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**DHU INTERNATIONAL JOURNAL**  

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***digital hollywood university***



## Prologue

### Editor's Preface to the Second Volume of DHU International Journal

On behalf of the editorial board, I am delighted to announce the release of the second volume of DHU International Journal. This open-access, international publication seeks to establish a robust academic forum where researchers, practitioners, and students specializing in digital content and communication can disseminate their findings and gain global recognition. It is gratifying to observe that the journal's mission has resonated deeply with contributors over the past year, culminating in this collection of distinguished, high-quality articles.

This volume opens with a Special Contribution by Prof. Tomoyuki Sugiyama, President of Digital Hollywood University, commemorating the 30th anniversary of the founding of the educational institute that served as the university's predecessor. This reflective piece reaffirms the university's foundational spirit—aligned with the journal's mission—and offers insights into its history. Following this tribute, five meticulously peer-reviewed articles are presented: three research notes and two detailed reports by faculty and graduate students.

Although this second issue does not feature a full-length research paper, our vision remains to establish the journal as an esteemed international forum for presenting and exchanging innovative research, conceptual developments, and academic achievements within digital content, digital communication, and educational methodologies. We, therefore, extend a warm invitation to scholars in these fields to contribute to future volumes of the journal, fostering dynamic and collaborative academic discourse. We hope to inspire with the following message:

“We are here, waiting for the one who will bring happiness to the world from now on.”

Atsuko K. YAMAZAKI

Chief Editor  
Specially Appointed Professor  
Digital Hollywood University, Graduate School

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## Future Humanity Will Name This Era "The Great Transition"

SUGIYAMA Tomoyuki

Digital Hollywood University, President

This paper discusses how generational divisions have become meaningless in the context of the development of AI technology and the Internet. The author, who has personally experienced the evolution of computer technology, points out that the proliferation of the internet and social media since 1995 has generated vast amounts of big data, which forms the foundation of the AI era. As a general-purpose technology, AI is fundamentally transforming future societal systems, and humanity is entering a "generation transition" to adapt to it. The author argues that with the advancement of generative AI and deep learning, our daily lives are increasingly shaped by AI, and society as a whole must be redesigned with AI in mind. The author refers to this technological shift as "The Great Transition" and concludes that it is crucial for humanity to navigate this transition successfully.

Do you know which generation you belong to? I assume most of you are part of Generation X, Y, or Z. However, I have come to believe that such generational divisions are becoming increasingly irrelevant. Born in 1954, I have experienced various technological developments firsthand as a heavy user of computers, from large mainframes to smartphones. In this article, I will reinterpret the last 40 years of the history of computing up until today as milestones leading up to the birth of generative AI. From that perspective, I would like to share my thoughts on where humanity is heading from here.

In the past, technologies like generative AI would have been the kind of advancements developed and controlled secretly by major nations. However, the rise of the internet dismantled this confidentiality culture. With the introduction of the world's first PC browser in December 1994, I believe that 1995 marked a pivotal starting point for a new era. Since then, nearly all cutting-edge computer software technologies have been released in real-time through the Internet. One contributing factor for that to happen was the fact that charging billions of users generates more revenue and influence than relying on national budgets, but I'd argue that it's also the "Power to the People" spirit, rooted in the early days of personal computing and deeply ingrained in the industry as a whole, that has always been the major driving force behind that.

In the 1980s, neural networks, which can be seen as the synapses of artificial intelligence, were already implemented and running on a language called LISP. However, they were unable to handle practical problems, causing AI research to lose momentum. For example, consider a robot arm trying to pick up an object in front of it. On a factory line, the parameters are limited, so a robot arm, integrated with computer vision, would correctly lift parts. But what would happen if you placed it in a human living space? The robot would need to identify what the object is, estimate its shape, weight, surface friction, and breaking strength—otherwise, it wouldn't even attempt to pick it up. In order to create a truly general-purpose artificial intelligence, it has to have a general understanding of every object humans use. It seems possible to infer from the data of representative items, but more common sense would be required. In contrast, however, a four-year-old

child, for instance, would unhesitatingly lift a paper cup filled with soda placed in front of them. This demonstrated that the general knowledge required for artificial General Intelligence (AGI) was so vast that it could not be fully digitized. Even if the data could be gathered, the computational power needed was too immense for computers of the time to handle.

Since 1995, we have been captivated by the creation of homepages, followed by the rise of various social media platforms. People of all ages have been continuously writing and uploading everything imaginable to the internet. No one intended it, yet all of us are sharing our insights, wisdom, knowledge, love, and hate. Now, with the widespread use of smartphones, this phenomenon has extended to all of humanity, showing no signs of slowing down.

All of us on the internet have been contributing to an enormous collective effort—building the ultimate big data. Let's make a bold assumption: if we paid everyone \$10 per hour for their work, and estimated that each person worked 1,000 hours over the last 10 years, with 2.5 billion participants, the total value would be \$25 trillion. That's equivalent to about 3.5 years of the U.S. federal budget or 35 years of Japan's budget. By comparison, Apple's market capitalization is \$3 trillion. It's clear that even the largest corporations could never make such a massive upfront investment to create this scale of big data. This, in essence, represents the value of the collective knowledge uploaded to the internet by its users.

In the early 1990s, Silicon Graphics was the dominant player in the CG industry, being the first company to sell workstations equipped with GPU chips worldwide. At that time, GPUs were not installed in personal computers. Therefore, young people aspiring to create CG had no choice but to attend my school, Digital Hollywood, which was equipped with Silicon Graphics workstations, and endured all-nighters to gain access to the necessary technology.

GPUs quickly became the core technology in home gaming consoles such as the PlayStation. Real-time 3D CG surged into households around the world. People became immersed in game spaces, demanding ever-expanding, beautiful worlds and realistic character movements. This demand rapidly fueled the growth of the GPU manufacturing industry. The core gamers, numbering

in the hundreds of millions globally, were instrumental in the development of NVIDIA. Backed by a market where selling GPUs in the millions was an achievable goal, research, development, and manufacturing advanced, leading to the widespread availability of high-performance GPUs at lower prices.

A breakthrough occurred in 2012 when it was realized that complex multi-layer neural networks could be constructed by connecting numerous off-the-shelf GPUs. This discovery propelled deep learning into the spotlight. For instance, in the realm of Go, a system trained on all recorded games in history swiftly defeated the world champion, shocking us all.

Ten years later, on November 30, 2022, the release of ChatGPT made large language models (LLMs) widely known. The foundational data for these models consists of the vast amount of content we have uploaded to the internet. As of now, numerous generative AIs have entered the market within the past 20 months.

To summarize boldly, both internet users and gamers have laid the groundwork for the advent of the artificial intelligence era. AI is a General Purpose Technology, akin to the steam engine of the 19th century, poised to transform every aspect of human society in the future.

Thirty years ago, I proposed that the 21st century would be an era where computers and their networks exist as seamlessly as air, and that we must redesign everything to fit this new environment. Re-Designing the Future. Over these 30 years, we have surfed the waves of emerging trends— the internet, blogs, smartphones, social media, the metaverse, and blockchain. However, the emerging wave of artificial intelligence is different in quality. It will bring about a new world where humans and AI together create a new kind of human experience.

Returning to the initial question on generation: The answer is that we are all part of the "Generation Transition." This transition carries risks that could potentially lead to human extinction if not managed correctly, but there is no turning back. We must succeed in this transition, contribute to advancing humanity to the next stage, and evolve it further. As participants in a transformative era in human history, let us greatly enjoy living through this period. May future history record this era as "The Great Transition!"

We are the "GENT." Starting today, our motto is: "For the Great Transition."

We have a grand future ahead of us.

# Contributing to Social Inclusion Through Use Open-Source Drone

SUEDA Koh

Digital Hollywood University, Medeia Science Institute/  
SenseFoil Pte. Ltd./Hannan University

This research note explores how open-source UAV (Unmanned Aerial Vehicle) technology can advance social inclusion and sustainable mobility. Our team has used open-source platforms for interdisciplinary projects beyond traditional development boundaries. We have organized anti-poaching drone workshops, remote STEAM education programs, and projects like "Crowminication" and "Third Person Piloting" to solve unique challenges through collaboration. We conducted joint research with EverBlue Technologies on sailing drones, which led to field experiments demonstrating the potential of UAV technology in enhancing sailing accessibility. These findings inspired the "Inclusive Sailing" project, which uses UAV technology to assist sailors of all abilities. These efforts show that open-source platforms can remove barriers related to expertise, resources, and geography, fostering inclusive and collaborative research. Our goal is to continue expanding these activities to engage diverse communities and inspire innovation.

## 1. Introduction

Our research team has utilized knowledge in computer-human interfaces and interaction design to promote the development of drone (UAV) interfaces and platforms aimed at enhancing drone operation and utilization. This involves both academic and practical efforts, including developing control interfaces, automating unmanned sailboats using open-source UAV (OSUAV) platforms, and conducting international collaborative research on drone applications in STEAM education. By leveraging open-source platforms that encompass technology, community engagement, and problem-solving mechanisms, we have enabled a wide range of interdisciplinary research activities that transcend specialized boundaries. Through these efforts, we have realized that the open-source concept plays a crucial role not only in democratizing research but also in promoting inclusive communication, especially in remote areas or among collaborators who lack specialized know-how.

Globally, there is a growing emphasis on creating an inclusive society that leaves no one behind, as reflected in the Sustainable Development Goals (SDGs). An inclusive society is one where all individuals, regardless of their background or abilities, can participate equally and are respected within the community. The key characteristics of an inclusive society include:

- **Equality of Social Participation:** Ensuring that all people, irrespective of age, gender, disability, economic status, religion, or cultural background, can participate equally in all aspects of society, including education, employment, and civic activities.
- **Respect for Diversity:** Providing an environment where individuals from diverse backgrounds and abilities are respected and where their unique skills and identities are recognized and valued.
- **Accessibility:** Ensuring that physical infrastructure, information, and services are accessible to everyone. This includes providing necessary support or accommodations for those with disabilities or the elderly to lead independent lives.
- **Empowerment:** Supporting socially marginalized groups in understanding their rights and actively engaging in society. This includes offering education, training, and opportunities for participation in policy-making processes.

- **Elimination of Discrimination and Prejudice:** Creating a society free from discrimination and prejudice based on race, gender, age, disability, sexual orientation, etc., through legal protections and social awareness campaigns.

- **Building Social Networks:** In an inclusive society, communities and networks play a critical role in supporting diverse individuals and preventing social isolation, aiming to strengthen social capital.

In this note, we will review our activities from the perspective of social inclusion and discuss our contributions and future developments in this area.

## 2. Summary of Activities

By utilizing open-source platforms, we have gained access to continuously evolving development environments and communities, allowing us to efficiently procure development resources through standardized and modular software and hardware. For example, one of the most widely-used open-source UAV development environments, "Ardupilot<sup>[1]</sup>," has opened up not only autopilot but also flight control hardware, making various components accessible worldwide at low cost through international e-commerce sites like Aliexpress. This accessibility has enabled the development of cutting-edge UAVs even in regions with limited infrastructure or financial resources. Additionally, leveraging open-source development forums allows us to swiftly resolve most technical issues with the support of contributors (mostly developers) and contribute to the community by identifying and sharing new challenges. Crucially, these open communities enable proactive problem-solving, even for those without specialized expertise or significant funding.

### 2.1 STEAM Education Programs for Remote Areas – Open Source UAV Challenges

The use of open-source technology proves highly effective in problem-solving-oriented STEAM programs. By leveraging the advantages of OSUAV (Open Source based UAV), we have provided STEAM education programs focused on drone development even in educational institutions without UAV

specialists<sup>[3]</sup>. In 2016, we conducted a 3-day, 24-hour intensive workshop on developing anti-poaching surveillance drones for first- and second-year students at a technical university in the mountainous region of Cambodia. Through this workshop, students acquired the know-how to develop fixed-wing drones capable of long-duration flights for monitoring elephant poaching in nearby forests. Over the course of three days, the students were able to solve challenges efficiently by utilizing resources from development communities (forum articles and videos) and deepening their understanding using machine translation in their native language.



**Figure 1: short-term intensive workshop on developing anti-poaching surveillance drones utilizing Ardupilot @KIT Cambodia**

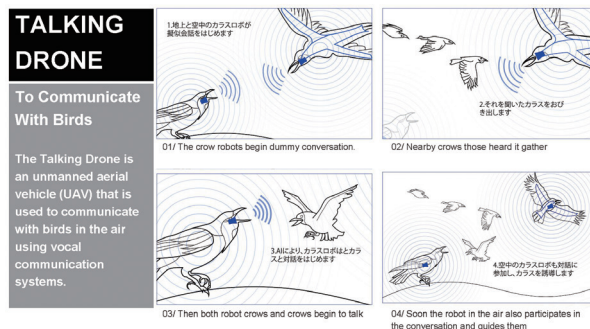
Additionally, we provided remote and on-site support to the newly established drone department instructors at Japan Aviation Academy (JAA), located in Japan's depopulated mountainous areas, using open-source tools. As a result, they were able to offer a unique educational program for their students to build DIY drones and eventually became collaborators in our drone research and development. Notably, this effort demonstrates how practical, hands-on training could be facilitated using well-prepared open-source resources, even when remote tools like Zoom were insufficient during the pandemic. We built a simple remote work support environment using smartphones, enabling efficient training under constrained conditions. These efforts have contributed to reducing educational disparities and costs through open-source solutions.



**Figure 2: Remote OSUAV development workshop utilizing a simple collaboration environment where participants can see each other's hands, gaze, work environment, and screen through a smartphone mounted on a headgear.**

## 2.2 Interdisciplinary Problem-Solving Using Open Source UAV

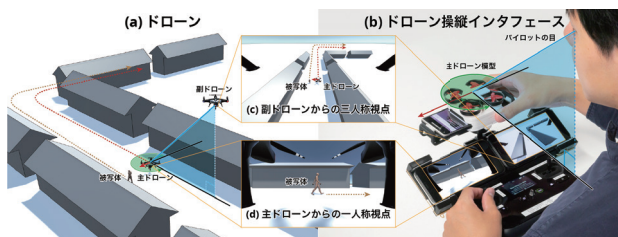
We have undertaken various interdisciplinary projects using Open Source UAVs (OSUAVs). For example, in the "Crowmunication Project<sup>[6]</sup>," we collaborated with Dr. Tsukahara, a biologist, to control crow behavior as part of an effort to coexist with them. This project involved developing custom bird-shaped fixed-wing drones using Ardupilot to mimic the flight patterns of crows.



**Figure 3: Crowmunication concept diagram**



**Figure 4: Prototype of a crow-shaped fixed-wing drone and a crow-guided test**



**Figure 5: Third Person Piloting: a drone piloting and aerial photography interface using two spatially linked camera perspectives.**

Another project, "Third Person Piloting<sup>[4]</sup>," focused on developing a drone piloting and aerial imaging support interface by autonomously controlling multiple camera-equipped drones to enhance situational awareness. Leveraging OSUAV documentation and forums enabled us to conduct trial and error efficiently and facilitated knowledge sharing and development implementation with collaborators who lacked drone expertise. These activities have proven that open source can serve as an effective collaboration tool, allowing researchers from different disciplines to work together smoothly. Additionally, utilizing well-structured open-source communities made it easier for graduate students involved in these projects to work independently, learn, and contribute to the research group.



### 2.3 Inclusive Sailing Project: Developing Community-Inclusive and Sustainable Mobility Using Open Source UAV Technology

We have supported the research and development of sailing drones in a collaborative international project with EverBlue Technologies. This project, based in locations such as Singapore and Hawaii, brought together America's Cup yacht designers, aerospace engineers, universities, and companies. As advisors on autonomous navigation and user interaction, we participated in the development process by providing drone development courses using Ardupilot to the stakeholders and engineers in the collaboration. By employing OSUAV as a communication tool among engineers, we successfully streamlined remote development work, allowing agile prototyping and feasibility studies for various use cases between Japan and Singapore. This facilitated the smooth development and implementation of sailing drones, including those that automate commercial sailboats.



**Figure6: FlyingSailboat developed using Ardupilot (left) and a sailing drone based on a Hansa Class1 sailboat (right).**



**Figure7: Aiming at Computer Aided Sailing and applying OSUAV to develop a sailboat that assists the sailor. Equipped with automatic/semi-automatic sailing and automatic return functions**



**Figure8: OSUAV-applied Computer Aided Sailing experiment where the sailboat can sail autonomously and complement some of the sailor's operations.**

This project was implemented as part of the Japanese government's "Smart Island Demonstration Project<sup>[5]</sup>," testing sustainable mobility on a remote island in Sakata City, Yamagata Prefecture. Local residents and businesses participated, and through experiments using sailing drones, various insights and suggestions were obtained. As a result, the project demonstrated the potential of enhancing sailing accessibility through autopilot rather than full automation and using these technologies as a resource for regional development.

Currently, we are advancing the project "Computer Aided Sailing for Everyone" to achieve inclusive sailing. This project involves co-designing systems that use open-source UAV technology to assist sailors with autopilot, allowing people of all ages and abilities, including those with disabilities, to enjoy sailing. This project aims to explore new ways to make sailing more accessible and enjoyable for everyone.

### 3. Insights

According to B. Huang's "The Hardware Hacker<sup>[2]</sup>," open source not only allows copying but also promotes innovation. Hackers use open source to solve problems and create new innovations by combining different open-source components. It is described as a system that "stands on the shoulders of giants," and the diffusion of open-source technology facilitates the creation of new combinations that drive innovation. Joseph Schumpeter, a 20th-century economist, described innovation as "a new combination of existing knowledge," while Clayton Christensen, a Harvard University professor, emphasized "thinking that connects seemingly unrelated things." A notable example is George Soros's distribution of copiers to Eastern European communist states, which spurred democratization movements and led to the emergence of new market economies.

Reviewing our activities in this context, it becomes clear that introducing open source not only fosters inclusive research and development beyond the advantages of local experts and infrastructure but also promotes social participation. From our experience, participants who acquired problem-solving skills through open source tend to take subsequent independent actions (as demonstrated in collaborations with KIT in Cambodia, JAA, and EverBlue Technologies). It is also observed that these participants achieve their goals not by working in isolation but through collaborative efforts with open communities. Additionally, we should note that such research activities, especially those involving hardware development, are supported by digital fabrication technologies such as 3D printing, many of which are open-sourced.

### 4. Future Direction and Conclusion

In this research note, we reviewed how our approach of utilizing open-source UAV technology has enabled interdisciplinary, international, and inclusive research activities, thereby involving people from various fields and regions regardless of their expertise. Initially, we did not foresee the positive impact of open source; rather, we utilized it to supplement our limited resources and expertise in aerospace-related fields, including UAVs. However, we unexpectedly achieved positive outcomes. By reviewing these activities in line with the "The key characteristics of an inclusive society," we explored the future direction and potential contributions of our activities. With open-source tools and open communities, we have managed to overcome disparities in environments and resources and transcend language and disability barriers to carry out research and development. We are now able to advance an inclusive sailing project using open-source UAV technology, allowing even visually impaired individuals to participate. Within the context of these activities and the recent trend toward inclusive societies, we believe that involving more people will further foster serendipity and new possibilities.

## Acknowledgements

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# Effective Leadership in Virtual Teams

FUKUNAGA Sumiko

Digital Hollywood University, Graduate School

This study explores effective leadership within virtual teams by closely analyzing communication patterns observed in online gaming teams. Through interviews conducted with both student leaders of gaming teams and corporate managers, along with conversation analysis on gameplay screen captures, the research identifies key behaviors that are essential for fostering successful team dynamics. The findings underscore the critical role of concise communication, pre-action notifications, and immediate feedback, drawing important parallels between the rapid decision-making necessary in gaming environments and the structured demands faced by virtual teams in corporate settings. Furthermore, the study addresses challenges such as managing response time lags and the pressures of providing real-time feedback in virtual environments. The insights gathered from this research suggest that strategies commonly used in online gaming can be effectively adapted to enhance leadership and team collaboration in corporate settings, especially as remote work and virtual collaboration continue to grow in prevalence.

## 1. Introduction

In recent years, there has been growing attention on virtual teams. Research on virtual teams, particularly regarding team formation, leadership, and communication within geographically dispersed teams, has been conducted since the 1990s. However, these studies were primarily focused on issues faced by a few global companies or a few global leaders, and thus, were not relevant to the majority of people. Yet, with the recent advancements in IT and the impact of COVID-19, working in virtual teams has become a more common issue for many.

According to Schweitzer & Duxbury (2010), virtual teams are defined as teams whose members do not share a common physical workspace all the time and must therefore collaborate using communication and collaboration tools such as email, videoconferencing, and other digital technologies<sup>[1]</sup>. Anoye & Kouamé (2018) highlight the challenges of leadership in virtual teams, emphasizing the need for shared leadership responsibilities and context-specific training programs. Leadership in virtual teams is a complex and multifaceted concept<sup>[2]</sup>, with various studies focusing on different aspects of its impact on team effectiveness. The discussion on effective leadership in virtual teams is still in its early stages.

From another perspective, online games have been suggested as potentially valuable tools for leadership development. They are particularly noted for their use in honing skills such as decision-making in complex situations, motivating teams, and fostering collaboration. For example, it has been reported that in-game experiences can contribute to the development of leadership, with team play providing opportunities for players to enhance their leadership skills (Jang & Ryu, 2009)<sup>[3]</sup>. Moreover, Mysirlaki & Paraskeva (2012)<sup>[4]</sup> suggest that massively multiplayer online role-playing games offer a dynamic environment that strengthens skills such as team building, decision-making, and risk management.

The aim of this study is to analyze communication patterns in online gaming teams and apply these insights to improve leadership in corporate virtual teams. The research seeks to uncover strategies that can be applied to virtual teams in

professional environments. To achieve this goal, the author employs a combination of interviews and conversation analysis to explore communication within virtual teams, specifically within online gaming teams.

In this paper, the authors discuss the identified communication patterns and their potential impacts on team dynamics. Additionally, the paper provides practical insights for improving leadership and collaboration in virtual environments.

## 2. Method

The methodology of this study consists of three qualitative methods:

- (a) Group interview with students: Conducted with two students who are leaders of online gaming teams to investigate which leadership behaviors have a positive impact on their teams.
- (b) Conversation Analysis: Performed on screen captures of a competitive match in the game *Overwatch*, where two teams of five players each competed.
- (c) Interviews with Managers: Conducted with managers who lead online gaming teams and also hold roles such as project management or section management in companies. These managers provided insights through interviews and interpretations of the screen captures.

### 2.1 Research Design and Objectives

The purpose and role of each research method are as follows:

#### (a) Student Interviews

Purpose:

- To understand the reality of leadership in online gaming teams
- To identify effective communication strategies

Role:

- To provide fresh perspectives on leadership in virtual environments
- To present concrete examples of communication patterns in games
- To suggest innovative approaches that can be applied to corporate environments

### (b) Conversation Analysis

#### Purpose:

- To observe real-time communication patterns in online gaming teams
- To identify specific leadership behaviors and their immediate effects
- To analyze the structure and flow of team interactions in a virtual setting

#### Role:

- To provide empirical evidence of communication strategies in action
- To offer detailed insights into the dynamics of virtual team interactions

### (c) Corporate Manager Interviews

#### Purpose:

- To identify challenges faced by virtual teams in corporate settings
- To evaluate the practical applicability of strategies observed in gaming environments
- To analyze similarities and differences between corporate and gaming environments

#### Role:

- To provide insights based on practical experience
- To validate findings from the gaming environment
- To reveal the current state and challenges of virtual team management in corporations

### Integrated Analysis

The combination of these three methods allows for a comprehensive examination of virtual team leadership:

- **Applicability assessment:** Evaluate gaming strategies (a) and (b) against corporate managers' experiences (c) to determine their effectiveness in professional settings.
- **Holistic understanding:** Synthesize insights from all three methods to develop a comprehensive model of effective virtual team leadership.
- **Practical implications:** Combine innovative gaming approaches (A and B) with corporate constraints (c) to formulate actionable recommendations for improving virtual team leadership.

This integrated approach ensures that the research captures both the unique aspects of gaming team leadership and the practical realities of corporate virtual teams, leading to more robust and applicable findings.

## 2.2 Interviews with Student Leaders of Online Gaming Teams

A group interview was conducted with two students who serve as leaders of their respective online gaming teams. The interview lasted approximately one hour and focused on questions such as what type of leadership boosts team motivation, improves performance, or enhances the team atmosphere. The interview followed a semi-structured format, allowing for in-depth exploration of how these leaders guide their teams and the key aspects they consider when leading an online gaming team. The Author interviewed leaders from both Overwatch and VALORANT to identify common communication strategies and leadership qualities in competitive team-based games.

## 2.3 Conversation Analysis of a Game's Screen Capture

One of the students who participated in the group interview provided a screen capture of their online gaming team's gameplay

for analysis. The conversation analysis focused on a segment of the match.



**Figure 1: Game's Screen Capture**

The screen capture, as shown in Figure 1, was annotated by the student to indicate what actions were being performed during the game. And the author was provided with screen captures that included voice chat audio from gaming teams, and we analyzed the conversations. Additionally, a follow-up interview was conducted while reviewing T The screen capture, allowing the student to further explain the context and actions being taken during the gameplay. For the screen capture analysis, we chose Overwatch specifically due to its stronger emphasis on teamwork. Overwatch's gameplay requires more coordinated team efforts, making it ideal for observing leadership dynamics and team communication in action.

## 2.4 Interviews with Manager

To achieve the objectives of this study, the author conducted interviews with individuals who fit the following profile:

- Corporate managers who hold roles as project managers or section managers in companies with over 100 employees.
- Managers with experience managing teams of three or more subordinates in a remote environment.
- Individuals who regularly participate in team-based online gaming competitions as a hobby.

Five individuals were selected for the interviews, and their profiles are shown in Table 1.

During the interviews, which lasted approximately one hour each, the managers were asked about the differences between virtual teams in the workplace and online gaming teams, the challenges they encounter in managing virtual teams at their companies, and their observations and interpretations of a screen capture provided earlier.

**Table 1: Interview Subjects (Managers)**

ID	Industry	Section	Position	Gender
a	Consulting	Consulting	Manager	Male
b	Chemical Manufacturer	IT	Manager	Male
c	Services	Operations	Manager	Female
s	IT	Consulting	Section Chief	Male
d	Services	Planning	Department Manager	Male

### 3 Result and Analysis

#### 3.1 Effective Leadership in Online Gaming Teams

Two first-year university students, who were team leaders of online gaming teams, participated in an unstructured group interview. One was the leader of a VALORANT team, and the other led an Overwatch team. According to Fukunaga (2024), the interviews revealed several key behaviors that contribute to effective leadership within online game teams:

- **Concise Communication:** Short, precise instructions are crucial for game leaders and equally valuable in virtual teams for efficient communication.
- **Broad Perspective:** A comprehensive view is essential for making strategic decisions, important for leaders in guiding their teams.
- **Calm Decision-Making:** Making decisions under pressure is critical, especially for leaders facing business uncertainty.
- **Immediate Feedback:** Instant feedback enhances team performance and helps maintain motivation and skill development in organizations.
- **Positive Attitude:** Maintaining team morale and motivation is key for fostering resilience and innovation.
- **Initiative:** Creating opportunities for team actions is vital, particularly for launching projects and solving problems in organizations<sup>[5]</sup>.

Building upon the interviews conducted by Fukunaga (2024), this study further explored the details through screen capture analysis and manager interviews.

#### 3.2 Communication Analysis from Screen Capture

One of the students who participated in the group interview provided a screen capture of their gameplay. The game, Overwatch, is played in teams of 5 versus 5. The roles of the five members of the allied team are distributed as shown in Table 2. When the number of utterances was counted, the roles and the number of utterances were as indicated in Table 2. A summary of the conversation analysis is provided in Table 3. The analysis was conducted while listening to explanations and interpretations of the gameplay. The game is free-to-play and has over 6 million players worldwide. It enjoys significant popularity, particularly in North America, Asia, and Europe, and is a key title in the esports world with regular international tournaments.

**Table2: Game Players**

Name	Role	Number of Utterances
A	DPS (Damage per Second)	11
B	Tank	11
C	Support	2
D	DPS (Damage per Second)	8
E	Support	9

In many multiplayer online games, team composition is key to success, with roles typically divided into three categories: Tank, DPS, and Support.

- **Tank:** Protects the team by absorbing damage and attracting enemy attacks, using high health and defense to control the battlefield.

**Table3: Convesation Analysis Summary**

Time	Event	Summary	impact
0:18	Strategic Planning Session	A: Proposes attacking from the bridge	+
		B: Acceptance	+
		D: Proposes attacking from below the bridge	+
		B: Acceptance	+
0:26	Initial Engagement	A: Reports enemy composition	+
0:30	Combat Phase	B: Targeting Directive	+
		B: Advance Command	+
0:46	Combat Phase	E: Repeatedly yells Targeting Directive	-
0:48	Combat Phase	B: Declares pursuit of DPS (Damage Per Second)	
0:55	Next Combat Preparation	A: Declaration	
1:07	Tactical Positioning	A: Declaration (whispering)	-
1:11	First Contact with the Enemy	(There is no conversation)	
1:29	Combat Phase	(There is no conversation)	
1:35	Combat Phase	E: Gives instructions to support	+
		B: Issues general instructions	
1:46	Combat Phase	A: Declares retreat and re-entry	
		A: Announces casualty (loudly, for a long time)	-
1:57	Combat Phase	B: Declaration	
		E: Declares Ultimate Ability Readiness	
2:04	Role/Character Switch	A: Reports role/character switch	
2:10	Emotional Expression	B: Utters "Not good, not good" (for a long time)	-
2:16	Verbal Emotional Response	B: From "Okay" to a scream	
2:45	Combat Phase	B: Countdown (joking)	
3:00	Combat Phase	D: Reports enemy actions	+
3:12	Combat Phase	E: Gives instructions to A	
		A: Ignores those instructions	-
3:15	Combat Phase	B: Focuses instructions on the pig	
		D: Refuses those instructions	
3:22	Combat Phase	E: Requests focus on Kiriko	
		A: Requests focus on Ana	
3:31	Combat Phase	D: Reports enemy isolation possibility	+
3:35	Object Involvement	E: Reports involvement with the object	+
3:44	Verbal Emotional Response	C: Reported being killed	+
3:49	Verbal Emotional Response	D: Report of reaction to an ally's death (for a long time)	-
4:16	Combat Phase	C: Reports enemy movement	
		B: Emphasizes survival	
4:20	Combat Phase	A: Ignores that instruction	
		B: Changes instruction	
4:24	Combat Phase	E: Praises ally's ultimate ability usage	
		D: Reports a kill	+
4:41	Combat Phase	E: Praise	+
		A: Requests help	+
4:44	Combat Phase	B: Responds to request	+
		E: Gives instructions to D	+
4:50	Combat Phase	A: Issues instructions to allies while dead	+
5:08	Verbal Emotional Response	D: Announces casualty (for a long time)	

- DPS: Focuses on quickly dealing significant damage to enemies, relying on Tank protection and Support healing.
- Support: Provides healing and buffs to enhance team performance, ensuring Tanks and DPS can operate effectively.

These roles work together to form the foundation of successful team strategies, requiring specific skills and coordination to achieve the team's objectives.

### 3.3 Finding from the communication Analysis

Table 3 is Conversations Analysis Summary.

Through interviews conducted while reviewing the screen capture of the online gaming team, the author able to gain insights into actions that lead to positive outcomes as well as those that result in negative outcomes within the team. The following is a summary of these findings.:

**Instruction-Action-Feedback Sequence:** The effective loop of giving clear instructions, receiving confirmations, taking actions, and providing feedback is crucial for ensuring precise and effective communication in virtual teams. For example, in the context of the game, this could involve a scenario where one player says, "I'm heading to this, so bring the vehicle over," to which the teammate responds, "Okay, vehicles in position," followed by, "Thanks."

This process is similar to the IT concept of a "three-way handshake," which ensures accurate and reliable exchanges (Figure 2).

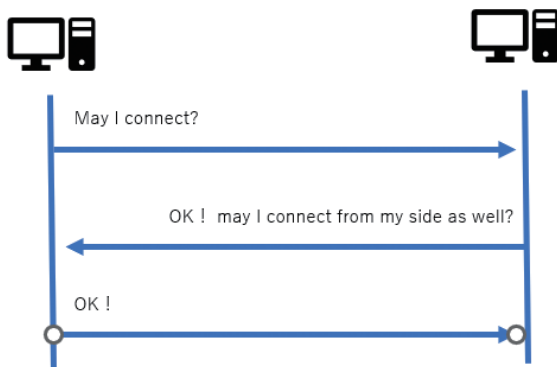


Figure 2: 3Way Handshake

**Pre-Action Communication:** Clearly stating intended actions before executing them helps in aligning the team, especially in virtual environments where physical cues are absent, ensuring that all team members are on the same page. In virtual teams, where members are not physically present, it's hard to know what others are planning.

Therefore, notifying the team of your next move, such as saying "I'm moving to the right," helps everyone adjust their actions more easily. This was highlighted as essential for effective virtual team management.

**Motivational and Immediate Feedback:** Using short, motivational phrases like "Good job", "OK" and providing immediate feedback are essential for keeping the team motivated and engaged, helping to sustain momentum and focus.

**Humor and Negative Tone Management:** The use of humor was identified as a powerful tool for creating a relaxed and productive atmosphere within the team. By fostering an environment where information can be shared more freely, important insights are more

likely to surface, potentially leading to more favorable outcomes in competitive situations. However, it is also crucial to manage the tone to avoid excessive negativity, which can undermine the team's overall performance.

**Concise Communication:** Keeping communication short and to the point is vital for maintaining focus and preventing the team from becoming overwhelmed or losing concentration, ensuring that essential information is effectively conveyed. In games, it was found that long, emotionally negative statements can make it difficult to hear important information and prolong a negative atmosphere, which is not ideal

### 3.4 Finding from the Manager Interview.

Table 4 highlights the key differences and similarities between online gaming virtual teams and organizational virtual teams, focusing on factors frequently mentioned by managers. Both teams prioritize goal achievement, but online gaming teams emphasize winning through voluntary cooperation, while organizational teams focus on achieving corporate goals through specific tasks

Communication and tools differ significantly: online gaming teams use real-time in-game chat and voice chat for quick decisions, whereas organizational teams rely on emails, video conferences, and project management tools for medium to long-term communication and documentation. Trust in online gaming teams is linked directly to performance and rapid decision-making, while in organizational teams, it is built over time through long-term collaboration.

Despite these differences, both team types emphasize the importance of effective communication, leadership, and emotional intelligence for success. Cooperation for goal achievement is essential in both settings, underscoring the significance of collaboration. This analysis highlights the shared principles critical to team performance across contexts.

This study incorporated the perspective of corporate managers, which was not covered in Fukunaga (2024)<sup>[5]</sup>, and gained the following insights:

**Importance of Long-term Trust Building:** Unlike online gaming teams, it became clear that long-term collaboration is essential for trust building in corporate virtual teams.

**Challenges of Real-time Feedback:** In corporate environments, providing immediate feedback and managing differences in time perception were newly identified as challenges.

**Adaptation of Communication Strategies:** The need to adapt effective communication strategies from gaming environments to corporate settings became clear. Particularly, strategy adjustments are necessary from the perspective of managing long-term projects and ensuring stability.

These new findings deepen our understanding of leadership in virtual teams and enhance practical applicability. The major contribution of this study is the identification of commonly applicable elements while clarifying the differences between gaming and corporate environments.

In interviews, many managers reported struggling with providing quick, real-time feedback and managing discrepancies in time perception with their team members. Additionally, some managers found it challenging to build trust with their teams.

**Table4: Differences and Commonalities Between Online Gaming Teams and Organizational Virtual Teams**

Perspective	Online Gaming Virtual Teams	count*	Organizational Virtual Teams	count*
Purpose and Mission	- Achieving in-game missions and winning competitions	4	- Achieving corporate goals and project objectives	4
	- Voluntary cooperation based on shared interests and enjoyment	5	- Engaging in specific tasks and projects	5
Team Structure and Roles	- Flexible role distribution	3	- Clear role assignments and official leaders	3
	- Spontaneous leadership	3	- Leadership directed by higher-ups	4
Communication and Tools	- Real-time communication via in-game chat and voice chat	2	- Use of emails, video conferences, and project management tools	2
	- Fast information sharing and communication	3	- communication over the medium to long term	4
Trust and Cooperation	- Trust directly linked to in-game performance	2	- Building trust through long-term collaboration	1
	- Rapid decision-making and cooperation	4	- Formal communication and documentation	2
	- High transparency and easy trust-building	1	- Building trust over time	4
<b>Commonalities</b>				<b>count*</b>
Trust and Cooperation	- Trust and cooperation are essential for team success			3
	- High trust promotes cooperation among team members and improves performance			3
	- Trust and cooperation directly lead to achieving goals			3
Communication and Tools	- Effective communication is crucial			5
	- The choice and use of appropriate communication tools impact team outcomes			2
	- Real-time information sharing and decision-making through digital tools			3
Leadership	- Effective leadership significantly contributes to team performance			5
	- Emotional intelligence and transformational leadership of the leader are important			3
	- Motivating team members and guiding them toward goal achievement			5
Cooperation for Goal	- Teams need to work together toward common goals			5
Achievement	- Cooperative relationships are essential for success in achieving goals			5
	- The importance of team members cooperating with each other			5

\*count:number of managers who mentioned a topic in the 5-manager interviews

### 3.5. Comparison of Student and Corporate Manager Interviews Communication Strategies

Students: Emphasized concise communication, pre-action notifications, and immediate feedback.

Managers: Acknowledged importance of immediate communication in corporate settings, but stressed need for more structured, long-term strategies.

#### Trust Building

Students: Quick trust-building through performance; easy team member replacement.

Managers: Identified trust-building as a major challenge, especially with newcomers; emphasized long-term strategies and difficulty in virtual settings.

#### Team Dynamics

Students: Flexible roles, spontaneous leadership, quick decision-making.

Managers: Noted need for structured roles, official leadership, and maintaining cohesion over time.

#### Application of Gaming Strategies

Students: Fundamental to success in gaming environments.

Managers: Recognized potential benefits but stressed insufficiency for corporate management; emphasized need for additional strategies.

#### Challenges

Students: Focused on in-game, short-term challenges.

Managers: Identified broader, long-term challenges like trust-building and sustained performance.

## 4. Discussion

This study explored the communication and leadership dynamics in online gaming teams and their relevance to corporate virtual teams. It highlighted that gaming environments, characterized by real-time decision-making and spontaneous leadership, emphasized concise communication through an Instruction-

Action-Feedback loop, akin to IT's "three-way handshake." Pre-action communication was found to be crucial for improving coordination in corporate settings. Additionally, motivational feedback and humor helped maintain team morale, while managing negative emotions was essential to prevent disrupting team dynamics. Furthermore, the importance of trust-building in virtual teams, as highlighted by Wilson, J. M., et al. (2006) was strongly supported by the interviews with managers in this study<sup>[6]</sup>.

While online gaming teams operate in short, intense bursts with flexible roles, corporate teams often manage long-term projects that required stability. Therefore, gaming strategies need to be adapted to meet corporate demands. Differences in industries, job roles, and the nature of required tasks suggested that there could be situations where these strategies are applicable and others where they are not. A small sample size may have limited the generalizability of the results, and short-term data may not have fully captured long-term impacts. Future research should address these limitations. Nonetheless, I believe that this study offered valuable insights for developing effective leadership practices in corporate settings.

## 5. Conclusion

In conclusion, this study explored the similarities between communication in online gaming teams and corporate virtual teams. The fast-paced, real-time communication strategies in gaming environments offered valuable insights for enhancing leadership in corporate settings, particularly through clear, concise communication, pre-action notifications, and immediate feedback to boost team performance.

While gaming was driven by short-term goals and flexible dynamics, corporate environments often demanded sustained, long-term approaches to leadership and collaboration. This highlighted the importance of adapting gaming strategies to fit the structured needs of corporate teams. Although the applicability

may be limited depending on the context, I believe that the communication protocols derived from online gaming teams can contribute to building trust between managers and their team members.

Finally, the findings indicated that further research should explore how these insights could be applied across various organizational contexts, especially as remote work became more prevalent. By bridging the gap between gaming and corporate virtual teams, this study contributed to the ongoing discussion on developing effective leadership practices in virtual environments.

## **Acknowledgments**

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# Psychological Recovery in Fibromyalgia Patients through Pain Visualization

NISHIMURA Mio

Digital Hollywood University ,Graduate School

Fibromyalgia is characterized by chronic, widespread pain, the complexity and individuality of which often complicate treatment. In this study, Riessman's narrative analysis was employed to explore the pain experiences and associated psychological changes in three patients with fibromyalgia. By utilizing onomatopoeia and graphics to visualize pain, common themes were identified from the narratives, which were then analyzed in relation to the patients' psychological backgrounds. The findings suggest that while pain tends to increase and become more complex over time, the rate of progression and methods of recovery vary significantly between individuals, underscoring the need for personalized treatment approaches. Additionally, the study highlights that the visualization and verbalization of pain, along with its externalization, may enhance self-efficacy and contribute to more effective pain management in fibromyalgia patients.

## 1. Introduction

Fibromyalgia has a prevalence rate of approximately 1.7% in Japan, making it a relatively common condition, even when compared to rheumatoid arthritis, which has a prevalence of about 0.6-1.0%<sup>[1][2]</sup>. However, due to the lack of specific abnormalities detectable in blood tests or imaging, the diagnosis of fibromyalgia is often delayed in Japan. This chronic condition is characterized by widespread pain throughout the body, severe stiffness, intense fatigue, sleep disorders, depression, and memory impairment, with symptoms persisting for over three months. Additionally, the intensity and location of pain in fibromyalgia can fluctuate daily, and patients often experience multiple types of pain simultaneously. This variability can distort sensory and cognitive functions, leading to persistent pain that causes hypersensitivity and sensory dullness, making it extremely difficult for patients to comprehend and articulate their pain to others.

This study examines the progression of pain in fibromyalgia and investigates how patients' psychological responses to their pain affect their sense of self-efficacy and self-acceptance, using three case studies as examples. We also analyze how these patients verbalize and manage their pain, comparing the results with previous studies.

Previous research has provided insights into the expression of pain and the enhancement of self-efficacy. Takahashi et al. explored the ways in which patients with chronic pain use onomatopoeia to express their pain in a large-scale survey of 170,000 people in Japan, and showed that onomatopoeia is an effective means of communicating the nuances of pain to others<sup>[3]</sup>. Lorig et al. found that self-management programs for chronic diseases contribute to improving patients' sense of self-efficacy and self-affirmation, particularly through the verbalization of symptoms, which increases the sense of control over the disease<sup>[4]</sup>. Melzack emphasized the highly subjective and individual nature of pain, exploring the impact of visualizing pain on patients' psychological organization, and showed that visualized pain can serve as a tool for self-understanding and contribute to pain management.<sup>[5]</sup> Pennebaker demonstrated that verbalizing emotions can foster empathy and alleviate feelings of isolation, further highlighting the impact of verbalization on emotional organization and

psychological health<sup>[6]</sup>. These studies suggest that the emotional resonance created through the verbalization and visualization of pain may provide psychological support for patients.

The aim of this study is to clarify how the verbalization and visualization of pain contribute to enhancing self-efficacy and self-affirmation in patients with fibromyalgia. While previous research has shown that these methods can influence psychological organization and pain management, many aspects remain unclear, particularly in the context of fibromyalgia.

## 2. Objectives

This study aims to evaluate how the process of verbalizing and visualizing pain by patients with fibromyalgia helps them understand the complexity and diversity of their pain and how this contributes to their psychological recovery. Additionally, the study examines the impact of patients sharing their pain with others on their self-efficacy and overall mental health.

## 3. Methods

### 3.1 Online Lecture on Pain

On July 6, 2023, an educational lecture on the fundamentals of pain was delivered via YouTube to an audience of chronic pain patients. This 45-minute session provided a comprehensive overview of the different types and mechanisms of pain, covering topics such as the functions of nerves and synapses, the role of sensory receptors, as well as distinctions between neuropathic pain, nociceptive pain, and alterations in pain modulation<sup>[8]</sup>.

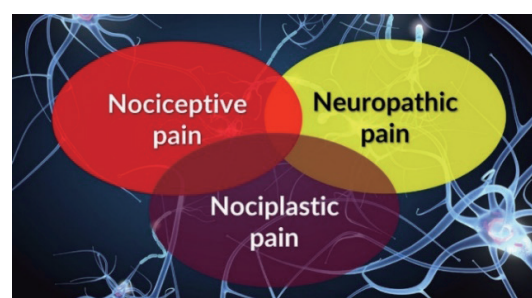


Figure 1: Classification of Pain by Pathology

(a) Neuropathic Pain

This type of pain results from nerve damage due to various causes, including spinal cord injury, stroke, vasculitis, diabetes, infections, or chemotherapy. Common conditions associated with neuropathic pain include sciatica, postherpetic neuralgia, phantom limb pain, and cervical spondylosis.

(b) Nociceptive Pain

This pain is triggered by tissue damage and is mediated by receptors responding to thermal, mechanical, or chemical stimuli. It typically manifests as part of the inflammatory response, characterized by swelling, redness, heat, and pain. Common examples include fractures, rheumatoid arthritis, and appendicitis.

(c) Nociplastic Pain

Nociplastic pain occurs due to altered pain perception or functional changes in the nervous system, even in the absence of actual nerve damage or tissue injury. This category includes conditions such as fibromyalgia, complex regional pain syndrome (CRPS), unexplained lower back pain, and irritable bowel syndrome.

3.2 Verbal and Visual Expression of Pain

Following the lecture, participants were provided with "pain cards" designed to aid in the visual representation of their pain. They were encouraged to begin creating their cards, with the understanding that each participant would present their work in a free-form presentation approximately three weeks later. The pain cards were developed using the Japanese version of the McGill Pain Questionnaire<sup>[7][8]</sup> as a foundation, incorporating onomatopoeia and visual graphics. There were 22 distinct types of pain cards available.

Onomatopoeia, particularly effective in Japanese for conveying sensory experiences and conditions intuitively, played a central role in the design of these cards. For instance, the word “zuki-zuki” conveys the rhythmic, throbbing nature of certain types of pain, while “hirihiri” suggests a sharp, burning sensation. The design of these cards was deeply influenced by the author's personal experiences as a fibromyalgia patient, with a focus on capturing the polysemy and figurative aspects of pain.

By using colors to visually emphasize the characteristics and sensations of each type of pain, observers can intuitively understand what kind of pain it is just by looking at the color. Utilizing color theory makes the visualization of pain even more effective. Figures 2 through 5 show the types of pain and a color used for each type of pain.

- The pain types are color-coded as follows
- Yellow: Neuropathic pain (Figure 2)
- Gray: Dull Pain (Figure 3)
- Red: Nociceptive pain (Figure 4)
- Navy: Psychogenic Pain (Figure 5)

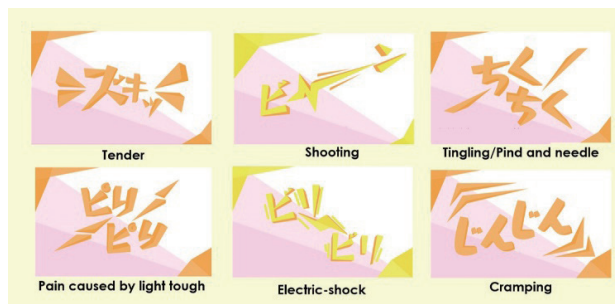


Figure 2: Pain cards in yellow for Neuropathic pain

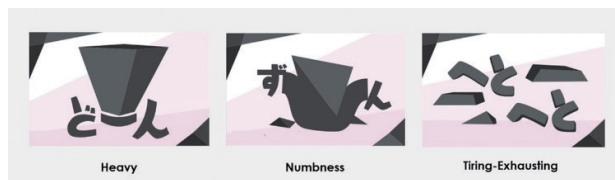


Figure 3: Pain cards in gray for Dull pain



Figure 4: Pain cards in red for Nociceptive pain

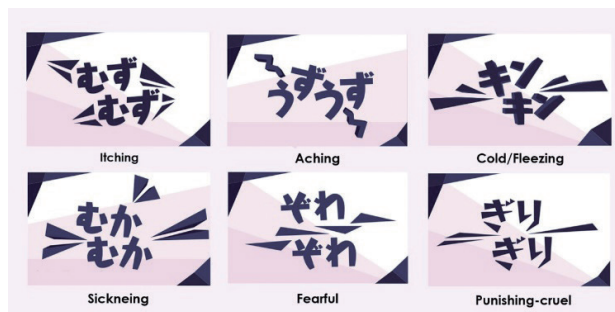


Figure 5: Pain cards in navy for Psychogenic pain

3.3 Patient-Led Pain Analysis Presentation Event

Between July 27 and August 10, 2023, we conducted a closed online event titled the “Pain Analysis Presentation Event” on three separate days. This event featured 20 participants (16 women, 4 men), of whom 8 presented their personal pain experiences. The presenters included 5 patients with fibromyalgia, 1 patient with sciatica, 1 patient with anterior cutaneous nerve entrapment syndrome, and 1 patient with post-marathon muscle pain. The primary objective of the event was to empower participants to gain a deeper understanding of their pain by expressing it visually through onomatopoeia and graphics and then articulating these expressions to others. Prior to the presentations, participants were assured that “the content you will present today is derived from your own analysis and interpretation of your pain, and there is no possibility of error, so please proceed confidently with your presentation.” This assurance was intended to create a psychologically safe environment, encouraging participants to present with confidence.

This study focuses on analyzing the pain experiences and related psychological changes of three fibromyalgia patients from the event, employing two analytical approaches: visual analysis and thematic analysis based on Riessman's narrative analysis method.

(a) Visual Analysis

This method interprets the nature and intensity of pain as depicted in the visual representations created by the patients. It enables an understanding of how pain evolves, becoming more complex and severe over time, as captured through the patients' visualizations.

(b) Thematic Analysis

This method involves extracting common themes from the patients' narratives and interpreting them within their broader context. Thematic analysis provides insights into how visualizing pain impacts the psychological state of patients.

Initially, we gathered detailed narratives from each patient, focusing on the progression and changes in their pain, their methods of self-expression, and coping strategies as presented during the event. These narratives were then organized and evaluated using visual analysis to assess how the pain was visually represented. Following this, thematic analysis was used to extract recurring themes, which were subsequently categorized into key elements such as psychological changes, pain visualization, and social isolation. These themes were then interpreted in relation to the patients' psychological contexts.

4. Results

**Case 1:** 43-year-old woman with a 27-year history of fibromyalgia, expressing pain progression using onomatopoeia and graphics

This patient's medical history reflects a severe and progressive chronic pain journey. Diagnosed at 15 with Complex Regional Pain Syndrome (CRPS) and Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS), she initially experienced deep, weather-sensitive pain in her knees, hips, and right shoulder. Over time, this evolved into sharp, electric shock-like sensations, along with burning and stabbing pain from even light touches.

By 23, her condition had escalated to fibromyalgia, resulting in relentless 24-hour pain across her body, likened to the sensation of bones being broken with an axe. This pain was exacerbated by external factors like wind, clothing, and even her own voice vibrations, leading to complete physical dependency. Now, at 43, after 27 years of struggle, she is bedridden, classified as PS 9, and requires full assistance for all daily activities.

Visual Analysis

The visualization of this patient's pain provides a clear depiction of how her condition has become more complex and intense over time. Initially, the primary symptom was represented by a throbbing pain, but as her condition progressed, sharper and more persistent pains, described as "jirigiri" and "gan-gan," were added to the mix. This evolution illustrates the transition of her pain from a manageable physical discomfort to an overwhelming sensation that dominates her entire body. The use of darker colors and bolder text in her illustrations represents the escalating severity and persistence of her pain. This visual shift conveys that the increasing intensity is not merely a function of time passing;

instead, the very nature of her pain has altered, transforming it into a more invasive and dominating experience. The dark hues, particularly reds and blacks, further highlight the gravity of her situation, symbolizing the intense psychological burden and feelings of hopelessness she endures.

Theme Analysis

The patient's narrative underscores the significant psychological toll that accompanies the progression of her pain. Initially, her pain was somewhat manageable, but as it became more complex and pervasive, it evolved into a relentless, 24-hour ordeal. This progression had a profound impact on her mental well-being, with feelings of hopelessness and loneliness intensifying as her condition worsened. The continued deterioration of her physical abilities, coupled with the constant presence of pain, led to a significant decline in her quality of life. Her attempts to find solace in playing the flute—a small psychological refuge - became less effective as her pain intensified, leaving her with limited coping mechanisms. Additionally, her expression of the pain as a "thud" that pierced her heart, due to the lack of understanding from those around her, highlights the deep emotional impact of both the pain and the associated isolation. This sense of being misunderstood contributed to a decline in her sense of self-efficacy and hindered her psychological recovery.



Figure 6: Pain illustration by the 43-year-old Woman with 27 Years of Fibromyalgia

**Case 2:** 60-year-old woman - Visualizing complex pain with icons and onomatopoeia

A 60-year-old woman who has endured fibromyalgia for 30 years, with grip strength below 10, is so physically weakened that even mild exertion like walking causes post-exertional fatigue, leaving her bedridden for 80% of the day. She only leaves the house once or twice a month for medical appointments. She vividly depicted her complex, multilayered pain that radiates throughout her body using icons and onomatopoeia, with illustrations of the human body as the focus.

During this excruciating pain, she experiences a profound sense of loneliness and sadness, feeling that those around her do not fully comprehend the depth of her suffering.

Visual Analysis

The patient's pain is depicted with intricate visual detail, highlighting its complexity and multi-layered nature. Onomatopoeic expressions such as "gabū" and "garigari" vividly convey the gnawing and scraping sensations around the collarbone and shoulder blade. When this pain extends to the sciatic nerve,

it is visualized as a shock-like sensation described as “bean.” This layered representation illustrates the progression of pain, showing how different sensations overlap and intensify, creating a compounded experience for the patient.

Additionally, the curvature of the spine, caused by the weakening of visualized with the expression “boom!” Although this pain is extremely intense, it is sometimes overshadowed by other layers of pain, revealing the daily struggle of the patient. The coldness in her muscles, akin to lying on an ice sheet, is effectively portrayed with onomatopoeic words like “zoon” and “dawn.” These visuals emphasize the multi-layered nature of her pain and demonstrate that visual representation is crucial for a deeper understanding of her experience.

### Theme Analysis

Three primary themes emerged from the patient's narrative:

#### 1. Progression and Multi-layered Pain

The patient's pain has grown more complex and multi-layered over time. Different types of pain interact and intensify her overall suffering. This multi-layered accumulation of various sensations severely impacts her life, indicating that her pain is not a singular experience but a compounded burden that worsens with time.

#### 2. Psychological Impact and Loneliness

The narrative reveals a deep sense of loneliness and sadness. The phrase “I'm smiling on the outside, but crying on the inside” encapsulates the significant psychological toll her pain takes on her. Her sense of isolation exacerbates her psychological burden, suggesting that this loneliness is a barrier to her mental recovery.

#### 3. Impact on Daily Life

Muscle stiffness and spinal curvature severely restrict the patient's ability to perform daily activities. These limitations further intensify her psychological distress. This case underscores the importance of pain visualization in understanding the complexity of the patient's experience and highlights the crucial role of psychological support in pain management.

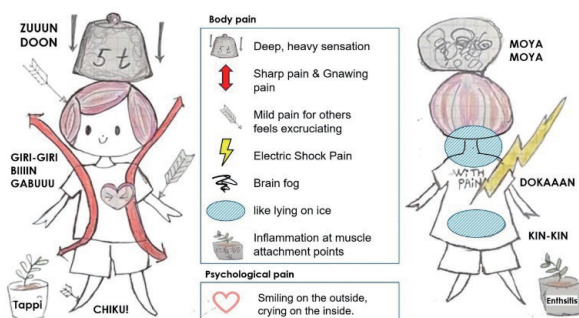


Figure 7: Pain illustration by 60-year-old Woman with 30 Years of Fibromyalgia

### Case 3: A 65-year-old Woman Who Used Onomatopoeia and Body Icons to Express Eight Different Types of Pain

This 65-year-old woman has been living with fibromyalgia for 8 years and works part-time as a lecturer (4 days a week, 4-5 hours a day). She identified and categorized her pain into eight distinct types, using onomatopoeic words to describe each one. To capture the holistic nature of her pain, she employed color-coding

to represent different body parts and used sensory descriptors like cold, hot, and pressure to convey the texture of her pain. Her self-analysis involved tracking the onset and management of each pain type, offering valuable insights into her coping strategies. This case underscores the importance of personalized pain management strategies and highlights the significant impact chronic pain can have on an individual's quality of life.

### Visual Analysis

The patient uses onomatopoeic words to vividly depict eight different pain sensations, effectively visualizing each pain and its management. The use of color and shapes in the graphics offers a detailed portrayal of the pain's texture, location, and intensity. For example, the sharp, persistent pain described as “zuki!” is shown in deep red, indicating a concentrated pain in a specific area. The expression “zowazowa,” representing muscle coldness, is illustrated in blue, conveying the sensation of cold spreading throughout the body. These visuals help provide a more concrete understanding of how the patient experiences pain, making it easier for medical professionals to assess its complexity. Moreover, the use of color and design also reflects the patient's joy in finally being able to express her pain, which had previously been difficult to communicate. This visual expression not only highlights the severity of the pain but also the patient's sense of achievement and the anticipation of smoother communication with others.

### Theme Analysis

Two main themes emerge from the patient's narrative: “pain diversity” and “self-management.” The theme of “pain diversity” is evident as the patient uses onomatopoeia to describe various sensations and details how each type of pain affects her daily life. The narrative illustrates how diverse and complex the pain is, and how much it restricts her daily activities.

The theme of “self-management” is also prominent, as the patient experiments with various methods to manage her pain. Her narrative reveals that she is trying treatments such as trigger point injections, acupuncture, and cryotherapy, and that her sense of self-efficacy is growing as she discovers coping strategies that work for her. Her statement, “there are times when the pain makes me lose confidence, but I have been able to cope with it in my own way,” highlights her successful efforts to manage her pain and the psychological achievement she feels as a result. It is clear that her psychological recovery has been supported by her ability to manage the diversity of her pain through self-management techniques.

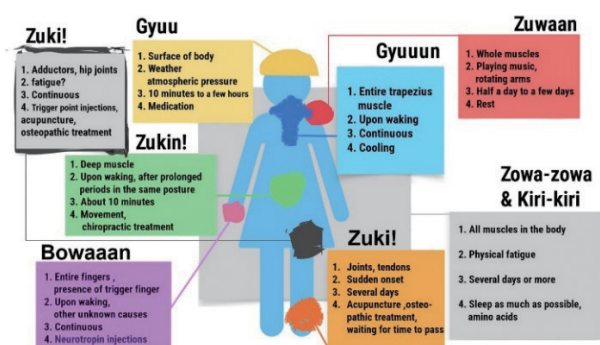


Figure 8: Pain illustration by 65-year-old Woman with 8 Years of Fibromyalgia

## 4. Discussion

### 4.1 Individuality and Multi-layered Structure of Pain

The experience of pain in fibromyalgia is highly individualized, as evidenced by the three cases in this study, which also suggest that pain has a complex, multi-layered structure. We will discuss these themes of “individuality of pain” and “multi-layered structure of pain” in comparison with previous studies.

Firstly, regarding the individuality of pain, as shown by Lorig<sup>[4]</sup>, the way chronic pain patients perceive and manage their pain varies greatly from one individual to another. Similarly, in this study, while the patient in Case 1 experienced an increase in complexity and intensity of pain over time, the patients in Cases 2 and 3 were able to identify different types of pain and find ways to manage each one. These differences are attributable to the patients' life experiences and perceptions of pain, emphasizing the highly individualized nature of pain experiences. However, what was consistently observed across the three cases was the presence of a “multi-layered structure” of pain.

This phenomenon, where multiple types of pain coexist and are perceived as distinct sensations, aligns with Melzack's “matrix theory of pain.” This theory suggests that pain is not a singular sensation but rather a complex mixture of sensory, emotional, and cognitive elements.<sup>[5]</sup> In light of this theory, the “multi-layered structure” observed in this study indicates that patients' perceptions of pain are complex and layered, making pain management particularly challenging.

### 4.2 Enhancing Self-Efficacy through Metacognition of Pain

The process of visualizing and verbalizing pain using onomatopoeia, graphics, illustrations, and colors enabled patients to “externalize” their pain and view it objectively. This externalization triggered a metacognitive effect, allowing patients to observe and understand their pain from a more detached perspective. This process helped them feel that their pain was under their control, contributing to an improvement in self-efficacy. Melzack also emphasized the subjectivity of pain, suggesting that visualization can complement this subjectivity by providing a more concrete understanding<sup>[5]</sup>.

The metacognitive approach through visualization and verbalization provided patients with a “map” of their pain, helping them to organize it more concretely and find appropriate coping strategies. As a result, patients better understood the complexity of their pain and found it easier to develop strategies for managing it. This aligns with Pennebaker's findings that visualization and increased self-efficacy are closely related. Such an improvement in self-efficacy is crucial for effective pain management, as it supports patients in achieving psychological stability while living with pain<sup>[6]</sup>. This process not only contributed to an increase in self-efficacy but also deepened patients' understanding and management of their pain, potentially leading to an improvement in their quality of life.

### 4.3 Social Isolation and the Role of Sharing and Empathy in Pain

Social isolation experienced by fibromyalgia patients arises not only from the pain itself but also from the lack of understanding from others. Pain is a subjective experience, and in fibromyalgia, its severity often goes unnoticed due to the lack of visible signs or diagnostic markers, making patients more susceptible to

feelings of loneliness and misunderstanding. In this study, it was observed that when patients visually expressed their pain using onomatopoeia and illustrations, communication with others was facilitated, and feelings of isolation were alleviated, as reflected in the patients' more relaxed expressions.

Non-verbal tools such as onomatopoeia and graphics proved effective in conveying pain that is difficult to describe verbally. This allowed patients to communicate their pain more effectively to others, reducing their psychological burden through empathy. The assurance that their pain was understood contributed to an improvement in self-affirmation and self-efficacy. Pennebaker et al. demonstrated that verbalizing emotions and experiences contributes to psychological well-being, and this study confirmed that non-verbal means can have a similar effect when verbalization is difficult<sup>[6]</sup>. Sharing pain with others not only alleviated feelings of isolation but also promoted an increase in self-efficacy. This process is a critical element in pain management and psychological recovery, indicating that social support plays a significant role in treatment.

Overall, the sharing and empathy of pain are essential in preventing social isolation and promoting psychological recovery in fibromyalgia patients. The use of non-verbal tools in pain expression plays a crucial role in achieving this.

## 5. Conclusion

This study explored how the process of visualizing and self-analyzing pain among fibromyalgia patients can lead to new interpretations and expressions of their pain, and how this contributes to psychological recovery. The use of onomatopoeia and graphics allowed patients to perceive and communicate their pain more concretely and visually. This process of visualization and verbalization functioned as a means to externalize and objectively understand their pain, which contributed to the enhancement of their self-efficacy and self-affirmation. By providing a foundation for organizing the complexity of their pain and finding appropriate coping strategies, patients were better able to manage their pain. Additionally, being able to interpret and express their pain enabled patients to share their experiences with others, reducing their sense of social isolation. These processes were shown to be not only tools for pain management but also essential for promoting psychological recovery.

However, it is important to note that this study was limited to three cases, and thus, generalizing the results requires caution. Future research should focus on a more diverse group of patients, examining how cultural backgrounds and individual personalities influence pain interpretation and management. This will help establish more effective and comprehensive treatment approaches for fibromyalgia patients.

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# The History and Future Prospects of Dental Caries Treatment

INOUE Takanobu

Digital Hollywood University, Graduate School

HOSHINO Hiroyuki

Digital Hollywood University, Graduate School, Project Professor

This report explains the evolution and future prospects of dental caries treatment. It traces the history of caries detection and removal techniques, from traditional methods to modern technologies like NIRI and laser fluorescence. The study highlights advancements in filling materials, particularly the widespread use of composite resins. Looking ahead, the note explores potential innovations such as intraoral milling machines, nanotechnology-based selective caries destruction, and 3D printing for direct resin application. The integration of AI for automated diagnosis is also discussed. While these technologies promise more precise and less invasive treatments, the paper acknowledges the challenges in their practical implementation and emphasizes the need for continued research and development in the field.

## 1. Introduction

Caries treatment is a crucial aspect of dental care and has been practiced since ancient times. The oldest documented account is found in Pierre Fauchard's (1678-1761) "Le Chirurgien Dentiste, ou Traité des dents". Caries treatment consists of three main components. The first step is identifying carious lesions accurately removing the carious dentin, and finally, in the case of direct treatment, filling and sealing the cavity. This report examines potential future advancements in these procedures.

## 2. Dental Caries

Dental caries (tooth decay) is a multifactorial disease that causes demineralization and destruction of tooth hard tissues. It is among the most prevalent chronic diseases worldwide, affecting individuals of all ages. Caries occurs when oral bacteria metabolize fermentable carbohydrates, producing acids that lower the pH in the oral environment<sup>[1,2]</sup>. This acidic environment causes the dissolution (demineralization) of tooth minerals, primarily hydroxyapatite<sup>[1]</sup>.

Various factors influence the development of caries:

- a. Presence of cariogenic bacteria such as *Streptococcus mutans* and *Lactobacilli*<sup>[1]</sup>
- b. Frequent consumption of fermentable carbohydrates<sup>[1]</sup>
- c. Inadequate oral hygiene practices<sup>[1]</sup>
- d. Decreased salivary flow or changes in saliva composition leading to reduced buffering capacity<sup>[1,2]</sup>
- e. Genetic factors affecting enamel formation and quality<sup>[1]</sup>

Caries can affect both the crown (coronal caries) and root (root caries) of the tooth. If left untreated, it can progress through the enamel and dentin, potentially reaching the pulp and causing severe pain and infection<sup>[1,2]</sup>. Early detection and intervention are crucial for preventing caries progression and maintaining oral health<sup>[2]</sup>.



Figure1: dental caries in extracted tooth

## 3. History of Caries Detection

Caries detection techniques have evolved over time.

One of the oldest diagnostic methods is detection based on hardness during excavation. When a tooth is infected with caries, the dentin softens due to the destruction of the hydroxyapatite crystal structure by acids produced from sugar by bacteria such as *Streptococcus mutans*. Carious dentin shows a significant decrease in Vickers hardness compared to normal dentin. While the hardness of healthy dentin is about 50-60 HV, carious dentin decreases to about 20-30 HV.

This difference allows for the detection of carious areas by the sensation of cutting instruments. Current spoon excavators and contra-angle steel burs are designed based on this principle, only able to cut the low-hardness carious dentin. This allows for effective removal of carious portions while protecting healthy tooth structure<sup>[3,4]</sup>.

For visual caries detection, areas stained by solutions have been diagnosed as caries. In 1972, Fusayama et al. found that 0.5% basic This staining method has been widely used as a means of accurately visualizing carious areas<sup>[5]</sup>.

X-ray imaging and CT scans are widely used to accurately assess the progression of caries by providing detailed images of the internal structure of teeth. These methods enable the detection of deep caries in areas that cannot be visually confirmed<sup>[6]</sup>.

In recent years, more non-invasive methods have been developed and are beginning to be used clinically, such as Diagnodent, which uses visible light laser fluorescence reflection<sup>[7]</sup>, and NIRI (Near-Infrared Reflectance Imaging) technology<sup>[8]</sup>. These technologies allow for non-invasive imaging of the body and internal tooth structure, enabling early detection of caries.



**Figure2: Caries detection by NIRI**

The caries area was visualized using NIRI technology. The red circle on the right side is displayed as white, and the hard tissue in that area has been destroyed. Align Technology's iTero 5D Plus was used.

#### 4. History of Caries Removal

The development of removal techniques in caries treatment has greatly contributed to the advancement of dental care. The first major development in this field was the foot-pedal drill invented by American dentist James Beall Morrison in 1871. This drill achieved a significantly higher rotation speed (about 2000 RPM) compared to conventional hand drills, greatly improving the efficiency of cavity preparation<sup>[9]</sup>.

The subsequent development was the air turbine developed by John Patrick Walsh from New Zealand in the 1950s. This technology used compressed air to rotate the drill at speeds (up to 400,000 RPM) that surpassed the electric drills of the time. This technology became indispensable in subsequent dental treatments.

Air turbines rotate diamond burs using air pressure, resulting in low torque. To improve torque, gear-driven 5x speed contra-angle handpieces were developed, achieving 40,000 RPM. Modern technology includes a cooling function that directly sprays water onto the cutting site to address the risk of pulp damage from heat generated during cutting<sup>[10]</sup>.

Methods using lasers for caries removal and solvents like Carisolv to dissolve only caries also exist, but they are not widely used in clinical settings due to their lower removal efficiency compared to rotary cutting instruments.



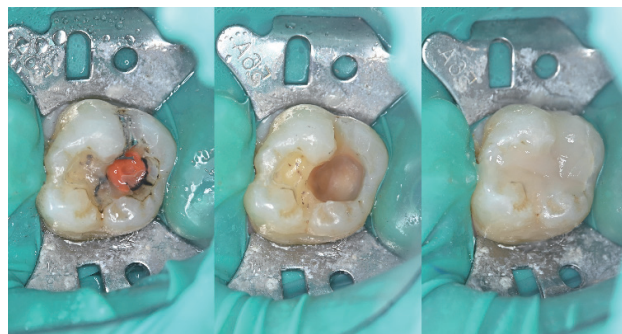
**Figure3:High speed dental handpiece**

The turbine head can be fitted with any cutting burr, has lights and can spray water and wind while cutting.

[https://www.japan.nsk-dental.com/products/contra-angles/contra-ti-max\\_x/](https://www.japan.nsk-dental.com/products/contra-angles/contra-ti-max_x/) (accessed2024-08-31)

#### 5. History of Cavity Filling

After removing caries, materials are inserted to fill the excavated area. Fauchard's book described the use of gold foil or mercury for filling, but currently, composite resins are widely used. Composite resins improve wear resistance by incorporating ceramic fillers into the resin<sup>[10]</sup>. Furthermore, light-curing technology allows for rapid hardening in the oral cavity<sup>[11]</sup>.



**Figure4: caries treatment procedure**

Cavity and old fillings are removed to expose a fresh surface which is then filled with composite resin.

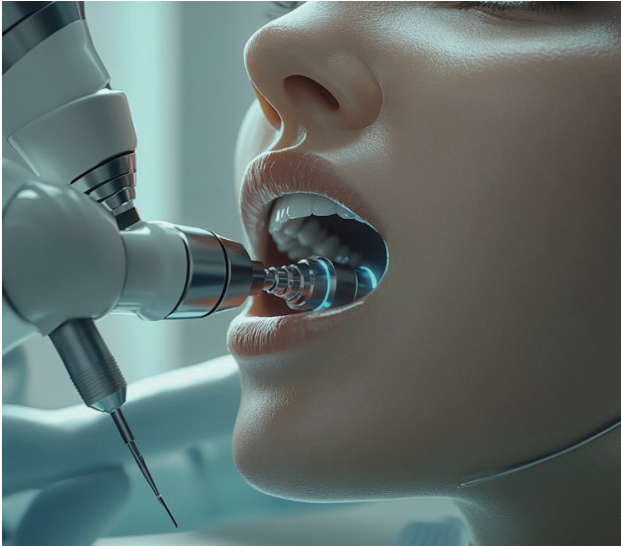
#### 6. Future Caries Removal Technology

The need to cut hard tissues is likely to continue in the future. Current cutting technologies face several challenges. In particular, the impact of heat and vibration generated during cutting on the dental pulp and surrounding tissues is a significant issue that cannot be ignored<sup>[4]</sup>. Moreover, enamel is extremely hard, with a Vickers hardness of about 343-430 HV<sup>[1]</sup>. Cutting tools with high torque and rotation speed are required to deal with this hardness<sup>[4]</sup>.

In the future, it is possible that systems will be introduced where small milling machines are inserted into the oral cavity, with drills moving freely like CAM systems, controlled by cameras. These systems are expected to have functions for power supply, water injection, and drainage via cords, greatly improving treatment efficiency.

With the advancement of nanotechnology, it may be possible in the future to realize systems that selectively destroy carious sites at the molecular level<sup>[12]</sup>. For example, mechanisms where specific nanoparticles bind only to carious portions and those portions are selectively destroyed using lasers or ultrasound are being considered. This technology is expected to enable more accurate and effective treatment while protecting the surrounding healthy tooth structure.

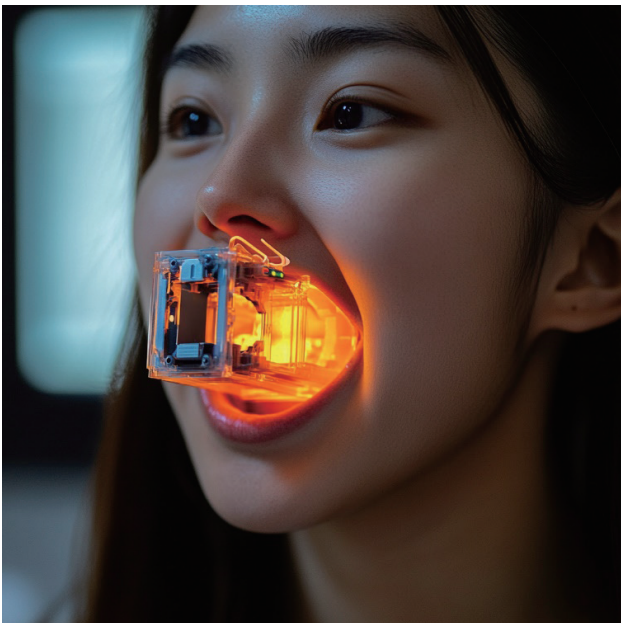




**Figure5 Future intraoral milling machine**

## 7. Future of Filling

In the future, methods using small 3D printers inserted into the oral cavity to directly 3D print resin onto teeth are expected to become mainstream. This technology is anticipated to shorten treatment time and improve accuracy. Additionally, AI-based automatic diagnosis will be used to determine the areas for excavation<sup>[13]</sup>.



**Figure6 Intraoral 3D printer**

## Conclusion

Future caries treatment has the potential to evolve significantly with the development of nanotechnology, AI, and 3D printing technologies. These technologies are expected to enable more precise and less invasive treatments, greatly reducing the burden on patients. However, many challenges remain for the practical application of these technologies, and it is anticipated that it will take time to resolve them. It is hoped that with the progress of future research and development, even more effective and patient-friendly caries treatment methods will be established.

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# Trends in Ethical Principles in Corporate AI Implementation

OZAWA Yasumasa

Digital Hollywood University, Graduate School

As artificial intelligence (AI) becomes increasingly integral to enhancing corporate competitiveness, attention to ethical principles during its implementation is crucial. This research note examines the evolving trends in ethical principles that companies should prioritize when adopting AI. Failure to address these ethical considerations may not only lead to suboptimal outcomes but also harm the company's reputation and long-term performance. By analyzing current trends, this note aims to provide guidance for companies on how to practically apply ethical principles in AI implementation, effectively balancing technological advancement with social responsibility.

## 1. Introduction

Artificial intelligence (AI) has great transformative power and significant implications for societies and economies around the world. AI is playing an increasingly important role in shaping the development of economies and financial sectors, and is expected to drive productivity and economic growth through increased efficiency, improved decision-making processes, and the creation of new products and industries. However, companies that proceed without taking into account the complexities of AI ethics and data integrity may harm their reputations in pursuit of short-term gains.

For instance, according to IBM's "The CEO's guide to generative AI"<sup>[1]</sup>, executives understand what is at stake in rushing to adopt AI, including the risk of damaging reputations for short-term gains, and 58% of them believe that the introduction of generative AI will increase significant ethical risks. And these risks will be very difficult to manage without new, or at least more mature, governance structures. However, many companies are struggling to put the principles into practice. 79% of executives say AI ethics are important for their company-wide AI approach, but less than 25% of companies are operationalizing common principles of AI ethics.

To illustrate, according to PwC Japan's "AI Predictions for 2023"<sup>[2]</sup>, when only companies in Japan and the US that have already implemented or are considering implementing AI governance were surveyed, the results were as follows. In Japan, 228 companies were surveyed, and in the US, 840 companies were surveyed.

Among these, 22% of Japanese companies and 40% of US companies responded that they are considering establishing an ethics committee. Additionally, 5% of Japanese companies and 0% of US companies reported that their governance measures are being implemented or progressing without any problems.

These results highlight the fact that even companies that have already implemented AI governance or are considering it are not necessarily doing so well.

Furthermore, according to the Information-Technology Agency, Japan's "Survey Report on Security Threats and Risks When Using AI"<sup>[3]</sup>, only respondents who indicated that they use, authorize, or plan to use AI (n=1,000) were asked whether they have established rules and systems related to security when using generative AI.

The survey results revealed that while approximately 60% of

respondents perceive threats related to AI security, less than 20% have established, documented, or systematically considered such rules. Even when including companies that have detailed security rules in place, the proportion remains at only around 40%.

This indicates a significant gap between the perceived risks and the implementation of security measures.

These data show that while companies recognize that AI ethics and governance are important, they are not taking sufficient measures. In this research note, I discuss the ethical benefits of introducing AI from the perspective of effective accelerationism and effective altruism, and present a cycle that satisfies stakeholders without separating ethical behavior from business behavior.

## 2. Effective Altruism and Effective Accelerationism

### 2.1 Effective Accelerationism

Effective accelerationism (e/acc) is a philosophy that aims to reform society through the promotion of technology and capitalism. This idea has gained a great deal of support, especially in the technology industry in Silicon Valley. It has become popular through platforms such as Twitter and Substack since around 2022, and many entrepreneurs and investors agree with this idea.

The main tenet of e/acc is to accelerate technological progress indefinitely and embrace the social and economic changes that arise in the process. This idea is at odds with voices that emphasize the safety of AI as research and development of AI progresses rapidly. In some parts of the tech industry, there is a growing argument that "technological progress should be accelerated without regulating technology," and some have said that "AI regulation advocates are pessimists."

Supporters of this idea include prominent venture capitalists and executives of major accelerators. For example, Marc Andreessen of Andreessen Horowitz and Gary Tan, CEO of Y Combinator, have expressed their support for effective accelerationism. They aim to maximize innovation and market-driven growth through this idea.

However, it has also been pointed out that the promotion of this rapid technological progress may give rise to social costs and ethical issues. Effective accelerationism aims to simultaneously advance technological progress and social reform, but there is currently no clear guideline established for how to deal with the various problems that arise in the process.

## 2.2 Effective Altruism

Effective Altruism (EA), as a social movement, aims to solve the world's problems in the most effective way. The movement has divided employees and executives of AI development companies, especially in Silicon Valley, demonstrating its influence. EA pursues ways to generate the greatest social impact based on reason and scientific evidence. This approach plays an important role, especially in the development of conversational AI.

EA advocates emphasize safety and ethical issues in AI research and development. They argue that a more cautious approach should be taken to the potential risks posed by technological advances. This way of thinking calls for a balance to deal with rapid progress and the ethical challenges that come with it, especially in artificial intelligence research.

The Effective Altruism (EA) movement has also significantly contributed to the development of ethical guidelines for AI. Through the EA framework, discussions have focused on critical issues such as how AI can enhance human welfare and how to ensure fairness in AI decision-making processes. By addressing these considerations, the EA movement aims to advance technological progress while carefully managing its societal impact.

However, there is a major divide between effective accelerationists and effective altruists regarding their approach to AI.

## 3. Advantages of Effective Altruism for Companies

There are several reasons why companies choose services from companies based on EA when introducing AI.

1. Ethical Considerations and Social Responsibility: EA is a philosophy that aims to maximize the benefit of others in the most effective way. By choosing a service based on this philosophy, companies can ensure that ethical considerations and social responsibility are taken into account when introducing AI. For example, the potential risks and impacts of AI can be evaluated in advance to ensure that it is beneficial to society.
2. Sustainable Growth: Companies that advocate EA do not simply pursue profits, but aim for sustainable growth from a long-term perspective. Even when introducing AI, the use of technology in a way that does not negatively impact the environment or society is prioritized, improving the sustainability of the company.
3. Trustworthiness and Transparency: Companies that practice EA place importance on trust and transparency. This ensures that data handling and decision-making processes are transparent even in AI introduction projects, increasing trust in the partnership. It is expected that companies will be able to appropriately respond to the ethical issues and challenges they face when introducing AI.
4. Reputation Management: A company's reputation as a socially responsible and ethical company is an important factor for consumers and investors. Partnering with a company based on EA can improve a company's social reputation and increase brand value.
5. Innovation and Leadership: Companies that engage in EA are proactive in innovating to maximize the benefits to society as a whole. Even in the introduction of AI, they can be expected to provide innovative technologies and solutions, helping companies establish leadership in their industries.

For these reasons, it can be said that companies considering introducing AI can benefit greatly in terms of ethical considerations, social responsibility, sustainability, improved trust, and reputation and innovation by choosing the services of a company based on EA.

## 4. Implications of AI Ethical Guidelines

According to "AI Ethics in the Age of Generative AI"<sup>[4]</sup>, as awareness of the risks and potential harms of AI grows, government agencies, AI development companies, and researchers have formulated various ethical guidelines for AI, called ethics codes, guidelines, statements, policies, principles, frameworks, etc., to seek healthy and reliable research, development, and use of AI.

Can various ethical guidelines for AI (AI guidelines) have an impact on society and guide government agencies, companies, academic institutions, and citizens in the healthy use and development of AI? Recent research on AI ethics has harshly criticized AI guidelines in the digital field for being used to deceive consumers, evade regulations, and buy time for lobbying activities to weaken regulations. In the field of environmental ethics, the deceptive and dishonest practices of companies and government agencies that attempt to appear more environmentally friendly, sustainable, and ecologically friendly than they actually are are sometimes called "green washing". Similarly, in the digital field, companies and government agencies have been criticized as "ethics washing" for pretending to have a greater moral responsibility to citizens and a wide range of stakeholders than they actually do. Building on these arguments, Munn<sup>[5]</sup> has ignited controversy by arguing that the AI guidelines are "useless" and being used as a tool for ethics washing.

While it may be true that AI guidelines are not fully implemented across all organizations, this does not mean that the guidelines themselves are "useless." Instead, this indicates the need for stricter oversight and enforcement mechanisms to ensure their effectiveness. Ethical guidelines not only encourage organizations to voluntarily fulfill their responsibilities but also highlight the necessity for external pressure and regulation.

The risk of "ethics washing" is indeed real, but dismissing AI guidelines entirely due to this risk is an overreaction. To prevent ethics washing, it is crucial to ensure transparency and establish third-party audits so that guidelines do not remain superficial statements. Additionally, including diverse stakeholder perspectives in the development of guidelines can make them more fair and effective, ensuring that ethical responsibilities lead to concrete actions rather than mere "window dressing."

AI guidelines may not be flawless in the short term, but in the long run, they can play a crucial role in establishing ethical standards for AI development and usage. Historical precedents show that guidelines and norms often evolve over time to influence corporate behavior. Similarly, AI guidelines have the potential to drive sustainable change as societal awareness and technology continue to advance.

The argument that AI guidelines are "useless" underestimates their potential value and capacity for evolution. While the risk of "ethics washing" exists, this should not lead to the outright dismissal of guidelines. Instead, efforts should be directed towards strengthening these guidelines and enhancing their effectiveness. Ethical guidelines are vital tools for promoting responsible AI

practices, and when properly implemented, they can significantly contribute to society.

## 5. Effective Accelerationism

If a company chooses to adopt services provided by a company based on e/acc instead of EA, especially in the context of the EU Artificial Intelligence Act (AI act), the company's executives could face several significant risks:

### 1. Legal Risks and Penalties

The EU's AI Act emphasizes the importance of safety and ethics in AI development and usage, with strict regulations, especially for high-risk AI systems. e/acc prioritizes rapid technological advancement, which may lead to the disregard of these regulations. This could result in the following risks:

**Hefty Fines:** If a company violates the AI Act, the EU can impose substantial fines. Specifically, companies may face penalties of up to 7% of their annual global turnover. Such fines can have a severe impact on the company's financial health.

**Legal Liability:** If regulatory violations are discovered, company executives may also face personal legal liability. If executives are found to have knowingly allowed these violations, they could be subject to legal actions, including criminal penalties.

### 2. Failure in Risk Management

Services based on e/acc aim to accelerate technological progress, which might result in inadequate risk management procedures as required by the AI Act. This can expose companies to the following risks:

**Lack of Compliance:** If AI systems do not meet the necessary risk assessments and audit procedures, regulatory authorities may increase scrutiny, potentially disrupting business operations.

**Product Recalls or Suspension Orders:** If non-compliant AI systems are released into the market, companies risk facing product recalls or orders to suspend usage. This can lead to a significant loss of market trust.

### 3. Reputation Risks

While AI services based on e/acc might appear innovative in the short term, neglecting ethical concerns can severely damage a company's reputation. Given the enforcement of the EU's AI Act, the following risks are pertinent:

**Loss of Consumer Trust:** If regulatory violations come to light, companies may lose the trust of consumers and partners, leading to a substantial decline in brand value.

**Pressure from Investors:** Investors who prioritize social responsibility are likely to avoid companies that violate regulations. This could make it difficult for the company to secure funding.

### 4. Restricted Market Access

The EU, through the AI Act, promotes the use of safe and ethical AI systems. Companies that do not comply with these regulations risk restricted access to the EU market.

**Market Exclusion:** Companies that violate regulations could be effectively excluded from the EU market, resulting in significant economic losses, particularly for those reliant on access to the EU market.

If a company's executives choose to adopt services based on e/acc, they face substantial risks in light of the EU's AI Act, including legal risks, risk management failures, reputation

damage, and restricted market access. These risks can have serious implications for the company's financial stability, credibility, and long-term sustainable growth, necessitating careful consideration in decision-making.

## 6. Conclusion

The choice between Effective Altruism (EA) and Effective Accelerationism (e/acc) is not just a philosophical debate. It has tangible implications for companies, especially in the context of AI governance. While e/acc emphasizes rapid technological progress and market-driven growth, it carries significant risks, particularly in light of stringent regulations like the EU's AI Act. These risks include legal penalties, failure in risk management, reputational damage, and potential exclusion from critical markets.

On the other hand, adopting principles based on EA offers a more balanced approach. Companies that align with EA can benefit from ethical considerations, social responsibility, and sustainable growth. By prioritizing transparency, trustworthiness, and innovation that serves societal well-being, EA-aligned companies are better positioned to navigate the complex landscape of AI ethics and governance.

Moreover, while criticisms like "ethics washing" raise valid concerns about the superficial application of AI guidelines, dismissing these guidelines outright would be shortsighted. Instead, efforts should focus on strengthening these frameworks, ensuring they are robust, enforceable, and inclusive of diverse stakeholder perspectives. Over time, well-implemented guidelines have the potential to shape responsible AI practices that align with both ethical standards and business objectives.

In conclusion, companies should carefully weigh the benefits of sustainable, ethical AI practices against the short-term gains of unchecked accelerationism. By choosing to integrate EA principles into their AI strategies, companies can mitigate risks, enhance their reputation, and contribute to a future where technological advancement and ethical responsibility go hand in hand. This balanced approach not only supports long-term growth but also aligns with the increasing demands for corporate accountability in the digital age.

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3F/4F Ochanomizu Sola City Academia,

4-6, Kandasurugadai, Chiyoda-ku, Tokyo, 101-0062, JAPAN

+81-3-5297-5797

<https://www.dhw.ac.jp/>

[journal@dhw.ac.jp](mailto:journal@dhw.ac.jp)

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