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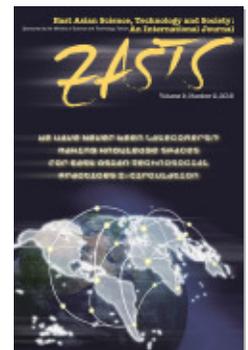
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# We Have Never Been Latecomers!? Making Knowledge Spaces for East Asian Technosocial Practices

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## 1 The Problem

Famously, Bruno Latour (1993) argued that “we have never been modern” and proposed instead that modernity balances or oscillates between the purity that it claims to be attached to on the one hand and impurity on the other. Ruthlessly but powerfully, this move created a space for thinking about the heterogeneous character of European modernity, and it is a claim that has been widely developed and explored, not least by Latour (2013) himself in his recent book, *An Inquiry into Modes of Existence*. At the same time, and partly in response to Latour’s call for symmetry, researchers with postcolonial sensitivities, such as Warwick Anderson (2002; 2009a), Dipesh Chakrabarty (2000), Sandra Harding (2008), and Helen Verran (2001) have reminded us that the celebration of the end of modernity and the powerful STS tool of analytical symmetry are both drawn from the specific historical, social, and knowledge contexts of Western Europe and North America.

The caution is clear: technoscience is not as pure and universal as many have assumed. It is important not to lose sight of the uneven distribution of technosocial networks around the world or of the alternative concerns, practices, or what we might think of as different “modes of knowing” in non-Western places. To say that we have never been modern is, in short, to talk about a “we” whose knowledge is particular, specific, and located.

These STS and postcolonial interrogations have attracted increasing attention in STS edited collections (Anderson and Adams 2008; Harding 2011) and special journal issues, including *Social Studies of Science* (Anderson 2002; Kowal, Radin, and Reardon 2013), *Science as Culture* (McNeil 2005), *Isis* (Schiebinger 2005), and *Postcolonial Studies* (Seth 2009). Unsurprisingly, several special issues of *East*

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*Asian Science, Technology and Society (EASTS)* have also explored the issue (for example, Tsukahara 2009, Anderson 2009b, Chen and Fu 2012). Nor is it surprising to discover that problematics and agendas vary between different contexts and locations.

## 2 How Far Can *EASTS* Go?

How do we know how “East Asia” is done in our knowing practices? Is it possible to imagine other East Asian modes of knowing or knowledge spaces? Is it possible to explore how these are enacted? The making of similarities has been going on since Vasco da Gama in one or another of the Western modes of international (Lin and Law forthcoming). This has come in various guises: modernization, Westernization, development, globalization, or even civilization. It has been done on a massive scale since the sixteenth century. And it has almost always been analytical and dominatory (Lin and Law 2014). No doubt many have done important work in these repertoires, but often, instead of recognizing that knowing is situated, their work has been accompanied by the elision of context. Clearly if we think within these repertoires, then we also need to ask: Where we are speaking from? How are our knowing practices making and remaking these repertoires? What routes do these ways of knowing follow? And where are they leading us?

All this suggests that engaging STS by highlighting practices from non-Western places such as East Asia, or more specifically Taiwan, is possible but problematic. This is because while locality, context, or situation can be specified, the ways in which this is done typically carry the ghost of area studies, theories of development and modernization, postcolonial studies, or some mix of these. Background categories and classifications mobilized to describe and prescribe knowledge spaces include center versus periphery, dependent versus independent, developed versus developing versus undeveloped, and empire versus the colonized. At the same time this intellectual baggage tends to disappear in the commitment of STS to symmetrical method and its theoretical and critical orientation to notions such as network, framing, circulation, and trading zone. What is happening here? The danger is that vocabularies such as these dissolve specific differences into a single happy and all-inclusive STS family.

How do we avoid this? As contributors to *EASTS* have interrogated the Western STS legacy with Asian local practices, they have proposed various strategies. Togo Tsukahara (2009) has explored dependent-independent relationships; Daiwie Fu and Ruey-Lin Chen (2012), Ruey-Lin Chen (2012a; 2012b), and Jia-shin Chen (2012) have examined and reflected on the distinctiveness of East Asian STS/theory; Fa-ti Fan (2012) has suggested the need for critical regionalism; Suzanne Moon (2012) has pointed to the importance of intuition; Gregory Clancey (2009) has argued that it is important to take up local materials within the STS rubric; and Anderson (2012) has even tentatively talked of Asia as method.

Exploring the tensions between local specificities and universal theoretical frameworks is always challenging and disconcerting (Law and Lin 2010). Rather than directly elaborating theories from local historical and social contexts within or beyond Western theories, or wondering how and why a local theory might be distinctive or not, this special issue adopts the alternative strategy of working at the meso-level. Most of its contributors do not evaluate local STS theory or cases directly. Adopting one of the

STS insights into knowing practices, this special issue focuses instead on the knowledge spaces that simultaneously enact and are enacted by

- (a) *institutions*, which include modes of production, knowledge producers and audiences, and systems of circulation, especially those making particular knowing subjectivities and materialities;
- (b) *representations* of the world, such as social and STS theory, and the different depictions generated in scientific, technological, or medical contents; and
- (c) the possibly variable *realities* enacted together with those institutions and representations; these include the implied metaphysics, ontologies, or fragmented forms of possible other worlds (Law 2011).

In the second part of this special double issue we develop this argument as the context for the contributions.

### 3 Making Knowledge Spaces

With an empirical sensitivity to knowledge spaces and practices, such as production networks, local communities, national strategies, industrial chains, or international flows, the contributors to this special issue are interested in exploring where and how technosciences and our theories for knowing them are produced. The focus is on the specificity of technosciences in these locations. And it is also on how production of technoscience and theory in turn transform these spaces.

As a part of this, the contributors are sensitive to the fact that there is important work on local technoscientific practices in other theoretical approaches and disciplines. In order to make alternative knowledge spaces for East Asian technosciences, the contributors thus seek to expand the scope of STS by joining forces with and interrogating a number of alternative intellectual legacies. This special issue brings together researchers from history, industrial and economic sociology, and STS with case studies drawn from Taiwan, Japan, Korea, and China as well as their international dynamics; the authors work together to critically explore these cases and their theoretical frameworks through various diffractions of STS.

Similarly, and following the theoretical sensitivity to place, half of the cases are Taiwan based but East Asian wide, and their authors are concerned with where and how to locate the diversity of East Asian and Taiwanese technosocial practices. Many are disconcerted by the familiar repertoires of “developing country,” “fast follower,” and “latecomer.” These are frameworks in industrial and economic sociology that have proposed and reproduced linear and progressive imaginative or normative spaces in describing and prescribing the character of technoscientific transformation and the often undesirable social and intellectual impact of technoscience and its knowledge in non-Western contexts. Yet it is not easy to break away from the familiar intellectual, social, and political routes.

Thus, paraphrasing Latour (but also following others), the special issue is entitled “we have never been latecomers,” with a question mark and an exclamation point. Its contributors ask: What are the kinds of alternative knowledge spaces that it might be wise—or indeed possible—to create in order to understand these practices? What kinds of different spaces are produced and transformed in these local (or sometimes

less than local) practices? And what can we learn from STS if we want to relocate these technoscientific and technosocial transformations? With such local contexts and specific problematics in mind, and based on the geographical contexts in which these technosciences move together with their technospatial implications, we divide the articles into a two-part special issue, first exploring circulation and then turning to situatedness.

What kinds of knowledge spaces—what *modes of knowing*—can be detected or imagined for East Asian and Taiwanese technoscience? The literature suggests various possibilities. As we noted above, we will explore these more carefully in the second part of the special issue. Our approach has been to try to distinguish between modes of knowing that assume the essentially unitary and fundamentally homogeneous character of the world, and those that rather take reality to be disparate and essentially heterogeneous. The former in one way or another tend to assume that the underlying order of the world is uniform, and therefore that it makes sense to seek general mechanisms that underpin the obvious empirical complexities. In this way of thinking, to know well is a matter of asking the right questions, developing the appropriate methodological and theoretical tools, and using those tools to discover and represent reality, and so to understand the mechanisms that produce the complexities that make up empirical appearances.

In the context of technoscience it may be useful to distinguish at least three modes of knowing that assume this kind of deeper world homogeneity. First, to talk in terms of *diffusion* is usually to assume that there are no essential differences between East Asia and Europe or North America. The assumption is that the world is similar in kind everywhere, and the linear development of technoscience is simultaneously socially and economically essential and empirically visible. The West becomes the desirable model and forerunner. It sets the standard that the non-West should shape itself into. A second mode of knowing explores *deformation*. This often radical way of thinking addresses the undesirable and sometimes disastrous consequences that not infrequently follow the diffusion of technoscience, and in particular explores the resultant distortions of local social structures, cultures, and ways of living. A third mode of knowing, also potentially radical, assumes the essential unity and homogeneity of the mechanisms at work in the world for thinking about *circulation*. In this case the argument is that the center and the periphery are constituted together and that realities such as “underdevelopment” need to be explored as relational effects. Here, then, the focus is on the dynamics that produce such underdevelopment.

Clearly these three ways of knowing technoscience and the concerns that underpin them are very different in practice. Equally clearly, in many cases they are more or less mixed together. However, as we have indicated above, they share the assumption that it is possible to make generally valid claims about the mechanisms that underpin technoscientific change. Empirical circumstances are, to be sure, vastly different, but those circumstances reveal commonalities if we look at them in the right way. The object in each case is to reveal mechanisms that operate generally. It is taken for granted that behind empirical heterogeneity and at the level of such general mechanisms the world is homogeneous. This assumption is absent for our second group of ways of knowing. In one way or another, these wrestle to know a world that is taken to be essentially heterogeneous and disparate in form. They assume, in other words, that it is not just empirical specificities that are specific to circumstances but also that the

mechanisms at work are different, and that appropriate ways for knowing those mechanisms are dissimilar, too. One implication of this heterogeneity is that knowing becomes *contextual*: what counts as good knowledge in one location may or may not count as knowledge anywhere else.

Any list of heterogeneous modes of knowing is arbitrary, and it also needs to recognize and handle its own locatedness. Nevertheless, within technoscience studies it may be useful to distinguish at least three approaches which work in this way, though often they overlap. First, it is possible to stress that both technoscience and the appropriate ways of knowing it are *situated*. (It is the latter recognition that distinguishes this style of knowing from approaches that work by exploring deformation.) This mode of knowing prioritizes the local and highlights the specificity and importance of local mechanisms, and therefore the fact that explanations also belong to a locality. The extent to which those explanations might work anywhere else is quite uncertain. Second, there is what we might think of as knowing as *translation*.<sup>1</sup> This similarly asserts the diversity and specificity of local worlds and their mechanisms but also emphasizes the framings and reframings that shape the encounters between different localities and worlds. Translations, always less than perfect, may work, or they may not. They may work in one world but not in another (for instance dominated) world. This is an empirical matter, though what can be told about words, translations, and their successes or otherwise is contingently limited, for knowing and translating are themselves contextual. And finally there is a mode of knowing which we might think of (provisionally following Eduardo Viveiros de Castro [2004]) as *controlled equivocation*. This also explores translations between different contexts, cultures, or worlds but seeks to foreground the way in which such translations are unavoidably also othering mistranslations (because single words necessarily refer to different realities, objects, or contexts). Here, the mistranslation between localities is recognized as unavoidable, and the issue becomes *how* to mistranslate. The object is to highlight underprivileged local perspectives and situations without essentializing locality. Place or situatedness is important, but so too are what is known and how knowing is done. To show what this might mean, we explore the possibility of displacing analytical methods for knowing (which are embedded in or underpin many and especially homogeneous ways of knowing) with alternative Chinese correlative methods.<sup>2</sup>

#### 4 Circulation

With these thoughts in mind, we turn to the two parts of the special issue. In the first of these, on circulation, the contributors explore different modes of technoscientific practice with special focus on the movement of technoscience in intra-Asian contexts. These articles mostly use multisited East Asian empirical cases to examine how technosciences are embedded in these local (and international) contexts, made and remade through them, and help to transform them. The cases cover agricultural devel-

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<sup>1</sup> Here we mean STS-oriented material-semiotic translation rather than linguistic translation.

<sup>2</sup> This is not to be confused with statistical correlation.

opment, TFT-LCD industries, biotechnologies, and robotic studies and come from Taiwan, Japan, Korea, and China.

Sometimes the global schemes designed to transform the locals adapt themselves in the trajectory of local circulation. In “Sowing Seeds and Knowledge: Agricultural Development in Taiwan and the World, 1925–1975,” James Lin presents the trajectory of international aid schemes for developing agriculture in China, Taiwan, the Asia Pacific region, and Africa. He argues that development is more than a story of academic agricultural science diffusion from the global North to the global South but rather that ideas and practices of development are contingent on political, economic, and cultural contexts. In order to alleviate poverty and famine, US nonstate actors and Cold War–driven agencies initiated a science-based breeding reform agenda but adapted it to social reform agendas and concerns in prewar China. While Taiwan followed this renewed agenda and was very successful in disseminating its development practices abroad, it initially continued the social reform agenda but then switched to a model based on basic and applied sciences. Thus despite the umbrella name and the superpower initiator, development altered in form as it moved; the specificity of practices and ideas changed as it circulated from place to place, and the local agents in the global South, such as the Chinese and Taiwanese, initiated their visions of development via their specific interventions.

Sometimes it is the microcirculation of people and tangible skills that help to shape global mapping. In “Risk and Mobility: A Case Study of the Thin-Film Transistor Liquid-Crystal Display Industry in East Asia,” Mayumi Tabata examines the flow of knowledge in the Castellan “network society” and points out that tacit knowledge is vital for production in competition by high-tech manufacturers in East Asia, for instance in areas such as the thin-film transistor liquid-crystal display industry. Tabata points out that following the ups and downs of the industry in Japan, Korea, Taiwan, and China since the 1980s, skilled engineers and their embodied expertise moved across national boundaries with the changing cross-national flows of job vacancies. Lacking legal practices such as filing patents to protect intellectual property rights, it is difficult to inhibit the flow of tacit knowledge. In contrast to a free flow of knowledge and labor, Tabata shows that the circulation of knowledge is shaped and mitigated by open or closed in-house pathways to varying extents in different contexts.

In addition to its international flows, technoscience also varies and transforms locales in its circulation between the state and society. Tzung-wen Chen’s “Global Technology and Local Society: Developing a Taiwanese and Korean Bioeconomy through the Vaccine Industry” compares the development of vaccines within Korea and Taiwan. The global vaccine market is dual structured, with high-priced vaccines manufactured by large companies that use advanced technology on the one hand and traditional low-cost vaccines on the other. Though Taiwan and Korea have similar state contexts committed to development, and both engaged in industrializing hepatitis B vaccines in the mid-1980s, in practice they developed different market structures with different functional configurations, which Chen calls *regeneration* and *translation*. If we distinguish between production (company) and adoption (state) networks, Korea formed its production network before there was any adoption network, and the production network shaped the form of its adoption network. By contrast, despite the great success of immunization programs, the failure to establish a production network in Taiwan meant that the adoption network translated and domi-

nated production. Thus, the circulation between production and adoption reveals that local society, in the form of production networks, is as important as the developmental state.

In the same vein, in “Theater as a Site for Technology Demonstration and Knowledge Production: Theatrical Robots in Japan and Taiwan,” Tzung-De Lin compares circulation of expectations about technosocial futures between technology and society epitomized by robotic theaters in the two countries. With the increase in interdisciplinary collaboration, theatrical robots have become a site of contest and knowledge production where different conceptualizations of the public (or audience) and forms of human-robot interaction are enacted. In the case of Taiwan, the theoretical act is more of a demonstration and the audience is conceptualized mainly as a passive witness of robotic wonders. This implies that the ever-advancing development of technology needs only one-way support from society. By contrast, in Japan, robotic technology, as represented by robot actors, symbolizes pessimistic societal anxiety about technosocial futures. The audience is not only led by the scenarios to reflect on the various situations it might encounter but is also asked to provide feedback through questionnaires and post-performance discussion. Thus the audience is enacted as an active participant that both reflects and collaborates on problems of technosocial development.

## 5 Situatedness

The second theme, situatedness, uses Taiwanese case studies to explore how three frameworks—the latecomer thesis, the development framework, and actor-network theory—drawn from existing industrial, social, and research practices can be reframed. It also explores how to think about alternative frameworks of technosocial practice and development from the perspective of STS. The articles in this section focus on studies of solar power stations, small and medium enterprises (SMEs), and Taiwan’s high-tech industries. Based on situated contexts, these articles develop various interventions to explore alternative knowledge spaces for situating Taiwanese experience.

Adopting an approach based on actor-network theory (ANT) for reflecting on non-Western technoscience, Hung-Jen Yang’s “Reassembling Solar Farms, Reassembling the Social: A Case Study of Ping-Tung County in Southern Taiwan” explores the adoption of solar photovoltaic (PV) systems in Taiwan by reassembling local heterogeneous configurations. Taiwan had been a major producer and exporter of solar PV panels but never dreamed of the large-scale local installation of such systems. Following a typhoon-caused disaster that flooded farms and ponds, and the severe crisis in the solar PV industry caused by the global economic recession, a new sociotechnical assemblage emerged in Taiwan after 2010. Drawing on the notions of “de-scription” and “fluid technology” in non-Western technoscience, Yang describes the redesign of artifacts, the changing local sociotechnical arrangements, and the role of government in translating new sociotechnological assemblages. This is an explication of post-ANT theoretical space with particular local specificities.

Michelle Fei-Yu Hsieh pushes the interrogation of theory further with her article, “Learning by Manufacturing Parts: Explaining Technological Change in Taiwan’s

Decentralized Industrialization.” She argues that contrary to the development literature that stresses the lead role of large firms in driving technological learning, the breakthroughs in the bicycle industry in Taiwan were accomplished at the intermediate level in a system of decentralized production composed of SMEs manufacturing bicycle parts. With in-depth illustrations of the process of technological change and diffusion through the adaptation, application, and commercialization of new technologies, Hsieh thus also introduces the processes of industrial dynamics and the role of entrepreneurs/manufacturers to STS. This further highlights the importance of the role of manufacturers in East Asian countries, including Taiwan, in global industrial chains and bridges the missing link between innovation studies and STS literatures on the use of technologies.

In a more radical move, Dung-Sheng Chen reflects on and problematizes the latecomer thesis in “We Have Never Been Latecomers: A Critical Review of High-Technology Industry and Social Studies of Technology in Taiwan.” Examining the literature of high-technology industry studies on Taiwan and social studies of local technology, Chen argues that the latecomer thesis not only describes technosocial development but also restricts the scope of researchers as they develop theory and seek to interpret empirical cases. In contrast, Chen explores alternative approaches that share insights with ANT in studies of Chinese medicine, bottom-up technological development in agriculture, and local mechanical and civil engineering. These studies exemplify the possibility of breaking away from the leader-latecomer thesis and the dichotomized theoretical space that distinguishes between that which is advanced and that which is backward. They challenge us to explore local specificity in its own terms.

Finally, in “Making Other Knowledge Spaces: Theorizing in Practice for STS” we draw on economic, sociological, postcolonial, and STS theories to articulate and explore the implications of the series of different knowledge spaces that we have touched on above. We not only suggest that East Asia/Taiwan is made differently in these spaces but also argue that understanding the institutions, representations, and metaphysics involved in “theorizing in practice” is crucial if we are to break away from dichotomized forms of knowing. If this can be achieved then it will become possible to elaborate more theoretical routes from local perspectives in the attempt to enrich STS. As a part of this, and as it moves from the West to the rest, we take it for granted that STS will necessarily start to pluralize itself.

Our hope is that exploring circulation and situatedness will not only open a dialogue between industrial and economic studies and STS but also illustrate the possibility of taking different routes to explore what is distinctive about East Asia on the basis of its specific intellectual and historical legacies. It would be good to think that this special issue offers the East Asian and Taiwanese STS community a timely opportunity to place alternative knowledge spaces on the agenda of STS.

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