**Sensing, Territory, Population: Computation, Embodied Sensors, and Hamlet Control in the Vietnam War**

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**Abstract:** This article analyses a mid-twentieth century computerized pacification reporting system, the Hamlet Evaluation System (HES), used by the US military to measure hamlet-level security and development trends in the Vietnam War. The significance of the HES was its capacity to translate US Military Advisor observations of Vietnamese hamlet life into a machine-readable format used by US military systems analysts to disclose 'patterns of life.' I show how US Military Advisors operated as 'embodied sensors' within the HES, producing a distinctive location-based event ontology – a 'view of below' – accompanied by rudimentary digital maps in-formation from incoming hamlet-level observation streams. I argue that acts of translating the rich texture of hamlet and village life into an objectified information format constituted a unique form of 'epistemic violence,' rooted not so much in the narrative subjection of the 'Other,' but in the pure abstraction of life into a digitally stored data trace.

In October 1966, one year after the first American ground troops and support units arrived in southern Vietnam, United States Defense Secretary Robert McNamara asked the Central Intelligence Agency (CIA) to design a computer-based intelligence reporting system capable of measuring military 'progress' in America's counterinsurgency war in the Vietnamese countryside. Frustrated by the lack of reliable intelligence, McNamara wanted a metrics-style reporting system that provided insight into the rural security and development conditions thought to be decisive variables for winning an unconventional war often characterized as 'without fronts' (Thayer, 1985). McNamara was impressed by a paper-based reporting system developed in 1965 by the US Marines as part of the their 'civic action' operations along the border of North Vietnam. In the US Marines system, data was collected on the political and military infrastructure of National Liberation Front (NLF) guerrillas at the village and provincial level, including 'intangible' dimensions like villagers' attitudes towards the central government and the effectiveness of US development aid programs. McNamara wanted a similar reporting system but with a 'higher resolution' at the *hamlet* level, a scale now achievable because of advances in business computing. McNamara and his staff wagered that by adopting new digital data-processing technologies to manage the growing catalog of reporting systems in Vietnam,[1] American

military and civilian officials could, over time, better understand population dynamics and pacification trends in rural areas (Daddis, 2012; AUTHOR 2016).

Following McNamara's request, a team of private contractors hired by the Advanced Research Projects Agency (ARPA) and CIA were sent to Saigon to develop the digital hamlet intelligence system. The team created a reporting system based on the input and storage of hamlet and village population data into a database for future retrieval. The Hamlet Evaluation System (HES), as it came to be called, produced monthly statistical reports on the status of 'population control' in the countryside, as well as state-of-the-art digital maps showing the status of hamlet control by either the Government of Vietnam (GVN) or the NLF. By spring 1967, the HES was fully functional in the field, and stayed operational—albeit with several upgrades—until 1973. The HES consumed 'thousands of man-days of work by countless young army officers' (Allen, 2001: 224), making it one of the largest—and most labour-intensive—geographical information systems of its time.

The Vietnam War marked an important turning point in the conduct of late-modern war because it was the first time computer technologies were integrated into nearly every facet of the US military apparatus. What difference did computers make? Starting in 1963, punch-card processing systems, followed in 1967 by mainframe computers with magnetic-tape storage capacity (Feltham, 2012), were fast becoming the vital infrastructure undergirding the full spectrum of US military violence (Cowen, 2014). By the late 1960s, the background of America's deadly 'techno-war' in Vietnam was humming with computer hardware (Edwards, 1997), accommodating ground-level logistical equipment for deadly search-and-destroy missions that were managed much like an 'assembly line' (Gibson, 1986). Computers were integral for military command and control systems; the conduct of covert operations (e.g., the Phoenix assassination program; Shaw, 2016); the 'electronic battlefield' tracking NLF north-south movements (Gregory, 2011); and various military-civilian programs that evaluated and measured 'progress' in the US pacification campaign (Daddis, 2012). In the discussion here, I focus on a specific technical object hitherto unknown in war, *digital population data* (cf. Halpern, 2014), whose facility in representing 'actual' village and hamlet conditions on the ground became a contentious flash point between the anti-war movement, an increasingly skeptical US media, and the managers running the war.

The Vietnam War was also a watershed for Geographical Information Systems (GIS). Database systems like the HES were predicated on a *location-based* event ontology, significant insofar as social geographical phenomena could be disclosed at a local level. Long before GIS systems were used to track insurgent movements and incidents in the 'event-ful battle spaces' of Iraq, Afghanistan, and Pakistan (Croser, 2007; Gregory, 2010), drone strikes (Hall-Kindervater, 2016), or more recently to

track migration flows across the Mediterranean (Tazzioli, 2018), the HES and other pacification reporting systems were capable of translating hamlet-level population dynamics – movement, economic activity, NLF attacks, education and medical access – into digital visual formats that could be tracked in 'real time.' A key variable in these new digital systems was the use of a standard geographical reference point – Universal Transverse Mercator (UTM) coordinates – assigned to reported activity and inputted into military computers. As one of the HES's key designers, CIA officer George Allen, notes:

> Virtually all reporting from Saigon on activities related to the war was geared to a common factor: geographical locale. Air strikes, enemy harassing attacks, patrol engagements, friendly and enemy troop dispositions, supply caches, command post locations, original homes of refugees, former locations of defectors and prisoners, positions of artillery units and locations of their targets, ambush positions, helicopter landing pads, elephant sightings, locations of province capitals, district towns, hamlets, outposts, major combat actions… there were separate computerized accounting systems for every conceivable kind of activity, including the locations of the hamlets in our new evaluation system. (Allen, 2001: 224-225)

Hyper-local geo-referenced data points allowed US systems analysts to extrapolate pacification trends from collected data of everyday life in Vietnamese villages. Moreover, since US and Vietnamese officials lacked a reliable census, GIS systems like the HES became the only comprehensive record available on population numbers and hamlet locations in the Vietnam War (Brigham, 1970; Thayer, 1985).

Translating the everyday locations of activities and events into the HES was possible due to an underappreciated figure in the history of the Vietnam War: the US Military Advisor. US Military Advisors were placed in each district of South Vietnam's 44 provinces, and were assigned the task of accurately reporting the conditions of hamlet populations on a monthly basis. In this article, I examine how they translated their observations into a computer-friendly format. Ramkin (2016) has noted how 'embedded subjectivity' is now central to contemporary mapping and navigation practices, with technologies like GPS integrated into nearly all digital platforms and devices. The US Military Advisor, as an interpretive subject reporting local conditions, was an important genealogical precursor to this cartographic shift to embedded mapping practices. US Advisors served, I argue, as *embodied sensors*[2] within the new computational infrastructure in southern Vietnam. With US Advisors and Vietnamese counterparts assigning UTM coordinates to every reported activity, they became the decisive inputs that constituted the location-based ontology at the heart of the HES.

By focusing on 'embodied sensors,' I draw attention to the make-up of the 'human-machine assemblage' (Holmqvist 2013; Wilcox, 2017) at work in most Vietnam-era reporting systems. The post-

war development of electronic sensors, designed to detect movements and changes in an environment, were central to the tactical techno-rationalities of the US military and CIA in Vietnam. For example, military intelligence officers used electronic sensors to track Vietminh movements and supply lines along the 'Ho Chi Minh trail' from north to south Vietnam (Deitchman, 2008). The HES was designed to have the same surveillance capacity offered by sensors, but in the hamlets and villages of Vietnam. However, electronic sensors were obviously not capable of detecting the types of changes important in contemporary warfare, namely political attitudes and economic development. Instead, US Military Advisors were effectively trained as 'sensors' to report on the 'subjective' dimensions of war for the 'objective' digital reporting systems driven by computational statistics.

Thus, US Advisors had the peculiar task of translating the complex, qualitative socio-political life of the hamlet into a quantitative ordinal score for the HES.[3] The goal was to produce a monthly data point for every hamlet in South Vietnam that could be stored in databases. Over time, observational data points would accumulate, serving as raw material for statistical analysis of hamlet 'patterns of life' (cf. Chamayou 2014). This analysis, in turn, shaped military operations and economic development aid at the hamlet level. The embedded subjectivity of US Advisors as embodied sensors, in conjunction with location-based data-processing capacities of computer systems, co-constituted one another within the HES, each side of the 'human-machine assemblage' – the Advisor and the computer – moulding the expectations of the other.

To be sure, the translation activity of the US Advisors was burdened by the complex power relationship between the US Military Advisor and the Vietnamese official he usually depended upon for information. US Advisors typically lacked proficiency in the Vietnamese language, making them heavily reliant upon Vietnamese officials/translators to convey the experiences of village and hamlet residents. Moreover, US Advisors had to engage in their own acts of translation. If translators always 'distort [their] language in order to render the original faithfully' (Conley, 2010: 18), then the impossible task of Military Advisors as 'embodied sensors' was to faithfully adhere to the experience of the Vietnamese peasant—conveyed through the speech-act of the Vietnamese translator—and translate that experience into a machine-readable format capable of producing the actionable outputs of status reports and digital maps. As one would expect, these calculated spaces, as they morphed from translation to translation, could only maintain a tenuous relationship with the 'reality' they claimed to represent.

However, that did not make these calculated spaces meaningless. Quite the contrary. A whole new way of 'seeing like a state' (Scott, 1998) was enacted through computer-based reporting systems like the HES. Indeed, the novelty of these reporting systems is apparent when one compares them to

Scott's important work on the modern state. For Scott, the hallmark of modern state practice was to make nature and people 'legible' through acts of 'simplification'—cartography, urban planning, a census—which numerically accounted for population and resources within a territory. The location-based reporting systems introduced in Vietnam had a different orientation entirely. While database systems accounted for population and resources, the aim was not simplification but rather allowance for the *complexity* of population dynamics to be appreciated on its own terms in 'real time,' calculated through Bayesian statistical analysis. Unlike the static simplifications of the 'view from above' central to Scott's account (e.g., manually drafted maps, aerial photography), database systems like the HES operationalized a distinctive *view of below*, accompanied by a data-driven map constantly in-formation from the incoming stream of monthly reports by hundreds of Advisors observing South Vietnam's 11,000-plus hamlets. By comparing different activities based on the common denominator of geographical locale, systems analysts within the US military realized they could disclose dynamics, trends, and even make data-based predictions in the pacification war. Of course, these capabilities were never realized to the extent of contemporary data analytics. Nonetheless, the system discussed here was an important genealogical precursor of late-modern 'big data' analytics.

In this paper, I examine the emergence of embodied sensors and a computational location-based event ontology by focusing on the Hamlet Evaluation System. First, I discuss the design of the HES and the historical context that led to its implementation. Next, I explore the HES as a socio-technical-material arrangement and how it was operationalized during the Vietnam War, focusing specifically on the role of US Military Advisors and Vietnamese officials as embodied sensors within the hamlet evaluation system. Finally, I show the novelty of the mapping system within the HES. The last part of the story is significant as one of the trailblazers of GIS, Harvard Professor Howard Fisher, was contracted by the Defense Department to develop the HES mapping system. The Hamlet Evaluation System was a massive undertaking. Therefore, my analysis focuses strictly on its design and implementation in 1966-67. However, in the conclusion, I touch on some of the problems that emerged in the system throughout 1967-68, particularly around issues of data quality (AUTHOR 2016) which eventually led to major revisions of the HES in 1969 and 1971. This article is based on extensive archival research at the US National Archives (College Park, MD), the Center for Military History (Washington, DC), and the Lyndon B. Johnson Library (Austin, TX).

My argument has two important aims beyond the empirics presented. First, by interrogating computer systems such as the HES, which were designed to manage pacification and development projects, I problematize the assumption that security and development were distinct projects during the Cold War, including the narrative that the 'security-development nexus' is largely a post-Cold War phenomenon (Duffield 2001; Kaldor 2012). Rather, as I show, security and development were

intertwined through the digital technologies employed in the US counterinsurgency campaign in Vietnam.

Second, I hope this paper serves as a catalyst for decolonizing the history of computation and geographical information systems. In recent years, the traditionally stodgy field of computational history has begun to account for the role of women and people of colour in the history of technology (Hicks, 2017; Light, 1999), as well as the utilization of computers outside of the global North (Medina, 2011). However, as far as I know, the development of computational hardware and GIS for the explicit purpose of population control in post- and neocolonial Cold War contexts, such as Vietnam, has not been considered in any depth, if at all. When I ask, 'what difference did computers make?' in the Vietnam War, I am equally concerned with how acts of translating the rich texture of hamlet and village life into an objectified information format constitute a unique form of 'epistemic violence' (Spivak, 1988; Griffiths 2018); that is, a mode of violence rooted not so much in the narrative subjections of the 'Other,' but in the pure abstraction of life into a digitally stored data trace? This paper thus presents a critical contribution to the as-yet-unwritten history of computers as a technology of imperial violence.

**'A system to regularize observations'**

The HES was at once a census and an archive, a map and record of on-the-ground observations made by US Advisors of Vietnamese villages. The electronic computer was the apparatus that made this population-based system possible. The historical relationship between neo-colonial population control and the emergence of computers is often overlooked in scholarly literature, especially when compared to the extensive interrogation of paper-based censuses in colonial contexts – a biopolitical technology *par excellence* for identifying population-life processes and controlling boundaries between racial and ethnic groups (Legg, 2005). However, the question of biopolitical control in the transition from paper to computer-based census systems remains underappreciated, even though the 'birth' of the computer is a consequence of the census.

Herman Hollerith (1860 – 1929), the founder of the Tabulating Machine Company, which later became IBM, successfully developed calculating machine technology in 1884 for the 1890 US Census, the largest population data processing project of the 19th century (Campbell-Kelly et al., 2013). By the late-1950s, punch-card computing was a routine part of administrative operations in government, military and business institutions, including in American colonies.[4] By the late-1960s, mainframe computers such as the IBM/360, outfitted with advanced processing power and magnetic tape data storage, allowed vast amounts of information to be codified, processed, and plotted in time-evolving data sets more efficiently than could earlier punch-card counterparts. A new professional class of 'systems men'

(Haigh, 2001) emerged to develop 'cybernetic' command and control models for urban planning, business management, and military logistics (Light 2004). Importantly, these powerful new machines were capable of disclosing biopolitical relationships between seemingly disparate phenomena.

During the Vietnam War, punch-card machines and mainframe computers became central, with varying degrees of success, to US intelligence efforts to control the village population in southern Vietnam. Digital population data produced in Vietnam – from 'body counts' (Tyner, 2009) to economic development statistics – allowed an array of generalizations to be made about trends in the Vietnamese countryside. In 1963-65, as US military presence grew in Vietnam, civilian and military war managers adopted a more 'scientific management' approach to combat (Gibson, 1986). Defense Secretary McNamara, a former CEO of Ford Motor Company and trained in statistics and economics at Harvard, was especially keen to apply 'systems analysis' to a range of military activities, from military budgets to combat operations (McCann 2017).

At the heart of systems analysis was the need for *information*. 'Only during this era [the 1960s],' Haigh writes (2001: 18), 'was the now commonplace concept of information as a distinct, abstract, yet universal and impersonal quantity first established.' US military analysts in Vietnam were eager for reliable information on the rural population where, following the fall of Diem in 1963, large swaths of the population supported the revolutionary platform of the Vietminh and NLF (Fitzgerald, 1972).

Computer-based reporting systems like the HES were developed to understand population dynamics fuelling the insurgency. These systems were designed to address three problems with US military intelligence and information gathering in Vietnam:

(1) *The priority placed on 'physical security' over population intelligence*. In the first years of intervention by US forces, MACV[5] commanders notoriously prioritised 'physical security' for the Saigon regime, which came at the expense of gaining intelligence on the NLF's political infrastructure. The security metric used to indicate 'progress' was the 'body count' (see Tyner 2009), and other conventional military measurements. As David Marr, the prominent Vietnam historian and former Marine intelligence officer in the Mekong Delta in the 1960s, writes: 'My colonel simply wanted to know if "the enemy" was located in village "A" or village "B," whether he had weapons larger than 30 calibre that would force us to fly above 1,500 feet, and what the weather was going to be like tomorrow. The colonel cared not a wink about the political "infrastructure," the relationship of "insurgents" to the local population, or the social program and essential motivations of the NLF (1985: 206).' The indiscriminate killing of Vietnamese peasants – suspected NLF or otherwise – to achieve a body count predictably failed to turn the population into a willing cast of supporters for the US/Saigon regime.

(2) *Reliance on Vietnamese sources*. MACV and US intelligence agencies knew very little about the situation in Vietnam outside of Saigon, especially the socio-economic factors in the countryside that drove large swaths of the population to support the NLF. Thus, intelligence officers and military personnel were reliant upon Vietnamese counterparts for information. However, the deterioration of order in Saigon and the countryside following Diem's overthrow in 1963 shook the confidence of American officials and commanders in their Vietnamese counterparts (Kahin, 1986: 93-181). The American skepticism towards Vietnamese information, especially among lower ranks, was unsurprising given the enduring American racism towards the Vietnamese (Bradley, 2000). The language barrier between the Americans and Vietnamese aggravated an already tense relationship. In 1964, RAND analyst G.C. Hickey produced an insightful report on US Military Advisors in Vietnam.[6] Hickey, a strong supporter of US involvement in Vietnam, feared the venture could be undermined by rampant racism among American Advisors.

> Many Americans, measuring the Vietnamese by their own cultural standards, are highly critical of their value system and some of their attitudes and behaviour patterns. They are apt to accuse their counterparts and other associates of being lazy, unenthusiastic, without a sense of urgency about their jobs and the pursuit of war in general, lacking in frankness to the point of deviousness, intent on ritual but uncharitable toward their fellowmen, lax about health and hygiene, wasteful with material. Often, they vaguely ascribe these characteristics to what they call the inscrutable 'oriental mentality' (Hickey, 1965: viii).

In part, computer-based reporting systems were developed to mitigate against racist dispositions and interpretations by American personnel reporting on security and development conditions. Statistical analysis based on numbers rather than narratives was used to overcome cultural prejudice in intelligence reporting. In their careful design (e.g., by using standardized reporting worksheets; see below), reporting systems were intended to provide a more 'objective' picture of Vietnam. Moreover, statistical analysis could counteract the proclivities of US Advisors who, under pressure from superiors to show improvement in their districts, had an incentive to paint a rosier picture of the situation than the reality (Cooper et al., 1972a: 24). However, the reliance on statistical analysis was high as numbers increasingly became a substitute for in-depth cultural knowledge. As Daddis notes (2012: 50): 'Without solid footing in either counterinsurgency or Asian culture, [US] officials under pressure from McNamara opted for numbers over nuance.'

(3) *Long-form narrative vs. quantitative reporting*. The most important US intelligence problem leading to computational reporting-systems like the HES was the predominant *form* of intelligence reports; that is, as narrative-based formats. The composition and length of some intelligence reports could extend to hundreds pages, making them difficult for US commanders to digest in a timely manner. Statistical reports, by contrast, could be read quickly and 'at a glance.' Until 1967, US Advisors typed narrative situational status reports on provinces and districts, but these accounts were neither widely read nor systematized by US military personnel, including commanders. The abundance of written reports accumulated to an unsustainable point, producing a confused tessellation of perspectives on the political and military situation in the villages and hamlets of South Vietnam.

Already in 1962, a Kennedy administration policy staff member wrote in a US State Department memo:

> We have been impressed by the *great disparities in impressions* of observers as to the state of progress on attitudes and the state of government progress in the countryside.' Probably much of this variation is caused by the fact that different observers see different parts of the country or different aspects of what's going on. It would be desirable, if at all possible, to *establish a system to regularize observations* (Johnson, 1962; my emphasis).

The HES was precisely that: a computerized system to regularize observations of the rural Vietnamese population. The power of the HES lay in its ability to systematize and centralize disparate incoming information sources – i.e., monthly US Advisor observations made in the field – which produced a powerful (if provisional) sense of coherency to an otherwise 'messy' guerrilla war. As one official working on the HES put it, 'It is impossible to generalize about the situation in rural Vietnam without employing an instrument such as the HES, which develops a national mosaic composed of individual hamlets (Brigham, 1970: 55).' The capacities of 'storage' and 'retrieval' of information in databases, combined with Bayesian statistical analysis and high-resolution computational maps portraying hamlet control, enacted a new way of understanding the Vietnam population.

**Making the Hamlet Information Stream**

In 1966, 'body counts' were still upheld as the premium metric of 'progress' among military commanders (Daddis, 2012: 87-103). However, it had lost much of its lustre among US officials, who began to realize that the use of force to measure enemy-attrition often worked at cross-purposes with assessing the popular attitudes of villagers. There was a push within the Johnson Administration by Walt Rostow, National Security Advisor Robert Komer, McNamara and others to re-emphasize a

'population-based' counterinsurgency strategy aimed at winning the loyalty of the Vietnamese. A February 1966 Honolulu Conference resulted in a declaration of support by the Johnson Administration for the Ky government in Saigon, and the American commitment to economic development and counterinsurgency targeting NLF political infrastructure was reaffirmed (Fitzgerald, 2002: 275).

After the Honolulu Conference, US officials began to express concern about the reliability of population figures for South Vietnam. An accurate census was needed to gauge 'progress' on political and economic development at provincial, district, village and hamlet levels. Key questions arose such as: What percentage of residents in hamlets and villages are secure this month compared to last month? What percentage of the population use health and economic aid over the duration of USAID programs? For many US officials, these were critical questions for any liberal nation-building strategy aimed at winning an 'unconventional' war (Marquis 2000). A major information-gathering problem was caused by US military operations that continually displaced (and re-displaced) the rural population. By 1967, Daddis writes (2012: 125), 'search-and-destroy missions and bombing raids had left homeless roughly three million South Vietnamese. American operations generated scores of refugees, unravelling the countryside's social and political fabric and destabilizing any foundation on which pacification programs could build.'

The task of producing a reliable census and population data fell to Civil Operations and Revolutionary Development Support (CORDS), a new US military-civilian pacification program established in May 1967. CORDS's mission was to measure security and development, and oversee 'civic action' pacification programs working in tandem with MACV offensive operations in the countryside. CORDS used the HES as an instrument to count and catalog the Vietnamese population, the essential data ingredient for calculating security and development trends at the hamlet level (Komer, 1971). If the HES was going to provide a 'real time' statistical picture of pacification programs, then a synchronous incoming hamlet information stream was required to feed into the system. Monthly observations by US Advisors became the data anchor for the HES information stream.

*The View of Below*

By late-1967, US Provincial Advisors were in place in all 44 provinces of South Vietnam, as well as US District Advisors in each of the 235 districts in the provinces. Every month, US District Advisors with Vietnamese counterparts (usually low-level military or state officials), visited every hamlet and village in their districts, recording security and development conditions on HES worksheets, and submitted the worksheets and supplementary written materials to Provincial Advisors. Provincial Advisors assembled and collated the incoming worksheets and reports, and forwarded the materials to MACV

headquarters in Saigon for punch-card processing, statistical analysis, and database storage. In return, US Provincial Advisors received computer-generated HES reports based on previous month's reporting, including statistics on provincial security and development changes and trends (Figure 1). The district and provincial-level reports produced an evolving monthly statistical understanding of South Vietnam, supplemented by HES maps (see below) that had a profound 'truth-effect' of portraying a comprehensive picture of the war in an 'objective' numerical format for US officials and MACV commanders. As the two lead programmers of the HES, Dorothy Clark and Charles Wyman, wrote: 'the system is structured to allow computation of a nationwide indicator of progress (Clark and Wyman, 1967: 33).' As I note in the conclusion, the desire within the Johnson Administration for a simplified metric of progress misled officials and the public on the state of the war. Nevertheless, as a practical tool, the monthly HES reports and maps allowed Provincial Advisors and commanders recalibrate or sustain tactical operations at the hamlet level.

FIGURE 1 HERE

Why was the hamlet the preferred scale of analysis? A primary factor was the destruction and deterioration of village life caused by US forces. The traditional role of the village as the administrative centre for collections of hamlets was severely damaged by the war (Owens 2015: 209-242). The breakdown of the village fragmented the population created ideal conditions for the NLF to infiltrate hamlets and propagandize a Communist revolutionary program. The US and GVN, realizing the successes of the NLF, created their own 'Revolutionary Development'[7] programs at hamlet populations to counteract the inroads made by NLF guerrillas.

However, hamlet-level information and analysis was insufficient for Revolutionary Development programs, despite the CIA and USAID operating in hamlets since at least Diem's failed 1962-1963 'strategic hamlet program' (Attewell, 2015). The incongruity between implementing hamlet-level security and aid programs without appropriate techniques for measuring their effectiveness frustrated CORDS officials. The HES's scaled-down information-gathering operation remedied this problem (Clark and Wyman, 1967: 35). The bedrock of the HES was a separate information file for each of the 11,355 hamlets in South Vietnam, identified by province, district, village, and population count. Hamlets were given a name, and standardized GVN and US code numbers. Most importantly, each hamlet was assigned a UTM coordinate, which allowed socio-spatial pacification trends to be calculated across time and space (Clark and Wyman, 1967: 2-3). For example, GVN planners could aim to re-establish control in areas where population densities were high and land was cultivated, both signs that an insurgency presence was low (Clark and Wyman, 1967: 53). Details ranging from military

incidents and guerrilla attacks, to the cultivated/noncultivated land and the condition of educational facilities, were thus key data inputs for the HES.

The ingenuity of the HES lied in its location-based reporting. The location-based reporting mechanism, which allowed for the fabrication of digital population data, was the key feature that separated computational systems from modernist modes of 'seeing like a state.' To understand the difference, consider what Jameson calls the 'nominalistic dilemma' (Jameson, 2013) at the heart of war[8]; i.e., the dissimilitude between a soldier's ground-level perspective of war and the so-called 'god's eye view' afforded by a 'machine aesthetic from the air' (Saint-Amour, 2003: 352; Bousquet 2018). Unlike the confused sensory experience inherent in the immediacy of combat (trenches saturated with gases, shrapnel, and bullets; the dense foliage of the jungle), the conceit of technological *vertical* distancing from the ground is the achievement of an 'objective' perspective of war (Virilio, 1989). In the first two World Wars, western militaries, including the United States, invested heavily in various technologies – aerial reconnaissance and photography, maps, balloons – to guarantee a 'view from above' (Haffner, 2013). As Saint-Amour notes (2003: 356), 'aerial photographs possessed the conceit of laying reality bare by their deadly accuracy, their vertical penetration, their plenitude or even excess of detail, and their ability to reveal facts, objects, and strategic intentions not otherwise accessible' from the ground. The vertical 'view from above' seemed the 'appropriate' view for conventional wars defined by armies operating along fronts.

However, such a vertical view is faced with limits in *un*conventional wars *without* fronts (Thayer 1985). While aerial and satellite reconnaissance remained crucial for military reconnaissance in Vietnam, computational systems like the HES inverted the view back to the observational experiences of soldiers better positioned to disclose the complex texture of everyday hamlet life. When combined with the computational capacity to process and store observational data points on population dynamics and events, systems like the HES cut across Jameson's 'nominalistic dilemma': 'objectivity' was achieved not by a 'view from above,' but rather by the multiplicity of US District Advisors' sensory observations from the ground. This *view of below* – a computationally processed combination of hundreds of dispersed observations of Advisors – provided a unique abstracted reality of hamlet life. The difference in these two abstract views – from above, of below – lay in the *mechanism* that repurposed 'reality' for military action. If the aerial photograph's relation to the world can be described as one of pictorial *transcription*[9], then the sharp end of data produced by the rotating cast of US District Advisors for the HES was one of 'factual' *translation* of Vietnamese peasant life into a machine-readable format. Digital population data, a new 'form of appearance' in the 1960s afforded by the computer, revealed evolving and dynamic life processes in *locations* that were unseen in the static pictures of *areas* taken from above.

The view *of* below should not be confused with a view *from* below, as my point is not to rehearse the notion of a 'world divided' between high-tech military gazes in the sky and victimized 'embodied subjects' below (cf. Chow 2006). Rather, the view of below is an instrumental horizontal perspective. The embodied observations of US Advisors mattered only so long as they anchored recorded data points that were archived in databases. As I discuss below, observational data points were the raw material for arguably the HES's most important output: a constantly changing map in-formation that translated security and development statuses into pictorial form (Figure 2). No longer was the 'state simplification' of the map oriented towards 'permanently settl[ing]… mobile peoples (Scott 1998: 1)' or 'area control.' The static map gave way to a map in-formation—founded on a location-based ontology, constituted by observational data-points—allowing the dynamics of the conflict *to be seen* by CORDS officials and commanders in 'real time.' . In the following, I outline HES key *inputs* and *outputs* to illustrate how this hamlet control system worked in operation.

FIGURE 2 HERE

*HES Inputs: Embodied Sensors*

The 1967 version of HES was heavily reliant upon US District Advisors' observational assessments of hamlet conditions.[10] To mitigate against subjective interpretations in Advisor information-gathering and reporting, HES programmers devised unique techniques that turned Military Advisors into sensors for the system. The quality of the HES was only as good as Advisors' observations—which was also the weakness of the system. Thus, a great deal of training effort went into shaping ways of seeing.[11]

HES programmers designed two important micro-technologies to maximise an 'objective' interpretation of hamlet conditions. First, the programmers developed a matrix of six categories by which the security and development statuses of hamlets were qualitatively assessed: VC Military Activities; VC Political & Subversive Activities; Security/Friendly Capabilities; Administrative & Political Activities; Health, Education & Welfare; Economic Development. Within each category, three criteria indicators were assigned, totalling 18 indicators, which the Advisor scored from E (worst) to A (best). For example, under the Economic Development factor, an Advisor could score the indicator 'Economic Improvement Programs (Farming, Fishing, Land Reform, etc.' in a hamlet in the following way:

> E = None; no programs started
>
> D = Some planning: few basic programs started
>
> C = Basic programs underway; people interested
>
> B = More advanced programs started; increased popular support and participation.
>
> A = Most programs well advanced in response to popular demand and continuing participation.

For a secured 'A' hamlet, the Advisor needed to observe 'No [NLF] incidents, including harassments, in village or near hamlet or on routes to village during month,' and evaluator's guide was developed to assist Advisors in scoring (Clark and Wyman 1967: 3). Every month, a single overall average score was calculated for each hamlet based on the 18 indicators submitted by Advisors (Cooper et al. 1972b: 228).

The second micro-technology was the use of a standardized worksheet to assess the six categories (Figure 3). In addition to scoring each indicator representative of hamlet conditions, the worksheet required Advisors to provide geographical information (district, village, & hamlet), hamlet number, a 'confidence estimate' of reporting, and a brief written assessment of overall hamlet conditions (e.g., uncontested; undergoing clearing; undergoing securing; secured). The back of the worksheet included boxes where aspects of a hamlet (e.g., the receptiveness of villagers to US forces; corruption details; tax collection; road conditions; etc.) could be recorded by Advisors. As Legere (1971: 24) notes, 'from the very beginning of the HES, the system provided for some registration of adviser reaction over and above the lettered ratings under the specified indicators.'

FIGURE 3 HERE

The scores produced from compiled Advisor worksheets were instrumental for military systems analysts in developing methods of pattern recognition. The results from Advisor worksheets produced reports that served as the primary index for US officials in Washington DC and military commanders in Saigon to track trends in economic development and population control on a hamlet-by-hamlet basis.

> The arrival of staffers with in-country experience on reporting matters from the field resulted in the preparation of comprehensive data tables that made it possible for the first time to deal with data on a time-series basis, thus exposing trends over time—including some trends in population control in terms of hamlets and people (Cooper et al. 1972b: 224)

Together, the assemblage of security/development factors, worksheets, and statistical reports produced a twin-effect. First, they trained soldiers' eyes and shaped observations to see particular features in hamlets, and filtered information from Vietnamese translators that did or did not have direct relevance to the criteria on the worksheets. This allowed, Advisors to translate the thick texture of village life into a format compatible for producing statistical analysis. Of course, the HES was not a neutral 'inbox' of hamlet observations. The system formed an observational subject in the mould of an embodied sensor, who, by design, could only see hamlets and villages as abstracted objects or 'sets of conditions' to be assessed. The observations of Advisors on the move from hamlet-to-hamlet created a feedback loop, as the computational requirements of the HES determined the mode of

seeing by Advisors. The programming effect was one of instrumentalized perspectival orientation, observational capture, and the gestural control of marking worksheets cf. Butler 2009: xi). Second, as a monthly composite of more than 240+ District Advisor observations, the processed worksheets enabled the HES programmers to *establish a system*—a system of regularized observations—capable of providing a coherent picture based on interdependent local reports. In the next section, I discuss how this form of epistemic violence manifested in an abstracted pictorial map format.

*HES outputs: Maps in-formation*

In late-1966, the Office of the Assistant Secretary of Defense Systems Analysis Research and Analysis Division, in conjunction with ARPA and the CIA, contracted the Research Analysis Corporation (RAC) to design the HES. Initially called the Analysis of Revolutionary Development Evaluation and Measurement System (ARDEMS), the project was carried out by a three-person team: Dorothy Clark, Charles Wyman, and CIA officer George Allen[12]. The HES project had two tasks: (1) to produce the set of indicators and hamlet control criteria discussed above; and (2) to replace hand-written reports with automated data-processing techniques. From the RAC team's perspective, the use of automated technologies would increase the accuracy and speed of reporting, collecting, collating, and storing a database of hamlet conditions. McNamara demanded the new system be operational by 1 January 1967, and the RAC team, working under pressure, designed and programmed the HES system in just two weeks, an incredible feat for a system that was in service for seven years (Clark and Wyman 1967: 2-3).[13] As an ARPA assessment team noted in 1972, very few major revisions were made to the initial HES because 'the system turned out to have been well-designed, in spite of the crash-action that had attended its introduction (Cooper 1972b et al.: 231).'

In its early days, the technology available in Vietnam did not match the RAC team's ambitions. For example, magnetic-tape database storage did not arrive in Saigon until 1968 (Feltham 2012). Thus, the team was limited to using a Univac 1005 punch-card processing machine for the initial HES until the 1969 HES-70 revision incorporated an IBM/360 (Clark and Wyman 1967: 57). The Univac-based punch-card processing equipment was beset with problems. Punch-cards only recorded 80 Hollerith data items, meaning that the information data gathered by a US Advisor in a hamlet could fit on just one card. Since around 11,355 hamlets were evaluated on a monthly basis, a single month's hamlet information file for southern Vietnam thus consisted of 11,355 cards, posing many problems. As Clark and Wyman point out, punch-card processing was much slower than business computing, requiring 'machine-operator manpower with the attendant likelihood of the introduction of human error (1967: 34).' Cards were misplaced, and the Univac machines frequently broke down. Business computers

allowed large masses of data to be handled, and files and reports were revised with minimal physical manpower. However, HES handlers would have to wait two years for the IBM/360 they desired.

In the meantime, Clark and Wyman worked with what they had. A significant output produced by the HES were the hybrid digital-paper maps produced by the early machinery (see Figure 2). Computational HES maps were capable of representing the the security score (based on the average security score of the 18 indicators) for every hamlet in South Vietnam; e.g., 'A,' 'C,' and 'V's on the maps represented a single hamlet status. The cutting-edge technical mechanisms that produced a high-resolution maps of hamlet control, and thus a new mode of abstraction of Vietnamese hamlet life, were unique for their time. To do so, the RAC took a standard South Vietnam map as a background layer, and overlaid a 1-$km^2$ grid over all 44 provinces (Figure 4).

FIGURE 4 HERE

Hamlet score inputs based on UTM coordinates were presented within the confines of the hundreds of grid squares, allowing for a more refined presentation of hamlet control. The RAC adopted the use of punch-cards (Figure 5) to code various perimeters for the map outputs. For example, taking hamlet control data captured on District Advisor worksheets (e.g., 'A' or 'C' statuses), a code was entered onto a designated punch-card column (39A, 34C), that was then processed and printed onto the gridded map.[14]

FIGURE 5 HERE

The mapping product that made these hybrid digital-paper maps possible was SYMAP, a program and printing technique developed by Howard Fisher, an early pioneer of GIS (see Wilson 2018) at Harvard University's Laboratory for Computer Graphics. Fisher received a $40,000 contract to develop the map plotting system for the HES from Thomas Thayer, Deputy Director of Intelligence and Force Effectiveness in the systems Analysis and Research Division (Thayer 1967a, Thayer 1967b). The RAC team and Thayer were attracted to Fisher's product because it could simplify the 'chaotic' incoming hamlet observation streams onto a single sheet of paper, the totality of the hamlet control and revolutionary development abstracted into a picture format that could be referenced at a glance (Thayer 1967c). SYMAP's plotting technique allowed for a 'high resolution' representation of hamlet scores – all 11,355 hamlets represented on a map – which proved a significant cartographic transformation emphasizing locational-based points rather than areas (Cloud 2001).

The shift from areas to location points in computational HES maps was significant for two reasons. First, on a military level, the HES maps addressed a long-standing criticism of US commanders that manually-produced area maps only represented population control at the level of the province or

district, rather than the village or hamlet. For a military officer, this was a significant capability in an unconventional pacification war where the political motivations of Vietnamese villagers matter as much as NLF 'body counts.' Hand-drawn area maps were unable to show how the Vietnamese population was divided between pro-Saigon and NLF forces at the village or hamlet level. By representing control at the level of the province and district, rather than hamlet, a 'contested' area (a 'C' score) could give a 'a false impression to the uninitiated of the extent of GVN influence over people and resources' (Clark and Wyman 1967: 15).' High-resolution location-based maps based on the *hamlet* observation stream scaled-down the unit of analysis, and military planners could manage the war accordingly at that level.

Second, as Clark and Wyman's report (1967: 47) reveals – although they did not frame it this way – an important act of erasure took place with the introduction of computational HES maps, namely the role of Vietnamese cartographers who were employed to manually draw area control maps for the US military. Prior to the HES, Vietnamese cartographers drew and redrew area control maps on a monthly basis by tracing paper over a master map, and plotting intelligence points onto districts or provinces. With the introduction of the HES, not only was the rich texture of Vietnamese hamlet life translated into a statistical ordinal score through computational abstractions, but the machine-produced HES maps slowly erased the Vietnamese cartographer's hand from any involvement in representing control. In the digital process of abstraction, the world was stripped of its qualities in novel ways, although not without new 'cartographic anxieties' (Gregory, 1994).

**Conclusion**

The HES's combination of inputs (embodied sensors) and outputs (statistical reports, digital maps information) enacted a location-based event ontology novel for its time. The HES continued to be a primary instrument used by US war planners to measure security and development trends until the American withdrawal in 1973. From a historical perspective, the operation of the HES illustrates that the 'security-development nexus' was not a post-Cold War breakthrough, but rather part and parcel of US military operations integrating computational systems focusing on the population. In terms of the history of (American) imperial violence, the 'view of below' obtained by the 'embodied sensors' of US Military Advisors' observations served the purpose of translating the lived textures of Vietnamese hamlet life into machine-readable data points for calculation and analysis. Unlike the violent abstractions attained by the vertical 'view from above,' the view of below allowed the biopolitical complexities of hamlet existence – subsistence, shelter, movement – to be disclosed on their own terms, clearing the ground for a refined form of violence that was visited on Vietnamese

rural life. The modernist ways of 'seeing like a state' realized a perspective more acute form -- and thus more deadly – in the view of below in the Vietnam War.

Despite the new ways of 'seeing like a state' by the HES, the numbers generated by reporting systems were politicized from the moment they were introduced. When the HES failed to 'predict' the January 1968 Tet Offensive, metrics-based reporting systems came under intense scrutiny, specifically around the question of data quality. In December 1968, US Representative John Tunney submitted a report to the US Congress on 'Measuring Hamlet Security in Vietnam.' Tunney concluded it was impossible for the HES to produce an accurate picture for two reasons. First, the 12-month length of tour of District Advisors meant little training for their replacements or continuity in observations. Second, hamlet residents themselves were unreliable data sources for the understandable reason that they feared the presence of a uniformed foreign soldier asking questions about security. The act of cooperating with US forces could place a resident's life at risk, especially if NLF operatives were active nearby. 'Garbage in, garbage out' was Tunney's (1968) verdict.

Other data quality issues plagued the system. CORDS Chief Robert Komer was pressed by American journalists about the quality of HES outputs at a 1 December 1967 press conference in Saigon, one year after the system's introduction. The often rosy security and development picture painted by the HES (usually due to 'optimistic' Advisor scores), did not square with reporters' experiences of the violent American war in Vietnamese villages. One journalist noted that over the course of 1967, 500,000 more bodies were claimed 'secured' and under 'control' when compared to 1966 figures. However, the 500,000 figure mirrored the number of villagers displaced into refugee camps over the same period in 1967. Were HES Advisors simply counting refugees as 'secured'? Komer did not deny this possibility, claiming 'it is a matter of the definition of a refugee… If they are coming into secured areas [refugee camps] that does – at least on the security side – improve the secure population situation (Komer 1967: 12).' Komer also did not deny the possibility that since the HES did not draw distinctions between military-aged men, women, and children, a hamlet could appear 'secure' because of low numbers of armed males [killed or operating elsewhere], even though the actual loyalties of the hamlet could be to the NLF (Komer 1967: 12-13). In 1985, George Allen, the CIA officer who helped design the HES with Clark and Wyman made an extraordinary admission at a Vietnam Intelligence conference held in McLean, Virginia, revealing that the HES never achieved an accurate count of hamlets and population because of the number destroyed by US forces:

> I mentioned one thing that occurred was that we started with 13,000 hamlets. I think the demise of 2,000 hamlets was a result of… the sort of thing the Soviets are engaged in now in Afghanistan. In essence, much of our military operations, and in particular our

> bombing, tended to force the population to make a choice. Stay in the countryside and get killed or get the hell out and get somewhere where you are not going to get bombed. And where you are not going to get bombed is in the areas where Vietnamese troops are. That is why I think 2,000 hamlets disappeared in Vietnam and were no longer viable political administrative entities. It was just because they were wiped off the maps (Allen 1985: 6-9).

The criticisms levelled at HES data quality were significant, and resulted in two major revisions of the HES in 1969 (HES-70) and 1971 (HES-71). Nevertheless, the focus on data quality – i.e., was 'reality' on the ground accurately represented in HES statistical reports and maps – overlooks the *technical armature* put in place in Vietnam. The capacity of computational hardware to produce an 'objective' picture was never put into doubt by critics. Rather, the quality of data entry was the focus. However, the whole logistical digital-material arrangement put into operation invited the modes of abstraction that allowed population dynamics to be calculated on their own terms. Questioning the veracity of the data in this world in a machine misses the point that war managers and military commanders *acted as if* the HES accurately represented reality, and planned accordingly based on its statistical and cartographic outputs. As I have shown, this entailed a form of violence that is neglected in histories of computing and the Vietnam War. This violence, operating under the promise of 'objective' precision, instead brought an incalculable number of deaths to Vietnam's rural hamlets.

**Bibliography**

Allen G (2001) *None So Blind: A Personal Account of the Intelligence Failure in Vietnam*. Chicago, Ivan Dee Books

Allen G (1985) The View from the US Intelligence Community. 24 September, *Analyzing Guerrilla Warfare: Proceedings of a Conference*, Douglas Pike Collection, Unit 03 – Insurgency Warfare, Texas Tech University Vietnam Center and Archive

Attewell W (2015) Ghosts in the Delta: USAID and the Historical Geographies of Vietnam's 'Other' War. *Environment and Planning A: Economy and Space* 47(11): 2257-2275

AUTHOR 2016

Bousquet A (2018) *The Eye of War: Military Perception from the Telescope to the Drone*. Minneapolis, University of Minnesota Press

Bradley M (2000) *Imagining Vietnam and America: The Making of Postcolonial Vietnam, 1919-1950*. Chapel Hill, University of North Carolina Press

Brigham E (1970) Pacification Measurement. *Military Review*: 47-55

Butler J (2009) *Frames of War: When is Life Grievable?* London, Verso Books

Campbell-Kelly M, Aspray W, Ensmenger N, Yost J (2013) *Computer: A History of the Information Machine*. Boulder: Westview Press

Cavell S (2006) What Photography Calls Thinking. In W Rothman (Ed.) *Cavell on Film*. Albany, SUNY Press

Chamayou G (2014) Patterns of Life: a Very Short History of Schematic Bodies. *The Funambulist Papers* 57(4) Available at: https://thefunambulist.net/history/the-funambulist-papers-57-schematic-bodies-notes-on-a-patterns-genealogy-by-gregoire-chamayou

Chow R (2006) *The Age of the World Target: Self-Referentiality in War, Theory, and Comparative Work*. Durham, Duke University Press

Clark D, Wyman C (1967) *An Exploratory Analysis of the Reporting, Measuring, and Evaluating of Revolutionary Development in South Vietnam*. Folder 101251, Box 21, RG 472, Command Information Publications, National Archives Records Administration, Washington DC

Cloud J (2001) American Cartographic Transformations during the Cold War. *Cartography and Geographic Information Science* 29(3): 261-282

Conley V (2010) Living in Translation. *Profession*: 18-24

Cooper C, Corson J, Legere L, Lockwood D, Weller D (1972a) *The American Experience with Pacification in Vietnam, Volume I: An Overview of Pacification*. Institute for Defense Analyses, Arlington

Cooper C, Corson J, Legere L, Lockwood D, Weller D (1972b) *The American Experience with Pacification in Vietnam, Volume II: Elements of Pacification*. Institute for Defense Analyses, Arlington

Cowen, D (2014) *The Deadly Life of Logistics: Mapping Violence in Global Trade*. Minneapolis: University of Minnesota Press

Croser, C (2007) Networking Security in the Space of the City: Eventful Battlespaces and the Contingency of the Encounter. *Theory & Event* 10(2)

Daddis G (2012) *No Sure Victory: Measuring US Army Effectiveness and Progress in the Vietnam War*. Oxford: Oxford University Press

Daston L, Galison P (2007) *Objectivity*. New York, Zone Books

Deitchman S (2008) The 'Electronic Battlefield' in the Vietnam War. *The Journal of Military History* 72(3): 869-887

Duffield M (2001) *Global Governance and the New Wars: The Merging of Development and Security*. London, Zed Books

Edwards P (1997) *The Closed World: Computers and the Politics of Discourse in the Cold War*. Boston: MIT Press

Feltham D (2012) *When Big Blue Went to War: The History of the IBM Corporation's Mission in Southeast Asia during the Vietnam War (1965-1975)*. Bloomington: Abbot Press

Fitzgerald F (1972) *Fire in the Lake: The Vietnamese and the Americans in Vietnam*. San Francisco: Back Bay Books.

Gibson, J (1986) *The Perfect War: Technowar in Vietnam*. New York: Atlantic Monthly Press

Gregory D (2011) Lines of Descent. *openDemocracy.net*, 8 November Available at: https://www.opendemocracy.net/derek-gregory/lines-of-descent

Gregory D (2010) Seeing Red: Baghdad and the Event-ful City. *Political Geography* 29(5): 266-279

Gregory D (1994) *Geographical Imaginations*. London, Blackwell Press

Griffiths M (2018) For Speaking Against Silence: Spivak's Subaltern Ethics in the Field. *Transactions of the Institute of British Geographers* 43(2): 299-311

Haigh T (2001) Inventing Information Systems: The Systems Men and the Computer, 1950-1968. *Business History Review* 75(1): 15-61

Haffner J (2013) *The View From Above: The Science of Social Space*. Boston, MIT Press

Hall-Kindervater, K (2016) The Emergence of Lethal Surveillance: Watching and Killing in the History of Drone Technology. *Security Dialogue* 47(3): 223-238

Halpern, O (2014) *Beautiful Data: A History of Vision and Reason since 1945*. Durham: Duke University Press

Hickey GC (1965) *The American Military Advisor and His Foreign Counterpart: The Case of Vietnam*. Rand Corporation, Santa Monica

Hicks M (2017) *Programmed Inequality: How Britain Discarded Women Technologists and Lost Its Edge in Computing*. Cambridge: MIT Press

Holmqvist C (2013) Undoing War: War Ontologies and the Materiality of Drone Warfare. *Millennium: Journal of International Studies* 41(3): 535-552

Jameson F (2013) *The Antinomies of Realism*. London, Verso Books

Johnson R (1962) Memorandum from the Policy Planning Staff to the Deputy Assistant Secretary of State for Far Eastern Affairs (Cottrell). Department of State, S/P Files: Lot 69 D 121, Vietnam 1962, Secret

Kahin G (1986) *Intervention: How America Became Involved in Vietnam*. New York, Doubleday Press

Kaldor M (2012) *New and Old Wars: Organized Violence in a Global Era, 3rd Edition*. Cambridge, Polity Press

Komer R (1971) Impact of Pacification on Insurgency in South Vietnam. *Journal of International Affairs* 25(1): 48-69

Komer R (1967) HES System – Text of Ambassador Komer's News Conference on the Hamlet Evaluation System. Douglas Pike Collection, Unit 03 – Statistical Data, Texas Tech University Vietnam Center and Archive

Latour B (1987) *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge: Harvard University Press

Legere L (1971) *Reporting and Evaluation*. 10 November, Folder 90, Thomas Thayer Collection, The US Army Center for Military History, Washington DC

Legg S (2005) Foucault's Population Geographies: Classifications, Biopolitics, and Governmental Spaces. *Population, Space and Place* 11(3): 137-156

Light J (2004) *From Warfare to Welfare: Defense Intellectuals and Urban Problems in Cold War America*. Baltimore: John Hopkins Press.

Light J (1999) When Computers Were Women. *Technology and Culture* 40(3): 455-483

Marquis J (2000) The Other Warriors: American Social Science and Nation-Building in Vietnam. *Diplomatic History* 24(1): 79-105

Marr D (1995) The Rise and Fall of 'Counterinsurgency': 1961-1964. In M Gettleman (Ed.) *Vietnam and America: A Documented History*. New York, Grove Press: 204-214

McCann L (2017) 'Killing is Our Business and Business is Good': The Evolution of 'War Managerialism' from Body Counts to Counterinsurgency. *Organization* 24(4): 491-515

McCoy A (2009) *Policing America's Empire: The United States, the Philippines, and the Rise of the Surveillance State*. Madison, University of Wisconsin Press

Medina E (2011) *Cybernetic Revolutionaries: Technology and Politics in Allende's Chile*. Cambridge: MIT Press

Owens P (2015) *Economy of Force: Counterinsurgency and the Historical Rise of the Social*. Cambridge, Cambridge University Press

Ramkin W (2016) *After the Map: Cartography, Navigation, and the Transformation of Territory in the Twentieth Century*. Chicago: University of Chicago Press

Saint-Amour P (2011) 'Applied Modernism': Military and Civilian Uses of the Aerial Photomosaic. *Theory, Culture and Society* 28(7): 241-269

Scott J (1998) *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven: Yale University Press

Shaw, I (2016) Scorched Atmospheres: The Violent Geographies of the Vietnam War and the Rise of Drone Warfare. *Annals of the Association of Geographers* 106(3): 688-704

Spivak G (1988) Can the Subaltern Speak? In C Nelson and L Grossberg (Eds.) *Marxism and the Interpretation of Culture*. Champaign: University of Illinois Press: 271-313

Tazzioli, M (2018) Spy, Track and Archive: The Temporality of Visibility in Eurosur and Jora. *Security Dialogue* 49(4): 272-288

Thayer T (1985) *War Without Fronts: The American Experience in Vietnam.* Boulder: Westview Press

Thayer T (1967a) Thayer to Howard Fisher, Subject: Graphic Display System. March 1, Folder 54, Thomas Thayer Collection, The Center for Military History, Washington DC

Thayer T (1967b) Thayer to LT Norkin, Subject: Howard Fisher's Project. September 27, Folder 54, Thomas Thayer Collection, The US Center for Military History, Washington DC

Thayer T (1967c) Thayer to LT COL Montague, Subject: HES Map plots. July 11. Folder 54, Thomas Thayer Collection, The US Center for Military History, Washington DC

Tunney JV (1968) *Measuring Hamlet Security in Vietnam*, Special Study Mission Report prepared for the House Committee on Foreign Affairs, 90th Cong., 23 December

Tyner J (2009) *War, Violence, and Population: Making the Body Count*. New York: Guilford Press

Virilio P (1989) *War and Cinema: The Logistics of Perception*. London, Verso

Weinberger S (2017) *The Imagineers of War: The Untold Story of DARPA, the Pentagon Agency that Changed the World.* New York, Alfred Knopf

Wilcox L (2017) Embodying Algorithmic War: Gender, Race, and the Posthuman in Drone Warfare. *Security Dialogue* 48(1): 11-28

Wilson M (2018) *New Lines: Critical GIS and the Trouble of the Map*. Minneapolis: University of Minnesota Press

[1] Brigham (1970) provides a list of pacification reporting systems operated by the US Military Assistance Command, Vietnam (MACV): *Chieu Hoi* Management Information System, National Police Evaluation System, Pacification Data Bank, People's Self-Defense Force Management Information System, Refugee Management Information System, Revolutionary Development Cadre Information System, Rural Information System, Self-Help Project Monitoring System, Territorial Forces Evaluation System, Terrorist Incident Reporting System, Village-Hamlet Radio System, and the Viet Cong Infrastructure-Guerrilla Forces Reporting System.
[2] The term 'embodied sensor' was introduced to me by Dr Andrés Luque-Ayala.
[3] My understanding of 'translation' in socio-technical systems is indebted to Latour (1987).
[4] As McCoy (2009) shows, technical advances in American administrative practices were exported to the Philippines and other former colonies in an effort to destroy various Communist-inspired movements.
[5] The Military Assistance Command, Vietnam was set up in 1962 to replace the Military Assistance Advisory Group Vietnam. MACV, as a joint-service command, directed all military operations in the Vietnam war from 1962-1973.
[6] Hickey's report was based on 320 interviews with US Advisors around South Vietnam over a 10-month period.
[7] 'Revolutionary Development' was a Saigon-led program to reconstitute war torn Vietnamese society through American funded political and development programs. Pacification was the military component of Revolutionary Development.
[8] 'War offers the paradigm of the nominalistic dilemma: the abstraction from totality [versus] the here-and-now of sensory immediacy and confusion (Jameson, 2013: 232).'
[9] See Cavell, 2006: 118. 'A representation emphasizes the identity of its subject, hence it may be called a likeness; a photograph emphasizes the existence of its subject, recording it; hence it is what may be called a transcription.'
[10] There were two revisions made to the HES in 1969 (HES-70) and 1971 (HES-71). Unfortunately, I do not have space here to detail these revisions. The major revision made in both systems was to strip the ability of the US Advisors to score hamlet conditions. Instead, Advisors' hamlets assessments were scored centrally at MACV headquarters.
[11] See Daston and Galison (2007) on shaping 'epistemologies of the eye' to achieve 'objectivity.'
[12] Initially, the team was in Saigon to fix an ARPA reporting system developed by Allen and others in 1964 used to measure 'progress' at the provincial level (Allen, 2001)

[13] Around the same time, ARPA and the Stanford Research Institute developed similar system in Thailand in a joint project (see Weinberger 2017: 149).
[14] In the HES-70 system, a coding technique that allwoed vegetation type, population density, and secured area goals to be represented (Legere 1971: 29).