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## Abstract of Thesis

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| Name ( KATIRAI Amelia Nur )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                    |
| Title                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Emerging Technologies, Stakeholder Involvement, and Healthcare: Sociological Studies at Their Intersections<br>(新規科学技術・ステークホルダー参画・ヘルスケアに関する社会学的研究) |
| <p>There is a growing consensus that we are experiencing a period of unprecedented social change, wherein emerging technologies are upending the existing social order. Machine learning and other forms of artificial intelligence (AI) are driving this change, both disrupting and reinforcing existing social structures. One area in which this is most visible is the healthcare space. Healthcare systems already strained prior to the Covid-19 pandemic have been increasingly worn to the limit, with growing recognition of the costs to the health and wellbeing of healthcare professionals and their patients. Against this background, expectations for the application of emerging technologies such as AI are ballooning, even as a growing body of social scientific research highlights the potential for harm through their pursuit and implementation.</p> <p>In this thesis, I report on five, sociologically-oriented studies conducted between 2019 and 2022, which are situated at the intersections of emerging technologies, stakeholders, and healthcare, and focus particularly on the use of AI in healthcare in Japan and the United Kingdom. Together, these studies explore the discourse on the social impact of AI in healthcare in five settings: institutional discourses and their concern with ethics, patient and citizen discourses elicited through a participatory workshop, clinician discourse from a Roundtable conducted with experts, social media discourses circulating on Twitter, and academic discourse.</p> <p>In the first study, I assess the degree to which ethical considerations for AI in healthcare set out by the World Health Organization are addressed in the Research Plan for Japan's Cross-Ministerial Strategic Innovation Promotion Program for an "Innovative AI Hospital System". Following this, I report on three studies conducted with different stakeholder groups as their focus: first, a qualitative analysis of a workshop conducted with members of a Patient and Public Involvement Panel; second, a qualitative analysis of a Roundtable session conducted with expert clinicians; and third, a mixed-methods analysis of the discourse circulating on Twitter. The final study in this thesis branches out to consider the social and ethical issues of a particular cluster of emerging technologies beyond healthcare, through a structured review of the academic literature on emotion recognition technologies. In the conclusion, I synthesize the insights gleaned from these diverse settings. I highlight the need for careful consideration in the use of emerging technologies, weighing their utility against the possibility of harm, particularly in light of concerns about the impact on stakeholders across the studies included in this thesis. I argue for the merits of a sociological approach to emerging technologies, and that centering the voices of those who will be directly impacted by the implementation of new technologies is essential. Moreover, I extend the studies contained in this thesis by arguing that we must radically expand our conception of the relevant stakeholders as we urgently consider how to balance the promise of emerging technologies to benefit health with awareness of the risks they pose to human health through environmental harm.</p> |                                                                                                                                                    |

## 論文審査の結果の要旨及び担当者

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## 論文審査の結果の要旨

The above-mentioned members of the doctoral committee examined Amelia Katirai's thesis entitled Emerging Technologies Stakeholder Involvement and Healthcare: Sociological Studies at their Intersections. The Committee found the research contained within the thesis to be timely and relevant to the field of Human Sciences and judged the results to make a meaningful contribution to the field.

The thesis is a collection of papers showcasing independent and collaborative research activity that she conducted between 2019 and 2022 focusing on emerging technologies, particularly Artificial Intelligence, stakeholder engagement, particularly patient, public and healthcare professionals, and healthcare. The thesis is constituted of five studies sandwiched between a lengthy introductory chapter surveying the literature in the field, especially Japanese literature, and a concluding chapter that brings together the findings and outlines their overall significance of the findings. Three of the studies are from work that Amelia was involved in from a large joint UK-Japan funded, interdisciplinary research project, the AIDE project, between the University of Oxford and Osaka University on stakeholder involvement in healthcare AI (studies 2, 3 and 4). Studies 1 and 5 were conducted independently by Amelia around ethics and AI technologies. The sixth study, which appears in the appendix, is from research that Amelia conducted for a project funded by JST RISTEX on patient involvement in priority setting. Studies 1, 2 and 5 are currently under review in leading journals in the field, and study 6 is already published.

Study one employs a documentary content analysis to evaluate the extent to which an important government publication on health care AI, the Research Plan for Japan's Cross-Ministerial Strategic Innovation Promotion Program for an "Innovative AI Hospital System" reflects 6 ethical principles laid out by the World Health Organization in its Guidance on Ethics and Governance of Artificial Intelligence for Health. This study revealed that considerations for the principle 'Promoting human well-being and safety and the public interest' were frequently articulated, but the principle 'promoting AI that is responsive and sustainable' was not considered at all.

Study two aided to understand patient and citizen perspectives on AI in healthcare through workshops conducted with a Patient and Public Involvement Panel (PPIP). Using an on-line 'post-it' type software, the PPIP met twice for 90-minute online workshops to articulate concerns and expectations of AI in healthcare in week one, and then to cluster the results in week 2. The workshops were co-facilitated by the research team and Amelia analyzed the data. This work was presented at different stages of the analysis by Amelia at The British Sociological Association Medical Sociology Conference (2021) and the International Union of Health Promotion and

Education Conference (2022).

Study three was part of a landscaping review of healthcare AI development and deployment in the two study sites for the AIDE project, Osaka University Hospital and the University of Oxford NHS Trust Hospitals. As part of this review, a Roundtable session discussing six questions was held between clinician AI researchers from both hospital groups along with the AIDE project research teams. The data from the data was transcribed and then analyzed for key themes by Amelia. Three major themes were identified. While this is an internal project report, the analysis and writing up was completed by Amelia.

Study four was a mixed-method study of English and Japanese-language Twitter discourse on AI and healthcare. Twitter data was retrieved at 4-week intervals in August and September 2020 using Twitter REST API. The research design and data collection were completed by Amelia in consultation with one researcher from the UK team and one from the Japan team. Three kinds of analysis were conducted on the data: a genre analysis, a sentiment analysis and a thematic analysis. All data were subjected to hand-based analysis. This is the first study to examine Twitter discourse on AI in healthcare using English and Japanese-language data.

Study five was a structured review of literature examining the ethical and social implications of emotion recognition technologies (ERT). In total, 43 relevant articles were included from a database and hand search of academic and grey literature. Thematic analysis was conducted with three major themes identified: bias and faulty bases, sensitivity of emotion data and use in consequential settings. This was an independent study conducted by Amelia.

Study six, which appears in the appendix, was also a structured review using similar thematic analysis to identify studies that had used patient-driven priority setting in medical policy making, especially funding policy. Amelia conducted the review and led the data analysis. Study six has already been published with Amelia as the first author: Katirai A, Kogetsu A, Kato K, Yamamoto B. Patient involvement in priority-setting for medical research: A mini review of initiatives in the rare disease field. *Front Public Health*. 2022 Jul 19;

Through the six studies, Amelia demonstrates her competency in working with a variety of qualitative methodologies as well as a big-data analysis of discourses circulating in Twitter around AI in healthcare. She also showed herself able to work with qualitative workshop and documentary data in Japanese. The Committee judged that the work was of a very high standard, and its overall presentation very clear and readable. Through the defense, Amelia demonstrated a high level of knowledge around the content of all the studies and was able to field questions with confidence. The Committee felt that the sociological approach was not strongly evident, despite the thesis title, and that she may have been better framing the research as an interdisciplinary exploration given that this was the nature of four of the studies. While the structure of this dissertation is novel for the Graduate School of Sciences, it was felt that the various chapters held together well to make an important contribution to the study of AI in health care and stakeholder involvement. The Committee agreed that the overall quality of each chapter was high, and that chapters 1 and 7 were of sufficient breadth and depth to link the separate studies together in a meaningful way. As a result, we judge that the thesis is of sufficient quality for the student to be awarded a PhD.