Who and under What Context Requires "Roboethics"?
From Cross-Cultural Perspective on Assumptions about Robots

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I. INTRODUCTION

IT is known that the concept of "robot" itself is very old. However, it is only recently that humanoid and pet-type robots have appeared as commercial products in daily life, and images of "robots" widely vary from robot-arms in factories to human-sized humanoid robots. Thus, when we consider "roboethics," we should assume a concrete combination of robot types and issues to be considered. If we are sufficiently not careful for this problem, we may miss the essential part of the issues.

For example, when we consider an unemployment problem as one of social issues, types of occupation to be issued affect types of robots to be issued (e.g., robot arms in monotonous assembly line work, or humanoid robots in nursing for the elderly). When we consider ethical problems of robotics applications in medical fields, issues on surgical robotics differ from those on robots for mental healthcare. On philosophical issues such as "human self," to be discussed are not pet-type or vacuum robots but humanoid robots, in particular, androids.

However, there are cultural differences on assumptions about robots in their design, including types and tasks, due to factors such as the degree of usage of robotics in the society, religious beliefs, and images of the robots transmitted through media When we use the word "roboethics," we should care who requires it, what type of robot they require it, and under which social context they try to discuss, while considering these cultural differences. This paper discusses the importance of cultural issues on "roboethics."

II. CULTURAL DIFFERENCES ON ROBOTS

There have been some existing studies on cultural differences about robots. Some of them argued the specificity about robots in Japan. Yamamoto [1] argued the religious backgrounds (Confucianism) as one of its causes. Kaplan [2] focused on humanoid robots and argued that there were differences in familiarity when the West was compared to Japan related to the epistemological differences in the relationship of technological products with nature. Sone [3] also argued Japanese specificity in affinity for

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anthropomorphic robots, considering the influences of robot animations, Japanese automata, and religious backgrounds such as animism. These studies are based on theoretical consideration.

On the other hand, Bartneck et al. [4] reported some cultural differences between several countries including the United States, Japan, the United Kingdom, and the Netherlands, concerning negative attitudes toward robots. Moreover, MacDorman, Vasudevan, and Ho [5] used both explicit and implicit measures of attitudes toward robots to compare among the faculty of a US and a Japanese university, and suggested that there was no difference at the implicit level in contrary to some differences in the explicit level. These studies are based on empirical methods using psychological measures on attitudes toward robots.

A. Cultural Differences on Assumptions about Robots

More important is what people assume when they hear the word "robots," before discussing any differences in emotions and attitudes toward robots. Nomura et al. [6] investigated the differences in assumptions about humanoid and animal-type robots in Japan, Korea, and the United States.

This study found the following facts:

1. Japanese students tend to more strongly assume that humanoid robots have somewhat human characteristics and that their roles are related to social activities including communication, than do the Korean and the US students.

2. Korean students tend to have more negative attitudes toward the social influences of robots, in particular, humanoid robots, than do the Japanese students, while more strongly assuming that robots' roles are related to medical fields than do the Japanese students.

3. Students in the USA tend to have both more positive and more negative images of robots than do Japanese students, while more weakly assuming robots as blasphemous of nature than do Japanese and Korean students.

III. "ROBOTHICS" AND CULTURAL DIFFERENCES ABOUT ROBOT ASSUMPTIONS

Differences on people's assumptions when hearing the word "robots" may lead to differences on their assumptions when hearing the word "roboethics." Thus, we should care who and under what context tries to discuss ethical problems. Unless we are sensitive for this cross-cultural problem, the importance of a combination of robot types and social

contexts in a nation may not be understood by another nation, and the concept of "roboethics" itself may not be shared in the whole world.

For example, let us assume that some persons claim ethical danger of robotics applications in caring the elderly. Then, they should explain the meaning of the danger, for example, danger in physical assistance such as moving bodies, danger in mental assistance by artificial intelligence such as removing loneliness, or danger of social positions and motivations of care takers such as unemployment problems. Before they try to discuss these dangers with other persons, they should share which type of robot is problematic.

Even if humanoid robots having the function of communication is discussed in danger of mental assistance for the elderly, the differences between people on assumptions about humanoid robots may prevent from common understanding of the danger. Persons assuming low autonomy and emotional functionality of humanoid robots may issue that this robotics application has a low possibility of the success in the technological sense, and it may lead to low QOL of the elderly. On the other hand, persons assuming high autonomy and emotional functionality of humanoid robots may issue that artificial things like humans mentally care the elderly instead of human care takers while differentiating between machines and humans. Then, the difference on people's ways of differentiating between machines and humans (for example, the difference between the Western and Japanese cultures argued by Kaplan [2]) may lead to the difference of their acceptance of humanoid robots substituting for humans. This problem is also included in wider relationships between humans and technologies.

IV. Factors for Common Understanding of "Roboethics"

Globalization and standardization in industrial nations may reduce the differences on people's assumptions about robots. On the other hand, relationships between humans and technologies and values of humans in specific job areas are dependent on cultures. Moreover, these concepts are also dependent on personal traits even in a single culture (e.g., [7, 8]).

When we discuss "roboethics", we should confirm several presuppositions about robots and contexts of their applications, such as application areas and their importance in the society, types of robots and their functionalities, acceptability of technologies in the application areas, and relationships between human self and artificial things like humans.

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