

**Understanding the Impact of COVID-19 on Economy and Environment in the Asia-Pacific
Region**
(Technical Report)

An Actor-Network Theory Analysis of the SpeechEasy Device's Underperformance
(STS Research Paper)

An Undergraduate Thesis Portfolio

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By

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Socio-technical Synthesis: The COVID-19 Pandemic and SpeechEasy

My technical report and STS research paper are related to each other through Michael Callon's Actor Network Theory (ANT). Rather than reducing or analyzing a socio-technical system based on an individual actor or network, Callon's ANT explains that an actor-network system must be treated simultaneously as both an actor and network. The resulting power in a sociotechnical system therefore does not reside in any single actor, but rather in the strength of connections between actors and their ability to work towards a common purpose. My technical report focuses on understanding the relationships between the COVID-19 pandemic, government lockdowns and restrictions, the economy, and environment as both individual actors, and an interconnected actor-network in the Asia-Pacific region. Similarly, my STS research paper draws on the ANT framework to reveal how the SpeechEasy actor-network failed to identify and recruit the necessary actors to completely eliminate stuttered speech among its users.

My technical capstone team's project was to determine how government policy, lockdowns, and travel restrictions implemented during the COVID-19 outbreak have slowed economic growth in transportation, manufacturing, and agriculture sectors, and in turn, impacted air quality and water quality. In other words, our goal was to understand how various actors (policy, the economy, various industries, and transportation) impact and affect other actors in the Asia-Pacific actor-network of China, Japan, South Korea, New Zealand, and Australia. Using data from public databases for economic activity, including transportation and road usage, as well as NASA satellite sensor observations, my team and I used statistical analysis to draw conclusions regarding the extent to which COVID response policies have reduced the economy, and in turn affected air quality. Our hope was that our discoveries would then help drive future decisions made by policymakers were another pandemic or similar global crisis to arise.

In my STS research paper, I used ANT to systematically analyze why the SpeechEasy device, a hearing device made for stutterers, has failed to consistently eliminate stuttered speech across its patients. I argued that the primary actors of the SpeechEasy device failed to identify all of the relevant actors when building the network. By failing to identify the diaphragmatic breathing technique, the gentle onset technique, and the psychosomatic effect of anxiety as necessary actors, the SpeechEasy network failed to operate as a cohesive, integrated system, and was unable to eliminate all stuttered speech among its patients. I concluded by stating that proper implementation of these three actors into the SpeechEasy actor-network was necessary in order for the device to be 100% effective in eliminating stuttered speech.

By working on my technical capstone project and my STS research paper together, I have learned a great deal more than had I worked on the projects in isolation. My STS research paper and the ANT framework gave me the tools to better understand the importance of the interconnectedness of government policy, the economy, and the environment, thus improving my technical capstone project. Simultaneously, my work with my technical project regarding the COVID-19 pandemic and its impact in the Asia-Pacific region helped me gain a deeper understanding of the role that non-human actors play in the success of an actor-network, allowing me to analyze every actor of the SpeechEasy network, and build my argument regarding the lack of various non-human actors. In summary, the work on my technical capstone project and STS research paper allowed me to gain a deeper understanding of Callon's ANT and how it can be used to systematically analyze complex socio-technical system.

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