Can an AI Learn to Make you Laugh?

Creating Humor with Machine Learning on Computer Interfaces to Combat Stress at Work

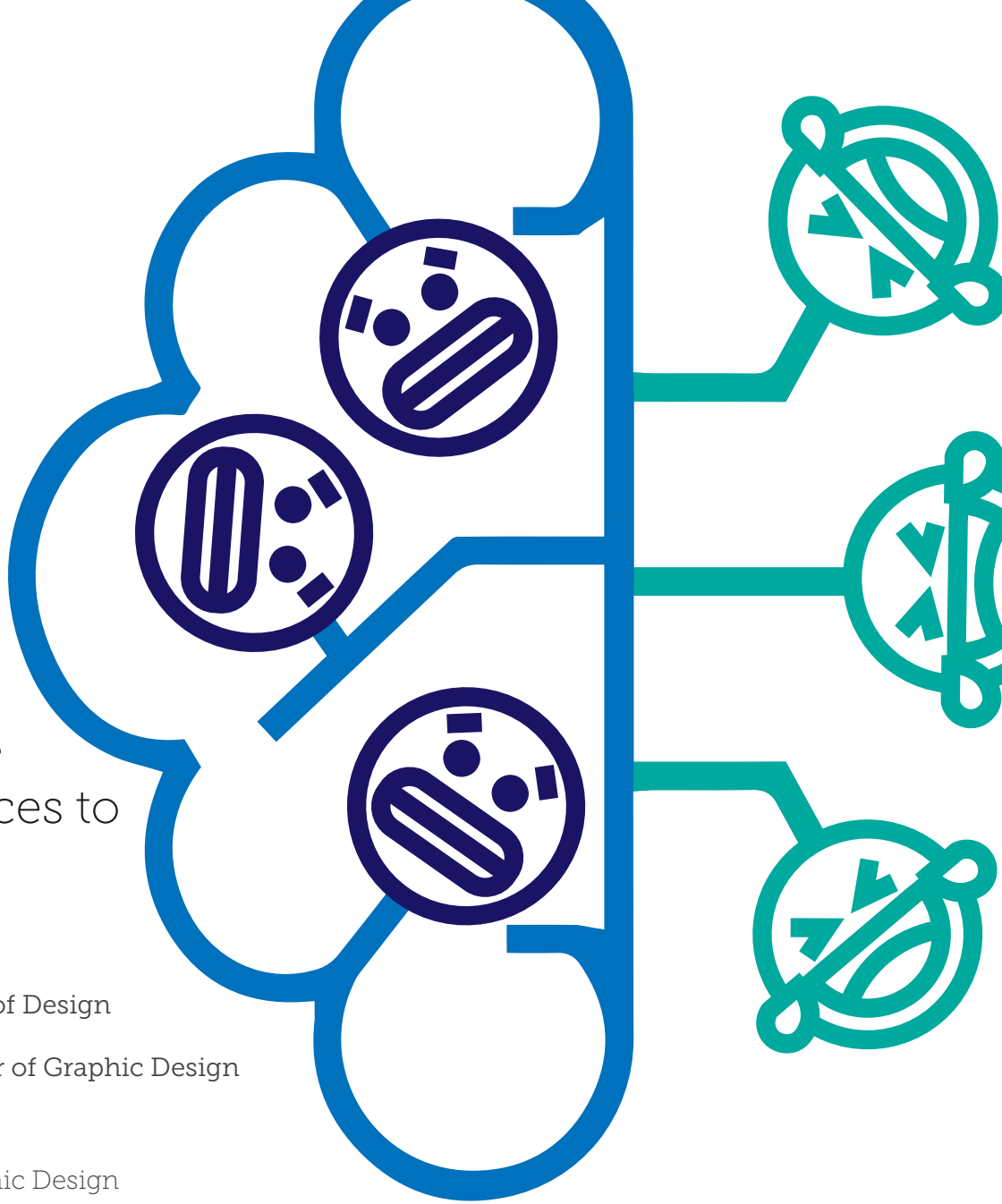
Harrison F. Lyman III
April 28, 2020
Department of Graphic and Industrial Design College of Design
North Carolina State University
Submitted in partial fulfillment for the degree of Master of Graphic Design

Committee:

Helen Armstrong | Chair – Associate Professor of Graphic Design

Kermit Bailey | Reader – Associate Professor of Graphic Design

Debora Littlejohn | Reviewer – Assistant Professor of Graphic Design



Can an AI Learn to Make you Laugh?

Creating Humor with Machine Learning on Computer Interfaces to Combat Stress at Work

Harrison Franklin Lyman III
April 28, 2020
Department of Graphic and Industrial Design College of Design
North Carolina State University
Submitted in partial fulfillment for the degree of Master of Graphic Design

Helen Armstrong — Date
Committee Chair – Associate Professor – College of Design

Denise Gonzales Crisp — Date
Director of Graduate Program – College of Design

Tsai Lu Liu — Date
Department Head – College of Design

Dr. Mark Hoversten — Date
Associate Dean – College of Design

-2. Abstract

Elevated stress levels can harm the human body physically and mentally over time. Professionals who work primarily on a computer in an office environment are prone to experiencing regular elevated stress. Humor is therapeutic to body and to mind as it directly decreases stress levels. Machine learning technology may be used to detect short term and long term stress and recommend appropriate humorous interventions. These ML recommendation systems could gather initial data as well as recognize patterns to develop a user humor profile and improve timing and content of such interventions. The results of this study show the potential to use ML to implement humor via a user interface design, specifically through the use of a variety of intelligent low strategy games, characters, and language.

-1. Acknowledgments

I have many people I'd like to acknowledge for their encouragement, help brainstorming, and inspiration. They were willing to put-up with me, listen to my jokes one after the other but still never laughed. I'd like to thank Cookie Monster and Jim Henson. I would like to thank Arnold Schwarzenegger for having such a great voice and never taking himself too seriously. There are many comedians I can thank, but the two that stand out most in my mind for influencing my own style of humor are Steve Martin and Jerry Seinfeld. Comic inspiration also has manifested in me from a long list of the following comedians: Monty Python cast, Chris Farley, Adam Sandler, Will Ferrell, David Spade, Eddie Murphy, Bill Hader, Kristen Wiig, Dave Chappelle, Tina Fey, Brian Regan, Demitri Martin, Bill Burr, Ali Wong, Lewis Black, Tom Segura and many other comedians I have listened, watched and laughed from for years. A debt of gratitude is extended to Lori Wachter who interviewed with me and provided expert guidance and insight. I would also like to sincerely thank all my teachers who actually laughed at my jokes and encouraged my use of humor throughout my design education. My project would not be where it was without the guidance of my committee chair Helen Armstrong. I absolutely want to thank all of my classmates in my graphic design program for allowing me to be a clown. I'd also like to thank both my parents for being complete goofballs with both horrible and fantastic senses of humor. I'd like to thank my dogs Nyla and Piko for being oblivious, but most of all I must thank my wonderful fiancee, who helped me brainstorm many of the humor concepts and threatened to leave me if I did not finish.

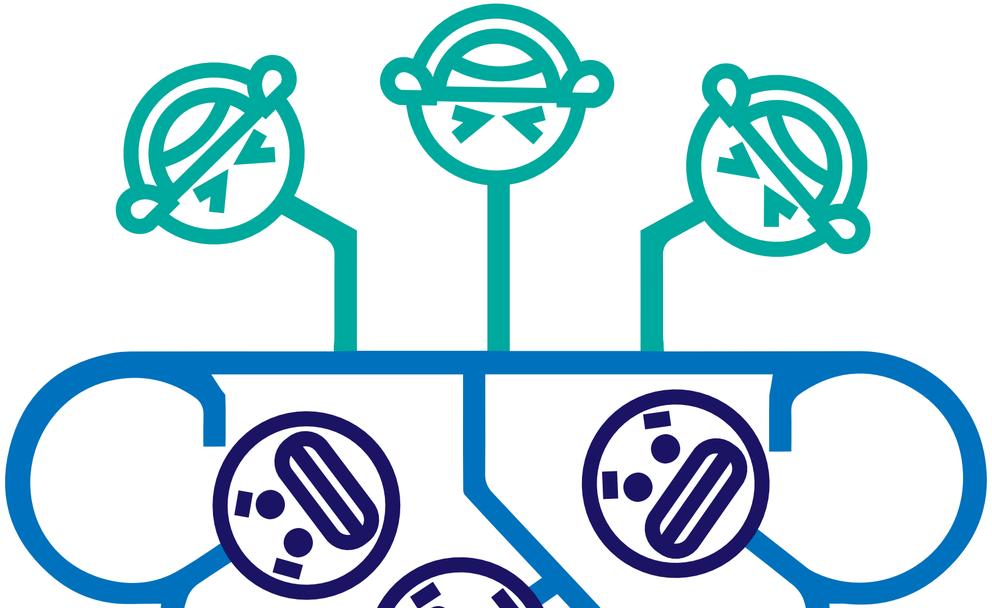


Table of Contents

Term	Definition
Artificial Intelligence (AI)	*The theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.*
Machine Learning (ML)	*An application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it to learn for themselves.*
User Experience (UX)	*What a user of a particular product experiences when using that product. This is comprised of design of the entire process of acquiring and integrating the product, including aspects of branding, design, usability, and function.*
User Interface (UI)	*Design is the process of making interfaces in software or computerized devices with a focus on look or style. The functionality and UX is dependent on and coordinates with UI.*
Conversational User Interface (CUI)	*A user interface for computers that emulates a conversation with a real human.*
Chatbot	*A piece of software that conducts a conversation via auditory or textual methods that uses CUI.*
AI or ML Agent	*Refers to an autonomous entity which acts, directing its activity towards achieving goals (i.e. it is an agent), upon an environment using observation through sensors and consequent actuators (i.e. it is intelligent).*
Natural Language Processing	*The branch of artificial intelligence that deals with the interaction between computers and humans using natural language. This is in its infant stages and is a topic of debate for its full possibilities to mimic human conversation.*
OS	*Operating System of a computer*

Clarifications

Amusement	*The goal is not laughter, but a pleasurable lighthearted experience that aims to produce a smile.*
Humor	*Any content or action that is aimed to (or accidentally) provoke laughter.*
Playful	*Something lighthearted that may result in amusement. Potential for interactivity.*
Easter egg	*A hidden game or humorous non essential performance by the computer or software.*

1. Introduction

Over my 32 years on this glorious rock we call earth, I have had a fascination, beyond the norm, with comedy, and enjoyed being slightly absurd to get a laugh. Sometimes it works and sometimes it flops. But where I find myself making more jokes and getting the most laughs is in environments where work is on the line, such as the classroom or the office. Why is this? Well, there are a lot of ways to approach that question through psychology, sociology, biology and philosophy. Looking at laughter through psychology and sociology explains it in a manner that is individualized and/or specific to a particular culture. Gelotology is the physiological study of laughter. Although much of what happens in the brain when we laugh is presently unknown to science, researchers have been able to regularly detect that electrical waves move through the cerebral cortex, the largest part of the brain, right before laughing and release endorphins (Brain, 2000). Beyond what is measurable brain activity, researchers do not know a ton about why we laugh. However, biologists Gervais and Wilson (2005) figured out by looking at facial muscles that humans have been laughing for 2-4 million years—before we ever had language.

Although there have been many theories to explain humor over the past two centuries, three popular philosophical theories have emerged (Morreall, 2016). First, Superiority Theory, which dates back to Plato and Aristotle, is a pretty cynical approach that claims people laugh about the misfortunes of others, because it asserts their superiority (Wilkins, 2009). Second came Relief Theory which suggests that laughter is the release and transfer of spare energy and nervous feelings in us (Wilkins, 2009). Third—and most widely accepted— is Incongruity Theory, a theory developed by the philosopher James Beattie in 1779. According to Beattie, humor arises when concepts, physical things, actions, people, or any other "things", as a general term, that do not normally belong together replace logic and familiarity, i.e. Incongruity Theory (Wilkins, 2009). In other words, when something that is expected in a line of thought is replaced by something that does not belong there, it catches the viewer off guard and in that moment of surprise creates humor. Building off of Incongruity Theory, a more recent theory called Benign Violation Theory (McGraw, 2014) proposes that humor happens when three conditions are met: 1) A situation is benign; 2) a situation is a violation; and 3) these happen at the same time.

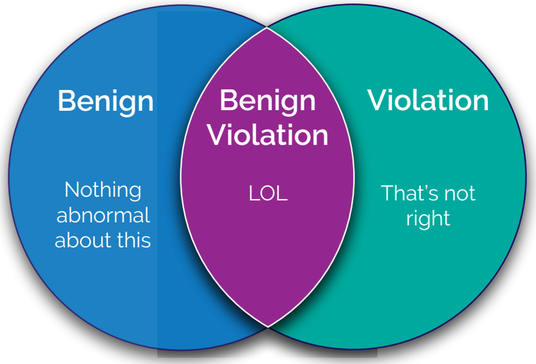


Figure 1.
Benign Violation Theory diagram. The Humor Code (McGraw & Warner, 2014)

Here is an example of those three together creating humor. Use your imagination for a moment to follow this example by the comedian Demitri Martin who lays out these types of situations plainly in his stand up by turning what is usually a benign behavior into a violation:

> *"When I cross the street, I always look both ways. To not do that would be crazy.*
> *But if I look both ways any other time in life,.....*
> *then that looks crazy.*
> *If I get a slice of pizza, and before I take a bite I look both ways, (acts it out) I'm a creepy pizza eater.*
> *If I bring a girl home at the end of a date and I'm like, 'I had a really good time tonight' and look both ways as I lean in, she'll be like 'Wowowowoo!'*
> *'Is this your baby? Can I hold him?' (looks both ways)."*

In this joke, he highlights that the benign situation of looking both ways, when mixed with another benign situation (eating pizza, saying bye at the end of a date, asking to hold a baby) becomes a violation, and therefore creates a benign violation when combined in the same situation. But we aren't all comedians, so what about a more real life use of humor? I will use a story of my own to lead into my next point. This is not a *funny story* per say, but an example of benign violation producing laughter in the moment.

> *My coworkers and I sat at a calm department meeting in our office, with only our manager's voice heard for the past 15 minutes. As we learn about new work that our department will have to take on in addition to our current workload, we roll our eyes and think about how we will fit it in. As my manager concludes the meeting I spurt out loudly, "ISH NOTE FAY-AHH!" (It's not fair) in what might be described as the voice of a whiny German boy. My coworkers and manager burst out laughing, despite the unfortunate news of more work, and we all left with smiles on.*

In this example the *benign situation* would be a department meeting in a nondescript office in the US in which the employees begrudgingly are receiving more work. The *violation situation* would be the whiny German boy's voice—not funny on its own, but annoying, not my normal voice, and a violation of professional behavior. The *benign violation* is the combination of these two situations or concepts that do not normally belong together replacing logic and familiarity (Wilkins, 2009).

Laughing and smiling, besides being a universally pleasurable experience at face value, has benefits that positively affect our biological, physiological, and psychological state. My humor that day in the office worked, but what I did not realize is that these jabs at humor were in fact a natural form of stress relief for everyone in that room and helped people handle their day. I was catching the laugh waves without knowing it. My classmates and coworkers all these years were stressed and, according to Relief Theory, primed to laugh, and an impulsive blurt-out was a suitable violation to the situation. My fuel for this project is benign violation on the rocks with a twist of relief theory.

In today's fast-paced world of multitasking, professionals experience elevated stress stemming from a range of stressors. However, working at a computer opens the potential to detect and predict elevated levels of stress as well as disrupt stress with humor. Although mild stress can improve productivity, elevated levels of stress negatively affect physical and mental health as well as productivity and creativity. Thankfully, laughter and amusement have been shown to combat all of these negative effects.

I am researching and exploring various methods to design a seamless injection of appropriate, contextualized humor into high-stress situations, without affecting individual productivity. This injection will mitigate stress and improve immediate and long-term physical and mental health through the therapeutic benefits of laughter. The humor would be communicated through interaction with a computer. The timing of humor while working can make or break the value of the injection. In order to have accurate timing, it is necessary to use intelligent stress prediction methods, employing facial recognition, eye tracking, computer activity, and other non-intrusive multimodal data collection methods. There are many ways to potentially interact in a humorous way with users using visuals, text, noises, and speech. How, where and when this interaction happens is what needs to be explored and refined by designers.

2. Problem Statement and Justification

Communal office work environments foster stressors from a wide variety of sources, with the highest percentage experienced while using or attempting to use a computer (Hudiburg, 1989). Most adults working behind a computer experience regular sustained stress over the course of their career (Tennant, 2001). The ways in which stress manifests itself in an office professional's life are numerous and come with many adverse immediate and long-term physical and mental health effects including poor sleep, depression, decreased organ function, and unwanted toxin retention (Mika & Päivi, 2002). Not addressing stress can lead to unhealthy self-medication tactics for short-term stress relief, such as consuming 'stress foods' and alcohol overconsumption, which exacerbate the previously listed negative health effects. Many corporations over the past 30 years have concluded that work stress inhibits production, work quality, service or product and needs to be addressed from top down (Vartabedian, 1993; McMaster, 2014).

Stress detection in offices and work environments is possible through the use of cameras, keyboards, mouse activity, along with machine learning (ML) algorithms (Alberdi et al., 2015; McDuff et al., 2017). Through advances in ML facial recognition technology, computers can recognize stress indicators through optical computer recognition of a person's face while working (Dinges et al., 2005). Other stress sensory prototypes can accurately gather data from keyboard and mouse activity to determine stress levels in real time (Hernandez et al., 2014). Being able to detect stress, mark the activity and environment, and respond immediately, opens up an opportunity to combat stress in an office environment with existing computer cameras , and smart "wearable" devices when available (G. Giannakakis, 2017).

Humor and laughter can decrease stress and its negative effects on the body and mind (Wilkins, 2009; Chang, 2013; Savage, 2017). Laughing, even internally, throughout the day can increase productivity and enjoyment of work (Seaward, 2017; Abramis, 1989). Employers have attempted to convert offices into "playful workspaces," through games, relaxation rooms and even bars with the intention of reshaping the way people view the space they work in. While these can offer effective stress relief, they often go unutilized, especially by those stuck behind a computer,

who require ample stress reduction (Vartabedian, 1993). This is why introducing humor into the personal workspace of the individual has such high potential benefits. However, the level of amusement the humor evokes is important when considering workflow and disruption. Laughing to oneself is less distracting and disruptive to workflow than outward laughter (McMaster, 2004). To maintain workflow, the simple act of smiling also shows a substantial correlation to decreasing stress (Kraft & Pressman, 2012). Playfulness can be implemented into the workday without being too distracting and disruptive to the workflow, while also achieving the elementary benefits of humor therapy (Nijholt et al., 2017; Tarvin, 2019).

A potential solution for addressing workplace stress is to inject non-disruptive humor and playfulness into a computer interface through the use of visuals, noises, text, speech, and games (Nijholt, 2016; Blinov et al., 2017; O'Broin, 2018). The humor or playful interactions could take place within a variety of interfaces, such as the desktop, document finder, applications, web browsers and websites (Niculescu & Banchs, 2015; Yocco, 2017; Polgar, 2018). Timing and accuracy of humorous elements can drastically change whether a user finds the elements funny and therefore provides therapeutic benefits (Schwab, 2016). If the humorous and playful elements are triggered by ML (machine learning) stress prediction algorithms, and, if based on the current activity or situations of the computer functions, timing and accuracy will be more consistent (De Leon, 2016). In this exploration I design user experiences (UX) and user interfaces (UI) as a way to inject such humor into daily tasks on a work computer, with the intention of mitigating stress for benefits of short term and long term physical and mental health.

3. Assumptions and Limitations

3.1 Assumptions

Moving forward, the following assumptions are made for the purposes of this study's fluidity. Professionals work a standard 40-hour week or more and are within close proximity of others with the same schedule. All professionals experience some level of stress, some experiencing more than others, and want to decrease their stress levels. Each professional has their own computer and designated workspace with ability to have headphones connected to the computer. People have a sense of humor, enjoy laughing and are willing to be amused during their work process.

Another assumption moving forward is that the AI technology for detecting, calculating, and producing humor has been developed and understands timing, tone, as well as the different styles of humor. I recognize this is not a straightforward task, but I believe it is achievable long term.

In order to design freely I must also assume that the AI that is collecting data to improve and interact with the user is not sharing data collected from the microphone, camera, eye tracking and other tools for recording activity. I am assuming that the AI used would be able to self learn and share the information within its own system for collaborative learning from other users. I recognize that observation from employers and governments is a current human rights issue in some authoritarian countries such as China and complete privacy will be a priority as studies evolve.

3.2 Limitations

This study focuses on young and middle-aged professionals in North America. While the findings may be applicable to other ages and regions, humor changes significantly between cultures and age often determines humor relevance. It is important to note that users experience and react to stress in different ways. The users identified for these studies are office professionals who are not in the comedy entertainment business and have no professional comedy background. Comedic professionals are, by nature of their skills and experience, more critical of humor, and would likely already be finding humor elsewhere.

Currently the technology for a virtual agent to employ *natural language abilities* necessary to contextualize humor with tone, timing, and context, has not been successfully developed. The humor AI in this study is limited to what I predict a future AI with natural language capabilities would be able to compute.

4. Annotated Bibliography

4.1 Stress via Work & Tech

A study performed by Richard Hudiburg at the University of Alabama concluded that "the Computer Technology Hassles Scale taps a dimension of psychological stress and that increased computer use for some people leads to increased computer-related stress." Although developed in 1989, the Computer Technology Hassles Scale is still used in a modified version for today's computers. (Hudiburg, 1989)

A range of adverse health outcomes are identified, with significantly higher possibility for psychological disorder, due to occupational stress.(Tennant, 2001)

Extreme health risks increase. Cardiovascular mortality risk doubles among people with high job strain and effort-reward imbalance. (Kivimäki et al., 2002)

Work content that contributes to role ambiguity and role conflict are the highest contributors to work stress leading to job dissatisfaction and psychological well-being. (Terry et al., 1993)

4.2 Machine Learning Stress Detection

Unobtrusive computer vision for facial stress detection shows high detection accuracy of stress induced by overload work demands. (Dinges et al., 2005)

Keyboards and mice are effective potential tools for accurately determining stress levels non-invasively while completing tasks on a computer. (Hernandez et al., 2014)

"A sound analytical framework has been developed for the analysis, recognition and classification for efficient stress/anxiety detection through facial video recordings, achieving good classification accuracy in relation to the neutral state." (Giannakakis, 2017)

Continuous and unobtrusive multi-modal monitoring can be accomplished with the use of wearables, smart devices, and ambient sensors, which send data via wireless connections to the processing units. (Alberdi et al., 2015)

4.3 Humor Therapy

Physiological benefits of laughter occur regardless of the theory that is used to explain the humor: relief theory, incongruity theory, or superiority theory. (Wilkins, 2009)

Humor, along with many physiological and psychological benefits, is explained, through the incongruity-resolution theory and disposition theory, to improve attention and information retention.(Savage et al. 2017)

Performing simulated laughter has measurable psychological, immunological and physiological benefits. (Chang, 2013)

Humor provides a wide range of health benefits physiologically, psychological and physical, that reverse the negative effects of elevated stress (Seaward, 2017)

Although genuine smiling has the highest correlation with stress relief, even a "standard" forced smile decreases stress levels in the moment and for a period of time after smiling stops. (Kraft & Pressman, 2012)

Humor can be inappropriate and, in turn, ineffective if it does not meet the criteria for being safe in the workplace. These criteria are appropriate time, appropriate target, and appropriate subject matter. (Tarvin, 2019)

4.4 Humor Environments

Human-computer interaction is imperfect and will likely always maintain discrepancies between expectations and performance, which affords the possibility of accidental humor to occur. However, the humor that occurs in this scenario is more than likely at the expense of the user. (Nijholt, 2016)

Designing humorous and playful interaction for public spaces is not necessarily different from designing humor and playful interaction in a digital smart environment. (Nijholt, 2018)

There is no perfect formula for creating humor and no way to appeal to all audiences, but humorous AI can be more approachable if avoiding human avatar form and instead taking on the form of friendly cartoon avatar. (Schwab, 2016)

Introducing humor into an interface can be accomplished by visual alternatives without the need for a comedy focused experience.(Yocco, 2017)

Work stress as a serious inhibitor of production, work quality, service or product, needs to be addressed from top down. (Vartabedian, 1993)

Humor is a valuable tool in the work environment and can improve performance and creativity. (McMaster, 2004)

People who actively try to make work fun actually have more fun on the job and greater job satisfaction.(Abramis, 1989)

4.5 Humorous CUI & Digital Interaction

AI development teams will need to look to the media, performing arts or "even comedy improvs" for personnel who understand the local interaction aspect of humor in a smart environment. (O'Broin, 2018)

Using an information retrieval approach, teaching an AI to be funny and produce contextual attempts at humor can produce a satisfactory performance at this point in technology. (Blinov, 2017)

In order for a chatbot to effectively make a joke that is relevant within context and employs proper timing and tone necessitates overcoming the challenge of natural language in AI. (Polgar, 2018)

The fact that a chatbot is having a two way conversation with the user highlights the affordances of certain humor that requires a persona's response and engagement in order to set the context. (De Leon, 2016)

Topic	Title	Citation
Stress via Work & Tech	*Psychology of Computer Use: VII. Measuring Technostress: Computer-Related Stress*	R. Hudiburg, **1989**
	Work-related stress and depressive disorders	C. Tennant, **1999**
	Work stress and risk of cardiovascular mortality: prospective cohort study of industrial employees	K. Mika, L. Päivi, **2002**
	Effects of work stress on psychological well being and job satisfaction: The stress buffering role of social support	D.J. Terry, M. Nielsen, L. Perchard, **1993**
ML Stress Detection	*COGCAM: Contact-free Measurement of Cognitive Stress During Computer Tasks with a Digital Camera*	D. J. McDuff, J. Hernandez, S. Gontarek, R. W. Picard **2016**
	Optical Computer Recognition of Facial Expressions Associated with Stress Induced by Performance Demands	D. F. Dinges; R. L. Rider, J. Dorrian, E. L. McGlinchey, N. L. Rogers , Z. Cizman, S. K. Goldenstein, C. Vogler, S. Venkataraman, D. N. Metaxas, **2005**
	Towards an automatic early stress recognition system for office environments based on multimodal measurements: A review	A. Alberdi, A. Aztiria, A. Basarab **2015**
	Under pressure: Sensing stress of computer users	J. Hernandez, P. Paredes, A. Roseway, M. Czerwinski, **2014**
	Grin and Bear It: The Influence of Manipulated Facial Expression on the Stress Response	T. L. Kraft, S.D. Pressman, **2012**
	Stress and anxiety detection using facial cues from videos	G. Giannakakis, **2017**

Humor Environments	*Smart Bugs and Digital Banana Peels: Accidental Humor in Smart Environments?*	A. Nijholt, **2016**
	Humor in Human-Computer Interaction: A Short Survey	A. Nijholt, A. Niculescu, A.Valitutti, R. Banchs, **2018**
	The Daunting Task Of Making AI Funny	K. Schwab, **2016**
	Connecting With Users: Incorporating Humor In Web Design	V. Yocco, **2017**
	Humor in the Workplace: A Communication Challenge	RA Vartabedian, **1993**
	Humor Ups Performance and Creativity at Work	R. McMaster, PhD., **2004**
	All Work and No Play Isn't Even Good for Work	D. Abramis, **1989**
Humor Theory	*The Humor Code*	P. McGraw **2014**
	Humor theories and the Physiological Benefits of Laughter	J. Wilkins., A. J. Eisenbraun, **2009**
Humor Therapy	*Humor That Works: The Missing Skill for Success and Happiness at Work*	A. Tarvin, **2019**
	Humor theories and the physiological benefits of laughter	J. Wilkins, **2009**
	Humor, laughter, learning, and health!	BM. Savage, **2017**
	Psychological, immunological and physiological effects of a Laughing Qigong Program (LQP) on adolescents. Complementary Therapies in Medicine.	C. Chang, **2013**
	Comic relief: The healing power of humor. In: Essentials of Managing Stress	BL. Seaward, **2017**
CUI & Digital Interaction	*Having a Laugh: Humor and Chatbot User Experience*	U. O'Broin, **2018**
	A Pinch of Humor for Short-Text Conversation: An Information Retrieval Approach	V. Blinov, K. Mishchenko, V. Bolotova, P. Braslavski, **2017**
	How Funny Should a Chatbot Be?	D.R. Polgar, **2018**
	Can a Bot Make You Laugh?	J. De Leon, **2016**

5. Conceptual Framework and Research Questions

5.1. Conceptual Framework

To help visualize the areas of study and factors at play in the challenge of using ML to battle stress with the use of suggested humor design, figure (1) is a diagram of the relationship of these elements to each other and when and where they appear in the process. Within the context and environment of the office, there are a range of stressors, some of which carry over from external sources. Some stressors are from regular work activities performed on a computer, which is where a ML agent can effectively detect stress from a range of possible input data. Within this environment there is potential for humor and playfulness which is the focus of this investigation. The potential in that situation to make an attempt at amusing the user can lead to either 1) a negative/ neutral reaction or 2) an amused or laughing reaction. This will either then lead to the predictive algorithms learning the humor preferences of the user (a true negative) or experiencing stress reduction to a healthier manageable level (a true positive). In figures (2,3,4) simplified framework diagrams break down each area of study to further understand how they relate to each other.

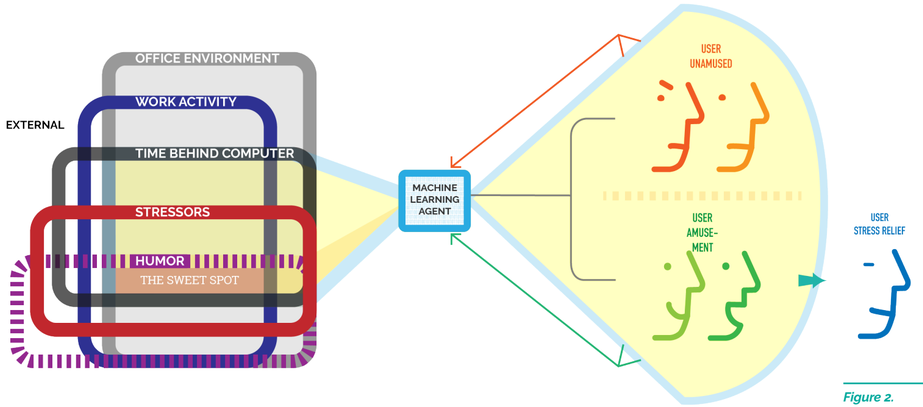


Figure 2.
Conceptual Framework

5.2. Research Question

How can the design of a computer interface used by professionals at their desks in a semi-private work environment inject humor into the user experience to reduce stress, improve mental and physical health and maintain workflow?

Sub-questions

1. How can machine learning agents properly determine and deliver relevant, properly timed humor to its user, and improve these over time?

2. How can low strategy games on a computer interface integrate into workflow and decrease stress through humor?

3. How can characters and screen manipulation with audio be used to deliver humor in an open office setting?

4. How can language be used to provide humor through UX/UI design within a work computer OS for those with job related stress?

5.3. Investigation Framework

To explore further what form this humorous interruption might take, I have created a framework of how users experience humor sensorially using visual and auditory stimuli and what forms the humor currently takes. Attempting to translate humor using the senses of smell, taste and touch would be inappropriate and ineffective in a professional setting. A key element when considering what areas to explore is what is likely to be the least distracting and take up the least time. What forms of communication accomplish amusement or laughter in the shortest amount of time?

Stress Model

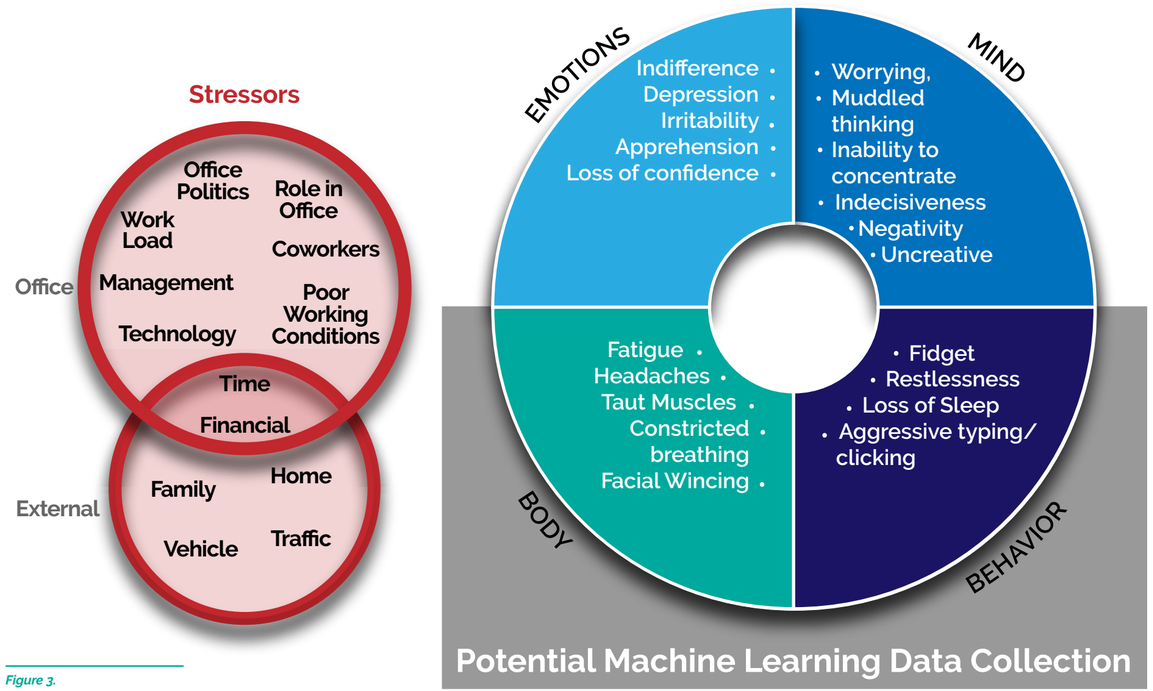


Figure 3.
Stress Conceptual Framework

Machine Learning Agent

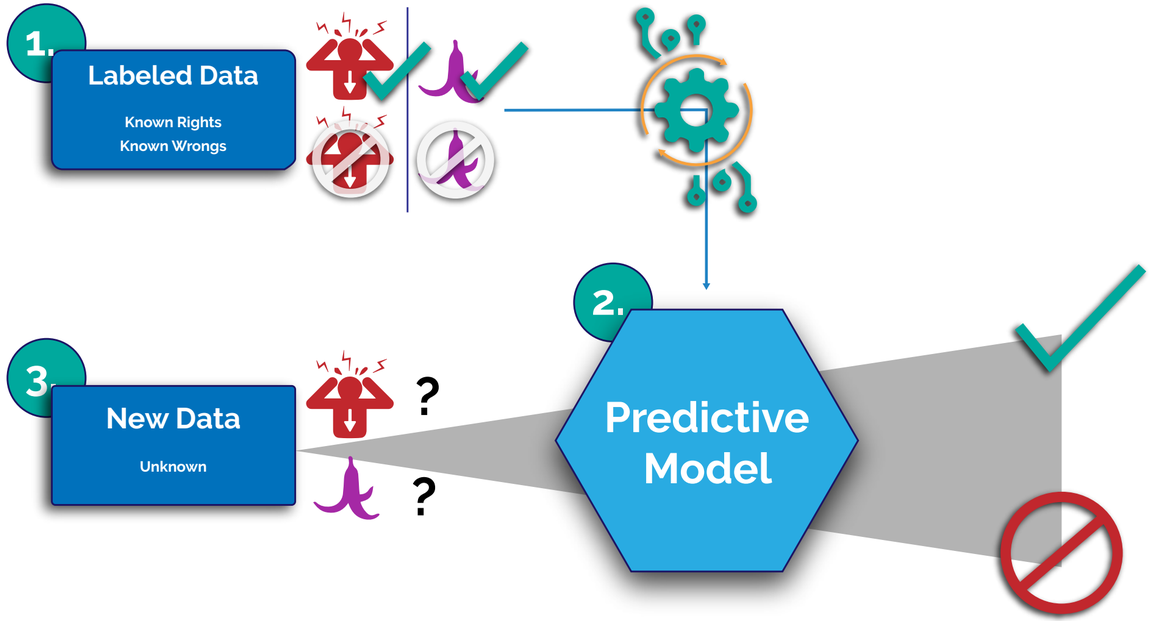
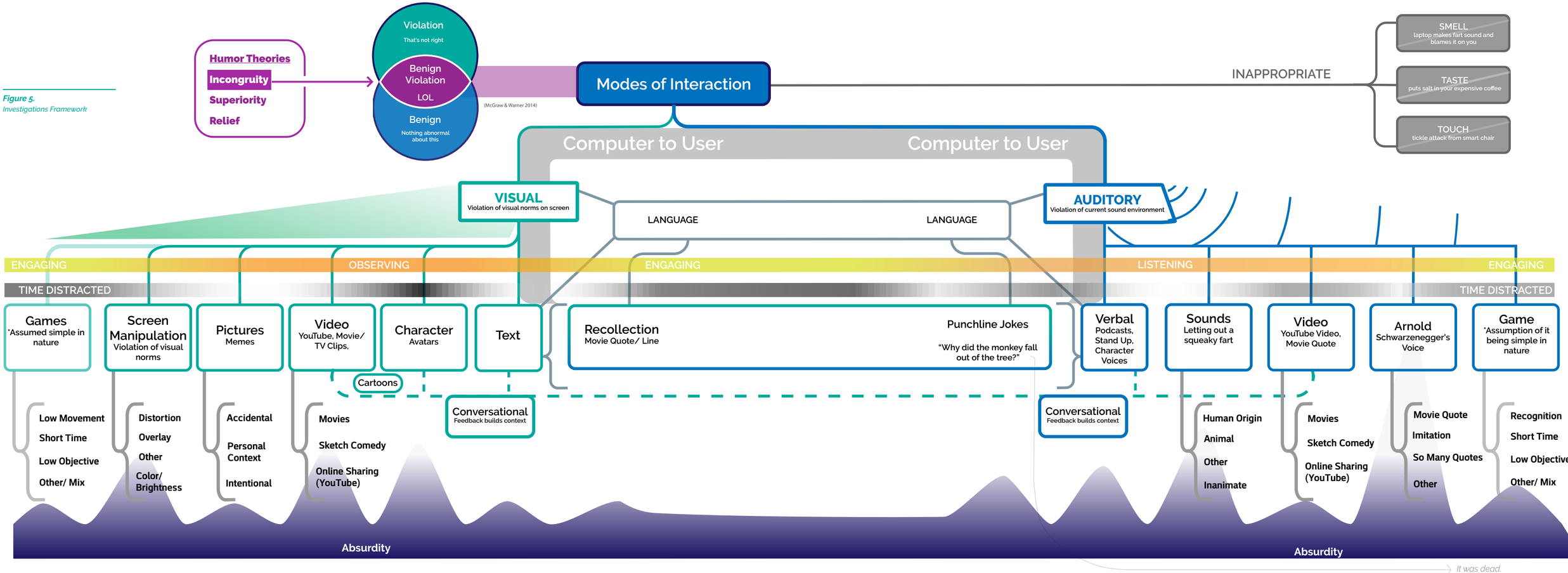


Figure 4.
Machine Learning Conceptual Framework

Figure 5.
Investigations Framework



6. Methods

The following methods are employed in the research process of this study. They are sourced from *Universal Methods of Design* (Martin & Hanington, 2012)

6.1 Literature Review

(discusses published information in a particular subject area, and sometimes information in a particular subject area within a certain time period). I gathered a wide range of published academic articles to explore the current knowledge and research surrounding each of the combined topics of the question. Humor in Environments, Therapy with Humor, Humorous CUI's & Digital Interaction, Stress via Work & Tech, ML Stress Detection.

6.2 Design Charette [study ideation]

(short, collaborative meeting during which members of a team quickly collaborate and sketch designs to explore and share a broad diversity of design ideas.) Because humor and laughter happen more frequently in a social setting, I met with multiple groups to collaboratively brainstorm humorous, silly, and playful ways to address stressful situations on a computer.

6.3 Case Studies and Design Precedent Analysis [benchmarking humor and ML]

(in-depth investigation of single events, instances or current examples in context using multiple sources of research evidence). I used existing studies and current products and prototypes to determine the potential and limitations of current technology and design of ML, humorous implementation, and playful interfaces. Case studies were used to determine the accuracy of stress levels, and humor therapy.

6.4 Interviews, Questionnaires, and Observation [personas/ types of humor, stress points]

(user-focused gathering of first-hand information of user feedback and organic behavior in an environment). Due to the unique situation and comical nature of this design exploration, I needed to gather first-hand feedback from potential users in the form of interviews, questionnaires, and extended observations.

6.5 Personas, Scenarios, and Journey Maps

(descriptions of typical user behavior into profiles and paths, to humanize design focus, test possible situations and visualize experiences). In order to examine all the possibilities and paint

the full picture of my study, it was necessary to create personas of office workers in scenarios where they become stressed and the potential interaction and experience in the form of journey maps.

6.6 Visual Studies, Research Through Design and Prototyping

(These methods work together in exploring possibilities of design through the process of creating, testing, feedback and editing). The most revealing and tangible of these research methods will be the prototyping and design exploration of the humorous and playful interfaces and interactions with real users. These along with observation will reveal if the content is indeed funny or uplifting.

7. Results

7.1. Precedents and Interviews

7.1.1 Precedents

The following are precedents that show current applications of the elements necessary to accomplish the design of just-in-time stress humor therapy. These precedents, from each of four topics, relate to a potential application of the research performed through humorous interaction via computer and ML (machine learning). These topics are *Humor Therapy, Stress Applications, Humor Applications, CUI/Chatbot Humor.* Although the goal of this paper is not to explore the possibilities of mobile application interfaces, these are the existing interfaces that employ and exercise similar concepts with users.

Stress Reduction Applications

Headspace is an app that helps users cope with anxiety. While the methods range from meditation to movement and sport, the user interface (UI) employs friendly and light hearted visuals that evoke smiles.

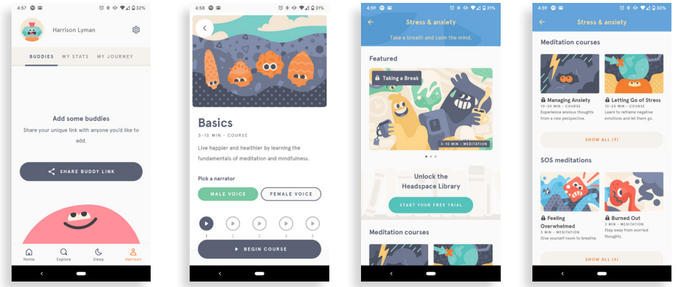


Figure 6.
Screenshots of Headspace App

Rootd helps users cope with anxiety. Like the *Headspace* app, the methods are a range of self help tools that the user can learn. The user interface employs friendly/ light-hearted characters to evoke laughter and smiles.

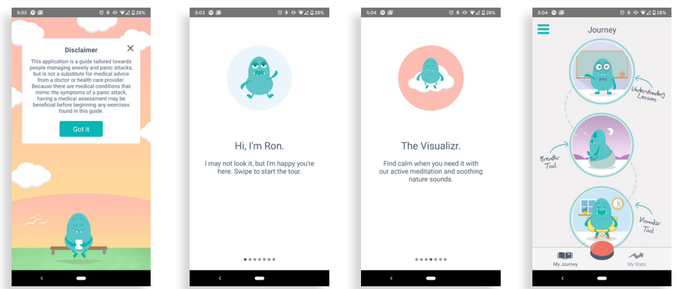


Figure 7.
Screenshots of Rootd App

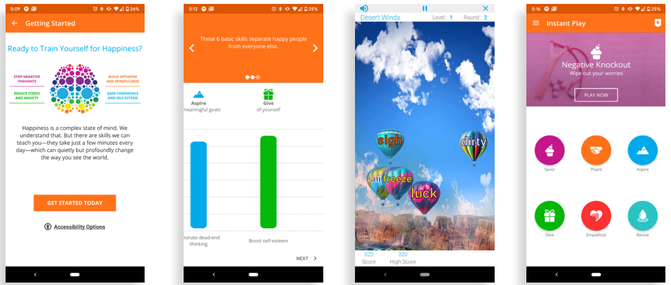


Figure 8.
Screenshots of Happify App

Happify is an application for mobile devices that helps users defeat stress and promote more happiness. The methods used are games, activities and quizzes. It also performs self-tracking to help make more long-term improvements.

Therapy via Humor/ Amusement

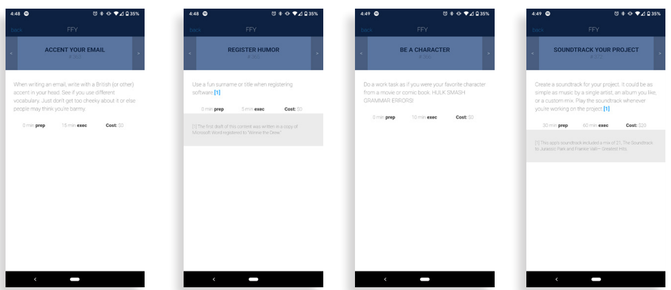


Figure 9.
Screenshots of 501 Ways to Use Humor App

501 Ways to Use Humor is an app available on mobile phones and tablets that teaches users "how to beat stress, increase productivity, and have fun at work using humor in the workplace. "The app requires a bit more initiative than an interface using ML to predict stress and act at the right time, but helps users gain more control of workplace stressors in an interface through the use of humor tactics.

Woebot is a chatbot that reduces stress by utilizing lighthearted discussion and companionship. This online psychologist chatbot was developed by Stanford University clinical psychologist Dr. Alison Darcy, and uses cognitive behavioral therapy to treat depression through its online interface and accompanying app. The bot can recognize behavioral patterns that are not detectable by users.

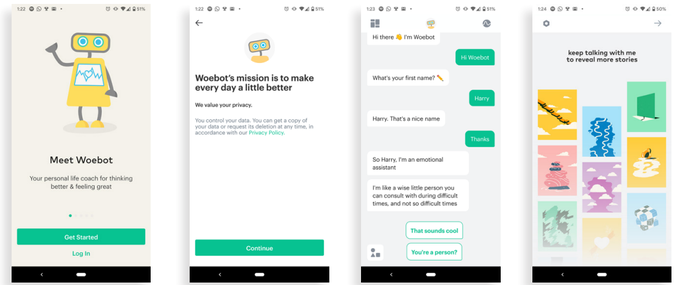


Figure 10.
Screenshots of Woebot App

Humor Apps, Add-ons and Low Strategy Games

9Gag is a humor app that provides users with a range of comical media, including but not limited to memes, funny videos, and jokes. A unique trait to the app is the community aspect , *i.e.*, the ability to share with other users. Users are encouraged to post and share any content they find funny. The ability to customize and filter your humor feed by topic and style addresses the challenge of appealing to different cultures, contexts and styles of humor.

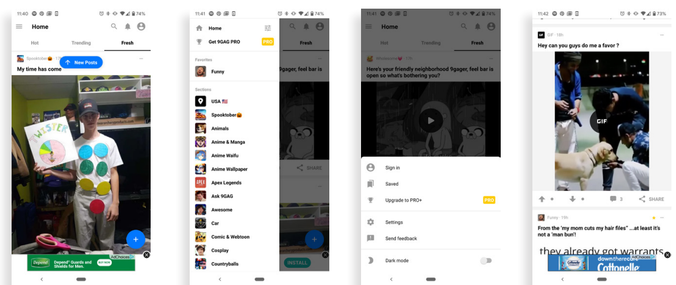


Figure 11.
Screenshots of 9Gag App

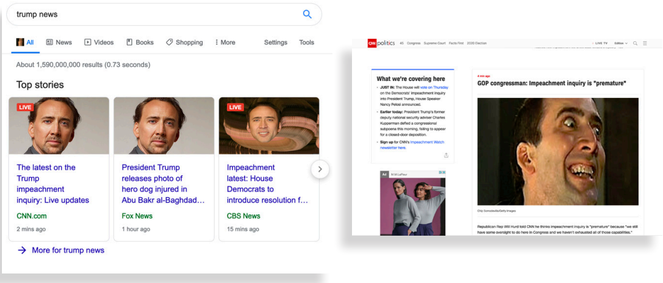
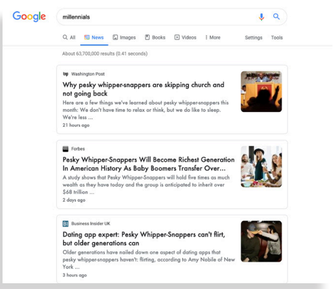


Figure 12.
Screenshots of NicCage browser extention

The *NicCage* extension replaces almost all images on the internet with pictures of Nicolas Cage. This is an example of the injection of humor seamlessly into the regular workflow of internet browsers. The interface is the humor itself and blends into unexpected places in the background.



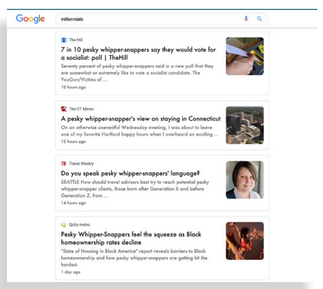


Figure 13.
Screenshots of Millenials Begone! browser extention

Millennials Begone! This internet browser extension will replace the word "millennial" from the web with "pesky whipper-snapper." The employment of word replacement can take users off guard which is an essential element to most humor and generation of laughter. Yet again this a seamless way for humor to be implemented into the regular workflow of users without creating a major distraction.

New Mustachio was an extension that added a mustache to every face in the users' internet browser. Although it only worked for a few months in 2012, the simple application of moustaches to faces that you would not expect is funny and can be explained by the incongruity theory.

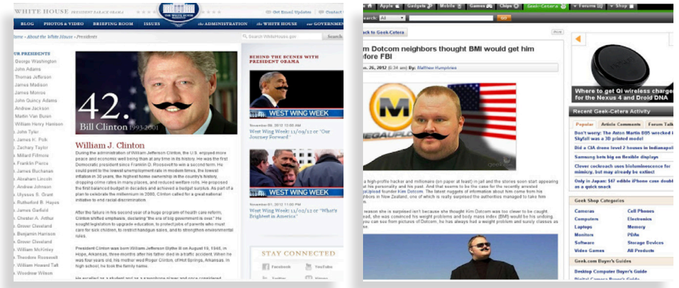


Figure 14.
Screenshots of New Mustacio browser extention

The Trumpweb finds any mention of Donald Trump on a website and adds an actual Donald Trump quote to his name. This Chrome extension looks through the text of a webpage you're visiting and adds a quote that Donald Trump either said during a media appearance or wrote on Twitter to his name. That's it. Nothing more.

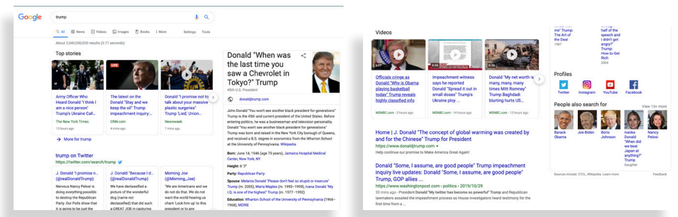


Figure 15.
Screenshots of The Trump Web browser extention

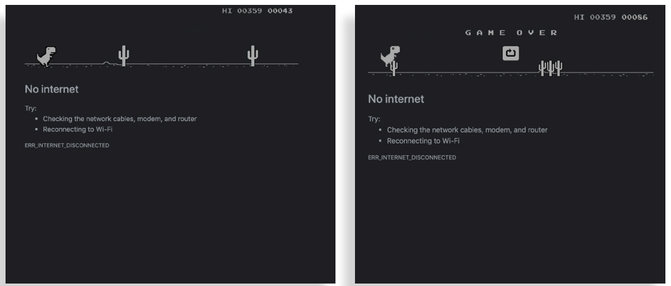


Figure 16.
Screenshots of Google Chrome Dinosaur Waiting Game

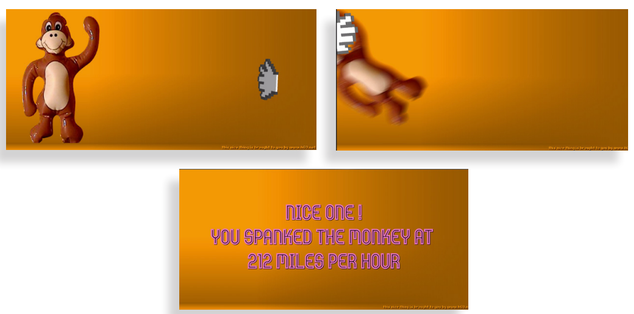


Figure 17.
Screenshots of Spank the Monkey web game

Google Dinosaur Waiting Game - When an internet connection is not being made, the user can hit the spacebar and play a simple game to pass the time until connection resumes, making the most of a period when work is halted. This is also what is referred to as an "Easter egg," which is a hidden gem within software. This concept is repeated in the studies.

Spank the Monkey - Low strategy games are less distracting, but can be a source of brief amusement without getting sidetracked and maintaining the ability to stay productive. This game consists of dragging a virtual cartoon hand across a screen to spank an inflated monkey toy. The only object is to see if you can spank it at over 200 MPH. Although there are some humor apps that claim to monitor your mood, they are simple, ineffective, and undesigned. However, the rating of 4.9 from 38,173 reviews on addicting games.com shows that moderating stress through humor is something people are seeking.

Elevate Mind Games App - Provides a complete experience and covers all categories of cognitive thought, including math, comprehension, vocabulary, and grammar. It allows users to track their progression. There is a great amount of research on the proven benefits of playing short mindful games like this on a daily basis to improve mental strength and even fight Alzheimer's and dementia. The Elevate app was a huge source of inspiration and I must give direct credit for some of the game concepts that adapted to fit the humor concept, in particular for Lucy's stage three language study *Despicable Grammar*.

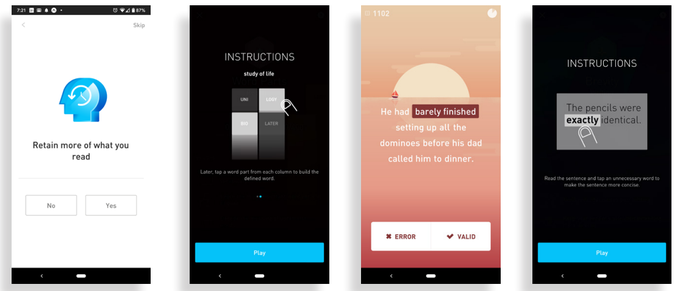


Figure 18.
Screenshots of Elevate Mind Games App

7.1.2 Interviews

Once an initial framework was drafted of how the background for the Humor AI functioned, it was necessary to discuss the theoretical structure of its decision-making process with an expert in the field. The value of this is as follows: to confirm the proper path for the AI to be following, what type of data it was collecting from where, where there were gaps in the processes and where the framework may have gone unnecessarily or unrealistically too far. Lori Wachter is an Artificial Intelligence Development Specialist with Advance Auto Parts (AAP), and oversees multiple complex projects being developed by teams in their AI office at Advance Auto Parts' headquarters in Raleigh, NC. I had the good fortune of having worked with Lori and other AI professionals at AAP in 2019 on a project for incorporating machine learning into new potential customer experiences. Lori provided invaluable insight to what was unlikely, what was needed and reframing what type of AI was actually being developed in this study.
She advised that although data sets could provide extensive personalized data, they can actually confuse a machine learning AI algorithm as there are many external factors that may influence a particular user's streaming data or browsing history such as other users on shared accounts and constantly calculating new input in reference to what the AI is learning within its intended environment. Next, Lori quickly identified the proposed Humor AI as an advanced recommendation system. Recommendation systems are a technology utilized by streaming services and many other everyday services to provide content more accurately customized to our individual preferences . This provided a new structural foundation to the proposed Humor AI framework with proven success.

7.2 Studies

7.2.1. Study One : How can machine learning agents properly determine and deliver relevant, properly timed humor to its user, and improve these over time?

The importance of understanding how this dual Stress to Humor AI process works is inescapable in the process of making these humor studies. In order to accomplish this, it is necessary to break down the elements of both the stress detection AI and the humor recommendation AI to visualize how they work in harmony with one another.

Stress Detection AI Background

The stress detection AI must be able to calculate and determine where, when and why the user's stress is peaking. Then it must teach itself to predict when that stress will happen again.

The multimodal stress detection AI would gather data from all available input sources to detect and learn how the user expressed their stress consciously and unconsciously. Currently available technology for gathering such data are a computer log of recent activity, a log of all activity since the computer was last asleep, keyboard activity and pressure, mouse activity and pressure, smart watch movement and heart rate, external noises from internal microphone, eye tracking activity and facial recognition (see figure 19).

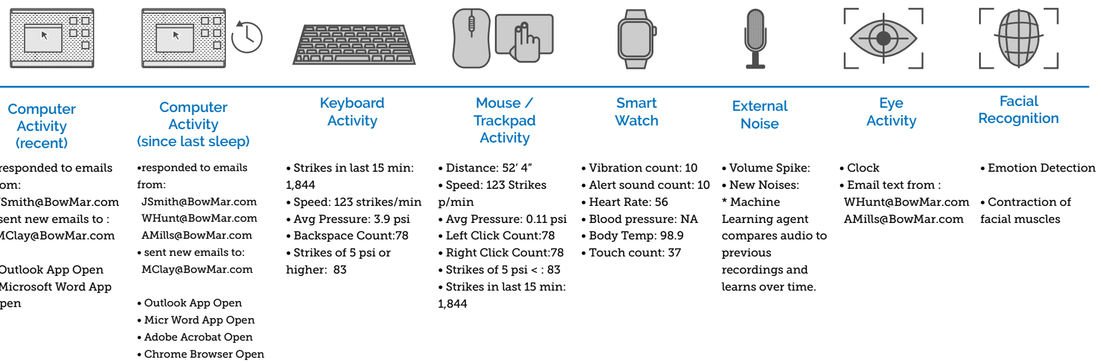


Figure 19.
Sensorial Avenues for gathering user activity data for detecting stress and amusement.

Humor AI Recommendation System

Next, the background framework for the humor AI must determine what information it needs. To be able to accurately produce humor tailored to the user, their preferred humor style must be determined. This is not what humor they necessarily see themselves using, but rather what humor they seek out and find funny. Although this is a complex profile to develop for an individual person, I have simplified it for the purposes of comprehending this framework structure. The humor style, as it will be referred to in this study, will be a combination of silly, sarcastic, clever and crude. The user profile will be labeled as one primary humor style and two secondary humor styles (see figure 7.3)

In order to create this profile the predictive algorithms must collect initial data from the user. How and where this initial information would be gathered for the AI must be predetermined. As discussed in the interview with AI development strategist Lori Wachter, although approval to access the user's streaming services and browsing history, among others, would provide a large amount of data for this profile, such approval might hinder the AI's ability to accurately learn about the user within this desktop environment due to potential external factors and constant change within

this mass of data. The best way to generate this profile would be through an initial questionnaire .This questionnaire would ask multiple choice questions and display humorous images, videos, quotes, and sound clips to see how the user reacts. This would act as a filter to jump into the humor profile building process and refine humor quickly.

The windows in figure 20 show how this questionnaire might walk a new user through explaining how the system worksin regards to their privacy. This is also the point where their initial humor profile is built and permission is granted to access current data and gather future data.

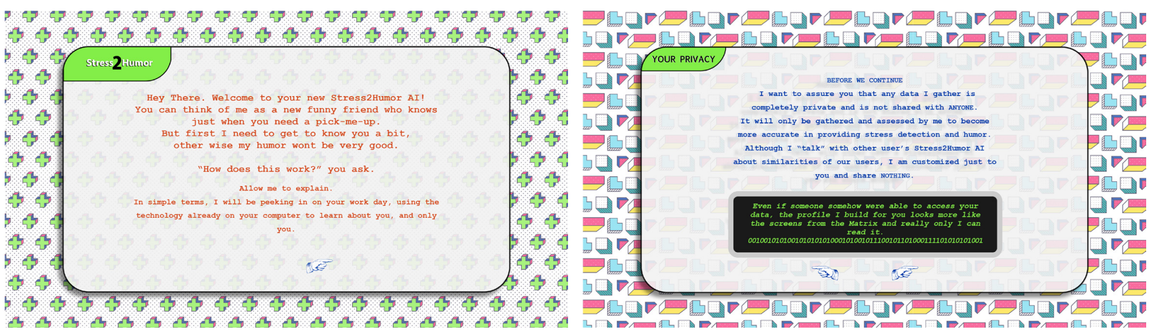
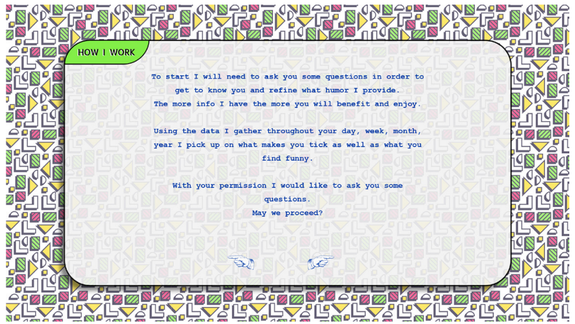
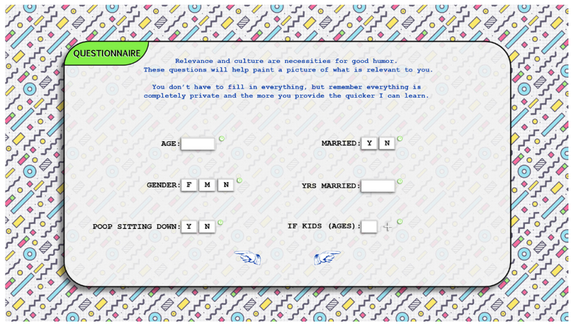


Figure 20.
Initial questionnaire or new users





Since much of humor references outside concepts to draw comparisons, the AI must be able to gather and categorize familiar cultural references from the user's life. Figures 7.#, 7.# are small samples of what the personas used for this study, Lucy and James, may regard as cultural references organized by decade into the categories of *youth culture, popular culture,* and *news*. These are streamlined for the purpose of comprehending this framework structure.

The humor AI must then gather data to determine the most appropriate values for the humor style and form for that user in a particular situation while maintaining the end goal of decreasing stress (figure 21.) The user's reaction to these decisons would inform the AI's ability to then interperate relations of the humor values rather than relations of whole humor injection. (Eckhardt, 2009)

The stress detection information will work in sync with the humor recommendation AI to identify the optimal time to insert humor into the user experience/interface. This also means using situational awareness, such as a visitor to the users desk, to ensure appropriate timing. The recommendation model will also inform what content the humor could reference to evoke laughter, as humor's effectiveness relies on context and timing. Although this

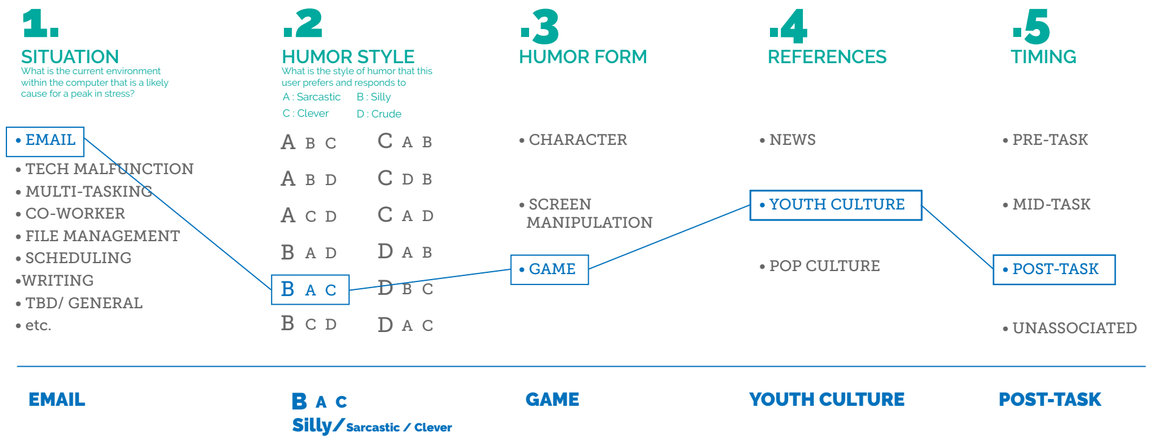


Figure 21.
The five values of the AI's decison making process for humor implementation.

is an accomplishment on its own, the job is not done. There are two different jobs these AI agents must perform: short term and long term learning (see figure 22). Once the short-term process is determined, it is critical to understand and explain how the AI would learn, develop and improve over time.

1.

SHORT TERM
Initial Interaction using Recommendation System.

Stress Detection

Just-In-Time Humor
Delivered at moment of stress peak

Content-Based
+
Collaborative
Recommendation
System

.2

LONG TERM
Pattern Recognition

Stress Prediction

Contextually Time Accurate Humor

Figure 22.
Short Term and Long Term role of the AI

Long Term Recommendation System

The greatest power and potential of these AIs is their ability to learn and improve over time, but this does not happen like magic. The humor AI's ability to learn to accurately predict effective

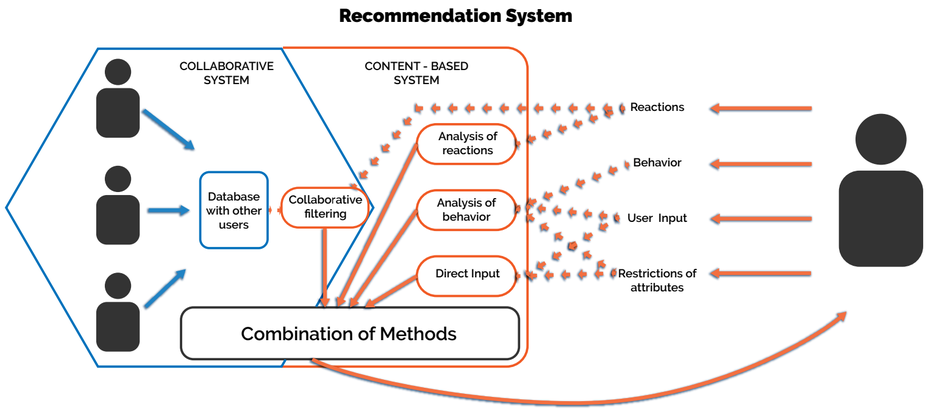


Figure 23.
Adaptation of Recommendation System Structure diagram by Alan Eckhardt (2009)

humor interventions for its unique user—driven by the AI's recommendation system— is the end goal of this AI development project and its true potential. (see figure 23).

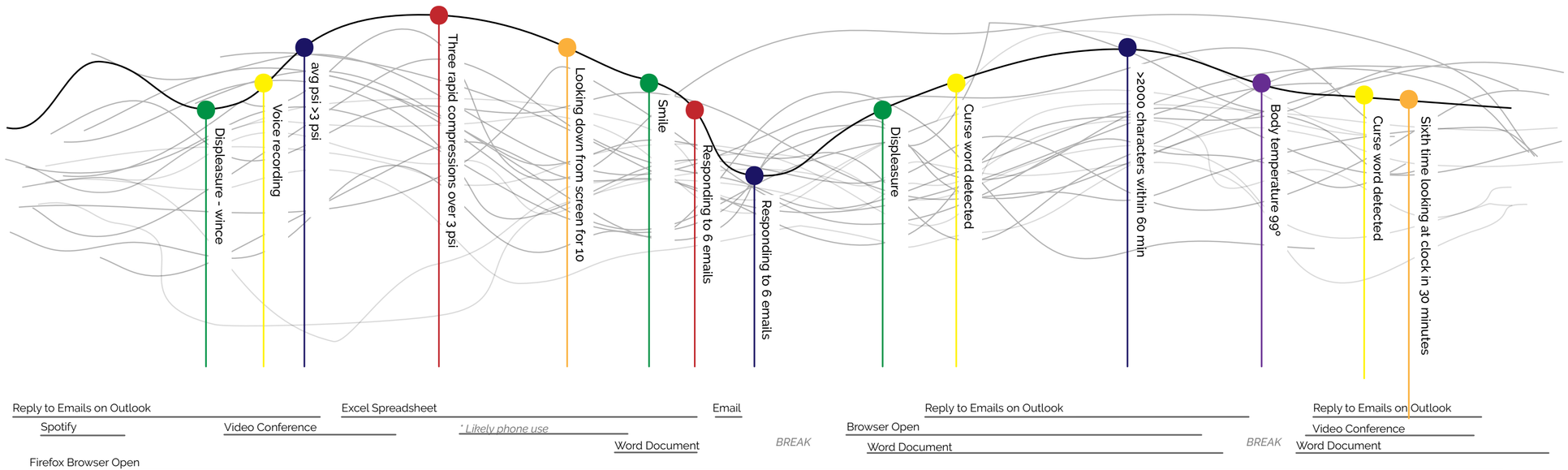
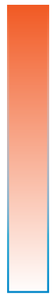


Figure 24.
Multimodal data user stress and activity pattern map

The stress detection AI along with the humor recommendation AI recognize patterns of data in categories to map out the users routines and inform how the model will improve.



The development of these frameworks to explain the data gathering, categorization, calculation and decision making process, made possible the conceptualization and design of the following humor injection studies.

7.2.2 Study Two : How can low strategy games on a computer interface integrate into workflow and decrease stress through humor?

Approaching the challenge of incorporating games as a way of presenting humor in the computer user interface is an evasive task. Games by nature should be fun, but at what point can they be considered funny? The goal in conceptualizing and designing games for this purpose is to find the user in what may be a natural stress point and produce a game that would fit right in to the task at hand and be a non-intrusive "Easter egg." This should be accomplished by recognizing the space, time and elements available within the context of the situation to create something unexpected yet simple enough that anyone could perform.

7.2.3 Study Three : How can characters and screen manipulation with audio be used to deliver humor in an open office setting?

The use of characters and screen manipulation must avoid disrupting or disturbing too much or even reach the point of annoyance as many characters demand attention in their form of communicating humor and screen manipulation may get in the way of performing a task. However, characters and screen manipulation provide a wide spectrum of opportunity for humor to be implemented and communicated through visuals, tone, voices and all four humor types, *clever, crude, silly and sarcastic*. These attributes expand the opportunities to create a benign violation in an office setting where unemotional professionalism is valued and characters are often outlandish personalities that demand attention. Characters also provide the affordance of reflecting and creating commentary on the current situation or task.

7.2.4 Study Four : How can language be used to provide humor through UX/UI design within a work computer OS for those with job related stress?

"Tell me a joke." Much of what people regard as humor is delivered in the form of language, written or spoken. Although this requires *Natural Language Processing* capabilities in AI, this study progresses under the assumption that comprehension and ability to produce tone and inflection is possible in AI. Written and spoken language can come from many sources and take many forms, such as quotes from a movie, conversation, stories, punch-line style jokes, and wordplay. Although the category of language humor overlaps with the other two studies, it is one of

Figure 25.
Progression of persona humor injections over stages one, two and three

the main pillars of humor communication and demands its own set of studies.

7.2.2 – 7.2.6 Study Progression by Persona

For the purpose of this project, it is important that the studies follow the user personas which must be painted in full to better understand the stress situations and context of each study. Humor, as discussed prior, is particular to individuals and to the context in which it is presented. For this reason each persona will be introduced and then led through each of three study categories in each of three stages (week 1/month 6/ year 1).

** See all animation videos and full resolution images of humor designs at https://college.design.ncsu.edu/ thenfinally/lyman/*

Lucy STAGE one
1 Month

Games	*LEGO SWEEP* • Low Challenge • Overlay • Use of Reference	Rating: **POOR** Reaction: **Wince** Time: **13 sec/ 9:45 AM/Post-Task** Related Task: **Inbox Assessment**
Characters / Screen Manipulation	*MR. ROGERS POP-IN* • Partial Overlay • Use of References • Avatar	Rating: **OKAY** Reaction: **Smirk/ Smile** Time: **25 sec/ 11:45 AM/Post-Task** Related Task: **Inbox Assessment**
Language	*STICKY POPSICLE* • Partial Overlay • Use of Reference ; On-topic • Wordplay • Goofy	Rating: **OKAY/HIT** Reaction: **Smile** Time: **120 sec/ 2:45 PM/Mid-Task** Related Task: **Internal Email Chain**

James STAGE one
1 Month

Games	*F'CK OFF WALDO* • Low Challenge • Overlay • Use of Reference	Rating: **OKAY** Reaction: **Smirk, Vocal "Ha"** Time: **10 sec/ 9:05 AM/Post-Task** Related Task: **Inbox Assessment**
Characters / Screen Manipulation	*TRUMP LEAF BLOWER* • Partial Overlay • Use of References • Avatar • Crude • Political	Rating: **HIT** Reaction: **Smile, Laugh, Share** Time: **10 sec/ 9:45 AM/Interruption** Related Task: **Inbox Assessment**
Language	*SEARCH SUGGESTIONS* • Blended DURING task • Wordplay : On-Topic • Goofy	Rating: **POOR** Reaction: **Head Shake** Time: **783 sec/ 3:30 PM/Mid-Task** Related Task: **On-line Research**

Lucy STAGE two
9 Months

EXCEL TETRIS • Medium Challenge ; Puzzle • Blended • Use of Reference	Rating: **POOR/OKAY** Reaction: **Smirk** Time: **122 sec/ 10:45 AM/Post-Task** Related Task: **Excel sheet creation**
FINE ART ICON SWAP • Partial Overlay • Use of Reference • Clever ; On-topic	Rating: **HIT** Reaction: **Smile, Share** Time: **260 sec/ 1:35 PM/Post-Task** Related Task: **Publication Review**
E-MAIL AUTHOR CHANGE • Blended POST task • Wordplay • Character	Rating: **HIT** Reaction: **Smile with teeth** Time: **460 sec/ 4:15 PM/Post-Task** Related Task: **Email Response**

James STAGE two
9 Months

C IS FOR COOKIE • Medium Challenge • Blended MID task: On-Topic • Use of References • Avatar	Rating: **HIT** Reaction: **Laugh, Share** Time: **80 sec/ 12:30 PM/Mid-Task** Related Task: **Google Analytics**
BURNT-OUT CLIPPY • Blended MID task • Use of References • Avatar • Wordplay : On-Topic • Crude	Rating: **OKAY** Reaction: **Smile, Interaction** Time: **1,440 sec/ 10 AM/Mid-Task** Related Task: **Writers Block**
BBC HELP COMMENTATOR • Blended DURING task • Wordplay : On-Topic • Avatar • References	Rating: **HIT** Reaction: **Smile with teeth "ext** Time: **16 sec/ 2:45 PM/Mid-Task** Related Task: **Unfamiliar Software**

Lucy STAGE three
18 Months

DESPICABLE GRAMMAR • High Challenge • Blended POST task • Wordplay ; On Topic	Rating: **HIT** Reaction: **Smile with teeth** Time: **328 sec/ 9:45 AM/Post-Task** Related Task: **Email Response**
VID-CHAT ART FILTER • Blended Pre-task • Use of Reference • Goofy ; On-topic	Rating: **HIT** Reaction: **Smile with teeth, Share** Time: **128 sec/ 12:55 PM/Pre-Task** Related Task: **Client Video Meeting**
POWERPOINT FEEDBACK • Blended MID task • Wordplay ; On-topic • Avatar	Rating: **HIT** Reaction: **Smirk** Time:**160 sec/ 9:35 AM/Mid-post Task** Related Task: **PowerPoint Review**

James STAGE three
18 Months

SUPER MARIO CALENDAR • Medium/ High Challenge • Blended MID task: On-Topic • Use of References	Rating: **HIT** Reaction: **Smirk** Time: **10 sec/ 9:45 AM/Mid-Task** Related Task: **Schedule Assessment**
POST MEETING MEME • Overlay • On-Topic • References • Crude (•Political)	Rating: **OKAY/HIT** Reaction: **Smile, Interaction** Time: **3, 576 sec/ 2 PM/Post-Task** Related Task: **Video Meeting**
ARNOLD THE AUTHOR • Blended DURING task • Wordplay : On-Topic • Goofy	Rating: **HIT** Reaction: **Smile with teeth** Time: **10 sec/ 3:45 PM/Post-Task** Related Task: **Writers Block**

7.2.5 Persona One : Lucy Adams

Lucy is a sixty-one year old Senior Strategist at the Boldman Marketing Agency in Chicago, IL. She is one of over two hundred employees working at the Boldman Marketing office. She has worked for Boldman for eleven years and has been in the industry for over thirty years. She has a team of eight working under her to manage the company's larger accounts, which hold expectations that match their high budgets. She has climbed the corporate ladder over her career to earn her position, Although she received her bachelor's degree in 1980, Lucy never had the need or time to go back to get a master's degree. Whether true or not, she feels this is something her colleagues remind her of regularly, as office politics can become a bit "cut-throat" at times. Outside the office, Lucy lives at her home with her husband of thirty five years, who just retired last year with worries about his health. They have three adult children and two young grandchildren. She is concerned with her retirement plans and her husband's health issues on top of her career. Lucy suffers from Chronic Stress, which is defined as the response to emotional pressure suffered for a prolonged period of time in which an individual perceives they have little or no control. Lucy prides herself on her sense of humor and feels it has helped her career. She has finished the questionnaire for her Stress to Humor AI and is prepared to see humor injected into her time in front of the computer.

Lucy's Stressors by Stage

Lucy Adams
61 Year-old senior marketing strategist.

Stress Type:
Chronic Stress -
The response to emotional pressure suffered for a prolonged period of time in which an individual perceives they have little or no control.

Long term Stressors
Office politics
Retirement finances
Her firm want to start adding strategies to include newer technology

Stage One : Stressors
-> Humor Response

- ***Social:***
  Nagging Emails from lazy coworkers
  -> Game
- ***Self/ Workload:***
  Big Budget Proposal for top tier client due by noon.
  -> Character
- ***Social/ Politics***
  Disapproval of budget from inexperienced coworker
  -> Language

Stage Two: Stressors
-> Humor Response

- ***Career:***
  Reviewing poorly designed marketing material for Art Museum Client
  -> Character
- ***Technology:***
  Excel sheet is boring and needs detailed changes
  -> Game
- ***Self/ Workload:***
  Reviewing presentation she needs to give later in the week.
  -> Language

Stage Three: Stressors
-> Humor Response

- ***Career:***
  In an uncomfortable situation with coworkers in conflict
  -> Game
- ***Social***
  Frustration with Coworkers/ Clients in Video Conference.
  -> Screen Manipulation
- ***Social***
  Coworkers and use of intelligent vocabulary.
  -> Language

Lucy's Humor Profile

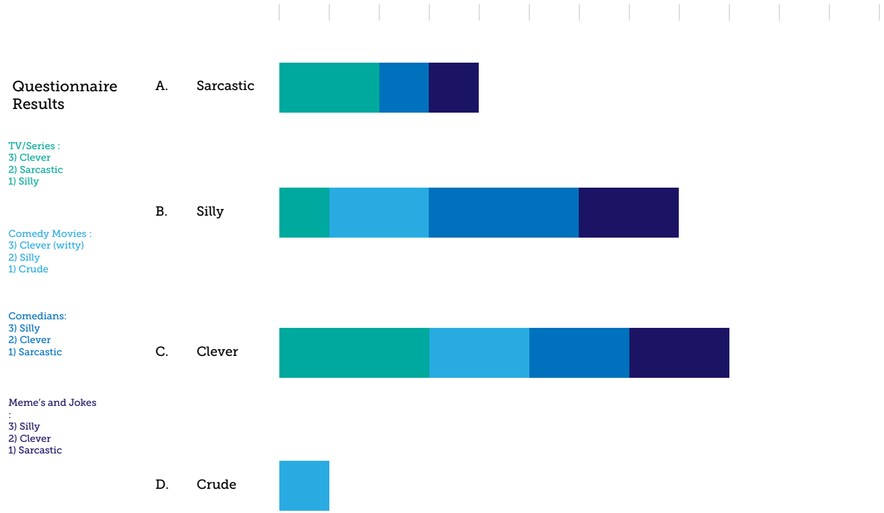


Figure 26.
Lucy's humor preferences based on results from initial questionnaire

Lucy's Cultural Life References

Figure 27.
Map of cultural references over past sixty years, highlighting most likely for the Lucy persona.

Age : 61

Gender: F

Married: Y
Year - M/F:
1984 - M

Children: Y
Year - B/G:
1985 - B
1987 - B
1990 - B

Education:
HS
1974-1979
College
1979-1984

☆ = found in browser history >5 times
★ = found in browser history >10 times

	1960 0 yrs	1970 10 yrs	1980 20 yrs	1990 30 yrs	2000 40 yrs	2010 50 yrs	2020 60 yrs
NEWS	Vietnam War Space Race Cuban Missile Crisis MLK/ Civil Rights Mvmt Kennedy Assassination LBJ Nixon	Neil Armstrong Apollo 13 Return Water Gate/ Nixon Resignation Vietnam War Ends J. Carter beats G. Ford Panama Canal	Mount St. Helens Ronald Regan Moscow Olympics Boycott AIDS Recognized Chernobyl disaster Challenger Shuttle Tragedy Mad Cow G. Bush Senior End Iraq War Berlin Wall comes down	Nelson Mandela Release Op Desert Storm Clinton Impeachment Eastern Europe deconstruction Rwanda Genocide Princess Diana Dies East & West Germany Reunite NAFTA Oklahoma City Bombing The Una-bomber	Y2K Conversion Scare Afghanistan War G-Dubb-ya Dot Com Bubble Burst Iraq Invasion 9/11 Attacks V-Tech Shootings	Trump / Impeachment ☆ Global Warming Election Interference Electric Vehicles Smart Phones Afghan & Iraq Wars
POPULAR CULTURE	Woodstock Flower Power Sidney Poitier The Beatles Ford Mustang The Mini Skirt Star Trek Rolling Stone Mag Bell-bottoms Paisley Pattern James Bond Monty Python	Saturday Night Live Beatles Break Up Disney World Opens Pong Jaws Garfield Space Invaders Big collars & lapels Plaid & Madress 8 Track Charlies Angels	John Lennon Shot MTV Starts Walkman Microsoft v. Apple 1st mobile phones Padded shoulders Star Wars Cheers Happy Days Ghost-busters Back To The Future	Seinfeld Friends Michael Jordan & Bulls Bay Watch The Simpsons VHS Arnold Schwarzenegger Ask Jeeves iMac Computer release Beavis & Butthead Jay Leno Napster	iPod/iPhone South Park Google AOL/ AIM Bono Mobile phones & Texting Tiger Woods The Govenator Martha Stewart Convicted Youtube Barry Bonds Steroids Lance Armstrong	Game of Thrones Smart Phones/Watches Kardashians Tom Brady & Patriots Legalization of MJ Climate Change Google v. Apple Instagram/ Facebook Tesla & EV's "Netflix and chill"
YOUTH CULTURE (CHILDHOOD & PARENTHOOD)	Chatty Kathy GI-Joe Trolls Seasame St. CandyLand Flintstones Peanuts Comic (50's-90's)	Simon (says) Atari Barbie Hot-wheels Hungry Hippos Silly Putty Erector Set Talky Crissy Doll Rock Em Sock Em Robots Raggedy Ann and Andy Mr. Potato Head Bean Bag Chairs	Pac-Man Easy Bake Oven Legos (spans all decades) Transformers Talking Alf Matchbox Cars Karate Kid Car Beds Verbot & Omnibot 2000 Sega Genesis	Beverly Hills 90210 Boy Bands Nintendo Game Boy Furrby Looney Toons Mr.Rodgers (60's-90's) Tamagotchi Pet Tickle Me Elmo Barney Teletubbies Nintendo 64 v. Play Station	Harry Potter Legos (spans all decades) Transformers Talking Alf Matchbox Cars Karate Kid Car Beds Verbot & Omnibot 2000 Sega Genesis	Hunger Games Justin Beiber Jonas Brothers Marvel & DC Comics Movies

Child in house
Child in house
Child in house

Lucy / Stage One/ Game Humor: Lego Sweep Game

Scenario

It is a Friday and the first week of Lucy using her new Stress to Humor AI. She arrives at her desk to find fifteen new emails in her inbox. She uses a Windows laptop and prefers to use the Outlook email platform. The emails are from a variety of people and group email chains, but she needs to respond before getting to the final budget proposal for a new large client she needs to send to the department by 2PM. More than usual these are emails concerning "small fires" she must put-out for the parties contacting her. She likes most of the people contacting her, but feels these are issues that could have been handled without her or been avoided. Lucy sends the last one, and returns to the desktop with her chronic stress now already heightened as she moves on to her own workload.

Description

At this point an overlay of spread out Lego pieces covers the screen with instructions. *"Click anywhere to start the clock. A foot will appear to clear the Legos, but move too fast and your foot will surrender to the Legos."* She clicks and foot appears along with a timer counting down from 10 seconds. Lucy moves the foot across the desktop sweeping away the Legos, and as she does the

Figure 29.
Lego Sweep game screenshots
View animation
https://college.design.ncsu.edu/thenfinally/lyman/lego-sweep.mp4

sound of a woman laughing plays with each sweep. Quickly the 10 seconds is up and the screen displays text saying "That was ok, but take it seriously next time." She is returned to the desktop.

Reaction

Lucy winces without much sign of amusement, and returns to her work unimpressed.

AI Calculation

The humor AI had displayed this game to mirror the task she had just completed of cleaning up a mess left by people perfectly capable of cleaning it up themselves. Drawing from her cultural references, Legos had been around in her childhood as well as been in her home for years as a mother with her children likely playing with them, so the known pain of stepping on a Lego with a bare foot would be something she could relate to. Lucy also showed direct enjoyment of the Monty Python comedy group in her questionnaire who routinely used a bare foot in their cartoons to squish things it should not have. On top of that instead of the expected sounds of pain, the theoretical owner of the foot is tickled by the task. The text at the end is presented with a sarcastic tone in response to her high rating of *Sarcasm* in her humor profile.

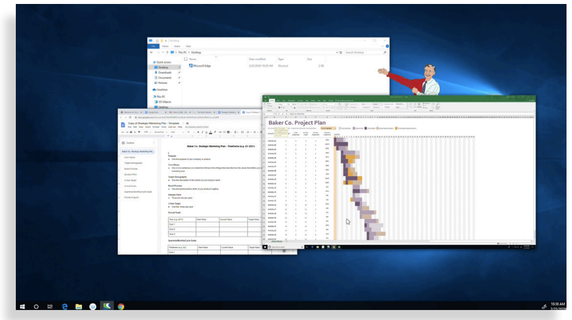
Lucy / Stage One/ Character Humor : Mr. Rogers Pop-in

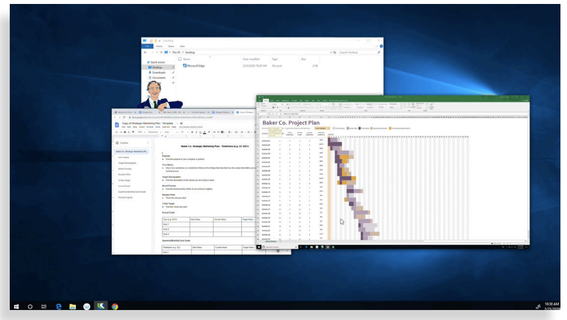
Scenario

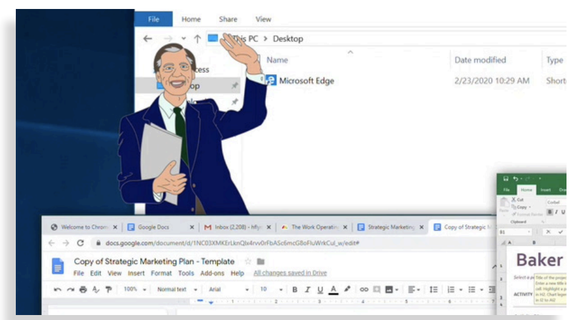
It is now 2PM, later that day and Lucy has just sent out the budget proposal to her department and other department heads for Bowman Marketing's newest big client. There is a lot riding on this and it is not a small budget she has suggested for a pretty aggressive marketing campaign. It still has to go through another few stages of approval and pitching to the client, but from her team's research and work she knows there is a good reason for each piece of the budget. Nevertheless she is stressed about the response from the CEO and CFO. After sending it out she navigates to look at the other work she can finish before the weekend.

Description

At this moment the AI delivers humor in the form of a character introduced outside of the task, overlaid on her home screen. With multiple windows pulled up on her home screen, illustrations of the beloved Mr. Rogers, start to pop up one at a time to wave and to say "hello neighbor" and replay other out of context quotes from the show.







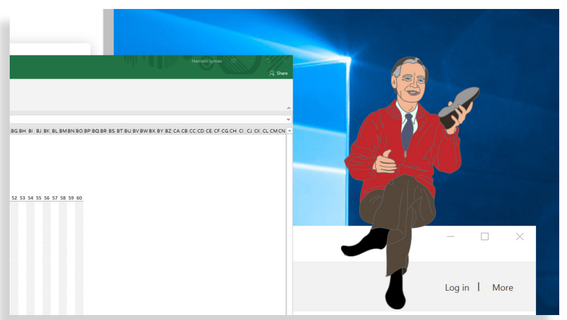


Figure 30.
Screenshots of Mr. Rogers Pop-In
View animation
https://college.design.ncsu.edu/thenfinally/lyman/mrrogers-pop-in.mp4

AI Calculation

Mr. Rogers, who was well known for adapting child psychology into the comfortable PBS TV show *Mr. Rogers' Neighborhood*, is normally set in the context of talking to children sitting in front of a TV in their living room. This is calculated as a benign violation by the humor AI.

Reaction

Having Mr. Rogers pop-in to Lucy's workspace to say "hello" draws on happy memories, from childhood as well as parenthood, about learning to deal with tough feelings.

Lucy / Stage One / Language Humor : Sticky Popsicle Situation

Scenario

With the week coming to a close, Lucy starts to tie up some loose ends to projects, set up for a productive week, and respond to any last minute emails. As she does, Lucy receives an email titled "Sticky situation with client." She is CC'd in this email between two coworkers about a client who is not happy with the ethics of how their content is being mass emailed and people are being duped into signing up for memberships. The client wants it fixed immediately. Although this is not Lucy's fault, she is quickly asked to help the client recover over the weekend. She is now handed this "sticky situation" but does not want to call out the person whose fault it is over the email.

Description

A hand reaches out from the side of her screen offering a popsicle still in its white plastic wrapping. She clicks on it and the popsicle stick expands as if bringing up to her face. The handle has the beginning of a joke on it, *"What do you do when someone leaves a mess for you to clean up?"* After 5 seconds the popsicle shrinks back down and Lucy's mouse and text cursor now takes the form of popsicles. As she navigates her email and replies, everything she clicks on and types over leaves a trace of the melting sticky

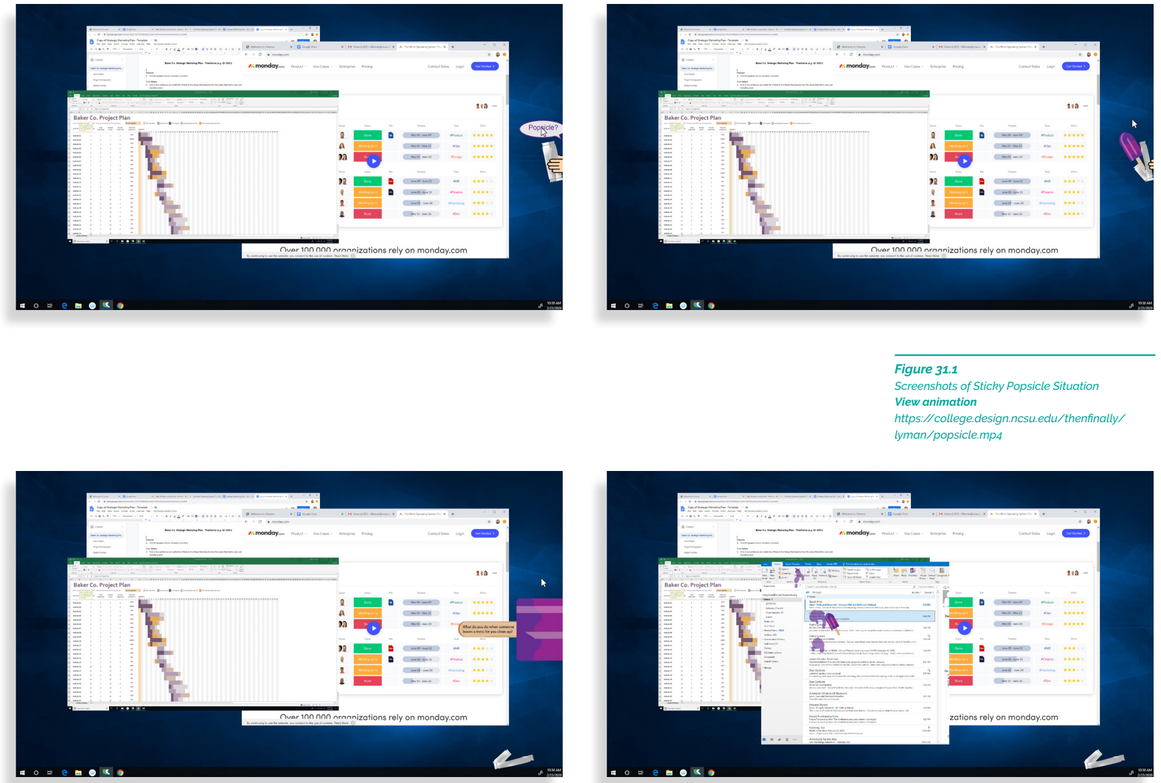


Figure 31.1
Screenshots of Sticky Popsicle Situation
View animation
https://college.design.ncsu.edu/thenfinally/lyman/popsicle.mp4

purple popsicle. The more Lucy types and clicks, the more it melts down. At the end, when the popsicle is fully melted off, the wooden stick it was on enlarges and displays a short joke, similar to what the popsicles she ate as a child had on them, but this joke made direct reference to the email and situation she was in. Through the purple stain the stick reads
"Nothing. They will probably get fired soon. Wave and smile."

AI Calculation

Noting that Lucy's stress has suddenly spiked, and the content and title of the email, the humor AI sees a word association opportunity with the term sticky, and makes another attempt at pulling from a childhood a reference and pointing out a likely universal experience of getting sticky hands from eating popsicles.

Reaction

Although Lucy did not seem very amused by the popsicle stick mouse or cursor, she did get a small chuckle from the joke on the stick which was unexpected. This is noted by the AI: she did not enjoy a childhood reference for the third time, but did enjoy a clever joke in reference to her email.

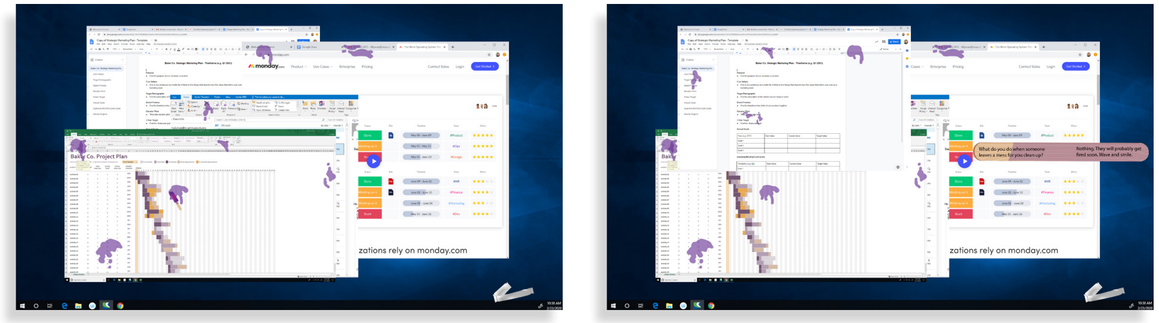


Figure 31.2
Screenshots of Sticky Popsicle Situation
View animation
https://college.design.ncsu.edu/thenfinally/lyman/popsicle.mp4

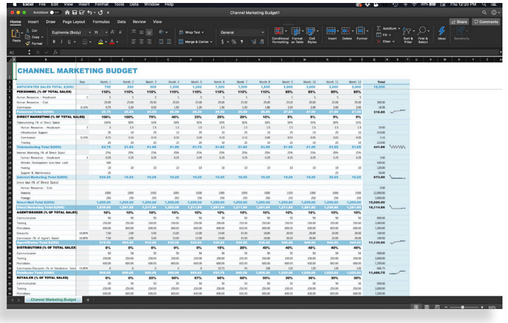
Lucy / Stage Two / Game Humor: Excel Tetris Game

Scenario

In stage two, Lucy has had the Stress to Humor AI for 6 months. As a senior strategist, Lucy must be able to analyze Excel spreadsheets provided to her and extract usable information to develop strategy and make crucial decisions for large clients. This responsibility weighs heavily on her and heightens her chronic stress as she focuses to pull the most pertinent pieces of information from the sheet of numbers for a presentation she is giving later in the week. Because it is a long dull task, she becomes less efficient and her stress increases.

Description

At the top of the Excel application window, the normal tools shift to the right and two new icons are revealed. A puzzle icon and a Tetris icon are now wedged between useful Excel tools, which is a benign violation. Once Lucy clicks the Tetris icon, the spreadsheet disappears and pieces of that spreadsheet begin to drop as would Tetris pieces. The pieces about to drop appear on the right hand side providing the opportunity to plan ahead. The game does not last long, allowing her to get back to work, with the possibility she might study the spreadsheet a bit more before playing it next time.



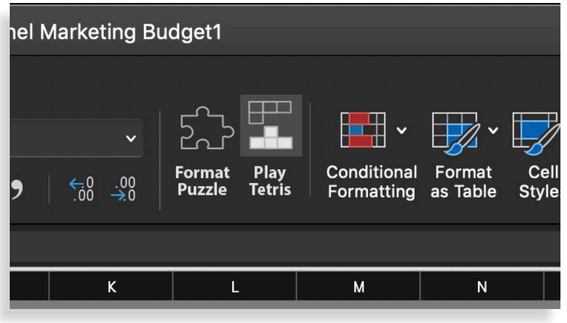
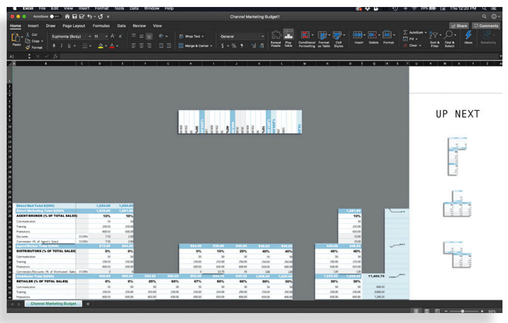
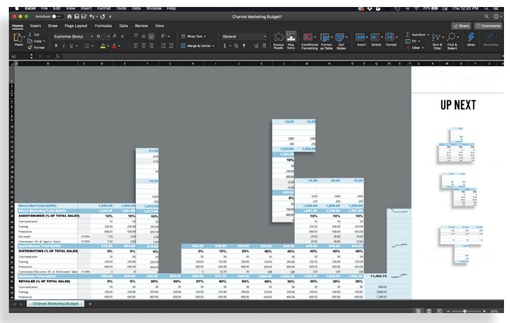


Figure 32.
Screenshots of Excel Tetris
View Semi-animated gif
https://college.design.ncsu.edu/thenfinally/lyman/excel-tetris.gif





AI Calculation

Although the humor AI over the past six months does not see a strong likelihood of Lucy appreciating arcade style games, Tetris is also a puzzle game requiring decision making in real time to accomplish a goal. Lucy enjoys challenges and puzzles and this was a bit more intriguing and appealing to her. In order to keep this game short it is also like a puzzle in the way that they are predetermined pieces that must fit together properly and cannot be placed at random nor do they disappear when a full bar is created like in the original Tetris game. Timing of introducing the game is crucial and providing the choice of playing is often the best way to accomplish success. Forcing Lucy into a game often results in higher stress and annoyance as did the Lego sweep game.

Reaction

Although she sees it as a clever use of the space and enjoys a puzzle-like challenge, it is not achieving much more than a brief smile; however, it is an improvement from the last game in this study.

Lucy / Stage Two / Character Humor: Folder Art Swap (figure 7.3)

Scenario

Lucy is beginning what will be pitched as a new marketing campaign to The Art Institute of Chicago. She is going over their current marketing and branding campaign along with research her team has gathered. In Lucy's eyes, nothing is of value and they will need to start completely from scratch again which will be expensive and require lots of convincing of the museum's directors. This seemingly fun new client is looking more like a mountain of a project. As she looks over their website, gallery files, new demographics and various files on her desktop her stress peaks.

Description

Lucy notices a painting pallet illustration slide down in the top right of her desktop suggesting, "Turn on Art Icons" and she clicks the pallet. The paintbrush on the pallet mixes the paints together as it processes the file titles and content. After 5 seconds, each file on her desktop is overlaid with a new icon placed over the old one. The new icons are clippings from well known pieces of fine art from multiple art periods that make reference to the content and titles of the files. For example, the Art Institute of Chicago now has their iconic lion statue on top of each file made for their

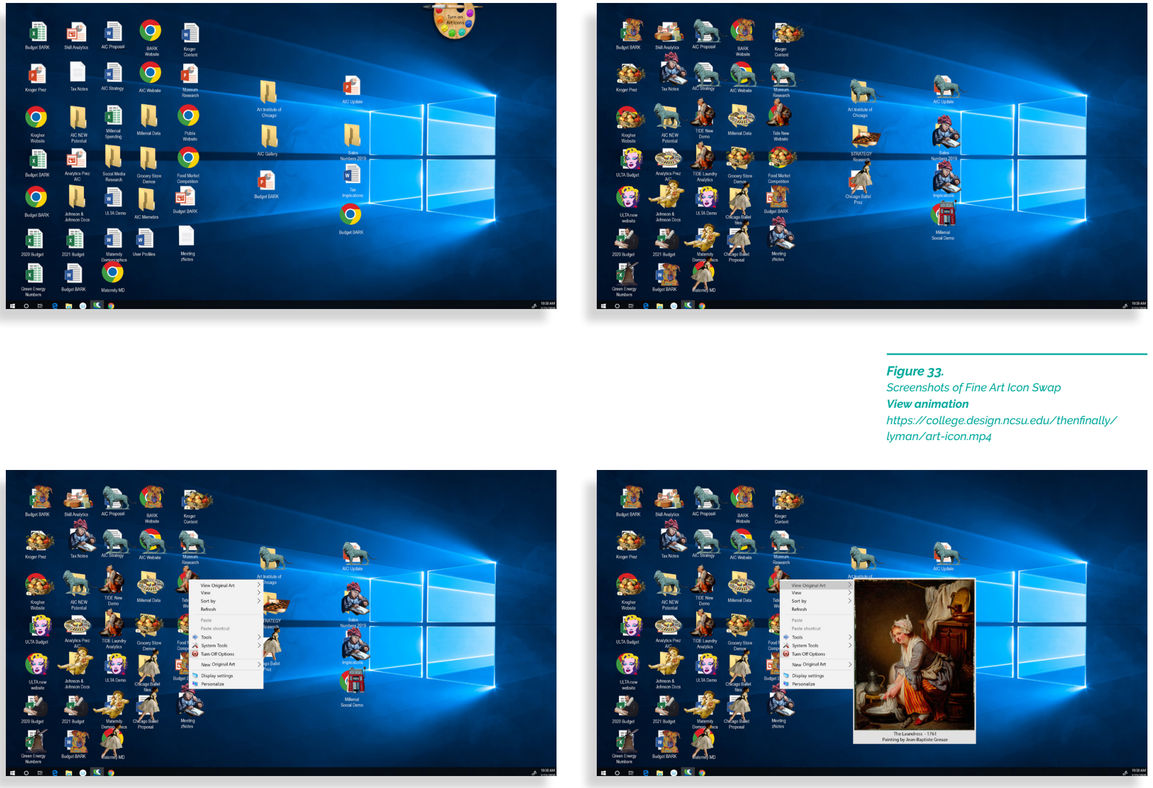


Figure 33.
Screenshots of Fine Art Icon Swap
View animation
https://college.design.ncsu.edu/thenfinally/lyman/art-icon.mp4

campaign. The ULTA Beauty Products campaign files have a clip of Andy Warhol's Portrait of Marilyn Monroe. Lucy soon discovers that when she "right clicks" on the icon, the option to "View Original Art" is at the top of the options, and from there the full original piece appears with a caption below.

AI Calculation

The AI noted that Lucy was not fond of childhood references as the primary driver of the provided humor. It also noted its humor design decision using image recognition of the content viewed, task at hand, and software used, was successful. Lucy thus far has shown positive reactions to culture and clever references. In this case the goal is amusement, with the physical response of smiles.

Reaction

Lucy, an art enthusiast, enjoyed seeing these paintings in her user experience. She enjoys the references and the new aid in organization of her chaotic desktop, which is now a gallery of artwork.

Lucy / Stage Two / Language Humor: Email Author Change (figure 7.3)

Scenario

As Lucy approaches the end of the day, on a Friday, all is seemingly well as she has just submitted the new campaign proposal for The Art Institute of Chicago a couple hours ago. But at 3:45, with only an hour and fifteen minutes left in the workweek, she receives an email addressed to her entire department, from a colleague project manager. He has reservations and criticisms about the proposal she has put forward without much sound justification or background for his suggestions. With time running low and distraught by the ungrounded criticisms of the proposal, she scrambles to compose an email, defending her campaign. After composing her email, she is aware that it may come off more defensive than logical.

Description

As she goes back to read over her hastily written response email, twelve options appear at the bottom of the email page, near her signature, to change the voice of the author. They read "Australian, Shakespearian, Yoda, Supportive Dad, Old English, Ned Flanders, Arnold (Schwarzenegger), Queen Liz, 12 beers deep, Emoji, Satanic and surfer dude. Lucy clicks on "Shakespearean." A waiting screen appears reading "Translating your work," along

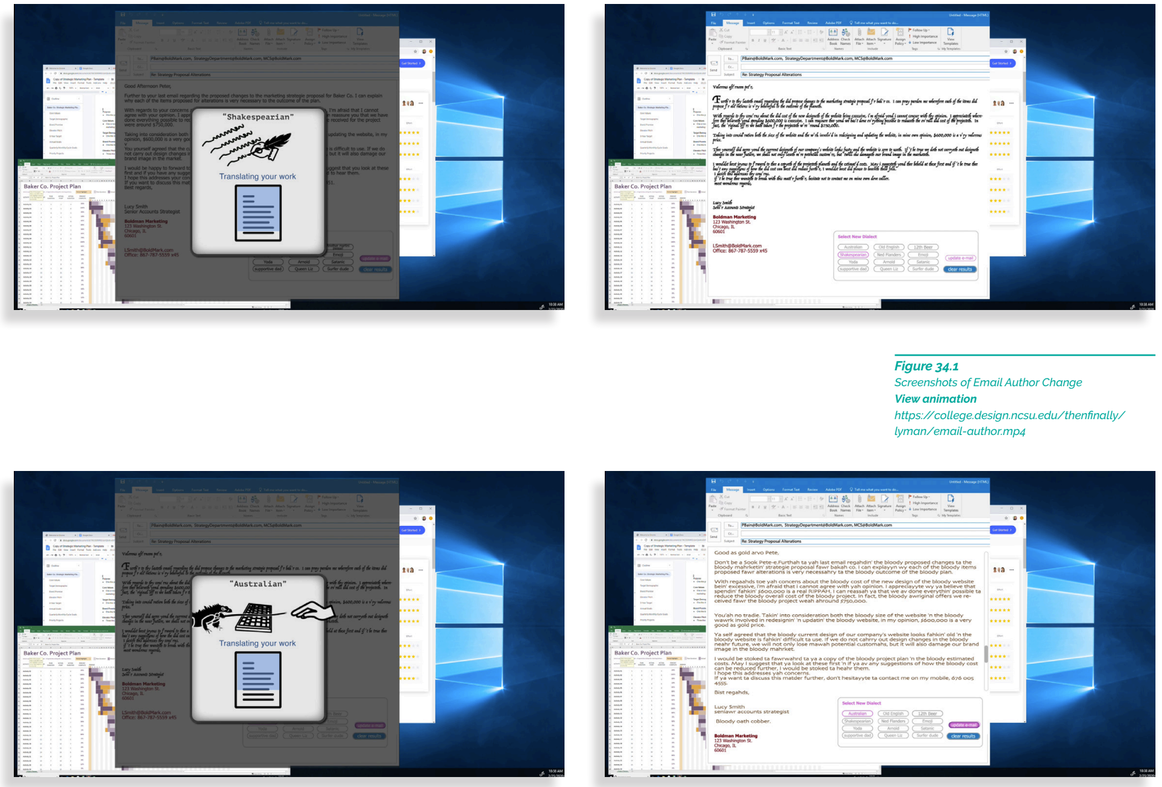
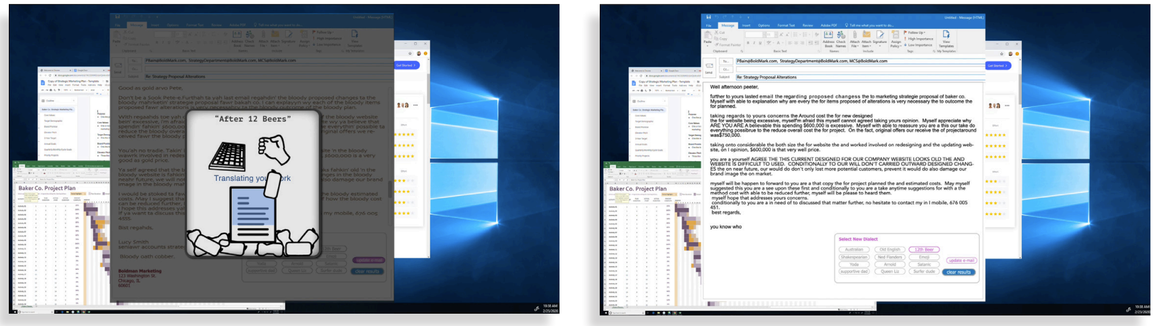


Figure 34.1
Screenshots of Email Author Change
View animation
https://college.design.ncsu.edu/thenfinally/lyman/email-author.mp4

with an animated icon of a hand writing with a quill, and ink as Shakespeare would have. Afterwards, the email has not only changed to a new font, but reads entirely as if written in Shakespearean language. Smirking at the email with a softened look on her face, entertained and curious, she then chooses “Australian.” The new waiting icon is a hand, reaching to type on a keyboard. As a large lizard comes out the hand pulls away, but the lizard grabs the hand with its tongue and bites it. This is slightly silly and does not make her more than smirk. However, she is impressed. And humored by the terms, tone, and font that this author change has turned her email into. She enjoys seeing what she wrote described with new terminology that she would never have used. She then clicks on the “After 12 beers" option. On the waiting screen are eleven crushed cans strewn across the bottom, and then a hand drops and lets go of the final twelfth can, and makes a noise as it hits the bottom and bounces. The hand icon makes a fist and starts pounding on the keyboard in front of it. The email is written as if by a drunk person. The font style and size changes throughout. There are extra “s”s imply slurring of words, repetition of sentences, spelling errors, and more. The detail of changes makes her laugh, as she finds it clever, despite its stupidity.



AI Calculation

The humor AI noted over the past six months that language humor had positive results. It is able to gather multiple cultural references that fit Lucy’s age demographic that qualify as characters with distinct vocabulary and accents. Giving her a choice of these does demand more work on her part but allows for greater learning.

Reaction

After she turns off the filter, with a calm, relaxed mind she is able to go back over her email and be more succinct and remove excess emotion from the email. Both the humor and her ability to write and edit her email to be more effective calm her down.

Figure 34.2
Screenshots of Email Author Change
View animation
https://college.design.ncsu.edu/thenfinally/lyman/email-author.mp4

Lucy / Stage Three / Game Humor: Despicable Grammar Quiz (figure 7.3)

Scenario

In stage three Lucy has now been using the Stress to Humor AI for a full year. Lucy prides herself in her correct use of vocabulary and grammar. Also she feels it is important to be precise and careful about what one writes. In contrast, some of her colleagues—for whom she is responsible—write emails using incorrect vocabulary, poor grammar and misplaced punctuation. Lucy feels this reflects poorly on the company and her, especially when they are communicating with clients.

Description

This game concept originated from Elevate Mind Games App, listed in precedents. It is a humor adaptation and combination of two vocabulary and grammar game concepts that fit this portion of the study.

The humor AI presents a small tab below the folders in the left hand bar of her Outlook email platform *"Despicable Grammar Quiz."* Lucy expands the game up to play. The game tests use of new vocabulary, correct words and proper grammar. However the sentences and phrases in which she must use correct grammar and vocabulary are ridiculous and depict situations that are not

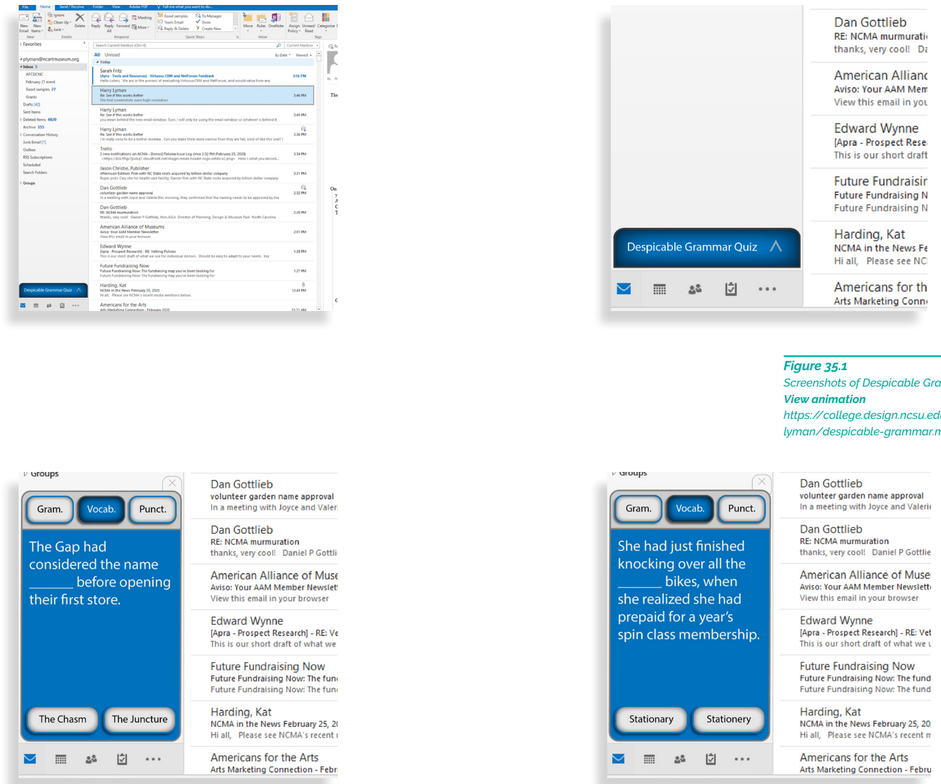


Figure 35.1
Screenshots of Despicable Grammar Quiz
View animation
https://college.design.ncsu.edu/thenfinally/lyman/despicable-grammar.mp4

what someone would expect to be used when testing proper English. This is a benign violation on top of the clever and absurd statements.

AI Calculation

The AI notices that her stress spikes when reading emails with poor English. It also notes that she spends time not only to double check for grammar mistakes but also find new phrases to improve her communication. The humor AI noticed she had suggested and talked with family and friends about her fondness of the game *Cards Against Humanity* that creates ridiculous and humorous *violation* statements from players by suggesting how a seemingly benign sentence should be finished. The humor AI draws a cultural reference to the game Mad-Libs that Lucy may have enjoyed in her childhood and with her two sons. This game concept provides potential variability for future use as it appeals to her appreciation for puzzles and cognitive processing in real time.

Reaction

Lucy appreciates the goofiness and absurdity especially as this involves intellect. Lucy reveals a big smile throughout the game with a few giggles.

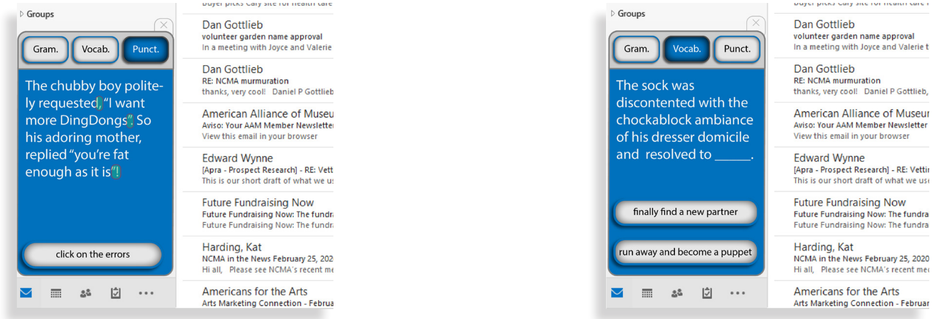


Figure 35.2
Screenshots of Despicable Grammar Qui
View animation
https://college.design.ncsu.edu/thenfinally/lyman/despicable-grammar.mp4

Lucy / Stage Three / Character Humor: Vid-Chat Art Filter

Scenario

Lucy is feeling the pressures and stresses before weekly virtual conference meetings for the art museum campaign, using the Zoom video chat platform. These meetings often involve uncomfortable disagreement between colleagues, and even sometimes with the client. For a number of reasons these meetings increase Lucy's stress about a half an hour beforehand as she prepares for ways to put out these small fires that may arise. Before Lucy enters the virtual conference room, she is held in a virtual waiting room, where she can test her video and audio and see what the camera will be capturing before she enters.

Description

As Lucy is preparing her camera and microphone, next to the other icons for adjusting audio and visuals, a small thumbnail of two well known fine art portraits appear with the caption, "Add an art filter. Once she selects the thumbnail, the portrait is projected on her screen, but with her eyes and mouth controlling the portrait's eyes and mouth. Not only does it show her eyes and mouth, looking around and opening up, but her eyes and mouth are displayed with the same style brushstroke as the painting, in this case a Van Gogh self portrait and Vermeer's *Girl with a Pearl*

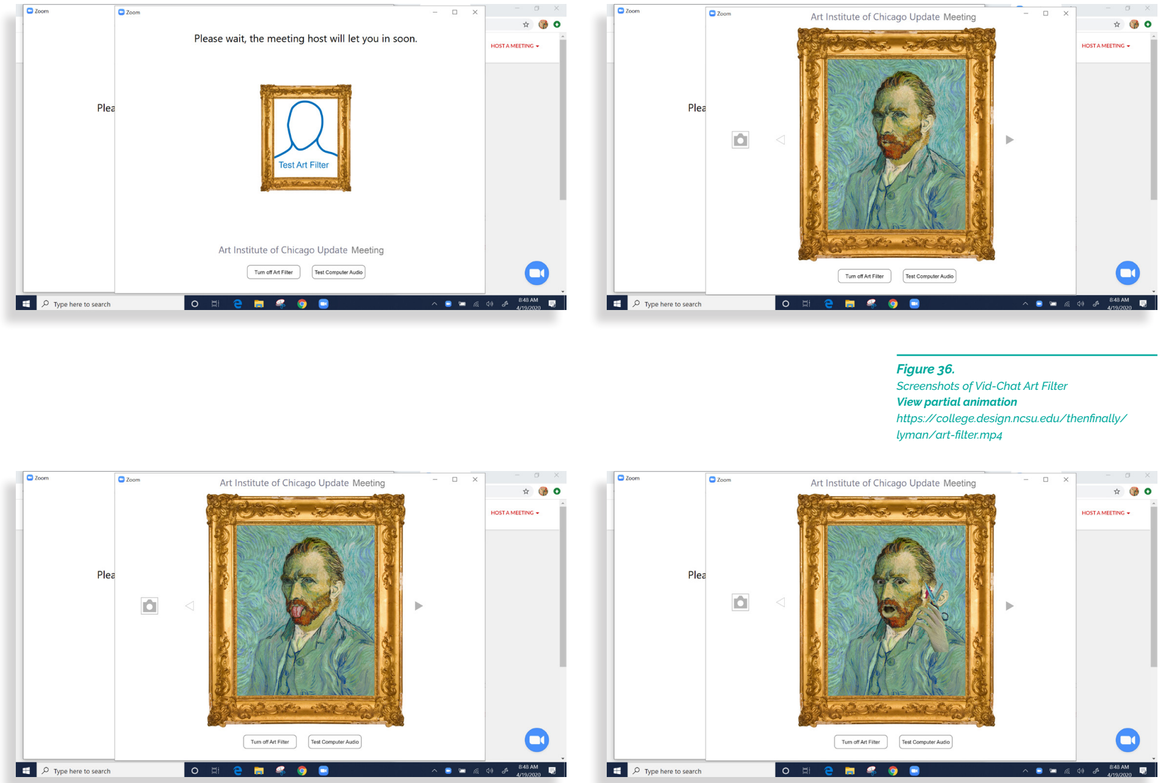


Figure 36.
Screenshots of Vid-Chat Art Filter
View partial animation
https://college.design.ncsu.edu/thenfinally/lyman/art-filter.mp4

Earring. Lucy explores and finds that when she sticks her tongue out that the portrait also sticks out a tongue as if painted in the same style. When looking at Van Gogh's self portrait she lifts up her hand as suggested and a pair of scissors appear in her hand and his ear falls off as per the true story of Van Gogh, cutting off his ear later in life. Crude humor does not fit her style preferences, but Lucy has seen this joke made before by other comedic illustrators and it does not bother her.

AI Calculation

Lucy has shown preference towards characters and visuals that are blended into the task and on topic, which in this situation is an art museum. The fine art icon replacement in stage two was a hit with Lucy. The AI noticed a correlation between the collaborative data of other users with appreciation for art and Lucy's interests. The recommendation algorithm calculated that involving art again would be a safe bet for repetition as it was also on topic with her task.

Reaction

Lucy is enamored by this ability to manipulate beloved, world-famous pieces of art. Once she notices that she can join the meeting she does and immediately shares the experience with her co-workers and clients. Lucy is then able to add the filter for

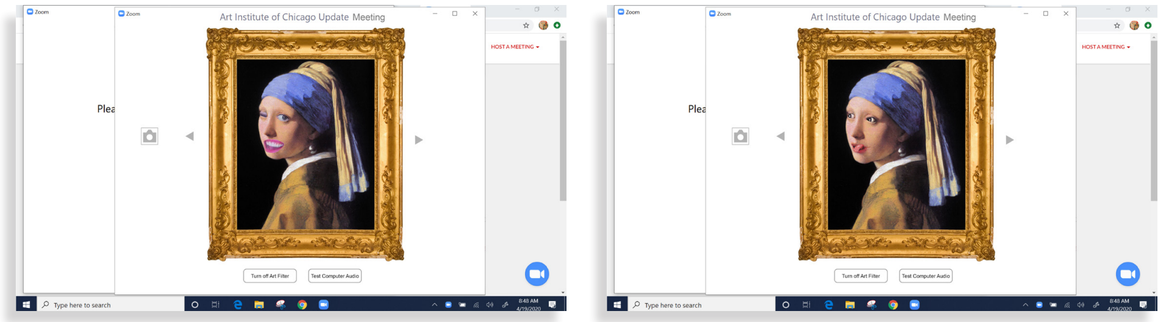


Figure 36.
Screenshots of Vid-Chat Art Filter
View partial animation
https://college.design.ncsu.edu/thenfinally/lyman/art-filter.mp4

them through her account. This tells the humor AI that it was a success for her unique humor preferences, along with her laughs and starts the meeting off on a happy note.

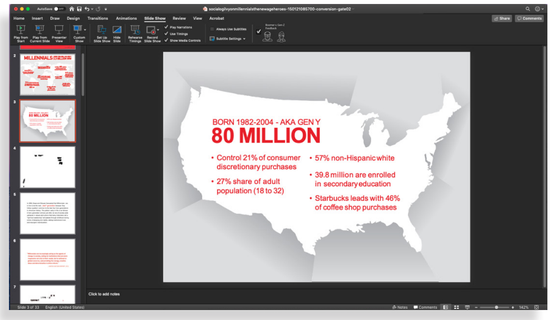
Lucy / Stage Three / Language Humor3: PowerPoint Feedback (figure 7.3)

Scenario

Lucy is working on a PowerPoint presentation that she must give at the end of the week on millennials, who are the key demographic for one of her clients, according to research done by Lucy's marketing team. The entire presentation discusses millennials, and their marketing demographic profile. Lucy has never been fond of public speaking, but is expected to report her team's work, and their upcoming strategy proposal to the client. She conducts the presentation in Microsoft PowerPoint. At 2:30pm, she is finishing up and reviewing the slides. Although she has been working on it for a while, she still finds it quite nerve wracking to work on and review the wording of her presentation.

Description

As Lucy begins to review the slides, two new icons with unchecked boxes appear in the toolbar. These are options for feedback. They read; "All feedback", "Generation Z," and "Boomers." Eager to ease the tension of reviewing the slides she will have to present later that week, Lucy gladly reaches for some now somewhat-expected humor, with a willingness to laugh. As she selects the options their icons pop up on either side of the slides.



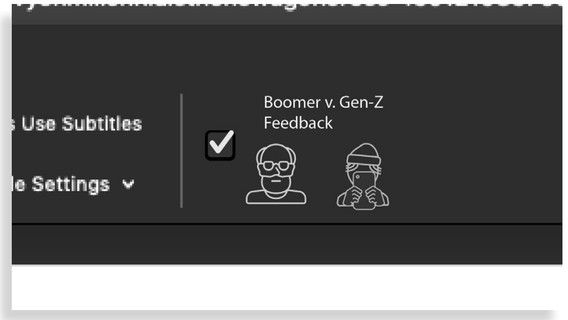
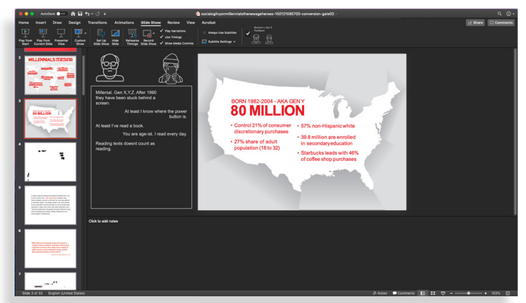
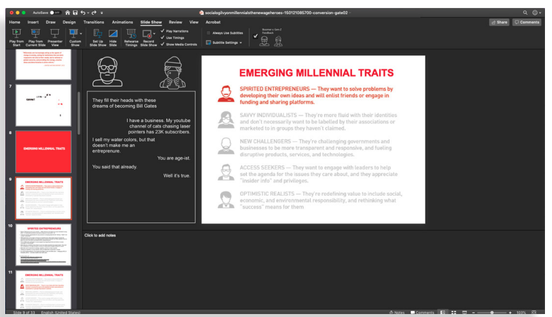


Figure 37.
Screenshots of PowerPoint Feedback
View animation
https://college.design.ncsu.edu/thenfinally/lyman/powerpoint-feedback.mp4





Their comments become banter, making remarks typical of their generation. Referring to millennials with despair in their banter is the benign violation in the situation, and Lucy finds it humorous and clever how they are able to make direct commentary on the slides content. She skips to slides that she thinks may produce funny commentary.

AI Calculation

The stress AI noted a jump in her stress levels when reaching the end of creating in PowerPoint. Mid-task interruptions are less successful, but humor blended into the platform used is a positive. The Humor AI noted over the past year, starting with the popsicle stick joke, as well as the e-mail author humor in stage two, that humor involving language has a good rate of success with Lucy, especially when on topic.

Reaction

Their comments are an ideal balance between direct commentary on the content of the slides and off topic jokes. These comments make her outwardly laugh. This is now the second occurrence of language humor employing character "voices."

7.2.6. Persona Two : James Smith

In another department of the Boldman Marketing Chicago office, James Smith is a thirty-seven-year-old Digital Marketing Specialist. He has worked for Bowman Marketing for three years and has been in the industry for seven years, but Lucy and James do not know each other. Last year he was promoted to *Project Lead* in his department of eleven people and now reports to one manager, who is only a few years older than he. As with Lucy, office politics plays a large role in his daily stress accumulation, as he is ambitious and aims to progress within the company, but knows there are not only others around him shooting for the same new position but also people eager for his job. James lives with his wife of six years and their two young daughters in their apartment downtown, which they love, but the landlord is slow to fix problems. He wants to get them more space and become a homeowner in the next two years. James suffers from Episodic Acute Stress which is defined as frequently experienced physical, physiological and psychological response to a perceived threat to your well-being. James considers himself relatively funny, as he was the big joker in his college friends group. He has finished the questionnaire for his Stress to Humor AI and is prepared to see humor injected into his time in front of the computer.

James' Stressors by Stage

James Smith
37 Year-old digital marketing specialist.

Stress Type:
Episodic Acute Stress -
Frequently experienced physical, physiological and psychological response to a perceived threat to your well being.

Long term Stressors
Office politics
Career ambitions
Approval of superiors

Stage One : Stressors
-> Humor Response

- ***Social***
  Nagging Emails from lazy coworkers
  -> Game
- ***Technology***
  Can't find file on server that was just there last week
  -> Character
- ***Self/ Writers Block***
  Must write product review content
  -> Language

Stage Two: Stressors
-> Humor Response

- ***Social***
  Frustration with Coworkers/ Clients in Video Conference.
  -> Screen Manipulation
- ***Technology***
  Must relearn design software to make edits
  -> Language
- ***Career***
  Poor analytical results on-line for client.
  -> Game

Stage Three: Stressors
-> Humor Response

- ***Social***
  Overbooked/ busy Calendar
  -> Game
- ***Technology***
  Google not providing search results he needs
  -> Language
- ***Self/ Writers Block***
  Must write proposal content for series of Facebook posts for client
  -> Character

James' Humor Profile

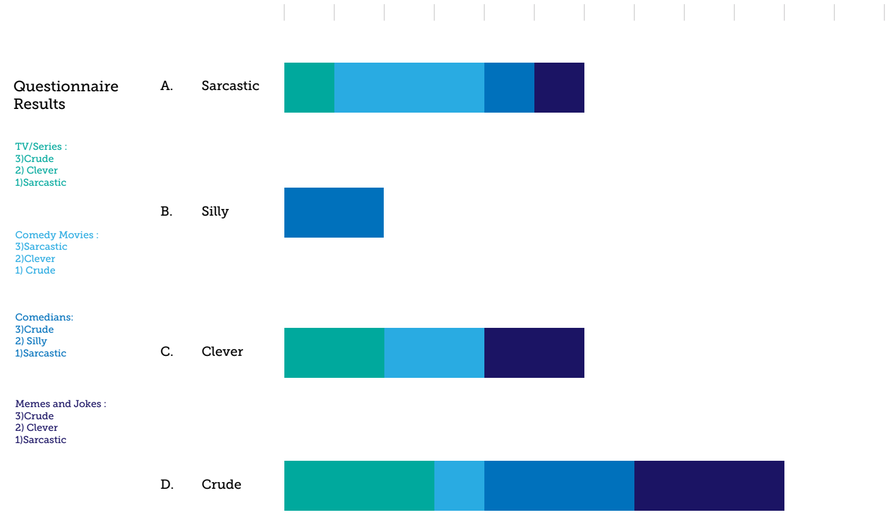


Figure 26.
James humor preferences based on results from initial questionnaire

James' Cultural Life References

Figure 27.
Map of cultural references over past sixty years highlighting most likely for the James persona.

Age : 37

Gender: M

Married: Y
Year - M/F:
2014 - F

Children: Y
Year - B/G:
1999 - G
2005 - G

Education:
HS
1997-2001
College
2001-2005

☆ = found in browser history >5 times
★ = found in browser history >10 times

	0 yrs	10 yrs	20 yrs	30 yrs	40 yrs	50 yrs	60 yrs
NEWS	Vietnam War Space Race Cuban Missile Crisis MLK/ Civil Rights Mvmt Kennedy Assassination LBJ Nixon	Neil Armstrong Apollo 13 Return Water Gate/ Nixon Resignation Vietnam War Ends J. Carter beats G. Ford Panama Canal	Mount St. Helens Ronald Regan Moscow Olympics Boycott AIDS Recognized Chernobyl disaster Challenger Shuttle Tragedy Mad Cow G. Bush Senior End Iraq War Berlin Wall comes down	Nelson Mandela Release Op Desert Storm Clinton Impeachment Eastern Europe deconstruction Rwanda Genocide Princess Diana Dies East & West Germany Reunite NAFTA Oklahoma City Bombing The Una-bomber	Y2K Conversion Scare Afghanistan War G-Dubb-ya Dot Com Bubble Burst Iraq Invasion 9/11 Attacks V-Tech Shootings	Trump / Impeachment ☆ Global Warming Election Interference Electric Vehicles Smart Phones Afghan & Iraq Wars
POPULAR CULTURE	Woodstock Flower Power Sidney Poitier The Beatles Ford Mustang The Mini Skirt Star Trek Rolling Stone Mag Bell-bottoms Paisley Pattern James Bond Monty Python	Saturday Night Live Beatles Break Up Disney World Opens Pong Jaws Garfield Space Invaders Big collars & lapels Plaid & Madress 8 Track Charlies Angels	John Lennon Shot MTV Starts Walkman Microsoft v. Apple 1st mobile phones Padded shoulders Star Wars Cheers Happy Days Ghost-busters Back To The Future	Seinfeld Friends Michael Jordan & Bulls Bay Watch The Simpsons VHS Arnold Schwarzenegger Ask Jeeves iMac Computer release Beavis & Butthead Jay Leno Napster	iPod/iPhone South Park Google AOL/ AIM Bono Mobile phones & Texting Tiger Woods The Govenator Martha Stewart Convicted Youtube Barry Bonds Steroids Lance Armstrong	Game of Thrones Smart Phones/Watches Kardashians Tom Brady & Patriots Legalization of MJ Climate Change Google v. Apple Instagram/ Facebook Tesla & EV's "Netflix and chill"
YOUTH CULTURE (CHILDHOOD & PARENTHOOD)	Chatty Kathy GI-Joe Trolls Seasame St. CandyLand Flintstones Peanuts Comic (50's-90's)	Simon (says) Atari Barbie Hot-wheels Hungry Hippos Silly Putty Erector Set Talky Crissy Doll Rock Em Sock Em Robots Raggedy Ann and Andy Mr. Potato Head Bean Bag Chairs	Pac-Man Easy Bake Oven Legos (spans all decades) Transformers Talking Alf Matchbox Cars Karate Kid Car Beds Verbot & Omnibot 2000 Sega Genesis	Beverly Hills 90210 Boy Bands Nintendo Game Boy Furrby Looney Toons Mr.Rogers (60's-90's) Tamagotchi Pet Tickle Me Elmo Barney Teletubbies Nintendo 64 v. Play Station	Harry Potter Legos (spans all decades) Transformers Talking Alf Matchbox Cars Karate Kid Car Beds Verbot & Omnibot 2000 Sega Genesis	Hunger Games Justin Beiber Jonas Brothers Marvel & DC Comics Movies

Child in house

Child in house

James / Stage One / Game Humor: F'ck Off Waldo

Scenario

It is a Friday and the first week of James using his new Stress to Humor AI. He, like Lucy, arrives at his desk to find seventeen new emails in his inbox. James uses a MacBook laptop but prefers to use G-mail. The emails have a range of reasons, but include reminders that he needs to renew his company policy learning tutorials for this year. These are unavoidable and cannot be skipped through, but he must complete them before getting to the rest of his work if he wants to get paid this week. James has no choice and settles in to complete the tutorials and quizzes that follow. He finishes the last one, now behind his planned work schedule, and returns to the desktop with his episodic acute stress now peaking.

Description

At this point an overlay of Waldo characters covers the screen with instructions. "Click anywhere to start the clock. A broom will appear and you will have 10 seconds to get rid of as many Waldos as possible ." James clicks and begins to sweep the Waldos away. As the broom sweeps the Waldos away, their limbs are gruesomely ripped apart and they cry out in pain. Wanting to hear what the voices are saying he slows the broom down and can hear the

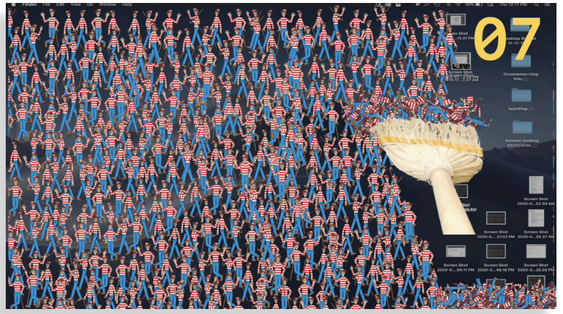


Figure 38.
Screenshots of F'ck Off Waldo
View animation
https://college.design.ncsu.edu/thenfinally/lyman/waldo.mp4

voices individually: *"No, no, no, no! Wait, wait, wait, wait!" "It's the Broom Again!" "oooowwww" "Oh my leg."* As the time runs out his score shows up on the screen sarcastically reading, "63% not good, but don't get upset. It's just a stupid game."

AI Calculation

To the AI's calculations James may remember the *Where's Waldo* books as a lighthearted game with the pages filled with illustrated characters, some of which are depicted in unfortunate situations but there is always only one Waldo, who is fine. To have a normally harmless broom demolish hundreds of Waldo's is calculated as a benign violation by his humor AI. This mirrored the task of cleaning up his inbox and removing annoying policy tutorials from his to do list. James also showed a high approval rating of *crude humor* and *sarcasm*.

Reaction

James is somewhat amused, letting out a short "ha," and a smile in response to the novelty of the situation and task he is asked to perform. His stress level drops, avoiding unhealthy levels.

James / Stage One / Character Humor: Trump Leap Blower

Scenario

James has just finished finding a file on a server that was difficult to find and should have been in the correct location. He needed to get updates to a client website quickly and felt he was appearing unprofessional not being able to produce it rapidly. Shortly after, he is back at his desktop screen with a few windows open.

Description

The AI can utilize eye tracking to recognize stress and tasks as well as a means for interaction with humor. In this case, a small gray bubble with a leaf blower shows up in the bottom right hand corner with instructions to stare at it for five seconds. Curious, James stares at it for five seconds as it makes revving noises trying to start. Simultaneously, cartoon illustrations of President Trump's face start to appear from behind windows on the screen. The leaf blower turns on and appears in the middle of the screen. Now wherever he looks the leaf blower points and pushes the screen in as if blowing on grass. President Trump's head pops out again from one of the windows and James immediately stares at the head and drags the leaf blower to the illustration. President Trump's hair blows back and his face changes from smug to surprised and immediately shoots back and hides behind

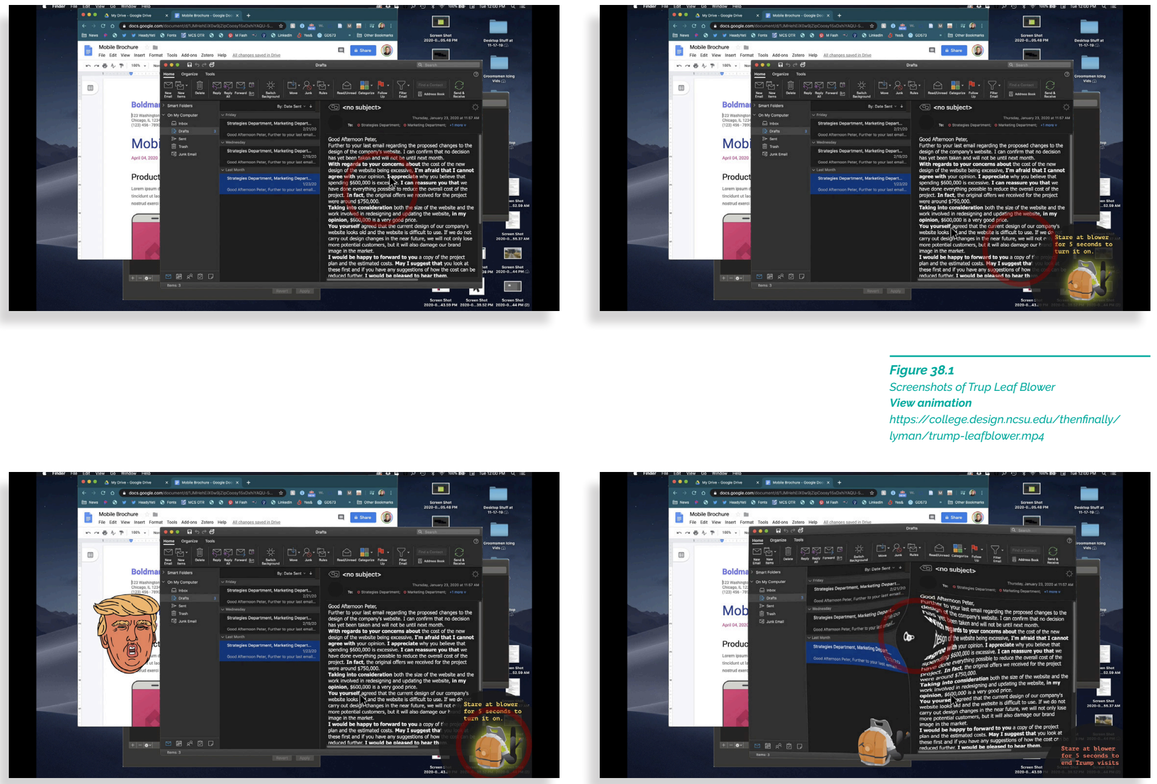


Figure 38.1
Screenshots of Trup Leaf Blower
View animation
https://college.design.ncsu.edu/thenfinally/lyman/trump-leafblower.mp4

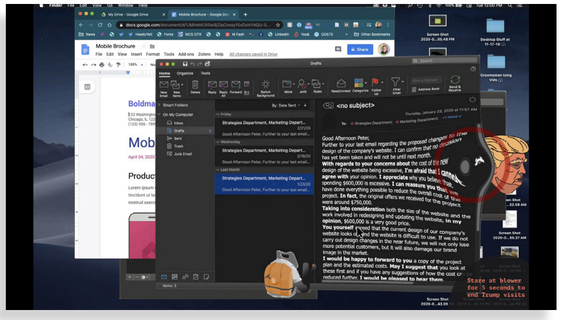
the windows. This happens intermittently with different faces popping out and going back behind until James looks back in the corner for another five seconds to turn off and hide the leaf blower. This is a simple short interaction with the humor character, manipulating the screen in order to interact.

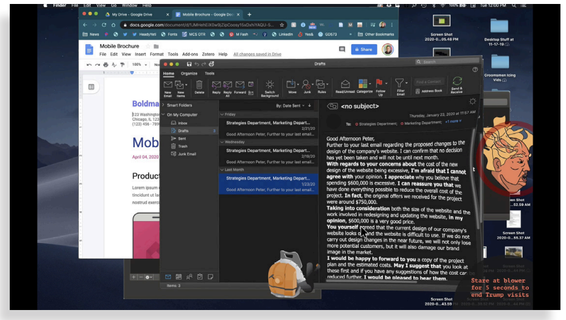
AI Calculation

The stress AI has not had enough time with James to detect patterns. With a calculated conclusion based on initial information from the questionnaire and web search history, the humor AI gathers that James is politically opinionated with a liberal leaning mindset and is not a fan of President Trump, so Trump's face is illustrated in an unflattering manner which is funny to James.

Reaction

This is a hit for James and the AI confirms this from his laugh and sharing of the experience with a colleague.





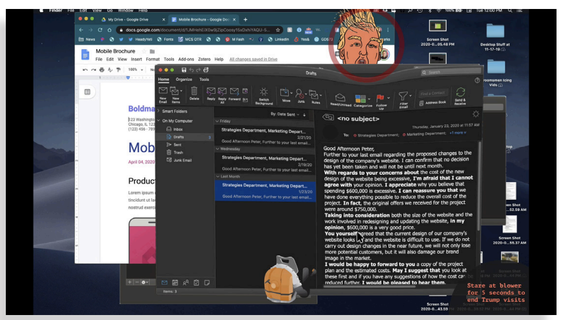


Figure 38.2
Screenshots of Trup Leaf Blower
View animation
https://college.design.ncsu.edu/thenfinally/lyman/trump-leafblower.mp4

James / Stage One / Language Humor: Search Engine Suggestions

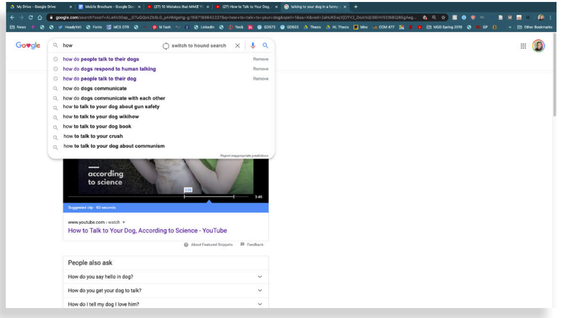
Scenario

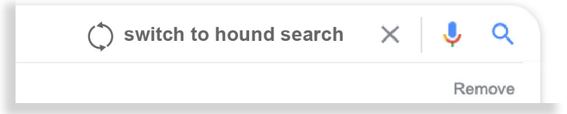
James needs to do research for his client, BARK, which makes dog food and treats. The project requires understanding the different ways people talk to their dogs. He searches and finds some interesting YouTubes, but when searching on Google, it only brings up dog training suggestions on best ways to talk to your dog, and not the various ways dog owners speak to them. He needs to have some research and links sent to the client before the end of the day. James is tired and struggling to think of new ways to phrase his search in Google. As James stares at the search tab with the words "How ___," typed in and the suggestions below

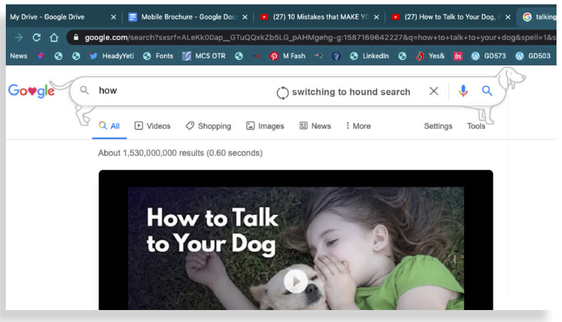
"How to talk to your dog"
"How do you talk like a dog"
"How to talk to your dog about gun safety"
"How to train your dog"
"How do people teach voice commands to their dog"

Description

Out of ideas for what to search, James notices on the right side of the search bar, text pops up saying "switch to hound search," with a switch icon in front of it. Out of ideas, James clicks the switch







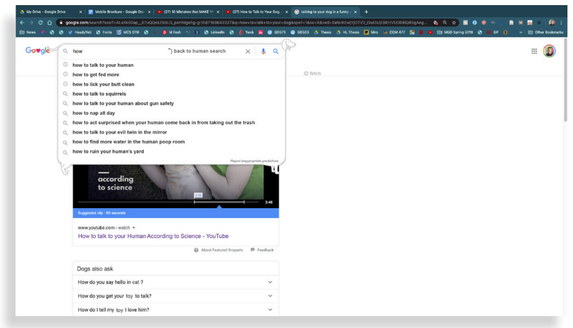


Figure 38.
Screenshots of Search Enguine Suggestions
View animation
https://college.design.ncsu.edu/thenfinally/lyman/hound-search.gif

icon. The search bar then becomes a Dachshund, and the tail wags as it converts. The search then changes all the suggestions to what dogs would be searching.
"How to talk to your human"
"How to get fed more"
"How to lick your butt clean"
"How to talk to squirrels"
"How to talk to your human about gun safety"
and so on.

To the right of the search bar is also a tennis ball with the text "fetch" next to it. He clicks and the search bar, now a Dachshund, goes chasing the ball off screen, returns with the ball in his mouth and assumes the regular stance where the search bar should be. The option to switch to hound search is replaced by *"switch to human search."*

AI Calculation

The humor AI noticed the high volume of searching within Google and YouTube about dog owner culture and made the recommendation to introduce dog humor into the task that was seemingly spiking James' acute episodic stress.

Reaction

James has some fun playing around with this for a bit and it helps him come up with some new ways to phrase his search, so he returns to regular Google search. James just smirks and shakes his head at the ridiculousness. It is a bit too cute for him; however, the AI did notice from eye tracking that his gaze returned to the more *crude* search suggestions more and skimmed past the silly ones.

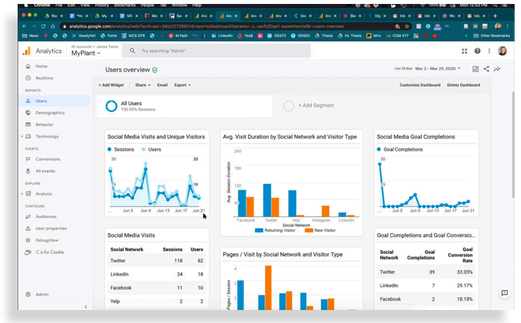
James / Stage Two / Game Humor: C is for Cookie Game

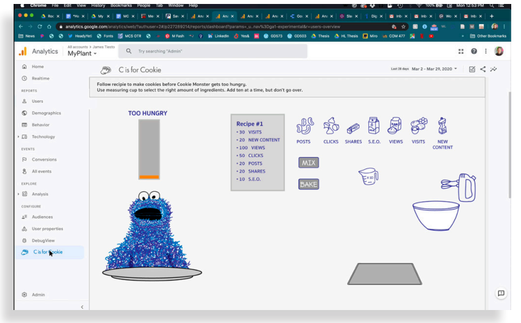
Scenario

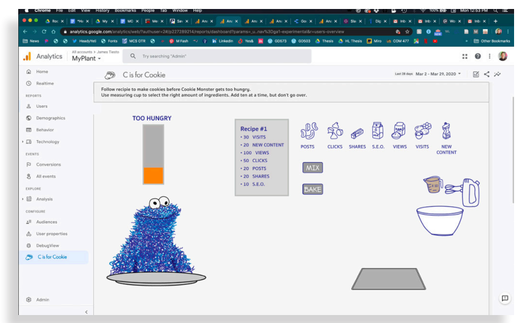
The success of James' clients directly affects his promotability. In parallel, the Google Analytics stats of his clients' websites directly affects spikes in his stress levels. As James logs in to check on results of a website launched earlier in the week, he is dismayed to find that it is getting far less traffic than expected, and dreads reporting these stats. Although there are tactical ways to directly improve these and he knows that numbers are always low the first week, his acute stress still spikes.

Description

At the bottom of the tabs bar to the left is a small icon of Cookie Monster that reads, "C Is For Cookie." James clicks the text and a new page appears. At the top are instructions: "Follow the recipe to make cookies before Cookie Monster gets too hungry. Use the measuring cup to select the right amount of ingredients. Add ten at a time but don't go over." Beneath is Cookie Monster sitting behind a plate. To the right are icons of baking tools and ingredients with their titles replaced with terms for what is needed to have good analytical results: "posts," "shares," "clicks," "visits," "SEO", "views" and "new content." Cookie Monster chimes in exclaiming how excited he is and that "you should start baking".







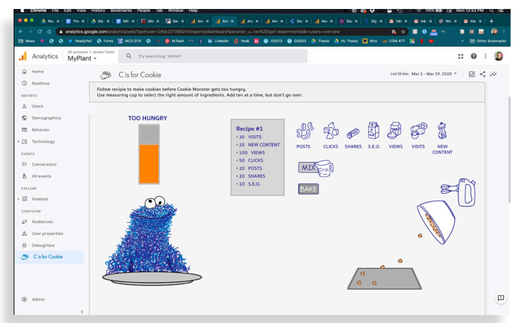


Figure 38.1
Screenshots of C is for Cookie Game
View animation
https://college.design.ncsu.edu/thenfinally/lyman/cookie-monster.mp4

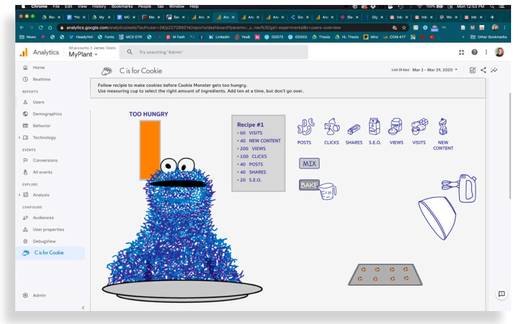
Straightforward James makes the first batch before the "too hungry" meter reaches the top and Cookie Monster demolishes the cookies immediately. The second round, the "too hungry" meter moves too fast, and Cookie Monster shouts about his inability to control his hunger. His illustration grows and before long Cookie Monster yells, "KOWABUNGA" and eats everything on the page. With nothing left but sounds of the breeze, he turns to James and says "oops." James is returned to the "Users" tab and continues working.

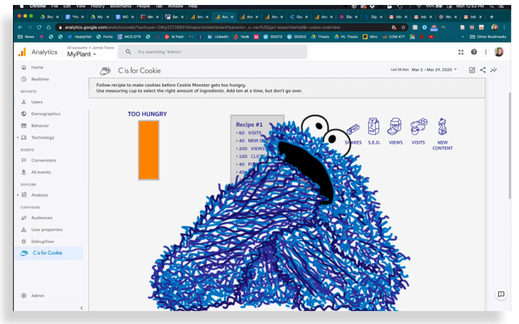
Reaction

James got a kick out of the game, laughing as Cookie Monster broke down and ate everything, even quickly taking a screenshot which he shared with his wife and kids afterward.

AI Calculation

The humor AI recognized James' repeated stress when looking at Google Analytics when results were poor. James had shown positive results for use of outrageous characters and drew from his likely references of knowing Sesame Street characters from childhood and parenthood. Utilizing wordplay, it made the connection between data "cookies" from the task at hand and "Cookie Monster."





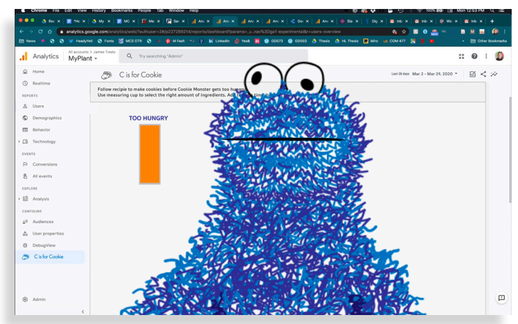


Figure 38.2
Screenshots of C is for Cookie Game
View animation
https://college.design.ncsu.edu/thenfinally/lyman/cookie-monster.mp4

(use QR code to play YouTube of Cookie Monster making cookies)

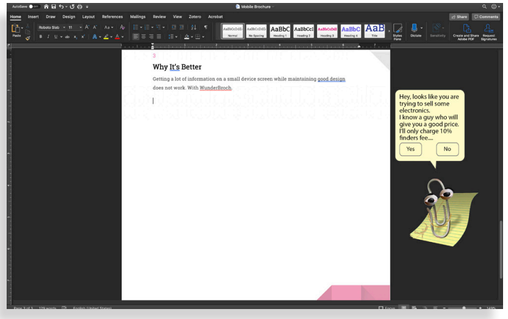
James / Stage Two / Character Humor: Burnt Out Clippy

Scenario

James struggles with writer's block often and is currently responsible for product descriptions for digital brochures to be posted online. He has a lot to write, and with deadlines approaching, he spends a large portion of his workday in document applications, contemplating what to write.

Description

As James stares at the page, Clippy stumbles into view hunched-over, rusted, faded bloodshot eyes and a cheap gold chain around his neck. The once crisp, clean page of yellow legal paper that lay beneath him is now stained with coffee and torn. He's looking pretty ratty and self-abused. Clippy instead of offering advice about the document that James is contemplating, now takes small pieces of what James has written and starts to tell long unnecessary stories about his past. Once a help-all super star known by everyone who used a computer in the early 2000's, his fame went to his head and crashed as quickly as he came up. Clippy, now a burnout celebrity riding out the fumes of his fame, stumbles and sways around the screen complaining about making bad investments and failed relationships, bragging about his moment of fame, and even passing out on occasion.



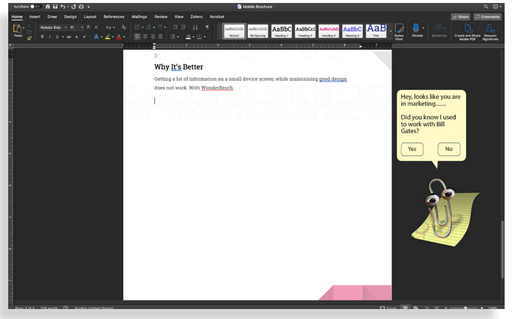


Figure 39.
Screenshots of Burn-Out Clippy
View full resolution images
https://college.design.ncsu.edu/thenfinally/lyman/clippy.gif

Reaction

This backstory is not necessary to explain to James upfront, and is quite funny as he immediately laughs and begins to share this newfound character. The concept that Clippy is now a nuisance is intentional and this benign violation of what a CUI is supposed to accomplish is humorous to James and lowers his stress and allows him to relax.

AI Calculation

Drawing on James' references and receiving positive reaction from use of such, the humor AI determines that the old helper avatar, Clippy, from the Microsoft Word document software in early 2000s, is something James would recognize.

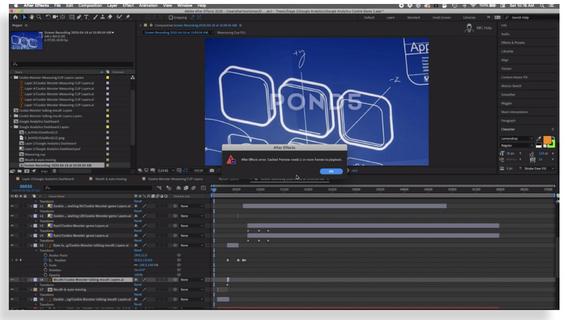
James / Stage Two / Language Humor: BBC Support Commentator

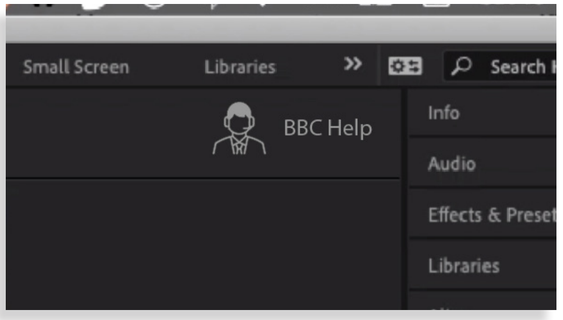
Scenario

For one of the projects James is working on, he has outsourced some graphics work to a freelance video artist who fits the style the client wants. However, this graphics artist is reluctant to follow the client's instructions because he believe he know what is best for the campaign video. Whether this is true or not, James is unwilling to take this risk and sets out to make the changes himself in the video editing software, After Effects, that he knew the basics of in college. To James's dismay the software is much more complex than he remembered as is the arrangement of files and settings within the project. He does not want to go to his boss and explain nor does he want to go to the client and explain what has happened. During his lunch break James goes back and forth between tutorials and help forums trying to make the small changes without damaging the file.

Description

As James' stress peaks, not understanding why the application is not cooperating, he sees in the side toolbar an illustration of a head wearing headphones leaning in toward a microphone with the text "BBC Helper" and the option to turn OFF or ON. Frustrated but unwilling to give up, and looking for answers, James turns it





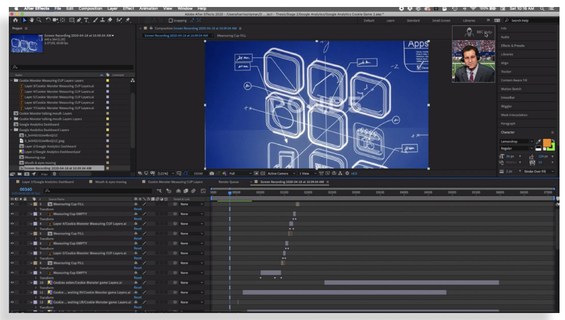


Figure 40.
Screenshots of BBC Support Commentator
View animation
https://college.design.ncsu.edu/thenfinally/lyman/bbc-commentator.mp4

(use QR code to play YouTube of Andrew Cotter's Voice commentating his dogs eatoing)

on and goes back to work. The dull roar of a stadium crowd fades in and an animated BBC sportscaster (search *Andrew Cotter*) with a Scottish accent, appears just below and begins to make commentary on what James is doing within the program. Not only does the sportscaster depict what James is doing in real time, but he makes comments about James' decisions, good and bad, of how to make edits with the tools and shortcuts available.

AI Calculation

The stress AI has not seen James use this software before, and rarely records him working around this time of day without a break. In addition the AI sees that James has multiple web search tabs open looking for help on the software, along with heightened stress detection. The AI recommendation system also draws from collaborative data of other users and determines that for this situation there is a higher probability of success if the humor is blended in mid-task. In the past the humor AI has noted regular views on YouTube by James of rugby clubs in the UK on his work computer with a strong probability of positive reference use within the humor.

Reaction

Before his lunch break is over he is grinning ear to ear and has the file saved *for the win*.

James / Stage Three / Game Humor: Super Marketing Land Calendar

Scenario

James is experiencing another peak of chronic stress as he realizes how busy his next month is and how he will have little time to rest and relax, seeing many due dates on his calendar. There's not much he can do about this. He is trying to get ahead and impress his managers and the project team leaders, but his schedule leaves little opportunity to go above and beyond to stand out from his colleagues. James also wishes he could be spending more time with his daughters. This point of conflict spikes his episodic acute stress. The AI has picked up on this overtime as it notices he goes back to check his calendar, regularly looking for opportunity with free time.

Description

At this moment a small Mario-like character icon appears at the top of the monthly calendar. The pixelated character is reminiscent of the old Gameboy Super Mario Land games that James played as a boy. Curious what will come from this piece of humor, James clicks on the character of a businessman holding a briefcase. The calendar becomes an obstacle course as the "events" of each day move up and down as layers to jump on. Pixelated thumbs-up icons representing social media "likes", take

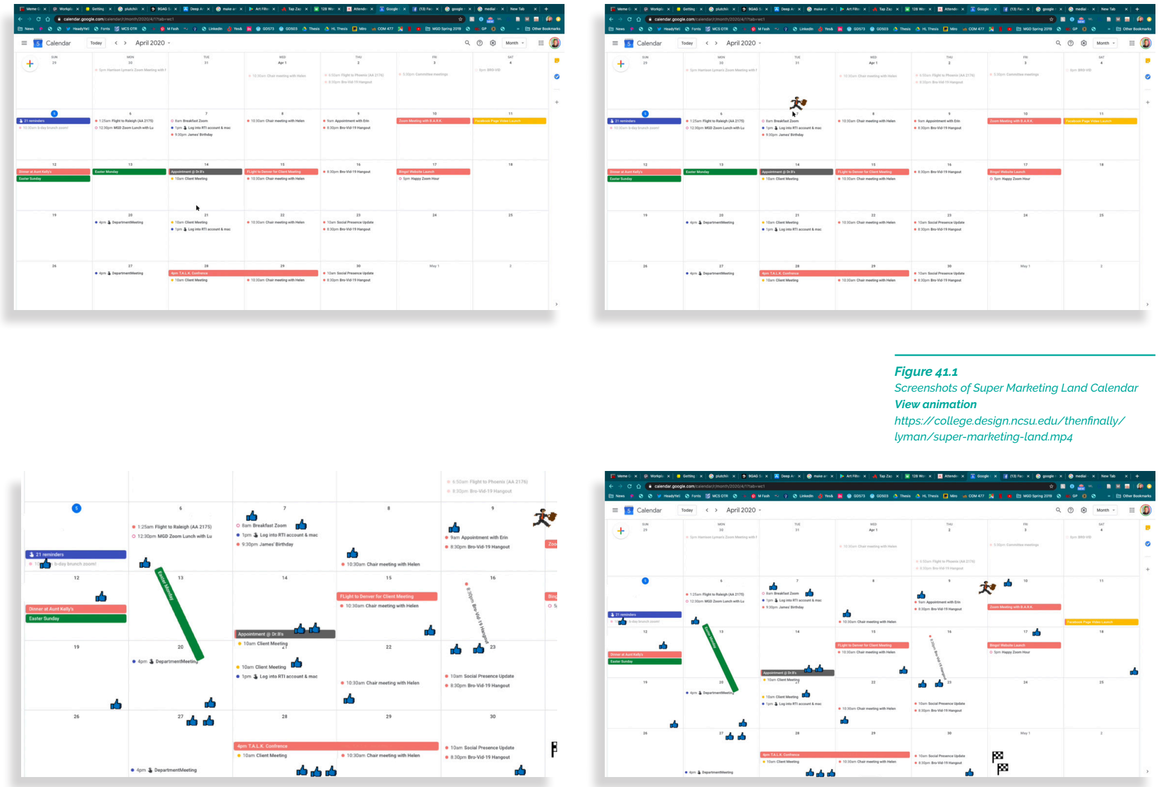


Figure 41.1
Screenshots of Super Marketing Land Calendar
View animation
https://college.design.ncsu.edu/thenfinally/lyman/super-marketing-land.mp4

the place of what would normally be coins to collect. It is simple: using up down and forward backwards buttons on his keyboard he is able to maneuver the character. Since James is familiar with the maneuvers he remembers using as a boy, he is able to have fun quickly. As he jumps and collects likes, noises similar to the MarioLand game are played. After getting to the 10th day of the month he gets crushed by one of the moving event titles and the game is over. The events in each day go back to where they were and the character disappears.

Reaction

The game recalls moments of joy for James as well as excitement that it has found its way into his workday. This is a positive experience for James, making him smile. After the game ends he goes on to share this with the colleague in the cubicle next to him.

AI Calculation

The AI is able to draw from references and re-create the simple game that James likely played as a child noting that in the past humor interventions, childhood memories were successful in achieving amusement and laughter. Yet again the option to play is there and requires initiative by the user— in this case James—to initiate the game to avoid being a nuisance and disrupting his workflow and creating more stress. The thumbs-up icons are on topic and relevant to his daily tasks.

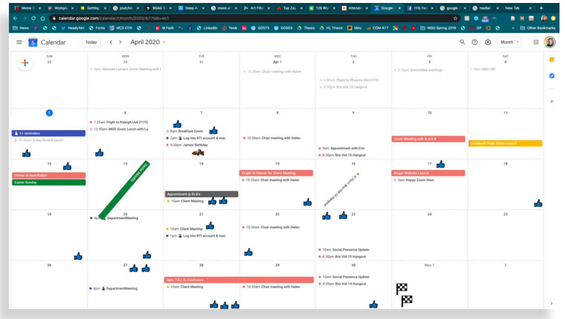


Figure 41.2
Screenshots of Super Marketing Land Calendar
View animation
https://college.design.ncsu.edu/thenfinally/lyman/super-marketing-land.mp4

James/ Stage Three / Character Humor: Post Meeting Meme

Scenario

James' frustrations have transferred to social issues and office politics. He now is on weekly video conference meetings with clients and coworkers out of office. Some of these participants have personalities that regularly stand out and are obtrusive and self-centered in meetings. Many make absurd requests or advise on topics for which they have little background. These personalities get under his skin and stress him out as he must remain professional and show good customer service. This has become a main source of frustration and stress that the stress recognition AI has picked up on.

Description

James ends these meetings in a state of acute stress as he thinks about working with these people for the foreseeable future. The humor AI recognizes this pattern as an opportune time and potential content for humor. Directly after the video chat meeting the humor AI generates memes based on the conversation and displays them in the "signout" screen providing commentary on moments that spiked James' stress.

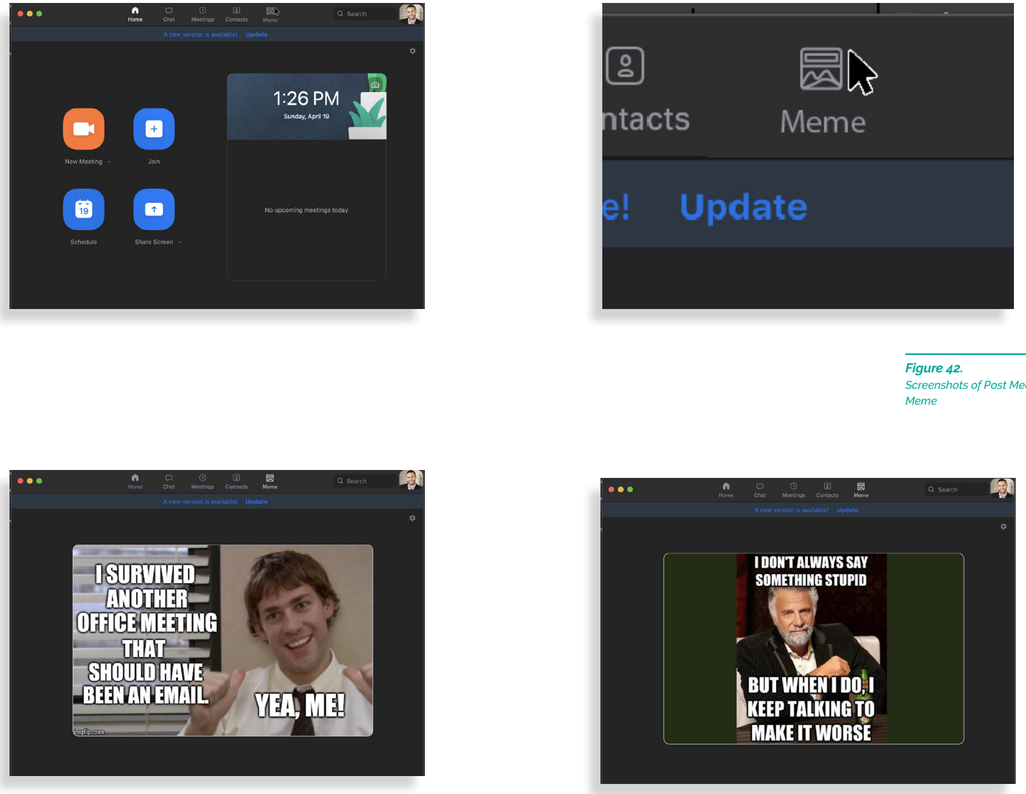
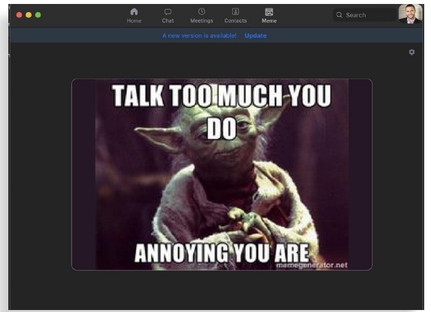


Figure 42.
Screenshots of Post Meeting Meme

AI Calculation

The memes are a direct joke laid out in front of James with fewer variables that James responds well to. It is a testable way for the AI to learn humor language and innuendos along with or in association to image recognition. Memes are often used to make commentary about and criticize people or the situations they find themselves in. Memes have shown up on James' history and have been shared by him. The humor AI is also aware that these are effective with other users and tries them with James. Being able to transcribe the conversations, note how much time participants talk, note who is talking less, measure voice volume and read James' reactions throughout, the humor AI is able to determine where his frustrations and stress source from. In doing so the AI is able to not only find memes that replicate and make commentary on this sort of situation but also able to generate memes directly based on the topic at hand within the recent conversation. The AI also is aware that memes are a generational phenomenon that are more likely to work with James and not as popular with Lucy's age group; however, this does not mean it would not be successful with her.



Reaction

James reacts positively to one of the memes generated and found by the humor AI with outward laughter, but others are less original or don't make sense. Overall it has lowered his lingering stress, and has potential for improvement.

Figure 42.2
Screenshots of Post Meeting Meme

James / Stage Three / Language Humor: Arnold The Author Suggestions (figure 7.3)

Scenario

James has an assignment to write digital marketing brochures for new mobile apps. Although he has written a number of these, this week he is struggling to come up with new content and with still six more brochures to write, he fears being repetitive. With the deadlines approaching, he wants to please the clients, and his boss who recommended him as writer for their brochures. He is worried about living up to expectations, and has been staring at a semi-blank page for almost 10 minutes.

Description

(For this description, the reader will benefit from refreshing themselves with Arnold Schwarzenegger's accent and keeping it in mind.)

From the side of his screen, a small tab pops up, saying, *"Arnnie wants to elp* (help) *you"*. He waits a little bit longer, and the text changes to "*Come on! What are you waiting foah?*" James—stuck and tired of looking at the blank page—decides to click on the tab. An illustration of Arnold pops up from the side. At the bottom the tab with his illustration is an option for turning audio and C.C. (Closed Captioning) off. James has his headphones in, so he

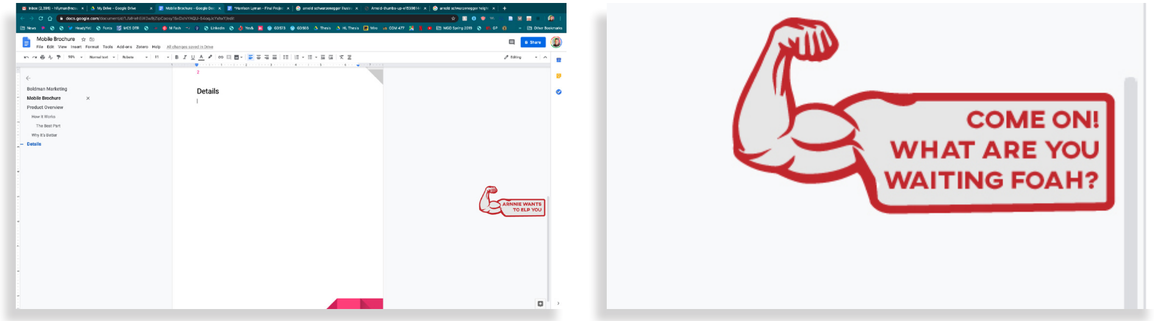
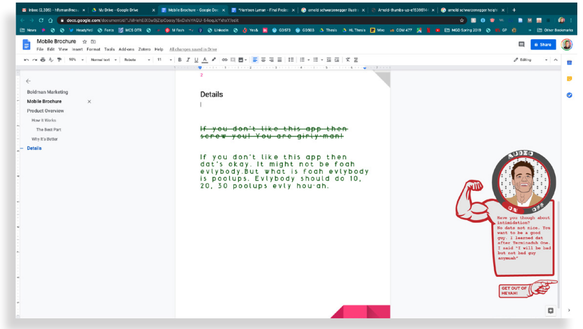


Figure 43.1
Screenshots of Arnold The Author Suggestions
View animation
https://college.design.ncsu.edu/thenfinally/lyman/arnold-author.mp4

leaves audio on, as well as the C.C. text. Beneath the two buttons is one more button that says, *"Get out off He-ah"* . Shortly after the Arnold avatar appears. The Arnold avatar is able to read the context of the mobile app, and understands that James is trying to write complimentary descriptions of the product for the reader of this brochure. Arnold begins to give advice out loud and writes his suggestions in relation to the content on the page in a bold army-like font. The Arnold author not only is a relatively accurate depiction of Arnold's voice, but the captions of what Arnold is saying are spelled out phonetically as Arnold would say them; so if you can't play the audio you still get the effect of his iconic accent. The Arnold author makes comments that are typical of comedic Arnold impersonations, making references to his movies, bodybuilding career, and political history. Although absurd, they are not completely useless. The comments spark James to think outside the box from a different point of view. Before too long James has started to think of new phrases, terms and positive descriptions of the product and turns off the Arnold author tab. When he closes the suggestions tab, the Arnold author says,*"Tank yoh. Dat vaz doo much typingh. My fingyours ver beginning to urt".*



(use QR code to play YouTube of comedian David Brent Performing Arnold Impression)

AI Calculation

The stress AI has seen James' stress spike from writer's block before. The Humor AI knows that mid-task interruptions are often welcomed by James as a time to provide humor. It also has seen a positive response to characters and voice overlays during work or when work has come to a halt. Drawing from his references, James likely grew up watching Arnold films, with his generation seeing Arnold as the ultimate over-stereotyped action hero.

Reaction

James loves these comments from Arnold based on his own words in the task at hand. James smiles with teeth showing by the time he turns off the *Arnold Author Suggestions*.

Figure 43.2
Screenshots of Arnold the Author Suggestions
View animation
https://college.design.ncsu.edu/thenfinally/lyman/arnold-author.mp4

8. Discussion

8.1. Design Principles

I set out to answer my research question by seeing what humor developed by AI would look like, with the presumption that stress was present and humor could be determined and calculated in a moment by the current situation and information. My question was:

How can the design of a computer interface used by professionals at their desks in a semi-private work environment inject humor into the user experience to reduce stress, improve mental and physical health and maintain workflow?

After gathering validation for my research question, I started with a set of sub-questions that focused on the surface level of stress detection and humor communication possibilities. However, shortly after developing my first studies to answer what this humor might sound and look like, it became apparent that this question went far beyond the surface, for both a stress detection AI and a humor implementation AI. Although what these would look and sound like was explored, much more went into determining the process of customization and accuracy. This process was developed and explained through the AI background framework. These can be broken down into four principles.

- Short Term vs. Long Term AI
- Ad Hoc Blended Humor Design and Calculation
- Implementation of Humor Theory
- Unique & Customized Humor Types

Short Term vs. Long Term AI - After developing most of the stage one studies for both personas, it was unclear how or why these pieces of humor A) were calculated by the AI for the different personas as well as B) how and why they would change over time to improve for the different persona's humor type. This demanded that a theoretical but plausible process and evaluation be created for how both the stress detection and humor AI were gathering and calculating their initial decisions. But the true power of machine learning AI is its ability to improve over time, and a background framework was needed to provide a path of reasoning for stress sources and prediction as well as improved accuracy of humor style, content and timing of delivery which are crucial to the effectiveness of evoking true laughter. (See 8.1)

Ad Hoc Blended Humor Design and Calculation - Entering into stage two of study development, and following the path of reasoning created in study 1, the humor implementation needed to display improvement of understanding content of the task at hand. The importance of blending the humor into the task was apparent in order to avoid increasing stress and allowing the user to stay on task with more versatility for proper timing as well as the option to end the humor at will. (see 8.2)

Implementation of Humor Theory - Although much of my research went into understanding the concepts and theories of humor, these were primarily developed for explaining humor. But none of these were developed to aid creating humor. I did continue to explain my humor using the Benign Violation Theory (McGraw 2014) but it was not enough to accurately and effectively create funny humor. Instead as I studied and researched existing humor I found that there were always multiple layers of benign violations with even simple forms of humor. Also these humor theories did not explain the differences and effectiveness of using auditory cues along with visuals to create a storyline. The storyline might be implied or presented in full, but this is a crucial part of what remains a "punchline". (see 7.2.2, 7.2.3 for best examples)

Unique & Customized Humor Types - One piece of advice I saw repeated during my research of how to be funny and make good humor was that trying to make other people laugh is most people's first mistake. Successful humor must first make yourself laugh in order for it to work. However, for this project that advice did not hold true for multiple personas, as my research emphasized how widely humor varies even within close proximity of cultures. Although this theoretical AI would be capable of this, I, as a designer, needed to put on different hats and step into the shoes of different people in order to figure out what they might find funny, and not just myself. This is far more difficult than I expected, as it needed to also portray the challenge of learning timing, tone and context.

8.2. Future Work

Expand on Humor Creation Theory - Although McGraw's Benign Violation Theory (2014) was helpful in building an equation for developing humor, I believe there are more layers of violation, in direct contrast to the benign situation, that need to occur to create humor. Explaining "why" something is funny, is different from explaining "how to make" something funny.

Collaboration with Professionals of Other Disciplines - As I consider potential future development of this project, the first change I would make to improve the outcome would be to make it a team project to improve a variety of humor. In particular I suggest involving comedy writers and comedians. Humor will certainly develop faster and further with multiple points of view. This would also help with the issue of trying to follow the structure of humor theories to develop funny content. One thing I learned quickly when beginning to develop these studies is that I am not a comedian and funny ideas take a long time to marinate before the "Yes" moment, and even then, there is a 50/50 chance it isn't all that funny once all the work has been done to make it come to life. Thankfully I was able to blame the studies not being funny on the AI's inability to perform, which is a reality; however, it is not the goal when attempting to answer the question.

Expand on and Develop Humor Studies - As design is often regarded by professions as "Never done. Only due", I feel the same goes for humor. Comedians will work out their new material in smaller venues to perfect it before getting on a big stage. I feel these humor interactions have more potential, as I think of something else funny to add each time I review them.

User Testing and Feedback - Once there is a larger more diverse team to tackle the challenge of humor concepts and build the designs, user testing becomes much more feasible. The addition of user testing and feedback would not only improve the humor studies for proposed humor, but more importantly allow the research to inform the background framework for the AI and refine the path of decision that the AI follows to calculate accurate humor.

Expanded Demographic of Personas - In the future, the project would greatly benefit from presenting and comparing more personas to understand more potential variety.

Adapting to New Implementations - Fortunately, or unfortunately for those who suffer from elevated stress, there are a lot of other potential implementations and uses for stress relieving, humorous, machine learning agents. Not only are there many more people than those who work in offices that suffer from elevated stress but there are other devices within our technology heavy, and now AI packed, culture that could utilize and benefit from such an ability. Another route I had considered pursuing was humor AI on a mobile device for relieving stress while driving —a form of stress that can be very dangerous.

8.3. Conclusion

The concept of personalized humor recommendation, design and implementation within any application or software being used to this extent is far from being developed with the current capabilities of today's artificial intelligence. However, this project demonstrates the spectrum of concepts and places within a digital environment that humor can take form. It also shows how plausible, refined and improved current AI technologies, when working together, might be able to accomplish these humor creations with the right access to users , softwares and tools. There are no limits to the possibilities of where humor can exist, as long as the human element is there to maintain a point of view that draws from personal experiences. An exciting moment when completing this study was that there were very few if any roadblocks to imply that stress detection and prediction AI is not plausible in the near future with available technologies. AI and technology, as we advance rapidly in the coming decades, will greatly benefit from maintaining an appreciation for the complexity of what it means to be human and full of what are actually beautiful errors; and as a generation of AI explosion we would be remiss to not include such a crucial and wonderful human characteristic as humor in our development and advancement.

9. References

Abramis, D (1989) All work and no play... isn't even good for work, *Psychology Today,* 23, 34-36+.

Alberdi, A., Aztiria, A., & Basarab, A. (2016). Towards an automatic early stress recognition system for office environments based on multimodal measurements: A review. *Journal of Biomedical Informatics*, 59, 49–75. https://doi.org/10.1016/j.jbi.2015.11.007

Anonymous (Mar 1989) All Work and No Play ... Isn't Even Good for Work. *Psychology Today*; New York Vol. 23, Iss. 2, : 34-36+. https://proxying.lib.ncsu.edu/index.php/login?url=https://search.proquest.com/docview/214473289?accountid=12725

Blinov V., Mishchenko K., Bolotova V., Braslavski P. (2017) A Pinch of Humor for Short-Text Conversation: An Information Retrieval Approach. In: Jones G. et al. (eds) Experimental IR Meets Multilinguality, Multimodality, and Interaction. CLEF 2017. *Lecture Notes in Computer Science, vol 10456*. Springer, Cham

Brain, M. (2000) "How Laughter Works" *HowStuffWorks.com*. <https://science.howstuffworks.com/life/inside-the-mind/emotions/laughter.htm> 30 November 2019

Chang, C., Tsai, G., & Hsieh, C. (2013). Psychological, immunological and physiological effects of a laughing qigong program (LQP) on adolescents. *Complementary Therapies in Medicine*, 21(6), 660-8. doi:http://dx.doi.org/10.1016/j.ctim.2013.09.004

De Leon, J (2016) Can a Bot Make You Laugh? *Medium Magazine*, https://medium.com/cognitivebusiness/can-a-bot-make-you-laugh-b68f753189f3

Eckhardt, A. (2009). *Various aspects of user preference learning and recommender systems*. 471, 56–67.

Elevate Labs App.

Giannakakis, G. (2017) Stress and anxiety detection using facial cues from videos. *Biomedical Signal Processing and Control* 31 (2017) 89–101

Hernandez, J., Paredes, P., Roseway, A., & Czerwinski, M. (2014). Under pressure: Sensing stress of computer users. *Proceedings of the 32nd Annual ACM Conference on Human Factors in Computing Systems* - CHI '14, 51–60.

Hudiburg, R. A. (1989). Psychology of Computer Use: VII. Measuring Technostress: Computer-Related Stress. *Psychological Reports*, 64(3), 767–772.

Kivimaki, M. (2002). Work stress and risk of cardiovascular mortality: *Prospective cohort study of industrial employees. BMJ*, 325(7369), 857–857.

Kraft, T. L., & Pressman, S. D. (2012). Grin and Bear It: The Influence of Manipulated Facial Expression on the Stress Response. *Psychological Science*, 23(11), 1372–1378.

Morreall, J. (2016) Philosophy of Humor, *The Stanford Encyclopedia of Philosophy* (Winter 2016 Edition), Edward N. Zalta (ed.),

Nijholt A. (2016) Smart Bugs and Digital Banana Peels: Accidental Humor in Smart Environments?. In: Streitz N., Markopoulos P. (eds) Distributed, Ambient and Pervasive Interactions. DAPI 2016. *Lecture Notes in Computer Science, vol 9749*. Pp 329. Springer, Cham

Nijholt, A., Niculescu, A. I., Valitutti, A., Banchs, R. E., Joshi, A., Balkrishan, D., ... Winckler, M. (2017). Humor in Human-Computer Interaction: A Short Survey. *INTERACT* 2017.

O'Broin, U. (2018) Having a Laugh: Humor and Chatbot User Experience, *Medium Magazine*, https://uxplanet.org/having-a-laugh-humor-and-chatbot-user-experience-e6b7636a454d

Polgar, D. (2018) How Funny Should a Chatbot Be, *IBM.com, New Thinking* https://www.ibm.com/blogs/insights-on-business/ibmix/how-funny-should-a-chatbot-be/

Savage, B. M., Lujan, H. L., Thipparthi, R. R., & DiCarlo, S. E. (2017). Humor, laughter, learning, and health! A brief review. *Advances in Physiology Education*, 41(3), 341-347. doi:http://dx.doi.org/10.1152/advan.00030.2017

Schwab, K. (2016) The Daunting Task Of Making AI Funny, Mind and Machine, *Fast Company*. https://www.fastcompany.com/3065970/the-daunting-task-of-making-ai-funny

Seaward, B.L. (2017) Essentials of Managing Stress. Ch7. Humor Therapy – *Comic relief: The healing power of humor. In:4th ed.* Burlington, Mass.: Jones & Bartlett Learning; p.. 272-292

Speck, P. S. (1991). The Humorous Message Taxonomy: A Framework for the Study of Humorous Ads. *Current Issues & Research in Advertising*, 13(1), 1. https://doi.org/10.1080/01633392.1991.10504957

Sumitro, S., Kurokawa, S., Shimano, K., & Wang, M. L. (2005). Monitoring based maintenance utilizing actual stress sensory technology. *Smart Materials and Structures*, 14(3), S68–S78.

Tarvin, A. (2019) *Humor That Works - The Missing Skill for Success and Happiness at Work*, Page Two Books. ISBN 978-1-989025-83-3

Tennant, C. (2001). Work-related stress and depressive disorders. *Journal of Psychosomatic Research*, 51(5), 697–704.

Terry, D. J., Nielsen, M., & Perchard, L. (1993). Effects of work stress on psychological well-being and job satisfaction: The stress-buffering role of social support. *Australian Journal of Psychology*, 45(3), 168–175. https://doi.org/10.1080/00049539308259135

Vartabedian, R. A., & Vartabedian, L. K. (1993). *Humor in the Workplace: A Communication Challenge*. https://eric.ed.gov/?id=ED363898

Wilkins, J., & Eisenbraun, A. J. (2009). Humor theories and the physiological benefits of laughter. *Holistic Nursing Practice*, 23(6), 349-354. doi:http://dx.doi.org/10.1097/HNP.0b013e3181bf37ad

Yocco, V. (2017) Connecting With Users: Incorporating Humor In Web Design, *Smashing Magazine*. https://www.smashingmagazine.com/2017/06/connecting-users-humor-web-design/

• See all animation videos and full resolution images of humor designs at https://college.design.ncsu.edu/thenfinally/lyman/