

# Do Digital Agents Do Dada?

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## Abstract

Do digital agents do Dadaism? To answer this question, we review a series of theatrical experiments involving human improvisers and AI-controlled *Cyborgs* in front of audiences. We describe these experiments and discuss the use of conversational digital agents (DA) on the stage. We identify two basic strategies of staging machines: the “immersive approach”, and the “Dadaistic approach”. We draw on Dadaistic conceptions of embracing modernity specifically in the Dadaists’ obsession with androids and cyborgs. Through analysis of several stage experiments we contend that digital agents, while attempting to build believable characters, do Dada, only if we do Dada too.

## Motivation: Improvisation and Digital Agents

Improvised theatre, *improv*, is an art form modelled on natural human interaction which demands constant adaptation to evolving contexts. Previous research has paralleled improv theatre and jazz music and formulated both as “real-time dynamical problem solving” (Bruce and others 2000; Johnson-Laird 2002; Magerko and others 2009).

The first problem is collectively creating stories by impersonating believable characters and incorporating narrative elements suggested by the audience. The second problem is how to be truthful and in the moment of the scene, while accepting the offers made by the other improvisers, the audience, or their own cultural background (Johnstone 1979; Merritt and Hines 2019). The third problem is finding the limits of an audience’s expectations.

## Logic in Improv and the Circle of Expectation

Improvisers follow the rules of logic while establishing a specific universe in which an improvised scene takes place. In this way, the performers and the audience can follow the story, and can predict how the scene continues (Merritt and Hines 2019). Practitioners introduced the *Circle of Expectation* as a concept to qualify the difference between adding obvious narrative elements that make the story more specific versus those that violate the expectations of the audience (Johnstone 2014). The circle contains the assumptions and associations that define the dramatic world (Mathewson and others 2020). Improvisors make offers by modelling



Figure 1: **TL:** Improv with a robotic digital agent controlled by an AI chatbot. **TR:** Improv where a human actor reads lines from the AI chatbot displayed on a screen. **BL:** Psychotherapist chatbot ELIZA appearing as a projection. **BR:** Improv (downstage) with one actor receiving lines from an AI chatbot controlled by a computer operator (upstage). Credits at [improbatics.org](http://improbatics.org)

obvious next-steps from the mind of the audience. Improvisers first establish the who, what, where, when, and the relationship between the characters, and then “do the most obvious thing” to move the story forward (Johnstone 1979).

## Digital Agents in Improvisational Theatre

For digital agents (DA) based on randomness, adhering to logic in improv, while staying within the Circle of Expectation, seems an impossible task. Nevertheless, the field has adopted technological trends continues to innovate toward this goal. Recent work builds upon computational improvisation in music and dance performance (Fiebrink 2011; Hoffman and Weinberg 2011; Long and others 2020), and collaborative storytelling (Perlin and Goldberg 1996; Hayes-Roth and Van Gent 1996; Riedl and Stern 2006; Magerko and others 2011).

There have also been attempts at generating high-level narrative consistency for improvised theatre. DAs have acted as directing narrators grounding the performances of human improvisers with generated plot points (Eger and Mathewson 2018). Other DAs have quantified and shaped

the narrative arc of generated text in interactive human-machine dialogue, in order to *reveal* or *conceal* information according to the Circle of Expectation (Mathewson and others 2020). DAs have been used elsewhere in improv theatre (Bruce and others 2000; Baumer and Magerko 2010; O’Neill and others 2011; Knight and others 2011; Jacob 2019) and Simone’s *Bot Party: Improv Comedy with Robots*.

Progress in machine learning for natural language processing, specifically neural networks for text generation (Vinyals and Le 2015; Radford and others 2019), encouraged practitioners to build DAs for improv by focusing on the conversational and storytelling aspects. Mathewson and Mirowski innovated in this space with their collaborative human-robot improv group *HumanMachine*.<sup>1</sup> They developed *A.L.Ex.*, an advanced conversational chatbot trained on film dialogue from OpenSubtitles (Tiedemann 2009) which interfaced with speech recognition, synthetic text-to-speech, and controlled a humanoid robot stage partner (Mathewson and Mirowski 2017a; 2017b).

### Advancing Digital Agents for the Stage

This study focuses on AI improv, where the robot is replaced by a human, who performs lines provided by an AI chatbot. Examples of such shows include *Improbatics*<sup>2</sup> by Mirowski and Mathewson, *Yes, Android* by Etan Muskat and *Almost Human*<sup>3</sup> by Gunter Loesel. In *Improbatics*, a DA sends lines of dialogue to a human performer *Cyborg*. While the *Cyborg* is free to move and to express non-verbal acting and emotional subtext, they can only say AI-generated lines. Those lines of dialogue are generated in response to context typed by a human *Operator* who also serves as curator in the case when multiple choices are offered.

The AI plays the role of an interactive playwright, giving lines to a specific performer, while challenging the other improvisers to justify the potentially nonsensical lines of dialogue. Experiments have investigated what kinds of theatrical frames emerge through the interaction of humans and machines on the stage, how one can describe and explain these theatrical phenomena, and what value these partly machine-generated dialogues can have in an artistic and aesthetic sense (Martin and others 2016; Mathewson and Mirowski 2017b).

Previous work uses artistic lenses to contextualize novel AI technology (Horswill 2012; 2016). We analyze DA improv through the lens of Dadaism, which, we argue, is a suitable artistic frame to understand human-machine co-creativity improvisation.

### Avant-garde Movements and Dadaism

The avant-garde movements at the beginning of the 20<sup>th</sup> century were the first artistic response to modernity and the industrial age. As the art historian Matthew Biro points out, the Dada movement was quite obsessed with the figure of the cyborg (Biro 2009)—though the word “cyborg” did not exist at that time. Dada artists, especially in the Berlin Dada

group, explored and involved machines in various ways to express their ambiguous relationship towards modern life. They were furious activists against the political and military “machinery” that led to the first world war. For example, Hausmann’s drawing “*Der eiserne Hindenburg*” (1920) displays the German general Hindenburg as half-human, half-machine indicating the de-humanizing impact of technological war and chauvinistic patriotism.

Not only did Dada artists point towards the political aspects of automatization, they also reflected on the human self turning more machine-like. In two famous self-portraits, George Grosz’s “*Daum marries her pedantic automaton George*” (1920) and Hausmann’s “*Selfportrait of the Dadasoph*” (1920), the Dadaists displayed themselves as half-machine and half-human. These works explored a new relationship between human and machine. The humans had no outside perspective to look at the machine as a human. They are already changed and turned into cyborgs and are unable to distance themselves from the machine.

This reflection is explored in (Hausmann 1921): “Why can’t we paint pictures today like those of Botticelli, Micheangelo, Leonardo, or Titian? Because human beings have completely changed in terms of their consciousness. This is the case not simply because we have the telephone, the airplane, the electric piano, and the escalator, but rather because these experiences have transformed our entire psychophysical condition.” The naïve perspective of the human as a counterpart of technology was questioned even at this early stage of reflecting on modernity. Consequently, the Dadaists proposed an art not made by humans. Grosz stated this clearly at the First International Dada Fair in 1920, when he declared: “Art is dead. Long live the new machine art of Tatlin” (Broeckmann 2016).

Dadaism has a couple of identifiable traits. One of particular interest is that the artists deconstructed meaning, arriving at the smallest units of expression—letters or phonemes—resulting in poems that consist of single letters only (Hausmann, “*fmsbw*”, 1918). This results in the Dadaistic practice of reducing the world to its basic units. Then putting those pieces together again in a nonsensical way, thereby uncovering the meaninglessness under the smooth veneer of sense-making. Optophonetic poetry (i.e. visible speech sounds) is an early example of the ambiguity of cyborg art. While subverting the meaning of language, it was performed in an expressive way, as can be experienced through recordings with Hausmann reading his own poetry.<sup>4</sup>

Dadaists did not embrace the machine age. They squeezed it so hard that modernity stopped being something you could look at from the outside. It became a feature internalized by modern human beings.

### Artistic Strategies for Cyborg Improv

In appearance, trying to build a DA that acts like a human seems superfluous artistically. Even if it were possible, which at the moment it is not, such an endeavour would only mimic human-to-human interaction. Quoting (Turing 1951): “But, I certainly hope and believe that no great efforts

<sup>1</sup><https://humanmachine.live>

<sup>2</sup><https://improbatics.org/>

<sup>3</sup><https://www.stupidlovers.de/de/show-termin/almost-human>

<sup>4</sup><https://youtu.be/21VqicURmFQ>

will be put into making machines with the most distinctively human, but non-intellectual characteristics such as the shape of the human body; it appears to me to be quite futile to make such attempts and their results would have something like the unpleasant quality of artificial flowers.”

DAs can, however, be employed to create new stage interactions. The benefits owing more to the DA’s deficits in social and psychological abilities than to their high-fidelity imitation. We now analyze digital agents in the context of such interactions.

### Subverting the Turing Test for Deception

One component of AI improv shows consists of performing a few scenes while hiding the identity of the actor(s) who get their lines from an AI chatbot. All improvisers wear headphones, whether they hear the AI or not. The performers are asked to improvise a poem based on a word suggested by the audience, one line at a time, and after a few verses, the audience is asked to guess the identity of the *Cyborg*. This game is based on the *Turing Test* or *Imitation Game* (Turing 1950), where the machine needs to convince an audience of human judges that it is human. This dynamic is explored in other games (Treanor and others 2015) including *Spy Party*.<sup>5</sup>

In order to understand and to quantify the performance of humans and AI models alike, Mathewson and Mirowski (2018) collected feedback from a large number of human performers who interacted with AI co-stars. The human performers highlighted the limitations of the DAs; agents generated sentences inconsistent with respect to logic, social conventions, and emotions. Interestingly, these limitations were welcomed by the performers as they felt the AI acted like an “X factor” and forced humans to become better improvisers.

Anecdotal evidence suggests that, while performing the Turing Test, the actors naturally introduced a slight modification to the principles of the game.<sup>6</sup> Not only was the *Cyborg* trying to pass as human, the humans tried to pass as robots. The non-*Cyborg* performers tried to behave like the *Cyborg* improvisers, aping the nonsensical nature of AI-generated text. This artistic choice was made by the human performers to deceive the audience into thinking that they actually were the *Cyborg*. The audience was fooled by the behaviour of the human actors, to great comedic success.

Based on feedback and observation, the actors gave the impression of not being “in their heads” while coming up with AI-sounding nonsense, rather, this nonsense was produced naturally. By being robotic, the actors behaved humanly upholding the audience’s expectations.

### Cyborgian Dadaism

Contrasting the setup above, *Almost Human* (Zurich and Germany, 2018) used an alternative approach. In *Almost Human*, the machine did not pretend to be a human. The technology was provocatively not hidden. The show questioned the “machineliness” of the human.

This change of perspective opposes mainstream “immersive” theatre in which creators aim to immerse the perform-

IMMERSIVE	DADAISTIC
Hiding technology	Displaying technology
Celebrating humanity	Celebrating the Cyborg
Mimic human behaviour	Expose machine behaviour
Within Circle of Expectation	Break Circle of Expectation
Try to pass Turing Test	Inspire the Cyborg in us

Table 1: Approaches for staging Digital Agents in improv.

ers and spectator in the fiction, making them forget the technology being used. Thus, there are two antagonistic strategies of dealing with modernity which we call the “immersive approach” and the “Dadaistic approach”.

*Almost Human* staged two chatbots in leading roles in a theatre piece—to our knowledge this is the first time this was done in a feature-length theatre performance. One chatbot was embodied by a human actor who got their lines from an in-ear-monitoring system (similar to *Improbots*), and the lines came from JANN, the Just Approximate Nearest Neighbor chatbot.<sup>7</sup>

For the show, JANN was trained on a large corpus of pop-song lines in order to make it respond concisely and emotionally. The second chatbot was a modern version of ELIZA, the chatbot therapist (Weizenbaum 1966). ELIZA was embodied through a real-time avatar, projected on the screen (see Fig. 1). The audience was informed which lines came from a machine, so there was no confusion about who was human and who was machine. The show’s creative team made it explicit that the chatbots were co-creators of the theatre performance.

Often times the digital agents added to the story, other times they acted unpredictably and added absurd and illogical material to the scene. By letting the audience know the responses were created by an algorithm, they were “invited in” on the conceit of the show. They knew that the humans did not have complete control; the scene could move in unforeseen directions due to the contributions of JANN or ELIZA. At the same time the actors reacted emotional to all lines from the machine, providing a sense of urgency and drama. The audience could watch a play that was generated partly by a machine and partly by humans, making it “cyborg art”. The intention was to leave the audience with some irritation about who was the author of this performance, if it was a machine or a human—or if there was an author at all.

## Discussion and Conclusion

A transfer of Dadaistic principles to today’s improvised performances is possible and consistent with the avant-gardes’ strategies for dealing with modernity. The use of AI in art has been heavily inspired by the Turing Test—training machines in their ability to imitate humans. Drawing on the avant-garde gives us a second frame for appreciating artistic human-machine collaboration. These theatrical experiments use two strategies. First, an immersive strategy that hides technology from the spectators and creates insecurity about the humanness of the actors. Second, a Dadaistic strategy

<sup>5</sup><http://spyparty.com>

<sup>6</sup>Recording of an AI improv show: <https://youtu.be/bMSigawTuJs>

<sup>7</sup><https://github.com/korymath/jann>

that displays technology and invites the audience to reflect about their machineliness and humanness.

The Dadaist deconstructed meaning, they concerned themselves with nonsense and irrationality. The anti-logic and anti-reason mentality of Dada broke open the Circle of Expectation. Dadaism defined itself by breaking those expectations and by shocking audience with seemingly disconnected associations.

In summary, we provide several conclusions supporting the continued creation of AI improv using the frame of Dadaism. The Dadaistic strategy has a logic that integrates probabilistic components. The immersive approach is over-represented in popular culture. Much of the computational text generation underlying AI improv involuntarily frees the language from semantics and syntax. This quality aligns well with the fundamental underpinnings of Dadasim.

We suggest to use the Dadaistic strategy as a measure of the “realism-absurdity degree” of an improvised scene. The optimal balance of absurdism and realism for artistic purposes remains an open question. Most previous work on AI improv focused on the justification of what the AI would say, viewing the machine-generated nonsense as a challenge to good improv. We encourage investigation of how the absurdity of AI-generated dialogue uplifts improv. Finally, we conclude that DA do Dada, only if we do Dada too.

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