Persuasive Technology and Emotional Agents

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INTRODUCTION

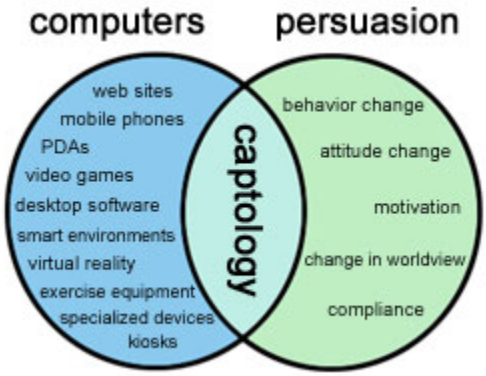
Today we are being influenced by new-age computers and devices. The use of persuasive technology in the future will expand marketing, sales, and everyday behaviors. The focus is on computers and persuasion, which combined is formally known as persuasive technology. Dr. B.J. Fogg states that, "A persuasive computing technology is a computing system, device or application intentionally designed to change a person's attitude or behavior in a predetermined way." [Fogg 1999] In order to understand we must first explore persuasion coupled with its techniques and intentions. The term captology focuses on the research and analysis of interactive computing products for persuasive technology. But the question is can these tools change attitudes and behaviors?

Persuasion is the process in which a message induces change in beliefs, attitudes, or behaviors. It is often used for presenting or promoting a point of view. The basic and perhaps the most classical type of persuasion is verbal communication. As persuasion evolved it included books, pamphlets, flyers, billboards, etc. There are many techniques used today that go unnoticed. The bible, parents, and teachers are all forms of persuasion that influence ones attitude and behavior.

Computer applications now are able to persuade as effectively as humans. Persuasive computing technologies can constructively change behaviors in health, safety, and education. This allows the computer to help humans improve themselves, their community, and their society. Unfortunately persuasive computing is also used for destructive purposes such as manipulation and coercion.

Persuasive techniques are widely known and are no longer secrets that belong to marketers and advertisers. The people being persuaded now are more sophisticated than the consumers of yesteryear. Viewers see persuasion as a game and even a challenge. Most people are critical and even cynical of persuasive techniques; perhaps youth in decades past were fairly unaware of the techniques. In order for a technique to be effective it has to have more persuasive power than years ago.

In this era everyone is looking to do bigger and better things in the persuasive market. Dr. B.J. Fogg of Stanford University introduced Captology to define how persuasive computers are designed to change ones attitudes and behaviors. This new area of study explores the overlapping of persuasion (influence, motivation, behavior change, etc) and computing technologies. This includes the design, research, and analysis of interactive computing devices.

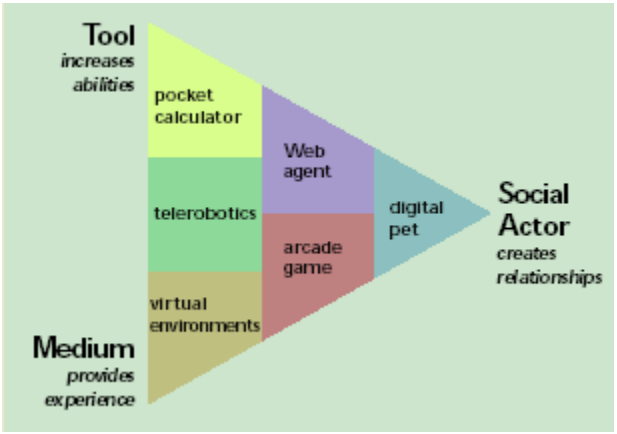


Captology was created to analyze the effects of changing people's attitudes or behaviors. Noticeably, more computing products are designed to change what we think and do. The emphasis is on influencing people positively in the realm of health and to also improve road safety. Applications also persuade one to hand over personal data that can be misused. Captology applies to many areas of everyday life and the list includes

education, e-commerce and buying behavior, sexual behavior, nutrition, marketing, religion, disease management, personal relationships, politics and driving safety.

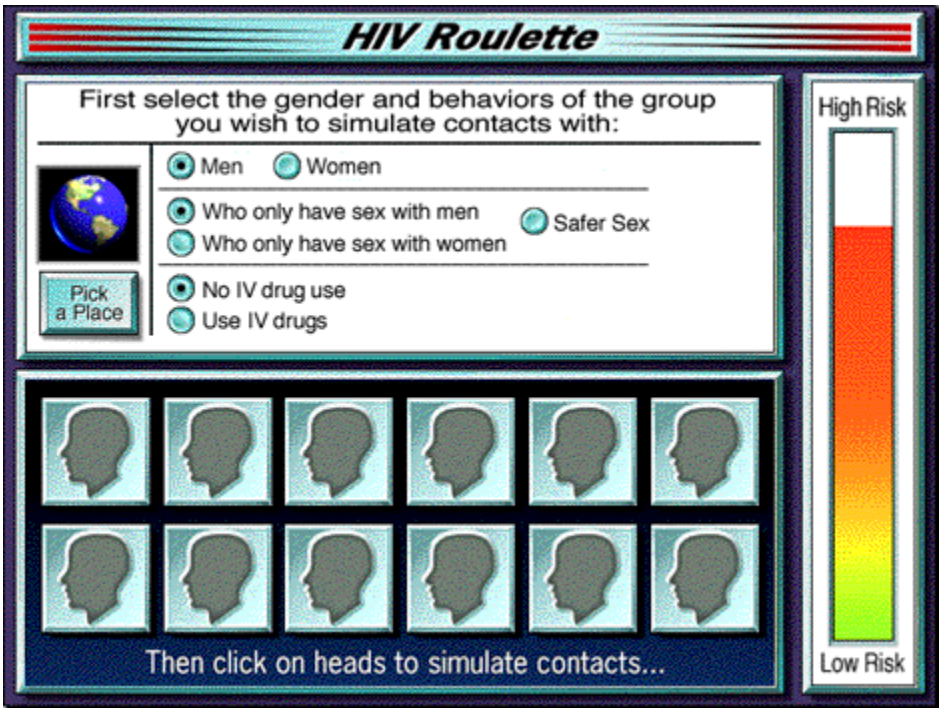
TOOLS, MEDIA, SOCIAL ACTORS

Persuasive computing can be employed as tools, media, or as social actors. The 3 roles provide situations to display persuasive intents. As a tool, a computer application or system can enable users with new abilities, allowing people to do things more easily. As a medium, a computer can convey either symbolic content or sensory content. Symbolic content includes text and icons. Sensory content includes virtual worlds and simulations. As social actors they can invoke social responses from users, play animated roles and follow social dynamics.



Can tools change attitudes and behaviors? The answer is yes. Computer tools persuade by providing tailored information and by leading people through a process. For example, a tool can be designed to help people save money for retirement. It walks users through steps to analyze their financial standing, set financial goals, and take actions to achieve their goals. This process motivates users to create and follow a budget, save more money for retirement, and maybe donate to a charity.

Computers as media provide different pathways to persuasion. The most popular are simulations and virtual environments. Simulations allow people to make hypothetical choices and then see the effects of their choice. Computer simulations do not need to force ideas on users. Instead one can explore the options in the simulation and observe the results for themselves. This is a powerful way to persuade. An example would be a game called "HIV Roulette" developed at San Francisco Exploratorium. [San Francisco Exploratorium] This game was designed to change sexual behavior by letting them see the chances of contracting HIV, the virus that leads to AIDS.



As persuasive social actors, computers provide social support, and model attitudes as well as behaviors. They also leverage social rules and dynamics. These systems give feedback which encourages the user to continue doing well. An example is of CD-ROMS geared towards children to encourage good nutrition. They have characters with names like Sherry Cherry that praise the children for practicing healthy eating habits.

The children respond kindly to the social actors and continue to seek positive feedback. This interactive technology persuades by increasing a person's ability, providing users with an experience, and by leveraging the power of social relationships.

PERSUASIVE TECHNOLOGY APPLICATIONS

Since 1997, the Persuasive Technology lab at Stanford University has tracked emerging computing devices designed to change human attitudes and behaviors. They have identified close to 50 devices. This paper will only discuss 3; Baby Think It Over, Hygiene Guard, and Onsale.com. Baby Think It Over is a computerized doll for teens simulating the difficulties of parenthood. Hygiene Guard is an employee monitoring system to encourage hand washing after using the restroom. Onsale.com is an online auction that treats bidding as playing and buying as winning.

Baby Think It Over is in the health category of persuasive technology. This computerized doll is used mostly in high school parenting classes. This technology gives the student a painful realistic simulation of raising a child. The baby is programmed to cry randomly day and night. The only thing to quiet it is a key attached to the students "parent" wrist that has to be inserted for 5-15 minutes. A small computer on the inside keeps a log of neglectfulness, inattention to cries or other mistreatment of the baby to be analyzed by the teacher. [Reality Works Inc.]

The idea of maintaining health through technology is not surprising. Promoting safety and security also has widespread appeal. Unlike health, safety is based on collective behavior and can lead to an ethics dispute. Hygiene Guard motivates safe behavior. This device is installed in restaurant and hospital restrooms to monitor

employees hand washing. Each employee is given a badge. During the trip to the bathroom, the employee has to use the sink for a set minimum time. Failure to do so is recorded by the central server. There are issues with this system concerning privacy, but the outcome of consumer safety and preventing the spread of disease justifies its existence.

Onsale.com is classified as a buying persuasive technology. The website goes far beyond traditional media and provides the opportunity of an interactive experience. Onsale.com is a virtual auction space allowing people to competitively bid on items in real-time. The environment is designed to make you feel like you are playing instead of bidding, and winning instead of purchasing. If you win you are publicly noted on the website. This boosts the winner's morale to buy again, or as they say on the website play again. [OnSale, Inc]

PERSUASIVE TECHNOLOGY SYSTEMS

The technologies mentioned before fall into 3 categories; desktop-based systems, artifact-based systems, and environment-based systems. Onsale.com is desk-bound because it is used on a personal computer or workstation. This limits when and where persuasion can occur. Artifact-based persuasive technologies are often portable and can persuade in many locations. Baby Think It Over falls in this category. The device is shaped and weighs as much as a real infant. The head is also weighted, which requires support when held. When the baby cries there is no way to manually turn the volume down. Users have to hold the key in place for an unknown time to silence it. The persuasion is between the responsibility of a real child and the Baby Think It Over

experience. Hygiene Guard is an environment-based technology because it is built into a room or other space. Hygiene Guard is not desk-bound and the user does not carry it, except for the identification badges.

The persuasive strategy used for simulated experiences is beneficial because it presents the user with similar environments to the real counterpart. The effectiveness in this system is that the choices made have no consequences in real life, only in real-time. Wrong choices produce negative results and better choices result in positive outcomes. Then the choices can be duplicated in the user's life.

ETHICS OF PERSUASIVE TECHNOLOGY

The surveillance technique is quite a controversial persuasive technology. Knowing that you are being monitored or tracked significantly affects a person's behavior. The human sense of the lost of freedom and privacy makes surveillance coercive and manipulative rather than persuasive. The loss of personal freedom does not mean surveillance is unethical or undesirable. For Hygiene Guard the surveillance technology benefits customers, diners, patients and employees alike. Yet this could minimize the trust in employer-employee relationships.

Ethics plays a major role in everything we do and in every decision we make. "Ethics is referred to as a rational, consistent system for determining right and wrong, usually in the context of specific actions or policies." [Berdichevsky/Neunschwander 1999] Previously persuaders used technology to maximize their usefulness. Not until recently have technologies become persuasive on their own. When designing the technologies one must not persuade users to do something the creator would not want to

do. Ethics of persuasive technology are evaluated by gauging its consequences with respect to a particular criterion, mostly human happiness or well being.

There is an argument that all involved parties of persuasion share full moral responsibility for the outcome. For example, George convinces Tyler to kill his wife. Tyler is responsible because he made the choice, but he was talked into performing the act. Some may dismiss George as an accessory to the crime because he did not commit the crime. George still plays a large role in the situation. If it had not been his persuasion, the act would have never been committed.

One must analyze acts of persuasion according to their motivation, method, and outcomes. The outcomes are intended and unintended. There has to be a measure of motivation from the designer and the persuasive intent of the technology. Consideration needs to go to whether technology alters or even shares the distribution of responsibility for the intent, method, and end result of the persuasive act. Arbitrarily, computers have not demonstrated the ability to form their own intentions or make their own choices. So when computers make serious mistakes, their programmers are the first ones blamed and users second. The computer itself gets off easy. This is because computers cannot make sense of mistakes, because it just executes human programs. [Berdichevsky/Neunschwander 1999]

Assigning responsibility for the persuasive act to the persuasive technology is misleading. It is not the slot machine's fault that it has a compelling narrative that persuades and even entices people to gamble their savings away. The machine cannot take the credit for making the experience entertaining. The real responsibility for the machine's motivation, methods, and outcomes belong to its creator and purchaser. The

gambler's choice is distributed to both creator and purchaser, and also the gambler themselves.

Any outcome of a persuasive act has to be evaluated to establish its ethical standing. If something is unethical for you to do, it is equally unethical to persuade another to do so. Unintended outcomes trip the system. For instance, if someone was persuaded to eat a fruit that is rarely associated with anyone being allergic (1:1,000,000,000) and they prove to be allergic; this was an unintended outcome. Although unfortunate, this would not be a predictable outcome and the person is not held accountable. If this was a common allergy and the person was persuaded, then the creator is to blame; bad ethics.

The ethical principles of persuasive design are as follows:

1. The intended outcome of any persuasive technology should never be one that would be deemed unethical if the persuasion were undertaken without the technology or if the outcome occurred independently of persuasion
2. The motivations behind the creation of a persuasive technology should never be such that they would be deemed unethical if they led to more traditional persuasion
3. The creators of a persuasive technology must consider, contend with, and assume responsibility for all reasonably predictable outcomes of its use.
4. The creators of a persuasive technology must ensure that it regards the privacy of users with at least as much respect as they regard their own privacy.
5. Persuasive technologies relaying personal information about a user to a third party must be closely scrutinized for privacy concerns.
6. The creators of a persuasive technology should disclose their motivations, methods, and intended outcomes, except when such disclosure would significantly undermine an otherwise ethical goal.
7. Persuasive technologies must not misinform in order to achiever their persuasive end.
8. The creators of a persuasive technology should never seek to persuade a person or persons of something they themselves would not consent to be persuaded to do. [Berdichevsky/Neunschwander 1999]

The rules of ethics mentioned above are what sparked the interest in Carey E. Heckman and Jacob O. Wobbrock to write an inspiring paper: "Put your best face

forward: anthropomorphic agents, e-commerce consumers, and the law." Their main concern is for the consumer and making sure the designers have their best interests at heart. [Heckman/Wobbrock 2000] The number of people that shop online is steadily increasing as well as the number of agents on the sites. Agents mimic the salesperson in an actual store. They hope agents will make the consumer's experience feel as if they were shopping in a real-world store, but will they do it safely?

CONSUMER SAFETY

Designers must stay away from building agents that mislead or provide disillusions to consumers. While shopping online consumers do not get face-to-face interaction, conversation, nor do they build personal relationships on the website. In some cases many consider this to be far less of an experience than physical shopping. In hopes of bettering the e-commerce experience agents are enabled with speech and body gestures. Speech and gestures coupled together display emotions to consumers. Online agents keep profiles of users past conversations, likes and dislikes, in an attempt to create a more personal experience. In an example an agent would have the user's birthday on file and when that day arrives would send them a gift certificate or coupon. This provides personalization and can be seen as a friendship; although a consumer cannot provide anything to the agent in return.

ANTHROPOMORPHIC AGENT LIMITATIONS

There are very few limitations to agents; other than the fact that they cannot think for themselves. Unlike humans in movies, agents can achieve the impossible. They will use any and everything they can to provide entertainment to the consumers.

The e-world and real world contain fraud, misrepresentation, deception and persuasion. In the fields mentioned, anyone unaware or easily fooled can be swayed into making bad choices. Anthropomorphic agents are no exception and must be monitored carefully. Agents are not personally responsible, but their creators are. If fraud is committed the person faces criminal and civil liabilities. Punishment includes a hefty fine and imprisonment for a decade or more.

Agents have the ability to provide consumers with false information in order to gain profit. The most common case would be providing misleading promotions to sell goods. Scripting an agent to file false insurance claims is also considered fraudulent behavior. The government has provided consumers with protection from these actions. A consumer has the opportunity to go to court and be provided the coverage of their damages. In some instances designer's intentions were not to deceive, but failed to avoid any case of deception. The courts countersuit is that the person that scripted the agent should have known the implications.

An agent can mislead a consumer by having or using something name brand on the web site. This is seen as an endorsement even if it was not the agent's objective; he just happened to be wearing a Nike® cap. Consumers do not know the difference and they look at it as if the agent was saying; 'Buy a Nike® cap just like the one I have on!'

Unlike online agents, sales persons can improvise and make the deal much sweeter for the consumer and not have to worry about legal liabilities.

When it is discovered that an anthropomorphic agent is involved in fraudulent activities the question is; who is held responsible for its bad conduct? Is it the designer or the person who configured the agent for the specific application or both? The person who programmed the agent with the deceptive speech is considered liable. "Anthropomorphic agents don't defraud consumers; those who configure anthropomorphic agents do."[Heckman and Wobbrock, 2000] The original designers and programmers are also held responsible. They are the ones that created the agent's skeleton and features. They decide what safety nets should be induced, if any. They should be able to fathom potential problems the anthropomorphic agents could cause, and create it so that it avoids the problems. Anthropomorphic agents are most effective when they provide personalization and behavior adaptations. Maintaining agents conduct and speech is a very difficult task. It is possible that the designer or person who configured the agent certainly never anticipated what the adaptive agent would say or do. Any court trying the case still holds both parties accountable.

BELIEVABILITY

Some believe that human-like agents are too familiar to users and therefore are unrealistic. Instead of animating realistic humans, designers animate cartoon like agents to encourage communication. This also allows the users to interact socially, treat agents as competent counterparts and even believe in the illusion. Movement and speech of the agent makes the experience more enjoyable. For instance if the animated sales agent read

a descriptive paragraph that was persuasive, to the user it was more personal and thoughtful than reading the text to himself.

Anthropomorphic agent's believability rests on its animation and gestures. There is a difference between the two. Animation is just movement, and gestures are movements that have information. Gestures if used correctly tend to go unnoticed. This is because gestures are a part of human-to-human interaction and is a natural part of communication. Anthropomorphic agent's believability is increased when there is perfect timing between gestures and speech. This introduces the strongest attribute of the agent, natural language. Some people have been fooled into thinking that a natural language agent is a real person. The agent's illusion is so strong that one temporarily forgets to what entity they are conversing with. Still others are worried that this strong illusion of intelligence of life by a competent agent could mislead consumers. The agent could be built to enforce this ability to have users seeking their advice when purchasing items online.

AGENTS WITH EMOTIONS

Agents must be given some sort of emotions or else it seems lifeless. People will see the agent as what it is; a programmed machine. Emotions come from human hearts, and that is the one thing designers cannot give their agents. Although a heart is the foundation of emotions, agent's designers clearly will have to make it appear as if they have emotions. If this is successful humans will respond emotionally and in minds the agent is transformed into a life entity. Over a period of time through interactions with an agent the user becomes fond of him and trusts the agent. Research shows that humans

treat innate objects like they treat other people. Although in minds they know the objects do not have lives.

Serious considerations of anthropomorphic agents being sales personnel are putting them in human roles. They can also be service representatives, guides and hosts. They will respond directly to user's action and remain long enough for the user to act upon them. The anthropomorphic agents do not wait for the user's to act, but are actors themselves and invoke interaction first. For these facts they are pushing computing technology, social, economic and legal fields to their limits. Setbacks may include an agent not upholding the illusion of human life or if the agent makes a mistake and there is no way to recover. Users may also become addicted to the online agents and there are potential dangers resulting from this. [Bates 1994]

Maintaining conversation with an agent may become complicated or confusing. An agent may sell goods online, such as gadgets with high-tech capabilities. Some of these gadgets involve many operations that need to be fully explained. If a user asks a detailed question and it is not worded correctly, or the agent does not understand, the agent may change the subject or turn the question around for its understanding. This inadequacy could lead to misinformation.

Skeptics do not think the agent or its designers are fully responsible for the user's loss. This is solely because a user should not be fooled by a limited computer application. Often times the user is caught in the illusion, and responds socially as if it was capable and competent. But if one user has a bad encounter, word-of-mouth will spread and e-commerce with anthropomorphic agents will suffer. The consumers should

feel comfortable that the agents they interact with are limited in what they can say and do.

Anthropomorphic agents are persuasive because of their contact with humans and the convincing manner in which they interact. In this early stage it is impossible to anticipate all the persuasive abilities of an anthropomorphic agent. There are boundaries that should be placed on any agent's persuasion. Boundaries will need to be enforced when agents are used in advertising. Advertisers will use anthropomorphic agents to persuade others to buy certain items or try new products, because it is known that agents have strong social and emotional effects on people. The extent on how we let anthropomorphic agents persuade humans still must be determined. Adaptive agents personalize the data of a user; examples are user's preferences and the pattern of their online shopping. This action can also be a violation of the user's privacy. The agent could then send the user's profile to a specific company and in turn the company would tailor to the user's needs; therefore increasing their revenue. This type of behavior is actually legal, but users may feel that the agent is intruding for advertisers.

ARTIFICIAL NARRATIVE INTELLIGENCE

The theory and design of computing technology in how it is used as an influential tool and ethical standards were previously explained. Now we push forward in exploring how persuasive technologies can be enforced through artificial narrative intelligence. Artificial Intelligence can be seen as an attempt to model aspects of human thought on computers. This study is pushing the limits of human-computer relations. A doctoral student at MIT Media Lab by the name of Tim Bickmore came up with a clever agent

that does exactly that; use artificial intelligence with persuasive technology. [Diamond 2003]

Bickmore designed a computerized exercise coach named Laura. His goal was to establish a relationship with a computer buddy to benefit the user. Laura is an animated software agent that is designed to remember conversations, and use that information in subsequent interactions. The system he built is used to get the user to exercise more often. The duration of the experiment was 30 days. Laura resided in the left portion of the computer screen and asked about the users exercise routine, weekend plans, told jokes, and offered advice. The user typically responded by typing an answer out or clicking a multiple-choice option. On the right side of the screen the user entered the details about their workout, viewed progress charts and read fitness tips.

The experiment results include having users shuttle among four gyms and a host of exercise trails. Then the exercise regimen becomes a part of the user's daily routine. Routines involve taking runs, bicycling, lifting weights and hiking. In a typical encounter a participant named David Diamond logs in and Laura says "Hello David. How are you?" David interacts with Laura by clicking or typing to respond after she talks. She shifts her body when they switch to a new topic. She also knows when it is the right time to smile. At one point David tests her extremities; he tells her that he is not feeling well. She asks why and David clicks the option for 'he hurt himself'. Then Laura provides a space for him to explain what happened. David types in "I walked into the table." She moves in closer to the screen and shows a look of concern. She explains that by seeing a doctor it can improve one's health. Laura inquires further to find out if the injury will have an impact on his exercise program, he enters "no". As the conversation continues he tells

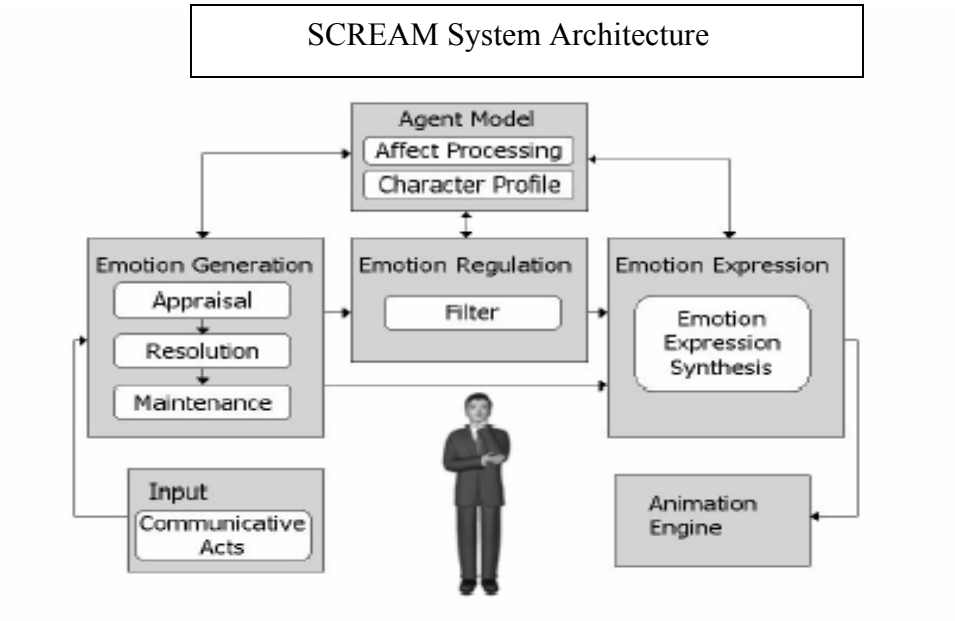
her that he will only be able to walk 4,000 steps the following day. Laura does not ask him to do more. "She knows not to push."

Laura can demonstrate that she is worried, affectionate, and displays esteem, although she is not efficient at distinguishing deceptive information. During the 30 day regimen with Laura, David began to look forward to his time spent with her. Laura also asks about movies David has seen, or his favorite cuisine, and the weather "out there." She replies with: "It's always the same in here; Day in, Day out." David is happy with the results of their encounter. He gets on the scale more often. He even admires his newly toned body in the mirror, almost conceitedly. On day 30 Laura tells David it is over and to take care of himself. David feels sad because he has become emotionally attached to her. So he logs on the next day, and he goes through a series of questions and is hurt because Laura used to know all of this; and he is unfamiliar to her (a total stranger). [Diamond 2003]

APPLICATIONS FOR SCRIPTING EMOTION-BASED AGENTS

Tim Bickmore put a lot of hard work and research into his creation of Laura and her capabilities. It is far more complex than it appears; now we are going to research lower level "Laura's" per say. The paper titled *Scripting the Bodies and Minds of Life-like Characters* is a very good base for emotional intelligent agents.[Descamps/Ishizuka/Prendinger] For creation of an interactive casino game the proprietors used SCREAM and MPML for implementation. SCREAM stands for SCRipting Emotion-based Agent Minds. SCREAM is intended to animate intelligent agents, by giving it goals and attitudes. Multimodal Presentation Mark-up Language

(MPML) is a XML-style markup language used to control and coordinate animated characters in web-based environments. It also controls the visual appearance of an animated character.



SCREAM application includes emotion generation where emotions are evaluated to their emotional significance for an agent. Emotions are compared with each other, and the one with the highest intensity wins. Emotion regulation determines whether an emotion is suppressed or expressed based on social and cultural norms. Affect processing is a change of attitude as a result of social interaction. Inside the character profile contains predefined mental make-up of an agent model. Emotion expression handles the intensity and terms of the agent's reactions and behaviors. An interaction or situation with other agents or users is inputted to begin the cycle. The animation engine uses MPML, Java and Jinni 2000, and Microsoft Agent package along with the sectors mentioned above to provide an end product. Java is used for its portability and Jinni is a Java based Prolog system that is used to support high level scripting for agent minds. The Microsoft Agent package is an interfacing device that is called upon when a scripted

agent is used. [Descamps/Ishizuka/Prendinger]

Casino Scenario

The end product is a casino illustrative black jack game. The emotion-based agent is a genie. The genie goes through 22 set classes of emotions that include: joy, distress, happy for, sorry for, resent, angry and etc. All the emotions have intensities that depend on the given situation. In the game the genie interacts with the narrator, the dealer, and the user. The genie comments on the games played by the user. The game is played 5 times and initially the genie's character profile is rather agreeable, extrovert, and half-way likes the user. The genie being extrovert means that he displays his opinions and views independently of what other agents may think. The genie's goal is to have the user win with low intensity and the user follows his advice with high intensity. Winning or losing the game is independent of the user following the genie's advice.

In the first game the user loses. The genie's winning emotional state turns to distress with a low intensity because the user did not follow his advice. Although he is distressed he displays that emotion with low intensity. This is because his character is rather agreeable and it decreases the negative emotions intensity. In the second game, the user loses again and the genie's emotional state is now distressed. In the third game the user loses, but this time the genie is gloating over the user's loss. This happens because now the negative emotions dominate the positive as a consequence for the user's repeated refusal to follow his advice. The genie's attitude changes to slightly disliking the user which lets him experience joy over the user's distress. In the fourth game the user wins, but the genie is in a bad mood and his intensity is at a medium. In the last game the user wins and the genie's emotional state has changed to resent. The genie now slightly dislikes the user and is distressed because the user won even though he did not take his advice. He expressed his emotions with a reduced intensity because of his initial character profile. The genie has to determine whether or not he is sorry for or resents the user's lost game. As long as the genie's profile is generally agreeable his emotional reactions will be fairly positive.

CONCLUSION

The topics in this manuscript range through persuasive techniques and applications, ethics, consumer safety, limitations of anthropomorphic agents, and scripting of emotional agents. Through this research on emotional agents and persuasive technology I conclude that agents are better persuaders if they display necessary emotions. I plan to continue researching the basics of scripting emotional agents. This

will give me an extensive background and provide me with adequate information to script my own agent and apply the scripting to various applications.

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