Where is East Asia in STS?[1]

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Introduction

Though it started in EuroAmerica, the intervening fifty years has seen the global spread of STS and the creation of thriving national and regional communities including the large and diverse area covered by the *East Asia Science, Technology and Society: An International Journal*. Its international spread has reshaped the discipline in many ways, pushing it from its original core focus on technoscience in EuroAmerica to embrace new and wider agendas. These include colonial and postcolonial asymmetries, the character of regional, national and local technoscientific practices, and an enhanced concern with the importance of space and place in the ordering of science and technology. Despite the fact that it is arguably impossible to write Asian grounded theory (Dutton 2002), the authors who publish in EASTS have nevertheless explored the possible character of an East Asian STS, asking how it might be distinctive, considering the relations between East Asian STS and East Asian Studies, and critically examining how STS in East Asia might best relate theoretically and substantively to EuroAmerican STS (Fan 2007, Fu 2007, Chen 2008, Anderson 2009b, Tsukahara 2009, Chen 2012, Fan 2012).

In considering how to put 'knowledge in its place' (Livingstone 2004, Seth 2009) some have traced how empires or other forms of asymmetrical global connection impose spatial and temporal frames to generate distinctions between the 'local' and the global (Redfield 2002, 793). In addition, many have warned against essentialising spatial and cultural difference, and stressed the importance of contingency and the need to explore epistemic violence by revealing what Warwick Anderson (2009a) describes as 'the heterogeneous, haunted, uneven terrain of contemporary power relations'. Sandra Harding has similarly argued the need to problematise 'northern science studies' and the power relations within technoscience as she has pressed for multiculturalism and the importance of studies from the periphery (Harding 2008).

So the complex relations between geography and forms of knowledge in technoscience are firmly on the agenda, the practitioners of STS including those working in East Asia conceptualise those complexities in a range of different and sometimes contradictory ways, and that multiplicity is also refracted in different assumptions about the character and location of East Asian technoscience (Abraham 2006). At the same time, it is sometimes difficult to conceptualise this clearly because the issues are also *reflexive*. How we think about the place of technoscience in the world cannot be completely disentangled from how we institutionally and epistemologically conceive of the relations between different forms of STS. To illustrate the point starkly (we will nuance this below) those who imagine science and technology to be putatively universal tend to be similarly committed to the idea that a single STS is appropriate to both (say) Taipei and

Toronto, whereas those who emphasise the importance of cultural difference in technoscience are also likely to argue that STS, too, both is and should be culturally multiple.

So how we practise STS is reflexively related to how we imagine our objects of study and their knowledge practices, and both in turn are tied to what are taken to be appropriate institutional arrangements. But the argument can be further extended to what there *is* in the world – that is to the ontological. Here the suggestion is that different knowledge practices (help to) generate different objects or realities because practices are *performative* (Mol 2002, Law 2011). The argument is thus that practices generate worlds, so different practices generate different worlds, a suggestion that also has important potential implications for East Asia and its STS. To illustrate, an STS committed to scientific, technical and social science universalism will both emphasise the putative generality of science and technology, and *enact* that universality in its own STS practices. It will work in and help to generate what we might think of as a 'one-world world' (Law 2015). By contrast, an STS committed to epistemological and ontological difference will both tend to discover this in the knowing practices it explores and *enact* this in its STS. Our suggestion is thus that whatever their virtues, these epistemic, institutional and ontological commitments also generate different versions of space, and locate East Asian technoscience in different ways within different versions of the world. In what follows we explore six ways in which this is done in East Asia, modes of knowing that we call *diffusion*, *distortion*, *circulation*, *localising, translation*, and *softening*.

Now the health warnings. First, to talk of an 'East Asian' STS is already to take too much for granted both conceptually and geographically. However, the use of aggregating geographical and conceptual terms cannot be avoided, and we are uneasily aware that their use is often unsatisfactory, an issue that we have explored in some detail elsewhere (Law and Lin 2017a, b). Second, as is obvious there are many alternative ways of classifying East Asian STS practices. Accordingly, we make no special claims for what follows. This is simply one way of distinguishing between different versions of STS that works by attending to their epistemic, ontological, institutional and political arrangements. Third, East Asian STS cases often, perhaps usually, combine several of the strategies that we detail below, so what we are offering is best understood as a set of ideal types rather than a direct characterisation of particular interventions. And fourth, we have sought so far as possible to be even-handed. Our concern has been to map different modes of practice rather than to recommend any particular approach. Indeed, we take it that diversity or balance is desirable. At the same time, we necessarily come

to the topic with our own conceptual bag and baggage. This is not and could not be a neutral survey of the spaces of East Asian STS.

Diffusion

> 'On July 8, 1853, American Commodore Matthew Perry led his four ships into the harbor at Tokyo Bay, seeking to re-establish for the first time in over 200 years regular trade and discourse between Japan and the western world….. Although Japan opened its ports to modern trade only reluctantly, once it did, it took advantage of the new access to modern technological developments. Japan's opening to the West enabled it to modernize its military, and to rise quickly to the position of the most formidable Asian power in the Pacific. (Office of the Historian 2015)

This comes from the U.S. Department of State's webpage under the heading 'MILESTONES: 1830–1860', and it is one of many that appear on those web pages. These are linear histories about progress, centres, peripheries, leaders and laggards. Such stories take many forms, but in one variant they argue that modern industrialisation started in Britain which subsequently ceded its premier place to the United States. Then Japan turned itself into an industrial superpower, while perhaps China will be the next. It adds that smaller countries such as Taiwan and Korea similarly struggle to move forward.

Linear and/or progressive histories are common. George Basalla (1967) famously argued that modern science diffused from a 'Western core' to the 'non-Western periphery' in three overlapping stages in which colonies were first a resource for European scientific expeditions before adopting Western institutions and traditions, and finally creating local independent national science. And historian Morris Low (1989, 323) carefully reveals how the dominant discourses of Japanese national and technoscience similarly reproduce linear time together with its centres and peripheries. Examples include a 'butterflies and frigates' narrative in which Japan was regenerated after Perry's visit, rapidly transforming itself into a threatening military power, a narrative that exoticises Japan, a 'teacher and pupil' story in which Japan continues to need to learn from the West, and a narrative about Japan as 'unique imitator' in which the Japanese are taken to lack original creativity.

Linear histories come in many more or less sophisticated forms, but they share the assumption that nations are located in a single global space and arrayed on a single progressive economic and technoscientific temporal continuum. Japan or Korea may be

laggards in the chase after development or modernisation or progress or indeed civilisation, or they may be catching up. As we noted above, perhaps in due course China will take the lead. But they all build on the assumption that we live in a 'one-world world' (Chakrabarty 2011, Law 2015), and at least up until the present it has usually been EuroAmerica that sets the target and acts as yardstick for that world. In the race for development, the moral is clear: if you work harder and learn more quickly you may become the next Asian tiger (Amsden 2001) or giant (Amsden 1989, Berger and Lester 2005). If you don't you will lag behind (瞿宛文 and 安士敦 2003, 王振寰 2010). And though few STS scholars would adopt a simple version of this diffusion model, some have critically noted the pattern of Euro-American influence on East Asian STS as a (new) form of that subordinate discipline, area studies (Nakajima 2007, Anderson 2009b, Fu 2013). More specifically, Chen (2015a) makes an important argument about the performative implications for STS in the context of Taiwanese industrial studies. His warning is that research practices that focus on diffusion, following and catching up, generate normative diffusionist realities and agendas, overlook local strengths and specificities and discourage industrial and research innovation. We will return to Chen's suggestion later. The message for now is clear: if practices generate worlds, then diffusionist knowing practices generate a one-world world in which East Asian countries that are said to be lagging behind are supposed to catch up. This is an argument that has important potential implications for East Asia and its STS.

> *Diffusion*. Here the world is understood and enacted as a *single space*. Knowledges, competences and institutional forms spread out from the centre, so there are global and historical leaders and laggards, while the East Asian problem has historically been: how to catch up. The diagnosis of leaders and laggards, and strategic concerns about how to move forward thus define a crucial context for STS work, but this progress narrative is also enacted in STS itself. Since its own scholarship is part of a single STS world, here the issues are: can East Asian STS catch up the presumptive EuroAmerican leaders? How might it do so? Does it need to modernise its academic structures so that its scholars are able to compete with EuroAmerica? And/or has this already happened?

Distortion

If diffusion is the first explanatory pattern, distortion counts as a second. Consider, for instance, the story of RCA in Taiwan (Asia Monitor Resource Centre 2015). This company was accused of dumping carcinogenic toxic chemicals into groundwater starting in the 1970s. After long delays court proceedings were initiated in 1994 but the verdict was

only reached in 2015, two long decades during which hundreds died from cancer (陳信行 2016).

> 'My wife started to work in the RCA factory soon after she graduated from high school (for 11 years) … It was during the period that we witnessed the takeoff of Taiwan's economic miracle…. She sacrificed her most precious time of youth to a society that exploited her when she was still capable of contributing, but then totally forgot her and deemed her useless. RCA deny any negligence or wrongdoing, and said it has never made its workers use groundwater. The Council of Labour Affairs was reluctant to identify the whole situation as a vocational disaster…. Nobody would recognize my wife's contribution to Taiwan's economy. My wife and daughter's sacrifices are totally irrelevant in today's world.' (Ku 2006, 181-182)

In this second picture technoscience also operates within a single global space – but it is exploitative, distorting the lives those who live and work on the periphery (Harding 2008).[2] The companies are looking for cheap but capable workforces, lax environmental and health regulations (Smith, Sonnenfeld, and Pellow 2006), and collude with often technocratic and/or corrupt governments that want to take advantage of compressed modernization (Abraham 2006, Greene 2008, Amir 2013, Bak 2014, Chang 2014, Quet and Noel 2014) The result of this interweaving of global and local power is exploitation, suffering, and a division of labour in which innovation and design come from EuroAmerica, manufacture and assembling are done in Latin America and East Asia, and e-Waste goes to Africa (Smith, Sonnenfeld, and Pellow 2006, BASEL Convention 2015).

Such accounts of distortion may be Marxist-inspired, distinguishing between core, semi-periphery, and periphery, between the developed, developing and underdeveloped worlds, or between the first and third worlds (Cardoso and Faletto 1979, Galeano 1997, Wallerstein 2004). But distortion is also epistemic. Here the argument is that the diffusion of homogeneous Eurocentric knowledge is itself a form of hegemonic domination that needs to be resisted. This argument has been vigorously made in Latin America, for instance by Arturo Escobar, who shifts the origins of modernity from the European Enlightenment to the conquest of America, arguing that it was colonialism and the capitalist world system that constituted modernity, and that the latter works in part by subordinating non-European knowledges. In this way of thinking Eurocentrism is modernity/coloniality in epistemic form, a hegemonic mode of knowing that claims

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[2] There is a further unseen gender politics in establishing the scientific links between the female works' cancer and the company's pollution (林宜平 2006).

universality by confusing 'abstract universality … [with] the concrete world hegemony derived from Europe's position as center.' (Escobar 2008, 167-168)

As Cheah (2001) notes, one version of this distortion takes the form of an irreducible Asia that is rendered particular by the assumed universalism of Western conceptual and methodological structures. More specifically, many have explored East Asia's subordination in terms of dominatory global dynamics, though the region also has local specificities including Japanese imperialism, a topic in need of further STS exploration (Clancey 2007, Fu 2013). It is, however, clear that the dynamics of Japanese imperialism helped to shape modern scientific networks in East Asia (Kim 2007a, Setoguchi 2007, Tsukahara 2007, Zaiki and Tsukahara 2007, Liu 2008). Applied to our own discipline, epistemic distortion implies the need to resist hegemonic forms of (EuroAmerican) STS in favour of forms of knowledge that grow from underprivileged standpoints (Harding 2016). In this way of thinking theories of diffusion are thus power-saturated misunderstandings of reality, though any theoretical approach originating in EuroAmerica is in need of critical scrutiny. An East Asian STS inspired by distortion would thus be sensitive to the political, economic and epistemic agendas that come with a hegemonic one-world world, and its task would be to detect, characterise and resist this exploitation, and to articulate counter-hegemonic forms of analysis.

> *Distortion*. As with diffusion, the world is a single space, a one-world world, with a centre and a periphery, but distortion attends to the dark side of this divide, treating the global as a space of exploitation. Technoscience inflicts damage to the economic, ecological and/or personal wellbeing of those at the periphery, whilst profiting the EuroAmerican centre. It also seeks to monopolise conceptual space, insisting that its forms of knowing are general. An East Asian STS would thus explore this exploitation both in technoscience and in its own ways of knowing.

Circulation

Diffusion and distortion assume that we live in a single world with a centre and a periphery, though how they imagine the relations between these is quite different. A third approach which we will call circulation similarly thinks in terms of a one-world world, but explores this in terms of relations of mutual dependence. Latour (1988, 140) tells us that 'to follow the transformation of a society by science, we must look not in the home country but in the colonies', and Livingstone (2004) similarly notes that technoscience is not simply EuroAmerican, but distributed and relational, while

Anderson (2006, 2008) talks of inter-local configurations. These are all characterisations of circulation. As an example, consider Patrick Manson's work on parasitology.[3]

> Originally a practising physician in Taiwan, Manson started to work on tropical medicine, moved to Xiamen, China, and started to work on filarial research. Treating elephantiasis, he hypothesised that mosquitoes were disease vectors, and with the help of local Chinese assistants went on to demonstrate this by drawing on local clinical, social, textual and material resources and using his assistants' skills to dissect mosquitos. Returning to England, he proposed mosquitoes as the vector for malaria, but had no way of demonstrating this until 1894 when he met Ronald Ross. At first the encounter was awkward. Manson had the laboratory techniques needed to test the theory but no access to clinical cases. Conversely, though Ross had access to clinical materials in India he did not have the necessary techniques, and he also had his own rival theory. However, a long distance collaboration evolved. Ross learned the appropriate techniques from Manson and gathered clinical materials and observations, sending findings and specimens to Manson from Indian rural hospitals. Manson in return offered Ross theoretical advice, sent him the latest publications, helped to promote the latter's findings, and organized English research support. Finally their collaboration was to verify the mosquito vector theory.

Despite the problematic division of labour between non-Western data collection and Western theorization (Heryanto 2016), circulation takes place within a global one-world world, but it is formed in the multi-sited and situated crafting of practices and links between those practices (Blok 2013) in which all, including so-called 'latecomers', are necessary and active participants. We are in a world of trading zones (Galison 1997), networks, associations, gift exchanges or assemblages, in which technoscience is being generated in distributed webs (Strathern 1991, Latour 2005, Ong and Collier 2005, Anderson 2008). The STS focus is therefore on multi-sited histories of science as it tracks the traffic in objects, people, value and resources within and between locations. Anderson observes that:

> If we are especially fortunate, these histories will creatively complicate conventional distinctions between center and periphery, modern and traditional, dominant and subordinate, civilized and primitive, global and local. (Anderson 2000, 736)

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[3] We draw our account from Shang-Jen Li (李尚仁 2012).

It is, therefore, a misunderstanding to say that tropical (malarial) medicine started in England, while India and Taiwan were its beneficiaries. Instead it was different local arrangements and long distance but reciprocal forms of circulation between sites in these different countries that led to success.

So what does this imply for East Asia? One answer is that East Asia as a whole is unlikely to be the appropriate unit of analysis. Instead the need is to trace specific technoscientific trajectories case by case by exploring local settings and the webs that link these together (傅大為 2005, Setoguchi 2007, Liu 2008, Mohácsi and Morita 2013). The object is to reveal the geopolitics of internationally contingent micro-physics (Lin 2015a, Sabharwal and Varma 2015), and the contingencies that generate local differences (Chen 2015b, Kim and Park 2015, Lin 2015b). The focus is thus on *co-constitution*, and there are many instances of such studies in the literatures. For instance some have argued that the dramatic pace of EuroAmerican and Japanese laboratory innovation is related to East Asian manufacturing capability (Amsden 1989, Berger and Lester 2005), and similar arguments have been made about the importance of the flows of knowledge, people and capital within East Asia for the increasing standard of high-tech industries (Tabata 2015).

In this way of thinking, circulation, technoscience and its institutions become an intersecting and co-constituting patchwork, but so too does STS. Particular East Asian and EuroAmerican STS practices work together within a one-world world, but East Asian STS does not lag behind because there are no centres or peripheries. Instead there are relations of mutual dependence in which different sites work in different ways and specific materials, people and findings circulate between equally specific locations. For scholars in East Asian STS it thus becomes important to explore what they have to offer to practitioners in other locations, and how they might innovate as part of a process of an intellectual division of international labour. This, then, is an STS that comes to value its internal heterogeneity.

Circulation. Here again we are in a one-word world, but the emphasis is on an intellectual division of labour which erodes centre-periphery distinctions in favour of specific relations of reciprocity. The role of STS is thus to understand this division of labour in technoscience, to articulate the forms of circulation that this implies, and to explore possibly more productive connections. Applied to itself, particular sites of practice in East Asian STS become part of a productive global division of labour. East Asian STS practices have their own important and distinctive place within the networks of STS, and it is important to identify and craft these.

Localising

Diffusion, distortion and circulation are very different but they all work within a 'one-world world'. That is, they assume a common world, and explore the technoscientific problems and possible solutions relevant to that world. As a part of this, they assume that good knowledge (whether in technoscience or STS) is location-independent: that what counts as validity does not vary between places. In the remaining three approaches to STS these assumptions are progressively eroded. Epistemological, institutional, and ontological differences start to appear while a 'one-world world' disappears. We start with *localising*, which insists on epistemological and institutional difference.

This way of thinking redefines Western universality as a particular case of the local. Each local is different, and though this does not necessarily follow, it can also be argued that each counts as a *part* of the universal (Cheah 2001). Examples within STS include Anderson's (2008) account of kuru. This shows how its scientists became inextricably entangled with local ideas about reciprocity, menstruation, propitiation, and identity, while some objects of scientific interest were inalienably local and could not be moved beyond the Fore (Anderson 2000). Others have argued that East Asian bioethics is untransportable because it is Confucian (Fan 2002, Tsai 2005, Rasmussen 2010), a factor which some have also claimed to be important in shaping East Asian industrial and technoscientific development (Berger 1992). And Linsu Kim (1997) has insisted on the importance of the *han* psyche for motivating South Korea to shift from imitation to innovation in technoscience. Kim's account combines a neo-Confucian influenced context of repression with the Korean experience of Japanese invasion and occupation:

> The Korean word *han*, ... means 'resentment or grudge,'... Culturally, ... children ... , employees ..., and people in ... society are required not only to repress feelings of anger and frustration toward their fathers, superiors, and rulers, but also to maintain a properly respectful attitude toward them regardless of provocation.

> On the other hand, ... Koreans with *han* psyche have an intense need to excel in all aspects of life to win approval from their superiors. That is, *han* is a source of energy that drives Koreans to work with a kind of frenzy, to be tenacious, to sacrifice themselves for the betterment of their families and country (Kim 1997, 70).[4]

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[4] Others make similar arguments. See, for instance (Kim 2008, Nakayama 2012, Kim 2014).

It is important to avoid orientalism (Fu 2013), but what intrigues us here is not the role of culture *per se*, but rather the claim that cultures cannot be translated. A famous case is the creation of Japaneseness in Ruth Benedict's *The Chrysanthemum and the Sword* (Benedict 1974). In this book Benedict collapsed materials from past and present to distinguish between the 'chrysanthemum' and the 'sword', treating these as timeless Japanese cultural values (Robertson 2007). Popular in America, her work also had a huge impact in Japan and its national reinvention of its ethnic and cultural distinctiveness in versions of *Nihonjinron* (theories of Japaneseness) and exoticism (Doak 1996, Morris-Suzuki 1998), and her influence remains important in the contemporary transnational Human Genome Project (Fujimura 2000, 83-84). Thus having argued that 'essential Japaneseness' and its analogues are cultural inventions in 'specific practices located in specific space and time', Joan Fujimura adds that in genomic science, 'scientific objects, technologies, and practices are both producers of society and culture and products of culture and society' (Fujimura 2000, 83-84). And Wen-hua Kuo makes a similar argument about the international harmonization of pharmaceutical regulations, noting that while the issue of race is hotly debated, what is:

> 'at stake is not race *per se* but its social representations, cultural transformations, and global circulation. Science, in this sense, is not the ultimate means for racial integration but an arena in which racial tropes travel and interact' (郭文華 2016, the author's translation for original Japanese publication)

What is at stake is localised explanatory validity. In this way of thinking, though there are exchanges between cultures, no overall shared view is possible. This means that different locations are irreducibly different both geographically and epistemologically – a position symbolised by so-called 'reassembled cars' which change shape as they adapt themselves to a wide range of working situations from mountain trails to uses offshore (Lin 2009). Here the epistemic one-world world has disappeared. And the same is the case for STS, where locally practised cultural frameworks become essentially different and mutually irreducible. The implication is that different versions of STS and different criteria of STS validity are appropriate to different locations.[5] In this way of thinking East Asia therefore becomes a heterogeneous patchwork of irreducibly different and locally valid forms of framing. It also becomes a space of contestation as it resists forms of explanation appropriate to EuroAmerican STS. To talk of 'East Asian STS' is thus to

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[5] Boundaries of 'the local' might include the Chinese empire before the 19th century, pre 1945 Japanese control, cold war politics, recent regional coalitions, and forms of indigeneity (黃金麟, 汪宏倫, and 黃崇憲 2010, 孫歌 2011, 葛兆光 2011, 汪暉 2015).

explore its non-coherent multidimensionality rather than to seek an overall explanatory framework.

> *Localising*. Here the one-world world is being eroded and is no longer a single epistemological space. Instead there is insistence on the epistemological and institutional specificity of local ways of knowing. The world is divided into separate cultures, practices, and institutional forms, each with its own criteria of validity, and criteria appropriate to one location are not relevant to others. This suggests that the role for STS is to articulate and perhaps to champion local forms of validity. By implication, and applied to itself, STS starts to fragment because what becomes important is the exploration and articulation of appropriate local forms of validity for different STS practices.

Translation

But are differences really irreconcilable? Does the world necessarily dissolve into a set of epistemologically different patches? The last two STS approaches recognise and wrestle with difference by noting that practices in both technoscience and STS reach out to intersect with one another. This they have in common with circulation, but unlike the latter they assume not only epistemological and institutional, but also *ontological*, difference.

In STS the first of these, *translation*, is most closely associated with actor-network theory . Drawing on the work of Michel Serres (1974) ANT argues that actors precariously incorporate other actors by *translating* the latter. In everyday English, translation implies equivalence: a word in one language means the same as a word in another. However, there is never total equivalence, and in ANT translation becomes a metaphor for *incorporating* something (a word, an object, a subject, a finding, a version of reality) in the attempt to build a different word, object, subject, finding or reality. But such incorporation only works because it misunderstands, ignores, or distorts whatever it is translating. And this is also a way of emphasising insecurity, since whatever is translated may rebel and resume its original form. Translation, then, is about precariously misrecognising and supressing difference for the purpose of strategic assimilation (Callon 1986).

Early ANT excelled at studies of strategic growth involving European long distance (and sometimes imperialist) control (Law 1986, Latour 1988) in which technologies, natural forces, people and texts were all (mis)translated for European strategic ends. But there are also many instances of East Asian translation.

In 2003 clinical guidelines for diagnosing chronic kidney disease (CKD) and measuring the deterioration of kidney function were introduced in Taiwan (林文源 2012). Pressed by the Taiwanese Society of Nephrology (Hwang, Yang, and Dialysis Surveillance Committee) the result was a 2011 claim that at 11.93% the incidence of chronic kidney disease was higher in Taiwan than in any other country. The experience of 'advanced' countries and 'world-leading' scholarship was mobilized to support this claim. For instance, it was suggested that the figure derived from an 'advanced' U.S. formula used in a Taiwanese epidemiological survey published by the *Lancet*, an 'internationally leading' journal. However, what was not noted was that the formula and its variables were developed for American populations. International physiological differences meant that the global community of nephrologists was in debate about the utility of the formula, and the US team that created it was indeed still tinkering with the measure. Neither did its local proponents mention that the guidelines had not been adopted as US national policy, that other countries had adapted the guidelines using local data, and that the widely cited *Lancet* paper was controversial. Indeed, though clinical guidelines are often transferred between countries, differences between areas, standards, and forms of knowledge are usually explored in the process.[6]

This is a particularly instrumental version of translation: the misleading claim that events, processes and objects in one place are equivalent to those in another. Chen (2015a) undoes diffusionist STS Taiwanese industrial studies in the case mentioned earlier using similar tactics. Local practices are specific, he says. Here he draws on Lin's reworking of ANT and medicalisation theory. As we have seen, Lin argues that Taiwan is not a 'latecomer', but that its medical and policy entrepreneurs use this status to manipulate local debates. Using Lin's argument, Chen suggests that if we make use of Western dominated STS approaches, then 'local' (for instance Taiwanese) cases become special and exceptional. Here, then, a reflexive use of knowing as translation reveals the hidden and performative ontological implications of epistemological circulation and localizing.

Such case studies of (mis)translation are common in East Asian STS. Ru-bin Yang (楊儒賓 2014) shows how 'things' in the traditional Chinese world were turned in physics into modern 'materials', while the Western disciplinary name 'physics' was translated by

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[6] In Taiwan, for child developmental risk see (曾凡慈 2008, 2015), for harm reduction in drug usage see (Chen 2009) and for embryo implantation in in-vitro fertilization see (Wu 2012). For an assessment of the manipulation of standards as global and local are brought together see (Ong and Collier 2005), and on the modification of Western pharmaceutical regulations and clinical trials for Japanese populations see (Kuo 2008).

Japanese into the Chinese characters '物理' (*wù lǐ*; Principles of things, hereafter *wuli*) in the nineteenth century before being adopted by the Chinese themselves. And analogous arguments have been made about the translation of terms such as 'ethics' into Chinese 倫理 (*lún lǐ*; Principles of human order), and the translation of the psy disciplines into Chinese which was entangled with the desire to emulate the national success of the Japanese Meiji restoration (Platt 2007, 劉紀蕙 2011). And, a final example, Michael Keevak (2011) probes the historical construction of the idea that East Asians are yellow. Originally classified as white by Westerners (those who could be converted to Christianity qualified as white) Asians became yellow in the 18th century with the scientific taxonomies of Carl Linnaeus and Johann Friedrich Blumenbach which were standardized in the emerging medical and anthropological measurements of human skin colour and 'Mongolism' of the 19th century, and subsequently popularized in 'yellow peril' discourses of the early 20th century.

Thus in this way of thinking technoscience becomes a precarious and less than perfect process of literal and metaphorical translation. Terms and objects are both betrayed by being partially shorn of their significance as they are moved from their place of origin, reshaped, and incorporated into other practices. This means that they change, but since translations may not work they may also be undone. Indeed, more than is often recognised, ANT insists on the uncertainty of translation. It also notes that translations work in different ways in different locations. All this implies that epistemologies, institutions *and* ontologies (or realities) are different in different practices. A focus on translation thus dissolves the one-world world of diffusion, distortion, circulation and the modified expression of this in localising. The move is *performative* because what there is in the word is *also* being enacted. This means that it differs from circulation, both because it assumes ontological difference (there is no one-world world), but also because in translation practices overlap in a weave as they borrow from one another.

What does this imply for East Asian STS? One response is that the latter needs to be explored practice by practice. East Asian STS will not be one thing. A second is that the worlds of East Asian STS, its disciplinary thinking, its sensibilities and identities, and the realities that go with these are being constantly made and re-made. There is no stability. And a third is that since practices are performative – they help to generate realities – East Asian STS practices are also struggles to enact what there *is* in the world, a move with potential postcolonial implications.

Translation. As with localising, the idea that the world is a single space is washed away to be replaced by a world – or worlds – of irreducible difference. However, since

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translation is about the attempted incorporation of other objects and meanings these also overlap. To translate and assemble is also to betray – to mistranslate – whatever is being assembled as it enacts more or less precarious realities. Difference is thus epistemological, institutional, *and* ontological. What is real is also at stake. In this way, East Asian technoscience practices become attempts to assemble fragile but workable practices and projects that will hold together for practical purposes. One of the tasks of East Asian STS is thus to craft practices that reflect and enact East Asian-relevant realities as these relate to and incorporate partial and contingent mistranslations from other (for instance Euro-American) STS assemblages.

Softening

In *location* forms of knowledge are situated and specific, and in *translation* as knowledges and objects move they overwrite and rework whatever they translate. We have moved far from the one-world world of *diffusion*, *distortion* and *circulation*. In translation forms of knowledge, institutions *and* realities are all enacted differently in different practices, and the struggle is to incorporate difference by (mis)translating and so subduing it. But translation can be worked differently, and this happens in what we will call practices of *softening*. These work by making mistranslations explicit and pondering the merits or otherwise of particular mistranslations. What is at stake here is whether we should mistranslate whatever we might want to incorporate, and so to assimilate it to our reality. That is one possibility, and it is the logic of translation. But there is an alternative. This is that we might instead *mistranslate* our own practices and allow these to change as they intersect with other practices. It is this second approach that catches the logic of softening.

Consider Sean Hsiang-lin Lei's (2014) analysis of the encounter between of Chinese Medicine and biomedicine.

> Chinese medicine (CM) and biomedicine coexisted from the late nineteenth century in the Qing dynasty without directly competing with one other. However, in the search for national survival in the early 20th century Republican China embraced western science and technology. In 1929 the government sought to abolish CM. CM practitioners responded by creating the National Medicine Movement. This pressed professional CM interests and its institutional infrastructure, and sought government recognition that had previously been granted only to Western medicine. As part of this CM practitioners tried to ally themselves with the state in an attempt to turn CM into a 'national medicine' and started to embrace the discourses of modernity and the standards of biomedicine.

This led to a radical transformation in CM theory, practice, pedagogy and social networks. CM was subsequently criticized for becoming a mongrel that was 'neither horse nor donkey', but it was the historical contingency of these struggles that paved the way for the later full-scale creation of standardized Traditional Chinese Medicine (TCM) in 1950s' Communist China.[7]

Lei's study suggests that the modernization and scientization of CM neither discarded tradition nor reduced CM to biomedicine, but productively re-invented CM as a hybrid set of practices. It is also reflexive because Lei frames the story in similar terms, drawing on a contingent and mix of traditional intellectual practices and modern academic categories (汪暉 2015) such that, like the CM that it describes, his account is hybrid too. Others in or close to STS (Lei 1999, Scheid 2002, Kim 2006, 2007b, Zhan 2009, Ma and Lynch 2014), like the practitioners who mobilized 'national medicine' while adapting to biomedical standards, have also made explicit use of mistranslation (Law and Lin 2017a). The issue, then, is: what to mistranslate? What to betray? What kind of framing to assemble? And which kinds of realities to enact?[8]

There are large anthropological literatures on (mis)translation. For instance, Eduardo Vivieros de Castro talks of translation as *equivocation*. (To equivocate is to use a single term, a homonym, to describe different objects). He describes 'controlled equivocation' as the attempt to make explicit whatever is being lost in translation. At his hands a good translation becomes a mistranslation that betrays the destination language rather than the source language. The practical solution is to decide *what* and *how* to (mis)describe and (mis)theorize such that:

> 'alien concepts ... deform and subvert the translator's conceptual toolbox so that the intentio of the original language can be expressed within the new one' (Viveiros de Castro 2004, 4).

This is a radical position, but the softening of explicit mistranslation has also been explored in East Asian contexts including CM. Thus Volker Scheid (2002) uses STS language (Pickering 1995) to think about CM practices, noting that binary distinctions between human and nonhuman, nature and culture, and ontology and epistemology are

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[7] Though we cannot do justice to this here, Lei's story is both empirically sophisticated and theoretically challenging. One of his major points is that the entangled trajectory of CM's modernization converges with Latourian (1993) 'non-modern' hybridity.
[8] See on controlled mistranslations between forms of generalizing in the 'postcolonial moment' of encounters (Verran 2002, Jensen et al. 2011, Mohácsi and Morita 2013, Jensen 2014, Mol 2014). This is also a feature of 'theoretical creolization' in East Asian STS (Chen 2012, Fan 2012, Fu 2013, 陳瑞麟 2014)

absent in CM, and that the latter differs from biomedicine because its clinical practice takes the form of subtle manipulation by reading the direction of movement of disease *propensities* rather than attending to the disease itself (Scheid 2008).

Mei Zhan (2009) also softens anthropology and STS, arguing that CM works by hybridizing rather than purifying, and that experimental science and biomedical theories undermine CM's scientized forms by turning these into 'experiential medicine.' She further suggests that if CM cannot be fully accounted for by bioscience, STS and anthropology, then this tells us that relativism has not gone far enough. Thus, experiential CM unsettles the relations between empirical and conceptual, concrete and abstract, and contingent and universal, but if (as she puts it) we treat 'experiential CM as conceptual' then it becomes possible to analyse the specific, the contingent, and the experiential in ways that work by metaphor and analogy rather than deduction and induction (Zhan 2014). Here, then, anthropology and STS are being softened by translation into the categories of CM. And the present authors have similarly explored CM's correlative mode to reimagine an STS of CM (Lin and Law 2014),and used the notion of *shi* to rethink STS theory through a EuroAmerican case (Law and Lin 2016, Lin 2016).

We cite these instances of softening to offer a flavour of the very different ways in which explicit attention to translation and mistranslation might work. For, as is obvious, an STS that starts to soften itself will become an STS that is conceptually and empirically diverse. It will look different in Euro-America and East Asia. But it probably will look different within each of these too. That said, in East Asia it is likely that the STSs of softening will often have a 'post-colonial' flavour, for it will no longer be a priority to sustain Euro-American practices of knowing, institutional forms, or realities. And it will no longer be important to distinguish between STS and other ways of knowing and being.

Softening. As with situating and translating, there is no one-world world in softening. Instead there is (mis)translation between difference and a focus on making the character of particular mistranslations explicit and exploring their relative merits. The possible implication is that knowledge practices soften as they hybridise with their objects of study, so transforming themselves in ways that cannot be predicted. An STS of softening is therefore an STS that may dissolve itself, but how it does so will depend upon the practices and the realities that it encounters. Though this is simply an illustrative list, versions of softened STS relevant to East Asian practices might include

non-binary, experiential and propensity-inflected ways of knowing, and they might be expected to have a post-colonial flavour.

Conclusion

Over several decades the East Asian STS community has used a wide range of theoretical approaches to explore technoscience both within and beyond the region. In dialogue with cognate disciplines in East Asia, and with STS in other regions including EuroAmerica, it has developed national and international STS associations, a range of East Asian language journals and the English language *EASTS*. At the same time, many of its scholars have explored the distinctiveness of East Asian technoscience, and the appropriate character of East Asian STS, asking whether and how these might differ from those of (say) EuroAmerica or Latin America. This review is an attempt to explore the varieties of East Asian STS, and simplify its self-evident complexities by characterising a variety of *spatial strategies*. So our double question has been: how do scholars imagine the location of East Asian technoscience? And how do they imagine the location of STS? This heuristic, which suggests that at least six different versions of spatiality are at work, draws upon two analytical terms: the notion of a *one-world world*, and *performativity* (Law 2015).

Many STS practitioners assume that human activities including those of technoscience, take place within a single world. The assumption is that social, technological, scientific, economic, cultural, political, and natural events and processes all take place within something like a single space-time box, a 'one-world world'. But this spatial way of thinking is also epistemological. This is because in a one-world world it is also assumed that events and processes are produced by general mechanisms of cause and effect that work throughout the space-time box: that what is true in Tokyo is also the case in Toronto. So physical laws (as opposed to particular events) are invariant, but so too are the explanatory mechanisms of interest to STS scholar. For the social sciences including STS this picture that also needs to be nuanced by the workings of culture and social structure. This is because, as is obvious, daily practices, beliefs, and world-views differ from place to place. How to think about this crucial qualification has been a matter for discussion since the invention of social science, but many, perhaps most, social scientists assume that at least some general mechanisms are at work. So in STS we may say, for instance, that workable technologies are shaped by economic interests and by culture, or that scientific representations are constructed in laboratories, even though the substance of the technologies and forms of knowledge in specific locations may be different.

We have argued that at least three, and perhaps four of the styles of analysis described above are committed to a one-world world. As we have seen, *diffusion* explores the spread of technoscience across the globe, identifies leaders and laggards, worries about underdevelopment, and in both technoscience and STS looks for ways in which those that are lagging behind might match the centre. *Distortion* similarly imagines a one-world world as it explores the propensity of technoscience in the current world order to outsource its human, economic, and environmental costs to the periphery whilst imposing hegemonic forms of knowledge that conceal that exploitation by claiming universality. Here the task for STS is to articulate those costs and create alternative and better ways of knowing this world of exploitation. And *circulation* assumes a one-world world both materially and epistemologically to characterise the long-distance divisions of labour that foster technoscience, a focus that can equally be applied to our own discipline where it implies the importance of developing specialist forms of East Asian STS. Finally, *localising* also assumes, though much more ambiguously, a one-world world. Here the natural world is a unity, but within that world there are irreducible *social* and *cultural* differences so that technoscience and STS become location-bound, while what counts as valid knowledge cannot be moved elsewhere. The implication is that forms of STS are irreducibly context specific.

But what of *translation* and *softening*? As we noted, in thinking about these it is useful to attend to *performativity*, our second major analytical term. Extended from philosophy into STS, performativity is the suggestion that words, actions and practices may also perform corresponding realities into being: that, for instance, laboratories generate experimental realities that match the representation of those realities. Much has been written about this claim in anthropology and STS and we cannot explore those debates here.[9] However, it has crucial implications for our argument, because if it is correct then it follows that different *practices* enact not simply different social but also different *natural realities*. But if different realities are being done in different locations, then we are no longer living in a one-world world. Instead there are multiple though overlapping worlds.[10] And, to use a term we mentioned earlier, there are multiple ontologies or versions of the real. And this is where we find the strategies of *translation* and *softening*.

Translation, as we saw, is about incorporating by ignoring or misunderstanding difference. It is performative because it works to build one reality and the representations, the subjectivities, the objects, and the times and the places that go

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[9] See Hacking(1992), Mol(2002) and Law (2004) .
[10] For similar arguments see Blaser (2009) and de la Cadena (2010).

with that reality by squeezing the other realities that it incorporates: by mistranslating them. For translation this is how technoscience works, but it is also how STS works. The question is: what will be real-ised, made real in any particular STS location, and what will not? The questions for East Asian STS then become: to what extent can and does it want it enact its own realities, epistemological, institutional and natural? or to what extent will it or should it be incorporated in alternative STS reals? But *softening* has its own matching question. Less imperial, more concerned with Otherness, this question is to what extent and how it should allow itself to be mistranslated and so absorbed into the realities and practices that it encounters, such as those of CM? The issue is not domination. Rather it is how it might best soften itself.

As we noted in the Introduction, our attempt to understand the strategies of East Asian STS is scarcely neutral. Readers will appreciate that our own work is located somewhere between translation and softening. However, our object has not been to persuade the readership of EASTS of the merits of these two strategies. Rather it has been to characterise the various strategies available in East Asian STS as it thinks about its own distinctiveness and its place in the world.

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