
Improvised Comedy as a Turing Test

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Abstract

The best improvisational theatre actors can make any scene partner, of any skill level or ability, appear talented and proficient in the art form, and thus "make them shine". To challenge this improvisational paradigm, we built an artificial intelligence (AI) trained to perform live shows alongside human actors for human audiences. Over the course of 30 performances to a combined audience of almost 3000 people, we have refined theatrical games which involve combinations of human and (at times, adversarial) AI actors. We have developed specific scene structures to include audience participants in interesting ways. Finally, we developed a complete show structure to submit the audience to a Turing test and investigated the suspension of disbelief required for human/non-human theatre co-creation.

1 Background

Theatrical improvisation is a form of live theatre where artists perform "real-time dynamic problem solving" through semi-structured spontaneous storytelling [1]. Improvised comedy involves both performers and audience members in interactive formats. We present explorations in a theatrical Turing Test as part of an improvised comedy show. We have developed an artificial intelligence-based improvisational theatre actor—a chatbot with speech recognition and speech synthesis, with a physical humanoid robot embodiment [2, 3] and performed alongside it in improv shows^A at performing arts festivals, including ImproFest UK and the Brighton, Camden, and Edinburgh Fringe Festivals [4]. Over these first 30 shows, one or two humans performed improvised scenes with the AI. The performers strove to endow the AI with human qualities of character/personality, relationship, status, emotion, perspective, and intelligence, according to common rules of improvisation [5, 6]. Relying on custom state-of-the-art neural network software for language understanding and text generation, we were able to produce context-dependent replies for the AI actor.

The system we developed aims to maintain the illusion of intelligent dialogue. Improvised scenes developed emotional connections between imaginary characters played by humans and AI improvisors. The human-like characterization elicited attachment for the AI from audience members. Through various configurations (e.g. human-human, human-AI, and AI-AI) and different AI embodiments (e.g. voice alone, visual avatar, or robot), we challenged the audience to discriminate between human- and AI-led improvisation. In one particular game setup, through a Wizard-of-Oz illusion, we performed a Turing test inspired structure. We deceived the audience into believing that an AI was performing, then we asked them to compare that performance with a performance by an actual AI. Feedback from the audience, and from performers who have experimented with our system, provide insight for future development of improv games. Below we present details on how we debuted this technology to audiences, and provide reflections collected over multiple performances.

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^AShow listings and recordings are available at <https://humanmachine.live>

2 Methods

We named our AI improviser A.L.Ex, the Artificial Language Experiment, an homage to *Alex the Parrot*, trained to communicate using a vocabulary of 150 words [7]. The core of A.L.Ex consists of a text-based chatbot implemented as a word-level sequence-to-sequence recurrent neural network (4-layer LSTM encoder, similar decoder, and topic model inputs) with an output vocabulary of 50k words. The network was trained on cleaned and filtered subtitles from about 100k films^A. Dialogue turn-taking, candidate sentence selection, and sentiment analysis [8] on the input sentences are based on heuristics. The chatbot communicates with performers through out-of-the-box speech recognition and text-to-speech software. The chatbot runs on a local web server for modularity and allows for integration with physical embodiments (e.g. parallel control of a humanoid robot^B). The server also enables remote connection which can override the chatbot and give dialog control to a human operator. Further technological implementation details are provided by Mathewson and Mirowski [4].

An improvisational scene starts by soliciting suggestion for context from the audience (e.g., “non-geographical location” or “advice a grandparent might give”). The human performer then says several lines of dialogue to prime the AI with dense context. The scene continues through alternating lines of dialog between the human improviser(s) and the AI. Often through human justification, performers aim to maintain scene reality and ground narrative in believable storytelling. A typical scene lasts between 3-6 minutes, and is interrupted by the human performer when it reaches a natural ending (e.g. narrative conclusion or comical high point).

The first versions of the improvising artificial stage companions had their stage presence reduced to projected video and amplified sound. We evolved to physical embodiments (i.e. the humanoid robot) to project the attention of the performer(s) and audience on a material avatar. Our robotic performers are distinctly non-human in size, shape, material, actuation and lighting. We chose humanoid robotics because the more realistic an embodiment is the more comfortable humans often are with it; though comfort sharply drops when creatures have human-like qualities but are distinctly non-human [9].

The performances at the Camden and Edinburgh Fringe festivals involved a Turing test inspired scene conducted with the willing audience. We performed the test by first deceiving the audience into believing that an AI was performing (whereas the chatbot and the robot were controlled by a human); then we performed a second scene with an actual AI. In setup (1), we explained the Turing test first, then performed the two scenes consecutively and finally asked the audience to discriminate, through a vote, which scene was AI-led. In a different setup (2), we performed the Wizard-of-Oz scene and then immediately asked the audience if they suspected that a human was in control of the chatbot.

3 Results and Conclusions

In experimental setup (1), nearly everyone identified the AI from the human. However, we noted that in experimental setup (2) approximately half the audience members believed that an AI was performing flawlessly alongside human improviser(s). When not forewarned about the Turing test, the audience (aged from 6 to 70 years, with a median around 30, and a balanced gender distribution) was convinced that the dialog system understood the details of the scene and responded immediately and contextually. The propensity of this delusion is likely driven by several factors: the context within which they are viewing the deception, the lack of personal awareness of the current state-of-the-art AI abilities, and emotional connections with the scene. Post-show discussions with audience members confirmed that when a performer tells the audience that an AI is controlling the robot’s dialogue, the audience members will trust this information. Being at an improvisational show, they expect to suspend disbelief and use their imagination. Most of them were also unaware of capabilities and limitations of state-of-the-art AI systems, which highlights the responsibility of the AI community to communicate progress in AI effectively and to effectively invite public understanding of AI ability. Finally, we observed that the introduction of a humanoid robot, with a human-like voice, increased the audiences’ propensity to immerse themselves in the imaginative narrative presented to them.

This study explores the nature of reality and audience beliefs in terms of shared AI and human creativity[10]. We hope to better understand the way that audiences enjoy art when co-created by humans and AIs to create better tools and mediums for human expression.

^ASubtitles from 100k movies were collected from <https://opensubtitles.org>

^BThe robot was manufactured by <https://www.ez-robot.com>

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Supplementary Material

Acknowledgments

We would like to acknowledge the fantastic collaborators and supporters throughout the project. Thank you to Rapid Fire Theatre for a space for new ideas to flourish.

Illustrations

Figure 1: System diagram of the Artificial Language Experiment (A.L.Ex).

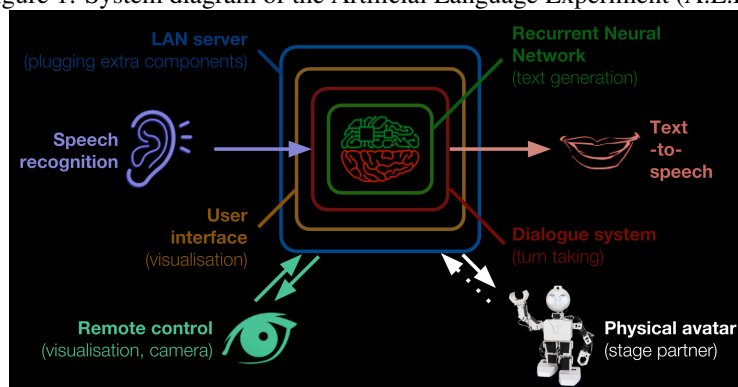


Figure 2: Visual and physical embodiments of the AI improviser.

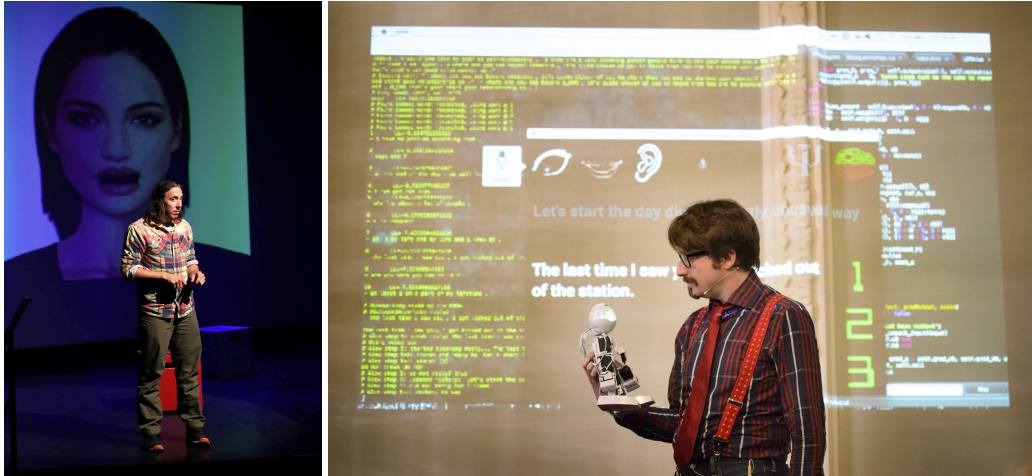


Figure 3: Two human performers and an audience volunteer improvising with a robot.

