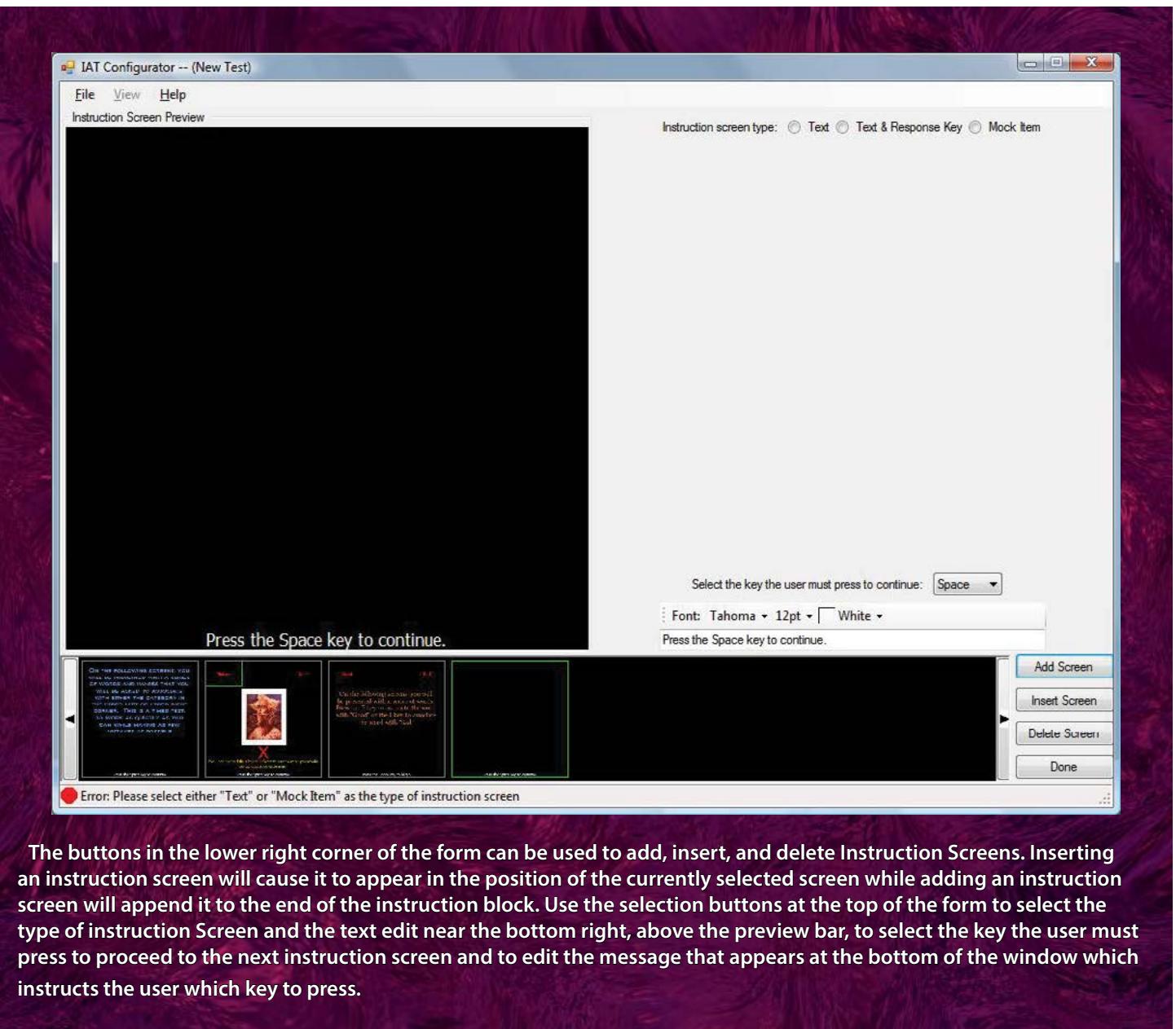
If you use images as the values for a simple response key, then when this is incorporated into a combined response key, these images will be shrunk to accommodate the space available. This will result in the image in the simple response key being shrunk as well. This is done to ensure the consistency of what is presented to the test taker. If you later either delete the combined response keys that simple key is incorporated or remove that simple key from those combined response keys, the images in the simple key will return to their original size.

Response Keys



Instruction Screens

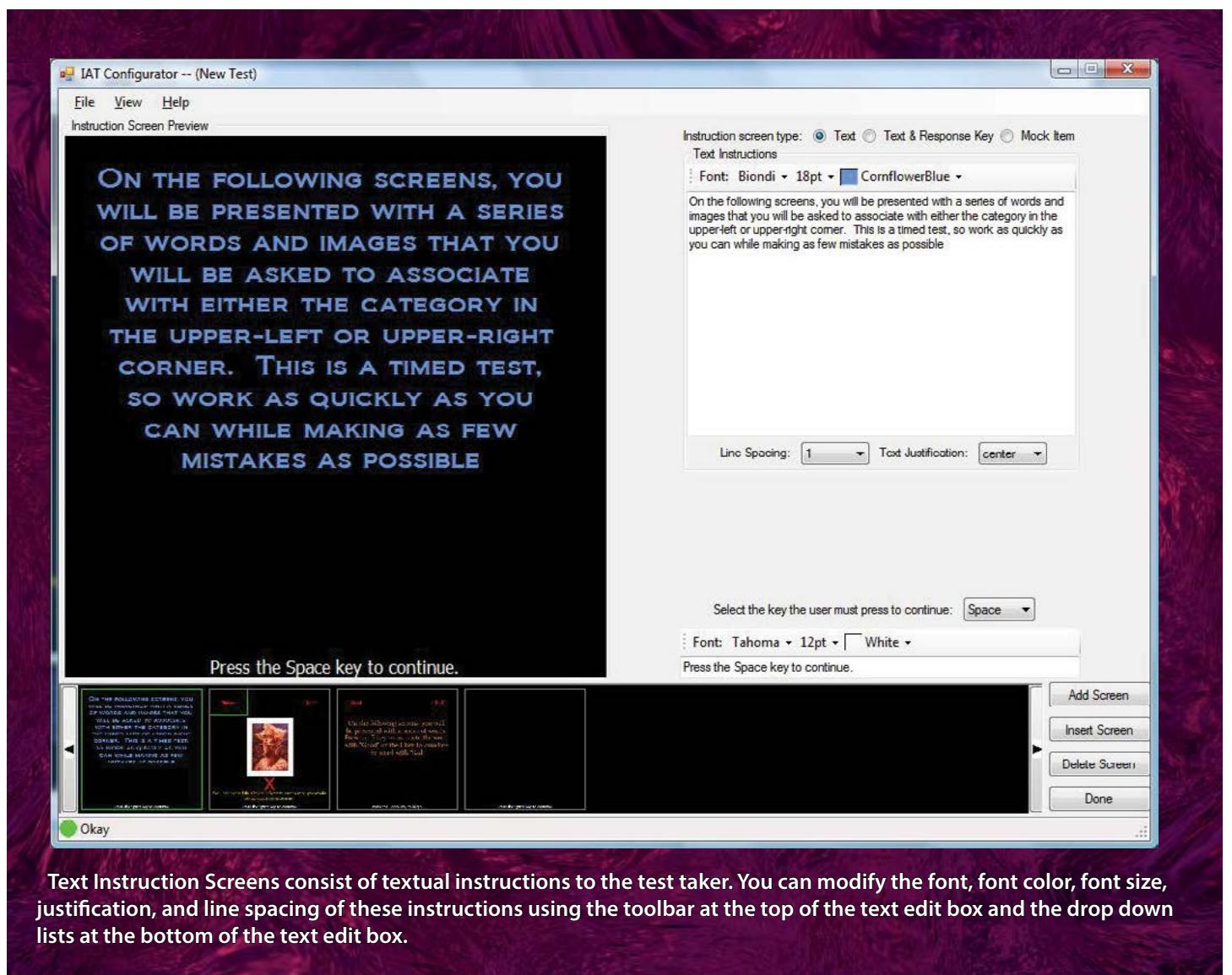
Blocks of instruction screens can be inserted into the IAT. These instruction screens can appear before or after any block of stimuli. Instruction screen blocks can be set to alternate with the blocks of the IAT (in a traditional 7-block IAT, blocks #3 and #4 are transposed with blocks #6 and #7 on alternate administrations.) Instruction screens fall into three categories: Text Instruction Screens, Key Instruction Screens, and Mock Item Instruction Screens.



Along the bottom of the screen, you will see previews of all the instruction screens you design. You can scroll through these previews by clicking on the left and right arrow buttons at either side of the preview strip. You can also drag and drop these previews to reorder them. Blocks of instructions typically appear before blocks one, two, three, five, and six. To force the instruction blocks that appear before blocks three and six to be transposed on alternate administrations along with the subsequent two IAT blocks, click the Specify Alternating Items button on the main form. Instructions for specifying alternating items can be found on page 29.

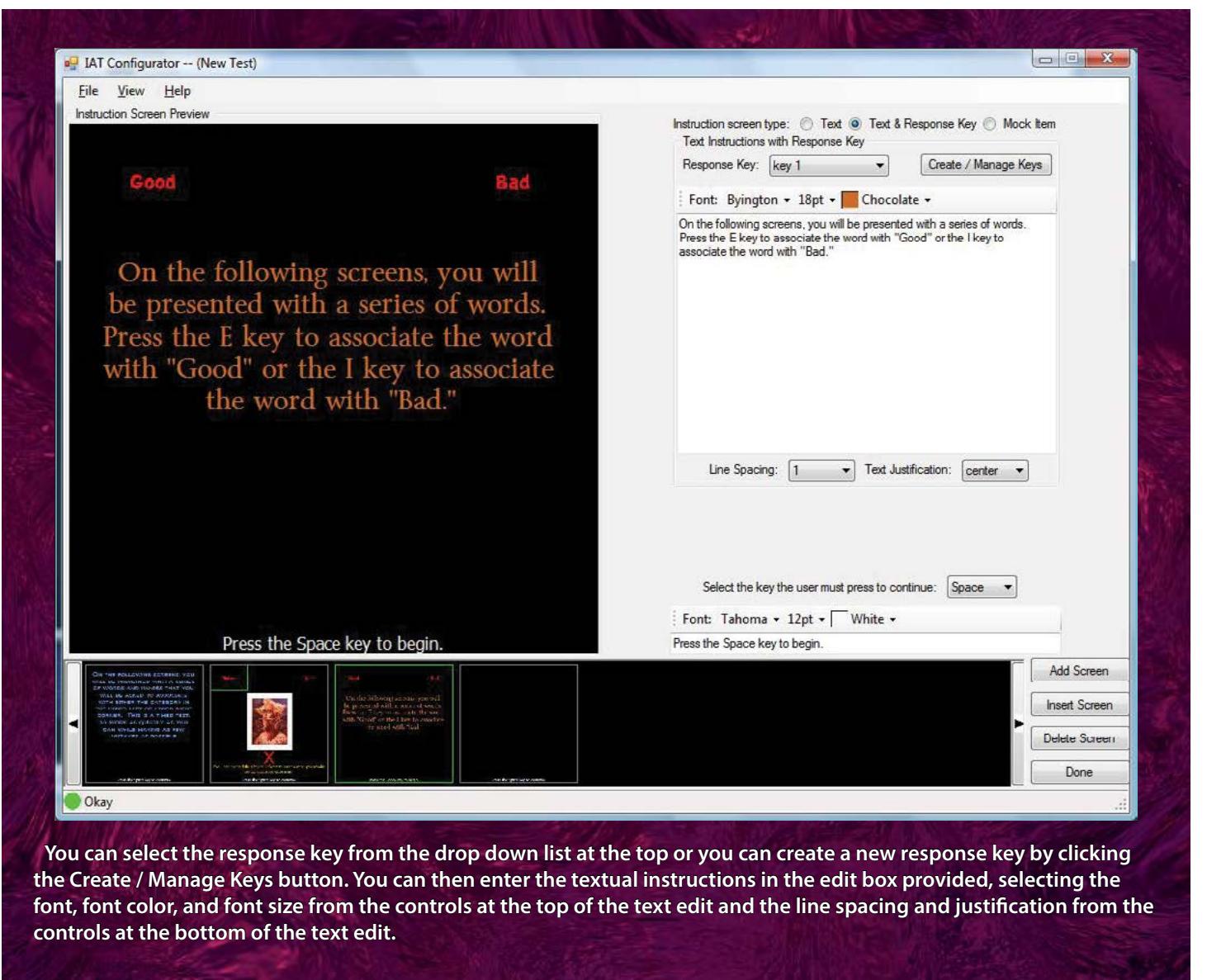
Instruction Screen Types

Text Instruction Screens



Text Instruction Screens consist of textual instructions to the test taker. You can modify the font, font color, font size, justification, and line spacing of these instructions using the toolbar at the top of the text edit box and the drop down lists at the bottom of the text edit box.

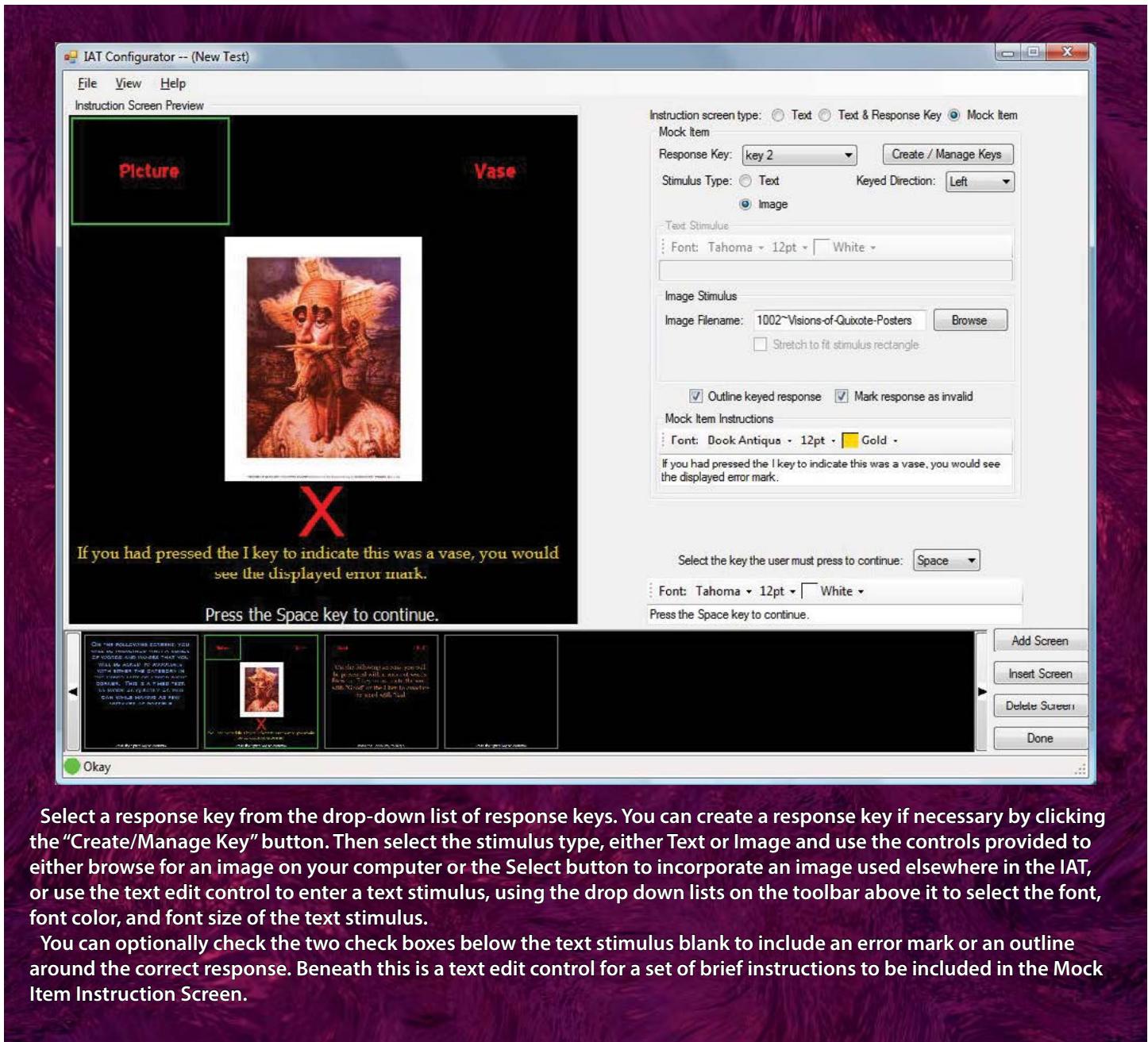
Keyed Instruction Screens



You can select the response key from the drop down list at the top or you can create a new response key by clicking the Create / Manage Keys button. You can then enter the textual instructions in the edit box provided, selecting the font, font color, and font size from the controls at the top of the text edit and the line spacing and justification from the controls at the bottom of the text edit.

It is a good idea to include at least one keyed instruction screen before each change in response keys that occurs in the program. So, before blocks one, two, three, five, and six, you will want to have a Keyed Instruction Screen informing the test taker what is expected of him or her during the next portion of the test. As blocks three and four are transposed with blocks six and seven of the IAT on alternate administrations to balance the test, you will need to manually set up the keyed instruction screens that precede those blocks to alternate on alternate administrations as well. For information on how to do this, see Alternating Items on page 26.

Mock Item Instruction Screens



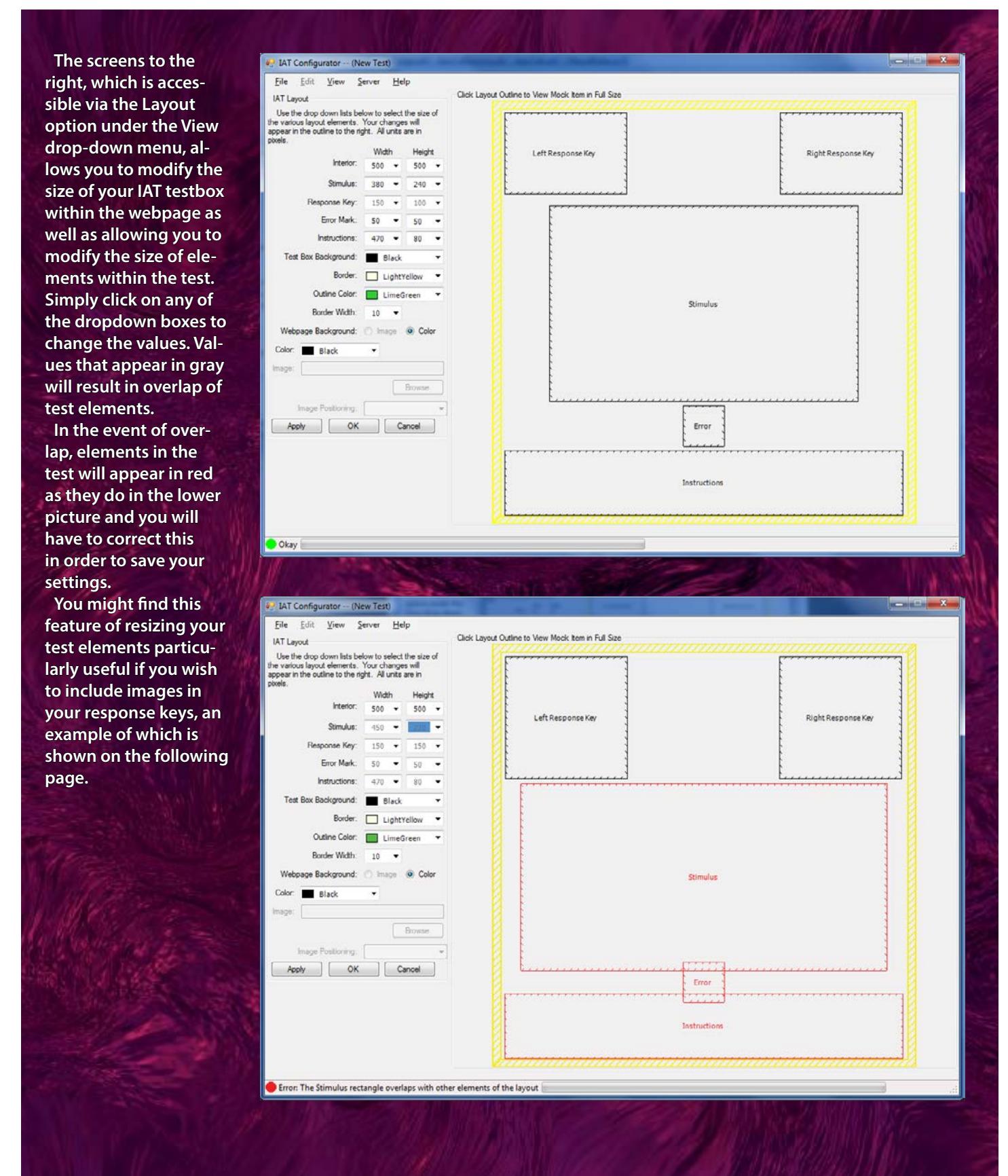
Select a response key from the drop-down list of response keys. You can create a response key if necessary by clicking the "Create/Manage Key" button. Then select the stimulus type, either Text or Image and use the controls provided to either browse for an image on your computer or the Select button to incorporate an image used elsewhere in the IAT, or use the text edit control to enter a text stimulus, using the drop down lists on the toolbar above it to select the font, font color, and font size of the text stimulus.

You can optionally check the two check boxes below the text stimulus blank to include an error mark or an outline around the correct response. Beneath this is a text edit control for a set of brief instructions to be included in the Mock Item Instruction Screen.

The screens to the right, which is accessible via the Layout option under the View drop-down menu, allows you to modify the size of your IAT testbox within the webpage as well as allowing you to modify the size of elements within the test. Simply click on any of the dropdown boxes to change the values. Values that appear in gray will result in overlap of test elements.

In the event of overlap, elements in the test will appear in red as they do in the lower picture and you will have to correct this in order to save your settings.

You might find this feature of resizing your test elements particularly useful if you wish to include images in your response keys, an example of which is shown on the following page.



Questionnaires

Surveys may be designated to appear before or after the IAT and may be specified to alternate from before the IAT to after it. This alternation, as well as the alternation of IAT elements is discussed elsewhere in Specifying Alternate Items. Surveys are added to the IAT on the main screen and editable through the Survey Form. A caption may be added to the survey by clicking the Include Survey Caption checkbox. The textual content of a survey caption may be set, and its font size. The color of the text, caption background, and the color and width of the border appearing at the bottom of the caption may also be set. The font of the survey caption cannot be set for the reason that surveys are displayed as HTML pages and it cannot be known with any certainty what fonts the end-user will have installed on his machine. What enables the font elements within the IAT to be set is that all text is stored as image data during the packaging process.

The survey design form contains a row of buttons on the right for adding items. To add an item, click on that item's response type and a question of that type will be appended to the end of the survey. Alternatively, to insert an item before the active question, click the Insert button in the top-right before clicking on the response type. The selected item is denoted by the green bars on either side of it. More than one item can be selected for a Cut/Copy/Paste operation. Questions can be collapsed or expanded by clicking the up or down arrows, respectively, in the box that appears around an item when you mouse over it.

Survey Response Types

True/False Items

The set that contains all sets that do not contain themselves does not contain itself. (Note: there is no correct answer to this question)

True
 False

These are items that consist of a statement that is answered as true or false. The statements need not be "True" and "False" but the true statement will always have a response value of 1 and the false statement will always have a response value of 0.

Likert Items

A bird in the hand is worth two in the bush.

1) I strongly disagree
 2) I disagree
 3) I somewhat disagree
 4) I neither agree nor disagree
 5) I somewhat agree
 6) I agree
 7) I strongly agree

Reverse Scored

Include Survey Caption

Designate Unique

Edit Unique

Return to Contents

Add Choice

Likert items consist of a statement followed by a list of statements that describe the degree to which the test taker either agrees or disagrees with the statement, the extent to which the statement applies to the test taker, the frequency with which the statement holds true, etc. By default, Likert items contain the seven statements shown below. These statements can be modified by clicking on the text of the statement, they can be removed by clicking on the X button to the right of the statement, and more statements can be added by clicking the Add Choice button. The response value contained in the data file is indicated to the left of each statement. If you wish to reverse-score a Likert item, simply click the Reverse Scored checkbox. This will not modify the order of the statements. Instead, the numerical values associated with the statements will switch to a declining order so that the first response would have a value of seven and the last a value of one.

Multiple Choice Items

Which of the following is a tenant of Zen Buddhism?

1) Every man for himself.
2) You bring these things on yourself. I mean, they don't happen to me.
3) The idea is to avoid duality, not to see the dirt and the stone and the trees, but to see the mountain.
4) We attempt to discover in others the spiritual glamour we ourselves have cast upon them; we are invariably disillusioned and learn that they are, in themselves, barren and devoid of the charms which they owed in our minds to the association of certain ideas.

Multiple choice items consist of a question and a set of choices. Choices may be added by clicking the Add Choice button and choices may be removed by clicking the X button to the right of the choice. The text of the question and choices can be modified by clicking on it. In the resulting data files, multiple choice item responses will have a numerical value corresponding to the number of the choice selected.

Weighted Multiple Choice Items

Which of the following describes your level of religious faith?

-5 I resent God for a variety of reasons.
-3 I'm athiestistic to the point of fanaticism.
0 I'm a nonbeliever.
2 I attend church services occasionally, of my own volition.
5 I devoutly adhere to my faith.
7 My holy scripture is the ultimate truth.

Weighted multiple choice items are similar to multiple choice items except that, instead of recording the ordinal index of the choice the test taker selects in the result file, a weight assigned to each choice is recorded. You may add choices by clicking the Add Choice button, remove them by clicking the X button next to the choice, and assign weights by mousing over the values next to the choices and clicking the up and down arrows, or clicking in the box that appears when you mouse over the value and entering an integer with your keyboard.

Bounded length Items

Refute Emmanuel Kant's "Categorical Imperative" in fewer than 1000 characters.

The user will provide a text response that is bounded by the lengths below.

Minimum length of user response: Maximum length of user response:

Bounded length items consist of a statement or question followed by a text area where the testee may enter a response. You can specify the minimal and maximal length of the response by mousing over the values at the bottom of the item display and clicking the up and down arrows, or by clicking in the box provided and enter-

ing a numerical value with your keyboard.

Bounded Number Items

Enter the one real cubed root of 512.

The user will provide a numeric response that is bounded inclusively by the values below.

Minimum response value: Maximum response value:

Bounded number items consist of a statement or question followed by a text input where the testee may enter a numerical response. You can specify the minimal and maximal inclusive bounds of the response by mousing over the values at the bottom of the item display and clicking the up and down arrows, or by clicking in the box provided and entering a numerical value with your keyboard.

fixed # of Digits Items

What is your ATM pin?

The user will provide a numeric response that consists of the number of digits given below.

Number of digits:

These items consist of a statement or question followed by a text area where the testee may enter an integer response. You can specify the number of digits that the response consists of by mousing over the value at the bottom of the item and clicking the up and down arrow buttons, or by clicking in the text box that appears when you mouse over the item and entering the number of digits.

Date Response Items

Please prognosticate the date of your own death.

The user will enter any date that falls inclusively between the two dates shown below.

Enable start date Start date: October 12, 2010
 Enable end date End date:

January, 2011											
Sun	Mon	Tue	Wed	Thu	Fri	Sat					
26	27	28	29	30	31	1	2	3	4	5	6
9	10	11	12	13	14	15	16	17	18	19	20
23	24	25	26	27	28	29	30	31	1	2	3
Today: 10/12/2010											

These items consist of a statement or question followed by a text area where the testee may enter a date in MM/DD/YYYY format. You can specify a starting date and/or an ending date or neither by clicking on the "Enable start date" and "Enable end date" checks. Once a box has been checked, a date will appear to the right of the check box. Mousing over this date will cause a calendar to appear. You may click on a date or click the left and right arrows next to the month at the top to change months.

Regular Expression Items

What is your email address?

The user will enter a value that must match the regular expression given below.

Test value: me@myhost.net

Match

Regular expressions are a powerful tool for validating data. Their syntax is well beyond the scope of these help files, but you can use them to determine, for example, if the user enters anything from a correctly formatted email address to a palindrome, though the usefulness of the latter is dubious. These items consist of a statement or question followed by a text input where the user enters a statement. The user must enter a statement that matches the regular expression you supply in designing the item to proceed. Within the item design window, you may enter test values to check your regular expression syntax. In this example, the user is asked to input a valid email address. The syntax for this regular expression is “`.+@.+.+`” The period represents a non-whitespace character. The plus-sign following the period indicates that one or more of these is to appear. An asterisk instead of a plus sign would indicate zero or more are to appear. The at-sign is not a special character. So, “`.+@`” would indicate that one or more non-whitespace characters must appear, followed by an @. “`.+@.+`” would then indicate that one or more non-whitespace characters is to appear, followed by an @, followed again by one or more non-whitespace characters. The backslash is an escape character. It can appear before a special character, such as a . or * to indicate that the special character is to take on its literal representation. So, “`.+@.+\.`” indicates that one or more non-whitespace characters is to appear, followed by an @, followed by one or more non-whitespace characters, followed by a period. Adding a final “`.`” to the end indicates that this period is again to be followed by one or more non-whitespace characters.

Instructions

These are statements that do not require a response.

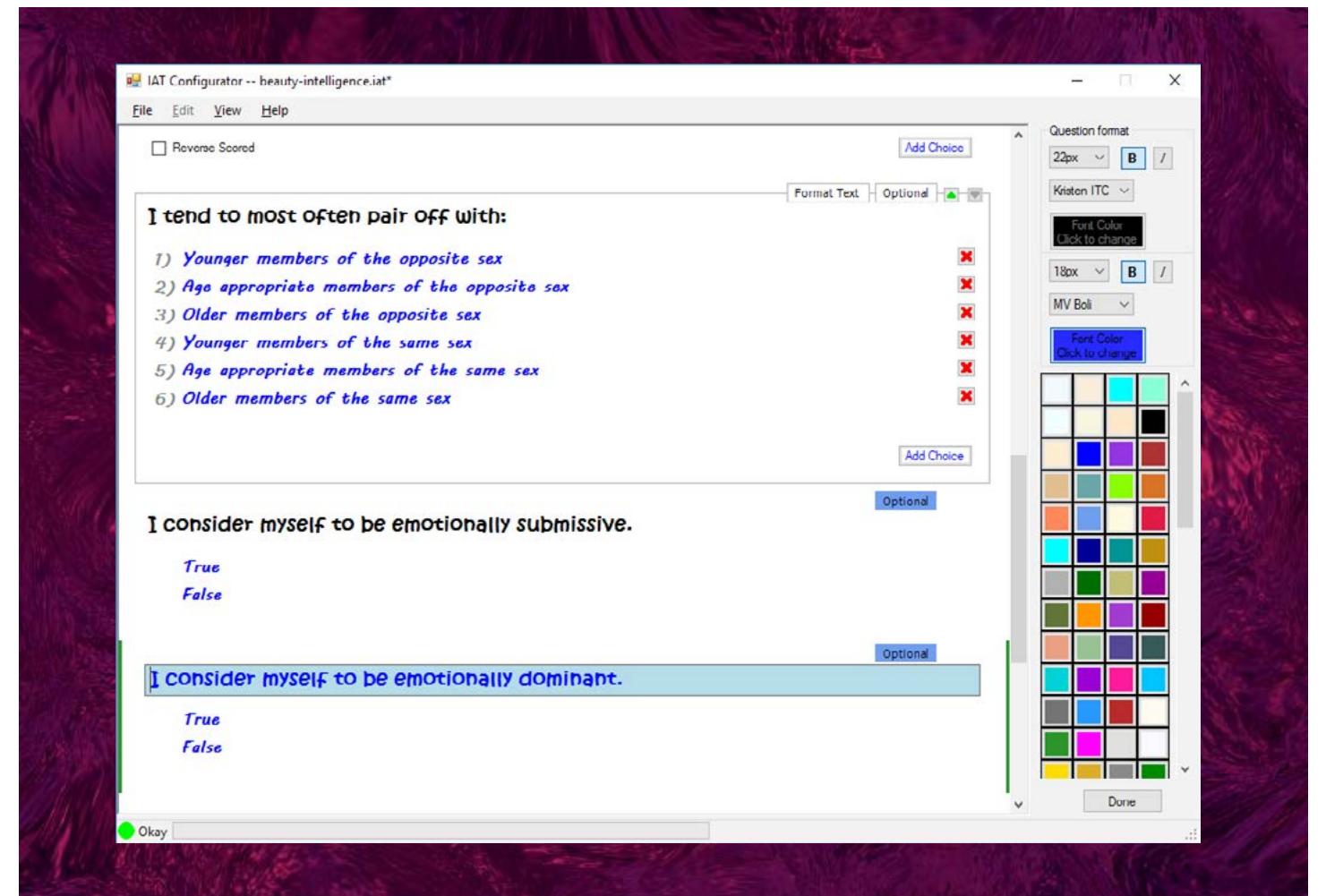
Other Questionnaire Features

It is possible to create questionnaires with time limits by entering a value in the “Time Limit” box. These questionnaire will automatically submit to the server after the given period of time has expired. All unanswered questions will be given a value of “null” in the results spreadsheet.

It is also possible to create a questionnaire item that requires a unique response from each test-taker. Only certain types of items can be chosen. You may supply a list of valid responses, each of which can then be used by only once, by one test taker. Optionally, you may omit this list of valid responses, which will ensure that each test-taker must supply a unique response but places no constraints upon the value of those responses.

You may also denote a questionnaire item as optional simply by clicking the “Optional” rectangle that appears when you mouse over the item. The rectangle should highlight in blue. Any result sets in which that do not include a reply to this question will read “Unanswered” in the result spreadsheet.

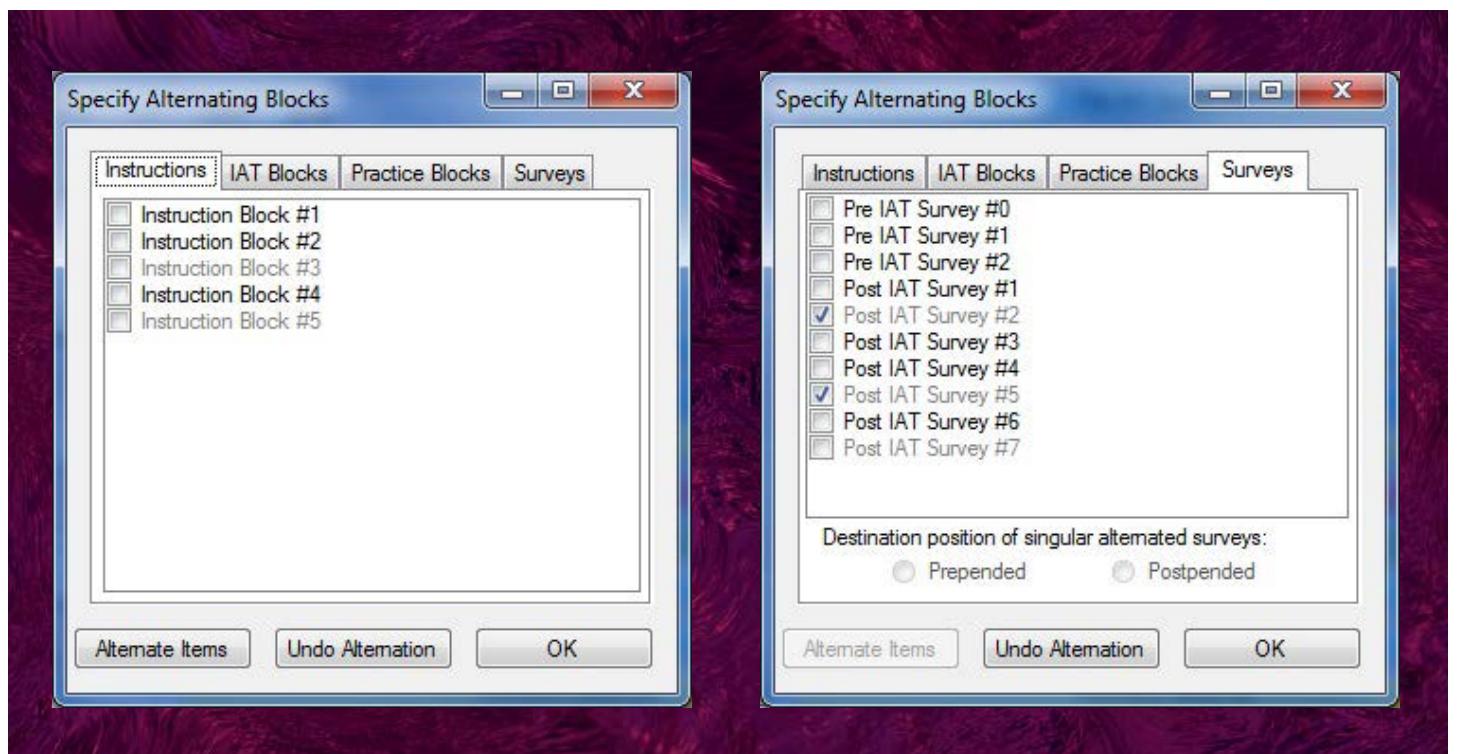
You may also format the text of your questionnaire items by click the “Format Text” rectangle that appears when you mouse over the question. The right-hand panel will be swapped out with a text formatting panel. You may choose from a small collection of fonts as well as font-sizes, font-colors, bold, italic, etc. Click “Done” to return to the questionnaire edit screen.



Alternating Items

In a traditional 7-Block IAT, blocks three and four are transposed with blocks six and seven on alternate administrations to balance the test. Because of this, if instruction blocks precede block three and block six, it is desirable to have these instruction blocks be transposed on alternate administrations as well. Perhaps, as well, you have a survey or set of surveys that you wish to alternate. This is accomplished via the following window.

Alternating Items



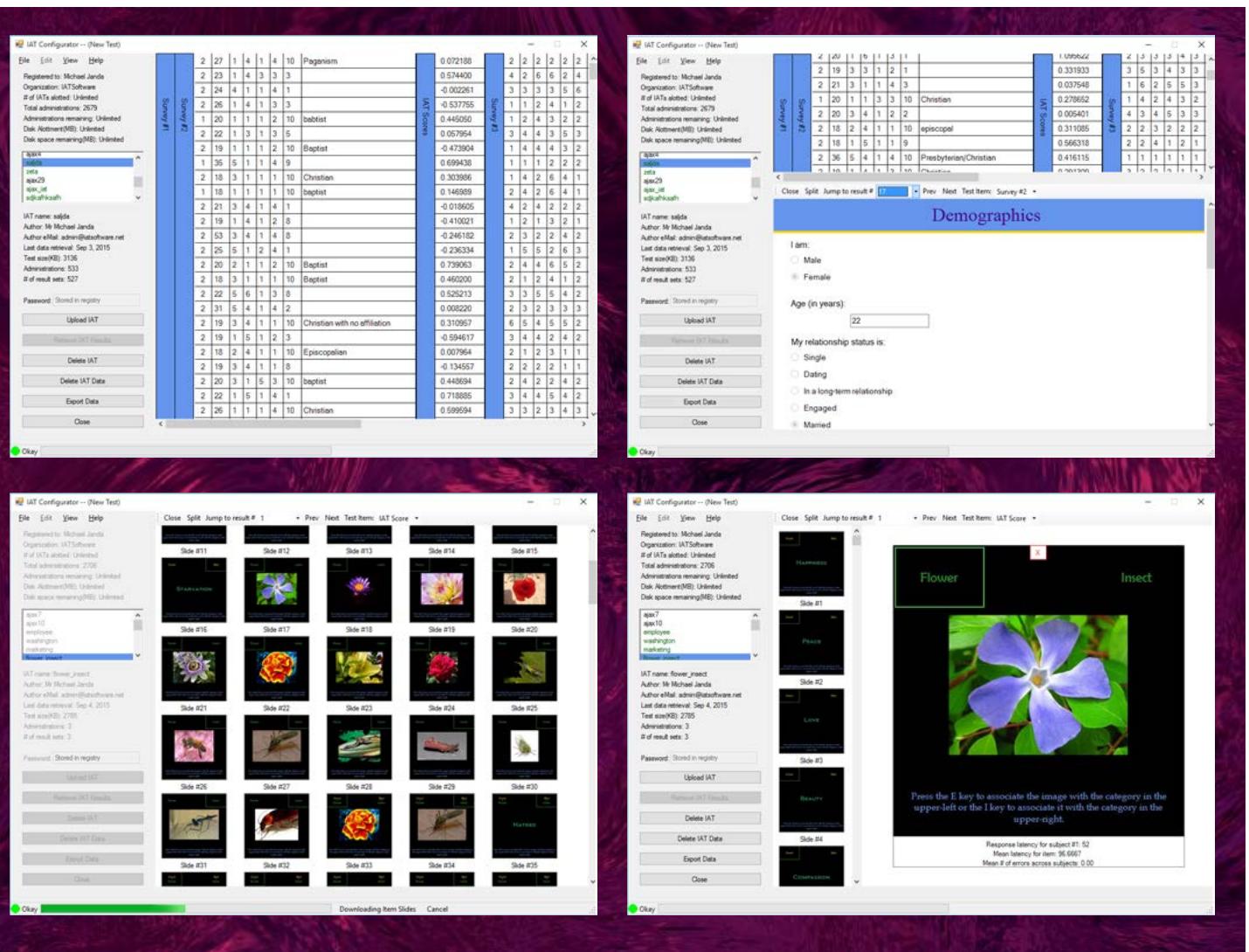
Above, you see two different tabs of the window wherein alternating items are specified. In the first are shown instruction blocks. To set two blocks of instructions to be transposed in order on alternate administrations, click the check box next to each instruction block and then click the Alternate Items button. Only two instruction blocks may be assigned to an alternation group, though multiple pairs of instruction blocks may be set to alternate, in which event each set of paired instruction blocks will be transposed in order on alternate administrations.

In the screen shot on the right, you see a list of surveys. Unlike instruction blocks, you may assign more than two surveys to be transposed with one another on alternate administrations of the IAT. In the event that more than two surveys are assigned to an alternation group, the surveys will be rotated in order, meaning that on the first alternation, the last survey will be administered first, followed by the first survey, and so on, until the next-to-last survey in the alternation group is displayed. The original placements of the surveys mark the positions the surveys in the alternation group will be rotated into. For example, if a non-alternated survey is originally administered as the second survey, it will always be administered as the second survey with the alternating surveys rotating about it. Also, it is possible to mark a single survey as alternating. This will cause it to appear before and after the IAT on alternate administrations. By default, singular surveys set to alternate will be postponed to the list of surveys at the opposite end of the IAT from the original placement of the survey. This can be changed so that the "self-alternating" survey is prepended to the list of surveys at the alternate end of the IAT from the original placement of that survey.

Server Interface

The server interface is used to manage the IATs you have on the server. With it, you can upload tests, delete tests, and retrieve result data. You can also use it to view usage statistics for each test you have on the server and your remaining allotted resources. To delete a test or clear the data for a test, select it in the pane on the left and then enter your password for the test if you chose not to store it in your computer's registry or are using a different computer. Next, click either the "Delete IAT" or "Deleted IAT Data" button. If you supplied the correct password, you should be prompted for confirmation and notified that the operation was successful.

To retrieve your result data, select your test and, again, enter the password if you did not store it to your computer's registry. Click the "Retrieve IAT Results" button. The data should download from the server and appear in the preview pane to the right. Retrieving your IAT data will not delete it from the server.



Above you see the various ways to preview your results. When the data has been completely downloaded, you can then export it to a Microsoft Excel file. This process can be lengthy, taking ten or more minutes on slower computers with large result sets, so please be patient. You will be notified when your spreadsheet file is ready.

DATA ENCRYPTION

We understand that the privacy of participants is essential to research. To ensure that your data is not compromised, it is stored in an encrypted form on the server. The encryption mechanism ensures that, even should someone — including the administer — have full access to the server, your data is still private. To accomplish this, you are asked to supply a password when you upload your IAT. This password is not stored on the server in any form and your data cannot be retrieved without it.

When you upload your IAT, you are given the option of storing your password in your own computer's registry, a place where programs can store small quantities of information. It is highly recommended that you do so to avoid losing it. If you do lose your password, your data cannot be accessed and is lost forever. This is necessary to ensure the privacy of your data, and accomplished with a combination of encryption schemes known as DES and RSA.

DES is a standard encryption algorithm that was devised many years ago. While it is not the strongest form of encryption available, the algorithm is secure and it is impossible to break DES encryption except through a brute force approach unless a person has a segment of encrypted data and the corresponding segment of decrypted data. DES encryption ciphers are not passwords. They are, in this instance, an eight byte key and an eight byte initialization vector. What most people don't understand about encryption is that any key supplied will yield an output. The encryption algorithm takes the two eight byte segments of data and performs the decryption where the key data is correct or not. If it is correct, the algorithm will output the decrypted data. If it is not, the algorithm will output garbage. The brute force approach is to try all combinations of these sixteen bytes of data (there are 340282366920938463463374607431768211456) and examine the output to determine whether that output is the decrypted equivalent of the encrypted data. This can be made easier if you know the format of the decrypted data. Suppose you know the decrypted data represents a PDF file. Then you could write a relatively simple computer program to interface with Adobe's PDF reader to separate out all valid PDF files. But your data on the server is not in a widely recognized format such as a Microsoft Word document or Jpeg image, so this is not possible.

RSA encryption is used for establishing secure transmissions over the internet. It's a form of asymmetric encryption known as public key encryption that allows two computers to agree on a shared cipher they will use for traditional encryption such as DES, which uses the same cipher both to encrypt and decrypt data. This is a difficult problem, arranging for a cipher to be shared between two computers over a non-secure connection. One answer is RSA. An RSA encryption key consists of a public key and a private key. The public key can encrypt data, but not decrypt it. Conversely, the private key can decrypt data but not encrypt it. If one computer needs a secure connection to another, it creates both a public and private key. It then sends its public key over the non-secure network. The second computer randomly generates a cipher for an algorithm such as DES or AES and then uses the public key to encrypt it. It sends the encrypted cipher back to the first computer which then uses the private key that never passed over the network to decrypt the cipher. Then both computers have the same shared cipher. Why not simply use RSA encryption alone? First, it's very computationally complex, meaning it demands much more processing power than standard encryption algorithms. Second, RSA encryption cannot be used on large quantities of data. The RSA algorithm used with IAT Design cannot encrypt more than 256 bytes of data at a time. Third, RSA encryption can be broken. Though it can be broken, it's still used to secure credit card transfers over the Internet. More detailed information can be found below.

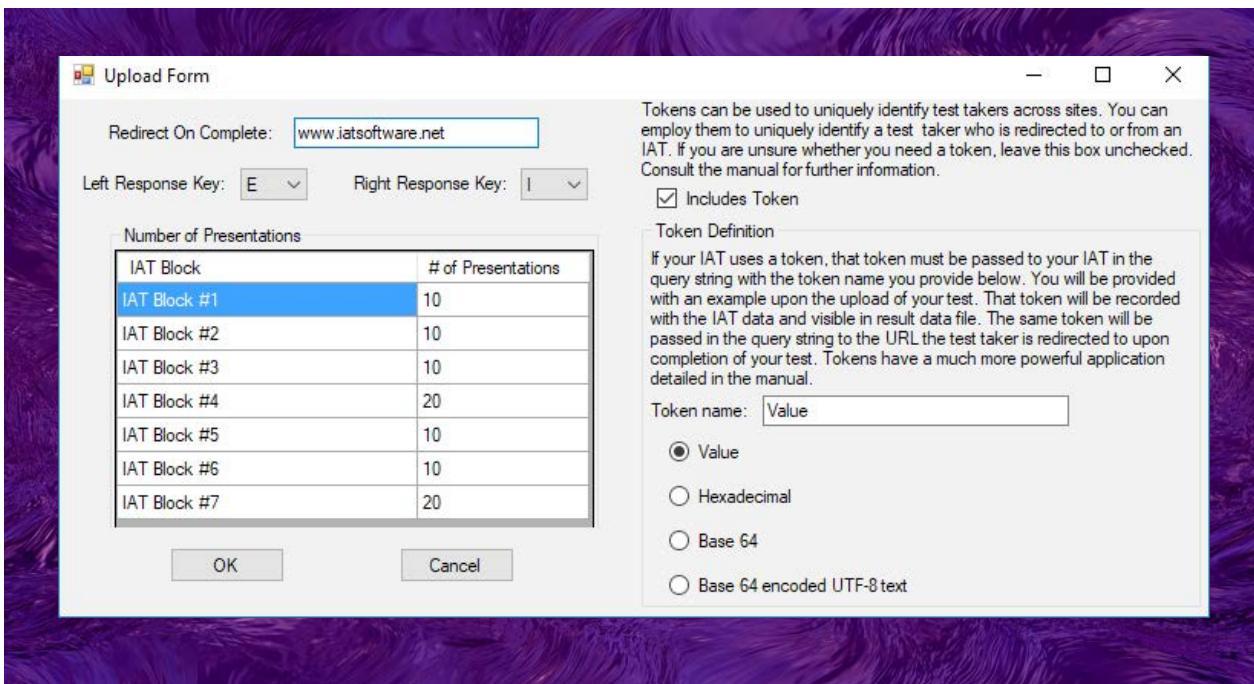
The password you enter when you upload your IAT is transformed through bit manipulation into 16 bytes overwhelmingly likely to be unique to your text password. This constitutes a DES key. The algorithm for generating it doesn't vary, so when you enter your password to retrieve your IAT result data, provided the same password is entered, the same DES key will be generated. When an IAT is uploaded, an RSA public/private key pair

is generated and the entirety of it is encrypted with the DES cipher generated from the supplied text password. The encrypted RSA key is transmitted to the server, but the DES cipher that could be used to decrypt it is not. The public portion of the RSA key pair, the key that can encrypt but not decrypt, is transmitted to the server as well in a non-encrypted form, though the connection with the server itself is secure. The server stores the unencrypted public key and the encrypted public and private key in the database. When a test taker's results are sent to the server, the server randomly generates a 16-byte DES key and initialization vector and uses them to encrypt the result data, then it uses the public RSA key to encrypt the DES cipher. It stores the randomly generated DES key that was used to encrypt the result data, after encrypting it with the RSA public key, to the database along with the encrypted result data. When you enter your password to download your IAT, the algorithm mentioned at the start of this paragraph will generate the same DES key that it used to encrypt the randomly generated RSA key before sending it to the server. The encrypted RSA key is returned from the server and decrypted with the DES cipher derived from your password. You now have access to the private portion of the RSA key, which can decrypt, that your computer generated when you uploaded the IAT. When the result set is processed, this private key is used to decrypt the DES ciphers the server used to encrypt the result data. They cannot be decrypted on the server because it only has the public portion of the RSA key pair available to it. Each result set has its own encrypted DES cipher. The private key is used to decrypt each, and then these decrypted DES ciphers are used to decrypt the corresponding result set. This is how your data is kept private.

RSA encryption begins with two very large random prime numbers. Large numbers can be tested for primality in a number of ways. One method is the Miller-Rabin primality test. It's computationally inexpensive, much less so than attempting to factor the number. For each pass through the Miller-Rabin primality test, there is a 50% chance the algorithm will reject the number, in which case the number is not prime, or accept it. In other words, the odds that the number is not prime are cut in half each time it passes the test. After 100 iterations, the odds that the number is not prime are 1 in 2100. Through methods such as this, two prime numbers are chosen that are each 1024 bits or very slightly fewer in length. These numbers are multiplied together to form the modulus of the RSA key. The Euler Totient is then calculated which is simply $(p - 1) \times (q - 1)$ for two numbers p and q provided both are prime. The public key consists of the modulus and a public key exponent. The public key exponent is a value that is selected at random with one criteria, that it be coprime to the Euler Totient of the two prime numbers. In other words, the public key exponent, which need not necessarily be prime, cannot have any factors in common with the calculated Euler Totient, which is not prime. The private key is computed from this data, specifically from the Euler Totient and the public key exponent. The raw byte representation of data to be encrypted must have a numerical value less than the product of p and q. As a quick example, the byte 10000011 represents the number 131. Similarly, the two bytes 11111111 and 11011000 have a numerical value of 65,496 when strung together. The data to be encrypted is treated as a number in this fashion and is multiplied by itself public key exponent number of times, meaning the number would be multiplied by itself 65,537 times if the public key exponent were 65,537. Each time the multiplication takes place, if the result value is larger than product of p and q, the modulus, then it is divided by that modulus and the remainder of that division is substituted for the value, which continues to be multiplied by itself. This is how the data is encrypted. The data is decrypted by performing substituting the private key exponent for the public key exponent and performing the exact same process.

So, how can this encryption be broken? Well, the private key exponent is computed from the public key exponent and the totient of p and q. The modulus, which is part of the public key, is the product of p and q. So, if someone can factor the 2048-bit modulus into the two prime numbers that comprise it, they can compute the private key. Though this sounds like child's play, factoring a 2048-bit number takes so long that, even with modern computers, Internet sites will use the same public/private key pair for a full year before substituting another for it. This process, RSA, was first developed to transmit emails over the internet and was initially referred to as PGP, or pretty good privacy.

Tokens



Tokens are used to link test takers with data collected via your own site or app. In the following section, you'll see a more powerful use of tokens. When you upload your test, you are given the option of selecting a token. Links to tests that are uploaded typically take the form `http://www.iatsoftware.net/IAT?IATName={test name}&ClientID=###`. When you add a token, you supply a name and a type. The Value type is sufficient in almost every instance. A token of the value type may consist of any URI encoded data, which is to say an alphanumeric characters, underscores, hyphens, and characters escaped with a %. There's a handy java script function, `encodeURIComponent()` that can be used to ensure your token value will be accepted. When you elect to add a token, your test URL will take the form:

<http://www.iatsoftware.net/IAT?IATName={test name}&ClientID=###&{token name}={token value}>

This same token will be sent to the redirection link you specify upon test completion. For example, if you specify `www.example.com/test-complete`, the user will be redirected to:

<http://www.example.com/test-complete?{token name}={token value}>

The token name and values will be available in the result data along with other data collected for collation with data you might collect via other mechanisms. I cannot say whether this functionality can be implemented in tandem with other data collection programs without any programming know-how.

On-the-Fly Data Retrieval

The most powerful use of tokens is that they allow you to retrieve results for individual test-takers without using the test design program. This feature is invaluable for applications in which data collected with this software must be coupled with data collected in a mobile app or other website and processed as it is collected. To take advantage of this feature, you must possess some programming knowledge. I will try to explain the steps as simply as I can.

The mechanism the server uses to authenticate requests for data is known as OAuth. Even if you are familiar with OAuth, please keep reading. I implemented it as close to the standard as I could, utilizing explicit grants, but in the event there are discrepancies, reading the next few paragraphs would be time well spent.

The first step is to register your test for OAuth access. Navigate to the following link to do this:

<https://www.iatsoftware.net/OAuth/RegisterTest>

OAuth Registration

Complete the form below to register your test data for remote access. Your test password is not an will not be stored on the server. It will only be used for verification purposes. When you submit this form, you will be presented with a client id and a client secret that you will use to authenticate applications that connect to retrieve result data. Authentication is completed using the OAuth scheme.

product key – This is accessible via the Help→About drop-down menu in the test design program.

test name – The name of the IAT you wish to register.

test password – The password for that IAT.

redirect uri – The URI the server will redirect the client application to in response to an authentication request. The domain of this URI should lie on your server, not IATSoftware.net.

Allow explicit redirects to subpaths of redirection URL

Product key: ABCD1234WXYZ6789

Test name: flowers-Insects

Test password: 1234

Redirect URL: <http://www.example.com/do-auth>

You can retrieve your product key from Help drop-down menu in the test design app. The test name and password are those you specified when uploading your test. Your password is not stored on the server. It is merely used to verify that you should be permitted to register this test for remote result retrieval. The redirect URL should be a location on your server. You may select the check that any sub-paths of the URL you supply can be used as well, if you'd like. In the above instance, that would mean that <https://www.example.com/do-auth> would be the default redirect URL, but <https://www.example.com/do-auth/flowers-insects> could be specified to be used instead. For simplicity's sake, I'll suppose you did not select this option for now and return to it later.

OAuth Access

Below is the client id and client secret you will use to authenticate your application with the server. Also listed is the URL the server will redirect your application to in the first stage of authentication. You can revisit this page to change that URL later.

If you have any questions regarding OAuth or the RESTful interface used to retrieve data, feel free to contact me at the email address below. I will assist you as I can and provide links to further reading material.

Client Id: **1-flowers-insects:382f68ce4a0f34dd**
 Client secret: **secret:1fd36ee527769cd6320f26b19137315c**
 Redirect URL: **<http://www.example.com/do-auth>**

You will see a screen similar to this when you submit your test registration request. The client_id and client_secret both specific to this particular test. If you lose either, simply register the test again and you'll be provided with the same values. The client_secret should never be distributed, by which I mean it should absolutely not be included in a webpage and shouldn't even be embedded in a mobile app. OAuth is a three step process.

1) GET request should be issued to <https://www.iatsoftware.net/IAT/OAuth/RequestAuth>. The query string should contain a "client_id" parameter. If you'd like, you can also append a "state" parameter to the query string for your own use:

https://www.iatsoftware.net/IAT/OAuth/RequestAuth?client_id={client_id}
https://www.iatsoftware.net/IAT/OAuth/RequestAuth?client_id={client_id}&state={my data}

This request will not issue a traditional response (HTTP status code 200) but a redirect (HTTP status code 302) to the URL you specified during registration. In other words, if you were to enter one of the above addresses in your browser, you would not see a page returned by iatsoftware.net but rather the URL you specified, with the addition of a query string which includes a "code" parameter, your OAuth authentication code. In the above example, you would be redirected to one of the following URLs, depending if you provided a state parameter:

<https://www.example.com?code={authentication code}>
<https://www.example.com?code={authentication code}&state={my data}>

This step is necessary to ensure that the request for authentication was made by your server or a device you have authorized to make authentication requests. If there is an error, an appropriate HTTP response code will be returned with a short description of the error. Next, make a POST request to the same URL as before, <http://www.iatsoftware.net/OAuth/RequestAuth> of the following form.

https://www.iatsoftware.net/OAuth/RequestAuth?code={authentication code}&grant_type=code&client_id={client id}&client_secret={client secret}

As stated before, you should not put your 'client secret' in a webpage returned to the user's browser, so though it might be tempting to do this with an AJAX request, you should not. If all the information you supply is valid, the server will return the following JSON object:

```
{
  "access_token": "{access token}",
  "refresh_token": "{refresh token}",
  "token_type": "bearer",
  "expires": {expiration time in seconds}
}
```

At the time of this writing, access tokens have a lifetime of 20 minutes and refresh tokens have a lifetime of 24 hours. It is not anticipated that you will distribute your access token and process third-party refresh requests, but you may do so by making a GET request to:

https://www.iatsoftware.net/IAT/OAuth/Refresh?client_id={client id}&client_secret={client secret}&refresh_token={refresh token}&grant_type=refresh_token

The same object as that listed above will be returned. In either case, if there is an error, "access_token" and "refresh_token" will be set to "error", "token_type" will be set to "none" and an "error" entry will be present with a description of the error. Otherwise, you are ready to retrieve data. There are a few options. The first is how to make the request. You may put all the parameters in the query string or you may simply include the "access_token" and place the remaining variables in a JSON object to be passed as the request body. In the first case, you would use a GET request:

GET https://www.iatsoftware.net/IAT/Restful/RetrieveResult?access_token={access token}&test_name={test name}&test_password={test password}&product_key={product key}&token={test taker token}&results_format={results format}

Alternatively, you can use JSON:

POST https://www.iatsoftware.net/IAT/Restful/RetrieveResult?access_token={access token}

```
{
  "test_name": "{test name}",
  "test_password": "{test password}",
  "token": "{test taker token}",
  "results_format": "{results format}"
}
```

You likely noticed the "results_format" parameter. This parameter is optional, but can take one of three values, indicating the amount of data you want returned in the response. The default value is "ResultsSummary". The other two values are "DScore" and "FullResults".

For a good example of how to use the OAuth interface, click this link to download a simple HTML file:

<http://www.iatsoftware.net/samples/OAuthTestPage.html>

You might want to look at the java script contained in the .html, but at the very least, it would be useful to place this page on your server and set the redirect URL to it. Make the initial request to:

https://www.iatsoftware.net/IAT/OAuth/RequestAuth?client_id={client_id}

If you have set everything up correctly, you will be redirected to the sample page and can test result retrieval and, moreover, see what is sent to the server and the server responses.