The Association Engine: A Free Associative Digital Improviser

Sara Owsley*, David A. Shamma*, Kristian J. Hammond*,
Shannon Bradshaw†, Sanjay Sood*

*Intelligent Information Laboratory
Northwestern University
1890 Maple Avenue, 3rd Floor
Evanston, Illinois 60201
+1 (847) 467-1771

{ayman, sowsley, hammond, budzik}@cs.northwestern.edu

†Department of Management Sciences
The University of Iowa
Iowa City, Iowa 52242
+1 (319) 335-3944

shannon-bradshaw@uiowa.edu

ABSTRACT

In this article, we present the Association Engine, a multimedia installation that explores the space of language and exposes connections between words. It externalizes meaningful associations to remind the viewer of forgotten connections but also introduce her to new ones. It accomplishes this by performing a series of improvisational games. It stands out from previous efforts in the realm of computers and theater as the agency has been empowered with a cultural understanding, more specifically, it uses the Web as a source of cultural reality.

General Terms

Human Factors

Keywords

Network Arts, Media Arts, Culture, World Wide Web, Software Agents

Categories and Subject Descriptors

J.5 [**Arts and Humanities**]: Arts, fine and performing; H.5.3 [**Information Interfaces and Presentation**]: Group and Organization Interfaces—*Web-based interaction*

1. INTRODUCTION

People's associations to words they encounter day to day are limited. Their experiences and their understanding filter, essentially bias their associations. Even their free associations are constricted by their environment, their emotions, and the way they think. The opportunity exists to extend beyond this restriction, to exhaustively expose associations using the machine. Our goal is to create artistic installations that keep the audience engaged in an immersive experience while reminding the viewer of cultural connections forgotten and introducing them to new ones. Such installations will use the Web as a representation of human understanding.

Much work in computers and theater to date has revolved around the operationalization of the mechanics of the stage. The advancements in automated lighting [3] and set design have largely benefitted through the use of new technologies. Within the improvisational space, advancements have been made in the form of a new type of theatrical experience. While these advancements include creating realistic improvisational agents [6], we feel that none to date have embodied a cultural understanding.

The opportunity exists for using the machine not as a device of computation, but as a device of communication of culture. We have used the internet as a representation of cultural reality and created an agency that communicates this cultural understanding.

2. THE ASSOCIATION ENGINE

The Association Engine is a multimedia installation that explores the space of language and exposes connections between words. To explore this space, we created five virtual improvisational players or actors, each with their own agency, each able to associate freely. These actors play several roles throughout the course of a performance.

The Association Engine uses a model of creativity and the imaginative process based on free association. It externalizes meaningful associations to remind the viewer of forgotten connections but also introduce her to new ones. It moves fluidly through the idea space and ties links that exist in the machine world to the human imaginative process. More so, it takes the machine world, as embodied in

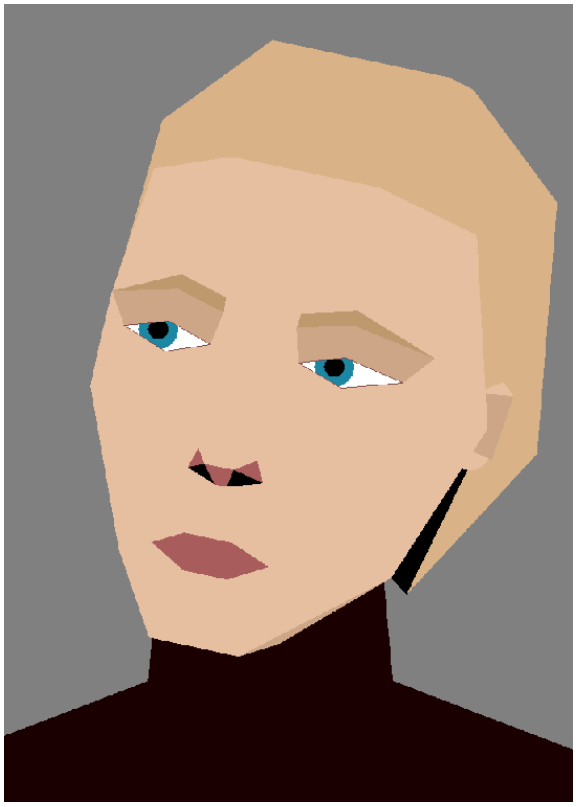

Figure 2: One of the five improvisational players.

hypertext links and semantic and lexical connectors, as a reflection of cultural reality to highlight and explore the relations between ideas.

2.1 The Actors

The Assocation Engine makes use of some existing technology. It uses AT&T Natural Voices text-to-speech engine. It also makes use of the graphics from Ken Perlin's 'Responsive Face' project [4]. The original face, created by Ken Perlin, is on the leftmost screen in the installation (see Figure 1). By altering this original face, we created four other faces. See Figure 3 and Figure 2. These five faces, coupled with AT&T Natural Voices text-to-speech engine make up an improvisational team, able to attend and respond to one another and interact as a troupe.

2.2 The Pattern Game

One particular embodiment of the Association Engine is the performance of an improvisational warm-up game called the Pattern Game. In improvisational theater, the pattern game is a warm-up game used to get a team of actors on the same contextual page. To play the pattern game, the troupe of actors gets a one word suggestion from the audience. Given that word, they do free association in turn through the team in a circular pattern. At the end of the Pattern Game, the actors have created a context from which to do a performance.

We use our five improvisational actors to perform a pattern game given a one word suggestion from the viewers. Given the one word suggestion of 'music,' the performance would go as follows. All five actors say the word 'music' together, as the word 'music' appears projected on the wall behind the actors (the collective idea

Pattern Game		
music	→	fine art → art → creation
	→	creative → inspiration → brainchild
	→	product → production → magazine
	→	newspaper → issue → exit
	→	outlet → out

One Word Story
An artist named Colleen called her friend Alicia. Colleen wanted to go to the production at the music hall. Colleen and Alicia met up at the music hall. To their surprise there was no production at the music hall. Instead the women decided to go to the stage.

Table 1: Discovered Word Chain and One Word Story from the Association Engine

space). The words on the wall continually move around the wall in a random manner. The actor on the far left says the phrase 'fine art,' at which point the phrase 'fine art' joins the word 'music' on the projection. Given the context of the word 'music' and 'fine art,' the second actor from the left contributes 'art' to the chain, while it is added to the projection. The third actor contributes 'creation.' The fourth adds 'creative.' The fifth actor says 'inspiration.' The first actor says 'brainchild.' All of these words have, in turn, been added to the projected space above the monitors. This process continues until each actor has contributed three words to the chain. The complete chain is shown in Table 1.

2.2.1 Lexical FreeNet

In performing the Pattern Game, the Association Engine does free association across the Lexical FreeNet [5] semantic network, an online connected thesaurus. In this thesaurus, words are organized into synonym sets, each representing one underlying lexical concept. There are various types of relations between words represented including: synonyms, antonyms, contains, appears in the definition of, definition includes, more general than, kind-of, part-of, rhymes with and sounds like. We were able to leverage this available technology to empower the agency to do free association.

2.2.2 Word Familiarity

When playing the Pattern Game in improvisational theater, choosing words that other actors are not familiar with is discouraged. This is because it hinders the goal of the game: to build a common understanding or theme for the coming performance. In order to keep the audience engaged and interested, the words they hear must be familiar and understandable to them as well. This is similar to how people converse with one another on a daily basis. We use vocabulary that is familiar to who we are speaking to. We have a notion of how familiar certain words will be to different people. People are very good at doing this, but how do they do it? It is clear how this would be a challenge for the machine.

Initially, the Association Engine was not aware of word obscurity. Lexical FreeNet contains such a breadth of words that many times the agency would choose a word or phrase which is unfamiliar to its general audience. So, the pattern 'blood' to 'corpuscle' to 'somatic cell' could be generated. The phrase 'somatic cell' is unfamiliar to the general public, more so during the Pattern Game the actors have almost nothing to free associate following 'somatic cell'. A chain that might be more familiar to a general public, given the word 'blood' is: 'blood' to 'family' to 'sister.' We needed the agency to be able to judge how familiar a word was before choosing

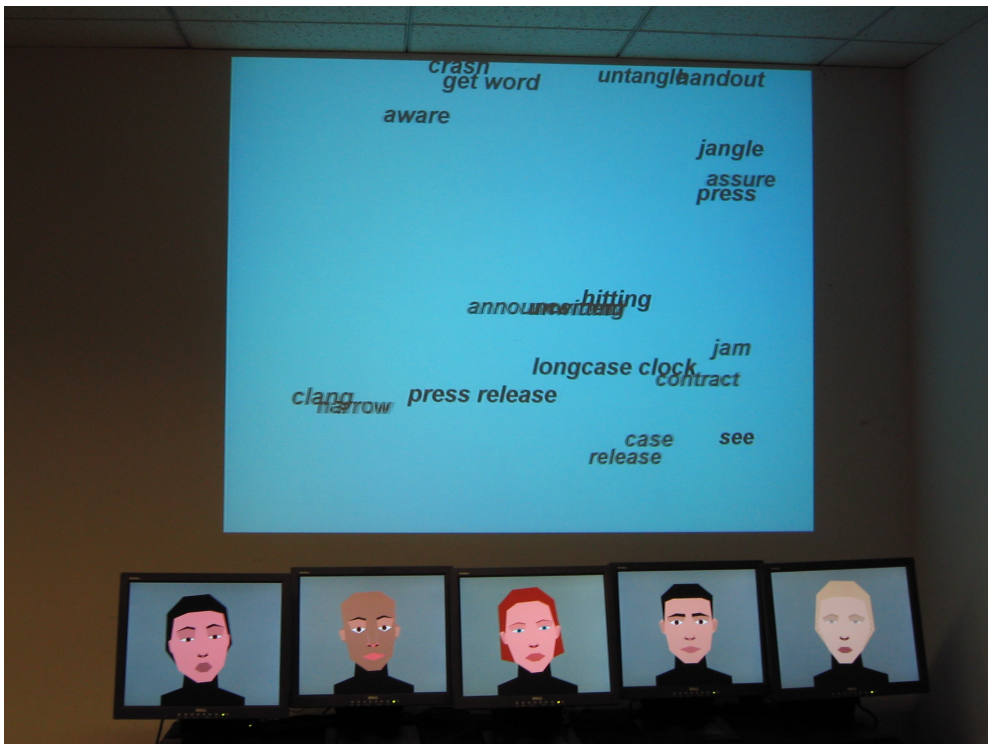

Figure 1: The Association Engine doing a performance of the Pattern Game.

Figure 3: Three of the five improvisational players interacting. The middle player is speaking, while the other players are attentive to him.

it.

Since people are good at judging word familiarity in conversation with one another, we felt a need to capture this with the machine. To capture this, we use a huge corpora full of language that people use, the Web. The Web is abundantly populated with the words that people use frequently and sparsely populated with words that people use infrequently. The agency uses presence on the Web to determine how familiar a word will be to a general audience [7].

2.2.3 Using Context

When playing this pattern game, improvisational actors use the context of the previous words that have been said to make their association. This is an important piece of knowledge as the associations that they make are not just to the previous word, but to the previous several words. This keeps them on point, and tied into a space of words. When that space is exhausted, they can jump out of it with an association into a different space or set of words. Each actor knows the previous couple of words and strives to make an association in that space. To simulate this, the Association Engine uses the last several words contributed as a context from which to make an association.

We use these technologies to make sure that the team of improvisational actors stays on course in performing the pattern game. We must ensure that associations are on point, not random, not totally free, meaningful, tied down, contextual, and very importantly, not obscure.

2.3 One Word Story

In improvisational theater, after performing a pattern game, the troupe is on the same contextual page and has a clearer focus. They have created a set of associations, a context. Then, in that context, they do a performance. This performance could take many different forms. One type of performance that we were interested in is called a One Word Story.

To do a One Word Story, the actors contribute one word at a time to tell a story. It is often challenging for improvisational actors to use the context, the set of words that they have created in warm up (the Pattern Game) in the One Word Story.

Following the performance of a pattern game, the Association Engine's team of actors tells a One Word Story in that context. Within the agency, we have represented knowledge of how to tell stories and how different kinds of stories are structured. Based on the associations made in the pattern game, the agency decides what kind of story to tell.

As an example of a performance of a One Word Story, consider that the troupe of virtual actors has just completed their performance of the Pattern Game described previously, given the seed word 'music.' The actors signal the conclusion of the Pattern Game by repeating the initial word in unison. They then perform the One Word Story in the same fashion as the Pattern Game, each actor contributing one word at a time in turn to create the story shown in Table 1.

2.3.1 Selectional Restriction

Just as people use words that are familiar to whom we are speaking to, we also use verb/object pairs that make sense. We know the grammatical structure of sentences, and what types of words make sense to follow one another. This is not simply a matter of knowing that a noun should follow a verb. We know that 'the dog ate the cheese' makes a lot more sense than 'the dog ate the suspension.' While 'cheese' and 'suspension' are both nouns, we know that following the verb 'ate' should be something that is not just a noun, but more specifically, a noun that make sense to follow 'ate' (likely a food, but not necessarily).

In creating a One Word Story, the agency needed to be able to incorporate the associations made in the Pattern Game into a story. However, to create a story that is coherent, using parts of speech as the sole rules for creating a story was not enough. We must use selectional restriction to create phrases and sentences that make sense.

This is a topic that has been the subject of much research in linguistics. However, we take a different approach to selection restriction. While we want to test if two words fit together, we do not use a standard rule base for doing so. We have found that such relations can be realized by utilizing one of the largest corpora of written language, the internet.

We use the internet to find the familiarity (popularity) of a particular verb/object pair. Given the nature of search engines, one can search by groupings of words or phrases. This has the side effect of allowing us to test whether certain groupings of words are used in documents that are indexed on the web and to quatify their presence on the Web. Taking this approach to selectional restrictions, we cannot generate new utterances, but can test whether certain utterances exist. Using this information, we can elect phrases from which to form stories.

3. CONCLUSIONS

Our goal as artists is to create a piece that on one hand opens up the dynamic of team work and performance and on the other shows the potential of the machine as an artistic agent. Coordinated with computer generated faces and a projected idea space, the Association Engine is an installation that meets our goals as a team of autonomous improvisational agents. [2] This work is actually part of a broader effort in the area called network art which is focused on merging information in the world, interaction design, and fine art to create new artistic agencies.

We initially set out to simulate the human process of association. We suspected this to be an intense cognitive skill, but we found that it maybe in fact be the product of freeing lower level skills and bringing those to the floor. We found that by using existing technologies (Lexical FreeNet [5] and the Web [7]), we were able to systematically generate such associations. The key to the success of the agency in making such associations is that by using the Web as a source, the agency has a cultural understanding.

From an artistic point of view, the flow state of the performance must be maintained [1]. This entails keeping the audience engaged, by addressing issues of timing and word familiarity. We have to be able to take the technology into the realm of art. That means that we have to embrace the limitations of the technology, understand and accept them, not simply exercise the technology to the detriment of the artistic experience.

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