Intermedial Networks: The Digital Present and Beyond, 7th conference of the International Society of Intermedial Studies Linnaeus University, Växjö, Sweden 23–25 October 2024

Remediating Indexical and Iconic Signs: Intertwining Transmission, Capture, Storage in Satellite-Based Forest Information Systems

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Abstract

This paper examines the use of satellite remote sensing as a case study to investigate how 21st-century knowledge infrastructures rely on multiple stages of remediation. By focusing on the application of satellite data in forest information systems, the study demonstrates how the production of environmental data is shaped by the close intertwining of techniques for transmitting data through space, capturing data using sensors and instruments, storing large amounts of data in physical storage media, and rapidly processing vast quantities of data using computer processors. The integration of these techniques necessitates the ability to quickly alternate between different physical modalities, such as photovoltaic energy (sensors), electromagnetic waves (wireless transmission), and magnetic fields (storage). The paper compares two concepts that have attempted to explain the transfer of data across physical modalities: Bruno Latour's concept of circulating reference and Martin Irvine's concept of retokenization. The author argues that Latour's concept of circulating reference requires modification by incorporating Irvine's use of Peircean semiotics, which distinguishes between indexical, iconic, and symbolic sign types, as well as between types and tokens. By interpreting the circulation of signs between sensors, transmitters, and storage devices as indexical and iconic sign types, and by viewing each stage of remediation as it passes through the information network as an act of retokenization—that is, translating the tokens of a type within one physical modality to different tokens of the same type within a differing physical modality—the author demonstrates how a Peircean semiotics provides a more comprehensive account of semiosic translation compared to Latour's work. Finally, by adopting the concept of environing media, introduced by media scholar Adam Wickberg and environmental historian Johan Gärdebo, the paper illustrates how the concept of retokenization is integral to understanding the increasing reliance on environmental data for informed decision about environmental policies.

ISBN: 978-91-8082-113-1

Keywords
Retokenization, Peirce, translation, remote sensing, environmental mediation

Bio
Erik Ljungberg is a PhD candidate at KTH Royal Institute of Technology in Stockholm, Sweden. His research examines relationships between humans, environments, and information technologies. In his current PhD project, he focuses on remote sensing and machine learning in Earth observation and forestry. He analyzes techniques of data collection and processing in environmental AI to assess their epistemic consequences and provide historical contexts for the media-ecological conditions that enable algorithmic mediation of nature. Drawing from critical media theory, science and technology studies, posthumanism, anthropology, environmental history, and history of knowledge his approach analyzes how novel modes of digitally mediated human-environment relations emerge in the scientific practices of environmental monitoring. Situated at the intersection of science, technology, and environment, his research aims to elucidate and critically analyze the role of data-intensive algorithms in constructing, representing, and enacting the natural world.