

# DynaSearch User's Manual

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# Chapter 1

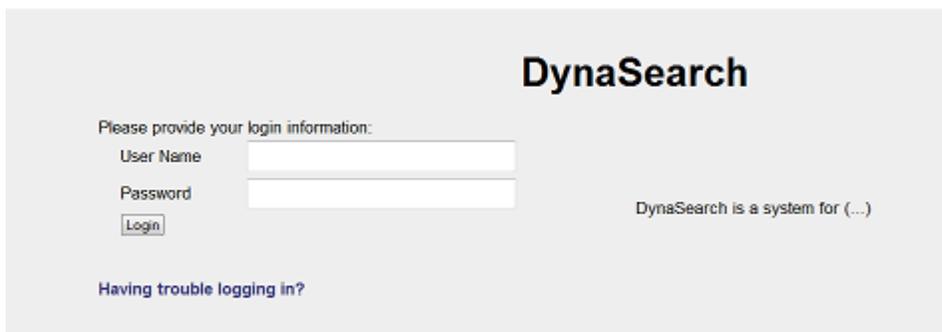
## Introduction

DynaSearch is a system that allows you to create experiments designed to test how users collect information. This is done by allowing users to click on specific buttons or areas of a window in order to display certain pieces of data. In order to accomplish this, DynaSearch provides you with the tools necessary build these pages in a web based environment. The rest of this document will explain these tools in greater detail, but in order to provide you with a picture of the end product, a short example of what can be created is detailed below.

### 1.1 A Short Example

#### 1.1.1 The Login Screen

All users should be provided with a user name and password so that they may login to the system. The login screen is displayed in Fig. 1.1.



The image shows a login screen for a system named "DynaSearch". The title "DynaSearch" is centered at the top in a large, bold, black font. Below the title, the text "Please provide your login information:" is displayed. Underneath this text, there are two input fields: "User Name" and "Password", each followed by a white rectangular text box. Below the "Password" field is a small button labeled "Login". To the right of the input fields, the text "DynaSearch is a system for (...)" is visible. At the bottom left of the screen, there is a link that says "Having trouble logging in?". The entire login form is set against a light gray background.

Figure 1.1: Users will start an experiment by logging into the DynaSearch system through the login screen.

### 1.1.2 The Size Registration Screen

In order to ensure that all users see screen elements of the exact same size, regardless of screen size and resolution, a size registration must first be performed. This is done by holding a real life credit card up to the screen and sliding the edges of the picture until it is the same size as an actual card. This screen is shown in Fig. 1.2.

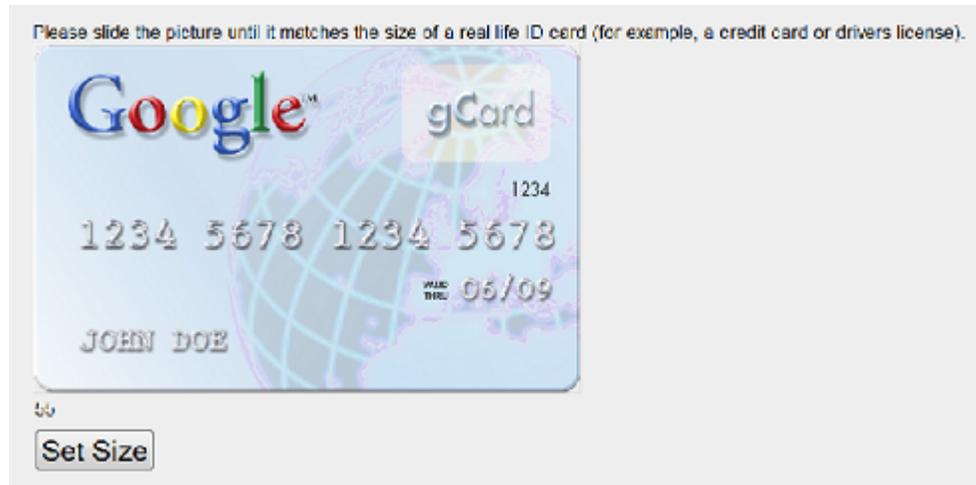


Figure 1.2: Users must first register the size of their screen

### 1.1.3 The Instruction Screen

Users can be supplied with supplemental information using the instruction screen. A sample instruction screen is displayed in Fig. 1.3.

### 1.1.4 The Training Screen

The training screen records the order and duration of user clicks. The user clicks on the screen in order to uncover certain pieces of information, whether it is a cell of a table or information drawn over an image. A sample training screen is displayed in Fig. 1.4.

### 1.1.5 The Survey Page

The survey screen allows the users to respond to specific questions designed by you. There are currently three question types available for use. A sample survey screen is displayed in Fig. 1.5.

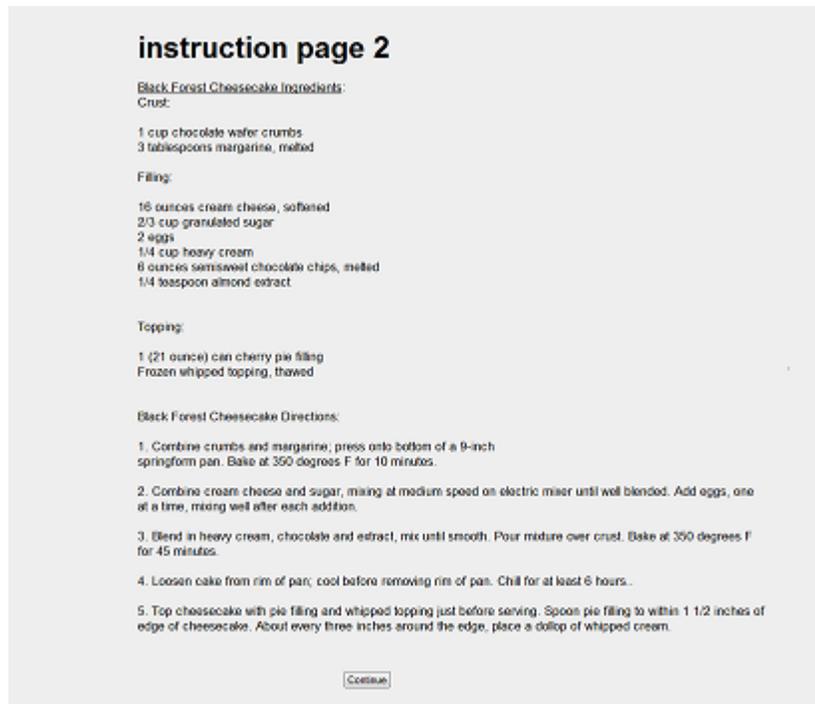


Figure 1.3: The instruction screen displays information for the users.

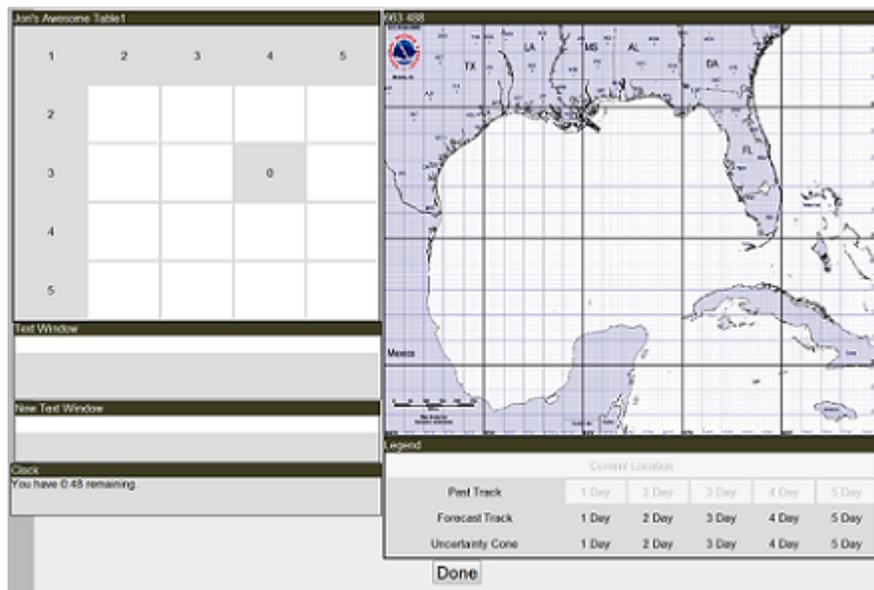


Figure 1.4: The training screen records information based on user clicks.

Please fillout the following questionnaire. The areas can be expanded by clicking on the respective titlebars.

Section 1

This is a test radio button question.

a  b  c  d

What is your favorite bed time story?

Section 2

Figure 1.5: The survey screen allows the users to answer specific question.

## Chapter 2

# Administrative Tools

### 2.1 A Quick Overview

From this point forward, the term “you” will refer to the individual creating the experiments, and the term “user” refers to the research participants.

The DynaSearch system allows for the creation of surveys that can contain three types of pages. The first is the instruction page. Here, basic HTML is displayed that can be used to convey specific instructions to users or as a means of supplying them with supplemental information. The second is the training page. This page is composed of tables, text boxes, and maps that are all hidden when the page first loads. In order for users to see this information, they must click on the desired element. The order and duration of these clicks is tracked by a database typically hosted on the web server. The last type of page is a questionnaire which provides users the opportunity to give feedback, or as a way to test the users on previously displayed information.

In order to create these pages, accounts with administrator access are taken to an administrator page where links to the different editors are listed. Instruction pages, training pages, and questionnaire pages can be created in any order. The survey creation tool should not be used until all of the pages for a given experiment have been finished..

The remainder of this section will explain the use and operation of these editors. For more information regarding the database, please refer to Appendix A. For more information on the file system, please see Appendix B.

#### 2.1.1 Instruction Pages

To create an instruction page, just create a text file that contains the information desired and place it in the `DynaSearch/expResources/instructPages/` directory located in the DynaSearch file system. Because this data will be inserted between the `<body>` tags of the template instruction page, any additional HTML tags maybe used as desired by the administrator. These files will automatically be available from the Survey Setup editor page.

### 2.1.2 Training Pages

To access the training page, select the Training Page Editor link from the administrator's page. This will take you to a blank training editor page with the toolbar window located in the upper left window. With the exception of the trash can, each of the icons on the toolbar allow for the creation of a different window. The toolbar window is displayed in Fig. 2.1. The toolbar window and any other created window can be moved by clicking and dragging on the title handle of the window.

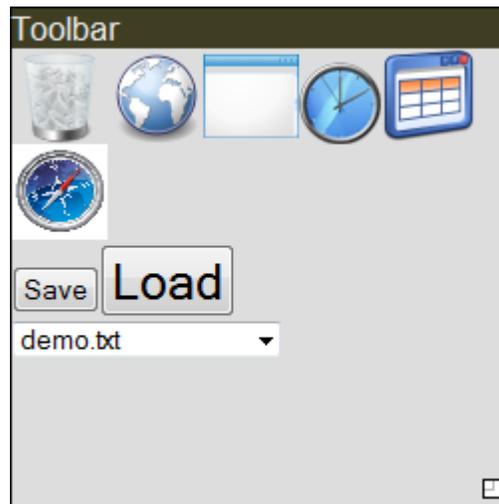


Figure 2.1: The icons represent the trash bin, map window, text window, clock window, table window, and map legend window, respectively.

#### The Trash Bin

The trash bin allows you to delete unwanted windows. Simply click on the title bar of the window you wish to remove, and drag it over the trash can. When you release it, it will be deleted.

#### The Image Window

The image window will allow you to select the images to be displayed. This function will allow you to display any type of picture, even though it was originally designed to display maps (see Fig. 2.2). It may be resized by clicking and dragging on the small white box in the lower right hand corner. The image file that you wish to use, as well as the advisory number for the training screen, can be set by clicking on the blue “i” icon in the upper right hand corner of the window.

The image file should be located in the `DynaSearch/expResources/images/` directory. Also located in that directory is the geographical information associated



### The Text Window

The text window is used to display paragraphs or sections of text to the user. These will be hidden during a training session until the user clicks on the section containing the text. The title of the window and the text inside can both be modified by clicking on the blue “i” icon in the top right corner of the window. It can be resized by clicking and dragging on the white box in the bottom right corner of the window.

### The Clock Window

The clock window determines how long a page will be available to a user. By clicking on the blue “i” icon, you can specify the number of minutes that each user should receive. The default time is 20 minutes. If no clock window is created, then the window will be available to the user until they click on the *Done* button. Please note that the clock window will not actually be displayed while the experiment is being run.

### The Table Window

The table window displays table information as seen in Fig. 2.3. Clicking on the blue “i” icon will allow the user to change both the table name and the file from which the table data is stored. These text files are stored in the directory `DynaSearch/expResources/tables`. The first row and column will always be visible. Columns are separated by commas, and the rows are separated by new lines. To resize the table, click on the white box in the bottom right corner of the table window. You must resize the table manually in order to test that the table displays the information correctly.

In order to distinguish which table a user is clicking on from the entries in the database, the tables in an experiment should have unique table names.

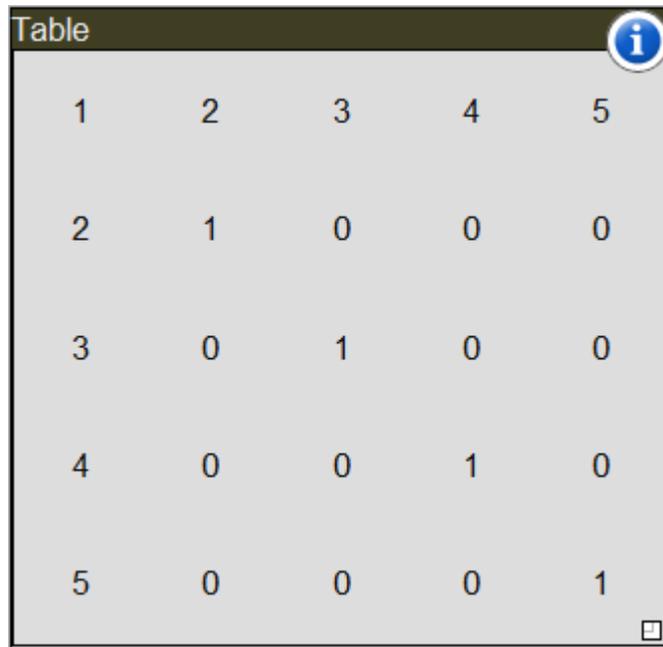
### The Legend Window

The legend window is associated with the image window on the editor screen (see Fig. 2.4). It contains buttons that the user can click to obtain various levels of information. Clicking on the blue “i” icon will allow you to rename the title for the legend window. User access to each group of buttons can be controlled by setting the correct permissions in the `t_user` database table. For more information regarding these, please see Appendix A.

The following button groups are currently implemented:

1. Current Location - Shows the current location of the hurricane and the rings of winds with varying wind speeds
2. Past Track - Show the path that the hurricane has taken over the past 1-5 days
3. Forecast Track - Shows the path that the hurricane is projected to take for the next 1-5 days
4. Uncertainty Cone - Shows the uncertainty cone for the next 1-5 days

Note that there can be only one map and one legend window for a given training screen.



1	2	3	4	5
2	1	0	0	0
3	0	1	0	0
4	0	0	1	0
5	0	0	0	1

Figure 2.3: The table window displays information in a table format.

### Loading

To load a previously saved training screen, pick the training file from the drop down menu that you wish to work with and hit the *Load* button. Note that to save any changes made to this training screen, you must hit the *Save* button before navigating away from the page.

### Saving

The *Save* button will prompt you to enter a name to save the file as. The extension `.txt` will automatically be added to the name you supply, so it is not necessary to include that in the file name. For example, if you want the file name to be `test1.txt`, enter only `test1`.

### 2.1.3 Questionnaire Editor

The Questionnaire Editor allows you to create a questionnaire that can be taken by users as they progress through an experiment. There are five basic building blocks that can be incorporated into each type of questionnaire, four of which are accessed through the toolbar displayed in Fig. 2.5 and the last of which is selected from the drop down menu on the page. Each of these is described in greater detail below.

The information submitted by the users is kept in a file with the same name as



Figure 2.4: The legend window displays the legend for the current map.

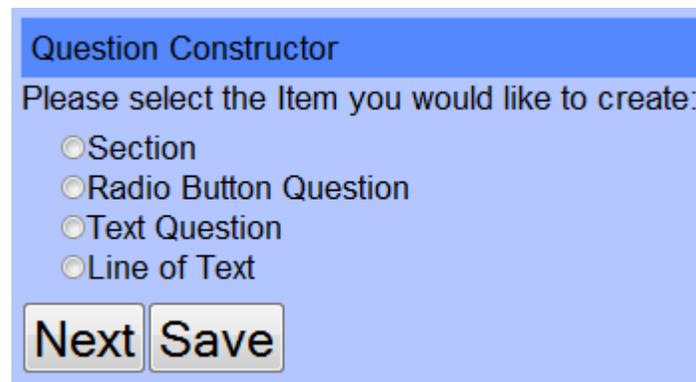


Figure 2.5: This toolbar allows you to create different question types.

the user's id, and is stored in the directory `DynaSearch/userData`. For more information on the file system, please refer to Appendix B.

### Section

The *Section* option allows you to split the questionnaire into different sections. Only one questionnaire section is open at a time. Each section is accessed by clicking on the section header bar. Note that this will only be visible to the user. The questionnaire will remain expanded while in administrator mode.

To create a section header, click on the *Section* radio button, and then hit *Next*. A prompt for the title will appear. After you enter a title and select the *Next* button, the section header will be visible on the page. To remove a section header, simply click on the red minus symbol above the upper right corner of the element.

### Radio Button Question

To create a radio button question, select the *Radio Button Question* option from the toolbar and hit *Next*. DynaSearch will display a prompt for the question as well as the

number of radio button choices. After you fill this information out and again hit the *Next* button, DynaSearch will prompt you to provide the specific value for each radio button option.

Note that DynaSearch will record the information as the index value you choose, and not the value you enter. To remove a radio button, simply click on the red minus symbol above the upper right corner of the element.

### **Text Question**

The *Text Question* option allows for the creation of a free response question. By selecting this option and clicking on the *Next* button, you will be prompted to provide the question for the text, as well as the number of characters that should be displayed on the screen for a response. Please note that the user may enter a response that is larger than this value, and that the entire response will be saved. This number only dictates how much of the response is displayed on the screen at one time.

After this information is filled out, the question can be added to the screen by hitting the *Next* button. To remove a text question, simply click on the red minus symbol above the upper right corner of the element.

### **Line of Text**

The *Line of Text* option allows you to provide users with additional instructions or information. After selecting this option and hitting the *Next* button, DynaSearch will prompt you to enter in the text that should be displayed. To add the information to the page, click the *Next* button again. To remove a line of text, simply click on the red minus symbol above the upper right corner of the element.

### **Drop Down Question List**

The administrator may place a prewritten radio or text question from the **Questionnaire Catalog** by selecting the appropriate question designator from the drop down menu on the page. For more information regarding the **Questionnaire Catalog**, please see the appropriate section of this guide. To remove a question added by the drop down list, simply click on the red minus symbol above the right corner of the element.

### **Save**

To save a questionnaire, hit the *Save* button. DynaSearch will prompt you to create a title for the questionnaire at the bottom of the page. After you enter the title, click the *Save* button on the bottom of the page.

## **2.1.4 Questionnaire Catalog**

The **Questionnaire Catalog** can be used to create questions that will be used multiple times throughout several questionnaires. You can create two question types from this screen through the toolbar shown in Fig. 2.6. They are the radio question and text question types.

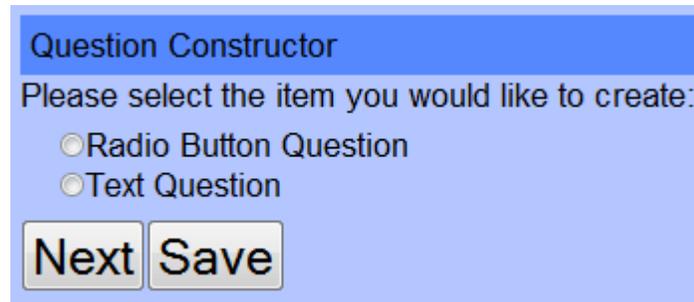


Figure 2.6: This toolbar allows you to create different question types.

### Radio Button Question

To create a radio button question, select the *Radio Button Question* option from the toolbar and hit *Next*. DynaSearch will display a prompt for the question as well as the number of radio button choices. After you fill this information out and again hit the *Next* button, DynaSearch will prompt you to provide the specific values for each radio button option.

After you fill the values, hit *Next* to save the question. A text box on the page will appear where a question designator can be created. This will be used to identify the question from the **Question Editor** screen via the *Drop Down Question List*.

Note that DynaSearch will record the information as the index value you choose, and not the value you enter.

### Text Question

The *Text Question* option allows for the creation of a free response question. By selecting this option and clicking on the *Next* button, you will be prompted to provide the question for the text, as well as the number of characters that should be displayed on the screen for a response. Please note that the user may enter a response that is larger than this value, and that the entire response will be saved. This number only dictates how much of the response is displayed on the screen at one time.

After you fill this information out and again hit the *Next* button, DynaSearch will prompt you to provide the specific values for each radio button option. After you fill the values, hit *Next* to save the question. A text box on the page will appear where a question designator can be created. This will be used to identify the question from the **Question Editor** screen via the *Drop Down Question List*.

## 2.1.5 Questionnaire Viewer

You can use this screen to view previously created questionnaires. To view a questionnaire, select the questionnaire from the drop down list, and click the *Load* button.

It is important to note that once a questionnaire is saved in the **Questionnaire Editor**, it can not be reloaded and changed in anyway without accessing the saved ques-

tionnaire directly in the `sur_questions` database table and modifying the `Value` field. However, it can be completely overwritten by a new questionnaire.

### 2.1.6 Experiment Editor

The **Experiment Editor** allows you to combine any number of instruction pages, training pages, and questionnaires into a single experiment. The interface shown in Fig. 2.7 will allow you to select and assemble the various elements required. To change the title of a new experiment, click on the current title. It is located at the top of the screen and is surrounded by quotes with a default value of, `New Experiment`.

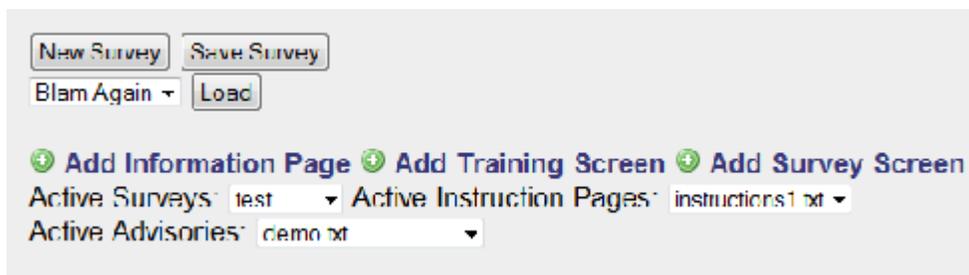


Figure 2.7: The options on the Experiment Editor allow you to assemble experiments.

#### Add Information Page

The *Add Information Page* button will allow you to insert a new information page into the current experiment. When this button is clicked, a new page is inserted into the current list of pages, as is shown in Fig. 2.8. The default title of the page is `New Page`. You can modify this by clicking on the current title, at which point

DynaSearch will prompt you to enter a new one. The default file associated with this page is set to `(unassigned)`, which can also be changed by clicking on it. Please be sure to enter the full file name of the instruction page that you wish to use. A list of the currently available instruction pages can be found by selecting the drop down list entitled **Active Instruction Pages**. The files listed are those that are stored in the `DynaSearch/expResources/instructPages` directory.

To change the sequence of a page, click and drag the blue box on the left hand side of the page's label up or down to slide it into the desired location. To remove a page from your list of pages, select the red minus sign on the right hand side of its label.

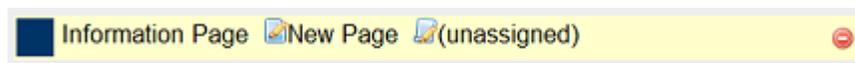


Figure 2.8: This element allows you to insert an instruction page.

### Add Training Page

The *Add Training Page* button will allow you to insert a new training page into the current experiment. When this button is clicked, a new training page is inserted into the current list of pages, as is shown in Fig. 2.9. The default title of the page is **New Page**. You can modify this by clicking on the current title, at which point DynaSearch will prompt you to enter a new one. The default file associated with this page is set to (unassigned), which can also be changed by clicking on it. Please be sure to enter the full file name of the training page that you wish to use. A list of the currently available training pages can be found by examining the drop down list entitled **Active Advisories**. The files listed are those that are stored in the `DynaSearch/expResources/advisory` directory.

To change the sequence of a page, click and drag the blue box on the left hand side of the page's label up or down to slide it into the desired location. To remove a page from your list of pages, select the red minus sign on the right hand side of its label.

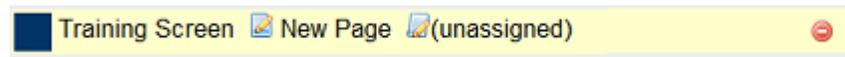


Figure 2.9: This element allows you to insert a training page.

### Add Survey Page

The *Add Survey Page* button will allow you to insert a new questionnaire into the current experiment. When this button is clicked, a new survey page is inserted into the current list of pages, as is shown in Fig. 2.10. The default title of the page is **New Page**. You can modify this by clicking on the current title, at which point DynaSearch will prompt you to enter a new one. The second parameter is the **file name**. Its default value is listed as (unassigned). This is the name of the file that the questionnaire will be saved to in the experiment's directory. The extension of any filename given should be `.txt`.

The final parameter in the list is the name of the questionnaire that you would like to use. This should be the name of the saved questionnaire that was created using the **Questionnaire Editor**. A list of all of the available questionnaires is under the drop down listed entitled *Active Surveys*.

To change the sequence of a page, click and drag the blue box on the left hand side of the page's label up or down to slide it into the desired location. To remove a page from your list of pages, select the red minus sign on the right hand side of its label.

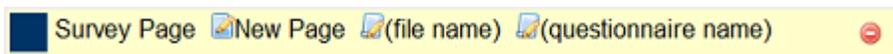


Figure 2.10: This element allows you to insert a survey page.

### **New Survey**

To start a new survey, click on the *New Survey*. Doing this will clear any work that has been done, so it is important to save previous work before continuing.

### **Save Survey**

To save a survey that you have been working on, click on the *Save Survey* button. DynaSearch will then use the experiment name and automatically create a folder in the directory `DynaSearch/hurricane_data`. This is explained in greater detail in Appendix B.

### **Load Survey**

To load a previously saved survey, select the survey that you wish to load from the drop down menu and then click on the *Load* button.



# Appendix A

## Database Information

The tables listed below are used for the DynaSearch system. Any other tables you find in the database are legacy items from the original EMDSS application on which this website was based. The tables have no dependency on each other. Because of this, the resulting structure is very simple and easy to maintain. The tables are explained in greater detail below. The database used for DynaSearch is MySQL 5.1. The entire system was built using version 2.0 of wampServer.

### A.1 *sur\_clicks*

The *sur\_clicks* table records the click information for each user on training pages. Each entry in the database represents a single click. Each individual field is explained below.

#### A.1.1 **Dummy**

This is the primary key for the entry. It allows you to determine when an element was inserted into the table in relation to the other elements. This can be useful for reordering the elements after ordering them by another value.

#### A.1.2 **UserName**

This is the user name of the individual that did the click.

#### A.1.3 **SessionNumber**

This field was placed to keep track of users between separate experiments. It was determined that it would not be of much help for the currently designed experiments and so was never fully implemented. It has been left for possible future expansion of the software. For now it is assumed that each user only participates in one experiment once. If this is not the case, then their data will need to be cleared out of this table beforehand and their position number will need to be reset in *t\_user*.

### A.1.4 ObjClicked

This is the item that was clicked on a particular training page. Every objects name begins with “x\_toTrack”. From there the naming convention differs, depending on the element in question. The details for each of the three element types are given below.

#### Tables

The format for tables is: *x\_toTrackTable\_“file name”\_“table name”\_“row”\_“column”*. So for example, if the file name was `testFile.txt`, the table name was `Table 1`, and the user clicked on the first row with the second column, then the entry would be `x_toTrackTable_testFile.txt_Table1_1_2`.

It is important to note that for any given experiment, there should be no two tables that share both the same file name and table name. Otherwise, it will be impossible to distinguish between them in the database.

#### Map Legends

The format for map legends is:

*x\_toTrackTable\_mapLegend\_adv\_“advisory number”\_“row”\_“column”*. So for example, if the advisory number for the map on the training screen was five and the user clicked on the second row and the third column, then the entry would be `x_toTrackTable_mapLegend_adv_5_2_3`.

It is important to note that no two maps should have the same advisory number for a given experiment. Otherwise, it will be impossible to distinguish between them in the database.

#### Text Blocks

The format for text blocks is: *x\_toTrackText\_“window name”*. So for example, the the name of the text window was “Advisory Information”, then the entry would be `x_toTrackText_AdvisoryInformation`.

It is important to note that no two text blocks should have the same title throughout an experiment. Otherwise, it will be impossible to distinguish between them in the database.

### A.1.5 ClickLength

This gives how long the element was clicked in seconds.

### A.1.6 ClickNumber

This gives the order that an element was clicked on a specific training page. Ordering the elements by their *Dummy* value will return the sequence in which the elements of a single training page were accessed.

## A.2 sur\_question

This table holds all of the questionnaires that have been created within DynaSearch. Everything in this database is handled internally, so it should almost never need to be accessed. It should be noted that once experiments are created, the information in the *Value* field is copied to a file in the file system. This is designed to protect individual experiments from issues that may occur with the database. The details of each field are given below.

### A.2.1 id

The id field serves as the primary key for an entry. It should never need to be referenced.

### A.2.2 Name

This is the name of the given questionnaire. It is what is displayed when trying to insert the questionnaire into different experiments. Each should be unique.

### A.2.3 Value

This is the HTML that makes up the questionnaire. It is stored in its basic format. If the questionnaire needs to be edited in any way after it is saved, it will have to be through this field, as there is currently no way to modify pre-existing surveys.

## A.3 sur\_randquestion

This table holds the questions that are created through the **Questionnaire Catalog**. They are single questions that maybe repeatedly inserted into a questionnaire. The details of each field are given below.

### A.3.1 id

The id field serves as the primary key for an entry. It should never need to be referenced.

### A.3.2 Designator

This is how the question is identified from the **Questionnaire Editor**. These should be unique values.

### A.3.3 Value

This is the HTML that makes up the question, and is stored in its basic format. If the question needs to be modified in anyway after it is saved, it will have to be through this field, as there is currently no way to change a question once it has been saved.

## A.4 t\_experiments

The experiments table holds all of the information that is saved from the **Experiment Editor**. Short of removing experiments from the database, this table should rarely be referenced.

### A.4.1 id

The id field serves as the primary key for an entry. It should never need to be referenced.

### A.4.2 ExperimentShortName

The experiment short name is the name of the experiment that will be seen from the **Experiment Editor**. It will be the name given to the experiment on creation without any spaces or special characters.

### A.4.3 ExperimentString

This field contains a string which represent the experiment referenced. Most of it is stored in hexadecimal characters, and is therefore unreadable by itself. This information should only ever be accessed through the **Experiment Editor**. This string keeps track of the order of the pages, as well as the names of the files that correspond to each page in the experiment's folder.

## A.5 t\_user

This table holds all of the account information for a given user. A detailed look at the fields is given below.

### A.5.1 User\_ID

This is the identification that the user provides to the login screen in order to access the experiment.

### A.5.2 County\_ID

Lists the current county of the user. This field is currently not used.

### A.5.3 UPassword

The password for the user. Because the system was designed for academic purposes and no personal information is being stored, these passwords are not encrypted in any way.

#### **A.5.4 User\_Type**

This specifies the role of the account. An “A” designates the account as an administrator. If this is true, they will automatically taken to the administrator page on login. A “U” designates the account as user. On login this individual will be taken to the experiment they are participating in. They should not have access to any of the editors or administrator page.

#### **A.5.5 Name**

Real name of the user.

#### **A.5.6 scaleW**

This field only applies to users. It is the width measurement that is recorded from the size registration page, and is used to ensure that every element on a training page is displayed with proper proportion, regardless of the monitor’s screen size or resolution.

#### **A.5.7 scaleH**

This field only applies to users. It is the height measurement that is recorded from the size registration page, and is used to ensure that every element on a training page is displayed with proper proportion, regardless of the monitor’s screen size or resolution.

#### **A.5.8 current\_position**

This field only applies to users. It determines where in an experiment the user should be, should they log out and try to log back in before the completion of the experiment. It should also prevent users from trying to back track in an experiment, though this behavior may vary from browser to browser.

#### **A.5.9 experiment**

This field only applies to users. It determines which experiment will be displayed for a user when they log into the system. The value must be one of the *Experiment Short Name* entries listed in the `t_experiments` table.

#### **A.5.10 FORECAST**

Determines whether or not the user should be able to click on the row of forecast buttons in the map legend window. A value of 0 means that the user will not be able to access this information, while a value of 1 means that they will.

**A.5.11 PAST\_TRACK**

Determines whether or not the user should be able to click on the row of past track buttons in the map legend window. A value of 0 means that the user will not be able to access this information, while a value of 1 means that they will.

**A.5.12 CONE**

Determines whether or not the user should be able to click on the row of cone of uncertainty buttons in the map legend window. A value of 0 means that the user will not be able to access this information, while a value of 1 means that they will.

**A.5.13 CURRENT**

Determines whether or not the user should be able to click on the current location button in the map legend window. A value of 0 means that the user will not be able to access this information, while a value of 1 means that they will.

# Appendix B

## Filesystem Information

The file system is separated into five sections. These are the main files, experiment files, experiment resources, user data, and other assets. Each of these is detailed below.

### B.1 Main Files

The main `DynaSearch` directory contains the files that are used during interaction with and creation of experiments. A quick overview is given of the most notable files.

- `admin.php` - The page that administrators login to
- `advance.php` and `director.php` - These files interact to ensure that users go to the right page when they login and click through the experiment
- `dynaview.php` - The main training page that users interact with
- `editor.php` - This is the page where the **Training Page Editor** loads
- `instructions.php` - This is the page that is used to display instructions to the users
- `questDisplay.php` - This page is used to implement the **Questionnaire Viewer**
- `questEditor.php` - This page is used to implement the **Questionnaire Editor**
- `question.php` - This page is used to display questionnaires to users
- `randQuestEditor.php` - This page is used to implement the **Questionnaire Catalog**
- `survey_setup.php` - This page is used to implement the **Experiment Editor**

## B.2 Experiment Files

Inside the directory `DynaSearch/hurricane_data` is a folder for every experiment that has been created. Inside these folders are files that correspond to each of the pages of the experiment. This means that for each instruction page, each training page, and each questionnaire, there will be one file in the experiment's folder that corresponds to it. Instruction and questionnaire pages will be displayed as HTML, while the training pages are encoded as hexadecimal characters.

## B.3 Experiment Resources

The folder `DynaSearch/expResources` contains a number of sub-folders which store the information needed to create the various instruction and training pages. The purpose of these folders is detailed below.

### B.3.1 `advisory`

This directory contains a copy of all of the training pages that have been created. The contents are displayed in hexadecimal characters, and are only utilized inside the `DynaSearch` framework.

### B.3.2 `images`

This directory contains copies of all the images that can be used in the training pages, along with files that contain the geographic information for each image.

### B.3.3 `instructPages`

This directory contains all of the instruction pages that can be used in an experiment. Though they all have the `.txt` extension, the contents are just the HTML that would be found between the `<body>` tags in a standard HTML file.

### B.3.4 `tables`

This directory contains all of the files containing table information which can be used in the training pages.

### B.3.5 `tracking`

This directory contains all of the files that hold hurricane tracking information which can be used in the training pages.

## B.4 User Data

This folder holds the user responses for each survey that a user participates in, as well as their window scaling information. Every value is comma separated, and commas that users type in the free response questions are replaced with a “’”. The files are named according to the user’s user name.

## B.5 Other Assets

The `DynaSearch/assets` directory hold all of the background scripts and files that are used to make the DynaSearch system work. Below is a list of the subdirectories and any major files that are located in each.

### B.5.1 images

This directory holds all of the images utilized by DynaSearch.

### B.5.2 php

This directory holds all of the php files that are used behind the scenes.

- `config.php` - Holds the database information that is required to access and modify data
- `standard.php` - Holds the standard header information for every php file. This includes the `<head>` tags.
- `db_util.php` - Provides the connection to the database specified in `config.php`

### B.5.3 scripts

This directory holds all of the javascript files that are used in DynaSearch. There are a few notables. e

- `editor.js` - This is a rather large file that stores all of the functions used by the **Training Page Editor** and also by `dynaview.php`
- `timer.js` - This file contains the scripts that are used to cover all of the elements on a training page, as well as to keep track of the user click information before it is sent to the server

### B.5.4 style

This directory just holds the style information for DynaSearch.



# Appendix C

## Math

There are two places in DynaSearch where mathematical computations are performed. This is when DynaSearch draws the current location of a hurricane with the radii of the separate wind speeds, as well as the uncertainty cone. Both of these are detailed below.

### C.1 Radius of Wind Speed

The `<canvas>` element is responsible for actually drawing the circle around the current location, but in order to do that, we need to provide the `<canvas>` element with x and y coordinates of the center, as well as the radius of the circle. The radius is predefined, but we need to translate this distance in miles into pixels.

First we determine the pixels per degree of longitude:

$$p_l = h / (m_r - m_l)$$

Where  $h$  is the height of the map in pixels,  $m_r$  is the longitude for the right side of the map and  $m_l$  is the longitude for the left side of the map. Then we determine the number of pixels that should occupy the radius by:

$$p = p_l / (d * 0.016)$$

Where  $p$  is the total number of pixels,  $d$  is the distance in nautical miles of the radius and 0.016 is the ratio of miles to degrees.

We compute the x coordinate of the center point to a pixel value as follows.

$$x = w * (((-1 * m_l) - c_x) / (m_r - m_l))$$

Where  $w$  is the width of the map in pixels,  $m_l$  is the longitude of the left side of the map,  $m_r$  is the longitude of the right side of the map, and  $c_x$  is the longitude of the hurricane's current position.

We compute the y coordinate of the center point to a pixel value as follows.

$$y = h * ((m_t - c_y) / (m_t - m_b))$$

Where  $h$  is the height of the map in pixels,  $m_t$  is the latitude of the top of the map,  $m_b$  is the latitude of the bottom of the map, and  $c_y$  is the latitude of the hurricane's current position. With this information, we make a call to the `<canvas>` element, which draws a circle of the correct radius around the hurricane's current position.

## C.2 Uncertainty Cone

The uncertainty cone is found by calculating the latitude and longitude position of the cone based on the projected position of the hurricane over the course of five days. To do this, we first find determine the perpendicular of the line segment that is made between two consecutive forecast positions. For example, the line created by the projected position after one day and two days, or the projected position after three days and four days. The distance of this line segment is determined by the day of the forecast that it corresponds to. For example, the distance off the projected position after one day is 25 miles. After two days, it increases to 50 miles, and so on.

First, we need to translate the latitude and longitude into pixel values that the `<canvas>` element can understand. This is computed as it is above.

The x coordinate for the top of the error cone for a given projected position  $p1$  is determined as follows.

$$t_x = p1_x + (d * 0.016) * (p1_y - p0_y)$$

Where  $d$  is the given distance from the projection position,  $p1_y$  is the y coordinate of the current projected position, and  $p0_y$  is the y coordinate of the previous position.

Similarly, to compute the y coordinate for the top of the error cone for a given projected position  $p1$ , we do the following.

$$t_y = p1_y + (d * 0.016) * (p1_x - p0_x)$$

Where  $d$  is the given distance from the projection position,  $p1_y$  is the y coordinate of the current projected position, and  $p0_x$  is the x coordinate of the previous position.

Finding the x and y coordinates are computed very similar equations. The bottom x is given as follows.

$$b_x = p1_x - (d * 0.016) * (p1_y - p0_y)$$

And finally, the bottom y.

$$b_y = p1_y - (d * 0.016) * (p1_x - p0_x)$$

## Appendix D

# Installing DynaSearch

To Install the DynaSearch Software:

1. Copy the DynaSearch folder to the appropriate folder utilized by the web server.
2. Go to the file `DynaSearch/assets/php/config.php` and provide the appropriate information for the following:
  - `$DB_HOST` - this is the host name where the database is located
  - `$DB_USER` - this is the administrator account that will be able to log in, query, and make changes to the EMDSS database
  - `$DB_PASS` - this is the password for `$DB_USER` account
  - Note - Do not change the database name unless the name is also changed on the database server
3. Import the EMDSS database into the MySQL server. The database file is named `EMDSS_DB.sql.zip` and can be found in the DynaSearch directory.
4. To test whether the system was imported correctly, go to `*webaddress*/DynaSearch/login.php` with the user name `jlcox5` with the password `jlcox5`. It should take you to a testing page.

If there are any problems or questions, please contact:  
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