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**Robots on the road to Tokyo Olympics 2020:
Complexity and the Social impact of AI in Japan**

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P1

1.Introduction

Good afternoon, everyone. I'm Toshie Takahashi from Waseda university. I should begin by qualifying that my background is that of a media scholar trying to make sense of the exciting world of AI. It helps that I have been appointed to the technology advisory committee of The Tokyo Organising Committee of the Olympic and Paralympic Games 2020. After Rio, Japanese government and companies seriously began to discuss how they make the Tokyo Olympic games "innovative" and "sustainable". It is against this background that I shall talk about what is going on in terms of new technologies in Japan and how can we understand its social impact. My paper is entitled, "Robots on the road to Tokyo Olympics 2020: Complexity and the Social impact of AI in Japan". I will briefly touch on my two ongoing projects. As they are still works in progress, I shall mostly be talking about the theoretical framework developed within the projects for understanding the social impact of AI.

P2

How can we understand the social impact of AI/Robots?

P3

Theoretical Framework

The theoretical framework I use is an adaptation of my earlier model for understanding media audiences. I had called that "**the complexity model of audience**" (Takahashi, 2003) earlier and now I rename it as "**the complexity model**

of communication” (Takahashi, 2016) in order to expand its scope and understand the social impact of AI/Robots in the smart age.

P4

“the complexity model of audience”(Takahashi, 2003)

“The complexity model of audience”(Takahashi, 2003) was first developed in my Ph.D dissertation in Media and communications at LSE in 2003. It has been published later as a book, “Audience Studies” by Routledge in 2009. In this model, I shifted the Paradigms from a linear to non-linear model, from “active audience” to “everyday life” and “complexity”, and from “audience activity” to “audience engagement”.

P5

The Paradigm of Complexity

The Paradigm of Complexity emerged from a number of different disciplines and has taken a number of different forms. Perhaps its most well known incarnation is in what has become known as the ‘butterfly effect’. Edward Lawrence, a meteorologist at the MIT, claimed in 1963, after discovering for the first time the implications of then unnamed chaos theory, that a butterfly fluttering its wings in Peking one day could possibly cause, a month later, a storm in New York. Chaos theory and work in the area of fractals represented the move to the paradigm of complexity within mathematics. In physics this move was represented by the emergence of theories of self-organisation, in biology, additionally by self-adaptivity and self-reflexivity. The paradigm of complexity also emerged

from within the social sciences. In economics it took form in the concepts of bounded rationality, increasing returns and self-reflexivity and in sociology, in autopoiesis and self-organisation.

P6

A human version of complexity theory

Appadurai (1996) calls for a human version of complexity theory:

In order for the theory of global cultural interactions predicated on disjunctive flows to have any force greater than that of a mechanical metaphor, it will have to move into something like a human version of the theory that some scientists are calling chaos theory. (p.46)

P7

The Complexity Model of Communication

P8

The Complexity Model of Communication (Takahashi, 2016)

In this paper, I will provide an integrated framework for the demonstration of the complex system of individuals, social groups and cultures and the paths of dynamic interaction between these in terms of interactivity, self-organisation, adaptivity and the notion of the edge of chaos, thus contributing to the idea of a human version of complexity theory as Appadurai calls. How it applies to human interaction with emerging technologies”?

P9

The Complexity Model of Communication (Takahashi, 2016)

I depict three levels of complexity in order to simplify the model but there are numerous complex systems that exist among the micro and macro levels and each level is not discrete but rather is intra- and inter-connected and moreover dynamically interacts with the others.

P10

The Complexity Model of Communication (micro-level)

Interactivity

At the level of the individual, there are two types of interactivity: intra-personal and interpersonal.

In the smart age, we have both more interaction with things such as Robots and more transnational interaction via multi-language voice translation systems. I will look at those two changes in the smart age from my two ongoing projects later.

P11

The complexity model of communication in the smart age (macro-level)

Adaptivity

Adaptivity describes the dynamics of the processes of self-creation and of individuals' relationships with their external environment such as institutions,

and the new communication technologies and it shows how the external environment in turn feeds back into self-creation. In the smart age, there are three major powers in macro-level: 1. Power from national level; 2. Power from global level; 3. Power from the revolution of communication technology

P12

Self-organisation

I view the relationships between individuals and the macro as complex, dynamic and sometimes unpredictable and as the site of the dynamic interactions among complex systems, including individuals, families, social groups, communities and cultures. This collection of complex systems is undergoing constant, dynamic interactivity, such that the micro-, macro- and every level in between are reflexively feeding back into each other.

P13

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This picture, when applied to people and societies, may give the impression that society emerges out of people's 'free' interaction. However, we must acknowledge the power of societies' institutions to impact on people's interactions through their reflexive interconnectedness with each other. Adopting Giddens'(1994) theory of structuration and Lash's (1994) structural- and self-reflexivity, I want to focus on the complex interactions between individuals, families, social groups, societies, cultures and the various factors that have been considered in various media active

audience theories to play a role in the relationship between people and new technologies such as AI/Robots.

P14

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The complexity model of communication is not a linear but non-linear model. Therefore it shows neither one way of power from macro-level such as institutions nor power from micro-level such as people's agency or empowerment. The aim of this model is to show the dynamic interaction of micro-level phenomena (individuals), macro-level phenomena (cultures) and all the phenomena in between (social groups), thereby demonstrating the complexity of 'culture'.

P15

The case of Japan in smart age

P16

Macro-level: Smart japan ICT strategy

In Macro-level, Ministry of Internal Affairs and Communications of Japan announced the smart Japan ICT strategy in June 2014. Their Mission is "To be the most active country in the world". It said, "Realizing Japan's economic growth and contribution to international society through innovation by ICT". And the Action is "Realizing the world's most advanced ICT environment for Tokyo 2020

Olympic and Paralympic Games”. How this power from national level will impact on Japanese people in micro-level?

P17

My On-going two projects

At this juncture, I would like to introduce my on-going two projects as they are aimed at answering such a question.

P18

My On-going projects

The first one is “Global Self-creation” project and the second one is “Youth and Robots” project. As I said that, in the smart age, we have both more interaction with things such as Robots and more transnational interaction via multi-language voice translation systems.

P19

1. Global self-creation project

Ministry of Internal Affairs and Communications of Japan have promoted “Global communication projects” (sophistication of multi-language voice translation system) in their “Smart Japan ICT strategy”. This is also the first project (out of nine scientific and technological projects) for Tokyo Olympic 2020 by Japanese government. Let us watch a clip from the video of science, technology and innovation which Japanese government created for their promotion for Tokyo Olympic 2020.

P20

Show the video clip

P21

VoiceTra

VoiceTra is a multi-language voice translation system which has been developed since 1986. They began to use AI to analyse mass amounts of web pages and social media from diversified perspectives over 10 years ago.

P22

ASTREC

They also create ASTREC, which is a team of Japanese companies to bring VoiceTra into society in many different scenes such as public transportation, hospitals, taxi and so on. They have received many feedbacks on VoiceTra from users and this feedback loop among users and scientists and AI has been improving VoiceTra dramatically.

P23

Interviewing

I have been interviewing top computer scientists and Neuroscientists who created VoiceTra and are specialists of AI.

P24

Interviewing

To take one example, I've just interviewed KDDI this Monday. I learned KDDI who develops VoiceTra in taxi don't only provide their gadget to local taxi drivers in rural area in Shimane prefecture, but also they teach how to communicate with foreigners in general. They try to expand their service to local shops and restaurants with local cable company which KDDI owns. In doing so, they will teach local people, who have never talked with foreigners before, not only how to use VoiceTra but also intercultural communication with foreigners in general. In order to survive in a global world, Japanese people reflexively create and recreate themselves through more and more intercultural interaction and transnational communication.

P25

Youth and Robots

The second project is "Youth and Robots". I will show you CNN which report about robots in Japan.

0-1:02; 3:52-6:24

P26

Interviewing @ Ishiguro Lab

In CNN video, we have just seen prof. Ishiguro who creates the androids. I have visited his lab and talked with Erica, the brand new android which can communicate with people by using AI.

P27

Doing research young people on robots

I'm also doing my research on young people and robots. I have asked 225 young people to draw their robots which they want to have in their everyday life.

I hope we can actually create a robot together which makes people happier in future. Japan is the fastest aging society in the world and its companies and scientists are creating a lot of robots in response to this demographic fact. More than ever, I believe we need more discussions about living with robots in the future.

P28

The complexity model of communication

As mentioned earlier, the two projects are ongoing and I hope to share more about them another time. I will investigate how inter-cultural interaction and transnational connectivity have increased from "Global self-creation" project. I will also investigate how intrapersonal interaction with things (Robots) and intra-cultural interaction have increased from "Youth and Robots". And what kind of social impact they will have and what kind of new cultures they will create?

P29

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P30

Social impact of AI/Robots

In conclusion, as the complexity model of communication shows, social impact of AI/Robots can be understood, not only from policies and strategies of government, companies and other institutions, but also from people's engagement with new technologies.

We are speeding into a brave new world where the complexities of human interactions with smart technologies and robots have the potential of hurling us towards the edge of chaos, so to speak. One question I have in mind is simply this: what can we learn *now* of the new cultures that may emerge?

P31

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Thank you!