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# The Internet in Asia through Singapore

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**Abstract** The Internet or, as these authors argue, internets (plural) in Asia are composed of cables and exchanges, protocols and firewalls, regulations and other legal devices, making them subject to investment and governance strategies, as well as treaties and court cases. But they are also composed of figures, layers, stories, and rumors. These latter descriptors provide a heuristic framework of social features that, together with metaphors from folklore, provide analytic tools for understanding the diversity, conflicts, competitions, and disengagements of the patchwork of internet development across Asia. The authors further argue that Singapore provides an exceptionally valuable comparative site from which to explore these features. The first part of this article lays out some of the comparative features, and the second part turns to the four themes or heuristics of figures, layers, stories, and rumors, developed through an STS research cluster at the Asia Research Institute and Tembusu College, both at the National University of Singapore.

**Keywords** Internet · Singapore · folklore

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## 1 Internets in Asia from a Situatedness in Singapore

It may be an exaggeration to claim that the Internet in Asia has not, as yet, been seriously studied. There are technical histories (e.g., Chon 2013, 2015, 2016) and studies at the scale of the nation-state (e.g., Hill and Sen 2000). In particular, there are works charting different aspects of the Internet's evolution in China (e.g., Tai 2006; Yu 2009; Yang 2009, 2015; Herold and de Seta 2015; Negro 2017) and India (e.g., Chopra 2008; Gajjala 2013; Biju 2017). There are studies of particular phenomena, such as activism and civic engagement (e.g., George 2006; Postill 2014; Pang and Goh 2016; Soon and Samsudin 2016) and time periods (e.g., Pang and Ng 2015; Abidin and Gwynne 2017). But, when we survey what has been done so far, we find little in the way of widespread, comparative, in-depth, or longitudinal surveys since Ho, Kluver, and Yang 2003.

This gap in science, technology, and society (STS) scholarship is particularly perplexing. Why have STS scholars of Asia not more fully embraced the Internet in Asia as a locus of comparative study, given STS as a field seems eminently equipped to question, study, and theorize it? Why might it be important for STS scholars to engage with the internets (plural) of Asia? Under what circumstances and with what methods might this occur?

This article both describes the problems the internets in Asia pose and puts forward an empirically grounded agenda and heuristic framework for studying it through Singapore with four interconnected themes founded in studies of folklore and internets: figures, layers, stories, and rumors. These themes emerged from ongoing conversations among Internet and STS researchers in Singapore between 2016 and 2018 as part of the project "Internet Life and Lore In Southeast Asia: Histories, Mythologies and Materialities," in which research interests, observations, and predictions were shared over two half-day workshops and subsequent discussions and meetings convened by the STS cluster at the Asia Research Institute and Tembusu College. Thus, these themes are views from Singapore on Asia's internets that reflect Singapore's centrality as a node for 15 undersea high-bandwidth cables, as a host of 8 Internet exchange points—compared with 19 in China (six in Beijing), 15 in Indonesia (10 in Jakarta), 25 in Japan (12 in Tokyo), 3 in Malaysia (all in Kuala Lumpur), 7 in South Korea (all in Seoul), 6 in Taiwan (all in Taipei), 12 in Thailand (all in Bangkok), and 3 in Vietnam (one in Hanoi) (Packet Clearing House, n.d.)—and as a regional and global data center hub and cloud services headquarters (Tanato 2017) housed in innovative green-cooling-designed multistory facilities. The themes are also grounded in two key arguments: that internets are forms of life and that internets reflect and produce narratives.

The use of the plural noun *internets* here is deliberate, corresponding to the overall argument that no single, monolithic Internet exists in Asia (or elsewhere) despite two nation-states (India and China) accounting for the majority of the regional population. In this stress on multiplicity, we also mean something more than that countries such as China, Iran, and Turkey have attempted to nationalize, detach, and control much internets (e.g., China's so-called Great Firewall and its aggressive efforts to promote its IT companies, social media, and Internet payment portals as alternatives to Western ones) or that businesses and governments have intranets with firewalls to the outside.

Through Singapore we ask what the exact configurations of the technology of the internets are or, in other terms, what the specific internets and their usages are: who they are for, who builds them, and what for. The multifaceted analysis of the Web by one of

us (Fischer) marks the beginning of our proposition that the Internet is not singular. This discussion of the Web describes the complexity of Asian internets: "A cultural, ideological, even ritual, space (con)fusion, at least in America (but we note this ideology has a transportable force), between a 'cowboy-hacker-individualist-anarchist-libertarian' ethic and a series of market and political mechanisms for restructuring labor in new forms of manufacturing and services" (Fischer 1999: 246). We argue that Asian internets, such as those in Singapore, cannot be understood through any single set of concepts or single theory and demand interdisciplinary attention. And in line with Fischer's work on the Web, we acknowledge these internets as historically embedded and thus associated with certain cultural imaginations: from "utopian and colonizing talk of the electronic frontier" to "gradual coevolution and integration of the Internet with other institutional worlds" (246).[1]

The fact that there is no single, monolithic Internet in Asia may account for the lack of work attempting a comprehensive description. The internets in Asia are as culturally and structurally diverse as they are variously regulated. Views from Singapore support these and other critical observations about it, for Singapore's internets allow use of the official, state-recognized languages of English, Mandarin, Malay, and Tamil, local dialects such as Hokkien (through, e.g., the use of specific words as well as longer posts and conversations), and Singlish, the widely spoken local variety of English and "well-established and deeply entrenched cultural category" (Wee 2018: 4). These aspects of diversity alone do not account for the sheer volume of (e.g., Web) services and (e.g., social media) platforms that different internets now support and incorporate or the degree to which private, exclusive intranets managed by corporations, on the one hand, and individual nation-states, on the other, exploit Internet infrastructures that depend on transnational connectivity and exchanges. Singapore's internets include open services like the World Wide Web and social platforms such as Facebook and Instagram, both of which are potentially available to everyone with Internet access, reflected by the large user base in 2018 of 4.8 million and 2.2 million, respectively (Kwang 2018; Hootsuite and We Are Social 2018). Singapore's Internet is used by large institutions such as banks to operate intranets that enable and structure secure financial transactions (e.g., consumer to consumer) and by the state to provide e-government services over mobile infrastructure.

Singapore's development of its internets provides an instructive comparative case in showing how Asia is a patchwork territory, given the diverse topography of network technology, national development levels, investment in Internet-related technologies, and presence of different multinational technology companies. For instance, according to Hootsuite and We Are Social (2018), within Southeast Asia, while Singapore's mobile connectivity index score is 83.42, Myanmar's is 49.9, and 100 percent of Singapore's mobile connections are 3G or 4G, compared to 34 percent in Vietnam. Twenty-six percent of Singapore's population over fifteen years of age makes online purchases or pays bills online, compared to 5 percent of Indonesia's. In comparison, China's mobile connectivity index is 63.5, 82 percent of its mobile connections are 3G or 4G, and 19 percent of its population completes online transactions. Many more use

[1] Graham et al. 2018 make a similar point in their introduction when discussing the hopes, conceptions and fears driving digital design.

cashless payment (e.g., through WeChat Pay) (Banjo 2018). While Internet technologies like social media platforms may employ (meta)data, protocols, and even low-level interfaces that conform with international standards (van Dijck 2013), the networking technology, regulatory environments, and even literacies they rely on are quite particular. Singapore, along with Indonesia, is ranked "partly free" in terms of Internet freedom, with scores of 41/100 and 46/100, respectively, while Myanmar and Vietnam are ranked "not free," with scores of 63/100 and 76/100, respectively. By this metric, Singapore has one of the freest internets in Southeast Asia and is liberal compared to China, with a score of 87/100 (Freedom House 2017a). Active social media users vary from 75 percent of the population in Singapore to 30 percent, 45 percent, and 52 percent in Myanmar, Indonesia, and Vietnam, respectively; China compares favorably to Singapore in this regard with 65 percent of its population active on social media (Hootsuite and We Are Social 2018).

This diversity within Asia exists despite the increasing synonymization of the Internet with particular Internet-related technologies. In the case of Singapore, the views and comparisons on the Internet achieved through the kinds of statistics presented in the previous paragraph report Internet and social media usage in close proximity. They also typically include computer and mobile phone ownership and usage (Hootsuite and We Are Social 2018; InfoComm Media Development Authority 2018; Lin and Toh 2017). Such statistics construct Singapore, and other countries we have compared it with, in very particular ways: as being developed, infrastructurally sophisticated, and even "free" or not. In our view, it essential to move beyond only statistical views on the Internet (e.g., penetration, usage).

These statistics also closely associate the Internet with specific platforms owned by multinational technology companies such as Facebook and Instagram. Somewhat ironically, such companies are able to exert influence though their use of the Internet's standardizing mechanisms: protocols (e.g., TCP/IP), low-level interfaces (e.g., APIs [Application Programming Interfaces]), and international standards (e.g., domain name databases). This not so subtle imperialism becomes more evident when considering social media platforms' standard legal agreements, framed in terms situated in Internet technology centers, such as end user license agreements and terms of service. Singapore, once again, provides a lens through which to consider such agreements that render the user–service-provider relations in legalistic terms and, more broadly, the different kinds of relationships that exist between states and technology companies in Asia. For example, while the Singapore state has permitted its citizens to acquiesce to the terms of such agreements and has left social media platforms such as Facebook largely unregulated, it has, like the US Congress (Fung 2018), recently closely scrutinized adherence to these agreements through a special parliamentary hearing (Seow 2018b).[2] Of particular concern in these hearings was the protections offered Facebook users' (and Singaporean citizens') data, the use of their data for political and commercial purposes without their consent, and the responsibility for and regulation of Facebook content.

[2] Freedom House (2017b) reports that in Singapore social media and information and communication technology applications and political and social content are not blocked. For example, a dispute over the legacy of the first prime minister of Singapore, somewhat remarkably, played out in real time over Facebook (Jayakumar 2018).

On a higher level, despite the best efforts of programmers—"those who program networks and platforms," meaning not just those involved in coding but also other kinds of designers, developers, industry players, and policy makers who contribute to various Internet products (van Dijck 2013: 27)—interfaces and defaults are (re)configured and engaged with by users to shape their own experiences. Open source communities challenge such programmers further through technical practices that generate specific interfaces for testing and use by themselves through creating, implementing, and/or modifying the algorithms underlying them (Kelty 2005). Such agency of the user in a context of control is well illustrated by Internet users in Singapore. Crystal Abidin and Joel Gwynne (2017) show that the experiences users create through Internet interfaces influence not only how the self relates to others (Fischer 1999; Turkle 2011) but also how users think of themselves and even become central to fulfilling a particular imagination and reality of self. Less obvious is the interaction between distinct imaginations and rationalities, particular shared conceptions of reality (Appadurai 1996), and what is considered logical or reasonable. In the case of Singapore, multinational technology companies' exploitation of the Internet may appeal to an imagination of modernity and progress, so that the incessant need to upgrade and renew through performing updates, accepting new usage agreements, and even switching to or adding other services or platforms align with state and society ideals. At the same time, Singapore shows that the economic rationality of control of the market, data collection—sold as improving experience (e.g., through targeted advertising) and consumption as a way of being—may not ideologically challenge citizens' sense of freedom or the state's sense of managing law and order (Mahizhnan and Yap 2000).

Such imaginations can be resisted or reclaimed. Singapore shows how groups of citizens in Asia can use internets to wrest back control from states and corporations that have imagined, programmed, and installed Internet technologies. For example, the Singapore state has managed the Internet and digitalization related initiatives from the early 1980s to the present time. A series of state-initiated master plans, from IT2000 (1992) through Connected Island (2003) to the Smart Nation (2017), have guided the Internet's development infrastructurally and technologically (Clancey 2012; Reubi 2010). However, citizens have used social media platforms to project and appeal to alternative, past-oriented imaginations and aspirations for sites slated for redevelopment, such as Bukit Brown Cemetery in Singapore (Liew and Pang 2015; Graham and Pang, forthcoming). This, and the past activism of Singapore's bloggers (Soon and Cho 2014), compares with how in China journalists and activists regularly criticize the state, despite encroaching authoritarianism (Yu 2009), and construct subjectivities that resist both state and corporation (Lindtner 2015).

## 2 Gazing On and Comparing Singapore's Internets

Gazing at Singapore's internets over time acknowledges their multi-faceted nature (e.g., linguistic, material, political) that becomes visible through different analytical lenses (e.g., internets as discursive spaces, material infrastructures, or social technologies) and their situatedness both compared to and as components of networks across different scales. Thus, it is meaningful both to discuss Singapore's internets and to compare them with other internets in Asia that are tied to and/or operate across nations.

Singapore is an important node in a global trade and financial network, a vibrant port and home to vital Internet infrastructure in the region, and increasingly, one where knowledge that travels from, a space of places and a spaces of flows (Castells 2004); this means it is a site that the rest of urban Asia, particularly Southeast Asia, can be thought through.[3]

Gazing from and at Singapore shows how it is useful to approach internets as operating across different scales, as at once global, national, and tribal. In the terms of this article, it is meaningful to distinguish and write from the perspective of and about (1) the Internet in Singapore, (2) Singapore's Interne, and (3) Singapore's internets.

First, gazing from and at the Internet in Singapore acknowledges the role of specific, global Internet technologies and standards such as TCP/IP, imaginations such as the Global Village (Barendregt 2012), and Singapore's leadership in the development and adoption of recent Internet technologies. Singapore's status as a key site for data centers provokes questions about the boundaries of modern states in Asia and the extension of their sovereignty (Rossiter 2017). In addition, its testing of blockchain technologies by banks in Singapore (Campbell-Verduyn 2018) forces reflection not only on the extent of permissible state-level surveillance and regulation of their citizens' financial transactions (Marshall 2015) but also the about the possibilities and threats of a shared regional or global currency.

It is also to realize global relations of a dyadic, collective, and public nature that produce narratives of different kinds but with a global inflection. Thus, the consumer-driven entrepreneurial affordances of Instagram and Facebook are appropriated not only by Singaporean "influencers" to engage a potentially global public (Abidin 2014) but also by individual state figures to connect with Singapore citizens. In the case of influencers an ongoing narrative of national self not only as consumer (Chua 2003) but also as consuming entrepreneur is produced, and the narrative that narrative of self *can* be produced is maintained (Abidin and Gwynne 2017). Studies of Singapore's Internet (e.g., Abidin and Gwynne 2017) also show that, instead of a generic global user passively submitting to hegemonic Internet technology, both state and citizen actors instead select, shape, and sometimes resist the Internet in Singapore. Some of these ways are more obvious than others. For example, many Singaporeans resist state- and institution-condoned initiatives, such as digital payments (Tan 2017), through nonuse driven by concerns about privacy and usability rather than through protest. This nonuse can transform into open resistance, as demonstrated by Singaporean students' recent petitioning against the introduction of technology on the grounds of unreliability and inequity (Lee 2018a, 2018b),

Second, gazing from and at Singapore's Internet means treating elements of infrastructure, how policies and regulation are constructed, and how it is closely coupled with particular imaginations associated with nationhood (e.g., development status). For example, the broadcast network structure and imagination was expressed materially through how Teleview, a precursor of the Web browser through the IT2000 master plan of 1990, was configured. This structure and imagination persisted through

[3] Singapore is ranked as the fourth most globally competitive financial center (Woo 2016) and continues to be a key port, ranked second busiest globally (World Shipping Council n.d.).

subsequent adaptations of Internet technology: the Singapore ONE Web portal and recent Internet technologies enabling "e-citizenship."[4] In this conception of Singapore's Internet, it is imagined as a channel to mediate one-to-many, state-to-citizen relations, and users are imagined as citizens who are appropriately skilled, savvy, and equipped with key information (e.g., concerning how they are identified by the state). Yet this trajectory also reduces the degree to which a global Internet that is imagined in terms of the nation by Singapore state and nonstate actors alike, is variously chaotic and ambivalent, and structured and informative; generative of shifting, mass networked publics, and productive of a configured, informed population; liberating and affording universal civil freedoms, and pragmatic and endangering individual privacy. Bloggers, for instance, have imagined and used the Internet as a space to surface issues and discourse that are not discussed by state actors (Pang and Goh 2016). To understand Singapore's Internet is to understand intersections and contestations between the state and citizen actors in patchworked, and therefore particular, cultures of expression.

Third, gazing from and at Singapore's internets is to acknowledge how interest- and action- based social networks such as LGBTQ activists (Phillips 2014; Soon and Kluver 2014) and increasingly technologically configured collectives such as supporters of political parties (Zhang 2016) are assembled through diverse (and often nationally endorsed and funded) Internet technologies, from mobile phones to server farms, from wireless networks to optical cables. Thus, despite the "grip" of national initiatives (or perhaps because of them), Singapore's internets can be best understood through both official, national culture and unofficial, discrete subcultures of use that have evolved over time mediated by certain Internet services and comprising particular groups (e.g., youth). From text-based Internet Relay Chat to immersive gaming worlds such as Defense of the Ancients and League of Legends, in addition to mainstream Internet use, there is a subversive engagement with information and communication technologies (ICTs) by users who are part of a collective identity that is not defined by the state but instead subject to individual affiliation and configuration. The view on such collectives is often a pathological one, framed by notions of deviance (e.g., Tang, Koh, and Gan 2017; Choo et al. 2015), although some work has considered alternatives such as social capital (e.g., Skoric and Kwan 2011). The exact collection of ICT–mediated "tribes" (Maffesoli, cited in Harper 2010: 65) in Singapore is neither well understood nor easily generalizable from or to any other nation-state in Asia. Singapore's Internet shows such subcultures coexist alongside official culture.

Considering these different internets within Singapore and across Asia leads us to ask if Asian internets contribute to form part of a "reality as a patchwork" (Fuller 2018), with Singapore's internets contributing to form one patch of reality. Given the different cultures, histories, and development trajectories present within Asia, what comparisons can be meaningfully made? Singapore's internets lead us to question if writing about them will always involve operating at one particular scale or imposing a version of history on the nation's and region's becoming, a version that is inevitably placed in terms of a geography, politics, economics, and even tradition of knowledge making. Comparing these different internets also makes visible the voices of those writing and

[4] Other technologies could have been considered here: browsers through which the user is imagined as a traveler/nomad, Internet Relay Chat through which the user is imagined as a converser/a voice, and Napster through which the user is imagined as a "free" consumer.

speaking: often those of urban, educated middle-class elites. In such terms Singapore, which has no hinterland within its national boundaries, even if economic hinterlands exist in neighboring countries, can be placed not as an aspiration or even an instructional comparison but as an embedded viewpoint that provides insights on ethics, governance, infrastructure, and society.

While this discussion resonates with the "Asia as method" dialogue of the late 2000s and early 2010s (e.g., Anderson 2012; Chen 2010) familiar for readers of *EASTS*, we are not ready to coin the term "Singapore as method" or even "internets as method." We agree with the proposal of scholars participating in this discussion as an activist response through recognizing the importance of a "locus of enunciation" (Anderson 2012: 449) to allow the emergence of "a less coerced and more dignified subjectivity" (Chen 2010: 3) in and for Asia.

Asia as method also acknowledged the colonial legacy of knowledge and its construction in Asia and the provisional, categorical and imaginative inflections of Asia as a category. Similarly, singling out the Internet as a category acknowledges a global capitalist legacy that emanates from technology centers such as Silicon Valley or Boston in the United States. Discussing the Internet in Asia, as with elsewhere, depends on and challenges the imagination of nation (Wang 2007). While the collective, material achievement of the Internet as a functional technology in Asia is highly dependent on national policy making and infrastructure and, as described above, is locally situated, it travels beyond the national, as Ned Rossiter's (2017) work on data centers has shown. Regionality, that is, being "Asian," can currently only really be conceived of in terms of how collections of diverse nations imagine and position themselves as "not the West" historically or ideologically. Any other family resemblances remain to be worked out.

As with Asia, there are difficulties with associating the Internet with any one, all-encompassing concept or category. We have been trying to study and understand it not only by drawing on the work of Steve Fuller (2018) and Rossiter (2017) as a patchwork territory, or ethnomethodologically, as a collective achievement produced by the contributing actors (Lynch 2007), but also as a shape-shifting organism. These words are not attempts at poetry but metaphors that we wish to seriously engage. "Shape-shifting" creatures or spirits from folklore evoke fear precisely because they cannot be stably categorized in normative terms or explained solely in the terms of modern rationalities. In the same vein, we draw on a metaphorics of organicism to mediate between these older folkloric tropes and modern biosensibilities (Fischer 2013a,forthcoming). We position an object from folklore alongside an object from science to acknowledge the distinct rationalities on which the Internet in Asia draws. By identifying the overlaps between folklore and modern science, we hope to show that we can come to know the Internet in Asia.

## 3 Figures, Layers, Stories, and Rumors: Probing the Cultural Structure of the Singapore Internet

Folklore often raises the question of who the folk are, as well as what the lore is. The internets in Asia pose similar questions. Who are the members of the communities that make up these internets? Who is included and excluded, and how are the boundaries of

such internets established? Folklore, like specific internets, poses a problem for legitimacy both in content and in method. How is folklore, or internets, established, and what methods can be used to discover this? What are the general features, and how might a particular folklore, or internet, be defined? Precisely because they are near-ubiquitous, infiltrating almost all aspects of the urban environment, everyday life, and society, internets present those who study them with the difficulty of not knowing what focus on, at what scale, using what metrics.

Our research group has been exploring the four frames—figures, layers, stories, and rumors—as ways to understand the life and lore of the Internet. Although we are still at the larger research proposal formulation stage, we draw on, and draw together, a variety of studies done by our group's members. We present the framework as a way of moving the field forward both for ourselves and for colleagues elsewhere.

We propose these four themes to rethink internets in Singapore.[6] *Layers* argues for the embodiment of the human through Internet technology. Today in Singapore, as it aspires to a Smart Nation (Hoe 2016), people live in layered worlds (Chee 2013), whether real, imaginative, or digital (e.g., the home, the gaming environment, the office). These layered worlds are accessed and engaged with in different ways (e.g., from the home, the mobile phone) and are productive of and constituted by networks of different kinds and qualities. Particular worlds are associated with different narratives, for example, in the case of gaming worlds, in-game (e.g., fantastical narratives; see also Krzywinska 2008) or through-game (e.g., player "legends"), and have materiality and sociality because of the role of different infrastructures in their maintenance and production.



*Stories* may be symbolic in nature, but they are also productive of inclusions and exclusions and form narratives about the Internet that transform how it is experienced. Such narratives require and produce new, digital literacies. In the case of Singapore, new Internet-related policies produce new narratives about productive citizenship and who can contribute to society and how (Tan 2012; Ho 2017). This theme considers narrative structures, relevant aesthetics (forms), the medium (representation), and sharing culture (remediation and following). The stories theme draws our attention to their evolution from oral practice, written media, film and video, and online distributed illustrations. It focuses on specific storytelling forms and explores the reasoning behind their expressions of narratives. In contrast to other work, this approach, by drawing on and understanding Singapore's developmental progression, understands the Internet as part of an ongoing lineage of storytelling technologies that contribute to locally situate lore that is relational, reflexive, and self-reflexive.

[5] This legacy is now challenged by such technology centers in Beijing, Shanghai, and Shenzhen and, less effectively by centers in Hyderabad, Bangalore, and Mumbai, where inroads have been made not only into the Internet economy in India but also globally, as in the reach of Tata Consultancies.

[6] In these four ways of seeing the Internet, layers, stories, figures, and rumors, we acknowledge our debt to Don Ihde's postphenomenological account of four basic forms of mediation (for a summary, see Rosenberger and Verbeek 2015). We also acknowledge our grant application collaborators, especially Crystal Abidin, Aieshah Arif, Celine Coderey, Axel Gelfert, Nancy Mauro-Flude, and Sarah-Tabea Sammel, for helping shape these themes through the submitted Singapore Ministry of Education Tier 2 grant proposal "Internet Life and Lore: Histories, Mythologies and Materialities." Our thanks to the other grant collaborators and to Gregory Clancey in particular for their coauthorship on this proposal.

*Figures* focuses on the human and nonhuman actors that populate the Internet — from bloggers, influencers, and trolls to affinity groups and programmers, from states and multinational companies to algorithms and autonomous bots. These actors have become visible through our discussions of Singapore. This theme also considers the vernacular expression through which these actors become heard, considering what role they play in broader narratives concerning, in the case of Singapore, national unrest (Pang and Goh 2016). Can blogs function as part of rhetorical publics (Warner 2002) in Asian democracies? While the affordances and norms of global Internet culture have encouraged the proliferation of some global figures (e.g., bloggers), the hard and soft infrastructure (i.e., physical servers, content filters, protocols) and soft power (i.e., diverse net cultures, paralanguages and Internet lexicons, user rituals) have stimulated the emergence of unique Asian versions of these figures such as influencers and trollers in Singapore (Abidin 2017).

*Rumors* are beyond the human's complete control. They are not always purposefully constructed in the way stories are, and yet they shape the experience of the Internet (Dalziel 2013). They are the "noise" from which one's conscious experience emerges. Singapore's recent hearings on "fake news" through the Select Committee on Deliberate Online Falsehoods—Causes, Consequences and Countermeasures (Seow 2018a) have both revealed how rumors can challenge the national agenda and how such ad hoc, informal diffusion of less verified information demonstrates the key actors, circuits, and effects of the Internet. Originally touted as an information superhighway in Singapore and globally, the Internet has equally enabled the rapid dissemination of unverified reports, misinformation, and outright fabrications. In addition to centralized purveyors of misinformation such as gossip websites and partisan propaganda websites, much of what drives the development of Internet lore—including online narratives drawing on myths, urban legends, conspiracy theories, and so on—is best characterized in terms of informal communication (Rahimi 2013). The shift toward social media, both as a means of communication and as a news source, has significantly increased the speed with which messages (of whatever kind) can spread across vast populations—even as our ability to individually monitor informants (e.g., in face-to-face communication, or by interrogating them in person) has significantly decreased (Gelfert 2013, 2018).

To think about internets not (only) as a networks, technologies, infrastructure, imaginations, or mediums but in terms of layers, stories, figures, and rumors provides a jumping-off point and a set of new perspectives that have developed from a ground-up collaboration of Internet-studying scholars in Singapore. These themes can coexist, can be contiguous, and are consistent with a position that there is no one Internet in Asia. In the process of studying and comparing different internets through Singapore, we aim to establish the role these themes play or might play as categories.

## 4 Approaching Asian Internets through Singapore

The social construction of technology, feminism and semiotic approaches to technology and cultural and media studies, and the social history and anthropology of science and technology have often placed human-technology relations at their heart. Our themes or heuristic frames are generative of at least two positions in this regard. First,

internets can be usefully understood in terms of relations between humans, other humans, and Internet technologies, or what Fischer (2013b) has called the "peopling of technologies." Second, through these relations, internets configure and reconfigure human experience. These themes acknowledge that internets, at some point, take on agential qualities that have their own momentum and force and reveal two multiple, mutually dependent and reciprocally shaping ways of thinking through the Internet.

Internets are forms of life (Wittgenstein 1973; Fischer 2003) because they have both general and particular elements and form the ground on which meaning can be created. Internets represent the shared human behavior through which it is possible. This assertion captures the networked, infrastructural, and technological elements of the Internet, provoking phenomenological and imaginative explorations. The notion of a community, for instance, is no longer limited by face-to-face interactions with neighbors, family and friends, and physical boundaries. In the context of Singapore, this can reflect the values, languages, and overlapping geographical imaginations (as molded by ASEAN, Asian, Asian-Pacific, Southeast Asian identities).

Internets correspond to a set of narratives because, in a manner of speaking, they account for themselves and generate accounts independent of themselves. Recognizing that they "account for themselves" is important because this marks out the internets' embeddedness in, even transformation of, time, place, and culture. Rules of engagement, symbols, norms, and meanings are produced and reproduced through various interactions and contestations between actors via Singapore's internets. This recognition, and identifying any underpinning ideology, is difficult because of internets' pervasiveness, increasing invisibility, and mundaneness and therefore requires discursive analysis that considers the distinction between the "social system and culture" (Schneider 1980: 134). This distinction is important to maintain as it helps to avoid the pitfall of reducing any analysis of narratives to simply being a part of a social system. This statement acknowledges internets' imaginative and mediating elements.

These statements, taken together, point to embedded conceptions of humanness—citizen, nomad, voice, consumer, body—within internets, conceptions that are themselves shifting and in flux because of the effect of different internets. We mean this not simply in terms of these statements being a philosophical, or more specifically epistemological choice and statement about human and technology's existence and being. The statements acknowledge that the Internet is not simply an object for study or even a way of being but also an expression of humanness, in the sense that how it is configured makes visible a narrative, or narratives, about us humans and, in turn, configures us humans. This is not to subscribe unknowingly to technological determinism or social constructivism, nor is this position wholly embracing the theory of technological affordances. It is to acknowledge the imagination wrapped up in Internet technologies, an imagination that is both profoundly local and global, shaping action, interaction, and even being. It is to recognize the turn to experience that is reconfiguring everyday human life and being.

By considering internets as forms of life and narratives, and internets' coproduction of these forms of life and narratives through thematically pursuing the meanings that layers, stories, figures, and rumors bring forth, we aim to productively engage a wide range of disciplines in the study of internets in Asia. Singapore is central to this approach, the patch from which the patchwork becomes visible and comprehensible.

In addition, the four themes we propose respond to dangers of "reading" Asia's internets through any one concept, set of concepts, or frame. These themes are heuristic devices, guiding sensitivities concerning what and who to study and how to approach this study. These four themes of figures, layers, stories and rumors are not definitive statements about ontology, epistemology, or methodology, although such categories of statements and relevant questions may be drawn from them. They are instead drawn from understanding internets in terms of life and lore, as ways of being and entangled narratives in which internets themselves, as things, are both remediating and remediated. They think through internets' life in terms of the ambivalent, playful expression of everyday interactions and as supporting mythology that, through internet's very infrastructure, can become established at the level of corporate and national ideology. On a more theoretical level, these distinctions permit the exploration of the relationship between online and offline, physical and digital, contemporary living and the continuities that exist between pre- and post-Internet times.

Crucially, these four themes are deeply informed through studying the Internet in Singapore, the hyperconnected city-state from which we write, where, contrary to popular opinion, narrative and reality are never far apart. This is partly because they so often correspond in this vulnerable country's ongoing efforts to at once be a global city and a nation-state and partly because key narratives engaging the past, present, and future are often either contested despite the professed control of the ruling People's Action Party over such narratives. The entangled nature of narrative and reality in Singapore both is enabled by the Internet's pliability, transparency, intelligence, and visibility and also, ironically, in some way mirrors the Internet's own shape-shifting, mundane complexity, auto-awareness and self-production.



## References

Abidin, Crystal (2014). "#In$tagLam: Instagram as a Repository of Taste, a Brimming Marketplace, a War of Eyeballs." In *Mobile Media Making in the Age of Smartphones*, edited by Marsha Berry and Max Schleser, 119–28. New York: Palgrave Pivot.

Abidin, Crystal (2017). "#familygoals: Family Influencers, Calibrated Amateurism, and Justifying Young Digital Labor." *Social Media + Society* 3, no. 2: 1–15 (https://doi.org/10.1177/2056305117707191).

Abidin, Crystal, and Joel Gwynne (2017). "Entrepreneurial Selves, Feminine Corporeality and Lifestyle Blogging in Singapore." *Asian Journal of Social Science* 45, nos. 4–5: 385–408.

Anderson, Warwick (2012). "Asia as Method in Science and Technology Studies." *East Asian Science, Technology and Society* 6, no. 4: 445–51.

Appadurai, Arjun (1996). *Modernity at Large: Cultural Dimensions of Globalization*. Minneapolis: University of Minnesota Press.

Banjo, Shelly (2018). "It's Becoming Harder to Use Cash in China." Bloomberg, 13 February (www.bloomberg.com/news/articles/2018-02-13/it-s-becoming-harder-to-use-cash-in-china).

Barendregt, Bart (2012). "Diverse Digital Worlds." In *Digital Anthropology*, edited by Heather A. Horst and Daniel Miller, 203–24. London: Bloomsbury.

Biju, P. R. (2017). *Political Internet: State and Politics in the Age of Social Media*. London: Routledge.

Campbell-Verduyn, Malcolm (2018). "Bitcoin, Crypto-Coins, and Global Anti-Money Laundering Governance." *Crime, Law and Social Change* 69, no. 2: 283–305.

Castells, Manuel (2004)."Informationalism, Networks, and the Network Society: A Theoretical Blue-print." In *The Network Society: A Cross-Cultural Perspective*, 3–45. Northampton, MA: Edward Elgar.

Chee, Lilian (2013). "The Public Private Interior: Constructing the Modern Domestic Interior in Singapore's Public Housing." In *The Handbook of Interior Architecture and Design*, edited by Lois Weinthal and Graeme Brooker, 199–212. London: Bloomsbury Academic.

Chen, Kuan-hsing (2010). *Asia as Method: Toward Deimperialization*. Durham, NC: Duke University Press.
Chon, Kilnam, ed. (2013). *An Asia Internet History: First Decade (1980–1990).* Seoul: Seoul National University Press.
Chon, Kilnam, ed. (2015). *An Asia Internet History: Second Decade (1991–2000)*. Seoul: Seoul National University Press.
Chon, Kilnam, ed. (2016). *An Asia Internet History: Third Decade (2001–2010* Seoul: Seoul National University Press.
Choo, Hyekyung, Timothy Sim, Albert K. F. Liau, Douglas A. Gentile, and Angeline Khoo (2015). "Parental Influences on Pathological Symptoms of Video-Gaming among Children and Adolescents: A Prospective Study." *Journal of Child and Family Studies* 24, no. 5: 1429–41.
Chopra, Rohit (2008). *Technology and Nationalism in India: Cultural Negotiations from Colonialism to Cyberspace*. Amherst, NY: Cambria Press.
Chua, Beng Huat (2003). *Life Is Not Complete without Shopping: Consumer Culture in Singapore*. Singapore: NUS Press.
Clancey, Gregory (2012). "Intelligent Island to Biopolis: Smart Minds, Sick Bodies and Millennial Turns in Singapore." *Science, Technology and Society* 17, no. 1: 13–35.
Dalziel, Greg (2013). *Rumor and Communication in Asia in the Internet Age*. Oxford: Routledge.
Fischer, Michael M. J. (1999). "Worlding Cyberspace: Towards an Ethnography in Time, Space and Theory." In *Critical Anthropology Now*, edited by George Marcus, 245–304. Santa Fe, NM: School for American Research.
Fischer, Michael M. J. (2003). *Emergent Forms of Life and the Anthropological Voice*. Durham, NC: Duke University Press.
Fischer, Michael M. J. (2013a). "Biopolis: Asian Science in the Global Circuitry." *Science, Technology, and Society* 18, no. 3: 379–404.
Fischer, Michael M. J. (2013b). "The Peopling of Technologies." In *When People Come First: Critical Studies in Global Health*, edited by João Guilherme Biehl and Adriana Petryna, 347–73. Princeton, NJ: Princeton University Press.
Fischer, Michael M. J. (forthcoming). "Theorizing STS from Asia: Toward an STS Multi-scale Bioecology Framework—A Blurred Genre Manifesto/Agenda for an Emergent Field." *East Asian Science, Technology and Society*
Freedom House (2017a). "Freedom on the Net 2017" (freedomhouse.org/report/freedom-net/freedom-net-2017).
Freedom House (2017b). "Freedom on the Net 2017: Singapore County Profile" (freedomhouse.org/report/freedom-net/2017/singapore).
Fuller, Steve (2018). *Post-truth: Knowledge as a Power Game*. London: Anthem Press.
Fung, Brian (2018). "'Your User Agreement Sucks': Mark Zuckerberg's Senate Grilling, in Ten Key Moments." *Washington Post*, 10 April (www.washingtonpost.com/news/the-switch/wp/2018/04/10/your-user-agreement-sucks-mark-zuckerbergs-senate-grilling-in-10-key-moments/).
Gajjala, Radhika (2013). *Cyberculture and the Subaltern: Weavings of the Virtual and Real*. Lanham, MD: Lexington Books.
Gelfert, Axel (2013). "Coverage-Reliability, Epistemic Dependence, and the Problem of Rumor-Based Belief." *Philosophia* 41, no. 3:763–86.
Gelfert, Axel (2018). "Fake News: A Definition." *Informal Logic* 38, no. 1:84–117.
George, Cherian (2006). *Contentious Journalism and the Internet: Towards Democratic Discourse in Malaysia and Singapore*. Singapore: Singapore University Press.
Graham, Connor, Wally Smith, Wendy Moncur, and Elise van den Hoven (2018). "Introduction: Mortality in Design." *Design Issues* 34, no. 1: 3–14.
Graham, Connor, and Natalie Pang (forthcoming). "The Politics of a Threatened Space of the Dead: Challenges for (Re-)Disposal in a Traditional Chinese Cemetery in Singapore." In *Residues of Death: Disposal Refigured*, edited by Tamara Kohn, Martin Gibbs, Bjorn Nansen, and Luke van Ryn. London: Routledge.
Harper, Richard H. R. (2010). *Texture: Human Expression in the Age of Communications Overload*. Cambridge, MA: MIT Press.
Herold, David Kurt, and Gabriele de Seta (2015). "Through the Looking Glass: Twenty Years of Chinese Internet Research." *Information Society* 31, 68–82.
Hill, David T., and Krishna Sen (2000). "The Internet in Indonesia's New Democracy." *Democratization* 7, no. 1: 119–36.
Ho, Ezra (2017). *Smart Subjects for a Smart Nation? Governing (Smart)Mentalities in Singapore*." *Urban Studies* 54, no. 3: 3101–118.

Ho, Kong-Chong, Randy Kluver, and Kenneth C. C. Yang (2003). *Asia.com: Asia Encounters the Internet*. London: RoutledgeCurzon.

Hoe, Sui Loon (2016). "Defining a Smart Nation: The Case of Singapore." *Journal of Information, Communication, and Ethics in Society* 14, no. 4: 323–33.

Hootsuite and We Are Social (2018). "Digital in 2018: Essential Insights Into Internet, Social Media, Mobile, and Ecommerce Use around the World." 30 January ( https://wearesocial.com/blog/2018/01/global-digital-report-2018).

InfoComm Media Development Authority (2018). "Infocomm Usage-Households and Individuals." 4 July (www.imda.gov.sg/industry-development/facts-and-figures/infocomm-usage-households-and-individuals).

Jayakumar, Shashi (2018). "Singapore In 2017: Testing Times, Within and Without." In *Southeast Asian Affairs 2018*, edited by Malcolm Cook and Daljit Singh, 298–320. Singapore: ISEAS–Yusof Ishak Institute.

Kelty, Christopher (2005). "Geeks, Social Imaginaries, and Recursive Publics." *Cultural Anthropology* 20, no. 2: 185–214.

Krzywinska, Tanya (2008). "World Creation and Lore: World of Warcraft as Rich Text." In *Digital Culture, Play, and Identity: A World of Warcraft Reader*, edited by Hilde G. Corneliussen and Jill Walker Rettberg, 123–141. Cambridge, MA: MIT Press.

Kwang, Kevin (2018). "Young Singaporeans Fleeing 'Fuddy-duddy' Facebook? Not Just Yet." Channel News Asia, 25 February (www.channelnewsasia.com/news/singapore/young-singaporeans-fleeing-fuddy-duddy-facebook-not-just-yet-9974088).

Lee, Wen-Yi (2018a)."NUS 'Cashless Campus' Initiative Draws Criticism from Students." *Straits Times*, April 18 (www.straitstimes.com/singapore/nus-cashless-campus-initiative-draws-criticism-from-students).

Lee, Wen-Yi (2018b). "Students Pan NUS' Cashless Campus Initiative." *Straits Times*, April 19 (www.straitstimes.com/singapore/students-pan-nus-cashless-campus-initiative).

Liew, Kai Khiun, and Natalie Pang (2015). "Neoliberal Visions, Post-Capitalist Memories: Heritage Politics and the Counter-Mapping of Singapore's Cityscape." *Ethnography* 16, no. 3: 331–51.

Liew, Kai Khiun, Pang, Natalie, and Brenda Chan (2014). "Industrial Railroad to Digital Memory Routes: Remembering the Last Railway in Singapore." *Media, Culture and Society* 16, no. 3: 331–51.

Lin, Yangchen, and Raynold Y. K. Toh (2017). "People in Singapore Spend over Twelve Hours on Gadgets Daily: Survey." *Straits Times*, 3 April (www.straitstimes.com/singapore/12hr-42min-connected-for-hours).

Lindtner, Silvia (2015). "Hackerspaces and the Internet of Things in China: How Makers Reinvent Industrial Production, Innovation, and the Self." In *China's Contested Internet*, edited by Gaobin Yang, 44–74. Copenhagen: NIAS Press.

Lynch, Michael (2006). "The Origins Of Ethnomethodology." In *Philosophy of Anthropology and Sociology*, edited by Stephen P. Turner and Mark W. Risjord, 485–515. Amsterdam: Elsevier.

Mahizhnan, Arun and Mui Teng Yap (2000). "Singapore: The Development of an Intelligent Island and Social Dividends of Information Technology." *Urban Studies* 37, no. 10: 1749–56.

Marshall, Russell (2015). "Bitcoin: Where Two Worlds Collide." *Bond Law Review* 27, no. 1: 89–112.

Negro, Gianluigi (2017). *The Internet in China From Infrastructure to a Nascent Civil Society.* Cham, Switzerland: Palgrave Macmillan.

Packet Clearing House (n.d.). Internet Exchange Directory (www.pch.net/ixp/dir).

Pang, Natalie, and Debbie Goh (2016). "Can Blogs Function as Rhetorical Publics in Asian Democracies? An Analysis Using the Case of Singapore." *Telematics and Informatics* 33, no. 2: 504–13.

Pang, Natalie, and Joshua Ng (2016). "Twittering the Little India Riot: Audience Responses, Information Behavior and the Use of Emotive Cues." *Computers in Human Behavior* 54: 607–19.

Phillips, Robert (2014). "'And I Am Also Gay': Illiberal Pragmatics, Neoliberal Homonormativity and LGBT Activism in Singapore." *Anthropologica* 56, no. 1: 45–54.

Postill, John (2014). "A Critical History of Internet Activism and Social Protest in Malaysia, 1998–2011." *Asiascape: Digital Asia*, 1 no. 1–2, 78–103.

Rahimi, Babak (2013). "The Politics of Informal Communication: Conspiracy Theories and Rumors in the 2009 (Post)-Electoral Iranian Public Sphere." In *Rumor and Communication in Asia in the Internet Age*, edited by Greg Dalziel, 78–93. Oxford: Routledge.

Reubi, David (2010). "The Will to Modernize: A Genealogy of Biomedical Research Ethics in Singapore." *International Political Sociology* 4: 142–58.

Rosenberger, Robert, and Peter-Paul Verbeek (2015). *Postphenomenological Investigations: Essays on Human-Technology Relations*. Lanham, MD: Lexington Books.

Rossiter, Ned (2017). "Imperial Infrastructures and Asia beyond Asia: Data Centres, State Formation and the Territoriality of Logistical Media." *Fibreculture Journal*, 29: 1–20.
Schneider, David M. (1980). *American Kinship: A Cultural Account*. Chicago: University of Chicago Press.
Seow Bei Yi (2018a). "Select Committee on Deliberate Online Falsehoods Receives 164 Submissions." Straits Times 9 March (https://www.straitstimes.com/politics/select-committee-on-deliberate-online-falsehoods-receives-164-submissions).
Seow, Bei Yi (2018b). "Facebook Admits It Should Have Told Users Earlier about Breach of Policy." *Straits Times*, 22 March (www.straitstimes.com/politics/facebook-admits-it-should-have-told-users-earlier-about-breach-of-policy).
Skoric, Marko M., and Grace Chi En Kwan (2011). "Platforms for Mediated Sociability and Online Social Capital: The Role of Facebook and Massively Multiplayer Online Games." *Asian Journal of Communication* 21, no. 5: 467–84.
Soon, Carol, and Hichang Cho (2014). "OMGs! Offline-Based Movement Organizations, Online-Based Movement Organizations and Network Mobilization: A Case Study of Political Bloggers in Singapore." *Information, Communication and Society* 17, no. 5: 537–59.
Soon, Carol, and Randy Kluver (2014). "Uniting Political Bloggers in Diversity: Collective Identity and Web Activism." *Journal of Computer-Mediated Communication* 19, no. 3: 500–515.
Soon, Carol, and Samsudin, Siti Nadzirah (2016). "General Election 2015 in Singapore: What Social Media Did and Did Not Do." *Round Table* 105, no. 2: 171–84.
Tai, Zixue (2006). *The Internet in China: Cyberspace and Civil Society.* New York: Routledge.
Tan Ai Hua, Margaret (2012). "Promises and Threats: iN2015 Masterplan to Pervasive Computing in Singapore." *Scienc,e Technolog,y and Society* 17, no. 1: 37–56.
Tan, WeiZhen (2017). "Ninety Percent of Singaporeans Prefer Cash Payments: PayPal." *Today Online*, 29 August (www.todayonline.com/singapore/90-singaporeans-prefer-cash-payments-paypal).
Tanato, Brandon (2017). "Singapore Rated Asia Pacific's Top Location for Data Centres: Study." Channel News Asia, 20 October (www.channelnewsasia.com/news/business/singapore-rated-asia-pacific-s-top-location-for-data-centres-9326042).
Tang, Catherine So-Kum, Yee Woen Koh, and YiQun Gan (2017). "Addiction to Internet Use, Online Gaming, and Online Social Networking among Young Adults in China, Singapore, and the United States." *Asia Pacific Journal of Public Health* 29, no. 8: 673–82.
Turkle, Sherry (2011). *Alone Together: Why We Expect More from Technology and Less from Each Other.* New York: Basic Books.
van Dijck, José. (2013). *The Culture of Connectivity: A Critical History of Social Media*. Oxford: Oxford University Press.
Wang, Hui (2007). "The Politics of Imagining Asia: A Genealogical Analysis." Translated by Matthew A. Hale. *Inter-Asia Cultural Studies* 8, no. 1: 1–33.
Warner, Michael (2002). "Publics and Counterpublics (abbreviated version)." *Quarterly Journal of Speech* 88, no. 4: 413–25.
Wee, Lionel (2018). *The Singlish Controversy: Language, Culture and Identity in a Globalizing World*. Cambridge: Cambridge University Press.
Wittgenstein, Ludwig (1973). *Philosophical Investigations*. 3rd ed. Upper Saddle River, NJ: Prentice Hall.
Woo, Jun Jie (2016). *Singapore as an International Financial Centre: History, Policy and Politics*. London: Palgrave Macmillan.
World Shipping Council (n.d.). "Top Fifty World Container Ports" (www.worldshipping.org/about-the-industry/global-trade/top-50-world-container-ports, accessed 11 July 2018).
Yang, Guobin (2009). *The Power of the Internet in China: Citizen Activism Online*. New York: Columbia University Press
Yang, Guobin (2015). *China's Contested Internet*. Copenhagen: NIAS Press.
Yu, Haiqing (2009). *Media and Cultural Transformation in China*. New York: Routledge.
Zhang, Weiyu (2016). "Social Media and Elections in Singapore: Comparing 2011 and 2015." *Chinese Journal of Communication* 9, no. 4: 367–84.

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