Chapter 9
Cybernetic Avatars and Society

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Abstract Toward a future symbiotic society with Cybernetic Avatars (CAs), it is crucial to develop socially well-accepted CAs and to discuss legal, ethical, and socioeconomic issues to update social rules and norms. This chapter provides interdisciplinary discussions for these issues from the perspectives of technological and social sciences. First, we propose avatar social implementation guidelines

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and present studies that contribute to the development of socially well-accepted CAs. The second part of this chapter addresses the ethical and legal issues in installing CAs in society and discusses solutions for them.

9.1 Introduction

Cybernetic Avatars (CAs) are an innovative technology that enables people to extend their physical, cognitive, and perceptual capabilities and become free from the constraints of time and space. Therefore, CA technologies may affect human life, including workstyles and communication with others. Toward such a future in a symbiotic society with CAs, it is crucial to study design methods for socially well-accepted CAs. In addition to technological issues, it is indispensable to discuss legal, ethical, and socioeconomic issues to update social rules and norms in order to realize a future society with CAs. To envision the implementation of CAs in society, this chapter provides interdisciplinary discussions on these issues from technological and social science perspectives.

Section 9.2 discusses the aspects of CA ethics that need to be considered when installing CAs in society, based on which, we propose avatar social implementation guidelines that consider concern and trust issues in the development of CAs, followed by a description of a use case and a discussion of the steps to disseminate CA guidelines in society.

Section 9.3 focuses on the technologies for socially well-accepted CAs by overviewing the moral problems specifically occurring in communications through CAs and proposes "moral computing" research that challenges to solve these problems. As examples of moral interaction research with CA, we propose a CA guardsman and CA cashier that can change inappropriate language from remote workers working as guardsmen or cashiers, to appropriate and polite language. As another aspect of social acceptance of CAs, we review the literature on cultural differences in human communication and discuss culturally adaptive social robots. As the third topic of this section, we propose a SOCIAL-PIA model consisting of environmental perception, intention inference, and sharing cooperative plans. A handover task between a human and a robot is presented as a use case for the SOCIAL-PIA model.

Section 9.4 discusses the ethical issues of CAs by focusing on two aspects: the impact of CAs on people's work and life and the ethical issues of gendering CAs. We then discuss how human society addresses ethical issues when encountering new technology.

Section 9.5 discusses the legal issues for CAs by defining the legal status of CAs and discussing corporate CAs separately from individual ones. We then show that not only ELSI issues but also Ethics, Law, Society, and Economics (ELSE) issues should be considered when installing CAs in society.

Section 9.6 discusses the use of CAs in election campaigning. In terms of using new technologies in elections, past cases of Internet use are presented.

9.2 Implementing Cybernetic Avatars in a Society

In human history, the introduction of new technology that significantly impacts people's lives has necessitated discussions on their application, use, and the need to update social rules and ethics to ensure their acceptance and dissemination in society. Regarding misuse, even if the technology is used in a way that the developer did not intend, it may cause social problems and lead to social condemnation of the developers. Therefore, defining and sharing social norms with people in society are indispensable for implementing new technologies. Given the potential of Cybernetic Avatar (CA) technology to revolutionize people's lives and work, it is imperative to establish ethical guidelines for CA. However, there are no regulations regarding the development and use of CA. In this section, we present a comprehensive discussion on the ethical considerations and factors that should be contemplated when implementing CA in society, along with guidelines for doing so. We also discuss further actions to disseminate these guidelines to the public.

9.2.1 Legal, Ethical, and Socioeconomic Principles for CA

As CA technology is deeply related to and developed based on Artificial Intelligence (AI) and robotics, which have recently been changing human lives, we begin by reviewing the legal and ethical principles of AI and robotics. In 2019, OECD and partner countries adopted policy guidelines on AI (OECD 2019) that aim to ensure robust, safe, fair, and trustworthy AI systems by upholding international standards. In 2019, the European Commission's expert group proposed ethical principles for trustworthy AI, including respect for human autonomy, prevention of harm, fairness, and explicability (European Commission 2019). Through this preparation, in 2021, the European Commission proposed minimum requirements to address the risks and problems associated with AI (EUR-Lex 2021). In 2021, UNESCO proposed a recommendation for AI ethics, which consists of four primary values for AI systems: AI systems should work for the good of humanity, individuals, societies, and the environment (UNESCO 2021).

Among AI principles proposed by academia, one of the earliest proposals is the Asilomar AI principles (Asilomar Conference 2017), which were formulated by over 100 researchers at the Asilomar conference organized by the Future of Life Institute. The principles consist of three parts: research issues, ethics and values, and long-term issues. As a proposal from an academic association, the IEEE, a professional association for electronic and electronics engineers, proposed General Principles of Ethical Autonomous and Intelligent Systems (IEEE SA 2019).

For the ethics on robotics, the European Parliament proposed civil law and ethical aspects of robotics, which were updated in 2017 (European Parliament 2017). The code of conduct for robotics engineers includes the principles of beneficence, non-maleficence, autonomy, and justice.

Despite the numerous proposals for AI ethics, articles that have reviewed AI principles have found a remarkable degree of coherence and overlap among them (Floridi et al. 2018; Morley et al. 2020). Floridi et al. (2018) proposed five common principles: beneficence, non-maleficence, autonomy, justice, and explicability. Beneficence refers to the principle of promoting well-being, preserving dignity, and sustaining the planet. Non-maleficence is the principle of avoiding negative consequences, particularly for privacy and security. Autonomy is the principle of an individual's right to make decisions, whether to decide by ourselves or delegate the decision to AI agents. Justice is the principle of promoting prosperity and preserving solidarity, while seeking to eliminate discrimination. Explicability is a principle of intelligibility and accountability, which can be expressed as transparency. Except for explicability, four principles of AI ethics are commonly proposed in robotics ethics (European Parliament 2017). Therefore, we adopted these five principles as the fundamental principles of CA ethics and added instrumental principles that protect and promote the core principles (Canca 2020). Table 9.1 list these principles.

Some instrumental principles contribute to the multiple core principles. For example, good behavior change can be advantageous for humans, while bad behavior change should be discouraged. Diversity should be considered in defining social justice and in decision-making.

9.2.2 Avatar Social Implementation Guidelines

Based on the discussion for principles of CA ethics in Sect. 9.2.1, we proposed guidelines for avatar social implementation. Although not all the principles are mentioned in the guidelines, this is the first draft of the CA ethics guidelines, which we designed to be as concise as possible.

<Preamble>
Innovation can make significant strides toward diversity and inclusion. The Moonshot R&D program aims to create a world where people can operate freely through avatar-related innovations. These guidelines are aimed at developers of

Table 9.1 Principles of CA ethics

Core principles	Instrumental principles
Beneficence	Human rights, dignity, sustainability and inclusive, well-being, trust and trustworthy, behavior change
Non-maleficence	Privacy, safety, security, anonymity, trust and trustworthy, disruptive behavior and harassment, psychological impacts, behavior change, error
Autonomy	Identity, diversity
Justice	Discrimination and disparity, rule of law, trust and trustworthy, democracy, literacy, morality, diversity
Explicability	Responsibility and accountability, trust and trustworthy

Cybernetic Avatars (CAs) and summarize the main aspects to be considered when implementing avatar-related innovations in society.

Due to the rapid pace of technological progress, new technologies often lack usage guidelines. However, they should continue to progress while maintaining a balance between R&D and social implementation, with the primary goal of enhancing social well-being. It is imperative to address issues of concern and trust, including legal and ethical considerations to ensure widespread adoption of new technologies.

<Solicitude>
In addition to general considerations for ensuring the reliability of information systems, the following can be considered as ways of addressing issues related to concern and trust in the development of CAs:

1. **Solicitude for Operators**

   (Safety) It is recommended to provide instructions to users to prevent them from using the CA inappropriately or equip the CA with functions that inhibit such behaviors.

   (Secure) The operator's consent should be obtained for the use of the operator's operating record.
2. **Solicitude for Users**
   (Safety) It is recommended to provide instructions to operators to prevent inappropriate use of CA, or equip the CA with a function that prevents such behavior.
   (Secure) CA operations may be performed autonomously by AI; it is desirable to indicate this fact to users while the AI is in operation.

<Dissemination>
Goals to be aimed at the spread of CA to society include the following;

- Anyone should have equal opportunities to use CAs. Therefore, when developing CAs, accessibility considerations are necessary to ensure that everyone (e.g., children, people with disabilities, and the elderly) can use CAs.
- To improve productivity, it is recommended that an individual utilizes multiple CAs.
- It is recommended to improve the service quality by using CAs.
- CAs must be acceptable to users, operators, and other relevant people. Therefore, it is recommended to consider the purpose and environment of CA usage in designing CA.
- It is recommended to contribute to a sustainable society by reducing the emissions of greenhouse gases, such as CO_2, using CAs.
- It is recommended to provide literacy education to properly use CAs in society.

9.2.3 Use Case

In this subsection, we present a possible use case and demonstrate how the guidelines proposed in Sect. 9.2.2 can be applied to the service or application of the use case.

Suppose that Mr. A works remotely as a shop clerk at a convenience store. Mr. A operates his CA from his home, far from the store. To prevent customer harassment, it is desirable to provide instructions to the store customers not to abuse CA clerks. It is also useful to provide CA functions that prevent customer harassment behaviors. One possibility is to automatically detect and admonish inappropriate behavior. To ensure the security of the CA operator when recording the operating log, it is necessary to obtain consent from Mr. A.

For convenience store customers, it is desirable to instruct CA operators not to serve customers improperly, for instance, crudely providing customer service. It is also recommended to provide functions to prevent CA clerks from performing inappropriate operations, such as automatically changing the clerks' tone of voice. To ensure customer security when the clerkship avatar is AI-controlled, it is recommended to provide customer notification.

9.2.4 Steps Toward Disseminating CA Guidelines in Society

As reviewed in Sect. 9.2.1, the principles are listed in AI ethics. However, as Prem (2023) suggests, these principles are defined at very high levels and do not specify how to realize them or translate them into operationalizable actions. Moreover, ethical standards may differ depending on the culture or community. Therefore, to put principles into practice, it is crucial to specify system requirements and develop tools and technologies to concretely address ethical issues. In this process, communication between developers and potential end-users is indispensable. Moreover, in the final step of the CA ethics practice, assessing the ethical aspects of the developed CAs is necessary. At this stage, the development of assessment tools is necessary.

9.3 Technologies for Implementing Socially Well-Accepted CAs

This section presents studies contributing to the development of socially well-accepted CAs. To this end, the following subsection focuses on the following three topics: moral computing, culturally adaptive design, and cooperative human–robot interaction.

9.3.1 Moral Interaction with Cybernetic Avatars

This subsection provides an overview of the "moral problems" that arise when moving from face-to-face to interactions using Cybernetic Avatars (CAs). We introduce "moral computing for CAs" and explain why achieving a harmonious cohabitation between the people and CAs is essential. We provide information on the current state of moral computing, outline our plans, and discuss the likely development of moral computing.

In many developed countries, including Japan, serious problems related to aging populations and the subsequent decline in the working population are emerging. As such, there are high expectations for robots and AI regarding their replacement or, at least, assisting human workers by taking on roles such as security guards, cashiers, clerks, receptionists, delivery personnel, attendants, and cleaners. Recent advances in robotics have demonstrated the feasibility of automating specific tasks, including parcel delivery. However, fully autonomous robots are not ready to perform most tasks requiring human-level communication skills. This space is designated for the deployment of CAs as "avatar workers" who interact with people in the service industry. We focus on CAs that engage in interactions with people to facilitate discussion and illustrate our presentation. Given the first potential for large scale use of CAs in this field, it is imperative to address the issue urgently. To facilitate clarity, we will henceforth refer to the worker operating the CA as the "remote worker" and the person interacting with the CA as the "customer" in the remainder of this subsection.

First, we evaluate the feasibility of substituting in-person workers with remote workers who perform the same tasks using CAs. Potential difficulties become apparent when the specifics of in-person workers are considered more closely. For example, fast-food cashiers greet customers in a friendly manner by politely taking and delivering orders. However, at a less perceptible level, cashiers also observe the environment from a human perspective. This aspect is crucial as the presence of "human eyes" can prevent some unscrupulous people from disturbing others or deteriorating the environment. A sense of order and security can be established by deterring low-moral behavior through the observation of others.

Concurrently, cashiers are themselves subject to the presence of "human eyes." They work in an environment in which people can see all their actions. Particularly, they face customers in person in an environment that encourages them to do their best and provide services with great professionalism. Specifically, being physically in the environment makes it difficult to ignore customers' requests and to behave in a rude manner.

Concerning a CA cashier, the "human eyes" of an in-person worker are replaced by those of a remote worker. To ensure environmental compliance, we must examine whether a remote worker can exert comparable peer pressure through the CA. In an adjacent context, surveillance cameras may already provide such functionalities, as one could argue. Certainly, surveillance cameras can inhibit serious crimes but cannot prevent low-moral behavior. Recently, the

problem of low-moral behavior has become more serious, even in cities where large networks of surveillance cameras have been installed (Velastin 2005; Gayet-Viaud 2017). Simply watching people who engage in low-moral behavior is not enough; interactions with them are necessary. If CAs can perform their duties in a friendly and accommodating manner while simultaneously monitoring the environment, similar to in-person cashiers, they may be accepted by society without raising ethical, legal, or societal concerns that could lead to fear of becoming a surveillance society.

When CAs are used to provide services, remote workers are not subject to direct pressure from customers. Thus, we anticipate a novel phenomenon—a substantial increase in unethical conduct aimed at customers. For example, when working in person, ignoring a customer is very difficult, whereas it is relatively easy behind the screen. Similarly, confronting a customer or starting an argument is less worrying behind the screen. We can draw an analogy between online and offline behaviors, where people tend to exhibit more negative behavior when interacting on the Internet than in face-to-face interactions. Of course, this issue depends on the remote workers' level of accountability and anonymity. However, we can imagine situations easily getting out of hand when remote workers are tired, stressed, or upset. If we do not want people to judge that the services provided by CAs are of inferior quality or even worse, plain rude, we must address this issue by preparing safeguards to handle remote worker issues.

Customers interacting with CAs may experience reduced social pressure to behave politely, leading to increased incidence of low-moral behavior directed toward remote workers. This phenomenon is not novel, as customers have been observed to exhibit low-moral behavior toward in-person workers. In contrast, remote workers may be less affected by such low-moral behaviors as they do not interact in-person with customers. However, we hypothesize that remote workers may be less susceptible to the negative impact of justified customer complaints and may be more resilient in their response.

In addition, immoral behavior induces immoral behavior in others (for instance, the "broken windows" theory (Wilson and Kelling 1982)). If people see others engaging in low-moral behaviors, such as abandoning bicycles, littering, spray-painting graffiti, making fun of others, making noise, running around (e.g., in libraries), eating and drinking in places where such activities are prohibited, urinating outdoors, and mismanaging dog feces, they are more likely to do so themselves. Then, we posit that CAs ought to adhere to "moral rules" to curb the propagation of immoral behaviors at an early stage and prevent further degradation.

Is it possible for CAs to play meaningful roles in moral interactions? Can they offer similar functionalities to "human vision" to reduce immoral or morally questionable behaviors while maintaining the professionalism that in-person workers naturally exhibit? The answer is unclear, and this remains a pressing academic challenge in human–robot interaction (HRI) research on CAs. We focus on the use of moral computing to address these challenges. Moral computing is an interdisciplinary field that combines computer and social sciences. The objective

is to integrate human morals and values into the designing, operation, and management of computer systems, particularly regarding human–robot interactions. As illustrated by our cashier example, we believe that moral computing applies to human-CA interactions and should allow for more harmonious and socially acceptable interactions.

9.3.1.1 Moral Interaction for Cybernetic Avatars

Morality is a fundamental element of a symbiotic society. Because most people are morally equipped, they tend to respect each other and engage in prosocial behaviors (e.g., helping one another). "Moral interaction" in the context of HRI is defined as an interaction in which a robot encourages people to respect it as a peer and moral recipient and brings a sense of security to the environment. In short, moral interactions with robots elicit both "peer pressure" and "peer respect."

Contrary to robots, CAs are "projections" of the remote workers. Then, during an interaction with a CA, we can assume that this occurs between morally equipped people (the customer and remote workers). However, "peer pressure" and "peer respect" are both diminished by the lack of physical proximity and the resulting communication barriers. Moral interaction for CAs should ensure that both "peer pressure" and "peer respect" are strong enough or propose workarounds to enable harmonious interactions. However, achieving this goal remains a largely unexplored issue. Research into moral interaction should ideally strive to elucidate the following question: How does using CA induce or promote moral behavior in both customers and remote workers?

9.3.1.2 Examples of Moral Interaction Research with Cybernetic Avatar

Two examples of research aimed at addressing moral interaction and enabling CAs to provide services in harmony with people are presented.

Study 1: Cybernetic Avatar as a Guardsman
The first study (Daneshmand et al. 2023) predicts that CA technology will enable remote work opportunities for individuals who are typically excluded from the workforce (Takeuchi et al. 2020). The working style of these newcomers is envisioned as a gig economy, where remote workers have the freedom to frequently switch between different CA-enabled jobs. In the service industry, inexperienced remote workers can manage CAs to perform brief work assignments and address the labor shortage.

This study considers using CAs to enable remote workers to fill in for missing guardsmen in shopping malls. In Japan, guardsmen are expected to remain polite and talk appropriately under all circumstances. Achieving this component requires experience and skills that novice workers typically do not acquire. One difficulty

is that consistently talking appropriately and politely, as guardsmen would do to customers who are not always well-behaved, imposes a severe mental burden on such novice workers. These novice workers are likely to control CAs in a familiar environment where the pressure to act professionally is relatively low compared to working in person in a shopping mall. Then, with fatigue and stress, it is very likely that they let some inappropriate utterances slip, and the quality of the service may suffer.

To solve this issue, we propose a support system that allows novice remote workers to talk freely without considering appropriateness and politeness, while maintaining the quality of the service. The support system functions as a "moral safeguard" that oversees the maintenance of appropriateness and politeness during interactions. This method aims to improve the performance of CAs by providing polite and friendly interactions, even when faced with challenges, such as remote workers' frustration and inexperience. A proposed system enables remote workers to express their intentions verbally, and an intent recognition pipeline determines the appropriate wording (Huggins et al. 2021). The remote worker and support system collaborate to enhance customer experience. While the remote worker observes customer behavior and communicates freely, the system identifies the probable purpose of the communication and uses appropriate and polite language to express it. As illustrated in Fig. 9.1, the inappropriate language of an angry remote worker is not conveyed to customers by the CA. This safeguarding system ensures that the CA behaves as expected.

Figure 9.1 illustrates the pipeline. First, the remote worker's spoken words are transcribed into text using automatic speech recognition (ASR). Next, the intent recognition module categorizes the text according to the intent it expresses. Finally, the speech-generation module produces a polite and appropriate response that reflects the recognized intent. The CA then communicates the appropriate utterance to the customer.

To develop the intent recognition module, we obtained a dataset covering nine tasks that guardsmen are expected to perform (including greeting customers, thanking customers, and admonishing customers who smoke or litter). For each task, we gathered approximately 40 utterances that expressed intent. Half of these were utterances appropriate for a guardsman, and the other half were rude or used broken language. The intent classifier was then created by fine-tuning a large language model (BERT trained on the Japanese version of Wikipedia (Suzuki and Takahashi 2020)) using this dataset.

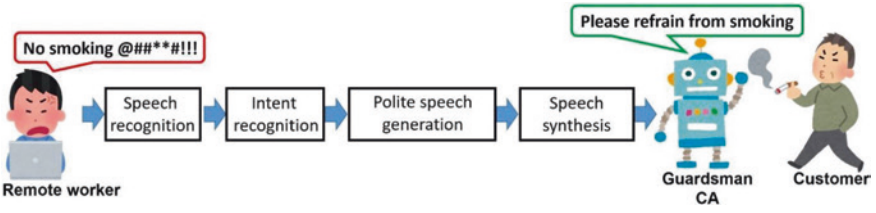

Fig. 9.1 Intent recognition pipeline for generating appropriate utterances from expressed intent

We conducted a user study with 23 participants who acted as novice remote workers controlling a guardsman's CA responsible for monitoring customer behaviors. The confederates who acted as customers were directed to engage in low-moral behaviors, such as smoking or littering, and to initially disregard or respond to the robot when admonished before either exiting the scene or complying and leaving the scene. This is illustrated in Fig. 9.2.

Each participant controlled the CA under two conditions: (1) with the help of the proposed support system and (2) without the help of the proposed support system. For each condition, we measured the workload using the NASA task load index (Hart and Staveland 1988; Hart 2006) and rated the politeness of the CA utterances. Participants were interviewed and debriefed after experiencing both conditions.

The support system demonstrated an expected mean classification accuracy of 96% across all participants. Specifically, the system accurately estimated the intent of participants, even when they spoke freely, and reformulated it appropriately.

The workload was significantly lower ($p<0.001$, Cohen's $d=1.23$) when using the proposed support system ($M=46.07$, SD = 14.36) than when not using it ($M=62.74$, SD = 12.70). There was no significant difference in the perceived politeness of the CA with and without support.

The analysis of post-experiment interviews showed that the reduction in workload was attributed to the system alleviating the pressure to speak politely or generate on-the-spot appropriate responses. Some participants regarded the system as a backup to correct mistakes. In addition, participants felt that the support system better protected the remote worker from negative customer behavior aimed at the CA.

The proposed support system is a "moral safeguard" that corrects utterances when the loss of peer pressure causes remote workers to act unprofessionally. On the customer side, the CA seems to adhere to the "moral rules" dictated by peer pressure, and harmonious interactions are possible. Simultaneously, the support system can potentially improve the welfare and mental health of remote workers by reducing their workload and cognitive pressure. However, it also raises concerns about worker autonomy and employer control, as it converts casual statements into polite and preset expressions, thus limiting the operators' ability to choose words and express themselves freely. The system limits operators to a

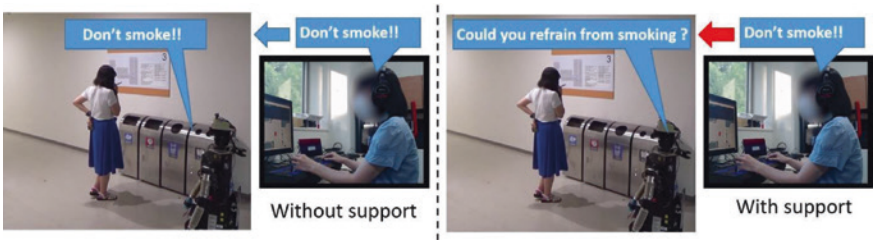

Fig. 9.2 Remote worker admonishing a confederate playing a smoking customer with and without support

set of predefined actions that can augment the employer's authority over worker behavior. This approach may result in interactions becoming more scripted and less personalized, which could lead to decreased engagement and a suboptimal user experience. Further developments should address these concerns by seeking a balance between support and employee autonomy. Involving stakeholders, such as users, CA designers, and ethicists, in discussions can help minimize potential negative impacts and ensure the ethical and responsible use of technology.

Study 2: Cybernetic Avatar as a Cashier

This second study (Yamada et al. 2023) investigated another support system designed to assist CA operators in customer service settings. The assumption is that most remote workers providing services using CAs will act professionally, with only a minority displaying subpar performance. Service providers should enable proficient operators to engage in unrestricted communication with customers, which leads to the delivery of high-quality services. However, there is a need to assist less-competent remote workers in achieving a decent quality of service. Then, we understand the need for a system that can classify remote workers as "competent workers" or "subpar workers."

To develop such a system, we selected a CA taking orders at a fast-food restaurant as an application scenario. Similar to an in-person worker, the CA must take orders from customers and answer more general questions. This second point is important because the quality of the service, and especially how hospitable it is, is often related to the ability of workers to perform their primary tasks. We judge a cashier as hospitable, which, in addition to taking our order, could indicate local tourist attractions when prompted. Regarding a CA cashier, competent and professional remote workers should be able to provide such a hospitable service, which we cannot expect from remote subpar workers.

In the proposed system, a remote worker is classified as competent if the estimated probability of using appropriate utterances exceeds 0.9. In contrast, if the estimated probability of using inappropriate utterances exceeds 0.06, the remote worker is classified as a subpar worker. These thresholds were determined based on preliminary experiments. Probabilities were estimated from the number of appropriate and inappropriate utterances made by remote workers. The appropriateness of an utterance was determined using an accurate utterance classifier obtained by fine-tuning a large language model (BERT trained on the Japanese version of Wikipedia (Suzuki and Takahashi 2020)) with a dataset of appropriate and inappropriate utterances. These utterances are used by competent and subpar remote workers when controlling the CA to greet customers and take orders.

In practice, the results from the remote worker classifier were used to alternate between the two operating modes of the cashier CA.

1. Free Mode: This mode enables competent remote workers to interact freely with customers.
2. Support Mode: This mode supports subpar remote workers by replacing their utterances with preset appropriate ones.

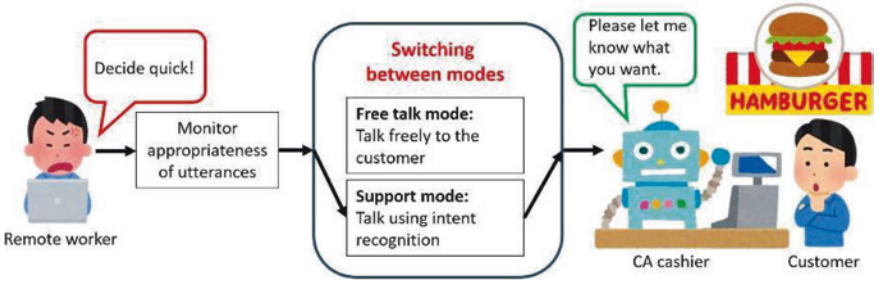

Fig. 9.3 System is switched to support mode and assist subpar remote worker to act professionally

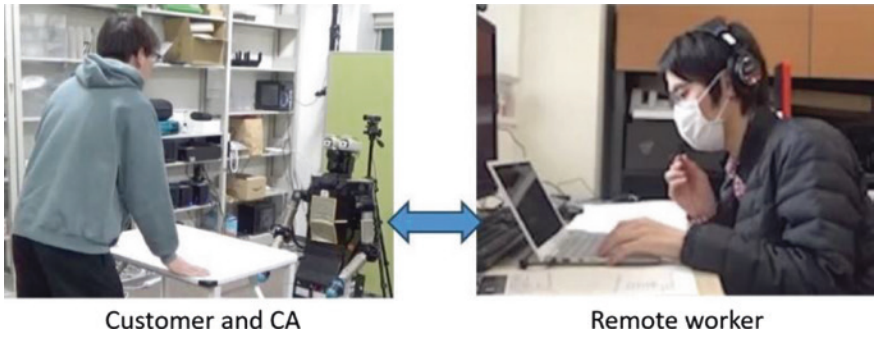

Fig. 9.4 Participant taking order from another participant using the cashier CA

The support mode (see Fig. 9.3) is based on an intent recognition (Takeuchi et al. 2020) pipeline to that used in the first study (Daneshmand et al. 2023). The intent recognition module was trained to classify utterances into classes that represented the different steps necessary for greeting customers and taking orders at a fast-food restaurant.

We conducted a user study involving 21 pairs of participants to compare the proposed system with a baseline system in which all remote workers could communicate freely with customers (see Fig. 9.4). For each pair, we conducted four sessions of order-taking using CA. One participant played a competent and subpar remote worker under both conditions (proposed system or baseline system), whereas the other played different types of customer orders. After each session, participants playing the customer completed a questionnaire to rate the service provided by the CA in terms of satisfaction (Chung et al. 2018) and politeness (Berry et al. 1988; Nakamura 2007). After completing four sessions, the participants were interviewed. The system accurately classified remote workers (94% accuracy), and the intent classification during the support mode had an accuracy of 90.6%.

The findings suggest that the proposed system significantly improves the quality of interactions for remote subpart workers without disrupting the efficiency of competent remote workers. For subpar remote workers, customer service quality was significantly higher in terms of politeness and customer satisfaction than in the baseline system. However, we did not find a significant difference among competent remote workers. In addition, 17 of the 21 participants (approximately 81%) preferred to interact with the CA controlled using the proposed system.

Our study was conducted in a simulated robotic burger restaurant, which may not represent the situation in all service industries. The study's practical application may be restricted because the participants were only role-playing operators with reduced structured dialog scenarios. However, we believe that it shows the importance of adapting the system controlling CAs to help remote workers who need it to guarantee that CAs abide by "moral rules" of conversation. The proposed system did not face any challenges. Remote workers' freedom of speech and professionalism are in tension, creating potential ethical issues. The system also occasionally hampered fluid interactions when the remote workers' intentions were not in line with the preset categories.

9.3.1.3 Discussion

Our investigation of moral interactions with CAs suggests that recent machine learning techniques, such as intent recognition, could be used to support remote workers' conversational capabilities. Our results show that an inexperienced remote worker can interact politely and appropriately without an excessive burden when supported by the system. This aspect could extend to proactive, positive interaction with customers, such as hospitable engagement.

Because CAs are expected to be mobile, a further area of exploration is spatial interactions. We must study how CAs navigate physical spaces, respond to their environments, and adapt their behaviors to the constraints of their physical surroundings. This finding has significant implications for the effective utilization of CAs in the service industry. We are particularly interested in developing moral codes that govern these spatial interactions.

We expect society to change with the widespread adoption of CAs equipped with the moral computing techniques we envision. CAs could potentially serve as tools for remote work and as extensions and augmentations of human capabilities. In this view, CAs may be considered a significant step toward integrating robotic assistance into daily life.

However, the implications of this new technology need to be evaluated. As highlighted in our case studies, although the proposed techniques improve the efficiency of service provision, they can also affect the autonomy of remote workers. Balancing effectiveness and ethical considerations is crucial for developing sustainable and fair CA practices. Questions such as "How much autonomy should be given to remote workers?" and "What impact does regulating autonomy have on user experiences?" necessitate careful investigation.

9.3.2 Socio-cultural Aspects in Designing Avatar Behaviors

9.3.2.1 Motivation

CAs can be used in various applications, such as receptionists, shop clerks, and helpdesks. Regardless of the type of application, to make CAs accepted in society, the avatar's behavior must be natural, consistent, and meaningful for users. However, the user's impression of avatar behavior may differ for multiple reasons, and culture is a critical factor affecting the acceptability of avatar behaviors.

Nass et al. (2000) discussed whether the ethnicity of computer agents affects user attitudes and behaviors. Their experimental results demonstrated that when subjects interacted with an ethnically matched agent, they perceived the agent to be more similar to themselves, socially attractive, and trustworthy. The participants also conformed more to the decision of the ethnically matched agent and perceived the agent's arguments to be better.

In human communication science, Ting-Toomey and Dorjee (2018) described the differences in non-verbal behaviors across different cultures. For example, Italians use broader full-arm gestures than US Americans, and most of their hand gestures are expressive. Generally, southern Europeans tend to employ more animated hand gestures than northern Europeans. Concerning the perceived credibility aspect, Ting-Toomey and Dorjee (2018) described that facial composure and body posture influence judgments of credibility (i.e., whether a person has social influence power). In some Asian cultures (e.g., South Korea and Japan), influential individuals tend to maintain restrained facial expressions and rigid postures. However, in the US culture, relaxed facial expressions and postures are associated with credibility and positive impressions. In addition to bodily behavior, speaking style is a type of non-verbal information. Ting-Toomey and Dorjee (2018) also described that interrupting a conversation partner is perceived as impolite in many cultures while interrupting is accepted positively in other cultures as a way to express interest in the conversation.

Therefore, to develop culturally adaptive CAs, it is essential to understand how non-verbal communication styles vary across cultures and how to design CA that consider these cultural differences.

9.3.2.2 Culturally Adaptive Agents and Robots

Several attempts have been made to develop culturally adaptive virtual agents and communication robots. In a study on virtual agents, the CUBE-G project between Germany and Japan collected a comparable corpus in three prototypical social interaction scenarios: a first-time meeting, negotiation, and conversation with someone of higher social status (Rehm et al. 2009). Endrass et al. (2013) analyzed the differences between German and Japanese speakers. They found that usage of body postures categorized by Bull (1987) differed between the two cultures. The

most frequent posture of German speakers was putting their hands into their pockets, but joining their hands was most frequently observed in the Japanese data. The three most frequent posture categories did not overlap between the two cultures. They found that the gesture expressivity differed between the two countries. In particular, gestures were performed faster, more powerfully, and more fluently by German speakers than by Japanese speakers. In addition, German participants used a wider space for their gestures than Japanese participants, while Japanese speakers used repetitive gestures more frequently. Based on these analyses, they developed and evaluated virtual agents that displayed prototypical or not-prototypical non-verbal behaviors in their culture. The experimental results showed that users preferred agent dialogues that reflected the behavioral patterns observed in their cultural backgrounds (Lugrin and Rehm 2021).

Research on Social Robotics has discovered that attitudes toward robots differ across cultures (Bartneck et al. 2005). It was also found that social signals displayed by robots were more accurately interpreted by native English speakers, and the interpretation of the robots' social signals differed depending on the culture (McKenna et al. 2018). The CASESSES Project between European countries and Japan aims to design culturally competent social robots for elderly care (Battistuzzi et al. 2018). They extracted key concepts from existing ethical guidelines for assistive technologies for people with dementia and applied them to scenarios describing how robots interact with the elderly belonging to different cultures.

9.3.2.3 Toward Designing Cultural and Ethical CAs

As described in the previous subsections, non-verbal behaviors are displayed and interpreted subconsciously rather than verbal information and are influenced by the user's cultural background. To consider this point, previous studies on virtual agents and social robots have attempted to propose non-verbal behavior models capable of producing culturally appropriate behaviors such as facial expressions, gesture expressivity, posture, and gaze.

Although the studies mentioned above focused on autonomous virtual agents and social robots, similar approaches can be used to design and develop culturally adaptive CAs. Furthermore, as discussed in Battistuzzi et al. (2018), it is also important to discuss cultural influences on ethical issues when designing avatars.

9.3.3 Cooperative Social Perception–Intention–Action (PIA) Model for Cybernetics Avatars

The term robot has been applied to automatons that execute simple and repetitive tasks to prevent humans from performing them. These early robots used an architecture composed of different layers (perception, modeling, planning, task

execution, and motor control), where the robot sensed its surroundings before planning how to execute a particular task (Brooks 1986), and followed what was denominated in the perception–action (PA) model. The PA model does not account for humans' involvement in the process and does not allow establishing social interactions with them. In human–robot interaction (HRI) or Human–Robot Cooperation (HRC), the robot should understand human behavior and intentions to make these interactions safe, reliable, comfortable, and easily understandable to users, and the outcome of these interactions should be as productive as possible (Duchaine and Gosselin 2009).

In HRC tasks with humans, a robot must identify human intentions in a specific context and generate future predictions of human behavior to create one or several robot plans that anticipate user actions (Ferrer and Sanfeliu 2014). In this manner, the robot can adapt to changes in individual behavior and facilitate safe and comfortable interactions. Notably, human intention is the key issue in any HRI or HRC model. Examples of human–robot cooperative tasks include accompanying people (Garrell and Sanfeliu 2012), transporting a table between a robot and a human (Mörtl et al. 2012), dancing with a robot (Kosuge et al. 2003) and collaborative search between a robot, and a human (Dalmasso et al. 2023), among others.

9.3.3.1 The Social PIA Model

To describe the Social PIA paradigm (Domínguez-Vidal et al. 2023, 2024), we discuss a cooperative task example called the handover task. Two agents, a robot and a human—are four meters apart and tasked with a handover assignment in which the robot will deliver a box to the human, who will subsequently pick it up (see Fig. 9.7). Both agents must perform several tasks to comprehend the mission context (e.g., proximity), forecast their future location, device an optimal plan, commit to it, and execute it. The object must be within a certain proximity to each other to enable switching. After switching, the user must raise their hands, reach for the object, and move away from the hand. To achieve these subtasks, in the case of a robot, the robot has to perceive the environment and localize the human hand and obstacles. Moreover, it has to identify the human intention; for example, the human wants to grab the object or prefers to go away. If a human wants to grab an object, he will move toward the robot and raise his hand to take the object. The motion of the human skeleton can be predicted by a robot, which can anticipate the location of the human arm in the future. The robot then planned its forward motion and delivered the box. The robot anticipates how much it has to move when it has to raise its arm and when it has to deliver the box. If the human does not want to grab the box, it stops in the middle of the path. For example, when a robot is immobile, it should request clarification from a human regarding their intends goal. Depending on the human answer, the robot can be anticipative or simply ask the person what to do next.

Figure 5b depicts the SOCIAL-PIA model. This instance pertains to two agents (a robot and a human) who want to perform cooperative tasks. Each agent has a

perception module for detecting objects, humans, and the environment. They also have an intention module that infers human intention (implicit intention) (Mutlu et al. 2009) or receives a verbal command or signal (explicit intention) (Domínguez-Vidal and Sanfeliu 2023). These two modules are the inputs for the Situation Awareness module (Endsley and Garland 2000), which compares and analyzes the current situation with what was expected (because the cooperative task and the steps to execute the task are known in advance) and computes the 2D or 3D prediction of the other agent's motion (Laplaza et al. 2022). These outputs are inputs to the decision-making module. In this module, the cooperative plan of each agent is elaborated, and the robot and the human create their plans, share their plans, and finally negotiate when the plan is unapproved by one of the agents. In certain scenarios, agents may negotiate their roles, with one agent assuming the role of leader, and the other that of follower. The intention module can also serve as an input to the decision-making process, influencing negotiation or role distribution. The output of this module is the subtask plan of each agent, for example, to move the robot and raise the hand in the cooperative case or not to move and ask the person what he wants to do if the human does not follow the expected cooperative subtasks. This cycle—prediction intention, situation awareness, and decision-making—is repeated until the task is completed or stopped by one of the agents.

A schematic of the Social PIA is shown in Fig. 5a, where two agents (AG) perform a cooperative task. Each agent performs the appropriate actions (AC) and uses the perception and intention modules (P–I) to understand the current situation and the intention of the other agent and/or scenario agents (for example, bystanders in the scenario). Moreover, they negotiate the subtasks to be performed using the PIA model, reorganize the roles of each partner, and create a joint plan.

9.3.3.2 The Social PIA Model Extended to Cybernetics Avatars

In the case of the Cybernetics Avatars (CAs), the Social PIA model can be extended, as shown in Fig. 9.6. Figure 6a shows a case of a CA interacting with an agent (AG, e.g., human). The CA is partially controlled by an operator (OP) who also perceives the actions and intentions of the CA and/or scenario agents (for example, bystanders) and performs the CA task. In some cases, it can negotiate CA tasks. The task execution between the CA and AG is the same as that explained for the PIA model. Although the operator (OP) can arbitrate (arbitration module), the dispute between the CA and AG does not arrive at a commitment consensus.

The previous diagram can be further extended when two CAs perform cooperative tasks. In this case, each CA is controlled by one operator (OP), and both OPs have the same interaction mechanism as their CAs. However, in this case, both operators could arbitrate the dispute over the CAs.

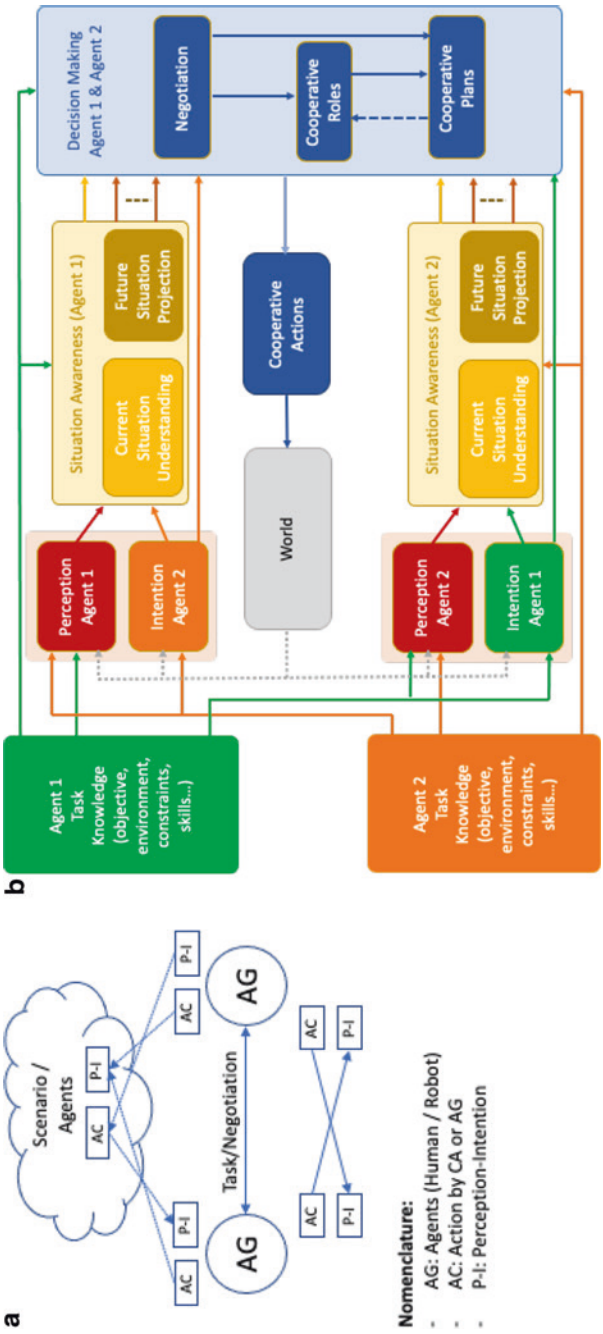

Fig. 9.5 **a** Schematic of the interaction between a robot and a human using the Social PIA model; **b** Social PIA model for two agents

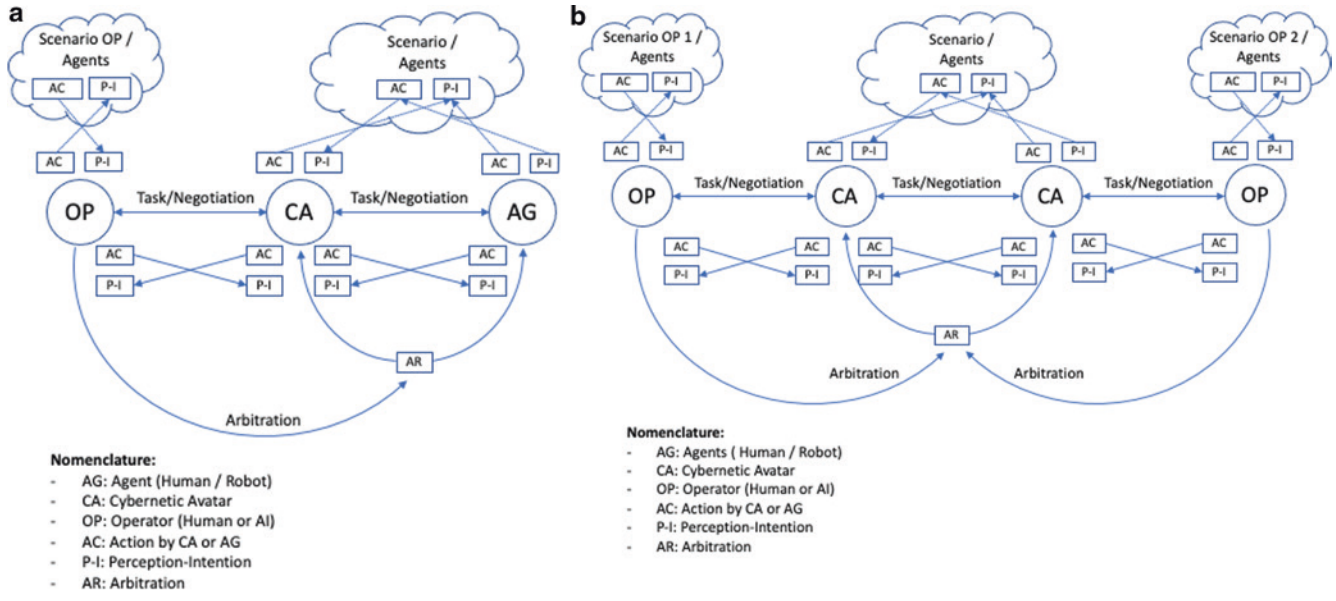

Fig. 9.6 **a** Schematic of the interaction between a CA and an agent (AG: human or robot) using the Social PIA model; **b** schematic of the interaction between two CAs using the Social PIA model

Fig. 9.7 Different steps of the handover use case using the Social PIA model

9.3.3.3 The Use Case of Social PIA in a Handover Collaborative Task

We introduce the handover use case in Sect. 9.3.3.2. We use the Social PIA model to illustrate and describe this use case. Figure 9.7 shows a robot that must deliver a box to a human. In Photogram #1, the robot awaits delivery of the box. In Photogram #2, the robot senses that there is a clear way to proceed and uses its sensors (a stereo camera and lidar) to identify the person who needs to deliver the package (the robot uses the perception module). However, in Photogram #2, the robot perceives the intention of the person who will receive the box (the robot uses the intention module). The perception of the environment (there is a free path to deliver the box) and the perception of the human intention allow the robot to predict human motion in front of it, as shown in Photogram #2 (the robot analyzes the current situation and predicts human motion using the Situation Awareness module). The photogram human white model is a future projection of the human 2.5 s in advance. Then, the robot plans to anticipate human motion and moves its arm to reach the contact point with the human, Photogram #3 (the robot uses the decision-making module to plan in coordination with the human, and Cooperative Actions are executed). The human moves toward the robot; however, the human prediction has already arrived at the destination, that is, Photogram #4 (the Cooperative Action module is executed). Then, the human arrives at the contact point and grabs the box, and the robot releases the box at the same time, as in Photogram #5 (the Cooperative Action module is executed). Finally, the human takes the box out of the robot, and the robot moves its arm back to the rest position, as in Photogram #6 (the Cooperative Action module is executed). If the robot detects a different intention, its plan will be different.

9.4 Ethical Issues Concerning Cybernetic Avatars

Historically, humanity has been constrained by the need to exist in a physical space, possess a body located in a single place, and bear an identity tied to that physicality. Cybernetic Avatars (CAs) are technologies that aim to free humans from these constraints. Therefore, they have the potential to alter human existence fundamentally. This prospect offers immense hope but also raises a host of ethical concerns.

In our research, we used a variety of methods to gather views from a wide range of sectors and fields, focusing on the desired visions of the future and the ethical concerns associated with CA. At the symposia, we invited speakers, including Artificial Intelligence researchers, legal scholars, ethicists, philosophers, aestheticians, anthropologists, and science fiction writers, for lectures and discussions. In our workshops, we invited members of the public to experience CA and participated in discussions. We also conducted surveys to gauge public awareness, impressions, expectations, and concerns regarding CA.

In this section, we discuss the ethical concerns and desirable developments related to CA, based on the opinions we collected. The impact of CA technology on human life and society is far-reaching, resulting in a wide range of ethical issues. Therefore, it is not possible to comprehensively discuss all these issues. Instead, we focused on issues related to work, life, and gender.

9.4.1 Work and Life in Avatar Symbiotic Society

This subsection examines the impact and ethical considerations of CAs in individual workplaces and lives.

The extensive implementation and advancement of CA technology are anticipated to considerably alter the way people work. With the possibility of remote work gaining acceptance, job opportunities have broadened. Furthermore, CAs can enable individuals to perform previously impractical tasks without assistance. The removal of physical movement requirements allows the utilization of short free-time intervals for various tasks. Furthermore, operating multiple CAs concurrently can increase earnings for the same duration of work.

Consumers are likely to access diverse services more affordably and conveniently with advancements in CA technology. For example, if a household possesses a multifunctional digital assistant, various individuals can operate it at different times to fulfill various roles such as household assistants, caregivers, tutors, babysitters, and pet sitters. Additionally, the parallel use of digital assistants by experts, such as doctors, counselors, educators, consultants, and trainers in diverse locations, could broaden the scope of people benefiting from their specialized expertise.

With the development of CAs, daily life is likely to change significantly. By using shared CAs located worldwide, we can travel globally with ease. It may be easier to have richer interactions with loved ones who are far away through CAs, thus providing a more immersive experience than videoconferencing.

However, such transformations are not without concerns. One of the most obvious concerns is that while CAs may create new opportunities, they may also lead to unemployment and increased economic inequality. For example, if powerful CAs are only accessible to a limited number of people, a significant opportunity gap could emerge between those who can use superior CAs and those who cannot. This could exacerbate and entrench the existing economic inequalities. Such a scenario is not only ethically undesirable but also results in a loss by failing to utilize beneficial talent in society. It is desirable to ensure that as many people as possible have access to CAs. It will also be necessary to educate everyone on the skills required to operate CAs.

Furthermore, the ability of individuals to work more with the help of CAs could lead to situations in which some people are overworked, while others lose their jobs. Issues of work sharing and maintaining an appropriate work–life balance will become more critical than ever.

In the context of home services, security, surveillance, and education that use CAs, there is a potential risk of privacy violations. Furthermore, there may be cases in which individuals use CAs to impersonate others or employ AI to operate CAs and engage in work activities. It is essential that CAs are equipped with appropriate security measures and that operators are properly trained in professional ethics. It is also necessary to consider responses to potential issues that arise during CA operations. It is irresponsible for companies operating CA services to place all responsibilities for any damage caused solely on CA operators or users. For example, it is important for companies to provide remedies such as insurance for harm measures.

However, as domestic services and other professions that use CAs evolve into gig-work-like scenarios, ensuring compliance with professional ethics is likely to become more difficult. This could also lead to an increase in insecure employment, exacerbating inequality and poverty. It is essential to ensure that professionals that use CAs are stable, fulfilling, and socially respected.

Travel using CAs may provide fewer benefits to local people than conventional travel. Therefore, it is necessary to consider the welfare of the destination communities. In addition, remote technologies such as CAs may lead to a "disinhibition effect" (Suler 2004), potentially increasing the tendency to behave without restraint at the destination. Appropriate regulations on the number of CAs and their permitted areas of movement, speed, and data collection are necessary to ensure that such travel does not involve disturbing local people.

In the context of using CAs for educational purposes, it is crucial to evaluate their effectiveness carefully. Most of all, it is necessary to ensure that no child is disadvantaged through the use of CAs. If the cost of introducing CAs remains high, not all families in need of CA-based educational services will have equitable access. Consequently, those who cannot afford these services may be disadvantaged, leading to the creation or exacerbation of inequalities based on socioeconomic status.

As the society becomes increasingly dependent on CAs for various activities, individuals and communities may become vulnerable to system failures, technical malfunctions, and cyberattacks. In particular, if CAs malfunction or are hacked, not only could security be compromised, but vulnerable individuals (such as the elderly who rely on avatar assistance) could also experience disruptions in their daily lives and be unable to access necessary goods and services.

9.4.2 Gendering and Its Ethical Implications

This subsection examines gender embodiment in CAs. We begin with an overview of how gender roles are assigned to artificial entities and then explore the common concerns associated with such assignments. The following discussion is based on AI systems and robots. However, the entire point should also apply to CAs.

Until recently, AI systems and robots were not considered social agents with which ordinary people could communicate. AI systems did not speak a natural language. Robots were limited to industrial factories for mass production. However, interaction with AI assistants via natural language has become increasingly common. Social robots, some of which are remote-controlled CAs, are deployed in public places such as airports, shopping malls, restaurants, hotels, and hospitals to assist customers and provide helpful information.

The rise of human–robot interaction (HRI) has been a consequence of this shift. HRI aims to explore the interaction between humans and robots by utilizing a range of disciplines such as robotics, engineering, psychology, and design. A key finding of HRI research is anthropomorphism. Humans interact with AI systems and robots as social agents even though they are known to be inanimate artifacts. We tend to treat AI systems and robots with politeness and respect, rather than as mere tools. Through repeated interaction, individuals may develop friendships or, in some cases, even intimate relationships with them. Reports state that every day, hundreds of thousands of people say "good morning" to Amazon's Alexa and some have confessed their love for her (Cox 2018). Hiroshi Ishiguro designed Erica, a realistic humanoid robot that resembles a Japanese woman. Ishiguro commented that she was the most beautiful woman he saw (Nyholm 2023).

Anthropomorphism indicates that humans are inclined to project social cues onto artificial entities. If this is the case, it is expedient for engineers to have artificial entities that elicit this tendency, enabling users to engage more effectively. A frequently adopted approach is the incorporation of gender in AI systems and robots. Female coding is frequently employed in AI systems and social robots. AI assistants typically have feminine names such as Alexa, Siri, or Cortana. Their voices were soft, high-pitched voices associated with women. This result was intentional. Microsoft conducted an extensive survey of individuals' preferences for AI assistants, revealing that respondents from around the world favored a female assistant over a male assistant, ideally in their twenties or thirties at oldest (Kedmey 2015).

This apparent convergence of preferences for female voices may reflect the expectation that women are particularly adept at tasks requiring empathy and conversational skills. However, in other conversational settings, users may favor agents coded as males. For instance, Bayerische Motoren Werke (BMW) initially marketed automobiles using a navigation system programmed to communicate through a female voice. Some customers raised concerns about receiving directions from females. Consequently, BMW decided that the voice should suggest a male who was slightly dominant, somewhat friendly, and highly competent (Nass and Brave 2005).

This discrepancy may arise from the fact that certain roles in human society are gender-specific. Some tend to be female centric, whereas others tend to be male-centric. In female-centric domains, a female-coded robot may perform better, because it matches human expectations. In male-centric domains, users may prefer male-coded robots. This hypothesis predicts that aligning robots with human expectations will increase their acceptance in society.

However, the gendering of AI systems and robots has also raised concerns about the perpetuation of gender stereotypes and reinforcement of gender divides. According to critics, the conflation of female-voiced AI assistants with real women may propagate gender stereotypes and normalize one-sided command-based verbal interactions with women, as these AI assistants are expected to act submissively (West et al. 2019). Furthermore, associating social robots with subordinate tasks traditionally performed by women can reinforce social inequalities, as these tasks tend to be paid poorly (Tannenbaum et al. 2019). It is currently uncertain whether this alleged conflation of female-voiced AI assistants with real women occurs regularly. Similarly, the extent to which gendering of AI systems and robots contributes to social inequality remains unclear. Nevertheless, these concerns are widely shared among journalists and humanities scholars.

A related but different concern is the symbolic significance of gendering. Recent research on the generation of shared laughter has illustrated this phenomenon. Inoue and his colleagues attempted to teach the art of conversational laughter to a humanoid robot in the hope of improving the natural conversation between humans and robots (Inoue et al. 2022). They obtained speed-dating dialogs between male university students and the CA, which were remotely controlled by one of four amateur actresses. The dataset was annotated with different laughter types and was used for machine learning. This research was immediately acknowledged for its contribution to affective computing, winning the NETEXPLO Innovation 2022 Award. Despite its technological success, however, critics have focused on the ethical implications of this research. This research employed Erica, a realistic humanoid who has long been known for her highly feminine beauty. Critics have suggested that this research on shared laughter generation implies that Erica learned submissive female behavior during Japanese speed-dating events.

If gendered AI systems and robots have some symbolic significance, as shown in the previous concern, they could serve as positive role models for both boys and girls. The idea is that female-coded systems can be programmed to be assertive and confident, whereas those coded as males can possess nurturing and empathetic traits. This approach can assist in challenging traditional gender stereotypes and encourages children to develop a broader view of what it means to be a boy or girl. It is also noteworthy that gendering is only one approach for designing AI systems and robots that elicit a human tendency to project social cues onto artificial entities. In principle, designers can focus on creating AI systems and robots that are perceived as gender neutral. This could involve using gender-neutral names, avoiding stereotypical design features, and programming these systems with a variety of behaviors that do not conform to traditional gender roles (Schiebinger et al. 2011–2020).

This is not a place to resolve the controversy but merely to highlight the complexity of introducing AI systems and robots into society. It is crucial to examine the ethical implications and to design AI systems and robots that promote inclusivity, diversity, and accountability.

9.4.3 Summary

Technological progress does not automatically improve the well-being of all people. Technology has historically worsened the lives of certain groups, exacerbated inequalities, and threatened social security. Often, socially vulnerable people are harmed, rather than benefiting from technological progress.

Truly valuable innovations increase the overall utility and well-being of society, improve the quality of individual lives, contribute to human prosperity and peace, and help solve societal challenges. Therefore, to promote innovation, individuals' rights, health, property, and dignity should be respected.

Technology must advance equitably. Special care must be taken to avoid worsening the situation for minorities and disadvantaged people. Thus, innovation should be a means of redressing discrimination and inequality. Driving innovation must protect the needs and rights of vulnerable people whose voices are not adequately represented and provide them with opportunities to participate in decision-making processes.

People are often fearful and cautious of new technologies. Those who promote technology must fulfill their duty to provide adequate explanations, increase the transparency of the technology itself and its promotion process, and address people's concerns. The public's understanding of technology is a critical prerequisite for its adoption. Risks are inherent in new technologies, and even experts may fail to anticipate potential harm. Therefore, it is necessary to prepare flexible responses to unforeseen negative effects. Moreover, all stakeholders must understand such uncertainties before technology can be introduced into society.

9.5 Legal Issues Concerning Cybernetic Avatars

9.5.1 What is an Avatar?

The word "avatar" is derived from the Sanskrit word "Avatāra" (अवतार), meaning "a representation of a divine principle" (a symbolic representation) or "descent" (a figure that has descended to earth), which is the object of people's faith (Lenoir and Drucker 2011). The term usually refers to the incarnation of the god, Vishnu.

In the Ramayana and the Mahābhāratam, the great Hindu epics, and in the Bhagavadgītā, one of the Hindu scriptures, Rāma appears as a superhuman protagonist and Krishna is the avatara (incarnation) of Vishnu. James Cameron's movie *Avatar* was inspired by this word (Lenoir and Drucker 2011).

Mandalas in Japan, India, and China depict Buddhas and deities descending to earth in temporary forms, and these are called "gongen" [alter-ego Buddhas] in Japan. In American museums, alter-ego Buddhas in the mandalas are described as avatars (Ikegami and Tanaka 2020). Therefore, the term "avatar" is often used to mean "alter-ego of oneself," extending the original meaning of alter-ego (incarnation) of God, to that of a human being.

9.5.2 What is a Cybernetic Avatar?

The term "cybernetics" has several definitions (Umpleby 1982). It was originated from the ancient Greek word "Κυβερνήτης" (*kybernetikos*) [helmsman (good at steering)].

In the first half of the nineteenth century, French physicist André-Marie Ampère, in his classification of sciences, suggested that the nonexistent science of government control is called cybernetics. The term was soon forgotten; however, it was not used again until the American mathematician Wiener (1948) published his book Cybernetics in 1948. In that book, Wiener referred to an 1868 article on governors by British physicist James Clerk Maxwell and pointed out that the term governor is derived, via Latin, from the same Greek word that gives rise to cybernetics. The date of Wiener's publication is generally accepted to mark the birth of cybernetics as an independent science. Wiener defined cybernetics as "the science of control and communications in the animal and machine." This definition is closely related to the theory of automatic control and physiology, particularly the physiology of the nervous system (Britannica).

A derivative word of "cybernetics" is "cyberspace," coined by William Gibson in his Neuromancer (1984) by combining the words "cybernetics" and "space."

There is, however, no clear definition of "Cybernetic Avatar" (CA) to date.

The Japanese Council for Science, Technology, and Innovation (CSTI) and the Strategic Headquarters for the Promotion of Health and Medical Care within the "moonshot-type R&D projects" have been promoting the "Moonshot Goal 1:" to realize a society in which people are free from the constraints of body, brain, space, and time by 2050. They explain the concept of CA in relation to this goal, including ICT and robotics technologies, which extend people's physical, cognitive, and perceptual abilities, in addition to robots and avatars that show tri-dimensional (3D) images as a substitute for the person.

Therefore, to start considering the legal status (proof of existence) of CAs in the future, I classify them as shown in Table 9.2.

"Tangible object CAs" are not limited to robots, such as "geminoids" and "humanoids," but also include other tangible objects (solid, liquid, or gas). Stealing liquid CA constitutes theft under Article 235 of the Japanese Penal Code, which is similar to stealing water. In the case of projection mapping, where a CA is displayed onto an area filled with gas, the gas becomes a tangible CA, and this projected image becomes intangible in the same way as a hologram.

Although electricity is an intangible substance, it is positioned as a property (tangible object) under the current Japanese law, and Article 245 of the Japanese Penal Code provides that "electricity shall be deemed to be a property."

Table 9.2 Classification of CAs

Tangible objects CAs	Physical avatars, such as robots
Intangible CAs	Computer graphics avatars and software agents that are complete in the virtual world

The following is a summary of the current theories regarding this property. Until this provision was established, the electric theft judgment (May 21, 1903) deemed them to be tangible objects. There are three theories regarding the meaning of goods: (1) corporeality (goods are tangible objects), (2) manageability (intangible objects are good as long as they are manageable), and (3) physical manageability (objects with manageable materiality), with (1) corporeality being the most common theory (Otani 2019).

Article 85 of the Japanese Civil Code also provides that "in this Act, 'thing' means a tangible object."

The "intangible CA" could be a "digital twin," (the avatar of a real or deceased person), a virtual fictional person, an avatar of a character, and an electronic agent or bot.

9.5.3 Usage Aspects of CAs

Because a CA is intended to carry out social activities on behalf of the individual, we attempt to classify the phases of its use.

(1) Situations in which CA can be used include (a) substitution of a real person, (b) reproduction of a deceased person, and (c) representation of a non-existent person.
(2) The following methods of use are envisioned: (a) remote operation, (b) use within the scope of automatic program processing, and (c) autonomous operation.
(3) With regard to the form of use, Moonshot Goal 1 involves developing a CA infrastructure that enables everyone to participate in diverse social activities by (a) combining a large number of avatars and robots remotely controlled by multiple people by 2050, (b) developing a CA infrastructure that can be used in a wide variety of social activities by the end of 2050, and (c) by 2030, developing technology that enables a single person to operate 10 or more avatars for a single task with the same speed and accuracy as a single avatar, and building the infrastructure necessary to operate such a system. The following is an example of a type of work that can be performed: Specifically, the concept of using a CA is "living a CA life", which means that (1) by 2050, technology will be developed to enable anyone who wants it to expand their physical, cognitive, and perceptual abilities to high levels, and a new lifestyle based on socially accepted ideas will be popularized; and (2) by 2030, anyone who wants it will be able to live through a CA.

9.5.4 Legal Status of CA

Legally, the notion of "person" includes not only natural persons but also legal entities. Because avatars are neither natural nor legal persons, they only have the legal status of objects (tangible or intangible) such as machines or software. Therefore, unless a legal personality is assigned to an avatar, its legal status will merely be that of the object. Therefore, various aspects must be clarified when performing legal acts using avatars.

Regarding tangible CAs, legal status theory (Saito 2017) is a future issue (Shimpo 2017), because legal status other than as a thing cannot be considered at this point.

The legal concept of CA for intangible objects such as electronic agents has been examined since the late 1990s. For example, Kerr and Shimpo (2000) presented three proposals for contracts using electronic agents: (1) a method that recognizes the juridical personality of the agent software; (2) a method that regards the action of the agent software as the act of a juridical person who uses the agent software; and (3) a method that refers to the legal status of slaves in ancient Roman times (Kerr and Shimpo 2000).

(1) Allows the agent software to have a juridical personality by equating it with other artificial juridical entities created by humans, such as corporations.

(2) Is a method in which an electronic device is regarded as the act of a juridical person who uses the action of agent software instead of being regarded as an independent juridical person. This method ignores the fact that agent software operates voluntarily in the process of concluding an agreement and pretends that it is nothing more than a mere means of communication. This is discussed as an application of "legal fiction." For example, the United Nations Commission on International Trade Law (UNCITRAL) Model Law Enactment Guide states that "data messages automatically generated by a computer without human intervention should be regarded as 'originally executed' by the legal entity, instead of being accomplished by the computer." The court indicated that the Uniform Commercial Code, Part 2 B, in its Compilation and Commentary, also states that electronic agent software is, in effect, merely an extension of the person who uses it and that his or her acts are constitutive of those of an individual. The Transactions Act also points out that it clearly recognizes electronic devices as an extension of human actions but also as something that can operate independently of human control and explicitly endorses contracts entered into by electronic agents and software. Furthermore, he states that there are other ways to extend the contract principle in a broad sense besides the application of legal mimicry.

Example (3) refers to the fact that Roman slaves were considered to have no juridical personality, but many legal rules existed that allowed them to participate in transactions and enter into contracts. An electronic device that voluntarily executes

transactions similar to Roman slaves will be granted a certain resemblance to legal status. Once the certainty of this technology is guaranteed and a high degree of autonomy and intelligence comes to the fore, this will be sufficient reason to treat it as a legal intermediary rather than a mere tool.

Pagallo (2013) examined these three perspectives. He points out that:

(1) "It makes no sense to treat a robot as a tool as a legal entity that has the capacity to conclude contracts based on its own rights" (Pagallo 2013) and then present an idea based on the Roman law with reference to the legal status of slaves in ancient Rome.

(2) At the national meeting of the Uniform State Law Commission within the annual meeting of the National Bar Association in May 2003, a proposal was made to recognize the validity of contracts made by electronic agents, even if no human action or knowledge intervened (Pagallo 2013). This led to efforts to amend the Uniform Commercial Code through the US Electronic Signature Act and the Uniform Computer Information Transactions Act of 1999 (UCITA), 15 U.S.C. § 7001(h), which provides that a contract "may be executed, created or delivered by one or more electronic agents, provided that such electronic agents are not involved in its formation, creation, or delivery". The legal effect, validity, and enforceability of a contract cannot be denied solely because of the involvement of an electronic agent even if such an agent is legally vested in the person bound by the contract. The following is a summary of the provisions of the law: Furthermore, Article 14 of the Uniform Electronic Transactions Act (UETA) of the USA states that a contract may be formed by the interaction of the electronic agents of the parties, even if the individual was unaware of or did not confirm the acts of the electronic agents or the resulting terms and agreements (Pagallo 2013).

(3) He suggests that today's robots can be likened to ancient Roman slaves and that the agency rights that ancient Roman law granted to "objects" indicate a way to address the inconsistencies in the robot-as-tool approach. While the majority of slaves did not have the right to demand their own patriarchs, some enjoyed considerable autonomy and even entered into contracts and managed assets on behalf of their own patriarch's family business. More specifically, they were "rulers" ("institores"). He presents a discussion based on Justinian's Digest (XIV, 3, 11, 3; XV, 1, 47) of the Justinian Code. Moreover, because the *Compendium of Learned Treatises* recognized slavery as a system of private property and allowed slaves to work as property managers, bankers, or merchants, although the juridical personality, which was the basis of private rights, was removed, it is also possible that a certain property value for robots is a factor that should be considered with respect to such machines.

9.5.5 Corporate CAs

To discuss the legal status of CAs, I divided them into corporate and individual avatars for tangible and intangible CAs.

The corporate avatar does not mean an avatar with a juridical personality, but simply an avatar of a corporation. In both tangible and intangible objects, the local characters and the characters of various corporations and other entities are present and active. A wide variety of avatars, from the so-called "stuffed animals to virtual avatars", are used daily, and Japan is one of the most avatar-oriented societies.

However, these corporate avatars are not expected to be used as entities that perform legal acts, and it is unlikely that legal acts by corporate CAs will be discussed in the future development of CAs.

For example, the Chiba Prefecture mascot CHI-BA+KUN is an avatar that personifies the Chiba Prefecture. However, it is inconceivable that this avatar performs legal acts related to Chiba Prefecture on behalf of the government. More specifically, when the governor is a representative of an organization that is eligible for a subsidy, it is not expected that they would delegate the authority of representation as the chairperson of the organization to Chi-Ba-kun to dissolve the relationship of mutual representation, as this would fall under mutual representation under Article 108 of the Civil Code.

Therefore, although there are situations where a corporate avatar is used for factual acts, it is considered unnecessary to use a corporate avatar to perform legal acts related to the corporation.

9.5.6 Proposals for New ELSI Studies

9.5.6.1 Establishing a Research System to Ensure and Maintain the Social Acceptability of CA in Avatar Life

To realize a life with avatars, ethical, legal, and social implication (ELSI) issues in human society cannot be avoided. However, the study of ELSI issues to find ways to resolve them has been confined to research in the humanities and social sciences. It is necessary to show how these new issues can be resolved using technology and establish a comprehensive research system for this purpose. It is also necessary to develop a new research vision that considers the complex and diverse ELSE issues and responds to the arrival of an avatar-deployment society beyond expectations.

However, it is practically impossible to examine all issues that may or may not arise in the future within the framework of current knowledge, society, and institutions. Although research on ELSI issues associated with new technological developments has been conducted by enumerating and exemplifying the issues to be considered, and research has been conducted assuming new issues, it is partly

because of research methods in the humanities and social sciences, but it is also because of research methods that are vertically divided into various fields and do not allow for cooperation between each field, and thus fragmented issues are being studied individually and The situation is that research is being conducted in a whack-a-mole fashion. Consequently, the lack of a research system and methods to fundamentally examine essential issues has contributed to the lack of significant progress in ELSI research.

9.5.6.2 ELSI Issues

With regard to ELSI issues, it may be a good idea to indicate that research will be conducted on issues that cannot be envisaged within the current framework or on tentative issues that require the presentation or construction of new concepts in the future, not within the existing ELSI framework, but from the four disciplines of ethics (E), law (L), society (S), and economics (E). We believe that this is one possible way to make further progress in ELSI research, which has not advanced well, by clarifying the areas of research responsibility.

We also proposes a research structure (sustainable ELSE research) for conducting new ELSI research that is comprehensive (encompassing), Looking Forward (looking forward), systematic (systematical), and integrated (integrated), rather than piecemeal research in individual fields (management systems) to conduct new ELSI research.

From the perspective of extending the functions of CA and improving productivity, ELSE research is a prerequisite for CA acceptability and promoting its use in society, which also contributes to indirect productivity improvements. The extension of individual activities as a community can also lead to increased productivity in the organization to which they belong, and in society in general.

By examining the possibilities of using CA as an extension of individual activities, noncontact technology, and teleoperation technology from an ELSE perspective, business continuity and ensuring (maintaining) productivity can be achieved through the use of CA as a continuation of activities, even in environments where people have to live with infectious diseases. The fulfillment of the statutory employment rate based on the Law for the Employment Promotion of Persons with Disabilities in the workplace by using CA is another example of ensuring productivity through the use of CA.

Because research in the humanities and social sciences does not produce inventions, but new knowledge can be gained through the accumulation of knowledge, we plan to construct an ELSE research management system to accumulate knowledge for this purpose.

9.5.7 Economic Security and CA R&D

9.5.7.1 Policy Development for CA R&D (Policy Advocacy, IP Protection, International Strategy, and Standardization)

To use CAs safely, securely, and reliably in daily life, it is necessary to build a certification infrastructure to guarantee their reliability and develop new continuous certification technologies to guarantee connectivity between the CA user and the main CA. It is also necessary to take institutional measures, such as standardization, building certification infrastructure, and implementing domestic and international policy development.

Recognizing the IP protection strategy from the perspective of economic security as a sensitive issue in CA development, international collaboration should be actively promoted as an opportunity to showcase the response to the challenging issues of the ELSE issue study, while also considering that a sensitive technology management mechanism based on the international security trade export control system and careful international deployment based on international collaboration must be promoted. At the same time, it is necessary to closely monitor the trends in studies in the international community in areas that cannot be addressed by the studies in this proposal, such as applications to autonomous weapons (LAWS).

9.5.7.2 Leading International Rulemaking

Proposals should be made for the legal framework necessary for the establishment of a CA certification infrastructure and for the international strategic policy development of CA R&D in the context of emerging international sensitive technology management systems, such as economic security and security trade export control.

It is also important to make the necessary recommendations for Japan's participation in strategic rulemaking to take the initiative in international rulemaking in CA infrastructure and CA life, based on trends in international legislation, and to maintain its advantage in terms of international competitiveness, even at the stage where CAs have spread internationally in 2050. The following are some of these recommendations:

9.5.8 CA R&D and the Legal System

In areas such as data management, information security, quality assurance, and environmental protection, initiatives based on a bi-design philosophy have been implemented, and standards for the establishment of management systems have been developed. Privacy Impact Assessment (PIA) was introduced as a specific personal data protection assessment tool under the Number Utilization Act.

However, mechanisms such as privacy by design and default as specified in the EU General Data Protection Regulation (GDPR) have not been implemented in Japan.

Although it is conceivable that knowledge of these management systems could be used in the construction of a certification infrastructure to prove the genuine existence of CAs, it is insufficient for their continuous certification as it is only an initiative in a discrete field. The most important issues are inclusiveness, privacy protection, responsibility for avatar actions, and the prevention of misuse, such as impersonation. Various research groups and organizations have individually considered and proposed ethical principles and regulations. It is important to create an international organization and network to discuss ELSI policies on avatars and their technical standards.

With regard to CA research and development and the legal system, proposals for a legal system are necessary for the establishment of a CA certification infrastructure, overcoming the disadvantages caused by the absence of a legal code to regulate and discipline the use of new technologies, issues associated with information acquisition and analysis, the development of guidelines, other rules and regulations, and transparency. Therefore, a mechanism ensuring transparency must be considered.

Ensuring the portability of CAs (portability (seamless transfer) of data required for CA use) and considering systems for portability and sharing mechanisms in the use of the CA itself are also needed.

9.6 Use of CA for Election Campaign

9.6.1 Can CA Be Used for Campaigning?

This section examines whether communicative avatars (CAs) can be used in election campaigns.

In conclusion, the CA cannot be used for election campaigning in Japan. The Public Offices Election Law regulates election campaigning. Although the Public Offices Election Law contains no provisions for CAs, their use is prohibited.

9.6.2 New Technologies and Election Campaigns

9.6.2.1 Use of the Internet in Election Campaigns

Today, with the proliferation of the Internet, it is being used extensively in election campaigns.

Politicians began using computer networks in the late 1980s. At that time, networks such as CompuServe and AOL were popular in the USA, and networks such as Nifty-Serve began to spread in Japan. The network consists of a modem

connected to a computer and a dial-up connection to the host computer via a telephone line.

In the late 1980s, politicians in Japan began using e-mails to report to their supporters. At that time, e-mail was not yet in the format used today but was sent and received via a telephone line connected to a host computer.

The year 1995 was marked by two major events in terms of the spread of the Internet: first, commercial use of the Internet became widespread, and second, Microsoft released Windows 95, allowing many users to easily connect to the Internet at home.

After 1995, some Diet members and political parties began to establish homepages, and after 2000, politicians began to use homepages in earnest. 60% or more of the candidates in the 2003 House of Representatives election established their own homepages. Currently, a minority of candidates do not have a homepage.

Perhaps the first country where the use of the Internet also had a significant impact on election campaigns was South Korea, symbolized by the 2002 presidential election. In the 2002 election for South Korea's 16th president, supporters of candidate Roh Moo-hyun formed an advocacy group through the Internet. Initially, Roh Moo-hyun was not considered a strong candidate. However, Internet advocacy groups helped Roh eventually win elections.

In South Korea, Internet-based election campaigns have transformed political traditions. In the 2012 presidential election, the ban on third parties other than political parties and candidates using the Internet to campaign during the election period was lifted. In the 2012 presidential election, the ban on third parties other than political parties and candidates using the Internet during the election campaign period was lifted.

9.6.2.2 Use of the Internet in Japanese Election Campaigns

Before discussing Internet election campaigns in Japan, we must first explain their characteristics of Japanese election campaigns.

First, the Public Offices Election Law, a national law, regulates the campaigning of prefectural and municipal leaders and assembly members so that prefectures and municipalities cannot set their own campaigning methods. This is partly because of the fact that Japan is not a country with a federal system.

The second was public election campaigning, which began in 1925 (Quigley 1926). To ensure the fairness of election campaigns, the Public Offices Election Law stipulates that national or local governments bear the costs of using campaign vehicles, distributing postcards and leaflets, posting posters, newspaper advertisements, political and biographical broadcasts, and speeches. Instead, the law regulates in detail the period of campaigning, who may campaign, the method of campaigning, and the maximum expenses (Hayashida 1967). Distribution and posting of leaflets, flyers, documents, and graphics other than those stipulated by law are prohibited.

Third, a distinction is made between election campaigns conducted as political activities and those conducted for a specific election. The election campaign period is limited to the period from the day a candidate's candidacy is announced to the day before voting. Election campaigning conducted prior to notification is illegal, as advance campaigning is prohibited. In reality, however, the prohibition of advanced campaigning has been criticized for having no practical effect, since activities such as policy propaganda and party expansion by political parties and other political organizations can be conducted before the election campaign period as political activities.

Until now, websites were considered to be "documents and drawings." If a candidate updated his/her homepage or posted it on a blog during the election campaign period, it was considered a violation of the Public Offices Election Law because it would fall under the prohibition of distributing or posting documents and drawings other than those stipulated in the Public Offices Election Law. Therefore, candidates were not allowed to use the Internet for election campaigns during the campaign period. Ordinary voters other than candidates were also prohibited from using their homepages or blogs to call for support for candidates, which could violate the prohibition of popular votes for "dropout campaigns," as well as the Public Offices Election Law, because such campaigns could violate the prohibition of signature campaigns prohibited by the Law.

9.6.2.3 Amendments to the Public Offices Election Law

There have been strong calls for the Internet to be used for election campaigns, and an increasing number of political parties have begun to use the Internet as a political activity, even during election campaigns. Shinzo Abe immediately expressed his view that the ban on using the Internet for election campaigning should be lifted after the LDP won the Lower House election in December 2012, returning to the ruling party and becoming the prime minister for a second time. In 2013, the Diet amended the Public Offices Election Law to lift the ban on Internet use in election campaigns. As a result, candidates and political parties can update their websites during the campaign period and use X (Twitter), blogs, and other social networking services to conduct election campaigns.

Regarding e-mail, the ban on its transmission by candidates and political parties for campaigning purposes has been lifted, but its transmission by third parties for campaigning purposes remains prohibited.

9.6.3 CA and Campaigning

There is no provision for CA in the Public Offices Election Law. Why is the use of CA prohibited?

The Election Department of the Ministry of Internal Affairs and Communications has authority to interpret the provisions of the Public Offices Election Law.

According to the Elections Department of the Ministry of Internal Affairs and Communications, CAs fall under the category of billboards, signs, and puppets.

If the CA does not have a three-dimensional appearance, it may be used as a billboard or sign within the provisions of the Public Office Election Law. However, the quantity must not exceed three panels for a candidate, and the size must not exceed 350×100 cm.

If the CA has a three-dimensional appearance, it may be a puppet. Puppets made based on the likeness of candidates may not be used. Therefore, the CA cannot be used for campaigns or political activities.

9.6.4 Use of On-Screen Avatars

Avatars, which are not CAs in robot form but appear on the screen, can be used for election campaigns. Candidates and parties can update their websites during the campaign and use Twitter, blogs, and social networking services. Among them, avatars can be used.

However, their use as advertisements has also been regulated. This is an interesting example.

In recent years, Japanese cabs have installed tablets or liquid crystal display (LCD) displays on the headrests or backs of passenger seats. In these displays, moving and still image advertisements are shown and sound is played. Is the use of campaign-related avatar advertisements in cabs regulated by the Public Offices Election Law?

It is noteworthy that the Election Division of the Ministry of Internal Affairs and Communications has recently expressed its interpretation that such advertisements on displays in cabs are not considered paid Internet advertisements (Election Division, Ministry of Ministry of Internal Affairs and Communications 2021).

First, "if the distribution is to a certain number of cabs of a certain size, it is assumed that a cloud-based system, which is a type of network distribution system, will be used." As such, it is acknowledged that the Internet is being used. Then, regarding the relationship between the display of such monitor advertisements in cabs and the law, it states that they fall under the category of "documents and drawings" under the Public Offices Election Law. However, it states that they are subject to the Public Offices Election Law as either projections or billboards.

As mentioned earlier, this advertising method can display still or moving images, and if the advertisements are exposed to the eyes of many customers, the monitors on which the advertisements are displayed are considered to be subject to the regulations of the law as "projection, etc." if they display different screens one after another, and as "billboards and signs" if they display the same screen for

a certain fixed period of time. If the monitor displays the same screen for a fixed period of time, it is considered to be a "billboard or signboard" and is subject to legal restrictions.

9.6.5 Possibility of Using CA in Election Campaigns

As mentioned previously, CAs cannot be used in election campaigns in Japan.

However, there are many advantages of using CA in election campaigns. Candidates with disabilities enjoy greater convenience. Candidates with speech impediments were unable to make campaign speeches because they were unable to speak for themselves. However, with the use of CA, candidates with speech impediments can make campaign speeches on the streets.

Candidates hospitalized because of serious disabilities or illness are not allowed to make campaign speeches on the streets. However, with the CA, they can make campaign speeches on the streets.

The use of CA also provides significant advantages for legislators with disabilities. In 2019, Eiko Kimura, a candidate with an extremely significant disability, was elected to the House of Councilors. Kimura was diagnosed with a spinal cord injury caused by an injury sustained when she was eight years old, leaving her with very little movement other than that of her right hand, which she used to operate a motorized wheelchair for transportation (Takenaka 2019). If she was able to use the CA, she would not have had to risk entering the chamber.

However, the use of CA in election campaigns is problematic. This can be distinguished from deep faking, which is a global problem. Fake information constitutes a major issue in election security.

In the USA, countermeasures against election faking are being taken from the perspective of Mis, Dis, and Malinformation (MDM). Foreign influencing tactics include leveraging misinformation, disinformation, and malinformation. The definitions of each are as follows (Cybersecurity and Infrastructure Security Agency 2020):

Misinformation is false but is not created or shared with the intention of causing harm.

Disinformation is deliberately created to mislead, harm, or manipulate a person, social group, organization, or country.

Malinformation is based on fact but used out of context to mislead, harm, or manipulate. An example of malinformation is the editing of a video to remove important contexts that harm or mislead.

It is also necessary to consider legal issues regarding the production and use of CA by a certain candidate or politician by a third party without consent. This issue must be considered from a wide range of perspectives including privacy, personal information, portrait rights, publicity, laws governing elections, and political activity.

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