

# THE SPATIAL HUMANITIES: A CHALLENGE TO THE ALL-KNOWING MAP

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In a letter to the novelist Naomi Mitchison in 1954, J. R. R. Tolkien wrote:

*I wisely started with a map, and made the story fit (generally with meticulous care for distances). The other way about lands one in confusions and impossibilities, and in any case it is weary work to compose a map from a story — as I fear you have found.*

As a child I was fascinated by the Lord of the Rings, but one thing that bothered me were the right angles in the mountains around Mordor: mountains don't go around corners, they run along fault lines, that's what mountains do; also what's the deal with a great big volcano in the middle of the middle of an open plain? I was a popular child. However, in later life it soothes me to know that the great encircling mountain range around the Land of the Dark Lord was absolutely necessary for narrative purposes, where distance matters and plate tectonics don't. Tolkien was simply making the tools, techniques, and traditions of cartography work in his service. I got over it.

The famous quote I opened with not only gives us an insight into Tolkien's writing style and method, it describes an abstract truth about his Middle-earth: that the entirety of its imaginative landscape is based on a visual geographical structure; which in turn shapes and frames the narrative of the stories. Tolkien's wise map is a perfect representation of Middle-earth, including its scientific imperfections: it defined Tolkien's vision. This expression of the practice of cartography provides an insight into the tension between the techno-cultural practices of mapping and our relationship with the physical world, whether imagined or not; how those practices help us find our way through it – and sometimes how they conspire to throw us off course.

The map Tolkien created is an all-encompassing, and therefore all-knowing map of an imaginary land, created by one author/cartographer. In the world that we live in and experience, rather than the one we read about in the pages of the Lord of the Rings, the ways

in which we feel, view and create space and place are based on the technologies with which we make sense of it, including maps, and our myriad practices of creating spatial information. But what kind of maps, both visual and otherwise, which purport to be all-knowing, are created as the world becomes increasingly connected? How did the evolution of print media, and the distribution of maps and spatial texts impact upon how we saw, and see, place? And how do the maps created in a digital society, with seemingly infinite and frictionless interconnection of both people and information differ from these? In what way do such maps “know” all of our world, in the way that Tolkien’s map “knew” Middle-earth?

The all-knowingness of the map and the seductive abstraction behind it was satirised by Jorge Luis Borges in his 1946 short story, *On the Exactitude of Science*, which describes a fictional Kingdom where the Art of Cartography attained such Perfection that “the map of a single Province occupied the entirety of a City, and the map of the Empire, the entirety of a Province”. Eventually, the science of cartography became so perfect that the Kingdom’s Cartographers’ Guild struck a map that was the same size of the Empire, coinciding point for point with it. However, this 1 to 1 level of perfection proved to be too perfect for the human mind; and as a result, the generations that came later did not appreciate Cartography to the same extent, so the great map was left to decay. This is the “all-knowing”, yet so-perfect-that-it-is-imperfect map that I speak of in my title. The perceived authority of the map often appears straightforward, but it never is. As Indiana Jones tells us in *The Last Crusade*, exhibiting absolutely no sense of shame or irony, X never, ever marks the spot. However, the perception that X does the spot is both compelling and seductive. We look to maps as authoritative statements about how the world is expressed through its physical and human geometry, and to understand how that geometry is organized and presented. Maps also thus frame the authority of ideology.

The internet and the World Wide Web – which, as my students do no doubt tire of hearing, are not the same thing - have not necessarily improved our ability to represent the world “accurately” with maps; but what they have done is connect us in a mass of new ways while we do so. This has accordingly evolved our relationship with space and place. In 1991, two years after the invention of the World Wide Web by Tim Berners-Lee at CERN, the feminist geographer Doreen Massey published a famous essay in *Marxism Today* entitled “A Global Sense of Place”, (Massey, 1991) in which she talked of “the power geometry of time-space compression”, where affluent layers of society were becoming ever more interconnected

across both time and space via ever stronger flows of communication enabled by email, the internet, telephones, faxes (remember them), and long-distance travel that was no longer the preserve of the super-wealthy. Please don't @ me by the way, I know there are many and more recent models of the flow of power and finance in the digital economy; I simply use Massey's as a key intervention at a key moment in the history of network technologies.

The idea that maps and cartographic instruments are not the only tools which regulate and frame our concept of place is crucial to my understanding of the spatial humanities. Our internal *genus loci*, our sense of place, is based not only upon information from our own innate five senses. It is also based on the tools that we make in order to manipulate and navigate our environment and our knowledge of it, and which store our collective, social, cultural and institutional memories. It is well known that the seductive blue dot on the map in the middle of one's smartphone, the ability to zoom seamlessly and immediately from the scale of continents to that of your street, exudes a sense of infallibility. Conversely, there is nothing quite as cold as the fear of being in an unfamiliar city and losing your GPS signal or, worse, your phone battery. But where does that sense of infallibility come from? It was not created by "the digital". The all-knowing map is not a new thing, a product of the digital age. It is much, much older.

The pursuit of infallibly geometrical representation of places, spaces and features on the Earth's surface has been the purported overarching aim of cartography for centuries – although, as we will see, this often masks other agendas. Much of what I have to say this evening flows from the school of "critical cartography", an influential movement from the second half of the twentieth century, and its sister concept "Critical Geographical Information Systems", or GIS. Critical cartography explicitly rejected the pursuit of perfection in mapping, and instead recognized maps as socially and culturally loaded objects. In 1989 – long before the digital had pervaded daily life, and three years before Massey's *Global Sense of Place* - one of the leading proponents of the critical cartography school, J B Harley, wrote:

*Much of the power of the map, as a representation of social geography, is that it operates behind a mask of a seemingly neutral science. It hides and denies its social dimensions at the same time as it legitimates. Yet whichever way we look at it the rules of society will surface. They have ensured that maps are at least as much an image of the social order as they are a measurement of the phenomenal world of objects.*

(Harley, 1989: 7)

Critical cartographers often situated such socially loaded maps in contrast, or even in opposition to, the rigid quantification of computational Geographic Information Systems; which pursued its own kind of abstracted perfection in the digital space. The first major work which addressed this head-on is usually acknowledged to be *Ground truth: The social implications of geographic information systems*, edited by John Pickles in 1995. We will return to the digital manifestations of social and cultural cartography later. For now, it is enough to be reminded that, as any good Digital Humanist knows, digital objects are every bit as open to critical, social and cultural scrutiny as anything else. Digital maps are no different.

One of the pivotal moments in the development of critical cartography and of critical GIS was a famous conference at Friday Harbor, an island facility of the University of Washington about half way between Seattle and Vancouver in 1993. It was here that critical geographers and GIS practitioners agreed once and for all that they could work together. I myself didn't attend the 1993 Friday Harbor meeting – I was, after all, only sixteen years old at the time - however twenty years on in 2014, some of the original organizers reconvened there for a second critical GIS meeting, with an open call for other participants; and I *did* manage to score an invitation to this one.

The communiqué that was subsequently published contained the following observation:

*[A] description of the relationship between the digital humanities and critical GIS might be premature, although there is considerable potential for synergies ... Bringing critical GIS and the digital humanities into conversation around the efforts of both in 'speculative computing' holds great promise—not only for critical GIS but also for the digital humanities, where critical geographical perspectives on absolute and relative spaces as well as on cartography have much to offer.*

(Thatcher *et al.*, 2016: 819)

In this evening's lecture, nearly ten years on from the second Friday Harbor meeting, I would like to offer an update on how this conversation is going – and, indeed what I think we can offer. This lecture also marks the end of my four interesting years as Head of the Department of Digital Humanities. I would therefore like to take this opportunity to try to both define and situate the Spatial Humanities and Digital Humanities in relation to one another. By the end of this talk, I hope you will agree with me that they are fundamentally interdependent. This will be practically useful, because instead of spending the first ten minutes of conversation with anyone I've just met explaining what I'm a Professor of, I can just give them a copy of this lecture.

An increasingly connected society, where more people have access to more information, as well as being subjected to Massey's progressivist notion of space time compression, also provides an environment where ideology, conflict and loaded agendas can become louder, stronger, multivariate and, as the technology progresses, start to behave differently. Just look at the rise of social media. This is partly why maps continue to exert such a powerful traction on the human imagination, and also why they remain powerful agents of misinformation, control, conflict, subjugation and resistance. Such agendas and agencies are not always obvious.

To explore all of these questions, I believe we need to examine the antecedents of today's digital maps and digital mapping technologies. We need to highlight how spatial information has been appropriated, documented and expressed in the past, and highlight its evolving nature in terms of its relationship with technology. I would like to illustrate this by spending a little time looking at some three examples of maps, and map-like texts from the early period of print media. In doing so I am forced to be selective in terms of linguistic and cultural context. With that acknowledged, I must stress that I am not seeking to provide a definitive history of spatial thought; rather I hope to outline a methodological framework which can be used to draw on and contextualise historical examples, to enable us to better understand more contemporary manifestations of mapping technology.

The sixteenth and seventeenth century heyday of the European Age of Exploration bought with it generations of European map makers who produced the plans and charts which both recorded and enabled it. A watershed moment was the successful sea trial of John Harrison's H-4 chronometer, the timepiece which allowed mariners to calculate longitude in real time on

board using an astrolabe or sextant, thus determining their exact position, in 1761. But long before this pivotal moment, the profession of European cartography began to produce its first superstars.

Among the most famous of these was the Flemish geodesist Abraham Ortelius (1527 – 1598), who came up with the idea of binding maps together as a book to make an atlas, which he called the *Theatrum Orbis Terrarum*. Originally trained as an engraver, and a protegee of Gerhardus Mercator, after whom the Mercator projection which is still used in today's mapping takes its name, Ortelius's genius was not so much as a maker of maps per se, but proficiency in its related crafts – engraving, bookbinding, colouring, the mixing of inks, calligraphy etc. I think of Ortelius as a kind of sixteenth century Steve Jobs, perhaps even an early practitioner of UX design, who understood that his product had to appeal visually, aesthetically and haptically. As I have argued in two recent publications, Ortelius was a key figure not just in the history of mapping, but in the relationship of mapping *to* history. In the *Theatrum*, he tells us:

*Seeing that as I thinke, there is no man, gentle Reader, but knoweth what, and how great profit the knowledge of Histories doth bring to those which are serious students therein ... there is almost no man be it that he have made neuer so little an entrance in to the same ... for the understanding of them aright, the knowledge of Geography, which, in that respect is therefore of some – and not without just cause called The eye of History.*

This notion of Geography, seen by Ortelius as a perfect abstraction of the world at scale in visual form, is rather radical (although it would be anathema to modern critical cartographers). The “understanding aright” of the “knowledge of Histories” he tells us, is not possible for the serious student without Geography, the Eye of History. That history must be seen in the visual form of the map in order to be fully understood. This line of thinking marks a significant departure. In the past, to understand Ancient Rome, one would read Tacitus, Polybius or Livy; to understand Ancient Greece they would read Herodotus, Thucydides or (for the geography) Strabo. For the Holy Land, of course, one would read the Bible. Ortelius extends his argument to the narrative of events, stating that the exploits of great “*Kings, Captaines and Emperoururs*” must be mapped to be understood; including the campaigns of Alexander the Great for example, and mythical exploits such as the voyage of the *Argo*. The

printed atlas, Ortelius is telling us, is equal to, and is possibly even better than, lived experience.

*This so necessary a knowledge of Geography, as many worthy and learned men have testified, may very easily be learn'd out of Geographicall Chartes or Mappes. ... these Chartes being places, as it were certaine glasses before our eyes, will the longer be kept in memory, and make the deeper impression in us, by which means it commeth to passe, that now we do seem to perceive some fruit of that which we have read.*

With his notion of the Eye of History, Ortelius's argument is that these regions' pasts can only be fully understood if such texts are augmented with the visual perspective of the map – “certaine glasses before our eyes”. And by leveraging the media technologies of the age with the invention of the atlas, Ortelius is claiming to open up past to the study of comparative visual history. A sixteenth century Steve Jobs? Perhaps or perhaps not, but I think you get the idea. He makes a clear argument for the value of visual history, enabled by a concatenation of printing, engraving, colouring, cartography and bookbinding; none of them new crafts, but crafts bought together in such a way as to enable new world views.

In the same text, Ortelius makes an intriguing reference, as an aside, to a more pedestrian issue that he had had to face: the cost of the *Theatrum*, and how it might limit its readership. He says:

*“There are many that are much delighted with Geography or Chorography, and especially with Mappes or Tables containing the Plotts and Descriptions of Countreys, such as there are many now adayes extant and everywhere to be Sold, But because they have either not that, that should buy them, or if they have so much as they are worth, yet they neglect them, neither do they anyway satisfy them”*

Here, Ortelius is pointing out that the *Theatrum* was, quite simply, too expensive for the Antwerpian middle and mercantile classes to afford. But even those with the means to purchase such “Mappes or Chartes” were faced with the problem of limited space:

*Were it not by reason of the narrownesse of the Roomes and places, broad and large Mappes cannot be so open'd or spread so that everything in them may be easily and well be seen and discernen'd.*

Maps cannot perform their role as certain glasses before our eyes in the study of history, if we do not have the space to unroll them: clearly this was a problem which Ortelius felt that his compact new Atlas would address. However it also hints at a broader and more interesting issue: the intellectual value of the map as a tool of History having been established, the professions of printing and cartography were now beginning to grapple with the challenges of expressing supra-regional geographical information within the material confines of the print medium; challenges which would become better understood in subsequent centuries. The spread of printing and the adoption of movable type as a – relatively speaking – mode of mass communication set challenges and provoked responses which both embraced the possibilities of “mass” media for the communication spatial data, and began to test, and be tested by, its limitations. For now, I invite you to hold this very early example in mind, and consider the comparative implications of expressing global geodata in a medium where information is retrievable, but has no materiality – the digital. This tension will frame my conclusions this evening.

Before we get there however, I would like to introduce you to my favourite seventeenth century churchman – because we all have one, don't we? – Peter Heylyn. As well as a cleric, Heylyn was a prolific author and polemicist, who is remembered primarily for two works: *“Microcosmus. A little description of the great world in 1621; and “Cosmographie in four bookes, containing the chorographie and historie of the whole world, and all the Principal Kingdoms, Countries Provinces, Isles and Seas &c” in 1652.* The *Cosmographie* is presented quite explicitly at the outset as an all-knowing map. To understand why, we must understand a little more of Heylyn.

Heylyn was a follower of the teachings of William Laud, the ardently Royalist Archbishop of Canterbury under Charles I. Laud's theology espoused the unity of Church, State and Realm under the unconditional spiritual and temporal authority of the King; drawing on the ideas of numerous pre-Civil War scholars and antiquarians including William Camden, who held that the age of popery in the English church had been an aberration, and that the Reformation had merely restored it to its status as an independent kingdom founded by Joseph of Arimathea.



There has to be a Brexit joke in there somewhere, but I will resist. Inevitably, Heylyn did not prosper after the execution of Charles I in 1649 and was stripped of his place and preferments by the Parliamentary authorities. He compiled the *Cosmographie* in this period, while essentially unemployed.

In the *Cosmographie*, Heylyn describes a confrontation he had on his way back from a court appearance:

*I was then encountered, in my passage from Westminster to White-hall; by a tall big Gentleman, who thrusting me rudely from the Wall, and looking over his shoulder on me in a scornful manner said, in a hoarse voice these words, Geography is better than Divinity; and so passed along. Whether his meaning were, That I was a better Geographer than Divine; or that Geography had been a Study of more credit and advantage to me in the eyes of men than Divinity was like to prove, I am not able to determine.*

I confess I have always been beguiled by the image of ruffians stalking the streets of seventeenth century Whitehall forcing decent God-fearing citizens to become geographers; but this fleeting reference gives us an insight not only into Heylyn's reduced circumstances, but to the continuing evolution of historical geography in its ideological context. In his preface, he states that he compiled his "cosmographie of the whole world" – his all-knowing map – to extoll the noble Actions of my country, exploited by both sea and land in most parts of the world"; "as a Church-man", he tells us that he has "taken more especial notice of the ancient and present face of Christianity in all parts of the World, the planting and Government of churches" as a "Geographer, I have been punctual and exact in giving into every province its peculiar bounds". As regards the historical context, he states that

*In this regard, as also out of that compassionate affection which a true English-man ought to bear his Native Country, although in my approaches towards these present times, I have took notice, in some other places, of such Battels, Sieges and Successes in the Chances of War, as have happened in these later days; I have forborne to take the least notice of those Tragedies of Blood and Death which have been lately acted on the Stage of England.*

Robert J. Mayhew has, quite rightly I think, framed the encounter with the big tall gentleman as an act of Parliamentary intimidation in the context of the period after the Civil War, with

which Heylyn illustrates being warned off his career as a theological author and to concentrate on geography (much as modern day celebrities are sometimes told to stay out of politics). However the *Cosmographie* is a description of the “whole world”, of which the Church, based implicitly on Caroline monarchy is the foundation. By thus cloaking ideology with geography, Heylyn was able to promote his worldview in print, in a time when he would otherwise face censorship, de-preferment, or even imprisonment for his views.

I should mention that in the *Cosmographie*, Heylyn, like Ortelius, acknowledges the cost of adding visual maps to his work, stating that he wished he could have added a map for each of the countries and kingdoms which he describes. “*I did once think of beautifying the Work with as many maps as the several States and Kingdoms which are here described*” he says; “*But on further consideration, how much it would increase the Book both in bulk and price, and consequently of less publik use than I did intend it; I laid by those thoughts, and rested satisfied with the adding of four Maps for the four parts of the World*”. Again, we see the limitations which the print medium imposes on the use and expression of maps as a visual medium made explicit.

The third cartographer of this era that I wish to mention is the Scottish translator and polymath John Ogilby (1600-1676).

Ogilby was another man of many talents, and in 1764 was appointed to the grand title of “His Majesty's Cosmographer and Geographic Printer” to Charles II. In 1765 he published his *Britannia*, another atlas, this one of the UK’s nascent road network, which documented the routes between various towns and cities in painstaking detail.

We can note this in context, the volume’s own professions of scientific accuracy, reproduced here in a later facsimile, on the title page: it is “correct”, “actual”, “exactly delineated”, “measured and computed”; with additional descriptions “added in clear and most compendious method”.

Ogilby’s approach to the limitations of the print medium different somewhat from that of Ortelius and Heylyn. Rather than limiting the size or number of maps he produced, he addressed the constraints by publishing his route maps in strips, in a form that was small enough to be carried by a passenger on a horse-drawn cart or coach. Ogilby developed the

one inch to the mile scale, with the number of miles from the town of origin picked out – with variable geometric accuracy, in spite of the claims made on the title page – along the way, just visible here. He deployed visual cues to the features one was likely to see on one's journey, no doubt with the aim of calibrating distance in real time between stops.

Significantly, for reasons we will return to, the maps are not aligned to the north, but rather trace the journey from the bottom of the page to the top – another compromise between cartographic convention and printing. Such a map would not have been much use for planning a journey or finding the best route; what it does do is give the traveller a better sense of place, in real time, while they were in transit. I would add that I am looking forward to interrogating this volume in greater depth this summer, with the invaluable assistance of two students under the King's Undergraduate Research Fellowship scheme.

These examples show that mapping, whether visual or not, has always been a cultural and an ideological undertaking, which relies on the coming together of various kinds of technology. But as we have seen, the entanglement of maps and ideology becomes tighter and more complex as our means to communicate, record, store and manipulate geodata, and to interact over time and space becomes greater. This process accelerated dramatically in the twentieth century, an era of world warfare and conflict, as well as rapid advances in technology, especially communication technology, which came to define challenges to long held political and social norms. The rapid pace of interconnection in the second half of the twentieth century was accompanied by a rethinking of attitudes to maps, space and place.

As the countryside opened up, transport became easier and cheaper, and as communication technology improved, maps became social objects, shared spaces of knowledge and, increasingly, vehicles of argument, reasoning and ideology; at the same time more so, and more insidiously than their copper-engraved predecessors of previous centuries. As Tom Harper argues in the introduction to *Maps and the 20<sup>th</sup> Century: Drawing the Line*, a volume of essays and illustrations accompanying the British Library's exhibition of that name in 2016:

*“[A]gain the twentieth century, thanks to teaching practices and technological change, the gap between maps and what they represented narrowed dramatically in people's perception: a conceptual leap, which was normalised through familiarity”.*

The most important manifestation in the growing influence of maps in this period was the extent to which abstract concepts, ideology, histories and events became humanized by their presence on maps, and sharable with ever larger audiences. Harper goes on:

*“The important point to make is that every single map ever made presents a version of the world, not as the real world itself; the ‘real’ world we experience is made up of numerous social constructs, such as those shown by maps”.*

Maps as human, social objects, projecting ideologies not of the powerful and established, but of the powerless, of outsiders, of mass movements set in opposition to established authority. These are sometimes called “psychogeographies”.

Such approaches are beautifully epitomized by Guy Debord’s 1957 *The Naked City*, which took the official municipal map of Paris, cut it to pieces, and rearranged the pieces in to what he called “crossroads” or “centres”, focal points connected by “slopes”, represented here by arrows reflecting the actual pedestrian flows of the city, the points of attraction, gathering and interest and how one reached them, not the cold geometry of the official city plan.

What about these processes in the digital age; the last decade of the twentieth century and the first decade of the twenty first, at the time of Doreen Massey’s space time compression intervention? The 2010s was when the Internet and World Wide Web stopped being only the future of publishing and became a conversational and interactive medium: Facebook began in 2004, Twitter in 2006, which was also the year in which the term “Crowdsourcing” was first coined by the journalist Jeff Howe in *Wired* magazine. And in 2004, Google – still only recently established as a global tech player – acquired a digital mapping start-up called Keyhole, resulting in the launch the following year of Google Maps, which attained one billion downloads just six years later. Put these developments into an environment where smartphone usage is becoming commonplace, and to the fore comes a technology which exemplifies the amalgamation of mapping and communication, which transformed navigation and normalised familiarity more than any other in the twentieth and, so far, in the twenty first centuries: Global Positioning Systems, or GPS.

Utilising decimal degrees in the World Geodetic Grid system, GPS is the first information tool in human history which provides an instantly shareable digital reading of one’s location

in fully abstract, Cartesian space. It is hard to overestimate the importance of GPS in the present world. Without GPS, there would be no internet, because the GPS satellite constellation synchronizes the clocks on which the world's web servers rely. It is used to predict earthquakes and floods, locate survivors of natural disasters, and is the backbone of local, national and international transport navigation and governance. According to a Research Triangle Institute report, GPS has contributed \$1.4tn to the US economy since its first commercial application in 1983. Although GPS must rank with the astrolabe, the sextant, the chronometer and the compass as one of the most important inventions in the history of navigation, its social and cultural significance, and the potential to understand it through the lens of the spatial humanities or critical cartography, is relatively under-theorized. In the last part of this lecture, I will have a go at doing this, using the principals of technological concatenation and cartographic ideology I have been describing so far as – forgive me – way markers.

The history of GPS is convoluted and technical and, frankly, not always all that interesting. However, its role as the ultimate expression of the all-knowing map – or rather, all-knowing geodata which can be displayed upon a map - can be traced through examination a few key events.

The first of these was the launch of the Soviet satellite Sputnik on Friday 4<sup>th</sup> October 1957. The launch established the USSR as the first country to successfully deploy a satellite into orbit, was a major setback for the United States and the West in the space race; and was trumpeted by the Soviet TASS news agency as a humiliation for Western capitalism. Sputnik emitted a “beep beep” tracking signal at 20mhz - a clever propaganda device, as it was easily acquirable by both official listening posts and amateur radio enthusiasts, ensuring that its progress was followed with frenzied interest in the West. On the following Monday, October 7<sup>th</sup>, two young computer engineers at John Hopkins University's Applied Physics Laboratory, William Guier and George Weiffenbach arrived at work amid the furore that the launch had caused and were surprised to find that no one in the Lab – which was a major contractor of the US Department of Defense – had tried to track the satellite. They duly started doing so. Over the next few days, they noticed that the wavelength of the signal contracted and expanded depending on its location in relation to the receiver due to the Doppler effect – the same effect that changes the pitch of the noise made a fast car on a long, straight road as it approaches, passes the listener, and moves away. By digitising and comparing the sound

waves, they found they could use the Doppler effect to calculate the position of the satellite. Their boss, Frank McClure, reasoned that the opposite must be true: if one knew the location of a satellite, one could determine the point of an unknown location on earth. Thus was born the principle of GPS.

Continuing to be necessarily selective in the narrative: the nascent GPS continued as an entirely closed operation of the US military for the next 20 years, until the narrative was shaken by another event, this one laced with tragedy. On 1<sup>st</sup> September 1983, a Korean Airlines Boeing *en route* from New York to Seoul accidentally encroached Soviet airspace over Siberia, and was shot down by the Russian air force, with the loss of all 269 people on board. In response, the Reagan administration accelerated making GPS available to civilian aviation; a process which culminated in March 2000 when, in a global atmosphere of détente after the end of the Cold War, President Clinton made the unscrambled signal from the US Government's satellite constellation available for general civilian use. Other, unrelated developments contributed to the concatenative impact of GPS. For example, in 1989, advances in microchip and transistor technology led to the Magellan NAV 1000, the world's first commercial handheld GPS receiver, mainly with the marine market in mind. Technological concatenation again led the narrative.

However, it was war that firmly established GPS as the most revolutionary navigational technology of all time. That conflict was the first Gulf War. Following the invasion of Kuwait by Saddam Hussein's Iraq on 2<sup>nd</sup> August 1990, a 39-member international coalition led by the United States began a military build-up in adjacent counties; and on 17<sup>th</sup> January 1991 Operation Desert Storm was launched: an aerial bombing campaign against Iraqi positions, followed by a land invasion. The war, if not its political aftermath, was short. Kuwait was liberated barely a month later, on 28<sup>th</sup> February.

The use of GPS by coalition forces was one of the main reasons for the war's quick conclusion and, in the process, provided a global demonstration of the technology's power. The reason for this was geographical as well as strategic. A British general was quoted at the time as saying the deserts of western Iraq contained "an awful lot of bugger all": hundreds of miles of flat, featureless desert, perilously occupied by units from numerous different countries, many of them driving similar vehicles and wearing similar uniforms. The ability of troops, vehicles and aircraft to pinpoint their exact location and share it with each other

instantly, in real time, using devices that required barely an hour's training to use, was a game changer.

In 1992 the journal *Navigation* published an assessment of GPS's performance in Desert Storm, by Commander Patrick Sharrett, Lt Col Joseph Wysocki, Capt. Gary Freedland, Donald Brown and Capt. Scott Netherland (Sharrett *et al.*, 1992), mostly from various branches of the US Airforce – one can only imagine the level of system and order that there must have been to this co-authorship process that the rest of us can only dream of. This paper documents numerous engagements where the coalition's access to GPS proved decisive, in the areas of aerial warfare, special operations and, especially, command and control. Even captured Iraqi officers expressed amazement at the system's power. The air war's chief planner, Brig. Gen. Buster Glosson is quoted in Greg Milner's wonderful history of GPS, *Pinpoint*, as saying that following successful air raids launched from the continental United States employing GPS: "it is a profound political statement for a nation-state to take off within its own boundaries and deliver a weapon as precise as this one was. It showed that we could make a significant impact halfway around the world. And nobody could do anything about it" ... Milner adds "global reach global power. Bought to you by GPS".

I offer this brief historical overview to illustrate the fact that like all the other examples of mapping that I have discussed, GPS is the result of a long process of different innovations and inventions coming together and driven, often serendipitously, by historical events, human histories and the human context in which they sit. The main difference is the extent to which GPS is embedded in contemporary (digital) culture and society. There are approximately 80 million smartphone subscriptions in the UK, most of which will deliver locative services based on GPS. These represent a total amalgamation of the digital communication medium with mapping, and have become fundamental to many aspects of daily life.

What sort of questions can we ask to better understand this amalgamation of time, place and experience? I think it is necessary to draw a distinction between our experience of the big geodata sets which underpin locative media and GPS, and the way that GPS mediates between us as individuals and our environment.

In terms of the former: there is a literature stretching back ten years or more which critiques the professions of the major big tech platforms which keep and curate our big geodata sets,

and which rely on GPS/geodata, such as Google Maps, to promote openness, transparency, democracy and equality by allowing a free platform for all to create and share location information. Most recently, Aparajita Bhandari and Rebecca Noone have highlighted the appropriation by Google Maps of “the Local” through its crowdsourced “Local Guides” platform. They describe the platform’s practice of badging businesses as “Black owned” or “woman owned”, ostensibly to promote them and encourage custom; but in reality making certain demographics hypervisible, and exposing them to discriminatory practices and reactions (Bhandari and Noone, 2023). Monica Stephens has documented how the feature classification practices of platforms like OpenStreetMap and Google Maps privileges the demographics who make up their user bases – who are generally white, male, older, better educated and better off. This inevitably deprivileges users who happen not to belong to those demographics (Stephens, 2013).

In terms of GPS as a mediator between ourselves as individuals and our environment: As well as entrenching bias, empowering big tech and generally bringing out the undesirable facets of society, GPS and locative media highlight the perils of the potential impact of dehumanized digital tools on human decision making in real time. This is exposed by numerous examples of how not to use GPS in daily life. It seems that every year there is a [raft of exhortations](#) from various mountain rescue services not to use GPS to navigate when hiking, or at least not to rely solely upon it, due to the number of people who get into difficulties through batteries running out, or of the signal and terrain not aligning for one reason or another.

Even worse, “[Death by GPS](#)” is now a thing: cases where people follow roads which appear on their digital map because it was planned but never built, or where a bridge is lower than marked or, in some cases, where a road simply ends in a lake or river. These can be, quite literally deadly. People have died. This of course raises troubling questions about the human tendency to follow unquestionably instructions given by machines.

The all-knowing map, this accidental product of the military industrial complex, as well as not being not so all-knowing, is encroaching into our brains, making us less reliant on our own senses and the observation of landmarks and computing our routes ourselves, by doing it for us. Numerous recent studies suggest that this is affecting and altering the hippocampus, the part of the brain which builds our internal cognitive map which enables us to remember



routes we have taken and, constantly fed by memory and experience, gives us the methodological capacity to compute new ones based on new information. If one is simply fed instructions by a smartphone, one's hippocampus becomes underused.

What next? It is not all bad news, and this is where the spatial humanities come in.

With a more humanistic approach, we can use the affordances of GPS and locative media to understand human interactions with their environment more clearly. In her PhD recently awarded by the Department of Digital Humanities, Dr Cristina Kiminami used geo-cultural analysis of social media data to understand collective digital interactions with key locations on London's bridges by identifying what she calls their "visual codes", as captured by geolocated imagery on social media. She says:

*"if the place is very well known and has a protagonist role, it entails a strong identity, presence and well-known angles, and therefore, famous viewsheds. The types of photos taken and the types of photos the place conditions, are part of a continuous cycle. In other words, one thing feeds the other ... what was identified is that a sensorial walk can afford different sights, visual recognition, and more awareness of the other four senses besides sight".*  
(Kiminami, 2022).

More theoretical considerations bear this out further. In the introduction to their edited volume *New Directions in radical Cartography: Why the Map is Never the territory*, Phil Cohen and Mike Duggan describe what they call the "cartographic pact", the idea that a map will always provide the best route through any given territory without the user getting lost (like the misplaced promise of GPS). They state:

*[I]f we learn to see the cartographic pact as just one scientific fiction amongst many, one which underwrites the common sense or taken-for-granted understandings of how maps work and what they are for, then perhaps we can also admit other kinds of thought experiment into the account. We then might be able to move beyond the present great divide between the two cultures of cartography, one privileging (digital) technologies of ever greater scientific realism and the other the creative power of the imagination released by do-it-yourself mapping.*

(Cohen and Duggan 2012: xxiv)

As we have seen, maps contain multiple scientific fictions, taking form not just as the creation of digital maps and geodata sets by corporations, institutions and grass-roots movements; but individuals and transactional networks formed by more loosely defined groups, for example those participating in a Twitter conversation or hashtag. These examples manifest themselves not just as 1s and 0s on a server, or as pixels on a computer screen or a smartphone, but in the actions in the real, physical world, both deliberate or performative, and passive or transactional, which create that data.

I agree with Cohen and Duggan that admitting multiple scientific fictions is a valuable first step towards thinking more creatively about cartography in the digital age; but I would go further, and suggest that we must also admit that there are multiple reasons to claim scientific accuracy in a map (or geodata set). It can be, as they imply, simply for its own sake. Or, it can be professed in the service of a purer and more accurate portrayal of human history (as with Ortelius), or it can project, or mask, an ideology for political reasons, as with Heylyn or, indeed, many of the twentieth century examples in the British Library's exhibition. We can claim to tell the truth with maps for many reasons and fail to do so for many more. And like Ortelius, Heylyn, Ogilby and Debord etc etc, we are only really beginning to grapple with the challenges of representing place and creating maps, and all their ideologies in a new(ish) medium, and in a new(ish) socio-economic context.

As an example of an overarching principle that might help us make sense of these challenges, I would argue that a dominant ideology of GPS in particular is one of distraction. By placing us at the centre of a map which moves and refreshes around us, by stripping away any "irrelevant" features, except those that we have specified as being relevant, we cede any necessity to engage with the environment, and thus to learn from it while we do so. I note that when navigating with a smartphone, one is typically looking down, not up at the features around one; also, the convention of "up" equalling north – which is itself an entirely artificial construct, based on arbitrary cartographic conventions – is replaced by "up" equalling "straight ahead", with any "irrelevant" features being masked or suppressed. There is, I think, a rather nice comparison there to be made with Ogilby's strip maps. The key difference is that here, visual features were added precisely to provide spatial context – to make the passenger look to the left or right, whereas GPS encourages the opposite.

To challenge the all-knowing map, the seamless and frictionless geographies of digital culture, and to understand where they are taking us, I believe that what we need is not more technology but more humanities. This evening I have tried to suggest that, like all mapping technologies, digital maps and the geodata beneath them have their origins in the accidents, the serendipities, the messiness, and the narratives of human events. It is only by understanding those events, drawing on the frameworks of history, archaeology and narrative as well as the social and information sciences, that we can truly understand them, and mitigate their reductive effects in society. At a time when the humanities are under attack as never before, when we have headlines such as the one that I am sure many of us saw last week openly celebrating the supposed demise of the humanities degree, making this case has never been more important.

I would like to finish on a personal note: it is the honour of my life to have been made a professor at King's College London. Many, many people have been on this journey with me, through the good and the bad. Lots of you are in this room, and I hope to clink glasses with every one of you shortly. First among them however are my wife Emma and my mother Lis, both of whom are here this evening. All of you have placed me on the shoulders of giants so tall that, from where I am, I can barely see the ground. I just about can see it however, and perhaps now I will be able to map it in a critical and historically informed way. For that I thank you.

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