A Web Application to Improve Emotional Awareness

in High-Functioning Autistics

by

Temitope O. Sonuyi

Submitted to the Department of Electrical Engineering and Computer Science

in Partial Fulfillment of the Requirements for the Degrees of

Master of Engineering in Electrical Engineering and Computer Science

at the Massachusetts Institute of Technology

May 26, 2006

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ABSTRACT

The web application built here is based on the idea of presenting scenarios to users, using text, and having the users choose likely emotions that match the scenarios. Taken for granted by most neurotypical people, high-functioning autistics are often lacking in this area of social-skill development. This idea of emotion to scenario matching is accomplished using a series of different games that take different approaches to exercise these skills. The application relies on the two main Artificial Intelligence (AI) approaches. The first AI approach is classical, relying on computer-based algorithms developed by others to judge text and put out the correct affect or emotion. The other part of the AI relies on users of the system contributing via regular usage or explicit correction to train the system in a type of feedback loop.

Thesis Supervisor: Henry Lieberman
Title: Research Scientist, MIT Media Laboratory
Thanks, Acknowledgements and Dedications

Adupe, Ese gaani Baba mi. O titan.
Mom, Dad, Tolu, Modupe, Gbemi, Tosin for being there for me, always.

Henry Lieberman, Hugo Liu, Paulina Modlitba, Edward Shen, Alea Teeters, Alki Delichatsios

Simon Baron-Cohen and his group, Rana El Kaliouby, Ofer Golan

Dedicated to Push Singh
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Introduction: Problem and Impetus for Solution

Mindblindness, what is it?
Simply put, mindblindness is the inability for someone to perceive or deduce emotions.

Mindblindness can more specifically be described as an inability to understand what another person might be feeling or thinking emotionally. Far from an “either-or” diagnosis, mindblindness has varying degrees of severity and is a core trait of those affected by autism. Coined by Professor Simon Baron-Cohen, the term “mindblind” has become the definitive way to categorize this psychological phenomenon. Mindblindness is generally found amongst high-functioning autistics and people with Asperger's syndrome. Both conditions belong under the Autism Spectrum Disorder, or ASD, category. The phenomenon of mindblindness is not only well documented in academic literature like Baron-Cohen’s book, but also has been well described from the viewpoint of those affected. The autobiographical descriptions range from harmless confusion to terrifying anxiety when describing mindblindness and living with it. A relatively new discovery compared to other psychological phenomena, there is not a wealth of research or information on how to combat the issue. Recent methods of treating it rely on fairly low-tech and "manual" techniques. This thesis looks at the very recent steps that have been taken to make computer software a useful tool in this realm of dealing with mindblindness, and to push the current boundaries within it.

An academic psychological view on mindblindness
Baron-Cohen uses the following example when describing mindblindness¹:

¹ The Sally and Anne example was designed by Simon Baron-Cohen and Uta Frith
"Sally has a marble. She puts her marble into the box, and then she goes outside. Anne comes in, takes the marble out of the box, and puts it in her basket. When Sally comes back, where will she look for the marble?"

By about the age of 4, most children who are presented with this scenario know the answer, this includes children with Down's syndrome and other developmental problems. But some children do not know the answer. They do not understand that what they know and what Sally knows are two separate things. They do not understand that Sally has her own thoughts about where the marble is. These children expect Sally go to the basket, because they know the marble is there. These children cannot understand how she doesn't know where the marble is. These same children are the ones likely to be diagnosed with some form of autism or Asperger's Syndrome. (Frith 158-161)

As shown in the example, the "Sally Anne Test", autistic children are slower in understanding the point of view of others. In his book, Baron-Cohen shows how autistic people have a hard time realizing that other minds exist, separate from themselves. This is as compared to the ability of those considered as "normal", or neurotypical, in the majority of society. It is also noted that mindblindness is very autism-specific, as even mentally disabled children are able to recognize the existence of minds outside of their own. A lot of these findings are based on the development of eye contact and attention patterns during the developmental process.

A personal view on mindblindness

"Now I know that it's simply that I have to *think* in order to *feel*. Emotions remain undifferentiated and un-understood until I can process them cognitively." –Hubert Cross, Adult High-Functioning Autistic (Cross)

These words of a high-functioning autistic man, offer a glimpse into a world where people like him often walk around confused and blind to the emotional mind-states that "normal" people take
for granted. Hubert describes his life of mindblindness as something he was never cognizant about as a child. He likens his life experience to the example of a physically blind person who was born blind but never told that everyone else around him could see, leaving him to fend for himself and have a skewed view of how "reality" was for everyone else. Having eventually learned about mindblindness and some valuable techniques of dealing with it, Hubert was amazed at just how widespread the affliction was and how little was being done to combat it when the solution was simple as making mindblind people aware. Spurred by a grippingly odd upbringing due to his mindblindness, and sometimes embarrassing eventfulness Hubert's biography about his experiences from an autistic point of view, give great insight to neurotypical people into what life is like when you are mindblind.

**Consequences of mindblindness**

Whether one is coming from the academic or personal view of autism, both views lead to the conclusion that untreated mindblindness can be critically debilitating. A common consequence of mindblindness in children is a lack of healthy socially interaction in settings like school. Often times mindblind people may unwittingly annoy others around them with behaviors that are considered unacceptable by society. There have been stories of mindblind children relieving themselves of waste in areas that are entirely off limits for that type of activity, leading to extreme embarrassment and often group alienation. Often times incognizant mindblind people will do things like stare at someone for a prolonged period of time without realizing the uncomfortableness that someone might feel. This also leads to alienation or cold-behavior by neurotypical peers. Consequences of mindblindness have even reached the realm of unintentionally harming other people or property because of that lack of understanding.
Dealing with mindblindness
While the effects change with the varying environments and degrees of mindblindness, solutions to helping this issue are relatively straightforward in that they all revolve around recognition. By simply recognizing that they are mindblind, those affected can begin to develop skills and techniques to overcome the impediments mindblindness causes. It should also be noted that it is best if treatment of mindblindness is started at a young age so that it is a part of the critical mental developmental cycle.

One common method of fighting mindblindness, especially in children, is the reading of stories (Edelson). These stories that are read to or read by the child with mindblindness are special in the fact that they are explicitly emotion based. The stories usually describe common scenarios that someone is likely to experience and explicitly states and reflects on the emotions of the characters in the story. So in essence multiple mental states of multiple different people are constantly highlighted. The hope is that the mindblind reader becomes accustomed to the idea that other minds exist and have emotional state. It also helps the child to understand what events or situations lead to different emotional states.

While helpful coping methods are used when mindblindness is diagnosed, many mindblind people who never learn about their condition simply have to learn “the hard way” about their surroundings. Some have been able to figure out how to not only survive, but often take advantage of their mindblindness, while others have lead miserable lives until their "eyes" were opened (Cross). These different experiences are due to the varying degrees of mindblindness and the different environments that those affected with it grow up in. In the worst case mindblind people may never learn how to cope with their condition and go through their entire lives confused and unaware forever.
Very recently, software has begun to be explored as a means of teaching mindblind people how to see. While there are not many at this point, the general idea of these applications is similar to that of the story reading idea, but more interactive. Because the learning is not restricted to a book, software tools can generate many different scenarios and give users a chance to interact through more descriptive story telling (audio, video), or through playing games in a user interface. There is a lot of room for growth in this area of mindblind assistance and that is where this thesis project aims to take root.

**A motivation for work**

The idea that people see the world so differently from the neurotypical majority is a great motivation for interest in the topic; but it is the negative consequences that arise due to untreated cases and a general lack of understanding by neurotypical people, that drive the motivations for this thesis. This thesis further explores and builds a software-based computational approach to try and contribute to helping people with mindblindness.

**History and background of related work**

*The emergence of software to assist the mindblind*

Software applications are just beginning to be turned to as an option for helping the mindblind. Because of the inherent versatility of software, it provides a host of different ways to teach people about emotions. One of the most important traits of these new ways of teaching is interactivity. Compared to a story book, a software application can provide a user interface that can be used to play games and display video/audio/text scenarios. If the saying "a picture is worth a thousand words" has any merit, then the medium of video alone offers so much more description and a more concrete real world connection for users to understand. It is because of these benefits that software is an interesting avenue of aide that continues to be expanded and explored.
The status quo in the existing realm of software applications has two main pillars. Firstly, most of the scenarios/events and emotions in current software are static and human-compiled. The term “static” means that the emotions that are chosen to be associated with certain events are "hard coded" or permanent. These associations are usually chosen manually (by human decision). The answers are what they are and will stay that way forever. The term “human-compiled” refers to the way in which the software must be made, relying on human judgment of different events and emotions and coming up with an answer. Although this allows for more specificness and higher rates of correctness, this idea of static human-compiled answers makes this process of software creation long, hard and costly. The second pillar of the status quo is rooted in the desktop installation. The term “desktop installation” refers to the required installation from a CD-ROM or an executable file to gain access to use the software. The desktop install idea has a few issues. One problem is accessibility, where people with different operating systems from the intended software are out of luck. Another limit of this style of software deployment is coverage. Because people need to order, wait and then install the software, the spread of its effectiveness is somewhat slowed. All that being said this approach has proved useful and affective in terms of quality and results. The point of this thesis project is not to analyze or critique the status quo of this type of software but rather propose a different, and hopefully better, style of software applications.

While there are a few software applications for mindblindness in existence, one of the more popular and most extensive examples today is Mind Reading: the interactive guide to emotions, which was created in part by Professor Simon Baron-Cohen (Baron-Cohen). This piece of software uses video, audio, image and text expressions of emotions in its repertoire. With over 412 different emotions organized into 24 groups, this software is one of the most expansive pieces out there today. Basically the software goes through many different scenarios, using its different medium, and tries to explain the association of them with emotions. It should be noted
that this thesis project actually borrows on the data in this software (with appropriate permission) to seed the corpus of scenarios/events being used.

The general consensus from study and testing has been that applications like Mind Reading are very useful and helpful in accomplishing the goal of helping the mindblind understand external emotions better. This sets the stage and justification for further use of software in this realm and is encouragement for this thesis project.

The Application: Details and Design, How it Works

Overview: the idea behind what it does and why it is done this way
This thesis project aims to usher in a new status quo based on web-based software applications for mindblindness aide. In its simplest form, the application is a series of different games that are playable through a user interface (UI). These games require the users to analyze and understand how different events are associated with different emotions in order to score points. The main pillars of this project rely on Artificial Intelligence (AI), a web-based UI, and community augmented error-correction.

The project relies heavily on the idea of using AI to deduce many of its answers. In this case that means associating which emotions go with which events/scenarios. This idea of using AI comes with some tradeoffs. By using a modular AI algorithm that can take in text describing an event and return an emotion, we make the software creation process much faster and cheaper since generation of answers can be dynamic. At the same time we may lose correctness/quality in our answers or associations because at this point in time the level of AI is not the same as that of human deduction. Furthermore the use of AI limits the granularity of emotions that are able to be deduced. For example, in the mind-reading program done by Professor Simon Baron-Cohen there
were 412 different emotions used, but in our own system we work with a set of Ekman's 6 basic emotions due to AI interpretation limits.

While working with a set of 6 basic emotions may seem very limiting at first glance, there are two ideas that are exploited to rebut this. First, the AI in the system allows for multiple mappings of the Ekman 6 emotions to each event. This way more complex emotions can be implicitly defined by combinations of the simpler emotions used (i.e. disgust might equate to surprise + anger). While this is not an absolute solution, it helps to alleviate the issue of using such simple emotions to describe a wide array of events that may need more complex emotions to be associated with them. Furthermore the original intent of this project was that it would be geared towards younger ASD users who are in the earlier stages of developing their emotion-event association skills. This set of users will have less of a need for explicitly denoted complex emotions tied to events. By the time these users do move towards a need for more complex defined events, the use of this system in their earlier event-emotion association development will hopefully have imparted/equipped them with skills that will carry over into their self-assessment processes.

To address these issues of higher error rates and a smaller set of emotions due to AI techniques, the system harnesses another part of the software. Because this is a web-based UI there are new advantages that can be harnessed to help prevent or correct errors made by the AI. There are multiple affordances for "reporting" errors through the User Interface which is available to all users. If a user notices an emotion that has been incorrectly assigned to an event, or an event that is missing one of many emotions that should belong to it, they can input that data which is then fed back to the system. This data is noted and used to correct the system when those events and or emotions resurface in the future. This means that as the system gets used more, the fidelity of the
answers should get better and better. This is something made possible entirely by the web-based platform paradigm.

Besides allowing augmentation of the AI in the system, the web based application brings a host of other benefits not seen in the status quo of software in this realm. Deployment, software-upgrading, cross-platform accessibility and compatibility become problems with very simple solutions now that the application is web-based. With no need to install software on every user’s system we open up the channels of usage to a larger audience more quickly. Furthermore the UI of the system allows users to input customized events/scenarios that they wish to know the associated emotion for. These user-generated events can be reused by the system to further build the corpus of events/scenarios that already exist.

Along with these main characteristics of the project, there are also some smaller details which enhance the user experience. Since the project is game-based we track the high scores of users and allow them to log-in and keep track of their best scores to date. This allows them to compete against themselves and gauge whether or not they are improving as they use the system. This data can also be used as a metric for how well the system is doing in accomplishing its goal. Furthermore the games in this project are designed to be fun and interactive in pushing the learning experience.

**Artificial Intelligence: the heart of the application**

The AI of this system involves associating events with emotions and storing these relationships for retrieval and amendment.
Getting a PAD reading from an event
To go from a sentence to an emotion this system relies on MIT Media Lab based artificial intelligence. The specific module used is called Emotus Ponens. The module is based on the OpenMind Common Sense project started at the Media Lab. The module works by taking a string of text as input, in this case a sentence describing a scenario or event, and it outputs a list of values called a PAD rating (Liu 125-132). PAD stands for Pleasure-Arousal-Dominance and is used to describe affect in terms of numerical values (Mehrabian 121, 339-361). The PAD values output by the Emotus Ponens module range from -1 to 1 for each part of the PAD (pleasure, arousal, dominance). In this case a score of 1 would mean a high indication of that particular part of the PAD and a -1 would reflect the opposite of a particular part of the PAD. So if the following values were returned by Emotus Ponens, [1,0,0], it would mean that the text that was originally put in was highly associated with pleasure. If the 1 value was changed to -1 then the PAD rating would indicated a high amount of displeasure. One can see how a combination of these values could reduce down to various different emotional states, which is what Emotus Ponens aims to accomplish.

A key part of the AI involved in the Emotus Ponens module is "spreading activation-energy". This involves associating emotions not only with keywords in a sentence, but also with words in proximity to keywords (Lieberman 7). This idea helps to account for the issue of context, which can highly change the meanings associated with different words.

Going from a PAD to an Ekman 6 emotion
While Emotus Ponens helps in reducing a sentence to a PAD value, there is still the very crucial step of reducing this PAD value to actual emotions that can be represented in words. For example
a PAD value of [1,0,0] may be reduced to the emotional word "happy". In any case there is the need for an algorithm that can take in a PAD value and put out emotion-denoting words.

The algorithm used to go from a PAD value to an emotion word uses a tree-traversing approach.

This algorithm works by taking a PAD value list as input at the single top node. The algorithm was designed so that each level of the tree is concerned with only one part of the PAD value input. Going from top to bottom, the first level of the tree is concerned with the Pleasure part of the PAD, the second level of the tree is concerned with the Arousal part of the PAD and the third level of the tree is concerned with the Dominance part of the PAD. Each level of the tree has at least one node in it. At each node on each level of the tree a decision must be made to decide which path to follow. This decision is based on part of the PAD value pertinent at that level and two threshold values set for the particular node where the decision is being made. The threshold values act as separators for each of the three possible paths to be traversed if the part of the PAD
value being examined is less than the left threshold value, then the left path is traversed, if it is
greater than the right threshold value then the right path is traversed, otherwise the middle path is
traversed. At the end of each edge coming from a node there is either a set of emotion words or
another node that can be traversed. At the leaves of the tree, there only exist emotion words. This
necessarily ensures that the PAD of every sentence gets associated with some type of textual
description. The threshold values used to make decisions at each node were observationally
decided but can easily be changed at any time. The same also applies for the choice and
placement of emotion words in the tree. The details of current threshold values and emotion
words used at the time of writing of this thesis are available in the appendix where the source
code for the algorithm is given².

**Gathering, Judging and Storing events in the Database**

Even with a way to convert sentences to emotions there is still the need to gather a corpus of
sentences appropriate for this project. After gaining a corpus of sentences, they must be ran
through the algorithm and associated with emotions. Then these relationships must be stored for
later retrieval and possible amendment.

The corpus of events for this project was taken, with permission, from Professor Baron-Cohen’s
Mind Reading software³. These sentences were created to describe events with emotional
significance so they are a very good candidate to seed our database of events. This same corpus of
sentences was used to condition Emotus Ponens to key-in on particular keywords that show up
with high frequency in the corpus (Liu).

---

² See appendix code for PadToEmotionAlgo.py and EmotionDecisionNode.py
³ See reference to Baron-Cohen DVD material in the bibliography section
Each sentence in the corpus was run through the Emotus Ponens AI module and the PAD-to-emotion algorithm in order to be associated with emotions. A database was kept to store this information. Each sentence was uniquely identified and has the ability to have one or more emotions associated with it. This ability to read and modify multiple emotions per event is important because it relates back to the idea of using community intelligence to augment the AI. After the algorithm judges a sentence we may only have one emotion associated with that sentence. Over time if users report that other emotions should also be associated with that sentence, the data can be amended to reflect that and return this amended information the subsequent times when the association between the sentence and its emotion(s) is requested. The storage design also appropriates the ability for each sentence to be denoted as "bad", due to grammar or offensiveness. This denotation is also created from community use in the UI portion of the system. Lastly we also allowed the ability for users to create their own sentences in the UI of the system. These user-created sentences can be stored in the database and add to the corpus of sentences available. The system tracks user-generated sentence addition to the corpus by flagging them with a creation date.
**Associating a Sentence with an Emotion**

1. A sentence
2. A PAD value
3. Pad to Emotion Algorithm

**Events and Emotions in Database**

<table>
<thead>
<tr>
<th>sentence</th>
<th>emotion</th>
<th>flag_type</th>
<th>human_corrected_emotions</th>
<th>human_supplied</th>
</tr>
</thead>
<tbody>
<tr>
<td>John got a gift.</td>
<td>happy</td>
<td>Missed_emotion</td>
<td>Surprise-3;disgust-1</td>
<td>1/1/2006</td>
</tr>
<tr>
<td>Sarah read a book.</td>
<td>Nothing</td>
<td>Null</td>
<td>Null</td>
<td>Null</td>
</tr>
</tbody>
</table>

**Sentence**: The unique sentence that defines this row.

**Emotion**: The computer-generated emotion(s) associated with the sentence.

**Flag_type**: The type of correction(s), if any, made for this sentence by the community of users.

**Human_corrected_emotions**: A count of how many times any emotion has been suggested for this sentence.

**Human_supplied**: The date of creation for a sentence if the sentence was user-supplied.

**The Base Architecture**

The architecture of this project is built around the idea of presenting a user interface (UI) for interactive game play. While the process-flow and component details may slightly differ for each
type of game presented in the UI, there is a lot of commonality on a basic level. The components of this basic architecture exist and interact as described here.

First we must define the general parts of the architecture.

- One important part of the system is the database. The database holds all information necessary to run the system which includes sentence-emotion relationships, user IDs, and high scores.

- Another component of the system is the web application or server. The server provides the pages necessary for the UI portion of the game and also serves as the communication channel between the database and the UI. All information between the user and the database is passed along and sometimes modified by the web server. To do its job of relaying information, the web server contains other subcomponents, or modules, which can be used as needed, depending on the game and the scenario.

- The UI component of the system is abstract at the architectural level and described in more detail in the next section. Nonetheless it is important because it is the interface provided to the user that allows interaction with the system. The UI allows the user to play each game and send reports or other data back to the system. This is also where data is displayed to the user that is not only pertinent to the game they are playing but also to their personal account.
The following general actions occur in relation to the components of the system:

**Logging in** - Users can login at the UI. This sends a request to the web server to ask the database for the high score information for a particular user, along with any other information pertaining to them.

**Getting sentence-emotion relationships** - When a game begins or ends there is the need to get information from the database about the relationship between a set of sentences and emotions. This is initiated at the UI and sent to the db via the web server. The web server then sends back the relevant information to the UI and it is displayed to the user according to the rules of the game being played.

**Displaying sentence-emotion in the UI** - Each game has its own rules for when and how the sentence-emotion relationships are shown, but in all cases when the game is finished they are all revealed in a section of the UI. This display of the correct emotion-sentence relationships sets the stage for community feedback to the system.

**Reporting scores** - As expected, at the end of a game scoring occurs. When a score has been calculated for a user the score is sent to the web server if a new high score has been reached for that particular game. This score is stored back in the database via the web server. The database
also increments how many times a new high score has been achieved so that performance can be gauged.

**Reporting errors** - At the end of the game there are UI affordances for reporting errors in sentence quality and sentence-emotion relationships. When all the AI-module-based relationships are displayed in the UI, users may report that the sentence is faulty, or choose a correct emotion that is they feel should be associated with the sentence.

**The Base UI**

While the UI is a component of the system architecture, it is also a very complex entity unto itself. The UI for each game is slightly different per the requirements of the game, but they all have similar basic areas. These areas and their function are defined as follows on the general level.

### Game UI Before Play Begins

<table>
<thead>
<tr>
<th>Start</th>
<th>Login: Login or register to view high scores and keep track of scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start : Pick difficulty level and initiate game play</td>
<td>Hi-Score: View high scores specific to currently logged in user</td>
</tr>
</tbody>
</table>
Game UI During Play

GamePlay: main gameplay interaction

Status: view time left and number of items finished for game

Login Area

Hi-Score Area

ShowAnswers: view history of user-answers during gameplay and view correct answers after gameplay

Game UI After Play

GamePlay Area

Status Area

Login Area

ShowAnswers Area

Reporting: send feedback to the system for corrections

Hi-Score Area

Scoring: view final score calculation
All areas of the UI allow for input or display of useful data for the user.

The first area is called the Start Area. The Start Area is where a user first chooses what level of difficulty they would like to play the game at. This usually ranges from easy to hard. A user also initiates the actual game play from this area as well. This area is not visible after game play has started.

Another area of the UI is the Login area. This area is pretty straightforward and easy to use. This is where a user may register for the first time on the system so that they can begin to track their progress. Once a user has registered one time, they can use this area to login to the system.

The Hi-Score area is adjacent and highly related to the Login area. Once a user has logged in, the Score area display's the user's current high score for each of the games. Whenever a new high score is reached by a user, this area automatically updates to reflect it.

The GamePlay area of the UI is where the main interaction takes place between the user and the system. Once game play has been initiated from the Start area, this area is where a user actually input's their choices and answers for the game to score. In every game currently in the project a user may not only choose an answer in this area, but also "backup" and re-answer as long as time permits, which will be explained in the next area, the Status area.

The Status area is the part of the UI that the user can check to see how many tasks he or she has left to complete in a game and how much time they have left to do it. The status area always display's how many tasks are left and how many have been done. The area also displays a
countdown timer that is activated as soon as game play is initiated. By constantly checking the Status area while working in the GamePlay area a user can manage their tasks efficiently.

The ShowAnswers area is displayed during game play when a user is completing tasks and after the game has finished (time has run out or all tasks have been completed). When this area is displayed during game play it shows the history of answers a user has selected. This allows a user to review their answers and make corrections by backing up before game play has ended. Once game play is ended this area displays not only the answers chosen by the user, but also the answers determined by the system as correct. The answers are then compared for scoring in the Scoring area.

The Reporting area is actually a sub area of the ShowAnswers area. In this section of the UI a user may choose to report one of two things to the system. In the case of some games a user may choose to report that the sentence being used in a certain answer was not sensical or grammatically correct by marking it a bad sentence. In all games a user may report that the emotion associated with a certain sentence is incomplete by suggesting a different emotion that should be associated with the sentence. In both cases the report is sent back to the database via the web server and processed accordingly.

The Scoring area of the UI is displayed at the end of game play and simply shows the calculation and final score for a user’s performance in a game. In this area a user may review their score and decide to play again or quit the game.
Game 1

Overview
In Game 1 users are presented with a series of scenarios or events. Users must choose which emotions they think best describe the scenarios. This must be accomplished in a limited amount of time and with a variable amount of scenarios, both based on the chosen difficulty level of the game. The scenarios are displayed to the user one at a time, so users must choose an emotion to match the sentence being presented before moving on to the next sentence. The user should analyze each scenario presented before him or her so that they grasp what emotion is most likely to be associated with it. The hope is that this analysis will cause a user to logically deduce why an emotion should be associated with a certain scenario, thus becoming more skilled in the parallel ability to analyze real world scenarios in a similar manner.

Noting the direction of this cognitive process, the game is designed to specifically stress the skill of going from a scenario or event to an emotion. While this is only one way of making event-emotion associations it is very important and designed to mimic the most basic and frequently encountered real life situation of having to make an event-emotion association.

This game is deemed moderately difficult because the number of emotion choices for each sentence, six, is neither extremely low nor high, requiring moderate analysis and time to make each decision.
UI Before Play Begins

ASD Games

Choose A Difficulty for the game:
- Easy [10 events, 55sec]
- Medium [20 events, 80sec]
- Hard [30 events, 115sec]

Don't Use a Timer

Event Sentence: [Input field]

Emotion Choices: [Options]

Time Remaining: XX

Done

To Go

X

X

Answers:

Sentence | Your Answer | Our Answer | Report This

Score:

**If you see a mistake "REPORT IT" by clicking on the buttons at the end of the rows. **

Log In

Log In

Log In
UI During Play

ASD Games

Home  | Game1  | Game2  | Game3

Game 1

Event Sentence:
Julie is congratulatory when a colleague announces he and his wife are expecting a baby.

Emotion Choices:
surprise
happiness
sadness
disgust
fear
anger
nothing

Time Remaining: 17

Done  | To Go

Log In

backup

Answers:

<table>
<thead>
<tr>
<th>Sentence</th>
<th>Your Answer</th>
<th>Our Answer</th>
<th>Report This</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peter feels tearful as he says goodbye to his girlfriend.</td>
<td>surprise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandra is happy sitting in her garden looking at the flowers.</td>
<td>happiness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kyle believes the woman's story about her experiences.</td>
<td>sadness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rachel feels soppy when she buys a cute teddy bear for her baby cousin and then gets one for herself.</td>
<td>disgust</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drew feels pleasure when his girlfriend massages his neck.</td>
<td>sadness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When Peter tells his girlfriend that he is a Superhero, he is joking.</td>
<td>happiness</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**If you see a mistake "REPORT IT" by clicking on the buttons at the end of the rows.**

Score:

Log In

Log In

Log In
When Peter tells his girlfriend that he is a Superhero, he is joking.

If you see a mistake, report it by clicking on the buttons at the end of the rows.

Score:

- #Correct: 2
- Game-type factor: 0.5
- Time bonus: 0

You received a score of 1 points!

play again

back to home
Design Details
Following is an expansive scenario describing the usage of this game.

1. Log in

Like all other games in the system, a user can begin by logging in or registering.

In the case of registering, a user need only provide a username, email address and password to be verified. This information is checked by client side code for errors in formatting or invalid character usage in all fields. Next this information is sent to the web server where it is further checked before being sent to the database for commitment. If any errors occur a message is sent back to the client and the applicable error is displayed in the UI. Errors can range from invalid formatted emails, to pre-existing usernames or emails in the database. If the check for verifying the sent information is ok, the username is sent back and displayed in the UI.

For logging in, only the username and password need to be supplied. When the user clicks the login button this information is sent to the web server and checked against the database. If the username and password are associated in the database, then the high score data for that user is sent back to the UI.

Once registration or login is verified by the web server a cookie is placed on the user's machine that contains the high score data for the user. This cookie also contains the username for a user. This is done so that upon returning to the site before the cookie expires, re-logging in will not be required. At this time the high score for each game is read from the placed cookie and displayed in the HiScore area. If a user does not login before using the system they are not prohibited from
play, but the high score area is filled with a message saying they are not logged in. This passively alerts the user to the option of logging in or registering without hindering usability.\(^4\)

This part of the game scenario was designed to be extremely easy to accomplish. Thus it is done using asynchronous server calls. At the time of this writing security was not a major issue while time was, so issues about the security of asynchronous server calls were overlooked.

![Login Area: not logged in versus logged in](image)

2. Read more instructions about the game, or not

A user has the ability to read more instructions in case they were linked directly to the game section of the application, or if they just want more information. This section can be expanded or collapsed to give the user more real estate during game play. At the time of this writing the instruction section reminds the user about the ability to backup when answering questions, the objective of the game and how to report errors found in the game.

Hidden versus Unhidden Instructions

3. Pick a difficulty level

**Difficulty Level and Game Initiation UI**

Choose A Difficulty for the game:
- Easy [10 events, 55sec]
- Medium [20 events, 80sec]
- Hard [30 events, 115sec]

Don't Use a Timer

Start

At this point in the scenario the user needs to choose what level of game play they wish to engage in. This game has low, medium and high difficulty levels displayed to the user for selection. Each level is distinguished by the number of sentences and the amount of time that will be allotted for game play.

Note: While the actual number of sentences and time allotted differs from game to game, the description is the same, in that the ratio of the number of sentences to the amount of allotted time increases slightly, while the actual numbers themselves increase substantially as you go from easy to hard. The values used are arbitrary and can easily be changed.
4. *Start game*\(^5\)

Now a user is ready to start game play, and may click the start button to do so. At this time the number of sentences to use, as determined by the difficulty level selected, is requested from the database via the web server. The data retrieved is a corresponding number of sentence-emotion pairs and is sent back to the web server and ultimately the client side code of the browser. Once this information is back to the client side, one of the sentences is presented to the user in the GamePlay area, along with a set of emotions that the user must choose from. The remaining events, not currently being shown are kept on client side variables along with their emotion associations. At this time the timer is also set to the allotted time associated with this level of difficulty and a countdown is started. Similarly, the number of sentences to match for this game and the number of sentences already matched, zero at this point, are presented in the Status area.

5. *GamePlay area usage*\(^6\):

During game play the user now must choose what emotion they choose to associate with the sentence that is currently being displayed. Every time the user chooses an emotion, the client-side code stores that user-chosen event-emotion pair and also displays that association in the table of the ShowAnswers area. This data is placed in only the first two of the 4 columns of the table, while the other columns remain blank. The first column of the table will hold the sentence judged, while the second column will hold the emotion that the user chose. Concurrently a new event is displayed in the "Event Sentence" box of the GamePlay area. At this time the Status area is also updated to show how many associations have been completed and how many are left to go, along with the current amount of time left to finish the game. Each time the user makes an association this process will repeat, unless there is no more time left or there are no more sentences left to judge. At any time before one of these two events occurs, signaling the end of the game, a user

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\(^5\)See appendix code for Game1.js:125-342, ASDGameServer.py:48-69, WebAppToDBMethods.py:125-188  
\(^6\)See appendix code for Game1.js:342-420
may choose to backup and change any association that was made earlier, using the backup button in the GamePlay area. Whenever the backup button is invoked the Status area updates accordingly to reflect the new amount of completed and uncompleted associations.

**GamePlay Area During Play**

Event Sentence:

*Julie is congratulatory when a colleague announces he and his wife are expecting a baby*

Emotion Choices:

- surprise
- happiness
- sadness
- disgust
- fear
- anger
- nothing

backup

**ShowAnswers Area During Play**

<table>
<thead>
<tr>
<th>Answers:</th>
<th>Sentence</th>
<th>Your Answer</th>
<th>Our Answer</th>
<th>Report This</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peter feels tearful as he says goodbye to his girlfriend.</td>
<td>surprise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandra is happy sitting in her garden looking at the flowers.</td>
<td>happiness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kyle believes the woman's story about her experiences.</td>
<td>sadness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rachel feels soppy when she buys a cute teddy bear for her baby cousin and then gets one for herself.</td>
<td>disgust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drew feels pleasure when his girlfriend massages his neck.</td>
<td>sadness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When Peter tells his girlfriend that he is a Superhero, he is joking.</td>
<td>happiness</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. See answers displayed at the end of the game. View which answers were correct and incorrect.7

7 See appendix code for Game1.js:453-533
Once time has expired or all the available associations have been made, the GamePlay area is disabled for usage. At this point all data in that area and the Status area are frozen. At this time all the system-generated, or "correct", event-emotion associations are displayed in the third column of the table in the ShowAnswers area. The third column will hold the emotion(s) that the system feels are associated with the sentence in the first column of each row. If a user answer differs from a system answer, the system answer is highlighted in red, while a coinciding user answer will cause the system answer to be highlighted in green. This offers an easy indication of which answers the user got correct and incorrect. The user may look over their answers versus the system answers to reiterate or correct their analysis of the association.

<table>
<thead>
<tr>
<th>Sentences</th>
<th>Your Answer</th>
<th>Our Answer</th>
<th>Report This</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peter feels tearful as he says goodbye to his girlfriend.</td>
<td>surprise</td>
<td>surprise/disgust</td>
<td>report it!</td>
</tr>
<tr>
<td>Sandra is happy sitting in her garden looking at the flowers.</td>
<td>happiness</td>
<td>nothing/happiness</td>
<td>report it!</td>
</tr>
<tr>
<td>Kyle believes the woman's story about her experiences.</td>
<td>sadness</td>
<td>nothing</td>
<td>report it!</td>
</tr>
<tr>
<td>Rachel feels soppy when she buys a cute teddy bear for her baby cousin and then gets one for herself.</td>
<td>disgust</td>
<td>surprise</td>
<td>report it!</td>
</tr>
<tr>
<td>Drew feels pleasure when his girlfriend massages his neck.</td>
<td>sadness</td>
<td>disgust/disgust</td>
<td>report it!</td>
</tr>
<tr>
<td>When Peter tells his girlfriend that he is a Superhero, he is joking.</td>
<td>happiness</td>
<td>surprise/disgust</td>
<td>report it!</td>
</tr>
</tbody>
</table>

7. Report errors if applicable

When the full answers are shown at the end of a game, a user may also review the ShowAnswers area to determine and report if there was a mistake made on the part of the system. In the last column of the table containing the event-emotion associations, there are buttons that allow the user to report a bad sentence or a bad answer. If a bad sentence is reported, information detailing which sentence is bad is sent to the database via the web server and recorded. If the user reports a bad answer, meaning that the emotion(s) picked by the system is/are incomplete, they can choose

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8 See code appendix for Game1.js:534-624, ASDGameServer.py:88-94, WebAppToDBMethods:266-399
what they feel the correct emotion should be. This suggested emotion, along with the pertinent sentence, is then sent to the database via the web server.

Note that the sent information about errors remains persistent in the database for future use. While the specifics of how the information is used can be tweaked, at the time of this writing a sentence that is reported as bad is wholly stricken from use. Similarly when an emotion is chosen to be augmented for a certain sentence it is associated and tallied such that each user-reported emotion for that emotion-event pairing is remembered. Whenever an event-emotion association is requested from the system, the tallies for user-suggested emotions are all counted and compared to a threshold value, currently set to two. If the tally for any emotion suggested for that sentence is over the threshold then that emotion is selected as being associated with the event (in addition to any other emotions that are currently associated with the event). Incentive and reminder to report errors is given by text and a link at the bottom of the table in the ShowAnswers section.
8. Check score and see calculation

Calculating and showing the final score is similar in all games. The only difference from game to game is the values used to calculate the score.

At the end of game play a user can see what their final score was and how it was calculated.

Things that factor into the score at the time of writing this thesis are the number of correct answers, the amount of time left over, the TimeWeight and the GameWeight. The number correct is simply the number of associations that the user got correct as assumed by the system. The time left over is simply the amount of time left over. The TimeWeight variable is different for each
game and is chosen based on the overall difficult of the type of game being played. For this game the TimeWeight is 0.05. The GameWeight also differs per type of game and for this game the GameWeight is 0.5. The total score for a game is calculated by performing the following sum of products. The number correct times the GameWeight, plus, the time left over times the TimeWeight. As illustrated, parts of the formula are shown along with the final calculated score.

<table>
<thead>
<tr>
<th>Scoring Area After Play</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score:</td>
</tr>
<tr>
<td>#Correct: (2)</td>
</tr>
<tr>
<td>Game-type factor: (0.5)</td>
</tr>
<tr>
<td>Time bonus: (0)</td>
</tr>
<tr>
<td>(#Correct * Game-type factor) + TimeBonus = Total</td>
</tr>
</tbody>
</table>

You received a score of [1] points!

play again

back to home

9. **Play again or quit**

After checking ones score a user can now choose to play again or go back to the home page.
**Game 2**

**Overview**

In Game 2, users are presented with a series of sentences, and one static emotion. Users must decide whether or not the current sentence being displayed exhibits an emotion that matches the static emotion. The static emotion can be chosen randomly or explicitly by the user before they begin, and they simply have to click yes or no to indicate a match or not. This goal must be accomplished in a limited amount of time and with a variable amount of sentences, both based on the chosen difficulty level of the game. The sentences are displayed to the user one at a time, so users must indicate a match or no match before moving on to the next sentence to judge. In his or her mind, the user should construct a solid meaning of what they think is the meaning of the static emotion being used during game play. They should then analyze each sentence presented before him or her and determine whether it matches that idea they have regarding the emotion. The hope is that this analysis will cause a high functioning autistic user to determine why an event should or shouldn’t be associated with a certain emotion. This should increase their skill to approach emotion association from another angle.

Noting the direction of the cognitive process, this game is designed to specifically stress the skill of going from a known emotion and deducing if an event should be associated with it. While this is again only one way of making the event-emotion association it is useful in the case where someone has a limited, but firm set of emotional knowledge. This game was designed to increase the flexibility that a high functioning autistic user would have in solving or logically deducing event-emotion associations.

This game is deemed relatively easier than the others because there are only two possible options when answering, reducing the analysis and time required to make a decision.
Before Play Begins

Choose A Difficulty for the game:
- Easy (10 events, 60sec)
- Medium (20 events, 110sec)
- Hard (30 events, 165sec)

To start, pick an emotion or let us randomly pick an emotion for you:
- choose an emotion
- use random emotion

Choose whether or not each event matches the following emotion:
Event Sentence: [A Match?]

Answers:
[Table with columns: Sentence, Your Answer, Our Answer, Report This]

**If you see a mistake "REPORT IT" by clicking on the buttons at the end of the rows. [Learn More]

Score:
During Play

ASD Games

Home | Game1 | Game2 | Game3

Game 1

more instructions

Choose whether or not each event matches the following emotion:

sadness

Event Sentence:

Julie is feeling playful and tickles her husband

A Match?

yes

no

Time Remaining

:50

username:

password:

Log In

Game 2

Log In

Game 3

Log In

Answers:

<table>
<thead>
<tr>
<th>Sentence</th>
<th>Your Answer</th>
<th>Our Answer</th>
<th>Report If True</th>
</tr>
</thead>
<tbody>
<tr>
<td>When Kim completes the difficult computer game she feels jubilant.</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kyle is calculating when he mentions that his friends are going to the</td>
<td>no</td>
<td></td>
<td></td>
</tr>
<tr>
<td>game on Saturday. He knows his wife will suggest they go along.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kyle feels moody on dark winter days.</td>
<td>no</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandra feels soppy about rabbits because they are such gentle creatures.</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ben feels frustrated when he has to wait 45 minutes for a bus.</td>
<td>no</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peter feels attacked when the lady criticises his carpentry.</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**If you see a mistake "REPORT IT" by clicking on the buttons at the end of the rows. Learn More.

Score:
Design Details
Following is an expansive scenario describing usage of this game.

1. Log in
The details for logging in, registering, and displaying high scores is the same for each game. See the description for this part of Game1 for more details.
2. Read more instructions about game, or not

The ability to read more instructions is the same for each game in the system. See the description for this part of Game 1 for more details.

3. Pick a difficulty level

In this part of the scenario the only differences from game to game are the actual values denoted for each level of game play. See the description for this part of Game 1 for more details.

<table>
<thead>
<tr>
<th>Difficulty Level and Game Initiation UI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Choose A Difficulty for the game:</strong></td>
</tr>
<tr>
<td>☑ Easy [10 events, 60sec]</td>
</tr>
<tr>
<td>☑ Medium [20 events, 110sec]</td>
</tr>
<tr>
<td>☑ Hard [30 events, 165sec]</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>To start, pick an emotion or let us randomly pick an emotion for you:</td>
</tr>
<tr>
<td>choose an emotion ▼ <del>OR</del> use random emotion</td>
</tr>
</tbody>
</table>

4. Pick an emotion to work with, or let the system choose randomly.

A user now needs to decide what emotion they would like to work with for the game. The user may either pick one of the six Ekman emotions from a dropdown, or opt to have the system pick and emotion randomly. This variable is stored and remembered on the client side when the decision is made and automatically starts the game.

5. Start game

When a user completes the preceding step of choosing an emotion to work with, the game play automatically starts. At this time the number of sentences to use, as determined by the difficulty level selected, is requested from the database via the web server. The data retrieved is a

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9 See appendix code for Game2.js:104-331, ASDGameServer.py:48-69, WebAppToDBMethods.py:125-188
corresponding number of sentence-emotion pairs and is sent back to the web server and
ultimately the client side code of the browser. Once this information is back to the client side, the
UI is ready for play. The UI in the GamePlay area will show:

- One of the sentences retrieved. (The remaining sentences, not currently being shown are kept on client side variables along with their emotion associations.)

- Two buttons that can be clicked, yes or no.

- The static emotion that has been selected for matching during game play.

At this time the timer in the Status area is set to the allotted time associated with this level of
game play and a countdown is started. Also, the number of events that need to be judged for this
game and the number that have been judged, zero so far, is shown in the Status Area.

6. GamePlay area usage10

Now that game play has ensued the user must determine if the current sentence matches the emotion displayed or not. Every time the user chooses yes or no the client side code stores that answer and the sentence being judged. The answer and the sentence are also displayed in the table of the ShowAnswers area. This data is placed in only the first 2 of the 4 columns of the table, while the other columns remain blank. The first column of the table will hold the sentence judged, while the second column will hold an answer of yes or no, which the user chose. At this same time a new event is displayed in the "Event Sentence" box of the GamePlay area. Concurrently, the Status area is updated to show how many sentences have been judged and how many are left to judge, along with the current amount of time left to finish the game. Each time the user makes a yes or no decision this process will repeat, unless there is no more time left or there are no more sentences left to judge. At any time before one of these two events occur, signaling the end of the game, a user may choose to backup and change any decision that was made earlier, using the

10 See appendix code for Game2.js:332-425
backup button in the GamePlay area. Whenever the backup button is invoked the Status area updates accordingly to reflect the new amount of completed and uncompleted decisions.

**GamePlay Area During Play**

Choose whether or not each event matches the following emotion:

![sadness]

Event Sentence:

Julie is feeling playful and tickles her husband

A Match?

A- yes

B- no

backup

**ShowAnswers Area During Play**

<table>
<thead>
<tr>
<th>Answers</th>
<th>Sentence</th>
<th>Your Answer</th>
<th>Our Answer</th>
<th>Report This</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>When Kim completes the difficult computer game she feels jubilant.</td>
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</tr>
<tr>
<td></td>
<td>Kyle is calculating when he mentions that his friends are going to the game on Saturday. He knows his wife will suggest they go along.</td>
<td>no</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kyle feels moody on dark winter days.</td>
<td>no</td>
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<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td>Peter feels attacked when the lady criticises his carpentry.</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. See answers displayed at the end of the game. View which answers were correct and incorrect.

Once time has expired or all the available sentences have been judged by the user, the GamePlay area is disabled for usage. At this point all data in that area and the Status area are frozen. In addition, all the system-generated, or "correct", judgments for each sentence are displayed in the third column of the table in the ShowAnswers area. The third column will not only hold the text of yes or no, but also the text for the emotion(s) that do/does match the corresponding sentence. If a user judgment differs from the system judgment, the system judgment in the third column is

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See appendix code for Game2.js:457-563

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highlighted in red, while if a user answer coincides with the system answer, the system answer is highlighted in green. This offers an easy indication of which answers the user got correct and incorrect. The user may look over their answers versus the system answers to reiterate or correct their judgment of the sentences emotional association.

<table>
<thead>
<tr>
<th>Answers:</th>
<th>Sentence</th>
<th>Your Answer</th>
<th>Our Answer</th>
<th>Report This</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carol is disapproving of her husband’s plan to buy a Rolls Royce. She thinks expensive cars are a waste of money.</td>
<td>no</td>
<td>yes -&gt;(surprise, disgust, anger)</td>
<td>report it</td>
<td></td>
</tr>
<tr>
<td>Tim is enjoying himself while playing music with his friends.</td>
<td>no</td>
<td>yes -&gt;(happiness, surprise)</td>
<td>report it</td>
<td></td>
</tr>
<tr>
<td>Ali is condemning of the war. He thinks it shouldn't happen.</td>
<td>yes</td>
<td>yes -&gt;(condemning, disgust)</td>
<td>report it</td>
<td></td>
</tr>
<tr>
<td>Kim is agonizing over whether to find the man guilty or not guilty when she does jury duty.</td>
<td>no</td>
<td>yes -&gt;(fear)</td>
<td>report it</td>
<td></td>
</tr>
<tr>
<td>Tom is miffed when he forgets to take his library books back and has to pay a fine.</td>
<td>yes</td>
<td>no -&gt;(nothing)</td>
<td>report it</td>
<td></td>
</tr>
<tr>
<td>Sally feels praised by her teammates when they congratulate her for scoring the winning goal</td>
<td>no</td>
<td>no -&gt;(nothing)</td>
<td>report it</td>
<td></td>
</tr>
<tr>
<td>Rachel feels pestered by the office junior when he won't stop asking her for a date.</td>
<td>yes</td>
<td>no -&gt;(nothing)</td>
<td>report it</td>
<td></td>
</tr>
</tbody>
</table>

8. Report errors if applicable
The process of reporting errors found in Game 2 is similar to that of Game 1. Users may report a bad sentence, meaning a sentence they were presented with was grammatically incorrect or nonsensical, or users may report a "bad answer" meaning that we have not included an emotion that should be associated with the sentence. All errors reported are kept and reused in the system. See the description of this scenario in the Game 1 section for more information.

9. Check score and see calculation
This scenario of calculating and showing the final score is similar in all games. The only difference from game to game is the values used to calculate the score.

At the end of game play a user can see what their final score was and how it was calculated here. Things that factor into the score at the time of writing this thesis are the number of correct
answers, the amount of time left over, the TimeWeight and the GameWeight. The number correct is simply the number of associations that the user got correct as assumed by the system. The time left over is simply the amount of time left over. The TimeWeight variable is different for each game and is chosen based on the overall difficult of the type of game being played. For this game the TimeWeight is 0.02. The GameWeight also differs per type of game and for this game the GameWeight is 0.2. The total score for a game is calculated by performing the following sum of products. The number correct times the GameWeight, plus, the time left over times the TimeWeight. As illustrated, parts of the formula are shown along with the final calculated score.

### Scoring Area After Play

<table>
<thead>
<tr>
<th>Score:</th>
</tr>
</thead>
<tbody>
<tr>
<td>#Correct: (4)</td>
</tr>
<tr>
<td>Game-type factor: (0.2)</td>
</tr>
<tr>
<td>Time bonus: (0)</td>
</tr>
<tr>
<td>(#Correct * Game-type factor) + TimeBonus = Total</td>
</tr>
</tbody>
</table>

You received a score of [0.8] points!

10. Play again or quit

After checking ones score a user can now choose to play again or go back to the home page.
**Game 3**

**Overview**
In Game 3, the paradigm of game design shifts a bit from that of games 1 and 2. Here users are given one static emotion to work with and must enter in their own sentences to try and match that emotion. This type of game requires a lot more interaction and thinking on the part of the user since they have to generate an event in their mind and then construct a sentence to convey the event, all while making sure that the event matches a particular emotion. It is also important that the user uses words in the sentence that are descriptive enough to definitively link it to the emotion. The user may not use the word and in some cases the root-word of the emotion they are trying to match, forcing them to make associative links between words and thus events. The static emotion that is being matched can be chosen randomly or explicitly by the user before they begin, just like in Game 2. The number of sentences that a user must input and the amount of time they have to do so, are both dictated by the chosen difficulty level of the game.

This game was designed so that the user must constructs a sentence describing an event that they feel definitively matches the emotion they are working with. The hope is that this cognitive process will cause a high functioning autistic user to go beyond simply recognizing given emotions and events, and begin to create events that can be associated with emotions. Doing well in this game necessarily shows a mastery of the goals of games 1 and 2 and stresses another component in social interaction skills. This should not only help a user interpret and get by in social interaction, but begin to create and shape social interaction according to their will, just like neurotypical people, or even better.

In addition to the user benefits in this game, there is a flip side that can provide benefit for the system. In this case user generated sentences can be added to the corpus of sentences in the
database increasing its size. More events in the database can be more helpful so it is an option that is available and can be explored and evaluated as more users play this Game.

This game is deemed relatively harder than the others because of the creative component required on top of the matching component to complete the goal.
Enter an event matching the following emotion: 

**sadness**

Answers:

<table>
<thead>
<tr>
<th>Your Sentence</th>
<th>Emotion To Match</th>
<th>A Match for 'sadness'?</th>
<th>Report This</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am alone in the dark</td>
<td>sadness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Someone steals my favorite toy</td>
<td>sadness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I move away from my best friend</td>
<td>sadness</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**If you see a mistake "REPORT IT" by clicking on the buttons at the end of the rows.**

Score:
**UI After Play**

**ASD Games**

<table>
<thead>
<tr>
<th>Home</th>
<th>Game1</th>
<th>Game2</th>
<th>Game3</th>
</tr>
</thead>
</table>

**Game III**

Enter an event matching the following emotion:

<table>
<thead>
<tr>
<th>Emotion To Match</th>
<th>A Match for ‘sadness’?</th>
</tr>
</thead>
<tbody>
<tr>
<td>sadness</td>
<td></td>
</tr>
</tbody>
</table>

**Answers:**

<table>
<thead>
<tr>
<th>Your Sentence</th>
<th>Emotion To Match</th>
<th>A Match for ‘sadness’?</th>
<th>Report This</th>
</tr>
</thead>
<tbody>
<tr>
<td>I move away from my best friend</td>
<td>sadness</td>
<td>no -&gt; (happy)</td>
<td>report AI</td>
</tr>
<tr>
<td>Someone steals my favorite toy</td>
<td>sadness</td>
<td>no -&gt; (happy)</td>
<td>report AI</td>
</tr>
<tr>
<td>I am alone in the dark</td>
<td>sadness</td>
<td>no -&gt; (happy)</td>
<td>report AI</td>
</tr>
</tbody>
</table>

**If you see a mistake “REPORT IT” by clicking on the buttons at the end of the rows.**

**Scores:**

- Correct: 0
- Game-type factor: 2
- Time bonus: 0

\[
\text{Total} = (\text{Correct} \times \text{Game-type factor}) + \text{TimeBonus}
\]

You received a score of [0] points!

- play again
- back to home

---

**Design Details**

Following is an expansive scenario describing usage of this game.

1. **Log in**

   The details for logging in, registering, and displaying high scores is the same for each game. See the description for this part of Game1 for more details.

2. **Read more instructions for the game, or not**
The ability to read more instructions is the same for each game in the system. See the description for this part of Game 1 for more details.

3. **Pick a difficulty level**

In this part of the scenario the only differences from game to game are the actual values denoted for each level of game play. See the description for this part of Game 1 for more details.

<table>
<thead>
<tr>
<th><strong>Difficulty and Game Initiation UI</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Choose A Difficulty for the game:</strong></td>
</tr>
<tr>
<td>- Easy [5 events, 85sec]</td>
</tr>
<tr>
<td>- Medium [10 events, 160sec]</td>
</tr>
<tr>
<td>- Hard [15 events, 230sec]</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Don't Use a Timer</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>To start, pick an emotion or let us randomly pick an emotion for you:</strong></td>
</tr>
<tr>
<td>- choose an emotion</td>
</tr>
<tr>
<td>- OR- use random emotion</td>
</tr>
</tbody>
</table>

4. **Pick an emotion to work with, or let the system choose one randomly.**

A user now needs to decide what emotion they would like to work with for the game. The user may either pick one of the six Ekman emotions from a dropdown, or opt to have the system pick and emotion randomly. This variable is stored and remembered on the client side when the decision is made and automatically starts the game.

5. **Start game**

When a user completes the preceding step of choosing an emotion to work with, the game play automatically starts. At this time the number of sentences to use, as determined by the difficulty level selected, is recorded, and the following are showing in the GamePlay area:

- The static emotion that has been selected for matching during game play.

---

• An editable text field that can be typed into
• An ‘ok’ button to submit the text in the given text field

At this time the timer in the Status area is set to the allotted time associated with this level of game play and a countdown is started. Also, the number of sentences that need to be entered and that have been entered, zero so far, are shown in the Status Area. At this point no information about game play has been sent to the web server.

6. GamePlay area usage

Now that game play has ensued the user must create an event that descriptively describes the emotion being used for this game. The user simply types in a sentence to the text field and hits enter or the Ok button to submit it. Whenever the user-created sentence is submitted, it is stored in client side code and also displayed in the table of the ShowAnswers area, along with the Emotion being matched. This data is placed in only the first 2 of the 4 columns of the table, while the other columns remain blank. The first column of the table will hold the sentence entered by the user, while the second column will hold the static emotion being matched against. At this same time a text field of the GamePlay area goes blank and takes focus so that typing of a new sentence can begin immediately. Concurrently, the Status area is updated to show how many sentences have been entered by the user and how many more need to be entered to complete the game. The Status area also displays the current amount of time left to finish the game. Each time the user enters a sentence this process will repeat, unless there is no more time left or there are no more sentences to enter. At any time before one of these two events occur, signaling the end of the game, a user may choose to backup and change any sentence that was entered earlier, using the backup button in the GamePlay area. Whenever the backup button is invoked, the last entered sentence is placed back in the text field and highlighted. Invoking the backup button also causes

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13 See appendix code for Game3.js: 342-457
the Status area to update accordingly, reflecting the new amount of entered and un-entered sentences.

**GamePlay Area During Play**

Enter an event matching the following emotion:

- **sadness**

**ShowAnswers Area During Play**

<table>
<thead>
<tr>
<th>Your Sentence</th>
<th>Emotion To Match</th>
<th>A Match for 'sadness'?</th>
<th>Report This</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am alone in the dark</td>
<td>sadness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Someone steals my favorite toy.</td>
<td>sadness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I move away from my best friend.</td>
<td>sadness</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. **See answers displayed at the end of the game. View which answers were correct and incorrect.**

Once time has expired or the total number of requested sentences has been entered by the user, the GamePlay area is disabled for usage. At this point all data in that area and the Status area are frozen.

At this point the correct answers, as judged by the computer-AI, need to be displayed. In order to do this the client side code sends over all the user-generated sentences to the web server for judgment by the AI module. The AI module runs each sentence through the algorithm described earlier and returns the emotion associated with each of them. If the sentence already exists in the database, the system gets the emotions denoted in the database for that sentence; this means it will include user-suggested emotion corrections if they exist. At this point the user-generated sentences can also be entered into the database if they do not already exist. Once all sentences
have their correct emotional associations determined they are all sent back to the client side code.

With a list of the correct emotional associations for each of the user-entered sentences, the client side code can compare these to the emotion that was supposed to be matched in the game. For each sentence entered, if the associated emotion returned by the web server matches that of the static emotion for the game, it is deemed correct, otherwise it is deemed incorrect. These results are recorded and placed into the third column of the table in the ShowAnswers area. The third column shows whether or not the sentence in that row was a match for the given emotion and then shows which emotions do in fact go with that sentence, regardless of correctness. Incorrectly matched sentences cause the third column of their row to be highlighted in red, while matching ones cause the third column of the row to be highlighted in green. This offers an easy indication of which answers the user got correct and incorrect.

At this point the user may look over their answers versus the system answers to reiterate or correct their judgment of the sentences that they entered and their emotional associations.

<table>
<thead>
<tr>
<th>ShowAnswers Area After Play</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Answers:</strong></td>
</tr>
<tr>
<td><strong>Your Sentence</strong></td>
</tr>
<tr>
<td>I move away from my best friend.</td>
</tr>
<tr>
<td>Someone steals my favorite toy.</td>
</tr>
<tr>
<td>I am alone in the dark.</td>
</tr>
</tbody>
</table>

8. Report errors if applicable

---

15 See appendix code for Game3.js: 540-626
The process of reporting errors found in Game 3 is similar to that of games 1 and 2, save for the lost option to report a bad sentence. Because the sentence is user-generated, the only system error plausible is that of a bad answer. Thus there is only affordance for a user to report a "bad answer" meaning that we have not included an emotion that should be associated with the sentence. As usual, all errors reported are kept and reused in the system. See the description of this scenario in the Game 1 section for more information.

9. Check score and see calculation

This scenario of calculating and showing the final score is similar in all games. The only difference from game to game is the values used to calculate the score.

At the end of game play a user can see what their final score was and how it was calculated here. Things that factor into the score at the time of writing this thesis are the number of correct answers, the amount of time left over, the TimeWeight and the GameWeight. The number correct is simply the number of associations that the user got correct as assumed by the system. The time left over is simply the amount of time left over. The TimeWeight variable is different for each game and is chosen based on the overall difficult of the type of game being played. For this game the TimeWeight is 0.2. The GameWeight also differs per type of game and for this game the GameWeight is 2.0. The total score for a game is calculated by performing the following sum of products. The number correct times the GameWeight, plus, the time left over times the TimeWeight. As illustrated, parts of the formula are shown along with the final calculated score.
10. **Play again or quit**

After checking ones score a user can now choose to play again or go back to the home page.
Findings
After building the application as described in the prior sections, it was put up for public consumption. At the time of writing this application was hosted at http://asdgames.dyndns.org. The application was built to the specification described above and many users were recruited to try it out. Links to the application were placed on sites that were resource centers for people with forms of ASD. Users with and without autism both used the application over about a 3 week period. By analyzing data about usage statistics, and collecting feedback surveys from a random sampling of users, the following findings arose. Overall, these findings summarily lead to a number of conclusions in the next section.

Analyzing Usage Statistics

Using a free stat counter on the site, the general usage statistics of people visiting the site were able to be captured. Over the three week period 473 unique users saw and used the application, with 47 of these visitors returning for later use. Altogether users ended up generating about 3400 page loads as well.

Six people signed up as registered members for the site. Registration was a prerequisite for the system to track details about individual usage of the application, thus only after signing up was activity recorded for these registered members. Of the six registered members, five of them completed game 1 after registering, five of them played game 2 after registering, and 3 of them played game 3 after registering. Two of the six users were able to improve their high scores for game 1 once.

Usage Statistics Summary:
- 473 unique users
- 47 returning visitors
- 3400+ page loads
- 6 registered users
- 2 score improvements
Feedback Form Results

One out of every three users who completed at least one game at the site was prompted with a feedback form. The forms had 4 multiple choice questions and one section for comments. Below is some of the response data gathered.

Statistics on the responses for the four multiple choice questions:

Q1) “Does this and/or the other games seem helpful to you in any way?”:
   - Yes(14 users)
   - No(7 users)

Q2) “Would you consider returning to this site again to play games?”:
   - Yes(15 users)
   - No(6 users)

Q3) “Do you think regular game play could improve your event-emotion association skills?”:
   - Yes(14 users)
   - No(7 users)

Q4) “What has been your overall user experience for this site so far?”:
   - Good(7 users)
   - Mediocre(10 users)
   - Bad(4 users)

These are some comments that gave substantial insight on how the application was faring in public usage.

Positive Reactions:
   - “I wish I could have more time to learn.... it is too quick for me, ... [...] thank you for developing these, I think they may be able to help over time.... maybe something with pictures or diagrams would help too : )”

Mixed Reactions:
   - “I don’t think most of these sentences go with the set of emotions here. This set comes from a limited selection of cross-cultural facial expressions, and poorly fits these sentences. The phrase "nothing" could be changed to "none of these" to help, and even better would be to allow people to enter a more appropriate emotional state label. If multiple people enter the same one, it could help the system learn.”
   - “I’m thinking that it can be difficult with regards to time allowed. Some of the words are advanced vocabulary ie: maudlin for someone to immediately associate. Sometimes, there are emotions not listed like "guilt" or
"embarrassment" which are not quite anger/sadness or fear that seem unavailable in a pinch for answering."

- "I find my answers do not match up with the "Correct" answers. I am a "neurotypical" person, and I believe I can understand and read emotions as well as the average person. This site could be useful if it gave the right answers."

- "limited by the scope/presentation of the game. It is not in real time or real circumstances, it is somewhat removed from reality therefore. Perhaps better for children rather than adults though. Would need to ask children their own perspectives of the game to get a better understanding - perhaps should ask the age of recipient at the start to gauge results better."

Negative Reactions:

- "Your answers don't make sense. Why would Julie feel surprise when asking a boy what to eat? Why would Heather feel surprised while calculating the good and bad points of moving out of town? Why would Mark be angry or disgusted about winning an award for his landscape design, when it specifically says that he is overjoyed?"

Being targeted at high-functioning autistics, it was important that the findings and feedback results pertained to that specific group of people. While feedback forms did not explicitly ask about each user’s degree of ASD or if they even had it, there are a number of factors that suggest that the findings here are largely from the ASD community. For one, all of the links to the application were posted at or distributed via ASD resource sites. Usage statistics confirmed that the traffic to the site was indeed coming from these ASD resource sites. Furthermore many personal correspondences between the author and the users, who claimed to have forms of ASD, took place during and after the 3 week trial period. Many users cited their own ASD condition and the helpfulness, or lack thereof, of the project for them specifically. The usage statistics and feedback form data exceptionally mirror the response received from personal correspondence with ASD-affected users of the project. These factors strengthen the suggestion that the findings presented are pertinent to high functioning autistics, and accurately describe their responses.
Conclusions and Future Work

Conclusions
Using data from user feedback forms and usage statistics, a number of conclusions became apparent.

User feedback forms revealed substantially mixed feelings about the current state of the application. Some users found the current application far too lacking in coherent matching of events and emotions, while others found it helpful to have such an application available and accessible. This is not acceptable enough to proclaim success in terms of overall user satisfaction.

User feedback forms indicated a majority of positive responses about the overall user experience. This leads to the conclusion that the user interface was adequate in terms of instructions, responsiveness, and general look & feel. The forms also indicated a majority of positive responses concerning the future usefulness of the application. Many users felt that an application like this could indeed be useful in helping people improve their event-emotion awareness. They also expressed a willingness to return to the site for further use. This leads to the conclusion that even if the current state of the application is not sufficiently robust, the overall paradigm is headed in the right direction.

With only six users choosing to register over 3 weeks, it seemed that users did not express a high level of interest in using the application as registered members. While unclear, this could have been due to a lack of confidence in the usefulness of the application at its current state. This also could have been a result of the general lack of incentives offered to the user for signing up. Since the users were still able to play the games without registering, the benefits of keeping historical track of high scores would not be readily apparent until prolonged usage (greater than the 3 week period used).
Of the small amount of registered users, only two users made improvements to existing high scores for their games. While this number does not reflect score improvement before registration, nor score improvement by unregistered users, it is still a relatively small number and can indicate a few different things. It could mean that there was simply light usage by registered users, or that these users simply were not able to improve early and often over the time period. In either case it can be said that this low number is related to the low number of registered members on the system, and the relatively short trial period. That being said, a drastic increase in these numbers should not be expected by simply increasing the trial period. Such improvements are not expected until future work is done to improve the event-emotion matching quality of the application.

**Future Work**

There are a number of things indicated by the findings that suggest a lot of benefit can come from future work on certain areas of the application.

Future work on this application should start with better improvements on the non-community influenced level of event-emotion matching. The current computer-generated event-emotion matching techniques used in the system are simply not robust enough to handle denotation of human emotion on a wide range of sentences. The types of improvement needed for these type of techniques to work correctly are not a reality yet, but when it does become feasible, or if alternate techniques are implemented, they will greatly improve the application as a whole.

Another avenue for future work involves first expanding the range of emotions used to denote sentences, far beyond the basic Ekman six. Secondly it involves removing the current computer-generated event-emotion matching technique altogether and relying more on static event-emotion
association and the community-generated intelligence ideas expressed earlier. This work would involve having a human-associated set of events and emotions put into the system before usage. A community-feedback based AI would come into play when correcting incorrectly associated sentences, or in adding new sentences to the corpus. This approach drastically reduces the complexity of the AI core of the system, but is a good holdover fix until better computer-generated event-emotion association techniques can be developed to correctly associate a wide range of emotions with a wide range of sentences.

The purpose of this future work would be to make the overall user satisfaction much higher than it is in the current incarnation of the application. These improvements would bring the application closer to its full potential, which was aptly recognized by many users.

**Final word**
At the beginning of this thesis a major question was posed that drove the work: Do the implications of a web-based application actually affect this arena of autism-related software, and if so is it for the better?

When this thesis project was set out upon the goals of the design were to improve accessibility and upgrade-deployment in autism-related software by creating a web-based application. It would have been great to also make an AI breakthrough along the way by using untested techniques as well, but that quickly became an obvious side-goal. I believe it has been proved that a web-based application definitely affects the arena of autism-related software, and for the better, simply because the goals setup at the inception of the thesis were accomplished. With a broader range of accessibility and easier deployment, the cost associated with the previous status quo for this software has fallen, and the reach of the software has expanded. The event-emotion association
techniques used have proved insufficient so we may now venture down other paths to accomplish that goal.

In the end, the current state of the application was not good enough in terms of computer-generated event-emotion association to be deemed a success (as evidenced by user feedback surveys); yet by providing a web-based application for autism-related software, it is pointing the work in this field in the right direction, and should serve as a good reference point for future work in this area.
Bibliography


Appendix of Code
PadToEmotionAlgo.py
# this is the overall architecture that is being built for this algo along with a method to run it
# head - 0.05, 0.25: node, node, node
# L - 0.05, 0.1: sadness, node(LM), node(LR)
# LM - 0.05, 0.05: sadness;disgust, sadness;disgust, sadness;disgust
# LR - 0.05, 0.05: fear, fear;anger;disgust, fear;anger;disgust
# M - 0.1, 0.05: nothing, node(MM), node(MR)
# MM - 0.05, 0.05: nothing, nothing, nothing
# MR - 0.05, 0.05: surprise, surprise, surprise;disgust;anger
# R - 0.1, 0.05: happiness, happiness, happiness;surprise

import EmotionDecisionNode as EDN

LR = EDN.EmotionDecisionNode(['fear', 'fear;anger;disgust', 'fear;anger;disgust'], 0.05, 0.05)
LM = EDN.EmotionDecisionNode(['sadness;disgust', 'sadness;disgust', 'sadness;disgust'], 0.05, 0.05)
L = EDN.EmotionDecisionNode(['sadness', 'sadness;disgust', 'LR'], 0.05, 0.1)
MR = EDN.EmotionDecisionNode(['surprise', 'surprise', 'surprise;disgust;anger'], 0.05, 0.05)
MM = EDN.EmotionDecisionNode(['nothing', 'nothing', 'nothing'], 0.05, 0.05)
M = EDN.EmotionDecisionNode(['nothing', 'nothing', 'MR'], 0.1, 0.05)
R = EDN.EmotionDecisionNode(['happiness', 'happiness', 'happiness;surprise'], 0.1, 0.05)
head = EDN.EmotionDecisionNode([L, M, R], 0.05, 0.25)

def textToEmotion(txt):
    if(txt[-1] == '.':
        dapad = el.appraise_document(txt[:-1])
    else:
        dapad = el.appraise_document(txt)
    if(len(dapad) != 3):
        dapad = [0, 0, 0]
    print 'DPl: ', dapad, head.findEmotion(dapad)
    return head.findEmotion(dapad)
+EmotionDecisionNode.py
class EmotionDecisionNode:
    def __init__(self, lmr, tl, tr):
        self.lmr = lmr
        self.thresh_right = tr
        self.thresh_left = tl

    def findEmotion(self, pad):
        # should try-catch to make sure list has element
        # check for left node first
        # print self.thresh, pad, self.lmr
        # print pad[0]
        if(pad[0] < -self.thresh_left):
            a = self.lmr[0]
            if(isinstance(a, EmotionDecisionNode)):
                # print "recursing negative"
                # make sure it has second member of the list here try catch or
                throw error
                return a.findEmotion(pad[1:])
            else:
                return a
        # check for right node
        elif(pad[0] > self.thresh_right):
            b = self.lmr[2]
            if(isinstance(b, EmotionDecisionNode)):
                # print "recursing positive"
                # make sure it has second member of the list here try catch or
                throw error
                return b.findEmotion(pad[1:])
            else:
                return b
        # check for middle node
        else:
            c = self.lmr[1]
            if(isinstance(c, EmotionDecisionNode)):
                # print "recursing middle"
                # make sure it has second member of the list here try catch or
                throw error
                return c.findEmotion(pad[1:])
            else:
                return c
function $(i) {
    var elements = new Array();
    for (var i = 0; i < arguments.length; i++) {
        var element = arguments[i];
        if (typeof element == 'string')
            element = document.getElementById(element);
        if (arguments.length == 1)
            return element;
        elements.push(element);
    }
    return elements;
}

//ADD EVENT stuff from top JS functions
function addEvent( obj, type, fn ) {
    if (obj.addEventListener) {
        obj.addEventListener( type, fn, false );
        EventCache.add(obj, type, fn);
    } else if (obj.attachEvent) {
        obj['e'+type+fn] = fn;
        obj[type+fn] = function() { obj['e'+type+fn]( window.event ); }
        obj.attachEvent( "on"+type, obj[type+fn] );
        EventCache.add(obj, type, fn);
    } else {
        obj['on'+type] = obj['e'+type+fn];
    }
}

var EventCache = function() {
    var listEvents = [];
    return {
        listEvents : listEvents,
        add : function(node, sEventName, fHandler){
            listEvents.push(arguments);
        },
        flush : function(){
            var i, item;
            for(i = listEvents.length - 1; i >= 0; i = i - 1){
                item = listEvents[i];
                if(item[0].removeEventListener){
                    item[0].removeEventListener(item[1], item[2],
                    item[3]);
                }
                if(item[1].substring(0, 2) != "on"){
                    item[1] = "on" + item[1];
                }
                if(item[0].detachEvent){
                    item[0].detachEvent(item[1], item[2]);
                }
                item[0][item[1]] = null;
            }
        }
    };
}

addEventListener(window, 'unload', EventCache.flush);
//END ADD EVENT stuff

Array.prototype.inArray = function (value) {
    var i;
    for (i=0; i < this.length; i++) {
        if (this[i] === value) {
            return true;
        }
    }
    return false;
};

function togIns(mol){
    if(mol == 'more'){
        //hide more element
        $('tihide').style.display = '';
        $('timore').style.display = 'none';
        /*$('timore').style.visibility = 'hidden';
        $('tihide').style.visibility = 'visible';*/
        //put display of mainheadercontent to empy
        $('mainHeaderContent').style.display = '';
    } else{
        //hide hide element
        $('tihide').style.display = 'none';
    }
function runMail(){
    var a = $('daMail');
    var b = a.innerHTML;
    b = b.replace('G9', '@');
    b = b.replace('G8', '.');
    b = b.replace('G7', 'mailto');
    a.innerHTML = b;
}

function getCookie( name ) {
    var start = document.cookie.indexOf( name + "=");
    var len = start + name.length + 1;
    if ( ( !start ) & ( name != document.cookie.substring( 0, name.length ) ) ) { return null; }
    if ( start == -1 ) return null;
    var end = document.cookie.indexOf( ";", len );
    if ( end == -1 ) end = document.cookie.length;
    return unescape( document.cookie.substring( len, end ) );
}

function setCookie( name, value, expires, path, domain, secure ) {
    var today = new Date();
    today.setTime( today.getTime() );
    if ( expires ) {
        expires = expires * 1000 * 60 * 60 * 24;
        var expires_date = new Date( today.getTime() + (expires) );
        document.cookie = name + "=" + escape( value ) + 
        ( ( expires ) ? ";expires=" + expires_date.toGMTString() : "") + 
        ( ( path ) ? ":path=" + path : "") + 
        ( ( domain ) ? ":domain=" + domain : "") + 
        ( ( secure ) ? ":secure=" : "") + 
        ";expires=Thu, 01-Jan-1970 00:00:01 GMT";
    }
}

function deleteCookie( name, path, domain ) {
    if ( getCookie( name ) ) document.cookie = name + "=" + 
    ( ( path ) ? ":path=" + path : "") + 
    ( ( domain ) ? ":domain=" + domain : "") + 
    ";expires=Thu, 01-Jan-1970 00:00:01 GMT";
}

function createRequestObject() {
    var ro;
    var browser = navigator.appName;
    // netscape.security.PrivilegeManager.enablePrivilege('UniversalBrowserRead');
    if ( browser == "Microsoft Internet Explorer") {
        ro = new ActiveXObject("Microsoft.XMLHTTP");
    } else {
        ro = new XMLHttpRequest();
    }
    return ro;
}

var http = createRequestObject();

// email address
// must be in user@host format
var objPatEmail = /(^[a-zA-Z0-9_.-]+@[a-zA-Z0-9_.-]+)+/;

// register function call that then auto login
function regUser() {
    // call python function via ajax to see if anything good comes back
    var uname = $('loginUname').value;
    var pw = $('loginPw').value;
    var email = $('regEmail').value;
    if (objPatEmail.test(email)) { 
        $('LoginBoxWarningText').innerHTML = 'Please enter a valid email, not: ' + email;
        return;
    } else { 
        return;
    }
}

if(uname.length < 1){
    $('LoginBoxWarningText').innerHTML = "Username must be greater than 0 characters";
    return;
}
if(pw.length < l){
    $('LoginBoxWarningText').innerHTML = "password must be greater than 0 characters";
    return;
}
$('UserStatusAreaProgress').style.display = "";
http.open("get", "/regUsr?e="+email+"&u="+uname+"&p="+pw, "true");
http.onreadystatechange = hdlRegUsr;
http.send(null);
}

function hdlRegUsr(){
    if(http.readyState == 4){
        $('UserStatusAreaProgress').style.display = "none";
        var data = http.responseText;
        //if response text !=contain any bad codes
        var a = data.split('[');
        if(a[0] == 'l'){
            //del all Cookies about to set
            deleteCookie( 'usr', null, null);
            deleteCookie( 'G1HS', null, null);
            deleteCookie( 'G2HS', null, null);
            deleteCookie( 'G3HS', null, null);
            //setCookie to asdgUsr, with username in response and hiscores in response(spli)
            setCookie( 'usr', a[1], 14, null, null, null);
            setCookie( 'G1HS', -1, 14, null, null, null );
            setCookie( 'G2HS', -1, 14, null, null, null );
            setCookie( 'G3HS', -1, 14, null, null, null );
            //make sure cookies got set, usr length > 0
            var c = getCookie('usr');
            if(c){
                //stop displaying th whoel login area
                $('LoginBox').style.display = 'none';
                //fill and show the welcom name
                $('UserNameDisplayBox').style.display = '';
                $('UserNameDisplayText').innerHTML = c;
                //fill the HiScoresBox values
                refreshUsr();
            }else{
                //else show *need cookies to register and login
                $('LoginBoxWarningText').innerHTML = 'You need to have cookies enabled in your browser in order to register or logon';
            }
        }
    }
}

//login function call (ajax then setCookie)
function logUsr(){
    //call python function via ajax to see if anything good comes back
    var uname = $('loginUname').value;
    var pw = $('loginPw').value;
    http.open("get", "/logUsr?u="+uname+"&p="+pw, "true");
    http.onreadystatechange = hdlLogUsr;
    http.send(null);
}

function hdlLogUsr(){
    if(http.readyState == 4){
        $('UserStatusAreaProgress').style.display = "none";
        var data = http.responseText;
        //alert(data);
        var a = data.split('[');
        //if response text !contain any bad codes
        if(a[0] == 'l'){
            var b = a[1].split(']');
            //del all Cookies about to set
            deleteCookie( 'usr', null, null);
deleteCookie('GiHS', null, null);
deleteCookie('G2HS', null, null);
deleteCookie('G3HS', null, null);
//setCookie to asdgUsr, with username in response and hiscores in response(split)
setCookie('usr', b[0], 14, null, null, null);
setCookie('G1HS', b[1], 14, null, null, null);
setCookie('G2HS', b[2], 14, null, null, null);
setCookie('G3HS', b[3], 14, null, null, null);
//make sure cookies got set, if usr length > 0
var c = getCookie('usr');
if(c){
  //stop displaying th whole login area
  $('LoginBox').style.display = 'none';
  //fill and show the welcom name
  $('UserNameDisplayBox').style.display = '';
  $('UserNameDisplayText').innerHTML = c;
  //fill the HiScoresBox values
  refreshUser();
}
else{
  //else show "need cookies to register and login
  $('LoginBoxWarningText').innerHTML = 'You need to have cookies enabled in your browser in order to register or logon';
}
}

function refreshUser(){
  //if usr vars/cookies exist reset their expiry by getting them by name and
  //resetting them by name and new expiry date (if date is not today)
  var a = getCookie('usr');
  var agone = getCookie('G1HS');
  var agtwo = getCookie('G2HS');
  var agthree = getCookie('G3HS');
  //simply renews the lifetime of all cookies present
  if(a){deleteCookie( 'usr', null, null); setCookie( 'usr', a, 14, null, null, null );}
  if(agone){deleteCookie( 'G1HS', null, null); setCookie( 'G1HS', agone, 14, null, null, null );}
  if(agtwo){deleteCookie( 'G2HS', null, null); setCookie( 'G2HS', agtwo, 14, null, null, null );}
  if(agthree){deleteCookie( 'G3HS', null, null); setCookie( 'G3HS', agthree, 14, null, null, null );}
  if(a){
    //also update username and scores display now using ? syntax or normal
    people talk
    if(agone & agone > -1){$('Game1HiScore').innerHTML = agone;else$('Game1HiScore').innerHTML = 'None';}
    if(agtwo & agtwo > -1){$('Game2HiScore').innerHTML = agtwo;else$('Game2HiScore').innerHTML = 'None';}
    if(agthree & agthree > -1){$('Game3HiScore').innerHTML = agthree;else$('Game3HiScore').innerHTML = 'None';}
  }
  //hide login area if cookies
  $('LoginBox').style.display = 'none';
  //show welcome area if cookies
  $('UserNameDisplayBox').style.display = '';
  $('UserNameDisplayText').innerHTML = a;
else{
    //alert('can’t find a so maybe no cookie set');
    //they simply are not logge din
    //show login area
    showLoginUI();
    //make sure "no score is set to score areas", shoudl automatically be so
    //show login area
    showLoginUI();
    //or not...as people rely on me to clear up mistakes or not
    $('Game1HiScore').innerHTML = 'Log In';
    $('Game2HiScore').innerHTML = 'Log In';
    $('Game3HiScore').innerHTML = 'Log In';

}

addOnEvent(window, 'load', refreshUsr);

//regUsr('test2@temi.com', 'timtop', 'pass');
//logUsr('timtop', 'pass');
//alert(getCookie('GLHS'));
function showRegUI(){
    $('LoginBox').style.display = '';
    $('regTitle').style.display = 'none';
    $('registerTitle').style.display = '';
    $('registerEmail').style.display = '';
    $('loginButton').style.display = 'none';
    $('registerButton').style.display = '';
    $('cancelRegisterButton').style.display = '';
    $('registerGateway').style.display = 'none';
    $('LoginBoxWarningText').innerHTML = '';
    $('UserNameDisplayBox').style.display = 'none';
    $('UserNameDisplayText').innerHTML = '';
}

function showLoginUI(){
    $('LoginBox').style.display = '';
    $('loginTitle').style.display = ''; 
    $('registerTitle').style.display = 'none';
    $('registerEmail').style.display = 'none';
    $('loginButton').style.display = 'none';
    $('registerButton').style.display = 'none';
    $('cancelRegisterButton').style.display = 'none';
    $('registerGateway').style.display = 'none';
    $('LoginBoxWarningText').innerHTML = ''; 
    $('UserNameDisplayBox').style.display = 'none';
    $('UserNameDisplayText').innerHTML = ''; 
}
/* Misc utility functions not related to arch */
function showeval(){
    var evalshow = Math.round(Math.random() * 2);
    if ((evalshow == 1) && !(getCookie('feedback_form')) && $('eval_frame_div').style.display == ''){
        $('eval_frame_div').style.display = 'block';
        $('eval_frame').src = '../getEvalPage';
    }
}

function createRequestObject(){
    var ro;
    var browser = navigator.appName;
    //netscape.security.PrivilegeManager.enablePrivilege('UniversalBrowserRead');
    if (browser == 'Microsoft Internet Explorer'){
        ro = new ActiveXObject("Microsoft.XMLHTTP");
    }else{
        ro = new XMLHttpRequest();
    }
    return ro;
}

var http = createRequestObject();

/*
function toStart(){
    setUsrVars();
}

//check for cookie and if so get and set username and GameHiScore variable at end of game
//must set this score variable if necessary and send it off for DB storage
//var username;
//var HiScore = -2;
function setUsrVars(){
    //if usr vars/cookies exist reset their expiry by getting them by name and
    //resetting them by name and new expiry date (if date is not today)
    var a = getCookie('usr');
    var oldScore = getCookie('GlHS');
    //if get cookie asdgUsr [meaning they logged in recently]
    if (a) {
        //display in approp alement box also store in a var
        username = a;
        //alert(username);
        if (oldScore) {
            //if HiScore value is int then display it in apporpiate element box
            HiScore = oldScore;
            //alert(HiScore);
        }
    }
    //else do nothing [should start with "Log In" in both spots
    //start the page as loads
    //toStart();
    */

    function tryLogScore(newScore){
        var oldScore = getCookie('GlHS');
        //if newScore is greater than HiScore variable AND username var != null
        then send ajax message to log in new HighScore for user
        if (newScore > oldScore){
            //alert(newScore + "im in");
            //del old cookie info, it will mess stuff up if you dont
            deleteCookie('GlHS', null, null);
            //set new info in Cookie, just updating this part or this cookie
            setCookie('GlHS', newScore, 14, null, null, null);
            var username = getCookie('usr');
            //alert(username);
            if (username) { //only send if the cookie is there, meaning they
            //logged in or registered or have been here lately
                //setUsrVars();
                $('GamelHiScore').innerHTML = newScore;
            }
        }
    }

    function hdlTryLogScore(){
        //literally do nothing
    }
}
var GameOver;
//things that need to be called from html and referred to in other functions
var timer_div; //refered to in starttimer function
var currentEventBox; //refered to in placeCurrEvt function
var MTD; //refered to in startGame
/*end misc vars to be named*/
//remember to append an END "</table>" tag at the end of this variable AND to depend when
modifying the table itself to make it work
var TblHTMLNeedEndTag = "<table border=1px><th>Sentence</th><th>Your Answer</th><th><div id=PCATH style='visibility:visible;'>Our Answer</div></th><th><div id=OTH style='visibility:visible;'>Report This</div></th></div>
var GameEventLength;
var GameTimeLength;
var IgnoreInputs;
var GameWeight = 0.5;
var TimeWeight = 0.05;
var use_time = 1;

function startGame(){
//set the board/UI to look as it should at the start of the game
//set game time and event lengths based off of what kind of difficulty given in start
//game
GameEventLength = 10;
GameTimeLength = 55;
if($('use_time_cb').checked){
    use_time = null;
}
//disable view of start button since cant be used till game stopped now
//document.getElementById('startbutton').style.visibility = 'hidden';
//document.getElementById('StartArea').style.display = 'none';
//a variable that will hold the index number of the selected radio button
var theone = dagdradz[theone].value;
switch (dagdradz[theone].value){
case 'Easy':
    GameEventLength = 10;
    GameTimeLength = 55;
    break;

case 'Medium':
    GameEventLength = 20;
    GameTimeLength = 80;
    break;
}
case "Hard":
GameEventLength = 30;
GameTimeLength = 115;
break;

default :
GameEventLength = 10;
GameTimeLength = 45;
}

//clear all variable sto null that need to be for new game

//variables need to be setup
//things that need to be displayed after the game is over, this list is dynamic as
answers are given, or it is at least not inclusive

/* PCAnswerTblHdr = document.getElementById('PCATH');
OptionsTblHdr = document.getElementById('OTH');
PlayAgainBtn = document.getElementById('playagainbutton');
QuitBtn = document.getElementById('quitbutton'); */

//things that need to be called from html and referred to in other function
timer_div = document.getElementById('showtimeBody'); //referred to in starttimer

function currentEventBox = document.getElementById('currenteventBody'); //referred to in
placeCurrEvt function

//get event-emotion from DB (or X event-emotions at once) and display 1 in currentEvent
box:
reqXEvtEmo(GameEventLength);

//get and display number of elements to go in left/to go status boxes:
updateEvtStatii(0, GameEventLength);

//start timer
if(use_time){
startTimer(GameTimeLength);
}

//set the main table...only done in start game
MTD = document.getElementById('maintabledivBody');
MTD.innerHTML = TblHTMLNeedEndTag + "</table>";

//set choice list to visible
var ep = document.getElementById('currentemotionoptionsBody');
ep.innerHTML = EmoChoiceList;

//set the event field to visible
var es = document.getElementById('currentevent');
es.innerHTML = EvtCurrent;

function reqxEvtEmo(x){

//send request for x events-emo pairs
document.getElementById('GameArea').style.visibility = 'hidden';
document.getElementById('loadScreen').style.visibility = 'visible';
http.open("get", "/getEvEmPairs?num="+x, "true");
http.onreadystatechange = hdlIncEvtEmo;
http.send(null);

//disable (invisible) ability to pick using emotion options (set grand variable) OR not,
//depending on
//document.getElementById('currentemotionoptionsBody').display = 'none';
//must specify what to do when request comesback
//var temp = "I get up[happiness][b]I go to sleep[s]no emotion[b]I get shot[s]scared";
//hdlIncEvtEmo();

var events = new Array();
var pc_ans = new Array();
var usr_ans = new Array();
var reports = new Array();
var global_count = 0;

//handle event-emotion return from DB (ajax comeback)
function hdlIncEvtEmo(){
if(http.readyState == 4){
var data = http.responseText;
// from evt-emo gotten back, place it and store it along with its answer
in a twin array OR a holder variable of currentRightEmotion
var tmpS = data.split('[[]]');
for(var i=0; i<tmpS.length; i++){
var tmpS = tmpB[i].split('[]');
var a = tmpS[0];
var b = tmpS[1];
events.push(a);
pc_ans.push(b);

//reports
//place current event
placeCurrEvt(events[0]);

//enable (visible) inputs for emotion options OR not since all comes back once
document.getElementById('currentemotionoptionsBody').display='';
document.getElementById('GameArea').style.visibility = 'visible';
document.getElementById('loadScreen').style.visibility = 'hidden';
}

//*given a sentence, it will display it in the current event box
//es.innerHTML = events[global_count];
//alert(currentEventBox);
currentEventBox.innerHTML = d;
//globalicount++;

var togonum;
var donenum;

//display number of elements to go/leaf in status boxes
function updateEvtStates(dir, total){
  //set innerHTML of both to reasonable values
  //check to see if innerHTML of togo = 0 do something (call show answer method)...or maybe not done here*
  //if dir = 0 then set done=0 and togo=total
  if(dir == 0){
    togonum = total;
    donenum = 0;
  }
  //if dir = 1 then inc done and dec togo
  if(dir == 1){
    if(togonum != 0){
      togonum--;
      donenum++;
    }
  }
  //if dir = -1 then dec done and in togo
  if(dir == -1){
    if(donenum != GameEventLength){
      togonum++;;
      donenum--;
    }else{
      //should we stop the game, or should they be allowed to still remove and redo events and click a done button
    }
  }

var a = document.getElementById('itemstogoBody');
var b = document.getElementById('itemsdoneBody');
a.innerHTML = togonum;
b.innerHTML = donenum;
}

var timeLeft;
//starts the game timer. call function with X seconds that updated the timer element
function startTimer(x){
  //when timer=0 AND not finished do something (showanswers)
  //if certain variable set STOP timer countdown
  //if var passed in is NOT null
  if(x){
    // set timeLeft to value passed in
    timeLeft = x;
    timer_div.innerHTML = ':' + timeLeft;
    window.setTimeout('startTimer(null)',1000)
  }
}
// if timeleft is greater than 0 then call self again
if(timeLeft > 0){
    //alert(timeLeft);
    window.setTimeout('startTimer(null)',1000)
}
else{
    stopGame();
}
//nothing game over

//var addedRows = new Array();
//record answer just given by user with emotion click
function recAns(pe){
    //only if they havent already answered everything
    if(donenum != events.length){
        //incoming variable is value of what was just clicked, picked emotion
        var emtxt = pe.innerHTML;
        usr_ans.push(emtxt);
        var evshown = $('currenteventBody');
        //disable, darken, outline, sleep for few mseconds, enable, lighten, no outline, GO OR just do it onMousePress
        evshown.style.background = 'black';
        window.setTimeout('$('currenteventBody').style.background = 'white',200);
        //get the current event text in the currevent box
        var evtxt = evshown.innerHTML;
        var rightOrWrong;
        if(pcans[donenum].indexOf(emtxt) > -1){
            rightOrWrong = 'right';
        }
        else{
            rightOrWrong = 'wrong';
        }
        //place the current event, picked emotion, correctanswer, report/flag in an array
        and in the maintable
        var apcans = '<div id="pcans"+String(donenum)+" class=""+rightOrWrong" id=
        +reportLinkreport"+String(donenum)+"">report it!</a"+"</div">;
        reports.push('report'+String(donenum));
        var arow = "
<tr>
<td>"+ evtxt +"
</td>
<td>"+ emtxt +"
</td>
<td>"+ apcans +"
</td>
<td>"+ areport +"
</td>
</tr>
";
        //addRows.push(arow);
        //chop off top by substringing finding last of </th> +5
        //keep bottom half too
        //add chopped off top + arow + bottom
        var a = MTD.innerHTML;
        var bFFX = a.lastIndexOf('</th>');
        var bIE = a.lastIndexOf('</TH>');
        var b = Math.max(bFFX, bIE);
        var top = a.substring(0, b+10);  
        var bot = a.substring(b+10, a.length);
        //alert(top);
        //alert(bot);
        MTD.innerHTML = top + arow + bot;
        //add closed table tag
        //update eventStatii to increase done and decrease togo
updateEvtStatii(l, null);

// request another event (from DB or from stored amount) to be placed in current
event. or place it yourself by taking/popping off the stack of returned ev-emo array
var nextev = events[donenum];
placeCurrEvt(nextev);
document.getElementById('backupbutton').style.visibility='';
if(donenum == GameEventLength){
    stopGame();
}
)
)

function removeLastAns(){
    if(donenum > 0 && donenum < GameEventLength ){
        var a = MTD.innerHTML;
        var bFFX = a.lastIndexOf('</th>');</a>
        var bIE = a.lastIndexOf('</TH>');
        var top = a.substring(0, b + 10);
        var bot = a.substring(b+10, a.length);
        var tmpBotFFX = bot.indexOf('</tr>');
        var tmpBotIE = bot.indexOf('</TR>');
        var tmpBot = Math.max(tmpBotFFX, tmpBotIE);
        var top = a.substring(0, tmpBot + 10);
        var bot = a.substring(tmpBot + 10, a.length);
        var sIE = MTD.innerHTML.lastIndexOf('<TR>');
        var sFFX = MTD.innerHTML.lastIndexOf('<tr>');
        var s = Math.max(sIE, sFFX);
        var f = MTD.innerHTML.lastIndexOf('</tr>');
        MTD.innerHTML = MTD.innerHTML.substring(0, s) + '</table>';
        /*var sIE = MTD.innerHTML.lastIndexOf('<TR>');
        var sFFX = MTD.innerHTML.lastIndexOf('<tr>');
        var s = Math.max(sIE, sFFX);
        //alert(s);
        var f = MTD.innerHTML.lastIndexOf('</tr>');
        MTD.innerHTML = MTD.innerHTML.substring(0, f) + '</table>';*/
        // var sIE = MTD.innerHTML.lastIndexOf('<TR>');
        // var sFFX = MTD.innerHTML.lastIndexOf('<tr>');
        // var s = Math.max(sIE, sFFX);
        // alert(s);
        var f = MTD.innerHTML.lastIndexOf('</tr>');
        MTD.innerHTML = MTD.innerHTML.substring(0, f) + '</table>);
        updateEvtStatii(-1, null);
        //usr_ans.pop() to take off last entry
        usr_ans.pop();
        reports.pop();
        // latest added row to table to be removed
        // addedRows.pop();
        $('currenteventBody').style.background = 'lightgreen';
        window.setTimeout('$('currenteventBody').style.background = 'white',150)
        placeCurrEvt(events[donenum]);
    }
}

function stopGame(){
    // reveal hidden elements in maintable
    var pcanscolhdr = document.getElementById('PCATH');
    var rptcolhdr = document.getElementById('OTH');
    pcanscolhdr.style.display='';
    rptcolhdr.style.display='';
    // end use of back button by hiding
    document.getElementById('backupbutton').style.visibility = 'hidden';
    // we use the length of reports so that we only reveal answers that have been placed in
    // the table, not ALL of them available
    for(var i=0; i<usr_ans.length; i++){
        var a = document.getElementById(reports[i]);
        var b = document.getElementById('pcans'+ String(i));
        a.style.display='';
        b.style.display='';
    }
    // hide certain input elements (emotion list, event read)
    document.getElementById('currentemotionoptionsBody').style.visibility = 'hidden';
    document.getElementById('currenteventBody').style.visibility = 'hidden';
    // calculate score and display it to user (possibly record it)
    var corr=0;
    for(var i=0; i<usr_ans.length; i++){
        var b = usr_ans[i];
        var a = pc_ans[i];
        if(a.indexOf(b) > -1){
            // inc correct total
            corr++
        }
    }
}
// add img src text for star to inner HTML of ? AND highlight the boxes certain way/color yellow or lime or green for both boxes (like a match)

} else {

// add other img text for red x to inner html of ? AND highlight and highlight boxes certain way/color/ red or black for each box so they are the same color

// stop the clock
GameOver = 1;
var tp = (use_time) ? timeLeft : 0;
tp = Math.round(tp * TimeWeight*10)/10;
// Math.round()
//alert(corr*GameWeight);
var TS = Math.round((tp + corr*GameWeight)*10)/10;

// send off total score to be logged in Db
tryLogScore(TS);
// tp++;
// alert(tp);
var sb = document.getElementById('scoreboxBody');
sb.innerHTML = "
<p>Correct: "+corr+"<br>
Game-type factor: "+GameWeight+"<br>
Time bonus: "+tp+"<br>
(#Correct * Game-type factor) + TimeBonus = Total</p><p>You received a score of <span id=scoreBoxActualScore>"+[TS]"</span> points!</p>
";

// Your score is ("+String(corr)+" correct answers) X ("+timeLeft+" seconds left + 1) = "+(tp + corr)+" Total Points!"

// reveal hidden buttons that should be shown now (quit, play next-round/again, my-all-time-high-score) - specify what should happen for each button first
/*document.getElementById('playagainbutton').style.display = '';
document.getElementById('quitbutton').style.display = '';
*/
$('#EndGameButtonArea').style.display = '';
show_eval();

// reset UI and variables, so that its like a page refresh
function playAgain(){
  // can we just reload the page at this point? only if not doing roundds
}

function repClicked(ro){
  // get the ahref "button" link and change color of it
  var repLinkBox = document.getElementById('reportLink' + ro.id);
  repLinkBox.style.background='white';
  // ro is the element that was clicked on. get ID
  // create a div using this id appended to something
  var mi = 'rptBoxA' + ro.id;
  var ii = 'rptBoxA' + ro.id;
  var iid = 'rptBoxAData' + ro.id;
  var oii = 'rptBoxB' + ro.id;
  var oiid = 'rptBoxBData' + ro.id;
  var rbxtxt = '<span id="'+ mi +'" >
   <div><a href="#" id="'+ii+'"
    onClick='rptBoxClicked(this.id):this.blur();return false;'
    class='bad answer?'</a>
    
    If you think that our answer is wrong or missing an emotion, let us know which emotion you think should go with this sentence.
    <select id="'+iid+'" onChange='rptValSent(this.id);'>
      <option selected>choose an emotion<option>
    </select>
  </div>
  <div><a href="#" id="'+oii+'"
    onClick='rptBoxClicked(this.id):this.blur();return false;'
    class='bad sentence?'
    type='text'
    style='display:none;'></input>
  </div>
  
</span>
";
}

"+"</span>;

// add the div to the page somehow (empty div/span)
var c = document.getElementById(ii);
// only if not already expanded
if(!c &amp;&amp; ro.innerHTML.indexOf('report it!')&gt;-1){
    ro.innerHTML+=rhtxt;
}

// get the div object and move its position to the position so the ro object (to make fit
with others and keep up, or to disappear?) [its already there]
}

function rptBoxClicked(d){
    // Take this id and see if it is a BoxA or B
    var i = d.indexOf('rptBoxA');
    if(i &gt; -1){
        // it was found so show the iid element by adding rptBoxAData.style.display=''
        //alert('rptBoxAData'+d.substring(7, d.length));
        document.getElementById('rptBoxAData'+d.substring(7)+'Holder').style.display=''
    }else{
        // wasn't found show the oiid element
        //document.getElementById('rptBoxBData' +d.substring(7)).style.display=''
        rptValSent(d);
    }
}

function rptValSent(id){
    // check if it is a sentence bad report OR
    var a = id.indexOf('report');
    var evt = events[id.substring(a+6)];
    var i = id.indexOf('rptBoxA');
    // check if its an emotion report
    if(i &gt; -1){
        // if emotion then get value of that selected and the appropriate sentence send to
        server/funciton the variables
        var d = document.getElementById(id).value;
        http.open("get", "/reportEvtError?evt="+evt+'&type=typel&data='+d, "true");
        http.onreadystatechange = hdlReportVerification;
        http.send(null);
        alert('The following emotion('+d+') has been reported as being associated with
        this event:('+evt+'');
    }else{
        // its sentence, so send the bad sentence to the server (server should mark time/count
        and flag)
        http.open("get", "/reportEvtError?evt="+evt+'&type=typeO", "true");
        http.onreadystatechange = hdlReportVerification;
        http.send(null);
        alert('This sentence has been reported as bad: '+evt);
    }
// set innerHTML to be reported. Thank you.
var repBox = document.getElementById(id.substring(a));
repBox.innerHTML = 'Reported!';
}

function hdlReportVerification(){
    var data = http.responseText;
}

/**- accept flags/corrections if given for an event
 function repEvtFlag(a, b, data){
     //given the event (via id or event itself) = a [may have to depend part of the id to get
     id of the actual event] OR [may have to find event match and use twin array structure]
     // and given a type of flagging/reporting = b
     // and given any extra data depending on flag type
     // post event and flag to the server to be timestamped/counted/record in db
     // do nothing when it gets back, just update the UI when this function is over (like
     reported in red comes up and it fades out? or stays there) It leaves, but then you
     replace the innerHTML of that reportID to Reported! with no link*/
/* Misc utility functions not related to arch */
function show eval(){
    var eval-show = Math.round(Math.random()*2);
    if( (eval-show == 1) && !(getCookie('feedback_form')) ){
        $('eval_frame_div').style.display='';
        $('eval_frame').src = '../getEvalPage';
    }
}

/* END Misc utility functions not related to arch */
function createRequestObject() {
    var ro;
    var browser = navigator.appName;
    //netscape.security.PrivilegeManager.enablePrivilege('UniversalBrowserRead');
    if( browser == 'Microsoft Internet Explorer') {
        ro = new ActiveXObject("Microsoft.XMLHTTP");
    } else {
        ro = new XMLHttpRequest();
    }
    return ro;
}

var http = createRequestObject();
/*misc variables that need to be named*/
//things that need to be displayed after the game is over, this list is dynamic as
//answers are given, or it is at least not inclusive
//var PCAnswerTblHdr;
//var OptionsTblHdr;
//var PlayAgainBtn;
//var QuitBtn;
function tryLogScore(newScore){
    var oldScore = getCookie('G2HS');
    if(newScore > oldScore){
        //alert(newScore + " im in");
        //del old cookie info, it will mess stuff up if you dont
        deleteCookie( 'G2HS', null, null);
        //set new info in Cookie, just updating this part or this cookie
        setCookie( 'G2HS', newScore, 14, null, null, null);
        var username = getCookie('usr');
        //alert(username);
        if(username){ //only send if the cookie is there, meaning they
            //setUsrVars();
            $('Game2HiScore').innerHTML = newScore;
            http.open("get",
            '/tryLogScore?u='+username+'&g=2&hs='+newScore, "true");
            http.onreadystatechange = hdlTryLogScore;
            http.send(null);
        } else mada {and dont even handle it;}
    }
}

function hdlTryLogScoreo(){
    //literally do nothing
}

var GameOver;
/*things that need to be called from html and referred to in other functions*/
var timer_div; //refered to in starttimer function
var currentEventBox; //refered to in placeCurrEvt funtctcon
var MTD; //refered ti i startGame
/*end misc vars to be named*/
//remember to append an END "</table>" tag at the end of this variable AND to depend when
modifying the table itself to make it work
//var TblHTMLNeedEndTag = "<table><th>Event</th><th>Your Answer</th><th><div id=PCATH style='display:none; '>Our Answer</div></th><th><div id=OTH style='display:none; '>Report This</div></th>";
var TblHTMLNeedEndTag = "<table border=1px><th>Sentence</th><th>Your Answer</th><th><div id=PCATH style='visibility:visible;'>Our Answer</div></th><th><div id=OTH style='visibility:visible; '>Report This</div></th>";

//perhaps these should be listed by a number/code
var EmoChoiceList = "\n  <ul> \\
    <li><a href='javascript:void(0)' id=0 onClick='recAns(this);this.blur();return false;'>yes</a></li> \\
    <li><a href='javascript:void(0)' id=1 onClick='recAns(this);this.blur();return false;'>no</a></li> \\
  </ul> \\
";
var PossibleEmotions = new Array();
PossibleEmotions.push('happiness');
PossibleEmotions.push('sadness');
PossibleEmotions.push('surprise');
PossibleEmotions.push('fear');
PossibleEmotions.push('anger');
PossibleEmotions.push('disgust');
PossibleEmotions.push('nothing');

/*entry innher HTML should have constant width done in style, along with colors*/

var EvtCurrent = "\n  <div id='evtshowingtitle'>What emotion goes with the event below?</div>\n  <div id='evtshowing'></div>\n  ", *");

var GameEventLength;
var GameTimeLength;
var IgnoreInputs;
var GameWeight = 0.2;
var TimeWeight = 0.02;
var use_time = 1;

function startGame(emotouse){
  //set the board/UI to look as it should at the start of the game
  //set game time and event lengths based off of what kind of difficulty given in start game
  //GameEventLength = 20;
  //GameTimeLength = 15;
  if($('usetimecb').checked){
    use_time = null;
  }

  //if passed in an emo to use, call place emotion with it, else call it anyway
  //also make emotion picking non plausible anymore
  //document.getElementById('pickemotiontype').style.visibility = 'hidden';
  document.getElementById('StartArea').style.display = 'none';
  //a variable that will hold the index number of the selected radio button
  var theone = $('egd', 'mgd', 'hgd');
  for (var i=0;i<dagdradz.length;i++){
    if (dagdradz[i].checked==true){
      theone=i;
      break; //exist for loop, as target acquired.
    }
  }
  switch (dagdradz[theone].value){
    case "Easy":
      GameEventLength = 10;
      GameTimeLength = 60;
      break;

    case "Medium":
      GameEventLength = 20;
      GameTimeLength = 110;
      break;

    case "Hard":
      GameEventLength = 30;
      GameTimeLength = 165;
      break;

    default :
      GameEventLength = 10;
      GameTimeLength = 60;
  }

  placeEmotion(emotouse);

  timer_div = document.getElementById('showtimeBody'); //referred to in starttimer function
  currentEventBox = document.getElementById('eventtojudgeBody'); //referred to in placeCurrEvt function

  //start timer
  if(use_time){
    startTimer(GameTimeLength);
  }
}
//get event-emotion from DB (or X event-emotions at once) and display 1 in currentEvent box:
reqXEvtEmo(GameEventLength);

//get and display number of elements to go in left/to go status boxes:
updateEvtStatii(0, GameEventLength);


//set the main table...only done in start game
MTE = document.getElementById('maintabledivBody');
MTE.innerHTML = TblHTMLNeedEntTag + '</table>';
//set choice list to visible
document.getElementById('currentyesnooptionsBody').innerHTML = EmoChoiceList;
"*/

var events = new Array();
var pc_ans = new Array();
var usran = new Array();
var reports = new Array();
//var globalcount = 0;

/***/

//handle event-emotion return from DB (ajax comeback)
function hdlIncEvtEmo(){
    //from evt emo gotten back, place it and store it along with its answer in a twin array OR a holder variable of currentRightEmotion
    if(http.readyState == 4){
        var data = http.responseText;
        var tmpS = data.split('][[');
        for(var i=0; i<tmpS.length; i++){
            var tmpS[i] = tmpS[i].split('[]');
            var a = tmpS[0];
            var b = tmpS[1];
            events.push(a);
            pc_ans.push(b);
            //usr_ans
            //reports
        };
    }
    //place current event
    placeCurrEvt(events[0]);
}
//enable (visible) inputs for emotion options OR not since all comes back
once
document.getElementById('currentyesnooptionsBody').display='';
document.getElementById('GameArea').style.visibility = 'visible';
document.getElementById('loadScreen').style.visibility = 'hidden';
}

//+given a sentence, it will display it in the current event box
function placeCurrEvt(d){

//set the inner HTML of the current Eventbox to the event
//es.innerHTML = events[global_count];
//alert(currentEventBox);
currentEventBox.innerHTML = d;
//global-count++;
}

var togonum;
var donenum;

//display number of elements to go/lef tin status boxes
function updateEvtStatii(dir, total){

/*-set innerHTML of both to reasonable values
-check to see if innerHTML of togo = 0 do something (call show answer method) ..or maybe not done here*/
//if dir = 0 then set done=0 and togo=total
if(dir ==0){
togonum = total;
donenum = 0;
}
//if dir = 1 then inc done and dec togo
if(dir =1){
if(togonum != 0){
togonum--;
donenum++;
}
}
//if dir = -1 then dec done and in togo
if(dir =-1){
if(donenum != GameEventLength){
togonum++;
donenum--;
}else{
//should we stop the game, or should they be allowed to still remove and redo events and click a done button
}
}

var a = document.getElementById('itemstogoBody');
var b = document.getElementById('itemsdoneBody');
a.innerHTML = togonum;
b.innerHTML = donenum;
}

var timeLeft;

//starts the game timer. call function with X seconds that updated the timer element
innerHTML
function startTimer(x){

//when timer=0 AND not finished do something (showanswers)
//if certain variable set STOP timer countdown
//if x passed in is NOT null
if(x){
//set timeLeft to value passed in
timeLeft = x;
timer_div.innerHTML = ':' + timeLeft;
window.setTimeout('startTimer(null)',1000)
}else if(timeLeft == GameOver){
timeLeft = timeLeft - 1;
timer_div.innerHTML = ':' + timeLeft;
if(timeLeft == 10){
timer_div.style.color = 'red';
}
//if timeleft is greater than 0 then call self again
if(timeLeft > 0){
//alert(timeLeft);
window.setTimeout('startTimer(null)',1000)
}
else{
  stopGame();
}
else{
  //nothing game over
}

//var addedRows = new Array();
//record answer just given by user with emotion click
function recAns(pe){
  //only if they haven't already answered everything
  if(donenum != events.length){
    //incoming variable is value of what was just clicked, picked yes or no
    for match
      var usr_yes_or_no_txt = pe.innerHTML;
      //update any UI stuff needed to certify click (disable, darken, outline,
      sleep for few mseconds, enable, lighten, no outline, GO OR just do it on MousePress)
      var eventJudge = $('eventtojudgeBody');
      eventJudge.style.background = 'black';
      window.setTimeout('$('eventtojudgeBody').style.background = 'white',200);
      //get the current event text in the currevent box
      var eventtxt = eventJudge.innerHTML;
      var pcvans =
      var rightOrWrong;
      //determine if OUR answer is yes or no if matchemotion contained in
      pcemotion-> yes, else no
      if(pc_ans[donenum].indexOf(PickedEmotionForMatching) > -1){
        pcvans = 'yes';
      } else{
        pcvans = 'no';
      }
      if(pcvans == usr_yes_or_no_txt){
        rightOrWrong = 'right';
      } else{
        rightOrWrong = 'wrong';
      }
      //place the current event, picked emotion, correctanswer, report/flag in
      an array and in the maintable
      var apcans = '<div id="'+pcans+donenum+'">' + pcvans + '</div>;'
      var areport = '<a href="javascript: void(0)"
        id="report" report='+donenum+' report it!"/>'+report+'</a>'
      reports.push('report' + donenum);
      var arow = '
      <tr>
      <td>eventtxt</td>
      <td>usr_yes_or_no_txt</td>
      <td>apcans</td>
      <td>areport</td>
    </tr>
    //addedRows.push(arow);
    var a = MTD.innerHTML;
    var bFfx = a.lastIndexOf('</th>');</a>
    var bIE = a.lastIndexOf('</TH>');
    var b = Math.max(bFfx, bIE);
    var top = a.substring(0, b + 10);
    var bot = a.substring(b + 10, a.length);
    //alert(top);
    //alert(bot);
    MTD.innerHTML = top + arow + bot;
    var tmp = MTD.innerHTML;
    tmp = tmp.substring(0, tmp.length - 9); //remove </table> tag
}
tmp = tmp + arow; //add new arow
MTD.innerHTML = tmp + '</table>'//add closed table tag
*/

//update eventStatii to increase done and decrease togo
updateEvtStatii(1, null);

//request another event [from DB or from stored amount] to be placed in
//current event or place it yourself by taking/popping off the stack of returned ev-em
array
var nextev = events[donenum];
placeCurrEvt(nextev);
document.getElementById('backupbutton').style.visibility='visible';
if(donenum == GameEventLength){
  stopGame();
}

//document.getElementById('GameArea').focus();

function removeLastAns(){
  if(donenum > 0 & donenum < GameEventLength ){
    var a = MTD.innerHTML;
    var bFFX = a.lastIndexOf('</th>');
    var bIE = a.lastIndexOf('</TH>');
    var b = Math.max(bFFX, bIE);
    var top = a.substring(0, b + 10);
    var bot = a.substring(b, a.length);
    var tmpBotFFX = bot.indexOf('</tr>');
    var tmpBotIE = bot.indexOf('</TR>');
    var tmpBot = Math.max(tmpBotFFX, tmpBotIE);
    bot = bot.substring(tmpBot + 5, bot.length);
    MTD.innerHTML = top + bot;
    //statii updated to decrease
    updateEvtStatii(-1, null);
    //usr_ans.pop() to take off last entry
    reports.pop();
    //latest added row to table to be removed
    addedRows.pop();
    $('eventtojudgeBody').style.background = 'lightgreen';
    window.setTimeout("$('eventtojudgeBody').style.background = 'white''",150);
    placeCurrEvt(events[donenum]);
  }
}

function stopGame(){
  //reveal hidden elements in maintable
  var pcanscolhdr = document.getElementById('PCATH');
  var rptcolhdr = document.getElementById('OTH');
  pcanscolhdr.style.display='';
  rptcolhdr.style.display='';
  //end use of back button by hiding
  document.getElementById('backupbutton').style.visibility = 'hidden';
  //we use the length of reports so that we only reveal answers that have been placed in
  //the table, not ALL of them available
  for(var i=0; i<usr_ans.length; i++){
    var a = document.getElementById(usr_ans[i]);
    var b = document.getElementById('pcans'+ String(i));
    a.style.display='';
    b.style.display='';
  }

  //hide certain input elements (emotion list, event read)
  document.getElementById('currentyesnooptionsBody').style.visibility = 'hidden';
  document.getElementById('eventtojudgeBody').style.visibility = 'hidden';
  //document.getElementById('startrandom').style.visibility = 'hidden';
  //calculate score and display it to user (possibly record it)
  var corr=0;
  for(var i=0; i<usr_ans.length; i++){
    var b = usr_ans[i];
  }
var a = pc_ans[i];
if((a.indexOf(PickedEmotionForMatching) > -1) && b == 'yes'){
  // inc correct total
  corr++;
  // add img src text for star to inner HTML of box AND highlight the boxes
certain way/color yellow or lime or green for both boxes (like a match)
}else if((a.indexOf(PickedEmotionForMatching) < 0) && b == 'no'){
  // inc correct total
  corr++;
  // add img src text for star to inner HTML of box AND highlight the boxes
certain way/color yellow or lime or green for both boxes (like a match)
}else{
  // add other img text for red x to inner HTML of box AND highlight and highlight
  boxes certain way/color red or black for each box so they are the same color
}
// stop the clock
GameOver = 1;
var tp = (use_time) ? timeLeft : 0;

tp = Math.round(tp * TimeWeight*10)/10;
//Math.round()
//alert(corr*GameWeight);
var TS = Math.round((tp+corr*GameWeight)*10)/10;
tryLogScore(TS);
//tp++;
//alert(tp);
var sb = document.getElementById('scoreboxBody');
sb.innerHTML = "
<p><b>Correct: (+corr*)<br>Game-type factor: (+GameWeight*)<br>Time bonus: (+tp*<br>({Correct * Game-Type factor}) + TimeBonus = Total</p>
<p>You received a score of <span id=scoreBoxActualScore>"+TS+" points!</p>

// reveal hidden buttons that should be shown now (quit, play next-round/again, my-alltime-
high-score) : specify what should happen for each button first
// document.getElementById('playagainbutton').style.display = '';
document.getElementById('quitbutton').style.display = ';
/$( intrusion function eval();

// reset UI and variables, so that its like a page refresh
function playAgain(){
  // can we just reload the page at this point? only if not ndoing rounds

  */
  // get score and display score for this round
  function doScoring(){
    // calculate a score based on time left and on number events correct
    // how many were correct? have answers given in stored arrays and run eventarrays thru
    scorer and see if match
    var total=0;
    for(var i=0; i<usr_ans.length; i++){
      var b = usr_ans[i];
      var a = pc_ans[i];
      if(a == b){
        total++;
      }
    }
    return total;
    // for each our answer check same stored your answer and see if it matches, if so inc a
    global score (make sure it was zero before doing it)
    // get current time left in the timeLeft thing (or from a variable)
    // correct * timeleft = score
    // set score box to reflect score
    */

    function repClicked(ro){
      // get the ahref "button" link and change color of it
var repLinkBox = document.getElementById("reportLink" + ro.id);
repLinkBox.style.background='white';
//ro is the element that was clicked on. get ID
//create a div using this id appended to something
var mi = "rptBox" + ro.id;
var ii = 'rptBoxA' + ro.id;
var iid = 'rptBoxAData' + ro.id;
var oii = 'rptBoxB' + ro.id;
var oiid = 'rptBoxBData' + ro.id;
var rbxtxt = "<span id='"+ mi +">" + "
<div a href='#' id='"+ii+"' onClick='rptBoxClicked(this.id);this.blur();return false;'>bad answer?</a>
<div id='"+iid+"Holder' style='display:none;'>
If you think that our answer is wrong or missing an emotion, let us know which emotion you think should go with this sentence.
<select id='"+iid+"' onChange='rptValSent(this.id);'>
<option selected>choose an emotion</option>
<option value=happiness>happiness</option>
<option value=sadness>sadness</option>
<option value=surprise>surprise</option>
<option value=anger>anger</option>
<option value=fear>fear</option>
<option value=disgust>disgust</option>
<option value=nothing>nothing</option>
</select>
</div>

<div a href='#' id='"+oii+"' onClick='rptBoxClicked(this.id);this.blur();return false;'>bad sentence?</a>
<input id='"+oiid+"' type=text style='display:none;'></input>
"1+</div>"1;

//add the div to the page somehow (empty div/span)
var c = document.getElementById(ii);
//only if not already expanded
if(!c && ro.innerHTML.indexOf('report it!')>-1){
    ro.innerHTML+=rbxtxt;
}
//get the div object and move its position to the position fo the ro object (to make fit with others and keep up, or to disappear?) [its already there]
function rptBoxClicked(d){
    //take this id and see if it is a BoxA or B
    var i = d.indexOf('rptBoxA');
    if(i > -1){
        // it was found so show the iid element by adding rptBoxAData.style.display='';
        //document.getElementById('rptBoxAData'+d.substring(7, d.length)).style.display='';
    }else{
        //wasn't found show the oiid element
        document.getElementById('rptBoxBData'+d.substring(7)).style.display='';
    }
}

function rptValSent(id){
    //check if it is a sentence bad report OR
    var a = id.indexOf('report');
    var evt = events[id.substring(a+6)];
    var i = id.indexOf('rptBoxA');
    //check if its an emotion report
    if(i > -1){
        //if emotion then get value of that selected and the appropriate sentence send to server/function the variables
        var d = document.getElementById(id).value;
        http.open("get", '/reportEvtError?evt=' +evt+'&type=typel&data="+d+"&true');
        http.onreadystatechange = hdlReportVerification;
        http.send(null);
        alert("The following emotion('"+d+"') has been reported as being associated with this event:('"+ evt+"')");
    }else{ //its sentence, so send the bad sentence to the server (server should mark time/count and flag)
        http.open("get", '/reportEvtError?evt="+evt+'&type=typeO", "true");
        http.onreadystatechange = hdlReportVerification;
        http.send(null);
        alert("This sentence has been reported as bad: ' + evt);
    }
    //set innerHTML to be reported. Thank you.
var repBox = document.getElementById(id.substring(a));
repBox.innerHTML = 'Reported!';

function hdlReportVerification()
  var data = http.responseText;
+Game3.js
function show-eval()
{
  var eval_show = Math.round(Math.random() * 2);
  if( (eval_show == 1) && (!(getCookie('feedback_form'))) ){
    $('eval_frame_div').style.display = '';
    $('eval_frame').src = '../getEvalPage';
  }
}

function getKey(e)
if (window.event)
  //alert(window.event.keyCode);
  return window.event.keyCode;
else if (e)
  //alert(e.which);
  return e.which;
else{
  return null;
}

function trim(str){
  return str.replace(/\s*|\s*$\//g, '');
}

function tryLogScore(newScore){
  var oldScore = getCookie('G3HS');
  //if newScore is greater than HiScore variable AND username var !=null
  then send ajax message to log in new HighScore for user
  if(newScore > oldScore){
    //alert(newScore + "im in");
    //del old cookie info, it will mess stuff up if dont
    //set new info in Cookie, just updating this part or this cookie
    deleteCookie('G3HS', newScore, 14, null, null, null);
    var username = getCookie('usr');
    //alert(username);
    if (username){
      //only send if the cookie is there, meaning they
      //logged in or registered or have been here lately
      //setUsrVars();
      '/tryLogScore?u="'+username+'"&g=3&hs='+newScore+'"
      http.open("get",
      hdlTryLogScore();
    http.send(null);
  }
}

function hdlTryLogScore(){
  //literally do nothing
}

var TblHTMLNeedEndTag;
/*misc variables that need to be named*/
//things that need to be displayed after the game is over, this list is dynamic as
answers are given, or it is at least not inclusive
var PCAnswerTblHdr;
var OptionsTblHdr;
var PlayAgainBtn;
var QuitBtn;
var GameOver;
/*things that need to be called from html and referred to in other fucntions
var timer_div://refered to in starttimer function
var currentEventBox; //refered to in placeCurrEvt funtciton
var MTD; //refered ti i startGame*/
/*end misc vars to be named*/
//perhaps these should be listed by a number/code
var EmoChoiceList = '
<ul>
<li>
<div id=0 onClick='recAns(this);'>yes</div>
</li>
<li>
<div id=1 onClick='recAns(this);'>no</div>
</li>
</ul>
';

var PossibleEmotions = new Array();
PossibleEmotions.push('happiness');
PossibleEmotions.push('sadness');
PossibleEmotions.push('surprise');
PossibleEmotions.push('fear');
PossibleEmotions.push('anger');
PossibleEmotions.push('disgust');
PossibleEmotions.push('nothing');
/*entry inner HTML should have constant width done in style, along with colors
var EvtCurrent = '"
<div id='evtshowingtitle'>What emotion goes with the event below?</div> 
<div id='evtshowing'></div> 
";'*/

var GameEventLength;
var GameTimeLength;
var IgnoreInputs;
var GameWeight = 2;
var TimeWeight = 0.2;
var use_time = 1;

function startGame(emotouse){
    //set the board/UI to look as it should at the start of the game
    //set game time and event lengths based off of what kind of difficulty given in start game
    //GameEventLength = 3;
    //GameTimeLength = 15;
    if($('usetimecb').checked){
        use_time = null;
    }
    //if passed in an emo to use, call place emotion with it, else call it anyway
    placeEmotion(emotouse);
    //also make emotion picking non-plausible anymore
    //document.getElementById('pickemotiontype').style.visibility = 'hidden';
    document.getElementById('StartArea').style.display = 'none';
    //a variable that will hold the index number of the selected radio button
    var theone;
    var dagdradz = $('egd', 'mgd', 'hgd');
    for (var i=0;i<dagdradz.length;i++){
        if (dagdradz[i].checked==true){
            theone=i;
            break; //exist for loop, as target acquired.
        }
    }
    switch (dagdradz[theone].value){
    case "Easy":
        GameEventLength = 5;
        GameTimeLength = 85;
        break;
    case "Medium":
        GameEventLength = 10;
        GameTimeLength = 160;
        break;
    case "Hard":
        GameEventLength = 15;
        GameTimeLength = 230;
        break;
    default :
        GameEventLength = 5;
        GameTimeLength = 85;
    }
    timer_div = document.getElementById('showtimeBody'); //referred to in starttimer function
currentEventBox = document.getElementById('eventtoenterinput'); //referred to in placeCurrEvt function
// start timer
if(use_time){
    startTimer(GameTimeLength);
}

// get event-emotion from DB (or X event-emotions at once) and display 1 in currentEvent box:
// reqXEvtEmo(GameEventLength);

// get and display number of elements to go in left/togo status boxes:
updateEvtStatii(0, GameEventLength);

// set the main table... only done in start game
// remember to append an END */<table>" tag at the end of this variable AND to depend when modifying the table itself to make it work
TblHTMLNeedEndTag = '<table border="1px"><th>Your Sentence</th><th>Emotion To Match</th><th>PickedEmotionForMatching</th><th>Report This</th></table>';

// set input box visible
document.getElementById('eventtoenterbox').style.display = 'none';

// clear or reset any client side elements needed
currentEventBox.disabled = 0;
currentEventBox.value = ''; currentEventBox.focus();

currentEventBox.disabled = 0;
currentEventBox.value = '';
currentEventBox.focus(); /* set the event field to visible
var es = document.getElementById('currentevent');
es.innerHTML = EvtCurrent;
*/

// var PickedEmotionForMatching;
var placeEmotion(a){
    // if emotion passed in set that, else set random from some home variable
    var daEmotion;
    if(a){
        daEmotion = a;
    } else{
        var randnum = Math.floor(Math.random()*(PossibleEmotions.length));
        daEmotion = PossibleEmotions[randnum];
    }
    PickedEmotionForMatching = daEmotion;
    document.getElementById('emotionselector').innerHTML = PickedEmotionForMatching;
    document.getElementById('emotiontomatchBody').innerHTML = daEmotion;
}

function reqXEvtEmo(x){
    // disable (invisible) ability to pick using emotion options (set grand variable) OR not, depending on
    // must specify what to do when request comeback
    var temp = "I get up[s]happiness[b]I go to sleep[s]no emotion[b]I get shot[s]scared";
    hdlIncEvtEmo(temp);
}

var events = new Array();
var pc_ans = new Array();
var usr_ans = new Array();
var reports = new Array();

// function hdlIncEvtEmo(data){
/* handle event-emotion return from DB (ajax comeback)
array OR a holder variable of currentRightEmotion
var tmpB = data.split('['b']');
for(var i=0; i<tmpB.length; i++){
    var tmpS = tmpB[i].split('['s']);
    var a =tmpS[0];
    var b = tmpS[1];
*/
events.push(a);
pc_ans.push(b);
//usr_ans/
//reports

//place current event
placeCurrEvt(events[0]);
//enable (visible) inputs for emotion options OR not since all comes back once
document.getElementById('currentyesnooptions').display='';

//given a sentence, it will display it in the current event box
function placeCurrEvt(d){
//set the inner HTML of the current Eventbox to the event
es.innerHTML = events[global_count];
//alert(currentEventBox);
currentEventBox.innerHTML = d;
//global_count++;
}

var togonum;
var donenum;

//display number of elements to go/lelt in statuts boxes
function updateEvtStats(dir, total){
/*-set innerHTML of both to reasonable values
-see if innerHTML of togo = 0 do something (call show answer method)...or maybe
not done here*/
//if dir = 0 then set done=0 and togo=total
if(dir ==0){
togonum = total;
donenum = 0;
}
//if dir = 1 then inc done and dec togo
if(dir ==1){
  if(togonum != 0){
togonum--;
donenum++;
  }
}
//if dir = -1 then dec done and inc togo
if(dir ==-1){
  if(donenum != GameEventLength){
togonum++;
donenum--;
  }else{ //should we stop the game, or should they be allowed to still remove and
redo events and click a done button
  }
}

var a = document.getElementById('itemstogoBody');
var b = document.getElementById('itemsdoneBody');
a.innerHTML = togonum;
b.innerHTML = donenum;
}

var timeLeft;
//starts the game timer. call function with X seconds that updated the timer element
innerHTML
function startTimer(x){
//when timer=0 AND not finished do so?ething (showanswers)
//if certain variable set STOP timer countdown
//if var passed in is NOT null
if(x){
  // set timeLeft to value passed in
timeLeft = x;
timer_div.innerHTML = ':' + timeLeft;
window.setTimeout('startTimer(null)',1000)
}else if(timeLeft && 'GameOver'){
timeLeft = timeLeft - 1;
timer_div.innerHTML = ':' + timeLeft;
if(timeLeft == 10){
  timer_div.style.color = 'red';
}

//if timeleft is greater than 0 then call self again
if(timeLeft > 0){

99
//alert(timeLeft);
window.setTimeout('startTimer(null)',1000)

else{
  stopGame();
}

//nothing game over

/*-record/accept answer for event input chosen by user
-put in a table (evt and report)
-put in an array (evt and report)
-decode accept answer
-pop from evt array
-pop from report array
-remove last tr from table
*/

function recAns(pe){
  //trim text in box and only do something if they entered something (an actual char.)
  var inctxt = escape(trim(pe)).replace(/%20/g, ' ');
  if(inctxt.length > 0){
    if(donenum != GameEventLength){
      if(inctxt.indexOf(PickedEmotionForMatching) > -1){
        var ws = $('warningSpan');
        ws.innerHTML = "you may not use the word "+PickedEmotionForMatching+" in your sentence.";
        wp.style.display = 'none';
        return;//exit, dont do anything if this if catches. except update ui
      } else { //write into span: "[you may not use the same sentence twice in matching this emotion."
        ws.innerHTML = "you may not use the same sentence twice in matching this emotion.";
      }
    } //make span visible
    currentEventBox.value =pe;
    currentEventBox.select();
    ws.style.display = '';
    return;//exit, dont do anything if this if catches. except update ui
  } //make span invisible, just in case [display none] if it made it this far
  var usrans = new Array();
  var apcans = "<div id='pcans'+String(donenum)+style='display:none;'>"+i dunno answer yet"+'</div>";
  var areport = "<div id='report'+String(donenum)+style='display:none;' onClick='repClicked(this);this.blur();return false;'>"+"<a href='javascript:void(0)'>report it!</a>'+'</div>";
  reports.push('report'+String(donenum));
  var arow = "<tr><td>"+unescape(inctxt)+"</td><td>"+pc_ans_or_no_txt+"</td></tr>";
  reports.push('report'+String(donenum));
  var arow = "<tr><td>"+unescape(inctxt)+"</td><td>"+pc_ans_or_no_txt+"</td></tr>";
  var evtxt = document.getElementById('eventtojudge').innerHTML;
  var pc-yes-or-no_txt;
  //determine if OUR answer is yes or no if matchemotion contained in pceemotion-> yes, else no
  if(pce_ans[donenum].indexOf(PickedEmotionForMatching) != -1){
    pc-yes-or-no_txt = 'yes';
  } else{
    pc-yes-or-no_txt = 'no';
  }
  //place the current event given, correctanswerholder, report/flagholder in an array and in the maintable
  var apcans = "<div id='"+pcans+String(donenum)+"' style='display:none;'>"+i dunno answer yet"+'</div>";
  var areport = "<div id='"+report+String(donenum)+"' style='display:none;' onv= onClick='repClicked(this);this.blur();return false;'>"+"<a href='javascript::void(0)'>report it!</a>'+'</div>";
  reports.push('report'+String(donenum));
  var arow = "<tr><td>"+unescape(inctxt)+"</td><td>"+pc_ans_or_no_txt+"</td></tr>";
  var evtxt = document.getElementById('eventtojudge').innerHTML;
  var pc-yes-or-no_txt;
  //determine if OUR answer is yes or no if matchemotion contained in pceemotion-> yes, else no
  if(pce_ans[donenum].indexOf(PickedEmotionForMatching) != -1){
    pc-yes-or-no_txt = 'yes';
  } else{
    pc-yes-or-no_txt = 'no';
  }
  //place the current event given, correctanswerholder, report/flagholder in an array and in the maintable
  var apcans = "<div id='"+pcans+String(donenum)+"' style='display:none;'>"+i dunno answer yet"+'</div>";
  var areport = "<div id='"+report+String(donenum)+"' style='display:none;' onv= onClick='repClicked(this);this.blur();return false;'>"+"<a href='javascript::void(0)'>report it!</a>'+'</div>";
  reports.push('report'+String(donenum));
  var arow = "<tr><td>"+unescape(inctxt)+"</td><td>"+pc_ans_or_no_txt+"</td></tr>";
  var evtxt = document.getElementById('eventtojudge').innerHTML;
  var pc-yes-or-no_txt;
  //determine if OUR answer is yes or no if matchemotion contained in pceemotion-> yes, else no
  if(pce_ans[donenum].indexOf(PickedEmotionForMatching) != -1){
    pc-yes-or-no_txt = 'yes';
  } else{
    pc-yes-or-no_txt = 'no';
  }
  //place the current event given, correctanswerholder, report/flagholder in an array and in the maintable
  var apcans = "<div id='"+pcans+String(donenum)+"' style='display:none;'>"+i dunno answer yet"+'</div>";
  var areport = "<div id='"+report+String(donenum)+"' style='display:none;' onv= onClick='repClicked(this);this.blur();return false;'>"+"<a href='javascript::void(0)'>report it!</a>'+'</div>";
  reports.push('report'+String(donenum));
  var arow = "<tr><td>"+unescape(inctxt)+"</td><td>"+pc_ans_or_no_txt+"</td></tr>";
  var evtxt = document.getElementById('eventtojudge').innerHTML;
  var pc-yes-or-no_txt;
  //determine if OUR answer is yes or no if matchemotion contained in pceemotion-> yes, else no
  if(pce_ans[donenum].indexOf(PickedEmotionForMatching) != -1){
    pc-yes-or-no_txt = 'yes';
  } else{
    pc-yes-or-no_txt = 'no';
  }
  //place the current event given, correctanswerholder, report/flagholder in an array and in the maintable
  var apcans = "<div id='"+pcans+String(donenum)+"' style='display:none;'>"+i dunno answer yet"+'</div>";
  var areport = "<div id='"+report+String(donenum)+"' style='display:none;' onv= onClick='repClicked(this);this.blur();return false;'>"+"<a href='javascript::void(0)'>report it!</a>'+'</div>";
  reports.push('report'+String(donenum));
  var arow = "<tr><td>"+unescape(inctxt)+"</td><td>"+pc_ans_or_no_txt+"</td></tr>";
function removeLastAns()
{
    if(donenum > 0 && donenum < GameEventLength )
    {
        var a = MTD.innerHTML;
        var bFFX = a.lastIndexOf('</th>');
        var bIE = a.lastIndexOf('</TH>');
        var b = Math.max(bFFX, bIE);
        var top = a.substring(0, b + 10);
        var bot = a.substring(b+10, a.length);
        //alert(top);
        //alert(bot);
        MTD.innerHTML = top + bot;
        /*var tmp = MTD.innerHTML;
         //alert(tmp);
         //tmp = tmp.substring(0, tmp.indexOf('</table>')); //remove </table> tag
         var tmpIE = tmp.substring(0, tmp.indexOf('</TABLE>'));
         var tmpFFX = tmp.substring(0, tmp.indexOf('</table>'));
         if(tmpIE)
            tmp = tmpIE;
         else{
            tmp = tmpFFX;
        }
        tmp = tmp + bot; //add closed table tag */
        //update eventStatii to increase done and decrease togo
        updateEvtStatii(1, null);
        //clear the input box to allow another add
        currentEventBox.value="";
        //currentEventBox.focus();
        document.getElementById('backupbutton').style.visibility='visible';
        if(donenum == GameEventLength){
            stopGame();
        }else{
            currentEventBox.focus();
        }
    }
}

function removeLastAns()
{
    var a = MTD.innerHTML;
    var bFFX = a.lastIndexOf('</th>');
    var bIE = a.lastIndexOf('</TH>');
    var b = Math.max(bFFX, bIE);
    var top = a.substring(0, b + 10);
    var bot = a.substring(b+10, a.length);
    //alert(top);
    //alert(bot);
    MTD.innerHTML = top + bot;
    /*var sIE = MTD.innerHTML.lastIndexOf('</TR>');
     var sFFX = MTD.innerHTML.lastIndexOf('</tr>');
     var s = Math.max(sIE, sFFX);
     var f = MTD.innerHTML.substring(0, s) + '</table>';
     //statii updated to decrease
     updateEvtStatii(-1, null);
     //user_ans.pop() to take off last entry
     var old_user_ans = user_ans.pop();
     reports.pop();
     //latest added row to table to be removed
     //addedRows.pop();
     currentEventBox.value =unescape(old_user_ans);
     */
}
- at TIME/FINISH of game display correct answers in table of current-history, along with correction options
- put up PROGRESS UI
- send list of events to server
- receive list of emotions that mirror array size for list sent
- for each element
  - see if emotion-received array contains PickedEmotionForMatching and mark as yes or no (do score count)
  - make new table, and place each row with EVT, Y/n (emotions), report it
    - show table (replace inner html)
    - get score and display score for this round
- END Progress UI
- accept flags/corrections if given for each event

function reqEmotionRatings(uaa){
  // that's user answer array
  var x = '';
  for(var i = 0; i < uaa.length; i++){
    if(i == uaa.length-1){
      x = x + uaa[i];
    }else{
      x = x + uaa[i] + '[],';
    }
  }
  // convert this array to a sendable string of events (for each except first and last add or ::)
  http.open('get', '*getEmotionsForEvents?eventliststring=' + x, 'true');
  http.onreadystatechange = rcvEmotionRatings;
  http.send(null);
  // send this string off to the server
  rcvEmotionRatings();
}

var ReadyToRead = 0;
var mostRecentEmotionRatings = new Array(); // to hold new emotions when they come back
function rcvEmotionRatings(){ // called when response is back
  // tear apart the string to put into an array (split)
  if(http.readyState == 4){
    var data = http.responseText;
    mostRecentEmotionRatings = data.split('[]');
    // assign the array to the mostRecentEmotionResponses var
    mostRecentEmotionRatings = bs;
    ReadyToRead = 1;
    stopGameContinued();
  }
}

function stopGame(){
  // disable hidden the box so no entry occurs
  currentEventBox.disabled = 1;
  // reveal hidden elements in maintain
  var pcancolhdr = document.getElementById('PCATH');
  var rptcolhdr = document.getElementById('OTH');
  pcancolhdr.style.display = '';
  rptcolhdr.style.display = '';
  // end use of back button by hiding
  document.getElementById('backupbutton').style.visibility = 'hidden';

  // set a PROGRESS UI to visible
  document.getElementById('GameArea').style.visibility = 'hidden';
  document.getElementById('loadScreen').style.visibility = 'visible';
  // request answers (and storage of pairing) for the events given by user and
  reqEmotionRatings(usr_ans);
}

function stopGameContinued(){
  //while(ReadyToRead != 1){ // dangerous I know, but I BETTER get a response from server or else (maybe set a timer for few seconds and if no come back alert (error warning))
  var pcan_ans_array = mostRecentEmotionRatings;
  ReadyToRead = 0;
//Progress UI thing
document.getElementById('GameArea').style.visibility = 'visible';
document.getElementById('loadScreen').style.visibility = 'hidden';

var holdRows = '';
var corr = 0;
var correct_user_ans_idnums = new Array();
var wrong_user_ans_idnums = new Array();
for(var i=0; i < user_ans.length; i++) {
    //find out if the pc ans matches th current emotion (yes or no)
    var aans = pc_ans_array[i];
    var ayn;
    var rightOrWrong;
    if(aans.indexOf(PickedEmotionForMatching) > -1){
        ayn = 'yes --> ' + '('+aans+')';
        correct_user_ans_idnums.push(i); //go thru this list later and
        append nums to familiar idnames to change their style
        rightOrWrong = 'right';
        corr++;
    }else{
        ayn = 'no --> ' + '('+aans+')';
        wrong_user_ans_idnums.push(i); //go thru this list later and append
        nums to familiar idnames to change their style
    }
    //place the current event given, correctanswerholder, report/flagholder in
    an array and in the maintable
    var apcans = '<div id=PCATH class="rightOrWrong">' + ayn + '</div>;;
    var areport = '<div id=OTH onclick=repClicked(this);this.blur();this.blur();return false;">report it!</a>' + 'report'+String(i)+">report
    it!</a></div>;;
    //reports.push('report'+String(donenum));
    var ausrans = user_ans[i];
    var arow = "
    <tr> 
    <td>unescape(ausrans) +"
    <td>
    <td>PickedEmotionForMatching +"  
    <td>apcans +"
    <td>
    <td>areport +"
    <td>
    <tr> \n    //addedRows.push(arow);
    holdRows+= arow;
    //reset that table :)
    TblHTMLNeedEndTag = '<table border=1px><th>Your Sentence</th> <th>Emotion To
    Match</th><th><div id=PCATH>A Match for '+PickedEmotionForMatching+'</div>;</th><th><div id=OTH>Report This</div></th>;  
    MTD.innerHTML = TblHTMLNeedEndTag + holdRows + '</table>';;
    //hide certain input elements (emotion list, event read)
    document.getElementById('eventtoenterbox').style.visibility = 'hidden';
    //stop the clock
    GameOver = 1;
    var tp = (use_time) ? timeLeft : 0;
    tp = Math.round(tp * TimeWeight*10)/10;
    //Math.round()
    //alert(corr*GameWeight);
    var TS = Math.round((tp+corr*GameWeight)*10)/10;
    tryLogScore(TS);
    //tp++;
    //alert(tp);
    var sb = document.getElementById('scoreboxBody');
    sb.innerHTML = "
    <p>#Correct: '+'+corr+'<br/>
    Game-type factor: '+'+GameWeight+'<br>
    Time bonus: '+'+tp+'<br>
    ('+Correct + 'Game-type factor) + TimeBonus = Total'</p>";}
You received a score of \[TS^+\] points!

// reveal hidden buttons that should be shown now (quit, play next-round/again, my-alltime-high-score):
specify what should happen for each button first
* document.getElementById('playagainbutton').style.display = '';
* document.getElementById('quitbutton').style.display = '';
* $('EndGameButtonArea').style.display = '';
* show_eval();
}

// reset UI and variables, so that its like a page refresh
function playAgain()
{ // can we just reload the page at this point? only if not nDoing rounds. buy client side
elements retain state (unless you explicitly reset them here)
// or you can change those elements (like selectores, to be div's or ul's)
}

/*
// - get score and display score for this round
function doScoring()
{ // calculate a score based on time left and on number events correct
// how many were correct? have answers given in stored arrays and run eventarrays thru
// scorer and see if match
var total = 0;
for (var i = 0; i < usr_ans.length; i++)
{ var b = usr_ans[i];
  var a = pc_ans[i];
  if (a == b)
  { total++
  }
}
return total;
// for each our answer check same stored your answer and see if it matches, if so inc a
global score (make sure it was zero before doing it)
// get current time left in the timeleft thing (or from a variable)
// #correct * timeleft = score
// set score box to reflect score
}
*/

function repClicked(ro)
{ // ro is the element that was clicked on. get ID
// create a div using this id appended to something
var mi = 'rptBox' + ro.id;
var ii = 'rptBoxA' + ro.id;
var iid = 'rptBoxAData' + ro.id;
var oii = 'rptBoxB' + ro.id;
var oiid = 'rptBoxBData' + ro.id;
var rbxtxt = '<span id=' + mi + ' >
  <div id=' + ii + ' onClick=' + repBoxClicked(this.id) + ' ;>
  bad answer?
  </div>'
'onClick=' + repBoxClicked(this.id) + ' ;'>bad answer?

  <select id=' + iid + ' style='display:none;'
  onChange='rptValSent(this.id)'
  option selected> If you are sure that our answer is wrong, choose the correct emotion for this event</option>
  <option> happiness</option>
  <option> sadness</option>
  <option> surprise</option>
  <option> disgust</option>
  <option> fear</option>
  <option> anger</option>
</select>

  <div id=' + oii + ' onClick=' + repBoxClicked(this.id) + ' ;'>bad sentence?
  <input id=' + oiid + ' type=text style='display:none;'></input>
</div>'

  <a href='button' link and change color of it
var repLinkBox = document.getElementById('reportLink' + ro.id);
repLinkBox.style.background='white';
// ro is the element that was clicked on. get ID
// create a div using this id appended to something
var mi = 'rptBox' + ro.id;
var ii = 'rptBoxA' + ro.id;
var iid = 'rptBoxAData' + ro.id;
var oii = 'rptBoxB' + ro.id;
var oiid = 'rptBoxBData' + ro.id;
var rbxtxt = '<span id="mi" >
  <div><a href="#" id="ii" onClick="rptBoxClicked(this.id);this.blur();return false;">bad answer?</a>
  <span id="iid" style='display:none;'>
    If you think that our answer is wrong or missing an emotion, let us know which emotion you think should go with this sentence.
    <select id="iid++" onChange="rptValSent(this.id);" >
      <option selected>choose an emotion</option>
      <option value=happiness>happiness</option>
      <option value=sadness>sadness</option>
      <option value=surprise>surprise</option>
      <option value=anger>anger</option>
      <option value=fear>fear</option>
      <option value=disgust>disgust</option>
      <option value=nothing>nothing</option>
    </select>
  </span>
</div>
<div><a href="#" id="oii" style='display:none;' onClick="rptBoxClicked(this.id);this.blur();return false;">bad sentence?</a>
  <input id="oiid" type=text style='display:none;'></input>
</div>
"1+"';

//add the div to the page somehow (empty div/span)
var c = document.getElementById(ii);
//only if not already expanded
if(!c && ro.innerHTML.indexOf('report it!')>-1){
  ro.innerHTML+=rbxtxt;
  //get the div object and move its position to the position fo the ro object (to make fit with others and keep up, or to disappear?) [its already there]
}

function rptBoxClicked(d){
  //take this id and see if it is a BoxA or B
  var i = d.indexOf('rptBoxA');
  if(i > -1){
    // it was found so show the iid element by adding rptBoxAData.style.display='';
    //alert('rptBoxAData'+d.substring(7, d.length));
    document.getElementById('rptBoxAData'+d.substring(7)+'Holder').style.display='';
  }else{
    //wasn't found show the oiid element
    document.getElementById('rptBoxBData'+d.substring(7)).style.display='';
    rptValSent(d);
  }
}

function rptValSent(id){
  //check if it is a sentence bad report OR
  var a = id.indexOf('report');
  //var evt = events[id.substring(a+6)];
  var e =usr_ans[id.substring(a+6)];
  var i = id.indexOf('rptBoxA');
  //check if its an emotion report
  if(i > -1){
    //if emotion then get value of that selected and the appropriate sentence send to server/function the variables
    var d = document.getElementById(id).value;
    http.open("get", "/reportEvtError?evt="+evt+'&type=type1&data="+d, "true";
    http.onreadystatechange = hdlReportVerification;
    http.send(null);
    alert('The following emotion('+d+') has been reported as being associated with this event:('+e+');
  }else{
    //its sentence, so send the bad sentence to the server [server should mark time/count and flag]
    http.open("get", "/reportEvtError?evt="+evt+'&type=type0", "true";
    http.onreadystatechange = hdlReportVerification;
    http.send(null);
    alert('This sentence has been reported as bad: '+e+');
  }
}

//set innerHTML to be reported. Thank you.
var repBox = document.getElementById(id.substring(a));
repBox.innerHTML = 'Reported!';
}
function hdlReportVerification()
{
    var data = http.responseText;
}
import cherrypy as cpg
import WebAppToDBMethods as dbm
import random
import re
Emailpattern = r'\b[A-Za-z0-9._%+-]+@[A-Za-z0-9._%]+\.[A-Za-z]{2,4}\b'
pattobj = re.compile(Emailpattern)
eps = pattobj.search

class Root:
    def index(self):
        return open("../static/index.html")
    index.exposed = True
    def getEvalPage(self):
        return open("Evaluation.html")
    getEvalPage.exposed = True
    def regUsr(self, e, u, p):
        if(e and u and p):
            #they must exist
            #make sure email is regex right (else return error)
            if(not eps(e)):
                return "O[]invalid email address"
            #make sure uname is all alphanumeric (else return error)
            if(not u.isalnum()):
                return "O[]username must contain numbers and letters only"
            #take hash of pw before its ready
            return dbm.regNewUsr(e, u, p)

    def logUsr(self, u, p):
        if(u and p):
            if(u.isalnum): return dbm.logUsr(u, p)
            #return "1[]test;35;25;15"
        else:
            return "O[]must include a username and password to login()" #one arg was null

    logUsr.exposed = True
    def tryLogScore(self, u, g, hs):
        g = int(g)
        #hs = int(hs)
        dbm.logNewHiScore(u, g, hs)
    tryLogScore.exposed = True
    def getEvEmPairs(self, num=0, xemt="", xemtnum=0):
        pairListString = ''
        #num = num - xemtnum
        num = int(num)
        xemtnum = int(xemtnum)
        regList = list()
        xregList = list()
        if(num > 0):
            #print num
            regList = dbm.getXEvEmPairs(num)
            #print len(regList)
            if(len(xregList)>0 and xemtnum>0):
                xregList = dbm.getXEventsForAnEmotion(xemt, xemtnum)
                regList.extend(xregList)
                random.shuffle(regList)
            for apair in regList:
                pairListString = pairListString + apair[0] + '][' + apair[1] + ']][[]
            #return pairListString.strip('[]::asd-bigsep::')
            return pairListString[:pairListString.rfind('[]')] 
    getEvEmPairs.exposed = True
    def getEmsForEvs(self, evtliststring=""):
        emsback = ''
        if(len(evtliststring) > 0):
            evlst = evtliststring.split('[][]')
            emlst = dbm.getEmotionsCorrespondingToEvents(evlst)
            for em in emlst:
                emsback = emsback + em[1] + '[[['
            #return emsback.strip('[]::asd-bigsep::')
            return emsback[:emsback.rfind('[[[')]
    getEmsForEvs.exposed = True
def storeEvents(self, els=""):  
    if(len(els) > 0):
        evlst = els.split('[]]')
        dbm.storeNewEvents(evlst)
    return 'okay'
storeEvents.exposed = True

def reportEvtError(self, evt="", type="", data=""):  
    if(len(evt)>0 and len(type)>0):
        dbm.setFlagForEvent(evt, type, data)
    return 'okay'
reportEvtError.exposed = True

cpg.root = Root()
cpg.config.update(file = '../wwtd.conf')
cpg.server.start()
# import necessary libraries
import PadToEmotionAlgo as pag
import MySQLdb
import time

# make time connection to dB needed
Gameconn = MySQLdb.connect(host = "localhost",
                           user = "XXXX",
                           passwd = "XXXX",
                           db = "XXXX")

Gcur = Gameconn.cursor()

# global variables
emojlist = "happiness, sadness, surprise, fear, disgust, anger, nothing"
max_results_back = 40
min_emotion_correction_threshold = 0

# User Login Functions

# register a new user and return fail or pass, along with username
def regNewUsr(email, uname, pw):
    # query for existing email
    try:
        Gcur.execute("SELECT email FROM asdusers WHERE email = %s", (email,))
        rows = Gcur.fetchall()
    except:
        print "error in trying to find existing email"
    # if exists report that error
    if(len(rows) > 0):
        return "0[]this email already exists in our system, choose another"
    # query for existing username
    try:
        Gcur.execute("SELECT username FROM asdusers WHERE username = %s", (uname,))
        rows = Gcur.fetchall()
    except:
        print "error in trying to find existing username"
    # if exists report that error
    if(len(rows) > 0):
        return "0[]this username already exists in our system, choose another"
    else: # or by default if it gets this far
        pwhash = hash(pw)
        joindate = time.asctime()
        try:
            Gcur.execute("INSERT INTO asdusers (username, email, pw, member_join_date) VALUES (%s, %s, %s, %s)", (uname, email, pwhash, joindate))
        except:
            print "Darn, error occurred when registering new user. Details below:
        print \nuname, email, pwhash, joindate", uname, email, pwhash, joindate
        # make sure changes get committed before exiting
        try:
            Gameconn.commit()
        except:
            print "\nDouble Darn, error occurred when committing all new adds in registration. Details below:\n        return "1[]"+uname

def logUsr(uname, pw):
    # get the columns for this uname and pw and game scores
    pwhash = hash(pw)
    try:
        Gcur.execute("SELECT username, Game1Hi, Game2Hi, Game3Hi FROM asdusers WHERE username = %s and pw = %s", (uname, pw))
```python
rows = Gcur.fetchall()
except:
    print 'error in trying to find existing username password match'
    if(len(rows) > 0):
        darow = rows[0]
    else:
        return 'O[]bad username and password combination'
def logNewHiScore(uname, gamenum, score):
    score = str(score)
    gnVar = 'GamelHi'
    if(gamenum == 2):
        gnVar = 'Game2Hi'
    if(gamenum == 3):
        gnVar = 'Game3Hi'
    try:
        Gcur.execute("",
    except:
        print "Darn, error occurred when reporting new hi score"
        print "unam, gamenum, score", uname, gamenum, score
    try:
        Gameconn.commit()
    except:
        print "Double Dar, error occurred when committing all new adds in new Hi Score.
    def getXEvEmPairs(x):
        numtoget = min(x, max_results_back)
        rows = list()
        largeHold = list()
        try:
            Gcur.execute("",
        except:
            print "error in getting XevEmPairs, basic method of retrieval ", numtoget
        return largeHold
    def getGameFunctions(x):
        return X sentence-emotion pairs In a double-list format
```
def getXEvtsForAnEmotion(em, x):
    # get min(MAX, x) number of events with this emotion as possibility
    # - includes trying user-appended and pc-algo generated
    # - exclude events marked as bad
    numToGet = min(x, max_results_back)
    em = '%' + em + '%'
    returnEvents = list()
    EvsAndEms = list()
    rows = list()
    try:
        Gcur.execute(''
            SELECT sentence
            FROM eventdata
            WHERE flag_types NOT LIKE '%%typeO%%' AND (algo_emotion LIKE %s OR human_corrected_emotion LIKE %s)
            ORDER BY RAND() LIMIT %s', (em, em, numToGet))
        rows = Gcur.fetchall()
    except:
        print 'error in gets from the dB using (getXevtsForAnemotion)-->', em, numToGet
    for row in rows:
        # put into a simple list of events
        returnEvents.append(row[0])
    EvsAndEms = getEmotionsCorrespondingToEvents(returnEvents)
    return EvsAndEms

# given events, get emotions and return list of those emotions(or string)
def getEmotionsCorrespondingToEvents(evtlist):
    evemlistreturn = list()
    for evt in evtlist:
        # print evt
        # groom the evt
        # evt = standardizeSent(evt)
        # run pad-algo judge for each incoming event
        algoem = pag.textToEmotion(evt)
        darow = None
        try:
            # now make query for this sentence to see if it exists in db (by hash) and if
            # so take its user-appended emotions as well if possible and if not conflicting ONLY if
            # flag has been reported will the user-appended even exist so we can void bringin queries
            # back if so
            Gcur.execute(''
                SELECT human_corrected_emotion
                FROM eventdata
                WHERE sentence_hash = %s AND human_corrected_emotion != ''''
                    (hash(evt),))
            darow = Gcur.fetchone()
        except:
            print 'error in getting EmotionsCorrespToevents -->', evt, hash(evt)
        if(darow):
            human_corrections = darow[0]
            helist = human_corrections.split(';
            for e in helist:
                apair = e.split(':')
                if(int(apair[1]) > min_emotion_correction_threshold) and algoem.find(apair[0])
                algoem = algoem + ';' + apair[0]
        # after checking current algo and user-reported in db if any add the modified
        algoem
        evemlistreturn.append((evt, algoem))
    # return corresponding list or list-item pairs
    return evemlistreturn

# store new events into the database
def storeNewEvents(evtlist):
    for evt in evtlist:
        # standardize sentence for entry and check sentence validity (2 words at
        # least, no delineator(bydefaultanyway)). erase double-space?, nah
        # - run through pad-algo judger
        # place in DB (one statement/query) multipel lnies thingie online
documentation orths
        # put in sentence, sentence_hash, algo-emotion, user-supplied
        sent = evt
        #
def setFlagForEvent(evt, ftype, data):
    stdsent = standardizeSent(evt)
    if stdsent:
        senthash = hash(stdsent)
        # if emotion thing, count and place
        if (ftype == "typel" and emo_list.find(data) > -1):
            rows = list()
            try:
                # see if any such emotions already exist. if so, reconstruct string, else simply add to string and put back int
                SELECT flag_types, human_corrected_emotion FROM eventdata WHERE sentence_hash = %s
                rows = cur.fetchall()
            except:
                print "failed just in getting pre-existing data from db for setting lags, in setFlagForEvent ->", stdsent
            for darow in rows:
                # darow = cur.fetchone()
                flagString = []
                newEmoCell = []
                fspot = darow[0].find("typel")
                cspot = darow[1].find(data)
                if (fspot == -1):  # this means it needs to have typel set for the first time (since it doesn't already have it), so ow flagString will get a value
                    flagString = ["typel"]
                if (cspot == -1):  # meaning there is no existence of a correction for this emotion yet, construct a new l with count l (emotion:1)
                    if (len(darow[1]) > 0):  # meaning already data there so append "," plus 1
                        newEmoCell = darow[1] + ';' + data + ':1'
                    else:  # meaning nothing there so simple add emotion and 1
                        newEmoCell = data + ':1'
                else:  # meaning this has been corrected before, cuz the data(emotion) was found in this column. get the number for this and update it
                    newEmoCell = data + ':1'
                    nameNnum = None
                    for line in emotions:  # find the number we want to inc, we know its in here
                        nameNnum = line.split(':')
                    if (nameNnum[0] == data):
                        newNum = int(nameNnum[1]) + 1
                        break;
                    if (newNum):  # kinda dum check cuz always is here as doen by bigger IF-
                        newEmoCell = begExist + data + ':' + str(newNum)
                    else:
                        newEmoCell = begExist + data + ':' + str(newNum)
                # print lines here
                # print "\"flagString: \"", flagString
                # print "\"newEmoCell: \"", newEmoCell
            except:
                print "failed just in getting pre-existing data from db for setting lags, in setFlagForEvent ->", stdsent
            finally:
                cur.execute("UPDATE eventdata SET flag_types = %s, human_corrected_emotion = %s WHERE sentence_hash = %s", (flagString, newEmoCell, senthash))
        else:
            print "\n\nDarn. error occurred when adding a new event. Details below:"
            print "\nsent, algoem, hash, datetime", sent, algoem, senthash, usrdate
        # make sure changes get committed before exiting
        conn.commit()
    except:
        print "\n\nDarn. error occurred when committing all new adds. Details below:"
else:
endExist = drow[1][startOfEndExist:] # else it does need
closer cuz something is after it

newEmoCell = begExist + data + ':' + str(newNum) + endExist
try: # now try to put the new EmoCell back into this (update?)
    Gcur.execute(''
        UPDATE eventdata
        SET human_corrected_emotion = %s, flag_types = CONCAT(flag_types, %s)
        WHERE sentence_hash = %s
    '', (newEmoCell,flagString,senthash))
except:
    print "db input erro accounting up new emotions. surprise surprise"
# make sure changes get committed before exiting
try:
    Gameconn.commit()
except:
    print "# print error
    print "\nTriple Darn, error occurred when committing all new adds.
Details below:""'
    #print "\nActual Error-->
    # # if sentence thing, mark in db, count as well, no count cuz after marked
    # one, it doesn't get reshown, so will always be!
    #if (ftype == 'typeO'):
    #  doesn't matter what is already there, cuz this can only get called once per
    # sentence, so just slap a '[typeO]' in the update spot
    #flagString = '[typeO]'
    try: # now try to put the new EmoCell back into this (update?)
        Gcur.execute(''
            UPDATE eventdata
            SET flag_types = CONCAT(flag_types, %s)
            WHERE sentence_hash = %s
        '', (flagString,senthash))
    except:
        print "db input erro at marking bad sentences"'
# determine if it's a valid sentence or not, spaces, subj and verb found (later and only if
reliable)

def sentOrNot(a):
    a = a.strip()
    if(a.find(' ') == -1):
        return None
    else:
        return 1
    #strip end of punctuation (no more), lowercase it (no more), strip ends, check if sent or
    # not (spaces, non-letter chars) and send back sent or null/None
def standardizeSent(a):
    # if begin or end of sentence has punctuation take it off (non letter)
    # find single quotes in sentence and replace back with \ to escape it
    # if any char in the sent is not a letter that is ok, prolly not a key word
    # if ; char in the word, remove it (that is used in string going back to server (but
    # shouldnt matter cuz the first split should be on a diff char like: ; ; ; ;
    #if not a[-1].isalpha()):
        #a = a[:-1]
    #if not a[0].isalpha():
        #a = a[1:]
    # strip whitespace from both ends
    a = a.strip()
    a = a.replace('\', '"
    # send whole sentence to lower case capitalization
    a = a.lower()
    #check sent or not
    son = sentOrNot(a)
    if(son):
        return a
    else:
        return None
    # return this sentence or None based on if sentence or not