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The Evolution of the Theatre Play, Human to AI: The Case of AI: When a Robot Writes a Play (2021)¹

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AI: When a Robot Writes a Play (Když Robot Píše Hru) (2021) is a contemporary attempt to write an AI-generated play in Prague, Czechia, directed by Daniel Hrbek. The contemporary play is developed and put on stage by a versatile team from the Academy of Performing Arts in Prague, Charles University, and Švanda Theatre, like a multifaceted collaboration. In detail, it is a 60-minute play streamed on the website. It is performed in Czech, and it can also be followed by simultaneous English subtitles. This article asks how the understanding of contemporary theatre is affected by AI technologies and explores the ongoing evolution from human to AI. Thus, is it possible for AI to create a machine-generated playwright, an AI form of Shakespeare, within both the limitations and advantages of artificial intelligence? Lastly, as this paper examines, will there be an AI-generated concept of art that can be possible and valuable?

Keywords: Artificial intelligence, contemporary theatre productions, the evolution of theatre plays, technology, and theatre

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**Tiyatro Oyununun Evrimi, İnsandan Yapay Zekâya:
Yapay Zekâ Örneği: AI: When a Robot Writes a Play
(2021)**

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AI: When a Robot Writes a Play (Když Robot Píše Hru) (2021), Daniel Hrbek'in yönettiği, Çekya, Prag'da yapay zekâ tarafından yaratılmış bir oyun yazma girişimidir. Bu çağdaş oyun, Prag Sahne Sanatları Akademisi, Charles Üniversitesi ve Švanda Tiyatrosu'ndan oluşan çok yönlü bir ekip tarafından, bir iş birliği ile geliştirilip sahnenelenmiştir. Ayrıntılı olarak, web sayfası üzerinden de yayınlanan 60 dakikalık bir oyundur. Bu oyun, Çekçe oynanır ve aynı anda İngilizce altyazı ile de takip edilebilir. Bu makale, çağdaş tiyatro anlayışının yapay zekâ teknolojilerinden nasıl etkilendiği sorusunu sormakta ve insandan yapay zekâya doğru devam eden evrimi incelemeyi amaçlamaktadır. Dolayısıyla, yapay zekânın hem sınırlamaları hem de avantajları göz önünde bulundurulursa makine tarafından yaratılmış bir oyun yazarı, yani Shakespeare'in yapay zekâ versiyonunu yaratması mümkün müdür? Son olarak, bu makalede incelendiği gibi, ileride, mümkün ve değerli olabilecek yapay zekâ tabanlı bir sanat kavramı olacak mı?

Anahtar Kelimeler: Yapay zekâ, çağdaş tiyatro prodüksyonları, tiyatro oyunlarının evrimi, teknoloji ve tiyatro

AI: When a Robot Writes a Play (Když Robot Piše Hru), directed by Daniel Hrbek, presents the human-versus-machine binary while exploring technological developments in the contemporary period. It is the first theatrical play that was written by artificial intelligence. The play premiered globally on 26 February 2021. (van Heerde et al. 104-105). In English, the plot and the script are created by OpenAI's language model GPT-2 (Radford 1-24). In Prague, it was translated into Czech, and 92% of the characters' lines are computer-generated. This article attempts to question and analyze the possibility/ impossibility of a machine-generated playwright or an AI form of Shakespeare, within the limitations and advantages of artificial intelligence.

The Evolution of the Theatre Play, Human to AI

Theatre has historically served as a crucible for technological development and experimentation, particularly through the creation of artistic value. However, it can be argued that theatre institutions have been relatively slow to respond to rapid transformations in their external environments, especially in their support and operational departments. Rapid advances in AI are having significant effects on different industrial sectors spanning operational, support, and artistic domains, and consequently on theatres themselves. It is crucial that theatre professionals develop a deeper understanding of AI's potential applications, benefits, and emerging challenges. (Horvath 10)

Theatre, as an art form, has embraced and adapted emerging technologies throughout its history. As a historical example, the Greek theatre introduced the eccyclema to stage automation. According to the Web page of Encyclopaedia Britannica, an eccyclema is “a stage mechanism consisting of a low platform that rolled on wheels or revolved on an axis and could be pushed onstage to reveal an interior or some offstage scene such as a tableau” (“eccyclema”). Moreover, in the nineteenth century, limelight, which was a “first theatrical spotlight … was first employed in a theatre in 1837 and was in wide use by the 1860s” (“limelight”). It also transformed theatre production, becoming the first instrument used for indoor stage lighting. The most significant recent addition to the theatre's technological developments is media/projection design. Emerging technologies are transforming theatre production across artists, audiences, and arts administrators. Artificial Intelligence (AI) dominates discussions in the contemporary period, causing major disruption across industries worldwide. Some areas, such as finance and information, have embraced AI more easily. Others, such as the arts and theatre, cannot fully manage AI and its potential applications in their industries. Despite the theatre industry's continued scepticism toward AI, many theatre practitioners have experimented with and explored its possibilities, encouraging the creation of new works. (Garcia, “Ai and Theatre: Playwriting, Stage Design, and Ticketing”)

AI, with its diverse algorithms, can initially analyze large volumes of pre-existing plays, theatrical works, and scripts to identify patterns, themes, and structures that are similar or different. This wealth of data can then be used to generate new and innovative storylines, plot twists, and character development, opening up unexplored possibilities for narrative exploration. Furthermore, AI can assist in the design and generation of visual effects and virtual sets to augment the audience's overall sensory experience. (Ren 28)

As an example of another significant perspective for the evolution of theater and the future of the AI-generated plays, Stanford's Michael Rau, who is both a live performance director and an assistant professor in the Theater and Performance Studies (TAPS) program in the School of Humanities and Sciences, can be valuable for comprehending the relationship between AI and theater. Rau has long explored how theater can mirror the complexities of modern life, a theme that is particularly relevant to this analysis. Rau argues that human creativity and artificial intelligence can enrich stagecraft's storytelling processes. In Stanford's Institute for Human-Centered Artificial Intelligence (HAI), Rau's mission is to integrate artificial intelligence into a theater. He merges three significant approaches: the first is image generation, an AI-powered image generator that takes a video feed from a specific live performance and interprets a command to manipulate the actors' images. The AI-adjusted feed is projected onto the stage in sync with the human-generated image, creating a stream of images that can be seen as a dream sequence, an alternate story, or an alternate dimension. Secondly, large language models (LLMs) live scripts are significant in current debates about AI. Audience suggestions are integrated into a larger language model as a script that provides suggestions. Text-to-speech developers then convert the script's lines into audio. The role is then transferred to a headset-equipped actor, who then voices the dialogue written by AI. This allows the actors to perform without the constraints of holding a script or reading lines from a monitor. Instead, they can react instantly using the lines delivered through their headsets. Lastly, pose analysis is the third important step for scholars and users of AI: This analytical tool for academics uses an AI enhancer to create a 3D composite of actors' bodily functions within a frame of a recorded performance. Potential applications of this tool, leveraged in collaboration with Peter Broadwell, Simon Wiles, and Vijoy Abraham at the Stanford Libraries Center for Interdisciplinary Digital Research, include helping film scholars analyze an actor's choreography in a film or enabling political experts to analyze the gestures a therapist uses during a speech. (Jensen, "Ai Brings New Potential to the Art of Theater") These methods are quite contemporary debates in the discussions of AI and the art of theatre, and quite beneficial for understanding the first AI-generated play, AI: When a Robot Writes a Play (Když Robot Píše Hru) (2021). In particular, large language models (LLMs) "are a category of foundation models trained on immense amounts of data making them capable of understanding and generating natural language and other types of content to perform a wide range of tasks" and these models "are designed to understand and generate text like a human, in addition to other forms of content, based on the vast amount of data used to train them" They also can "infer from context, generate coherent and contextually relevant responses, translate to languages other than English, summarize text, answer questions

(general conversation and FAQs), and even assist in creative writing or code generation tasks" ("What Are Large Language Models (LLMs)?").

AI and The Post-Digital Age in Theatre

Terranova's foreword in Choremata sheds light on how AI and the post-digital age transform our contemporary understanding of life and the arts. Thus, the post-digital age worldwide has become an era in which technological revolutions continually transform human perception of the contemporary period. For example, in the twenty-first century, social media, various applications, computers, and smartphones have become part of everyday life. This condition becomes an unbelievable reality, how fast the technological developments evolve and transform the world in the period between the second part of the twentieth century and the first part of the twenty-first century. It is also a fact that Generation Y is the last generation to have experienced both the analogue and digital eras. On the other hand, considering the future, it remains a mystery how Virtual Reality or Artificial Intelligence affects human understanding, whether these developments exceed the limitations of human intelligence and aid humanity across various fields, or replace human labour in some job sectors. For instance, artificial intelligence and virtual reality can be used to represent contemporary culture, such as in animation, video games, comic books, theatre, cinema, documentaries, literature, and television. This list could be expanded to meet the needs of both the consumer and the creator of that specific work of art. AI's profound traces in art can be traced back to Frankenstein's Monster, Pygmalion's Galatea, HAL 9000 from 2001: A Space Odyssey, and the Puppet Master from Ghost in the Shell. Thus, these representations of art have a continual, evolving history, starting with the questioning and positivist times after the Enlightenment Period, through the fluid, dynamic, and non-statistical understandings of the contemporary Post-humanist era. AI's characteristics of exceeding the limitations of the normativity of the traditional arts and sciences provide a *Zeitgeist* for how the emergence of technology may drastically change economic, epistemological, and political nuances in the world. While AI is not limited to artistic representations, it is both a product of humanity and a separate tool that can threaten it. (Terranova viii-x)

Furthermore, AI has become an indispensable tool for inference and data interpretation in industrial and postindustrial technologies. In the industry, AI sometimes remains a replacement for human workers rather than a reactualization of the technology. AI's contribution to the industry also helps companies automate repetitive, mechanical, or underpaid tasks within their systems. In digital networks, AI's contribution becomes a provider of computational power, and in the traditional form of sociopolitics, this contribution becomes a revolutionary change that, in the post-workerist digital era, AI does more than imitate the "virtuosity" and becomes a true source of value in cognitive capitalism of the contemporary period. Still, human creativity and capacity remain fundamental elements in both the arts and the sciences, but it is also a

fact that AI has increased the technicality and standardization of these areas. AI's accumulation and creation of digital commons also open space for using deep learning, neural networks, GANs, etc. For the purpose of broaden our minds, generative AI can be tool for creating a nonhuman reasoning, memory, perception and subjectivity that contemporary art and science critics (Critical race theorists, feminists, political ecologists, postcolonial and decolonial thinkers, neo-materialists, post-phenomenologists, Marxists, pragmatists, speculative philosophers and pragmatics), extend their debates to the how can AI-based realities can be adapted into critical theory that becomes one of the crucial and complex tasks for them to achieve. (Terranova viii-x)

As a further step toward this article's purpose of analyzing recent advancements in AI technology and robotics, these developments offer a new perception of art, with interactivity, reactivity, immersive environments, artificial morphogenesis, and cognitive machines that reshape the definition of contemporary art. In Vorn's article about AI and art, the contemporary advancements and debates in this field are analyzed. In this, it is claimed that theatrical machines integrate with multimedia objects (light, video, or sound) and become a means of expression that contributes to this article's claim. These new forms of expression include both lifelike systems and conceptual explorations of the aesthetics of machine mechanisms and artificial perceptions. In this context, the viewer's perception of the robot and the robot's perception of the environment are both significant, giving meaning to the art. This situation leads to the effect that creates an impression on the viewer that it could be possible to create an impression of life through AI or machine-generated behaviours with the integration of machine aesthetics of artificial construction with our creative work" (Vorn 367). As Vorn defines what AI-generated or robotic art brings to the table, it becomes significant to mention here, for the purpose of highlighting what art can be with a machine contribution in it:

"Robotic Art is not a single homogeneous discipline; rather it is a mixture of multiple technological areas involving mechanics, electronics, programming, as well as multimedia. In the same manner, our research program does not focus on one single problem or one field of study, it encompasses a wide variety of research projects that all have one thing in common: producing a work of art as a final outcome. (Vorn 366)"

Similar to the play that will be discussed, AI: When a Robot Writes a Play, a robotic or machine-generated piece of art, is not a homogeneous discipline. It is a mix of disciplines that includes both technology and art, such as mechanics, programming, and multimedia. Vorn emphasizes his research, which aims to be a complex and heterogeneous field of study that encompasses the limitations of traditional art.

In Demers's article, it is mentioned that theatre theorists, through the concept of presence, can be cited as an investigation of intention and the body. The presence of an actor is a vital element that contributes to

the play's liveness and energy. In performance theory, this also becomes a centre of analysis for the audience's perception and the human performer's reception. This performance has to gain empathy and understanding from the audience. Thus, the actor's embodiment, in conjunction with the spectator's imagination, creates a new potential insight. Similar to the human performer, according to Demers, the machine performer also needs the audience's co-presence to be fully realized. (Demers 275-276)

Demers thus asserts that "embodied AI provides not only new ways of considering embodiment but also techniques and principles to achieve alternative morphologies that could have an impact on how artists can design machine performers" (Demers 276) that can have the potential to create alternative and innovative art techniques similar to the one in *AI: When a Robot Writes a Play*. Demers expands his idea of the relationship between humans and AI on stage and tries to blur the dichotomy between the human and the machine: "the co-presence of audience and human performers is bonded, the machine performers also become more embodied" (303). Demers also emphasizes the importance of the AI designer who could possibly invent a re-experience of human experiences: "The designer of a machine performer should seek morphologies and cultural embodiment that help robots to recall, re-experience and re-enact human experiences, invented or not, simulated or not, and certainly not, with a complete computational model" (303). His idea of blurring the differences between humans and the machine while re-enacting the human experience with the help of an AI also coincides with *AI: When a Robot Writes a Play*'s aim: how the audience interacts with an AI-generated play, and it is possible for a human to experience an AI-generated play like a human-generated one?

AI: When a Robot Writes a Play (Když Robot Píše Hru) (2021)

THEaiTRobot is a specialized theatre script-generation tool that can create a play as an example of the subject matter of this article: *AI: When a Robot Writes a Play (Když Robot Píše Hru) (2021)*. This play lasts approximately sixty minutes. The THEaiTRobot program is a revolutionary tool capable of producing 90% of computer-generated play. With the aid of dramaturgist David Košťák and director Daniel Hrbek, the play makes the role of the artificial intelligence tool in its creation transparent. (Elias et. al 4) Generally, the play's script is mainly created as such:

For the play, 727 lines of script were generated. The user had the option to discard any generated line (together with all subsequent lines), prompting the tool to generate a different continuation (used 46). The user could also manually enter a line into the script, which became part of the input to GPT-2 (used 8). The script was then post-edited by deleting 214 lines and changing 362 words (8%) on 146 lines. (Rose et. al 1)

These figures show that even though the AI can produce a substantial amount of textual material, dramaturgical cohesion ultimately depends on human curation, which raises questions about authorship and the extent to which AI can truly function as an autonomous creative agent in theatrical production.

Thus, the creation process for the artificial intelligence-generated play differs significantly from that of human-generated playwriting. The process is much more technical and data-based. In this process of generating the play, the script begins with a specific user—a theatre dramaturgist — who defines the scene's opening phrase. The play begins with a setting and two lines of dialogue. The team behind this creation defines a specific set of inputs that selects a general topic, ultimately creating coherence for the script. The THEaiTRobot tool then continues this creation process by using GPT-2 XL to develop lines for the play. (Rose et. al 1) The characters in the play “do not seem to have independent personalities in the generated script; the model seems to simply ensure consistency with already generated text, not taking the character names into account” (2). Thus, these characters are more like shallow characterizations, lacking detailed, vivid descriptions. As “the text is generated word by word and line by line, whereas human authors of theater plays typically operate on a more abstract level, such as dramatic situations” (2), this characteristic of the play constitutes one of the differences between the human-generated play and the AI-generated play.

THEaiTRE is an interdisciplinary project that aims to combine science and theatre, led by a Czech team. The team mainly consists of computational linguists from Charles University and theater experts from the Academy of Performing Arts (DAMU) and Švanda Theater. The main goal is to explore the potential of contemporary AI techniques for theater practice. Also, confronts and explains the process behind the creation of the play and the current capabilities of the AI techniques. (Musil et. al 398)

The dramaturgist, or the human interpreter of the play, asserts that the AI-generated play lacked the conventional drama structure; instead, the words “relied on word associations to establish connections between various elements, having a consequent literary patina that did not fully adhere to the norms of dramatic dialogue”. As a result, the script required a significant reinterpretation from the director and the actors” (395). Thus, the Švanda Theatre designed a comprehensive production that contradicted its in-depth strategic vision with its creatively unconventional elements. This attempt succeeded by testing the elements’ cohesiveness by placing the script within a traditional theatrical context (395).

In the main website of the play, the Czech Theatre London defines the performance as being about a story that has “joy and sorrow of everyday life from a robot's point of view, is composed of dialogues generated by artificial intelligence to celebrate 100th anniversary of the premiere of Czech playwright Karel Čapek's play R.U.R. in which the word 'robot' was first used” (“Czech Centre London / AI: When a Robot Writes a Play”). Mainly, the 60-minute play is performed in Czech with English subtitles. Also, the performance is followed by a debate over whether a robot can write a play that is translated into English. In detail, Čapek (1890-1938) is still a prominent literary figure in Czechia: “Karel Čapek was a prolific writer in nearly every genre and

one of the most well-known figures from inter-war Czechoslovakia. He is best known today for coining the word robot in his dystopian play R.U.R. and for his satirical novel War with the Newts" (Christensen 1). Therefore, the premiere of the first play written by artificial intelligence is intended to celebrate and commemorate Karel Čapek, who paved the way for the age of robots in Czechia.

Can an AI-Generated Concept of Literary Art be Possible and Valuable?

In this article, the main question is how an AI-generated concept of literature can be possible and valuable. To discuss this subject, an example from the audience's reception can be valuable. After the play's performance, a discussion with the audience questions the project's origins. The audience fails to identify which parts of the play were human-generated and which were AI-generated. They also find the play not very good, yet their expectations for an AI-generated text exceed their overall expectations as an audience. They even find the script "as fluent and eerily natural but also as glitchy, a reminder of its artificial nature" (Musil et. al 395-396). The author's reception of the first AI-generated play can also lead to a transformation in how playwrights develop their writing styles through innovative methods and adapt their creativity to current AI systems. Similar to playwrights, directors can also shift their direction toward more AI-generated texts that require a balance between a human director and an AI text. Actors, for instance, can seek authenticity in AI-generated content, which can elicit different responses from the audience, ranging from negative to positive. In this THEaiTRE project, the audience becomes observant and curious about the play's context, but in future AI-generated plays, reactions may vary. (Musil et. al 395-396) This difficulty in distinguishing between human and AI-generated passages opens an important discussion about naturalness and estrangement in algorithmic dramaturgy, suggesting that while AI may simulate structural cohesion, it does not necessarily deliver emotional depth or performative resonance

Conclusion

AI-generated drama may still not have reached the level of literary merit found in human-generated texts, but the level of development achieved by AI in transforming the discipline of creative writing and addressing perceived challenges is promising. The evolving relationship between human creativity and Artificial Intelligence holds potential for future exploration, offering new dimensions to the field of digital humanities. (Elias et al. 10)

As this article explores how understanding contemporary theatre is affected by AI technologies, it aims to examine the ongoing evolution from human to AI. Thus, is it possible for AI to create a machine-generated playwright, an AI form of Shakespeare, within both the limitations and advantages of artificial intelligence? Lastly, as this paper examines, will there be an AI-generated concept of art that can be possible and valuable? The answers to these future-oriented, ambivalent questions may also be controversial. In particular,

for the near future, an AI version of Shakespeare seems unlikely. Yet, as AI technology continually evolves, maybe for future generations, AI-assisted Shakespeare might be possible, because AI and human beings can augment their collaborative efforts in the literary field. As “the THEaiTRE project provides a fascinating glimpse into the possibilities of human–AI collaboration in the context of theatrical performance and highlights the potential of AI to transform the creative process in presently unimaginable ways” (Musil et. al 398), why can’t the potential of AI transform the creative process much more efficiently in the following years in the context of theatrical performance?

As this article’s claims suggest, Ren’s ideas can be useful for concluding the article. While AI has made significant advances and challenges in generating plays and assisting in the creative process, it is still clear that human playwrights’ depth and cultural understanding in their work of art are far superior to those of AI-generated plays. Human playwrights’ artistic voices draw on unique life experiences. Thus, human-generated plays can more easily and deeply resonate with the audience. On the other hand, AI can analyze and generate large amounts of data based on the themes or patterns of specific types of play, potentially broadening the horizons of human playwrights through its technical capabilities. As Ren concludes, The collaboration between AI and human creativity can lead to exciting new horizons for stage plays, where AI augments human creativity and enhances the theatrical experience” (29). THEaiTRE project or AI: When a Robot Writes a Play can become a precursor of the future theatre that “lies in a harmonious convergence of art and artificial intelligence, where each complements and enriches the other. This synergy could lead to novel forms of storytelling and immersive experiences that have yet to be fully realized or understood” (Ren 29). Human playwrights’ artistic voices draw on unique life experiences. Thus, human-generated plays can more easily and deeply resonate with the audience. As performance theorists such as Erika Fischer-Lichte argue, the embodied presence and lived experience of the artist remain central to theatrical creation—a dimension current AI systems cannot replicate—which may explain why human-authored drama continues to produce emotional impact and relational depth in ways machine-generated dramaturgy has yet to achieve.

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