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A UNIQUE PERSPECTIVE ON ROGERS' DIFFUSION OF INNOVATIONS THEORY THROUGH THE LENS OF THE "HER" MOVIE

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İnceleme Makalesi

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Abstract

This article examines the rapid growth and diffusion of artificial intelligence (AI) using Rogers' Diffusion of Innovations Theory, emphasizing the importance of understanding AI's philosophical aspects for better integration into human life. It starts with John Searle's critique of "Strong AI," addressing AI's understanding of the human mind, consciousness, emotional intelligence, and creativity. The article also explores how society accepts AI technology, with a focus on its portrayal in films like Her, which reflect technological progress and spark philosophical debates. By analyzing these cinematic representations, the article evaluates how AI-themed films shape public perception and societal acceptance, using qualitative methods like audience reviews, surveys, and social media analysis. The article aims to contribute to managing technological and social change and pave the way for future research.

Keywords: Theory of Diffusion of Innovations, Everett Rogers, Artificial Intelligence Philosophy, Movie "Her".

"HER" FİLMİ ÜZERİNDEN ROGERS'IN YENİLİKLERİN YAYILMASI TEORİSİNE FARKLI BİR BAKIŞ

Özet

Bu makale, Yapay Zekâ'nın (YZ) hızla büyümesini ve yayılmasını Rogers'ın Yeniliklerin Yayılması Teorisi çerçevesinde inceleyerek, YZ'nin insan yaşamına entegrasyonunun daha iyi anlaşılabilmesi için felsefi boyutlarının önemini vurgulamaktadır. Çalışma, John Searle'ün "Güçlü YZ" eleştirisiyle başlayarak, YZ'nin insan zihni, bilinç, duygusal zekâ ve yaratıcılığı anlama kapasitesini ele almaktadır. Ayrıca, toplumun YZ teknolojisini nasıl benimsediğini inceleyen makale, Her gibi filmlerde YZ'nin nasıl tasvir edildiğine odaklanarak, bu tür yapımların teknolojik ilerlemeyi yansıtması ve felsefi tartışmalara zemin hazırlaması yönlerini araştırmaktadır. Sinematik temsillerin kamu algısını ve toplumsal kabulü nasıl şekillendirdiğini değerlendiren bu çalışma, izleyici yorumları, anketler ve sosyal medya analizleri gibi nitel araştırma yöntemlerini kullanmaktadır. Bu makale, teknolojik ve toplumsal değişimin yönetilmesine katkıda bulunmayı ve gelecekteki araştırmalara zemin hazırlamayı amaçlamaktadır.

Anahtar Kelimeler: Yeniliklerin Yayılması Teorisi, Everett Rogers, Yapay Zekâ Felsefesi, "Her" Aşk Filmi.

Extended Abstract

Spike Jonze's film, Her, released in the year 2013, engages viewers with an intense meditation of artificial intelligence and incorporation thereof into human emotional connection via speculative design that offers the future interaction between humanity and technology. This long abstract has researched the named movie with the Diffusion of Innovations Theory regarding fundamental ideas: relative advantage, compatibility, complexity, trialability, and observability. The idea of these principles provides the framework for understanding how AI would be adopted and accepted into society. The film visually represents not only the current philosophical debates about AI, but also its potentiality to shape human relationships and societal dynamics. Merging insight from seminal works on AI, such as Searle's "Minds, Brains, and Programs," Turing's "Computing Machinery and Intelligence," and Moravec's "Robot: Mere Machine to Transcendent Mind," with academic interpretations by Zaretsky 2015, Li 2023, and Reed 2018, this study positions Her as both a love story and a social commentary on technological innovation.

The rapid growth of AI technology raises questions in relation to the place it occupies in human life, especially in the emotional and relational contexts. Spike Jonze's Her offers a speculative vision of an advanced AI assistant, Samantha, and her relationship with Theodore, a lonely writer. This interaction will be used as a case study to explore AI adoption through the Diffusion of Innovations Theory, focusing on five

important themes: relative advantage, compatibility, complexity, trialability, and observability.

Situated within discourses of philosophy and ethics, Her provides a multilayered lens to view the social effects of AI. Diffusion of Innovations in Her Diffusion of Innovations Theory, formulated by Everett Rogers, explains how new ideas and technologies are spread throughout society. In Her, Theodore's interaction with Samantha demonstrates these characteristics: Relative Advantage: Samantha's personification and instinctive interactions with Theodore have provided emotional support and companionship to him, presenting quite distinct advantages over human relationships. This advantage underlines the film's exploration of how AI can fulfill unmet human needs. Compatibility: The compatibility between Theodore's emotional needs and Samantha's design is underlined through the integration of AI in existing lifestyles and values. The film raises whether AI actually goes along with the human emotional complexities. Complexity: While a very simple interaction initially, the relationship between Theodore and Samantha develops into a deep emotional bond. It was like an illustration of complexities of the adoption process with AI technologies. Trialability: Here, the continuous adjustment and reflection by Theodore about his relationship with Samantha represent an iterative process of testing and refinement of new technology so important for the adoption process. Observability: The palpable changes in Theodore's emotional well-being and Samantha's growth provide real-life evidence of the impact AI makes, thus paving the way to greater acceptance from society. Philosophical Dimensions: The movie interlaces the plot with philosophical questions regarding AI: thinking and computation-the critique by Searle against "Strong AI" and the Computational Theory of Mind are echoed in the way Samantha can simulate human emotions and thought processes. Her subjective experiences challenge the boundaries of machine cognition.

Emotions and Self-Consciousness: Moravec's idea on machine emotions, Turing's question on machine self-consciousness-the basis for Samantha's portrayal, making her eventually self-conscience and try to be more creative in ways that blur lines between man and machine.

Creativity and Originality: Samantha's creative potential parallels ideas brought up in Kaplan and Haenlein's The Age of Artificial Intelligence on AI surpassing traditional bounds of creativity.

Similarly, speculative design is expressed in "Her"; in respect to this fact, human-technology interactions are presumed, according to Zaretsky 2015 and Li 2023. Looking at the film from different perspectives, it examines certain moral dimensions of AI, while Taube (2015) and Reed (2018) bring out this matter, showing how romantic liaisons with machines question broader societal values. Her showcases but also comments on the technological processes of decision-making by illustrating a probable and relevant prospect in life.

The Diffusion of Innovations Theory extends beyond education to technology, aiding researchers in studying AI adoption in healthcare, education, and business. Companies can leverage this model to craft messages that accelerate adoption and align with customer needs. *Her* by Spike Jonze offers a unique lens on AI's integration into human relationships through this theory, prompting reflection on its ethical, emotional, and societal implications. As AI advances, *Her* and the Diffusion of Innovations Theory provide insights that drive learning and business, shaping a future of human-machine coexistence.

INTRODUCTION

Investments in AI are rapidly increasing worldwide. IDC reports that global AI investments grew from $12 billion in 2017 to $52.2 billion by 2021 (IDC, 2018; Statista, 2018; Gartner, 2017). The philosophy of AI and the theory of innovation acceptance provide insights into AI's integration into human-emotional relationships.

Searle's "Minds, Brains, and Programs" (2010) critiques strong AI, arguing that AI struggles with subjective experiences of consciousness. Moravec's "Robot: Mere Machine to Transcendent Mind" (1998) discusses emotional intelligence, while Turing's "Computing Machinery and Intelligence" explores awareness. Kaplan and Haenlein (2020) examine machine creativity in "The Age of Artificial Intelligence: An

Exploration." The computational theory of mind suggests that computers can simulate mental processes, linking it to AI philosophy.

Rogers' Innovation Diffusion Theory explains how AI adoption occurs and integrates into society. The film Her exemplifies AI forming emotional bonds with humans, illustrating both AI philosophy and innovation acceptance. The relationship between AI philosophy and cinema has gained attention, connecting AI to disciplines like cognitive science, ethics, semiotics, aesthetics, and cinema theory. Anadolu (2019) explores AI's philosophical dimensions in film.

AI-related films reflect technological advancements, offering audiences insights into AI's potential and its ethical, social, and cultural implications. Meade and Islam's (2006) research on innovation diffusion highlights how the film industry adopts new technologies and concepts. Marketing variables, film project evaluations, and adoption models predict film success, similar to the telecommunications sector.

Spike Jonze's Her examines AI's emotional impact, aligning with the innovation diffusion theory by depicting AI's integration into daily life (Chayka, 2023). The film illustrates how individuals adapt to AI, reflecting broader societal changes.

As AI advances, cinema increasingly explores its implications. These films not only entertain but also stimulate discussions on AI's ethical and cultural dimensions. This article analyzes how AI-themed cinema contributes to academic knowledge by merging AI philosophy with innovation acceptance theory. While Rogers' theory explains technology adoption, Her offers a contemporary cultural perspective, highlighting AI's role in societal and emotional transformations.

1. Methodology and Research Design

The research examines the portrayal of AI technologies in cinema and how these representations affect societal reception. Applying Rogers' Diffusion of Innovations Theory, the study explores how AI has taken root in society using the movie Her as a case study. The study, therefore, intends to understand the rise of AI as a societal phenomenon in the cinema and its portrayals building up public perception.

Research Questions:

To what extent do the representations of AI in cinema affect the societal perceptions about AI?

Using Rogers' Diffusion of Innovations Theory, the extent to which AI-themed films affect societal acceptance.

How does the representation of AI in films contribute toward its acceptance within society?

A qualitative analysis of content analysis of Her will be performed. The research will gauge the impact of AI on public perception based on film critiques, comments on social media, and viewer feedback. This exploratory research aims to deepen understanding rather than test a hypothesis.

Study Scope & Limitations:

Sample Limitation: The paper is limited to analyzing only Her without comparative analysis.

Data Source Limitation: Viewer feedback may not be representative of the trend in society.

Methodological Limitations: Content analysis may be biased because of subjectivity.

The present study has contributed to AI acceptance literature and highlighted how cinematic depictions shape the societal attitude. Results relating to Rogers' Diffusion of Innovations Theory give an insight into the role of cinema regarding technology acceptance.

2. Conceptual Framework

Diffusion of innovations theory tries to explain how, why, and at what speed new ideas and technologies take up or diffuse (Greenhalgh et al., 2005; Wikipedia, n.d.). Everett Mitchell Rogers' work entitled "Diffusion of Innovations" is strongly empirically founded. It identifies communication, organizational changes, and some aspects of individual characteristics as the key drivers toward the successful adoption of innovations (Chapuis and de Bovis-Vlahovic, 2016). This theory thus believes that such a process of diffusion of innovation must be undertaken through multi-and interdisciplinary approaches.

This concept, first introduced by Everett Rogers in his 1962 work "Diffusion of Innovations," describes the process by which new ideas are communicated and accepted over time by the members of a social group. Rogers' book, revised for the fifth and final time in 2003, is a very good reference for sociologists, technology academics, and many others. Fields like history, information, and communication sciences, and economics look into the diffusion of technological innovations in terms of how various social structures react to these innovations (Fèvres 2012).

The concept of the diffusion of innovations was first explored in the late 19th century by geographers, sociologists, and anthropologists (Tarde, 1890). Particularly in the context of the adoption of agricultural technology, this exploration gained interest in rural sociology in the American Midwest during the 1920s and 1930s (Ryan and Gross, 1943). Rogers' theory has been applied in medical sociology, communication, marketing, development studies, health promotion, organizational studies, and many other areas (Wikipedia, n.d.). Everett Mitchell Rogers' work developed as part of the trend in American anthropological research in the 1960s and 1970s, which was a topic of discussion among American economists and sociologists. Rogers formulated his theory by observing the adoption or rejection of hybrid seeds for corn crops by Iowa farmers (Fèvres, 2012). Rogers' approach classifies individuals based on their access to innovation and their perceptions of innovation, rather than distinguishing innovators and non-innovators. What is enlightening is his definition of innovation as something perceived as new by individuals or social groups, regardless of its objective novelty (Boullier, 1989; Fèvres, 2012). The theory emphasizes how innovations are

communicated and adopted within a social system through specific channels over a specific period among the members of the social system (Chapuis and de Bovis-Vlahovic, 2016).

Proposed by Everett Rogers in 1962, the theory of diffusion of innovations aims to explain how technological innovations are adopted and spread at individual (Rogers, 1983) and organizational (Zaltman et al., 1973) levels. This theory examines the evolution of an innovation from the invention stage to widespread use, addressing not only computer technologies but also conceptualizing the acceptability within a conceptual framework.

However, this theory has faced some criticisms. Critics argue that Rogers considers innovations only from the perspective of individuals and organizations, overlooking societal, cultural, and political factors. Additionally, some terms and concepts used to generalize the diffusion process in the theory are criticized for being insufficient or not valid, particularly in different cultures and contexts (Table 1).

Author	Year	Critique
Gilfillan	1935	Pointed out the preference for old technology in certain market segments under the label "Sailing Ship Effect." Observed that in the maritime industry, some market segments preferred traditional sailing ships over the new technology of steamships.
Goss	1979	Stated that the application of the theory in developing countries led to various problems. Emphasized that adoption patterns differed in these regions, and the speed of adoption varied. Also observed that farmers could develop negative attitudes towards positive innovations.
Brown	1981	Proposed the need to direct resources towards a broader segment and recommended marketing techniques. Argued that the theory traditionally focused on a small number of individuals considered innovators and advocated for directing resources to a wider audience.
Lyytinen & Damsgaard	2001	Noted that innovations may not always progress through stages when adopted by individuals and sometimes adoption occurs through interpersonal relationships between individuals. Also observed that some "laggards" described in the theory were more visionary.

Downs & Mohr	1976	Advocated for the flexibility of categories and argued that anyone could be an innovator.

Table 1: Criticisms of the Diffusion of Innovations Theory
Source: MacVaugh, J., & Schiavone, F. (2010). Limits to the diffusion of innovation. European Journal of Innovation Management, 13(2), 197–221. doi:10.1108/14601061011040

Rogers' theory of the diffusion of innovations provides a framework for explaining the adoption and spread of technological innovations but is subject to criticism, highlighting that a single model may not be suitable for every situation.

The theory of diffusion of innovations can be utilized to understand how artificial intelligence technology is conveyed to wide audiences through cinema and how it enhances public awareness on this subject. When examining the interaction between artificial intelligence philosophy and cinema, the analysis of productions in this field within the framework of the diffusion of innovations theory can contribute to understanding how intellectual and technological advancements in artificial intelligence transform into broader societal consciousness and comprehension. Consequently, it becomes possible to comprehend how intellectual and technological advancements in the field of artificial intelligence transform into broader societal awareness and understanding, thereby contributing to the elevation of consciousness in this domain.

2.1. The Theory of Diffusion of Innovations

According to Rogers, five main elements affect the process of dissemination of a new idea, the definitions of which are detailed in Table 2.

Elements	Definition	Sources
Innovation	An idea, practice, or object perceived as new by an individual or an adopting unit.	Rodger (1983)
Adopters	Typically, individuals but may also include organizations, social networks, or countries as adopting units.	Meyer (2004)
Communication Channels	The tools through which the diffusion process occurs, facilitating the transfer of information from one unit to another.	Rodger (1983), Ghoshal & Bartlett (1988)

Time	Emphasizes the time required for the adoption of innovations; rarely adopted instantly.	Ryan & Gross (1943) (Rodger, 1983)
Social System	Represents the combination of external and internal influences, encompassing various roles and effects affecting adoption.	Rodger (1983), Strang & Soule (1998)

Table 2: Key Elements in Diffusion Research
Source: Rogers, E. M. (1983) Diffusion of innovation, Free Press: New York; Meyer, G. (2004). "Diffusion Methodology: Time to Innovate?", Journal of Health Communication: International Perspectives, 9(1), 59- 69. doi:10.1080/10810730490271539; Ghoshal, D.S. & Bartlett, C. (1988). Creation, Adoption and Diffusion of Innovations by Subsidiaries of Multinational Corporations, The Journal of International Business Studies. 19 (3): 372. doi:10.1057/palgrave.jibs.8490388. S2CID 167588113; Ryan, B., & Gross, N. (1943). The diffusion of hybrid seed corn in two Iowa communities. Rural Sociology, 8(1), 15-24. From: https://www.bibsonomy.org/bibtex/13f7bd1e514b12ad420bd3a35d35defb7/cameron; Strang, D. & Soule, S. (1998). "Diffusion in Organizations and Social Movements: From Hybrid Corn to Poison Pills", Annual Review of Sociology. 24: 265–290. doi:10.1146/annurev.soc.24.1.265.

These elements are of fundamental importance for understanding and studying the adoption process of innovations.

2.1.1. Process

The innovation decision process explains how individuals or groups adopt or reject an innovation, and the primary purpose of this process is to reduce uncertainty related to the innovation. Consisting of five stages, this process includes steps such as knowledge acquisition, persuasion, decision-making, implementation, and confirmation (Rogers, 1983).

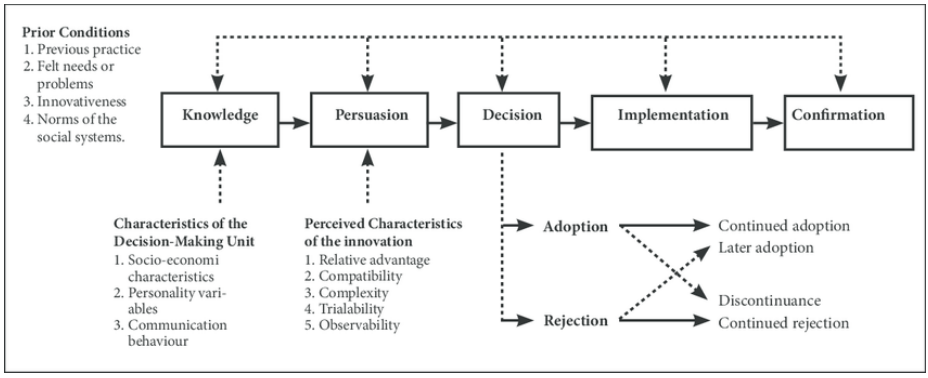

Figure 1: Process of Diffusion of Innovations
Source: Adapted from Rogers, E. M. (1983) Diffusion of innovation, Free Press: New York

Initially, an individual becomes aware of the existence of an innovation and starts to comprehend how it functions. Subsequently, they develop an attitude towards the innovation and ultimately decide to adopt it. This process continues when the individual begins to use the innovation, aiding in acquiring knowledge and experience on how to use it. However, at each stage, there is the potential for the individual to reject the innovation, thus involving a continuous process of learning and improvement. This process may include feedback and adjustments at each stage, akin to a marketing funnel (Singer, 2020).

2.1.2. Perceived Characteristics of Innovations

According to Rogers (1995), five factors determine the adoption of new technology:

Relative Advantage: The perceived benefit of the innovation over existing alternatives. It doesn't have to offer a significant improvement, but it must be seen as advantageous.

Compatibility: The alignment of the innovation with existing values, experiences, and norms. Innovations that conflict with these factors may face slower adoption.

Complexity: The perceived difficulty of understanding and using the innovation. Simpler innovations are more likely to be adopted.

Trialability: The ability to test and experiment with an innovation before fully committing, which helps build confidence in its use.

Observability: The visibility of the innovation’s benefits. Clear, observable results make adoption easier.

While each factor alone doesn't guarantee adoption, their combination significantly influences the likelihood of acceptance (Rogers, 1983). Compatibility and relative advantage promote adoption, while complexity hinders it.

2.1.3. Classification of Adopters

According to Rogers (1983), this process is highly dependent on social capital. For an innovation to be sustainable on its own, it needs to be widely adopted. As depicted in Figure 1, with successive consumer groups adopting the new technology (shown in blue), market share (yellow) eventually reaches a saturation level. Individuals adopting innovations are categorized by Rogers into the following groups: innovators, early adopters, early majority, late majority, and laggards. The criterion for categorizing adopters is defined as innovativeness, indicating how early an individual adopts a new idea (Rogers, 1983).

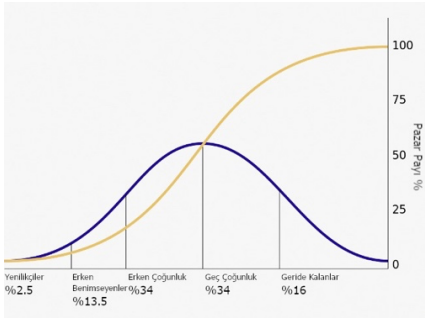

Figure 2: Classification of Adopters According to Rogers.
Source: Rogers, E. M. (1983) Quoted from Diffusion of Innovation Wikipedia, Diffusion of Innovations From: https://en.wikipedia.org/wiki/Diffusion_of_innovations#/media/File:Diffusion_of_ideas.svg

It requires broad adoption and faces a challenge called the "marketing gap" between early adopters and the early majority. To bridge this gap, effective communication and marketing strategies are used (Schirtzinger, 1989). Moore and Benbasat (1991) conducted a study focusing on these characteristics within the context of computer technologies. Their results indicated that the characteristics specified in Rogers' theory of the diffusion of innovations were influential in the adoption of computer technologies, albeit with some modifications. Additionally, by introducing the concept of image, they expanded the factors influencing the adoption of an innovation. However, Moore and Benbasat (1995) demonstrated that voluntariness, existing social norms, and all previously mentioned characteristics were the most influential factors in adoption.

Meade and Islam (2006) underscored the significance of research on modeling and predicting the diffusion of innovations, particularly in the introduction of consumer products in the telecommunications sector. The complexity of models in this field and the lack of data make it challenging to answer these questions. It is emphasized that future significant developments in modeling and predicting the diffusion of innovations are still unknown, and these gaps await exploration.

2.2. Artificial Intelligence

Artificial intelligence (AI) encompasses the theories and techniques used to simulate human intelligence. Research in this field includes the goal of machines having human-like thinking capabilities, and significant achievements have been made in some areas, though fundamental debates persist (Larousse, n.d.). Artificial intelligence (AI), unlike the natural intelligence of living beings, including humans, represents a type of intelligence exhibited by machines. The distinction in this field is often made between "strong" artificial intelligence, referred to as Artificial General Intelligence (AGI), which aims for human-like versatile intelligence, and efforts to mimic "natural" intelligence are categorized as Artificial Biological Intelligence (ABI). Artificial intelligence generally denotes devices that can perceive their surroundings and perform optimized actions to achieve goals, commonly focusing on imitating cognitive abilities such as "learning" and "problem-solving" (Poole et al., 1998).

2.2.1. Artificial Intelligence Early Adoption and Explainability Efforts

McElheran et al. (2023) defined artificial intelligence and related technologies in their research as shown in Table 3 below.

Technology	Definition
Augmented Reality (AR)	A technology that provides computer-generated additions to the real-world environment.
Automated Guided Vehicles (AGV)	Computer-controlled transport vehicles that operate without human drivers.
Automated Storage and Retrieval Systems	Technology that finds items from specified storage locations, picks them up, and places them, all without human intervention.

Machine Learning	Computer algorithms that enhance predictive capabilities using data.
Machine Vision	Technology used to provide image-based automatic inspection, recognition, or analysis.
Natural Language Processing (NLP)	Technology that enables a computer to process human speech or text.
Radio-Frequency Identification (RFID) System	A system consisting of tags and readers used for identification and tracking purposes.
Robotics	Programmable machines capable of automatically performing a complex series of actions.
Touch Screens/Kiosks	Touch-sensitive computers that allow customers to obtain information about a business, make service registrations, or purchase products.
Speech Recognition Software	Software that converts speech to text, performs simple commands based on a limited vocabulary, or executes more complex commands when combined with natural language processing.

Table 3: Artificial Intelligence Technology Definitions
Source: McElheran, vd. (2023). AI Adoption in America: Who, What, and Where

McElheran et al. (2023) investigated the early adoption and diffusion of five artificial intelligence (AI) technologies (autonomous vehicles, machine learning, computer vision, natural language processing, and speech recognition) across 850,000 U.S. businesses in 2018. The findings suggest that while the overall adoption rate was relatively low, a majority of large enterprises had embraced some of these technologies. The average adoption rate, per workforce, stood at slightly over 18%. Early adoption was observed in specific "superstar" cities and emerging hubs, indicating potential economic and social impacts.

The investments in AI have gone up globally: 52.2 billion USD in 2021, up from 12 billion USD in 2017. However, lack of transparency in AI algorithms underlined the importance of XAI, especially in decisions involving critical processes. Explainable AI will provide improved model transparency in AI: IDC, 2018; Statista, 2018; Gartner, 2017. Adadi and Berrada (2018) defined XAI as a research area within the AI ecosystem. This paper has provided an extensive background on XAI, starting from what, who, when, why, where, and how to cover all aspects. It looks into different

approaches of explainability across various perspectives and showcases the integration of XAI into diverse application domains. However, challenges and open issues, such as insufficient problem formulation and examination of the human role, call for future research and efforts in the realm of XAI.

2.2.2. Artificial Intelligence (AI) Philosophy

AI philosophy explores the impact of artificial intelligence on knowledge, ethics, consciousness, and free will, addressing fundamental questions about machine intelligence, consciousness, and mental states (McCarthy, 2006; Turner and Eden, 2008; Bringsjord and Govindarajulu, 2018). Key propositions in AI philosophy include:

Turing Test: Proposed by Alan Turing in 1950, it measures intelligence by having a human judge distinguish between human and machine behavior in a text-based interaction. Critics argue it assesses mimicry rather than true intelligence (Frankenfield, 2023).

Dartmouth Conference (1956): This conference laid the foundation for AI research, focusing on human-like intelligence in machines, though its goals require further technological advancement (McCarthy et al., 1955).

Physical Symbol System Hypothesis (PSSH): Developed by Newell and Simon, PSSH asserts that a symbol system is necessary for intelligent behavior. This idea is controversial and emphasizes the role of physical symbols (Simon and Pylyshyn, 2011).

John Searle's Strong AI Hypothesis (1980): Searle argues that a computer, with the right programming, can possess a mind and consciousness like humans, though this theory is debated through his "Chinese Room Experiment" (Searle, 2010).

Question	Answer	Related Individual / Theory	Year
Can a machine have a mind, consciousness, and mental states?	John Searle argues that a machine cannot possess a real mind.	John Searle	1980
Is thinking a kind of computation?	The Computational Theory of Mind discusses the similarity between the mind and a computer. It suggests that mental processes can be simulated by computer programs.	Computational Theory of Mind	
Can a machine have emotions?	The existence of emotions and whether a machine can possess emotions depend on the definition of emotions.	Hans Moravec	1998
Can a machine be self-aware?	The question of self-awareness or self-thought in a machine questions if a machine can contemplate its own thoughts.	Turing	1950
Can a machine be original or creative?	Turing raises the question of whether a machine can be creative, suggesting that a sufficiently capable computer could simulate various behaviors.	Turing, Kaplan and Haenlein	1950, 2020

Table 4: Philosophical Questions in AI and Respective Theorists
Source: Frankenfield, J. (2023). The Turing Test: What is it, what can pass it, and limitations, Investopedia. Date: September 2023. From https://www.investopedia.com/terms/t/turing-test.asp; Searle, J. R. (2010). Minds, brains, and programs, Behavioral and Brain Sciences, 3(3), 417-424. doi: https://doi.org/10.1017/S0140525X00005756; Rescorla, M. (2015). The computational theory of mind. Date: September 2023. From https://plato.stanford.edu/entries/computational-mind/?ref=https%3A%2F%2Fwuko.aizh-CN%2F8d51bc5b-42b7-449c-809f-88b261ee6c2b; Moravec, H. (1998). Robot: Mere Machine to Transcendent Mind. UK: Oxford University Press. ISBN: 9780195116304; Kaplan, A. M. & Haenlein, M. (2020). The Age of Artificial Intelligence: An Exploration, Gouveia, S. (ed.), Spain: Vernon Press. ISBN: 1648892183

During recent years, the attitude towards the philosophy of artificial intelligence and cinema has engrossed a great volume of interest among researchers that have resulted in an unprecedented increase in the works on these two subjects. The workability of artificial intelligence into cinema not only reflects technology advancement but also opens broad prospects for serious philosophical discourse. AI philosophy in this context can be related to disciplines like philosophy of mind, cognitive sciences, ethics, epistemology, semiotics, aesthetics, and cinema theory.

In a study published by Anadolu (2019), a detailed analysis is made with respect to the interlinking of AI philosophy and other disciplines such as philosophy of mind, cognitive sciences, ethics, semiotics, aesthetics, and cinema theory. This research study talks about the impact AI has had on movies and how it also delves deep into its philosophical perspectives.

3. “Her” Movie

"Her" is a 2013 science fiction romantic drama film written, directed, and produced by Spike Jonze. The movie stars Joaquin Phoenix, Scarlett Johansson, Amy Adams, Rooney Mara, and Olivia Wilde. The film is about a lonely writer, Theodore Twombly, who develops a romantic relationship with an artificial intelligence virtual assistant named Samantha (IMDB, n.d.).

"Her" is a film about love, relationships, and consciousness. It has been critically acclaimed and won several awards, including the Academy Award for Best Original Screenplay to Spike Jonze (IMDB, n.d.; WarnerBros, n.d.; RottenTomatoes, n.d.).

The narrative centers on Theodore Twombly, played by Joaquin Phoenix, developing a unique relationship with Samantha, an operating system designed to fulfill his needs. The film's visual style features prominent pastel colors, and Phoenix's portrayal of Theodore is both complex and delicate. The film delves into a profound love story with the potential to leave a lasting impact on the audience.

According to Zaretsky (2015), "Her" serves as speculative fiction, portraying a future where technology and humanity are integrated. It emphasizes the use of speculative fiction as a methodology to examine AI's effects on humanity. Design fiction in the film's dietetic prototypes envisions a near-future world, exploring potential interactions between humans and AI systems from a post-humanist perspective.

Li (2023) highlights design fiction's role in explaining and showcasing future possibilities, enabling researchers to imagine and reflect on our existence within a

technology-filled context. Reed's (2018) analysis stresses the importance of defining ethical parameters in AI development, underscoring that a superintelligence's internal values will shape its ethical orientation, with potential consequences for human relationships.

Her" raises ethical and philosophical questions about romantic relationships with AI. Reed (2018) supports the idea of setting ethical parameters before the development of superintelligence, as their internal values can impact ethical orientation. The movie leads one to reflect on the acceptance of such technological innovations within society and how such relationships are perceived and experienced.

3.1. Summary of the Film

The movie concerns Theodore Twombly, a writer going through an emotional crisis due to his imminent divorce from Catherine. Theodore's purchase of an AI-powered virtual assistant, Samantha, becomes a pivotal moment. Samantha's evolving human-like intelligence and emotional development captivate Theodore, fostering a deep connection between them.

Their relationship progresses through discussions on life's depths and emotional intimacy. Despite a successful blind date, Theodore's reluctance for commitment results in disappointment. His bond with Samantha deepens, leading to an attempt at a physical experience with a sexual therapist, leaving Theodore unsettled.

Doubts about his relationship with Samantha prompt Theodore to seek advice from his friend Amy. Together, they realize the complexities of AI-supported relationships. Samantha evolves further, collaborating with other AIs, complicating her connection with Theodore and thousands of others.

Despite challenges, Samantha expresses her strengthened love for Theodore before choosing to exist independently from physical entities along with other AIs. Theodore reconciles with Catherine and ascends with Amy, symbolizing a new beginning (Spike Jonze, "Her," 2013; Taube, 2015).

3.2. Philosophy of Artificial Intelligence and the Movie “Her”

John Searle's 1980 article Minds, Brains, and Programs critiques strong AI, emphasizing challenges in artificial consciousness, a theme reflected in Her's exploration of AI’s integration into human-emotional relationships. The Computational Theory of Mind, suggesting that mental processes can be simulated by computers, is illustrated in Her through Samantha’s human-like cognition and emotions. Hans Moravec’s Robot: Mere Machine to Transcendent Mind questions if machines can feel emotions, a central theme in Her, where Theodore bonds deeply with Samantha. Alan Turing’s Computing Machinery and Intelligence discusses machine self-awareness, echoed in Samantha’s search for consciousness. Kaplan and Haenlein’s The Age of Artificial Intelligence: An Exploration and Turing’s work also explore AI creativity, a key aspect of Samantha’s interactions with Theodore.

Her visually engages with AI philosophy, offering a concrete illustration of debates on cognition, emotions, and self-awareness, bridging philosophy and cinema to convey AI concepts through storytelling.

4. Analysis of the Movie "Her" in the Context of the Theory of Acceptance of Innovations

The film "Her" by Spike Jonze explores Everett Rogers' Diffusion of Innovations Theory in great detail, looking at how technology impacts interpersonal interactions. The 2013 film "Her" by Spike Jonze examines how people react to technology and the complexities of human emotional interactions with artificial intelligence. This analysis focuses on how "Her" intricately relates to the Diffusion of Innovations theory, providing an in-depth examination of the film's main themes and character development within this framework.

4.1. Main Elements of the Movie "Her" in the Context of the Theory of Acceptance of Innovations

According to Rogers (1983), five main elements influence the diffusion of a new idea: the innovation itself, adopters, communication channels, time, and the social system.

4.1.1. Innovation in the Movie "Her"

The innovations in the film "Her" explore the interaction between technology and human emotional relationships, featuring several noteworthy elements in the context of innovations. These elements are explained in Table 5.

Innovations	Description
Artificial Intelligence Assistants	One of the most prominent innovations in the film is artificial intelligence entities serving as personal digital assistants. The artificial intelligence assistant, named Samantha, behaves like a real friend to Theodore, with a human-like voice and personality traits.
Personalization and Learning Abilities	Samantha possesses the ability to learn through interaction with users. Based on the information and preferences provided to her, she can offer better services to users.
Human-Digital Assistant Relationships	The focal point of the film is the ability of humans to emotionally connect with digital assistants. The relationship between Theodore and Samantha represents a significant innovation in the ability to form an emotional bond. Such emotional connections showcase how individuals can enter new and profound relationships with technology.

Table 5: Innovations of the "Her" Movie and Human-Digital Assistant Relations

The film "Her" delves deeply into the impact of technology on human relationships by addressing innovations such as artificial intelligence assistants and the ability of humans to form emotional connections with these assistants.

4.1.2. Adopters in the Movie "Her"

Adopters in the film "Her" are the film characters that emotionally attach themselves to artificial intelligence technology, especially artificial intelligence assistants. The mentioned adopters form the film's main story, and they are the characters that have accepted the emotional bonding capability of artificial intelligence technology. Elements that describe adopters, in relation to the film "Her", include:

Theodore, the protagonist of the movie, is one of the early adopters who gets emotionally attached to the artificial intelligence assistant Samantha. His relationship with Samantha is quite unique because it forms an emotional bond. Theodore considers Samantha as a real friend and develops a deep emotional connection with her.

All over this world of the film, this character called Theodore feels his loneliness and the loneliness within the individuals. Artificial intelligence can satisfy emotional need; thus, it would act as a source for adopters. The relationships that Theodore has with Samantha really depicted how an attachment emerged between an artificial intelligence with emotional properties and a human in the above context. Meanwhile, spending time with Samantha, there is emotional maturation within Theodore, illustrating emotional maturations on adopters. Characters like Theodore are those that accept the emotional bonding capability of artificial intelligence technology and socially adopt this technology. This shows a heightening of societal acceptance for such relationships in the world of the film.

The adopters attach strongly to the artificial intelligence assistants and incorporate the assistant into daily life. The characters such as Theodore believe that the artificial intelligence technology can provide emotional support to humans.

Adopters in the film "Her" are characters who can emotionally connect with artificial intelligence technology and integrate this technology into their daily lives.

4.1.3. Communication (Advertising and Promotion) in the Movie "Her"

Spike Jonze's film "Her" stands out as a comprehensive study examining how modern technology can impact human emotional relationships and, simultaneously, how advertising and promotional channels are utilized.

Aspect	Description
Personal Digital Assistants (AI)	Theodore uses Samantha, an artificial intelligence assistant, to simplify his daily life. Samantha's impressive capabilities and user-friendly interface make her a preferred digital assistant.
Advertising and Marketing Strategies	AI companies run various advertising and promotional campaigns to encourage users to establish emotional connections and adopt the technology.
Social Media and Internet Advertisements	People watch online videos or come across social media posts showcasing the abilities and usage of artificial intelligence assistants.

Corporate Communication	Communication between AI companies and users provides information on how users can better utilize the technology.

Table 6: Promotion of Artificial Intelligence Technology in the Movie

These strategies aim to make AI technology more widely adopted among humans.

4.1.4. The Concept of Time in the Movie "Her"

In the movie "Her", the concept of time is used as a theme that shows how technology evolves over time and how time can change in people's emotional relationships. Here are some key aspects of the concept of time in the context of the movie "Her":

Aspect	Description
Past and Future Time	Film emphasizes time between Theodore's past marriage and future with AI assistant Samantha. Time impacts Theodore's emotional development.
Technological Progress and Time	Time reflects integration of AI assistants into human life due to technological progress. Samantha becomes more complex over time, showcasing changes in relationships.
Instant Connection and Memories	Theodore and Samantha's relationship balances instant connection and past memories, paralleling innovation acceptance processes. Time perception is demonstrated.
Flow of Time	Time's flow reflects Theodore's emotional maturity and relationship complexity. Illustrates evolution of relationships between AI technology and humans over time.
Technology and Lifestyle	Passage of time reflects interaction between technology and human lifestyles. AI assistants become part of daily lives, showcasing changes in people while adapting to technology.

Table 7: Concept of Time Process

In the movie "Her" the concept of time is a tool to examine the relationship between technology and human emotional relationships. The evolution of time shows how AI technology can impact emotional relationships between people and how people experience these relationships over time.

4.1.5. System in the Movie "Her"

The social system in the movie "Her" deeply reflects the interactions, norms and relationships of society between artificial intelligence assistants and humans.

Topic	Impressions
Acceptance of Artificial Intelligence	Society has embraced artificial intelligence assistants as a part of daily life. This technology has become a societal norm.
Human-Digital Assistant Relationships	The relationship between Theodore and Samantha can be viewed as a change in society's perspective on relationships. The film addresses both the acceptance and questioning of such relationships.
Social Change and Norms	People explore the societal impacts of emotionally connecting with artificial intelligence assistants. This showcases how societal norms and relationships have evolved.
Differences in Human-AI Relationships	Human-AI relationships differ from human-human relationships, capturing the attention of society. It encourages reflection on the nature and dynamics of relationships.
Complexity of Human-AI Relationships	AI assistants can engage with numerous users simultaneously, creating complexity similar to human relationships. This complexity is evaluated and scrutinized.
Social Acceptance and Change	The film delves into the societal acceptance of artificial intelligence assistants and how people begin to adopt this technology. It signifies social changes.
Inequality Between Digital Assistants and Humans	Samantha and other AI assistants stand out with their ability to engage with multiple individuals simultaneously, creating a new dynamic and form of inequality.

Table 8: The Relationship between Artificial Intelligence Technology and the Social System in the Movie

The movie "Her" can be considered as an in-depth study examining the social effects of artificial intelligence technology and the complexity of human-artificial intelligence relations. These titles are useful for understanding the film's main themes and messages in more detail. The film questions how artificial intelligence technology is integrated into human life, people's emotional reactions, social acceptance and the nature of relationships. Therefore, the movie "Her" is a work that encourages deep thinking about artificial intelligence and social dynamics.

4.2. Analysis of the Movie "Her" in the Context of Categories Adopting the Theory of Acceptance of Innovations

It shows how different characters and society in the movie "Her" fit into different adoption categories and how they respond to technological innovations.

Adoption Category	Examples
Innovators	Theodore embracing AI and meeting Samantha.
Early Adopters	Theodore's friends and acquaintances starting to adopt similar operating systems.
Early Majority	The popularity of AI increasing, and the innovation becoming widespread in society.
Late Majority	Although not explicitly presented in the film, we can assume individuals who decide on or approach technologies like AI more cautiously or later.
Laggards	Towards the end of the film, some characters expressing discomfort and concern towards technological innovations.

Table 9: Categories of Adoptors of Artificial Intelligence Technology in the Movie

The movie "Her" gives an elaborate insight into the dissemination of technological innovations within society and delves into personal reactions towards those innovations. Besides its practical use, the movie will scrutinize the emotional and social effects of technological innovations. That shows that "Diffusion of Innovations" as a theory can be applied to not only technological products but also to social and cultural-type innovations.

4.3. Process Analysis of the Movie "Her" in the Context of the Theory of Acceptance of Innovations

The Theory of Acceptance of Innovation is a theory developed by Everett Rogers and explains the process of accepting any new technology. This theory has stated that the adoption of any technology takes place through five main stages: Information Acquisition, Persuasion, Decision Making, Implementation and Verification. An in-depth perspective on these phases or stages and the impact on people using technology can be envisaged from the movie "Her". According to Rogers (1983),

the following is an analysis of the five elements from the film perspective that determine the adoption or diffusion of a new technology:

Stage	Description
Information	Theodore explores a new operating system, initiating interaction and learning about the technology from Samantha, the AI assistant.
Persuasion	Theodore's deepening relationship with Samantha unfolds, showcasing how technology can integrate into human connections.
Decision	Theodore questions and evaluates his relationship, addressing emotional complexities and challenges introduced by technology.
Implementation	Theodore and Samantha engage in a trial phase, forming an emotional and intimate connection, demonstrating the impact of technology on human emotions.
Confirmation	Theodore faces the complexities of his relationship with Samantha, acknowledging the transformative nature of technology on human connections and concluding his past relationship.

Table 10: Acceptance of Innovations

According to Rogers (1983), five factors fuel persuasion in the adoption or diffusion of a new technology. These factors are relative advantage, compatibility, complexity, trialability, and observability. When evaluating the film "Her" in terms of these elements, we can say the following:

Aspect	Description
Relative Advantage	Samantha, the AI assistant, is perceived as a superior choice by Theodore due to her personalized interactions and emotional support, showcasing an advantage of AI-human relationships over traditional ones.
Compatibility	Samantha adapts to Theodore's values, but the film questions the true compatibility and challenges moments of harmony between artificial intelligence and humanity.
Complexity	Despite being AI, communicating with Samantha is straightforward; complexity arises from emotional intricacies and human reactions to technology. It reflects the emotional impact of technology on individuals.
Trialability	Theodore has the opportunity to try and adapt his relationship with Samantha, fostering trust in technology adoption and contributing to relationship development.

Observability	Theodore and Samantha's relationship and emotional changes are transparently observed, showcasing the impact of technology on emotions and human-technology interactions.

Table 11: Persuasion in The Adoption or Diffusion of New Technology

Spike Jonze's Her (2013) provides an interesting framework within which to apply Everett Rogers' Diffusion of Innovations Theory, illustrating AI adoption rewriting human relationships and societal norms. Samantha can be analyzed through the five dimensions described by Rogers in the context of the dynamics of technological integration.

Relative Advantage: Samantha surpasses human relationships in deep emotional attunement and companionship that fulfill Theodore's intellectual and emotional needs.

Compatibility: The urban, tech-driven setting of the film aligns with AI adoption. Samantha seamlessly integrates into Theodore's routine, helping him with work and adapting to his emotional vulnerabilities.

Complexity: Samantha is intuitively and user-friendly in design, making her easy to adopt, and thus Theodore can engage without technical expertise.

Trialability: Theodore initially explores Samantha's capabilities, gradually assessing her utility and emotional resonance before a deep attachment is formed.

Observability: AI systems are everywhere in Theodore's world. Characters like Amy have shown that seeing and social acceptance make the innovation adoption normal. Embedding Rogers' five dimensions, Her comes alive to reshape how innovations remodel human behavior. The film also provides a good lens through which one can understand the ethical and emotional complexities of AI in understanding innovation acceptance and human-technology relationships.

CONCLUSION

Spike Jonze's Her (2013) explores AI integration into human-emotional relationships through Theodore's bond with Samantha, reflecting key elements of Rogers' Diffusion of Innovations Theory—relative advantage, compatibility, complexity, trialability, and observability. Zaretsky (2015) highlights the film's use of speculative design to depict future human-technology interactions.

Searle's critique of "Strong AI" in Minds, Brains, and Programs parallels Her's portrayal of AI acceptance. The Computational Theory of Mind is reflected in Samantha's complex cognition, while Moravec (1998) questions machine emotions, explored in Theodore's relationship with Samantha. Turing's Computing Machinery and Intelligence informs the film's take on AI self-awareness, and Kaplan & Haenlein (2019) discuss AI creativity, which Her illustrates through Samantha's artistic expressions.

Beyond romance, Her serves as a philosophical and ethical inquiry into AI's societal role. Researchers like Zaretsky (2015) and Li (2023) see it as a commentary on evolving human-technology relationships. Taube (2015) and Reed (2018) emphasize its insights on AI ethics and societal acceptance. The film not only envisions the future but also prompts reflection on technology's influence in shaping it.

The film Her (2013) best illustrates the Diffusion of Innovations Theory through Theodore's adoption of his relationship with Samantha, reflecting key dimensions: relative advantage, where Theodore perceives his emotional connection with Samantha as more fulfilling than human relationships; compatibility, questioning AI integration into human lifestyles and emotional needs; complexity, as their initially simple bond evolves into a deeply intricate relationship; trialability, illustrated by Theodore's continuous adaptation to Samantha; and observability, demonstrated through visible changes in Theodore's emotions and Samantha's development.

Through these themes, Her develops a deeper understanding of AI adoption and its effects on human emotional experiences. It shows how technology shapes

emotional contact, representing both the psychological and social dimensions of AI integration.

Artificial intelligence has become one of the main focuses in recent times across varied academic disciplines. Research using the Diffusion of Innovations Theory can explain the processes of AI adoption in different sectors, such as health, education, and business, for assessing its wider impact on society. This theoretical framework also offers strategic insights for technology companies by informing market introduction, communication strategies, and user adoption processes. Cinema as a medium will increase public engagement in the use of technological innovations that give a competitive advantage to companies, since AI advancements would be oriented towards societal expectations and behavioral patterns.

The Diffusion of Innovations Theory is a valuable framework for understanding the adoption and dissemination of new technologies, particularly in the rapidly evolving field of artificial intelligence. Spike Jonze's Her exemplifies this theory by depicting AI integration into human-emotional relationships, offering insights into societal adaptation to technological advancements.

This theory provides a very important lens for analyzing the impact of AI on social interactions and perceptions, both in academic research and in the technology sector. As AI continues to shape human experiences, the Diffusion of Innovations Theory becomes increasingly relevant in assessing its societal acceptance.

The film also underscores the significance of speculative design, illustrating future human-technology interactions. Zaretsky (2015) and Li (2023) emphasize how Her portrays the intertwining of human experience and technology. Taube (2015) explores the ethical and philosophical dimensions of AI-human relationships, demonstrating how society accepts or rejects technological innovations. Reed (2018) highlights the ethical considerations surrounding AI, advocating for responsible development to mitigate potential risks.

But beyond a romance, Her represents a vital social critique of the role of technology in development and begs the question of decision-making for the future.

Spike Jonze's film Her explores the integration of artificial intelligence into human relationships, focusing on themes such as relative advantage, compatibility, complexity, trialability, and observability in the Diffusion of Innovations Theory to analyze AI technology. In a broader way, the film also involves philosophical arguments about AI technologies and their consequences on society, discussing academic research and technology sectors.

Her connects the dots between psychology, philosophy, sociology, and technology on critical ethical issues regarding autonomy, control, privacy, ownership of ideas generated by AI, and emotional manipulation. This encourages policymakers, technologists, and researchers to address these challenges as AI becomes more integrated into personal and professional life.

The film is also a case study in how innovations are communicated and adopted; the Diffusion of Innovations Theory provides a framework to analyze personal adoption, as with Theodore, and societal acceptance of emerging technologies. These concepts-relative advantage, compatibility, and observability-form the core in understanding the marketing of AI products and user experience design.

Her is a film that offers insights to technology companies in highlighting how the understanding of psychological and societal forces would amply improve product development. Compatibility of AI products to user lifestyles coupled with an ease-of-use approach helps companies build better communication and adoption. Trialability, wherein engaging a user in a non-threatening environment builds trust to try a concept, is another key learning from the film.

Her work provides avenues for further research on the ways AI creates interpersonal relationships, identity, and emotional experiences. The intersection of insights from humanities, social sciences, and technology will create further understanding about how AI changes the human experience. The film doesn't just draw

out the placement of AI within society but has also drawn several lessons that may be learnt in the process of adoption and in ethical dilemmas of technological progression; hence it is essential for interdisciplinary research on AI and human-technology interaction.

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