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The Spaces of Science: Post-Colonial Design, Communication, and Enhancing Practice

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The notion of robust discussion leading to a “better,” more productive style of scientific practice has a lengthy set of origins as a trope, and it has a particularly strong hold in the political conversations of the early 1930s, the period prior to and coinciding with war. With much of Europe turning to authoritarian-style government (Germany, Italy, Spain), there were legitimate concerns raised about the viability of competing economic systems, especially those permitting a greater degree of fluctuation. The economic slowdown associated with 1929 marked the most recent iteration, and for many parts of the region, the aftermath of World War One had seen similar economic woes (Weimar Germany), requiring a period of recovery.¹ The severity of the economic shock was sufficient that the corresponding political turmoil may be read as a series of cautious responses, exploring comparative approaches to reorganizing society and its productive capabilities, with the turn to a planned or more tightly organized economy (whether Keynesian, Fascist, or Communist) reflecting a desire to minimize extreme variations associated with capitalism.²

1. Engaging with “Robust” Forms of Communication

At the time, “science” was perceived, by some parties, as a means of moderating these debates, offering a powerful take on relevant questions of the period, serving as an arbiter.³ In the period preceding the war, and continuing thereafter, a number of figures embraced the combination of vigorous debate and an engaged scientific practice as a means of preventing or curbing the appeal of authoritarian rule. The logic here suggests that only in a “free” or “open” society could such science flourish, given the need to evaluate rigorously various positions or theories surrounding difficult questions.⁴ With sufficient debate, and experiments designed to confirm empirical circumstances, informed members of a scientific group or community could come together on a question, bringing the best and most recent information to achieve a better and more thorough understanding of the natural world and its operations.

This style of inquiry informed some of the earliest efforts at creating a history of science pedagogy, and in particular, the Harvard case studies of the 1940s come to mind, with famous incidents or examples drawn primarily from the physical sciences (physics, chemistry), with some attention to the surrounding context, structured so that students might understand how the “correct” result was achieved.⁵ Even as this reduced account represents something of an abbreviated take on the field, prewar, and even postwar history of science, well into the late 1950s, tended to emphasize this style of process—engaged debate, structured around institutions such as the Royal Society, and similar bodies such as national academies—over its perceived counterpart, “ideological” science, or science

¹ Adam Ferguson. 2010. *When Money Dies: The Nightmare of Deficit Spending, Devaluation, and Hyperinflation in Weimar Germany*. Public Affairs.

² Jonathan Levy. 2012. *Freaks of Fortune: The Emerging World of Capitalism and Risk in America*. Cambridge, MA: Harvard University Press.

³ Karl Polyani. 2001. *The Great Transformation: The Political and Economic Origins of Our Time*. Beacon Press.

⁴ Karl Popper. 2020. *The Open Society and Its Enemies*. Princeton: Princeton University Press. The term “open society” originated earlier with Henri Bergson.

⁵ James Bryant Conant, ed. 1947. *Harvard Case Histories in Experimental Science, Volume I*. Cambridge, MA: Harvard University Press.

conducted primarily along political lines. Examples of this latter style might include the case of Lysenkoism, drawn from Soviet biology, and the Great Leap Forward, in early PRC China, with agricultural policy resulting in massive failure and famine.⁶ Ideological science, with debate subsumed by party interests, was almost inevitably linked with the communist / socialist world, or more broadly, with emerging post-colonial concerns, suggesting a certain set of norms characterizing scientific conduct along proper lines.

Extending this argument further, the question of “pure science” versus “ideological science,” admittedly a construction, functions largely in terms of an older model of the Cold War divide, a binary model in which there are two, largely coherent, camps.⁷ The style of scientific practice endorsed by much of North American and Western Europe appears as the normative ideal in this version of a winner’s history, validating its claims and empirical results. At the same time, this style of history of science, along with this reduced Cold War narrative, have both been subject to extensive critique in recent years. STS scholars have been challenging the limits of institutional history of science since at least the mid to late 1960s.⁸ In the second case, the Cold War literature has grown extensively since the early 1990s, with the opening of numerous archives (many of them only briefly), and with the reconfiguration of many area studies fields, producing a vigorous and sustained critique of the limited understanding of the conflict as something that was “won,” and one defined almost exclusively by the activities of two major protagonists.⁹

Collectively, this survey stands as an attempt to link these two ideas, that is, some conception of open or free debate, and the corresponding types of social organization which might permit and even enhance such conditions. In turn, the linking of these ideas supports some claim that “science” tends to perform better in such societies, in so far as such an engaged community allows for greater debate, challenges to established hierarchies, even encouraging new and fresh ideas if they can offer empirical backing. From here, there are two major questions, the first of which concerns whether there is value to these ideas, especially given the vast number of societies (whether past or present) which do not conform to these notions concerning the free circulation of discourse, and yet engage in their own form of knowledge production. The second, which will occupy the remainder of this brief commentary, asks whether it is possible to draw upon these ideas without attending strictly to the historical circumstances outlined here. In other words, is it possible to encourage an open or communitarian notion of scientific practice, without necessarily tying it to some set of specific historical conditions, especially a particular ideal of government?

⁶ Sigrid Schmalzer. 2016. *Red Revolution, Green Revolution: Scientific Farming in Socialist China*. Chicago: University of Chicago Press. See also Ruth Rogaski. forthcoming. *Knowing Manchuria: Environments, the Senses, and Natural Knowledge on an Asian Borderland*. Chicago: University of Chicago Press; Loren Graham. 2016. *Lysenko’s Ghost: Epigenetics and Russia*. Cambridge, MA: Harvard University Press.

⁷ John Lewis Gaddis. 2006. *The Cold War: A New History*. New York: Penguin Books.

⁸ Sherry Turkle. 2021. *The Empathy Diaries: A Memoir*. New York: Penguin Books; Sandra Harding. 2008. *Sciences from Below: Feminisms, Postcolonialities, and Modernities*. Durham, NC: Duke University Press.

⁹ Hajimu Masuda. 2015. *Cold War Crucible: The Korean Conflict and the Postwar World*. Cambridge, MA: Harvard University Press, 2015; Odd Arne Westad. 2011. *The Global Cold War: Third World Interventions and the Making of Our Times*. Cambridge, UK: Cambridge University Press.

Funding organizations in numerous societies have embraced this idea, especially when establishing new research institutions, taking into consideration their composition (nationality, age, race and / or ethnicity, gender), the fields or specialties to be undertaken, and even the physical space / arrangement of the site.¹⁰ In this last case, the arrangements through which researchers are housed and provided with office space holds the potential to either encourage or alternatively, reduce, the opportunity to collaborate through the production of “chance” social encounters. In some sense, this notion goes back at least as far as Francis Drake’s “Solomon’s House,” often taken as a stand-in for an early vision of the scientific research community operating under ideal conditions.¹¹ More recently, numerous sites show clear forethought about these considerations in their design and architecture, generating not only commentary from design historians, but also, extensive ethnographic work about the degree to which these physical arrangements achieve their desired social ambitions.¹²

2. Constructing New Models for the “Robust”: Fostering Communication under Diverse Conditions in “Science Cities”

In other words, the question here is less one of whether these idealized circumstances are linked to a particular historical trajectory, and instead, a more modest question of how to encourage or mobilize conditions likely to produce “better,” more frequent types of conversations. As suggested, the physical space of a research center has frequently been the focus of such efforts, at least since the early to mid-twentieth century, and there are numerous examples of such architecture, with accounts varying as to their relative success.¹³ For a number of Asian societies in the post-1945 era, it also became popular to reorganize entire cities along such lines, leading to the notion of the “science city,” a conscious attempt to gather together resources and researchers in a space designed to led itself to fruitful pursuit of new inquiry. Examples include Hsinchu (Taiwan), Tsukuba-si (Japan), and Daedok Science Town (South Korea), with a rich literature dating to the 1960s and following, covering the construction and such sites and the settling of new populations.¹⁴

Although there are more examples than those cited here, this limited sample suggests an interesting cluster of issues, as there is a fairly specific context to these three cases. At least for these East Asian sites, a big part of the drive informing the “science city” lay not with promoting democratic values per se—in fact, both Taiwan and South Korea were highly autocratic societies at the time, with LDP (Liberal Democratic Party) Japan highly bureaucratic—but with creating a centralization of research facilities, along with sufficient

¹⁰ James Holston. 1989. *The Modernist City: An Anthropological Critique of Brasilia*. Chicago: University of Chicago Press; Danette Riddle. 2004. *Architecture at Work: DMJM Design Los Angeles*. Edzioni Press.

¹¹ Francis Bacon. 2012. *The New Atlantis*. Start Press.

¹² Ed Regis. 1988. *Who Got Einstein's Office? Eccentricity and Genius at the Institute for Advanced Study*. New York: Basic Books.

¹³ Sharon Traweek. 1992. *Beamtimes and Lifetimes: The World of High Energy Physicists*. Cambridge, MA: Harvard University Press; James W. Dearing. 2002. *Growing a Japanese Science City: Communication in Scientific Research*. New York: Routledge.

¹⁴ The literature for Tsukuba-si (Tsukuba city) is probably more extensive as it was often seen as the first, or as a model.

distance from the main governing bodies situated in the capital. In other words, along with increasing frequency of interaction, the notion of decentralization, implying some degree of freedom from oversight or bureaucratic convention, provides another key idea underlying this idea of fostering better communication. While there are varying definitions, the “research park” and “science city” share this notion of living together, working together, and blending work and life in the pursuit of larger aims.¹⁵

As with the first set of examples, indebted to the prewar context of the 1930s and its aftermath, this second set of possible models relies on a specific set of material conditions, common to many post-colonial nations seeking to make a rapid turnover in their scientific practice. If we extend beyond East Asia, we might also include here comparable examples drawn from post-colonial India and the various IIT (India Institute of Technology) campuses, and the case of the Soviet Union and the “academic city” of Novosibirsk.¹⁶ In this last case, the industrial facilities clustered here, along with the scientific research associated with Akademgorodok, suggest a paradox, the idea of a conjoined radical freedom and relative comfort, situated within an authoritarian society. The secrecy associated with these sites was meant to contain their practices, likely from outside observers, as well as domestic.

Other countries with a post-colonial problem of expertise have turned to a variety of recruitment strategies, whether from within their own population, or appealing to possible newcomers. South Korea, especially during its rapid industrial growth of the late 1960s and early 1970s, aggressively recruited overseas Koreans, especially those who had migrated abroad.¹⁷ Offering a variety of incentives (higher salary, rapid rise in the hierarchy for lab facilities and support staff), many of the emerging GRIs (government research institutes) sought to accumulate research personnel, and to help them adapt to their new conditions. If this description very much recalls the circumstances of the period, and the related issue of “brain drain,” we should not forget that it still goes on, albeit under carefully coded circumstances, packaged to minimize friction. Many countries, for example, offer expedited visas and long-term research support to those with PhDs in the appropriate areas of expertise, while trying to deny any claims of favoritism towards specific groups.

3. Establishing “Robustness Checks”: Population Policy as a Model

To return to the context upon which this response is based, the idea of robust conversation associated with frequent debate derives from a desire to build a context around questions of climate change. The piece recently published in *Social Epistemology* by Li-an Yu offers such a context for climate change by looking into how some of these same dynamics played out in another field, in this case, by examining the legacy of population programs in the post-war.¹⁸ In other words, by looking at how some of these debates took shape both in the abstract and as policy, the author proposes that these concerns hold implications for climate discussions. I like this approach, and if I hold any reservations, it takes the form of the larger historical

¹⁵ In this sense, planned communities such as Greenbelt, Maryland also fit this discussion.

¹⁶ Stuart W. Leslie and Robert Kargon. 2006. “Exporting MIT: Science, Technology, and Nation-Building in India and Iran.” *Osiris* 21 (1): 110–130; Paul Josephson. 1997. *New Atlantis Revisited*. Princeton: Princeton University Press.

¹⁷ See Manyong Moon’s chapter in Youngsoo Bae, Buhm Soon Park, eds. 2013. *Bridging the Technology Gap Historical Perspectives on Modern Asia*. Seoul: SNU Press.

¹⁸ Li-An Yu. 2022. “On Social Robustness Checks on Science: What Climate Policymakers Can Learn from Population Control.” *Social Epistemology*. 36 (4): 436-448.

discussion outlined here in the previous sections, reflecting the reality that these conversations themselves possess a much longer history as a genre. Family planning and population concerns for East Asia span roughly the seventeenth century through the present, and understandably, cannot be easily reduced to an abbreviated form.

In Sections Three and Four of his article, Yu offers four narratives of population, ranging from the late nineteenth century to the present. In brief, these include: the fear of population outflow from late Qing China (“Yellow Peril”), interwar debates concerning birth control, Japan’s imperial policy of forced sterilization during Taisho / Showa, and the legacy of the One Child Policy in China.¹⁹ Taking care not to target any one political system or ideology, Yu’s intent here is to work out the dynamics through which such policies took hold, especially in terms of their acceptance within a particular social context by a wide range of actors. As he puts it, the policies or narratives can be accepted AND not blocked within a society, comprising what he sees as a suitable test of social robustness. In a number of the cases for his four narratives, he points out that these examples do not meet the criteria he proposes, as many of the actors lacked a voice or any capability of offering a substantive contribution to the political process.

This explanation fits particularly well with a number of Yu’s examples especially the late 19th century case of Anti-Asian exclusionary policy, motivated by the American context and the effort to limit the influx of migrant labor. Qing China began to send increasing numbers of migrants to the United States even earlier than this period, motivated by the Taiping rebellion, as well as the general decline of conditions under Qing rule. On the American side, the formal end to slavery, notwithstanding the sharecropping system to come, meant an acute need for inexpensive labor, a role filled in large part by migrant labor, especially by Chinese labor for the expansion of the rail system. However, legal limits to such movement by the 1880s came with legal force, and with racist enforcement, meaning increasingly limited chances, and a system ultimately framed by the 1924 codification of a quota system. Lacking a voice or say in such a scheme, this example stands as one of Yu’s cases of a lack of robust communication, and presumably, a society giving in to nativist sentiments.

Yu’s model ultimately argues for testing social policy under a wide range of conditions to determine when it is socially appropriate, and in this sense, offers an analogy to the clinical trial, a controlled social vetting of new policies. In this sense, it seeks to balance several concerns: the need for socially appropriate policy formation, along with the opportunity to block or limit any problematic aspects, with these impulses needing to be subjected to a variety of conditions. The four test cases Yu offers do not reflect positive or negative examples per se, but rather, historical instances possessing both positive and negative aspects, thereby allowing the author to go through and illustrate the applications of his theory as constructed. In a sense, this approach allows a degree of learning from history,

¹⁹ Susan Greenhalgh. 2008. *Just One Child: Science and Policy in Deng's China*. Oakland: University of California Press; Aya Homei. forthcoming. *Science for Governing Japan's Population*. Cambridge, UK: Cambridge University Press.

with Yu illustrating how appropriate lessons might be drawn, sometimes contrary to what actually happened.

The ambition of constructing such a model is admirable, and follows in a long line of HPS (history and philosophy of science) practitioners seeking to define or characterize what qualifies science to comment upon the natural world. Whether viewed in terms of fundamental debates such as Karl Popper's notion of falsifiability as the defining characteristic of empirical knowledge, the Quine-Duhem thesis (whereby assumptions tend to accompany empirical claims), or Thomas Kuhn's work on paradigms (claims rest within implicit models or frames), scholars have often sought to tease out the embedded assumptions within the emergence of a new knowledge practice from about the seventeenth century onwards, at least in much of Western Europe.²⁰ As previously noted, historians have taken this further, and linked much of the 1930s-1960s debates on this broad topic with the ideological concerns shaping the major political conflicts of the era. Yu's model nicely seeks to develop a revised model of practice by way of an analogy established between population programs and the controversy associated with climate science.

What is interesting is that Yu offers neither positive or negative models per se with his four population narratives, and instead, a model of communication and the possibility of introducing checks upon the implementation of social policy. As indicated here, for a long time, there has been a claim that such checks can only exist, or are more likely to prosper, within a liberal democracy, as understood in the post-1945 era. Again, the typical examples from history of science include Lysenkoism from Soviet biology, and the Great Leap Forward from early PRC China, with both cases embodying agrarian failure and resulting famine. Yu's model presumably does not follow such restrictions in the sense that it seeks to allow for checks regardless of social context or period, meaning that in theory, such communication might flourish a range of settings. To go back to the historical examples, the idealized space of the science city / research center might easily exist within an otherwise more harsh environment, under such a scheme.

In fact, this approach is precisely what a variety of governments have attempted, with varying degrees of success, in terms of structuring a set of incentives for members (or prospective members) of their scientific community. Rather than thinking strictly in terms of physical space per se, scientific bodies have employed a variety of tactics in recruiting, whether of foreign nationals, or of those returning from overseas study. These examples are particularly conspicuous for post-colonial nations, where the number of researchers might be lower, and therefore placed at a higher premium. South Korea, for examples, recruited heavily among overseas Koreans in the mid-1960s when assembling its team for KIST (Korea Institute of Science and Technology), offering lab facilities, higher salaries, and a high degree of independence in terms of conducting research.²¹ If this strategy attracted a number of scholars to return, it also created tensions with those remaining in Korea, largely East Asian-trained, in that the return of this younger generation violated all kinds of existing hierarchies.

²⁰ Thomas Kuhn. 2012. *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press.

²¹ There are numerous apocryphal stories about how this recruitment process took place. However, given the presence of high numbers of KIST researchers from certain American universities, it is easy to see the effects of networking through existing relationships.

Beyond the idea of attracting one's own nationals to return, many societies have recruited among foreign populations, targeting those groups from neighboring / regional partners, likely to consider the prospect of a move. Singapore's A*STAR (Agency for Science Technology and Research) has been doing this for years, although its international visibility grew only in recent years, especially with restrictions on HESC (Human embryonic stem cells) / stem cell research in certain locations.²² Initially targeting researchers from neighbors such as Sri Lanka and South Asia, Singapore began to target Western (Australian, British, and American) researchers in the early 2000s, with the last group among those affected by Bush-era stem cell regulations. In keeping with this discussion, SG tried to fashion its image as open to research, free of religious restrictions, while offering generous resettlement packages and funding sources comparable to that of the American NSF (National Science Foundation).

4. Science Communication and Public Engagement: Outreach and Highlighting the Spatial

The majority of the examples provided thus far relate to the dynamics of “science” as something to be shared among members of a smaller in-group, presumably scientists and those parties holding a significant investment in following its social implications. This question of robust communication also relates to larger questions of public engagement, especially in terms of Yu's notion of looking for diverse voices and checks for robustness. There are numerous models of public engagement across a range of societies, with a good deal of inquiry about how to provide proper distribution of results through channels, and what types of pedagogy might be best suited to convey ideas within a particular kind of society. On the question of engagement, models of “citizen science,” seeking to allow for greater participation by non-scientist members of society, whether in open forums, or in more select audiences, has gathered a good deal of attention. This last notion is particularly relevant for controversial policies, such as nuclear energy, population measures, the types of policies holding wider social implications.

This last notion also seems to come closest to Yu's discussion, even as his model as proposed does not use this vocabulary. Again, the examples taken from population bear the weight of providing models of interaction in actual practice (rather than an ideal), while looking back to examine their potential for future use in similar contexts. In other words, there is memory / retention and a learning curve built into the process, even if it is not intended to be strictly historical. The question remains, however, as to what types of societies might permit these types of checks and balances, recognizing that historically there has been a bias favoring certain types of democracies. However, one might propose such a model within certain constraints, allowing engagement and inquiry, even while placing a group of policy elites to direct the process. This type of model might fit within a number of East and Southeast Asian societies, whether nominally democratic or not, but certainly for places where there is room provided for only a limited range of social actors.

²² Wayne Arnold. 2006. “Singapore Acts as Haven for Stem Cell Research.” *The New York Times* August 17.

Moreover, the model might reach beyond the immediate discussion concerning the resolution of conflicts regarding knowledge questions, to include forms of public outreach such as pedagogy, science education, and museums and exhibitions. The last of these categories includes a much wider literature, and again, potentially touches any number of societies, with widely varying politics and social norms. Even societies with a restricted politics and limited public sphere, experience the need to communicate findings to their publics, whether in terms of how a particular scientific community impacts the economy, or in broader terms, with examples such as public health and COVID, where every country has been affected. These approaches to communication and dissemination need not necessarily occur under ideal conditions, and might easily include considerations of constraint / censorship, differences in education level, and regional differences, when taking into account how a particular idea might be conveyed.

Ultimately, the sheer diversity of historical examples does not in any way contradict Yu's line of argument, but rather, places it in conversation with recent history, especially for the broader East Asian region. Population policy for the region, even if limiting discussion only to China, Japan, and Korea (CJK), provides any number of recent publications to emphasize interest in the subject matter.²³ Especially given the discussions of sustainability, along with climate change, numerous scholars have looked at how Asian nations have dealt with large populations and earlier forms of these same problems, that is, limitations to food supply, and extreme variations in climate and weather, along with natural disasters. The other matter of great interest lies with studies of demographic methods, as many of these countries underwent changes to their statistical procedures during the 19th and 20th centuries, thereby altering the count, and the types of data collected by states, as opposed to earlier forms of government.²⁴

In this last case, with demographic methods, changes to counting methods make major differences in how the population is represented and mobilized, and these differences impacted empire, especially in the period leading up to the Pacific War.²⁵ In turn, the post-1945 arrival of American influence meant a greater impact for U.S. models, as sites such as Japan, Taiwan, and South Korea sought to make their data compatible with international institutions, meaning those based primarily in the United States and Western Europe. To offer a contrasting example, debates over counting, especially methods for estimating GDP, continue to shape differing perspectives on the Chinese economy and its growth after the late 1970s. In turn, certain countries, such as North Korea and Myanmar, often resist statistical gathering (and data reporting), arguing that such data leads to increased dependency, whether upon neighbors, aid institutions, or more powerful antagonists.

Again, I am not arguing for a natural or logical link between open communications and specific types of polities, although historically, such claims have been made. What I am trying to bring to bear upon Yu's rich discussion is a greater emphasis on space, here encompassing a range of meanings. "Spatial" may refer to varying points along the scale,

²³ Along with the work of Susan Greenhalgh and Aya Homei, see also Sujin Lee, University of Victoria (forthcoming book).

²⁴ Tong Lam. 2011. *A Passion for Facts: Social Surveys and the Construction of the Chinese Nation-State, 1900–1949*. Oakland; University of California Press.

²⁵ See the work of Irene Tauer and Frank Notestein on behalf of Princeton's OPR (office of Population Research), which informed many of the postwar East Asian family planning programs.

whether an individual research center or lab, a “science” city or research park, a network (Internet), or even a larger region. Recognizing that space affects communication, and has figured heavily in debates about science policy, adds another set of data points to models for communication. Certainly for the most common tropes in institutional history of science, visions of utopia (More, Bacon) invoke an island, a defined and easily visualized space, and one might easily take this ideal and place it in the context of debates about the early modern, the colonial, and visions of specific parts of the world.²⁶ Communication takes place within a range of spaces, and its specificity needs to be granted a higher priority.

²⁶ Stephen Greenblatt. 2007. *Learning to Curse: Essays in Early Modern Culture*. New York: Routledge.