ELEVEN

Mapping places

Anyone arriving in a research location by plane should try to look out of the window, and perhaps take a few photos, because this can provide a starting point for local mapping. If that fails, going up tall buildings or hills might be useful. Alternatively, find local people who work high in the air – crane operators can take wonderful aerial photos, especially if the topic of the research is construction and development.

Cartography is a specialist skill, and the purpose of this chapter is first to understand the *terms* and *techniques* of professional *general* maps.[1] But for most researchers, it is more important to create simple *thematic maps*[2] which can complement other research methods, and the methods of *citizen* and *grassroots mapmaking* are innovative and straightforward. Historical and indigenous map-making are useful sources of ideas.[3] Former methods can be a source of data, and were often created by inspired amateurs with basic materials, and these can often easily be adapted to new circumstances.

11.1 Terms and techniques

Geometrics is the science of collecting, analysing and presenting geographic and spatially referenced information about the Earth. *Geostatistics* combines spatial

and temporal data. These endeavours are the foundations of modern *Geographical Information Systems* (GIS), which use IT to manage maps and related information.[4] *Global Positioning Systems* (GPS) provide details of location, based on Russian and American satellite systems, and create the maps for smart phones, SatNav and other devices. But using proper GPS equipment is not simple, and requires training. Researchers often study power and mapping – how and why certain things are omitted or distorted, threats to privacy and security, the digital divide and spatial information, why companies like *Google* are so keen to amass and control so much data, and how maps 'lie'?[5]

The big technical problem for all world mapmakers is ***projection*** – how to depict a spherical world on a flat piece of paper – and this has often been politicized. In 1569, a Flemish cartographer, Gerardus Mercator, produced a projection that became the European standard for many centuries, but it showed the European, northern regions as proportionately much bigger than the southern continents. In 1855, a clergyman, James Gall, corrected this, and in 1967, a filmmaker, Arno Peters, produced the so-called *Peters' Projection* which become the favoured map for INGOs. An innovative projection came from the American polymath Buckminster Fuller in 1954. His 'one island' *Dymaxion Map* projection shows the continents of the world as a near contiguous landmass from Australia, across Eurasia, to the Antarctic.[6] But one of the most interesting projections comes from the sphere of 'borderless' outsider art – a map of the internet.

thinking zone: how do you map the internet?

"outsider"

Kokubo Norimitsu (小久保 憲満) is termed by some as 'autistic', and his work was a centrepiece of the *Souzou Outsider Art from Japan* exhibition at the *Wellcome Gallery*, London, in 2013.

world map

Kokubu's *World Map* depicts 'past, present and future' details of places he has come to know through the internet and other media. This *social projection* of the world reflects the GPS, interactive, real-time and topological maps which increasingly provide information rather than visual locations, about things like traffic flows, disasters, internet traffic, Earth systems and transport.

How might other so-called 'outsiders' map their world, differently – blind people, life prisoners, isolated villagers, robots, aliens from another planet?

[See References for further information.[7]]

Panoramic drawings of European cities were produced from the mid-16th century, often based on a river. Some were compiled by using numerous smaller local drawings;

others appear to be drawn from a single vantage point. From around 1860, panoramic cameras were widely used. Panoramic cameras either controlled the exposure of a long role of film, or took separate shots that were then 'stitched together'. This technique is now easy with digital cameras and software such as *Panomonkey* (*360cities*). *Google Street View* has developed the techniques of panoramic photography, and uses six video cameras, mounted on a car or bike, and the photos are stitched together digitally later. *Google Tracker* is a backpack version of the 360° camera systems which create *Street View*, but can be used in places that are not accessible for vehicles. Other systems use a similar camera, but can stream the results directly to the internet, which cannot be intercepted easily. Good quality panoramic cameras are expensive. But cheap clip-on lens mirrors for smart phones permit fish eye or 360° surround video. Alternatively, single shots can be stitched together using *MapKnitter*. But simply videoing river banks from a boat, or streets from a bus, can also provide a rich 'panorama' of data.

The first ***aerial photos*** were from balloons in 1858, and kites in 1889. Pigeons carried cameras in 1908; the shots were timed but very imprecise. In 1900, British military photographers took the first aerial photos for mapmaking, from manned balloons. The first aerial film was made when the Wright brothers spontaneously fixed a movie camera to the wing of their prototype plane, which became a film *Wilbur Wright und seine Flugmaschine* (1909). From 1916 planes took over from balloons, and satellites provided new opportunities (below).

In 1854, a London doctor, John Snow, marked the houses where people had died of cholera, on a simple street map. He noticed that the frequency increased close to a particular water pump, and correctly identified it as the source of the disease. He had also created a *thematic bivariate* ***dot map***, invented *epidemiology*, and provided the bases for present-day online resources such as *Google Flu Map*, *HealthMap* and the crowdsourced *Flusurvey*. The method has countless applications, such as evidencing that commuting motorists kill children in black areas of American cities,[5] and poisonings from environmental pollution.

In 1869, a retired French engineer, M. Minard, used secondary data to produce a remarkable *multivariate* ***flow map*** of Napoleon's failed attempt to invade Moscow in 1812–1813. The map shows the route the army took, the number of soldiers at each place (in graph form based on the width of line – 1 mm = 10,000 men), combined with a temperature scale below (low temperature at the top). The map showed how "General Winter" had defeated Napoleon. Online research methods can now produce similar multivariate maps in real time. By monitoring tweets, the UN-OCHA in Geneva was able to monitor the trajectory of *Typhoon Pablo* in 2012, and produce the first crisis map from social media data.

Topological maps are distorted representations which show travellers "how to get there", not exactly "where you are". These maps are now common – the London Underground map is the obvious example, but there are earlier instances. Aboriginal 'ground paintings' also emphasize relative position not exact location. Micronesian

'stick maps' help fishermen to navigate between islands.[9] The technique can be applied to many systems from oil pipelines to micro-electronic circuit boards. In simple form, topology can provide quick spatial research records, and simplify complex geopolitics. A topological Venn diagram map can clarify political structures, while still indicating relative geographical position.

Satellite maps can provide quick evidence for situation analysis (C6.2) of emergencies,[10] which can be politically very effective. George Cloony's *Satellite Sentinel Project* started monitoring Southern Sudan in 2010, to warn of potential mass atrocities. The *Peace Research Institute Oslo* (PRIO) provides mapping tools for assessing the potential for conflict, such as shared rivers and long international boundaries. Earthquakes are tracked by the *US Geological Survey*,[11] and mobile technology is becoming easy to use.[12] *Universe Today* provides a useful basic introduction to satellite methods. *Google Earth* and *National Geographic Maps* make satellite maps widely available. NASA *Landsat* images are free on *Earth Observatory*. Archived satellite images, and commissioned work, can be purchased from organizations such as *GeoEye*, *Digital Globe*, *Land Info*, *Spot Image* and *Earth Explorer*. Archived images can cost as little as US$10–50, commissions from organizations such as the *European Space Agency* are more expensive (around $1500) and the timing of shots depends on satellite availability and cloud cover. Mini satellites, as being developed by *Planet Labs*, produce HD low altitude images, and increasingly give power to individual citizen mapmakers. ***Real-time*** maps include *FightRadar24*, which shows all commercial air traffic in-flight. These *live maps* are especially useful for emergency and disaster mapping. Real-time maps can also track slower changes such as land cover,[13] and human activities such as illegal logging.

Remote sensing[14] was initially done from balloons, ships and buoys, but more recently by collecting data through light planes, satellites, UAVs and mobile devices, which can be analysed digitally.[15] Sensing entails gathering non-photographic information about the Earth from a distance – either *passively* though film or sensors, or *actively* by emitting energy and measuring its reflection like radar. Local remote sensing data can be added to maps, and expensive high-tech systems are not always needed. Data about pollution levels can be collected automatically from smart phone sensors (C10.9), or even from pigeons linked to the *Pigeonblog* website.[16] Arguably, humans can themselves be 'citizen sensors', sending *Volunteered Geographic Information* (VGI)[17] back to a website map, either from observations or via mobile devices which operate automatically.[18]

3D digital mapping is a culmination of old and new methods, which makes valuable "invisible" data visible.[19] Following the *Carte géométrique de la France* (1789), mapmakers have added contours to create *topographical* maps of the visible vertical features of territories (mountains, valleys). Soon after, William Smith created the first *geological map* of England (1815), and this *stratigraphic* mapping adds the invisible vertical features (under the ground and sea), which helps geologists to locate minerals and oil fields, and archaeologists to date the things they find. Superimposing sea-depth information on maps of coastal seas can help fishing communities and

activists to understand the likely consequences of government coastal developments (C10.4).[20] 3D sensing can reveal 'lost cities' and other archaeological factors such as ancient roadways or quarries, in places such as Easter Island.[21] Software such as the *Crytek CryENGINE* can convert historical maps and scientific drawings into 3D visualizations. *Airborne Light Detection and Ranging* (LiDAR) measures distance by illuminating a target with a laser and analysing the reflected light. It can, in effect, "x-ray" land cover and produce 3D maps which help to find unknown archaeological, or other, sites by showing regular features such as straight lines and circles. Interactive 3D maps permit users to manipulate and add data through hand gestures.[22]

Innovative *thematic maps*[23] include the *Globetrotter* interactive world map, which incorporates DNA mapping to identify human migrations throughout history, evidencing events like the Arab slave trade and Mongolian Empire.[24] But specialist knowledge and high-tech systems are not needed to map features such as police stations that use torture,[25] fishermen exposed to radiation from nuclear testing,[26] or the use of urban spaces by young people.[27]

11.2 Citizen mapmaking

Searching under the keywords *citizen mapping* and *grassroots mapping*, finds free software, advice and numerous mobile mapping devices.[28] Many resources focus on the vulnerability of communities to disasters,[29] and crisis mapping.[30] The *Public Laboratory for Open Technology and Science* (PLOTS) develops and makes available a wide range of low cost innovations and high-tech devices. The *publiclab.org* store provides balloon and kite mapping kits, and a 'grassroots mapping forum'.

Light lithium batteries have made it possible to mount cameras on diverse low cost ***Unmanned Aerial Vehicles*** (***UAVs*** – drones). Although currently the flying time is usually around 15 minutes, new hydrogen fuel cell engines are likely to extend this to around 30 hours. Planes take useful video, but because of the speed, still photos are often poor quality. *Quadcopters* can hover, and take better quality photos of exact locations. These are now sold cheaply as toys, can be pilotted by and send data to a mobile phone, and can be controlled on a retractable dog lead. Using more expensive systems, videos from UAVs can be streamed back to a PC. *DIY Drones* provides ongoing discussion and updates, for example about 'terrain mapping'.[31] Small UAVs fly low, can avoid cloud cover, and can take high resolution shots and infra-red images. Technologies can be up-and-running quickly, are completely controlled by the researchers, and are adaptable as ideas change. Check local laws before using UAVs, and consider safety if flying over people. Indoors use prop-guards. Drones sometimes fall out of the air for no reason.

There are also groups of *Kite Aerial Photography* (KAP) enthusiasts using supplies such as *KAPShop*. Unmanned *Balloon Aerial Photography* (BAP) is similar. Photos are taken by timed auto-exposure, continuous shooting ('continuous drive'), or are radio

controlled. Creating a 'rig' to maintain a stable camera angle is difficult, but a high shutter speed can overcome general wobble. The software *MapKnitter* helps to stitch photos together. Kites and balloons are silent and can therefore record discreetly, including sound, in quiet locations such as wetlands. If balloons have three tethers, they can be steered and held in specific locations for long periods of time, to monitor logging for example. Small flying devices, used by amateurs, may sometimes lawfully circumvent governmental controls on flying. At the start of the BP/Mexico Bay (*Deepwater Horizon*) oil spill, balloons were used to get around the 4000 ft restricted flight zone, which prevented evidence gathering by plane during the first few weeks.

Crowdsourced (C6.4) mapping contributes local details to improve online maps – concerning emergencies and disasters,[32] or land cover (vegetation, forests).[33] Local volunteers, perhaps using handheld GPS devices, may be asked to check out specific places of concern, and add photos or comments. These can then be verified and coordinated by other volunteers, anywhere in the world. Information can also come from big data analysis, which finds keywords in social media chat, about events such as typhoons, and can map their progress before other systems. *Syria Tracker* used *crowdmaps* to match satellite images and local photo/video and testimony to document political violence in Syria (Figure 11.1). The *iWitness Pollution Map* recorded oil pollution from the BP *Deepwater Horizon* oil spill. Citizen cartographers use sites such as *Wikimapia, OpenStreetMap, Google Mapmaker, Ushahidi* and *Crisis Mappers*. *Map Action* and the *Digital Humanitarian Network* provide GIS assistance to humanitarian NGOs, and the *Crisis Response Journal* has ongoing updates. But amateur mapmakers can sometimes create security problems by revealing safe locations, and perhaps unwittingly provide information that helps repressive regimes or other criminals.

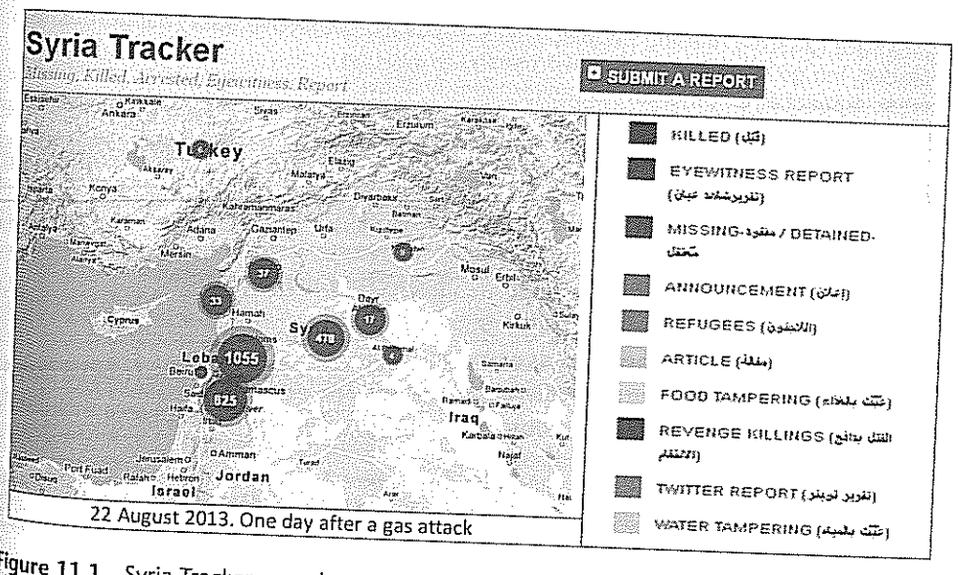


Figure 11.1 Syria Tracker crowdmap

The *World Bank* provides tools for micro-level ***community mapping***, including discussions of: social factors, mobility, risk and community resources.[34] Development agencies provide useful guides for participatory mapping.[35] Civil society initiatives are contributing local details to online maps,[36] using platforms such as *Wikimapia*. Using *Google Earth*, American students produced *North Korea Uncovered*,[37] which documented 'buildings, monuments, missile-storage facilities, mass graves, and secret labour camps'.[38] The potential for cheap low-tech innovation seems endless. "Spy cameras" can simply be taped to toy AUVs. A camera protected in bubble-wrap can be strung from hydrogen-filled party balloons, tied to a long piece of string, and retrieved when the balloon blows away or bursts.

11.3 Creating simple thematic maps

Mapping does not need to be complicated: it needs to be adequate for the purpose of the research. If assessing the time taken to get to safe drinking water from remote villages, drawing and measuring simple as-the-crow-flies lines on a map, and roughly adjusting the calculation for terrain (mountains, rivers, roads), might provide adequate relative data about different villages, which would not be much better if done using GPS tracking devices.

For researchers or their research participants, making basic maps entails simple decisions:

- the *purpose* of the map.
- how things will be *located* – compass, GPS, grid systems.
- *what* it needs to show – *physical reference points* (roads, rivers, buildings), *objective data* (deaths, missing people, waste disposal), *subjective data* (dangerous/safe places, 'no go' areas, overcrowded places).
- what statistical or physical *variables* must it show (reports of deaths, toxic waste dumps, water courses, drinking wells).
- how to *project* everything flat, on paper or screen.
- what is *not relevant*, and can be omitted.
- how to *visualize* relevant information (dots, colours, key).
- how to *link* to *extra information*.
- how to make things *simple*.
- the *aesthetics* of effective presentation – images, colours, size, title.

These decisions apply to paper, device-based and online mapping.

If basic maps of the area are available, in print or online, relevant features can be drawn on these. If not, the options for recording the basic physical features of an area include:

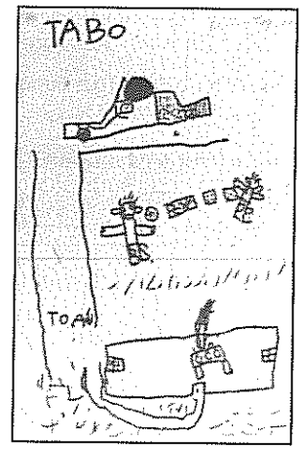
- using *Google Earth* or other satellite pictures (above).
- taking *panoramic* photos from high places (church or mosque towers, tall buildings, hills) (above).

- using basic geographical *survey methods* to measure ground features, starting with regular shapes (straight roads, square buildings) and landmarks (trees, towers), and then adding irregular features (rivers, crops).
- using *mapping software*, often free.
- *crowdsourcing* data (C6.4) ("Every family will measure and draw the area in front of their dwelling, to the middle of the path").
- using *aerial* photos from UAVs – kites, balloons, planes, helicopters (above).

If the purpose of the map requires a high degree of accuracy, scaling or GPS can be used. If not, maps may be topological (above), just showing significant features, such as safe routes to the market.

But not everyone understands the concept of a map or of a bird's-eye view. People in remote rural areas may never have seen a diagram, and not understand that symbols can represent real things. People with learning disabilities may not understand how physical things can be depicted on paper. (And students that have always depended on GPS devices, are often clueless about real maps.) Using large 3D 'model maps', on the ground or a table, can help to make mapping fully inclusive, for example to show routes and dangerous places. Smaller *tactile maps* can help blind and partially sighted people.[39]

People who are inexpert in mapping may be experts about other things, for example police violence, or state neglect. A South African street child who had been arrested by police for playing dice (using archaic colonial gaming laws) was asked where this happened. Without prompting, he drew a map, which provided convincing and precise evidence of the site of this abuse by police. (Figure 11.2).



Tabo mapped where police arrested him for playing dice

Figure 11.2 Maps by street children

Source: Williams, C. (1990) 'Street children and education' – http://etheses.bham.ac.uk/698/

main ideas

Understanding ***historical mapping*** methods can help to:

- analyse and compare *historical research*.
- inspire *new non-digital* and *digital mapping* methods.

Cartography includes using and creating:

- *general maps*, which usually requires specialist skills.
- *thematic maps* – dot maps, flow maps, topological maps, satellite images, remote sensing, 3D mapping.

Basic mapping can:

- add relevant details to *existing maps*, paper or online.
- use *aerial photos* from high buildings, kites, balloons, UAVs, light planes.
- *'stitch together'* panoramic or aerial photos.
- use, purchase or commission *satellite photos*.
- use free *crowdmap* sites to link maps to the internet.
- *crowdsource* to get numerous small mapping tasks done by many people.
- use simple *inclusive* methods to make sure that relevant people can participate in research.

key reading

Bankoff, G. et al. (2004) *Mapping Vulnerability: Disasters, Development, and People*. London: Earthscan.

Chuvieco, E. and Chuvieco, E. (eds) (2009) *The Fundamentals of Satellite Remote Sensing*. Boca Raton, FL: CRC Press.

Meier, P. (2013) 'Crowdsourcing to map conflict, crises and humanitarian response', in D. Backer et al. (eds), *Peace and Conflict*. Bethesda: University of Maryland Press.

Slocum, T. (2003) *Thematic Cartography and Geographic Visualization*. Upper Saddle River, NJ: Prentice-Hall.

online resources

To access the resources – search on the name in italics, use the http, or search on the generic term in 'quote marks'.

How to choose and use GPS devices – www.ordnancesurvey.co.uk/blog/2013/12/choosing-a-handheld-gps-device

Reviews of international devices – http://gps.toptenreviews.com/navigation/international-travel-which-gps-device-is-best-.html;www.reviewgist.com/best-gps-device-international-travel

Geocomm – lists free viewers and basic mapping tools – http://software.geocomm.com/viewers/

Free mapping software – www.esri.com/software/free-mapping-software

Crowdmap – mapping software that allows online additions to immersive internet maps

Crisis Mappers – support for mapping disasters and emergencies

360cities – advice and demos about panoramic mapping – www.360cities.net

Panomonkey – software to 'stitch' shots together – www.panomonkey.com

GeoEye. DigitalGlobe. Spot Image – purchasing and commissioning satellite maps

Crytek CryENGINE – creates 3D (computer game) visualizations from maps and drawings – www.crytek.com/cryengine

OpenSourceGIS. FreeGIS – lists of free GIS software

Kite Aerial Phography (KAP) – www.arch.ced.berkeley.edu/kap/

ConservationDrones.org – UAVs for sustainable development research

ResearchDrones.com – UAVs for general research

Tactile maps for blind and partially sighted people – www.tactileview.com/mapmaker

TWELVE

Analysing world systems

If bored on a plane journey, look at the route maps in the airline brochures. They provide wonderful data about world *systems* – economic hubs and networks, political affiliations, human mobility, commercial interests. Which airlines fly to Pyongyang and why? A historical study of air routes would probably represent a history of the development of the main systems of the modern technologically-based world. The site *Airline Route Maps* provides country-specific detail.[1]

But systems existed across the world well before airlines. Early traders, mariners, scholars and religions had large effective networks (Introduction), and they left information about their networks on buildings and in libraries. Therefore much fascinating data is non-digital, including colonial collections in museums like the *Oost-Indisch Huis (East India Company House)* in Amsterdam, or religious archives like the library of *St Catherine's Monastery*, Sinai. Many sources require field visits, for example to buildings and monuments across the old Silk Roads.

Methods books usually consider organizational, network and systems analysis separately. But for world research the interest is how these relate. Methods of data collection overlap, and so the relevant methodologies are discussed together. *World*

systems research starts from some form of *intelligence gathering* – data about 'other' systems. This is then *mapped* using diagrams (but not necessarily in the form of the spatial maps discussed in Chapter 11). These show how the parts of a system fit together.

12.1 Social and administrative systems

Systems can be categorized as 'human-dominated', 'human-influenced' and 'natural' (Figure 1, p. xxxi).[2] Social science is mainly interested in the first two, but understanding how we relate to the natural world is essential for human survival. Human history is shaped by Earth systems such as tides, the weather and climate change.[3]

The *International Society for the Systems Sciences* hosts ongoing discussions about methods, and provides a way to adapt methods across the natural sciences, IT and social sciences. Many guidebooks explain the *international systems*.[4] Contemporary international research is likely to be based around the UN. Many academic sites[5] provide resources about the systems, and research,[6] including the UN 'sister' organizations, the WTO/GATT,[7] *World Bank*[8] and IMF.[9] The *Model UN* research resource site is clear and helpful.[10] The *United Nations System* home page is oriented towards UN staff and experts[11] and provides a useful *Directory of United Nations System Organizations*.[12] Similarly, the *Protocol and Liaison Service* lists permanent missions, representatives and senior UN officials.[13] The *United Nations University* (UNU) produces publications and methodologies about current issues. UN Web TV provides a way to maintain a daily awareness of UN work.[14] By comparison, there is very little methodology about researching global civil society and INGOs.[15]

World systems can be viewed in four ways – *governance* (UN HQ, EU), *political violence* (NATO, *Amnesty*), *development and economics* (WTO, *Oxfam*), and *environment* (UNEP, *Greenpeace*) – and there are many relevant research *frameworks* (C6.3). International systems can be assessed using different units of analysis – elites, power, power blocs, sovereignty, national interests, interdependence, dependency, non-state actors, TNCs. A study might put data on a theoretical framework, such as Wallerstein's[16] world systems theory (Figure 12.1).[17] Data might include:

- *overview* – history, aims and strategies, values, resources, finances.
- *human factors* – power structures and leadership,[18] staff and expertise, networks,[19] communication,[20] 'narratives'.[21]
- *technical* – machinery, vehicles, IT, unique expertise.
- *contextual* – external influencing factors.

But current world theories often reflect colonial values and systems.

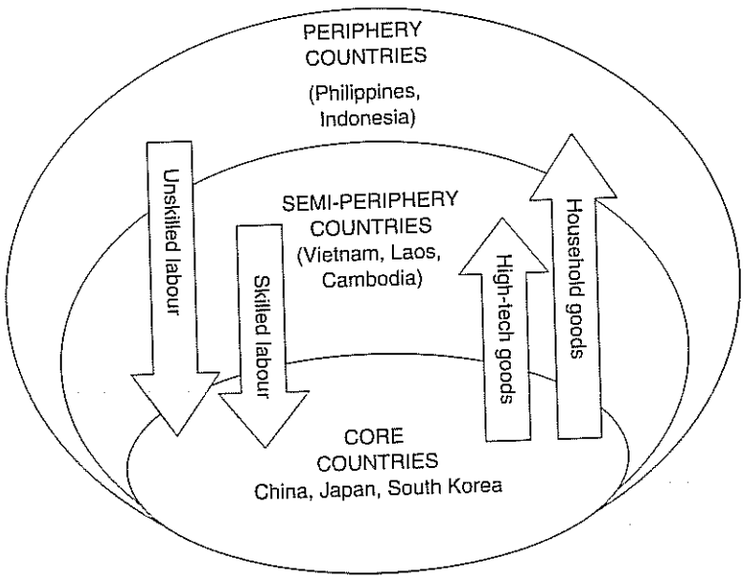


Figure 12.1 World systems theory

Based on: Wallerstein, I. (1974) *The Modern World-System: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century*. New York: Academic Press.

Systems analysis uses data about interconnections and interrelations – concerning people, processes, methods and procedures – within organizations, or on a world scale. The methods developed for assessing commercial systems can be adapted to public services.[22] *Corporate Watch* provides a useful guide – *How to Research Companies*[23] – which can be applied to other forms of organization. 'Hard systems' are amenable to simple functional analysis much in the way that an engineer would analyse a mechanical system; 'soft systems'[24] are complex, fluid, and definitions and structure are unclear because of human dynamics.[25] *Organizational analysis*[26] focuses on power relations, and *organizational network analysis* on communication.[27] *Network analysis*[28] identifies 'interlocks',[29] 'nodes' and 'ties'. The aims of studies are usually to improve systems, perhaps by comparison with similar more effective systems. ***Evaluative research*** often entails some form of SWOT assessment of the efficiency of a system in achieving its own goals, but also in relation to other world dynamics such as climate change (Figure 12.2).[30]

SWOT ANALYSIS MATRIX		
	positives	negatives
internal	**S**trengths	**W**eaknesses
external	**O**pportunities	**T**hreats

Figure 12.2 SWOT analysis

12.1.1 Intelligence gathering

Intelligence analysis[31] is the basis for understanding commercial, criminal, military[32] and other systems across the world. It usually starts top-down from researching the elites who run the systems.[33] A manual, published in 1954, *Discovering National Elites*, provided a comprehensive methods book for diplomats and intelligence officers, which is still relevant.[34] Research might be based on official announcements, leaks and protocols. The UN *Protocol and Liaison Service* maintains a *Manual of Protocol*, which provides a basis for understanding how international relations *should* operate.[35] In closed countries such as North Korea, workers in organizations providing humanitarian assistance may be the best sources of regional information.[36] Political posters indicate the personas of ruling elites, how they want to present their systems, and who their allies are.

International police organizations such as *Europol* and *Interpol*[37] create systems for international cooperation.[38] Comparing methodological frameworks – for example about military and criminal threats – can assist cooperation and generate new methods.[39] *Data mining* of social media sites, using programmes such as the US *Prism* programme, is said to identify suspicious communications – *traffic analysis* affiliations, which can be mined to analyse beliefs, thoughts, friendships, interests and purchasing.[40] But the number of false positives is likely to be very high.

12.2 Mapping world systems

Most systems research *maps* (using diagrams) the data about elements, networks and processes of a system,[41] perhaps to create comparable *case studies* (C6.2). In the 19th century, models of education systems permitted national governments to compare (C13.2), and copy, the more progressive countries, and the charts used for analysis are still interesting. They use the *similarities* (*independent variables*) such as 'age' to compare the *differences* (*dependent variables*) – like 'type of school'.

Basic ***mapping templates*** can be created using software such as *Word* (Insert – Smart Art; Shapes):

- *Venn diagrams* – show overlaps and common areas, and *nested Venn diagrams* show core and contextual elements.
- *matrices* – list the presence or level of factors, *Excel* spreadsheets.
- *organizational/line management charts* – despict power structures, and systems of control and responsibility.
- *flow (decision) charts* – explain how different processes do, or should, operate in response to "yes/no" decisions about events. These can help to plan or understand algorithms.
- *process charts* – depict *linear* and *cyclical* processes and procedures, and can help to analyse planning or policy-making.
- *spidergrams* and *network charts* – show the linkages that create networks. These are often computer generated.[42] Useful analytical software includes *UCINet*, *ORA*, *Pajek* and *GIU for Linux*,[43] which can handle small and large-scale studies.

- *timelines* – show the order in which things happen (chronology), which can be the basis for analysing how certain events (independent variables) affect other events (dependent variables).

From these basic charts, further analysis may combine different sources or forms of data, to provide a bigger picture. *Critical Process Analysis* (CPA) provides a framework for investigating abuses of power (C12.2). Large systems, including 'soft' complex situations,[44] may be *modelled*, usually on computers, to understand past and future trajectories.

Data for mapping systems (using diagrams) can be collected through:

- *Interviews* (C8.2) within organizations – staff, customers and service-users may explain their local networks (experts, subordinates), who they communicate with (IT security, country offices), and who gives them permission to take certain actions (line manger, finance officers). Similarly, in public space, public officials or company reps may describe their own contacts and communications; victims or operatives of crime syndicates and similar networks, may be able to identify immediate contacts. But interviewing powerful people has distinct problems and methods.[45] Like a jigsaw puzzle, fitting these 'local' pieces together can create the big picture.
- *Observation* (C8.3) can help to identify interviewees, or verify interview data. This can include following people (which may be illegal if seen as 'stalking'), using CCTV, watching from vantage points such as high buildings, or participant observation (C8.3).
- *Tracking* people and objects is increasingly easy by using electronic devices, including cash machine and mobile phone[46] data. Short-distance devices, such as *Radio Frequency Identification* (RFI), are creating an 'internet of things', and researchers will increasingly be able to track how countless contemporary objects move and are being used, in real time. Long-distance *GPS tracking devices* can track any object, almost anywhere – cars, fish,[47] containers.[48] Logbooks and inventories help to track objects. Diaries, passports and travel tickets provide similar information about people.
- *Documents* (C13) may provide sufficient information to map (diagrammatically) an organization, even if not presented in a helpful format. Government or commercial records may list data about *organizational affiliations*, and online CVs may provide *cultural affiliations*.
- *Online ethnography* (C8.4) can include discovering the 'links' on websites and social media to analyse organizational and personal connections.

Data then needs to be presented as concise findings that can be envisioned on diagrammatic *mapping* templates (above).

Spatial mapping methodologies (C11) can also be adapted, particularly topological visualizations, to explain systems such as *supply chains*.[49] This can help to improve efficiency, monitor specifics such as environmental impacts, or track abuses such as human trafficking and illegal logging (Figure 12.3).[50] ***Forensic mapping*** can utilize supply chain methods to demonstrate that events such as state crimes,[51] commercial corruption, food contamination, industrial pollution are *systematic*, and not just isolated incidents. This is often crucial for international courts and similar forums.[52] This may entail evidence showing that: *distinctive events* happen *repeatedly* across a

system (a type of torture), there was a *logic* and *reason* – *mens rea* (torture will scare protesters) – the events are *linked* by *communications* and *'command and control'* systems (a line management structure), there is *technical* evidence (the supply of torture implements), there are *causal links* – would Y had happened if X had not? (the torture could not be carried out without the implements) – and that some events amount to 'guilty acts' – *actus reus* (use of torture implements is illegal).

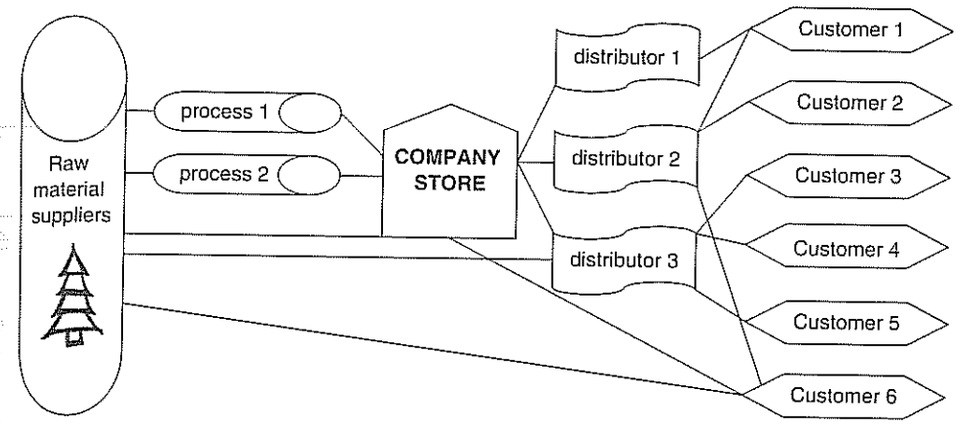


Figure 12.3 Supply chain analysis

Data in the form of ***infrastructure*** (C10.8) represents 'the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions'.[53] Data collection may start from infrastructure maps[54] which explain the strategic implications for business and security,[55] and aerial maps (C11), which can indicate likely research sites for field visits. Analysis may compare government or commercial descriptions of infrastructure, with what is actually on (or under) the ground. Networks may include:

- *trade and commercial* – distribution networks,[56] markets.[57]
- *transport* – roads, railways, waterways, air routes.[58]
- *communications*[59] – postal services, telecommunications, internet traffic,[60] submarine cables.[61]
- *energy and water* – electric power lines, gas and liquids pipelines,[62] dams and reservoirs for hydroelectric generation.[63]
- *waste removal* – rivers, drains, solid waste, sewage, pneumatic.[64]

Fieldwork is important. The existence of pylons in Minamata Bay (Japan) explains the *Chisso* mercury poisoning (C10.4). The Bay has abundant cheap hydroelectric power. This makes fertilizer and chemical production very cheap, which is important to the national economy. And this is why the government protected the company.

Triangulating data (C7.6) can help to validate *mapping*, including:

- *historical* – what was the formative context of the system, what did it aim to achieve?
- *conceptual* – what theories, plans and strategies (security, information flow, economic) informed decisions?
- *political* – how do international, national or regional governance and agreements affect the system?
- *administrative* –what are the key institutions and organizations?
- *infrastructure* – how are natural (rivers, trade winds) or built (roads, communications) systems relevant to the research?

The *East Asian Highway Agreement* (the 'New Silk Road') aims to stabilize the region through linking commercial interests, like Europe's postwar E-road network. It will link Tokyo to Tehran across Asia.[65] The existence of AH road signs in South Korea – indicating a road that goes to Japan, China, India and Turkey – evidences the implementation of the *Highway* concept in a tangible form.

Systems are based on ***processes***. *Critical Process Analysis* (CPA) provides a framework for data collection and analysis, which addresses the possibility that a process may not do what it claims to do. CPA combines academic and investigatory approaches to research, and can utilize any research framework (C6) and many forms of data. It is often easier to identify incorrect processes than incorrect outcomes, because processes and related methods have an intrinsic logic-consistency, sequences, scale, audit trails and information channels. Standard *process analysis* usually concerns efficiency in commercial settings,[66] and asks questions about the links between the steps within a process.[67] Within this, *process tracing* uses any data[68] to trace causal links and mechanisms.[69] The term 'critical process analysis' is sometimes used to describe the analysis of processes that are particularly 'critical' – vital – to a system.[70] But CPA is used to critically understand the use of power within a process, not just to make a process more efficient, which reflects the tradition of *critical theory*. Standard process analysis might ask, "How can UN Security Council meetings be arranged more quickly?" But CPA is likely to ask, "The UN could and should have arranged the meeting more quickly, so why did it not do this?"

Although CPA is distinct, the standard process model – input > process > output – provides a basis for first *mapping* an *original process*. This is based on the claims about how the original process was implemented, made by those involved with the process, for example in minutes of meetings or monitoring reports (Figure 12.4). This process *map* comprises:

- the *stated purpose* – policies, aims, intended outcomes.
- the *apparent inputs* and *methods* to make the process work – resources, personnel, information, meetings, research, communication systems, implementation procedures.
- but both the first and second items above operate within *parameters* and *underlying structures* which shape and control the process – norms, regulations, resource constraints, time-frames, ideologies, religious values, power structures, coercion.
- *outcomes* ('outputs') – decisions, information, policies, actions.

This explanation of an original process is then critically questioned *backwards* through the process and *maps*:

1. *Doubts* raised about the *outcomes* provide the starting point – media comment, profiling, informants, intuition, gossip. Doubts can create *hypotheses* about the causal links creating these doubts – "That pressure from the CEO caused omissions in the minutes of the meeting". These hypotheses provide the bases for then developing:
2. *Meta-methods* (methods to investigate methods) in relation to the 'doubts', to address three guiding questions:
   - 2.1 How *was* the outcome produced, according to the records? What was the *agency* – who or what made things happen? What was the underlying *function* of a specific aspect, in relation to aspects of the whole process which may be hidden?
   - 2.2 How else *should* that outcome have been produced – counterfactual scenarios based on standard practice, logic, efficiency, common sense, feasibility?
   - 2.3 How else *could* that outcome have been produced – counterfactual scenarios of other non-standard alternatives?
   - 2.4 *Other information* is introduced to investigate questions 2.2 and 2.3 – details about the methods usually used by others to produce similar outcomes, professional standards, procedural norms, legislation.
   - 2.5 *Comparative meta-analysis*[71] compares the answers to these questions to understand significant differences, and to discover and explain lack of *consistency* (above).
3. Any differences are then analysed in relation to the original stated purpose ('*map*'), to illuminate true motives.
4. Conclusions are then made about the validity and integrity of the original process – was this sound, complete, honest – "the truth, the whole truth, and nothing but the truth"?

CPA therefore entails questioning an original process by reconstructing that process in counterfactual ways that it *should* and *could* have been done, to compare and explain significant differences with the *claims* about what was done. It uses the question "What if ...", to interrogate what was claimed.

Most secular world institutions and governance systems reflect the ethos of the UN, and of a supposed 'international community'. But these are relatively new, and not universally accepted. In addition, modern world systems are technologically-based, and therefore vulnerable. The relevant lesson from history, which is often forgotten, is that world systems appear, change and disappear. And any form of systems analysis needs to be aware of that, and recognize the drivers that may create major changes, and plan for the implications.

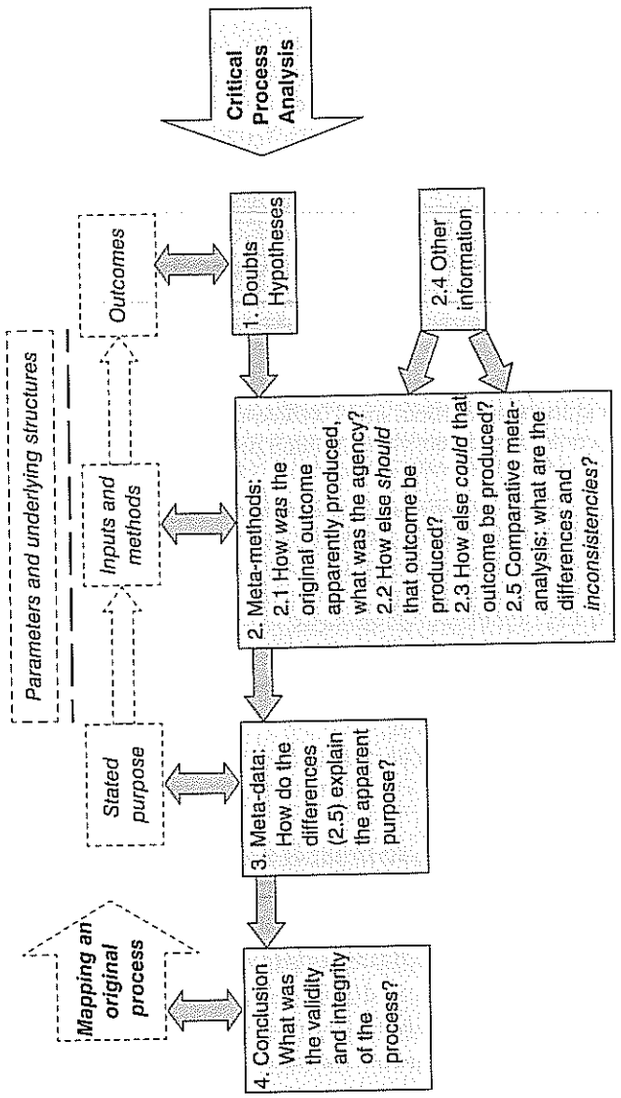


Figure 12.4 Critical Process Analysis (CPA)

thinking zone: how might systems change?

drivers

How might these *drivers* (C14.3) change national and international systems:

- a large earthquake in Tokyo or Tehran?
- a large flood in Paris or New York?
- the unification of North and South Korea?
- Mongolia's mineral wealth promoting it to OECD membership?
- an African country gaining nuclear weapons?
- Iran returning to a secular constitution?
- Israel's land becoming salinated because of sea level rise?
- the Nile drying up?
- the escape of an Ebola-type virus in North America?
- massive wildfires across the Americas?
- a large-scale eruption of the Mount Paektu (aka Changbaishan) volcano on the North Korean–China border, or of Eyjafjallajökull in Iceland?
- a world public that becomes immune to adverts on social media and other internet sites?
- an internet that becomes unusable because of viruses, hackers and overload?
- accelerated climate disruption?
- the unfreezing of the North-West passage and other sea routes?
- the unfreezing of polar regions, making mineral and other resources more accessible?
- massive movements of 'environmental refugees'?
- total toxic pollution in some regions?
- an electro-magnetic storm that destroys the internet and satellite-based communications?
- a large-scale asteroid impact?
- a virus that outpaces all antibiotics?
- Russia, China, EU or South America set up an alternative internet system?
- things costing the same to manufacture, everywhere in the world, even in China?

How could the UN, TNCs and other international organizations prepare for, and respond to, these events?

main ideas

When researching ***world systems*** consider:

- *the historical* context, and how theories reflect this.
- how to use *intelligence* methods to collect information.
- how to *map* systems.
- *templates* for diagrammatic *mapping*: Venn diagrams, organizational/line management charts, flow charts, process charts, spidergrams, networks charts, timelines, and adapting spatial *mapping* methods.
- how *data* can be collected through interviews, observation, tracking, documents, online ethnography.
- how *infrastructure* relates to other systems.
- *triangulation* to assess validity.
- *CPA* provides a framework for assessing failings in systems.

key reading

Babones, S. and Chase-Dunn, C. (2012) *Handbook of World Systems Analysis*. London: Routledge.

Brandes, U. and Erlebah, T. (eds) (2005) *Network Analysis: Methodological Foundations*. Berlin: Springer-Verlag.

Punnett, B.J. and Shenkar, O. (2004) *Handbook for International Management Research*. London: Wiley.

Reinalda, B. (ed.) (2013) *Routledge Handbook of International Organization*. London: Routledge.

online resources

To access the resources – search on the name in italics, use the http, or search on the generic term in 'quote marks'.

International Society for the Systems Sciences – ongoing methodological discussions – isss.org/projects/overview

Airline Route Maps – www.airlineroutemaps.com

ITO – infrastructure maps – www.itoworld.com

Directory of United Nations System Organizations Index – www.un.org/en/index.shtml

Model UN Research – http://bestdelegate.com/research/

United Nations System – www.unsceb.org

WTO/GATT – http://nyulaw.libguides.com/content.php?pid=55653&sid=424226

World Bank – http://econ.worldbank.org/external/default/main?menuPK=577939&pagePK=64165265&piPK=64165423&theSitePK=469382

IMF – www.lib.berkeley.edu/doemoff/govinfo/intl/gov_imf.html

THIRTEEN

Analysing official documents

Take a look at your passport: it is an official international document. Do you understand it all? If you are British and standing in an immigration queue at Heathrow airport for several hours, it might be worth understanding what 'allow the bearer to pass freely without let or hindrance' means. If you have a 2012 Chinese passport, what are those dashes, on the map, around the disputed southern islands?[1] Countless official documents are available for analysis, not least online.

But not all official documents are immediately accessible. Europe has superb *chained libraries* of texts that are not digitalized, which contain manuscripts and maps of world systems by former world travellers. International records are sometimes in the form of texts on buildings (C10.6), handwritten letters, or religious tomes. This chapter discusses how *official documents* can be *found* and *used* to understand how international systems function (C12), and to inform other aspects of world studies.

13.1 Finding documents

Documents are increasingly easy to access online.[2] The UN *Dag Hammarskjöld Library* provides an access point for ***international documents***, and two distinctions are helpful when starting to understand formal UN documents:

> A *document* is a text submitted to a principal organ or a subsidiary organ of the United Nations for consideration by it, usually in connection with item(s) on its agenda.
>
> The term 'United Nations *publication*' refers to any written material which is issued by the United Nations to the general public.[3]

The *UN History Project*[4] maintains archives of non-current material, including photos, radio broadcasts and videos.[5]

National documents also contain international material. Most national *constitutions* can now be accessed online, which provides insights into the values underpinning international relations.[6] The *UN Treaty Collection* provides access to all international agreements between nations.[7] The charters and constitutions of the UN, INGOs and other international organizations, and companies, provide a starting point for a documentary understanding of international institutions.

Other ***organization texts*** can be found online by searching under the organization name, and adding headings such as 'company profile', 'staff profiles', 'management structure', 'financial report', 'chair's report'. Materials that organizations inadvertently leave online might be found by using keywords and adding 'pdf' or 'ppt'. Headers and footers might show that a document's title had been changed at the last minute, leading researchers to seek out earlier versions, as with the UK government's *Iraq Dossier*.[8] Not all online texts are what they seem and the sources need to be verified through checking the web address and contact details against other information, or on sites like *checkdomain* or *whois*.

Using ***archives*** is more complicated than using university libraries,[9] because the material may not all be indexed digitally, and *Google* may not find documents that are on private intranet systems. Keep in mind that many national collections hold material about other countries, but finding the material is not straightforward. In Britain, government documents about wartime "Japan" may be filed under "America", if they are intelligence intercepts. The 'finding aids' for archival research are systemized by the *International Council on Archives*. But usually talking to local archivists is an effective way to find exactly what is needed. Problems with government archives include: incomplete records which give a misleading impression, a focus on administrative process rather than cause and effect, reports that are deliberately misleading, and a 'self-justificatory element'.[10] *Secret material*, collected by organizations such as the CIA,[11] may at some point become available.[12] When the Chinese *Public Security Bureau* archives were opened in 2006, they revealed meticulous records of the brutality of Mao Zedong's regime.[13] Specialist libraries can make declassified documents easier to search.[14] Check what devices can be used in archives. Handheld *wand scanners* are useful for copying paper documents quickly and accurately. If not, try "spy cameras".

During Japanese occupation, and 'Korean War', many Korean documents were destroyed. The South Korean government is working to locate Korean-related materials around the world, and record them. The ICRC (Red Cross) in Geneva is one source.
Documents are archived under:

- *Paper* (Can be photographed but not scanned)
- *Images* (Thumbnails are available on a CD, high definition can be requested on a one-by-one basis)
- *Film and sound* (Often in original format)

The Korean government offers to create high quality digital copies for the archives, and for Korean museums.

Yun-Joo LEE

www.icrc.org/eng/resources/icrc-archives/

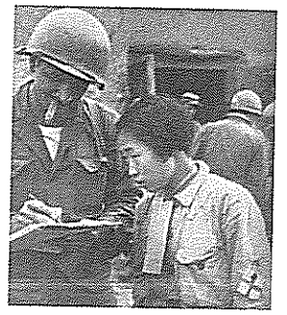


Figure 13.1 Using international archives

Photo: Author's collection

Documentary evidence can also be captured from ***non-written sources***, such as radio, TV and film. Philosopher Andrew Chrucky provided interesting data about US military policy in relation to Japan, from the film *The Fog of War*. He explains, 'there is a very fast sequence of frames in which the bombed Japanese cities are named...To get all this information, I had to advance the DVD frame-by-frame – otherwise the whole thing shoots by you in a blur.' And from this he could present the data as a chart, including an effective comparison with US cities.

Of course, world data is often ***censored***, hidden or manipulated by states. *Reporters Without Borders* provides updates and an annual *World Press Freedom Index* (Figure 13.2).[15] *Freedom of information* (FOI) systems[16] provide a 'right to know' in relation to information held by a government. Many countries have helpful legislation – but the efficacy varies. The Canadian government provides a useful international comparative review,[17] and *Open Government: A Journal on Freedom of Information*[18] presents ongoing discussions. Details of how to access FOI systems are country specific, and usually available on websites or from any governmental organization.[19] Officers working in FOI departments can sometimes be obstructive, and may be attached to national intelligence services. Initial inquiries should appear low-key and harmless. If a first attempt fails, try again using a different persona and approach. Asking for a large number of seemingly related documents can provide cover for getting the one that is crucial. Information from central government can often be accessed through local government departments and organizations – sensitive central government information is sometimes repeated in secondary documents such as local policy and planning reports. A CPA chart can help to *map* obvious and less obvious sources (C12.2).

REPORTERS WITHOUT BORDERS FOR FREEDOM OF INFORMATION

مراسلون بلا حدود

无国界记者 维护信息自由

FREEDOM OF THE PRESS WORLDWIDE IN 2013

Rank	Country	Rank	Country
1	Finland	176	Syria
2	Netherlands	177	Turkmenistan
3	Norway	178	North Korea
4	Luxembourg	179	Eritrea

LA LIBERTE DE LA PRESSE DANS LE MONDE EN 2013

Figure 13.2 World Press Freedom Index

Source: Reporters Without Borders

Crowdsourcing (C6.4) has dramatically improved access to, and use of, old documents. Non-digital texts can be photographed and 'sliced and diced', to give small tasks to large numbers of people. This can include simply typing titles and other biographical information into a database, and *tagging* photos – writing descriptors using keywords such as '2 boys, 3 girls, mosque, car'. If texts are handwritten, the crowd can help to transcribe and digitalize them.

13.2 Using documents

Documents can be used in three ways:[20]

- as the basis for a *literature review* (C3).
- as a source of *specific evidence* ('Lee found that...').[21]
- for *documentary analysis* – the text is treated like an interviewee and *interrogated* in depth, probably by using an analytical schedule/framework. This can help to check the obvious things – who wrote it, why, when, how (C1.1) – and more specific things – who funded the study, what are the obvious omissions – much like an interview questionnaire.

Texts might also be analysed more broadly in terms of *mass communications*.[22] Software such as *NVivo* help with managing and analysing documents, through linking, shaping, searching and modelling.[23] *QDA Miner* helps with mixed-methods qualitative analysis, and includes statistical functions such as coding frequencies, visualization tools including heat maps and proximity plot, and geo-tagging.[24]

Documentary analysis[25] starts by identifying appropriate physical or digital documents (books, reports, magazines, letters), and then useful texts are selected from

those documents using relevant criteria – time periods, events, meetings, keywords. A search can start by using big data document sites like *Amazon*, or with keywords on *GDELT*, *Google Trends* and *Ngram* (Box 3.1). In general, most documents are scarce and texts will be selected *purposively* or *opportunistically* (C7.4). But if there is a large *population* of documents – international magazines, political autobiographies, minutes of meetings – they could be selected by random sampling (C9.3). *Wikileaks* proposes a simple methodology for accessing and 'crowdsourcing' analysis (C6.4) of its online documents.[26]

- Search for events you remember that happened for example in your country.
- Browse by date or search for an origin near you.
- Pick out interesting events and tell others about them.
- Use *Twitter*, *Reddit*, *email*, whatever suits your audience best.

When certain phrases are extracted from individual documents, some form of *coding* is necessary, which is likely to use a *coding frame* (C7.4).[27] A specific difficulty, when analysing international texts, is to ascertain exactly who wrote them. Were they drafted by speech writers or assistants, and the named authors simply approved and put their names to the script, as with most company or government reports?

Content analysis provides deeper insights into any type of communication,[28] and is often applied to transcripts.[29] Analysis can be based on simple questions to discover the unwritten aspects of a document as in historical research,[30] or can take a more theoretical approach such as analysing rhetoric.[31] When working across a number of different languages, the methods need to be simplified. A study might examine the origins, usage and linguistic source (indigenous, translated, assimilated) of keywords such as 'comfort women', in Japanese, Korean, Chinese and American English. *Google Books Ngram* can provide basic big data content searches (Box 3.1).

Discourse analysis treats any text as primary data.[32] Analysis can be at a detailed level, using methods and theories of linguistics to assess aspects such as the frequency of certain phrases. For 'aphorisms' (summaries to make an impact), analytical frameworks and plotting charts can help to compare and rate (less to more) data effectively (Figure 13.3). Software is available to help.[33] ***Critical discourse analysis*** (CDA) considers how language is used to increase domination and power,[34] and assumes that texts mediate power.[35] Fairclough's CDA framework combines:[36]

- *micro-analysis* of syntax, metaphoric structure and metrical devises – Does this speech reflect a particular linguistic style?
- *meso-analysis* of the production and consumption of the text, and related power relations – How many copies were circulated free, to whom, and why?
- *macro-analysis* of the general societal trends affecting the text – How has Chinese soft power influenced African political speeches?

An ***epistemic*** approach to CDA links discourse and sources of knowledge.[37] It is often relevant to notice what is missing or hidden in a text, but that needs objective criteria indicating what should be included and conspicuous.

A formal document should be assessed in terms of ***consistency*** with itself (internal), or with other standards (external).[38] Consistency is a requirement in the formulation of law,[39] or when drafting of public documents.[40] Ireland's 2009 *Blasphemy Act* outlaws publishing or uttering 'matter that is grossly abusive or insulting in relation to matters held sacred by any religion' (36.a.). Critics point out that therefore religious texts are blasphemous.[41] Jesus reportedly said of the Jews, 'Ye are of your father the devil, and the lusts of your father ye will do. He was a murderer from the beginning, and abode not in the truth, because there is no truth in him.'[42] Muhammad is quoted as saying, 'May Allah curse the Jews and Christians for they built the places of worship at the graves of their prophets.'[43]

Maps (C11), the way they are created, changed and manipulated can reveal a lot about geopolitics. The primary purpose is often to demonstrate power. Maps commonly exaggerate property, colonial lands and the centrality of power elites.[44] A significant use of politicized maps has been in school classrooms, and that continues. Jewish sources complain that Palestinian school textbooks omit details of modern Israel.[45] The Kuwaiti *Not to Forget Museum* displays Iraqi school textbooks from Saddam Hussein's era, in which maps show an Iraqi empire spanning North Africa, and Kuwait as part of Iraq.

Documents can also be analysed as ***objects*** (C10.7), which may happen as part of police or museum work. Analyses might entail discovering how and when the paper was made, what printing process was used, watermarks, changes, damage and incidental marks such as food stains. Infra-red photography can identify different types of ink or reveal what was written underneath obliterations.[46] Diaries, purportedly by Mussolini and Hitler, were found to be fakes because the straw fibres and optical brighteners found in the paper were introduced after the stated dates of writing.[47] Software is now available to reconstruct shredded documents, and has been used to piece together Stasi files that were thrown into 16,000 garbage bags in 1989.[48]

Policy analysis, in relation to national, international[49] or regional policy, is likely to be based on documents, but may also include observation and interviews.[50] Analysis concerns either *making* or *assessing* policy. The model that a policy-making process should have been based on can be *mapped* diagramatically, and what actually happened is then compared with this.[51] The *International Institute for Democracy and Electoral Assistance* (IDEA) provides tools and data for international policy work.[52] Influence between international and national policies is often interesting, but not easy to show. Comparative policy-making, for example relating climate systems to international and national systems, can be *mapped* as a timeline, in two languages.

Many international policy documents relate to ***international law***, which is a contested concept as there are differing cultural views about world ethics (C5). Analysis quickly becomes politicized, and often applies present-day standards to past events such as 'comfort women' and slavery. It is useful to distinguish between *retrospective* ethics – a counterfactual conclusion that, "If that happened today it would be unethical/illegal", and *retroactive* ethics – "I want compensation for something that happened to my parents". Sadly, the conclusions often reflect 'victors' justice'.

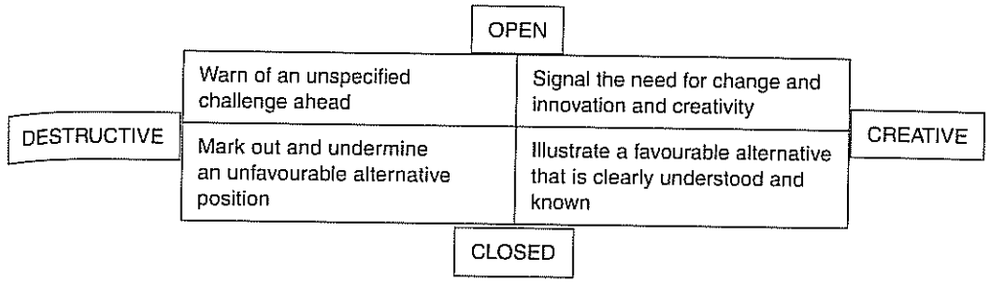


Figure 13.3 Analysing aphorisms

Source: Morrell, K. (2006) 'Aphorisms and leaders' rhetoric: a new analytical approach', *Leadership*, 2 (3): 367–382.

thinking zone: when is a crime a crime?

ICC

The *Rome Statute of the International Criminal Court* addresses crimes against humanity (Art. 7):

1. ...acts when committed as part of a widespread or systematic attack directed against any civilian population, with knowledge of the attack:

(a) Murder;

(b) Extermination; ...

(k) Other inhumane acts of a similar character intentionally causing great suffering, or serious injury to body or to mental or physical health.

2.(a) "Attack directed against any civilian population" means a course of conduct involving the multiple commission of acts referred to in paragraph 1 against any civilian population, pursuant to or in furtherance of a State or organizational policy to commit such attack;

Japan

During World War II, the US air force used napalm to firebomb 67 Japanese cities in 1945. The victims were mainly civilians – women, children and older people. The US knew that the fire service was run by young boys. US strategists calculated wind direction and other factors to optimize destruction of the wood and paper homes. Official estimates range from 1 million dead and 1.3 million injured, upwards. The atomic bomb exploded over Nagasaki was not dropped on the original military target, but through a gap in the clouds, destroying, among other things, the biggest Christian cathedral in Asia.

victors' justice

In the book and film *The Fog of War*, Robert McNamara quoted General Curtis LeMay as saying, "If we'd lost the war, we'd all have been prosecuted as war criminals."

(Continued)

(Continued)

McNamara continued, "And I think he's right...He, and I'd say I, were behaving as war criminals...LeMay recognized that what he was doing would be thought immoral if his side has lost. But what makes it immoral if you lose and not immoral if you win?"

crimes?

Would these events have been crimes:

- Under legal norms at the time of World War II?
- Under the *ICC Rome Statute*?
- Had American allies not won the war?

Might the concept of 'war crime' hide the conceptualization of war as a crime?

[See References for further information.[53]]

main ideas

When researching ***formal documents*** consider how they will be used – for a *literature review*, as a *source of evidence*, for *documentary analysis*, or to analyse *mass communications*.

To ***find*** and ***select*** documents:

- check if they are in archives and "invisible" to online searches, and plan how to find them.
- ascertain if UN documents are *categorized* as a *document* or *publication*.
- decide the *sampling method*, if there is a large 'population' of similar documents.
- design a *coding frame* for extracting particular texts.
- remember *secret documents* may become available after certain time periods, but are often *censored, hidden,* or *manipulated*.
- use *Freedom of Information* laws to gain access to sensitive material.

When ***using*** documents, consider:

- *documentary analysis*, which *interrogates* a document, using questions or an analytical framework.
- *content analysis*, which may be useful for transcripts.
- *discourse analysis*, which may consider the use of language in-depth.
- *critical discourse analysis*, which will assess how the text relates to power including *epistemic* aspects.
- *policy analysis*, which will assist with *making* or *assessing* policy, and investigate how *policy-making frameworks* are/were followed.
- internal and external *consistency*.

key reading

Fairclough, N. (2001) *Language and Power*. London: Longman.

Gee, J.P. (2005) *An Introduction to Discourse Analysis: Theory and Method*. London: Routledge.

Hansen, A. (2009) *Mass Communication Research Methods*. London: Sage.

Hill, M.R. (1993) *Archival Strategies and Techniques*. Thousand Oaks, CA: Sage.

Krippendorff, K. (2004) *Content Analysis: An Introduction to its Methodology*. Thousand Oaks, CA: Sage.

Scott, J.P. (2006) *Documentary Research*. London: Sage.

online resources

To access the resources – search on the name in italics, use the http, or search on the generic term in 'quote marks'.

Constitute Project – national constitutions – www.constituteproject.org/#

UN Treaty Collection – https://treaties.un.org

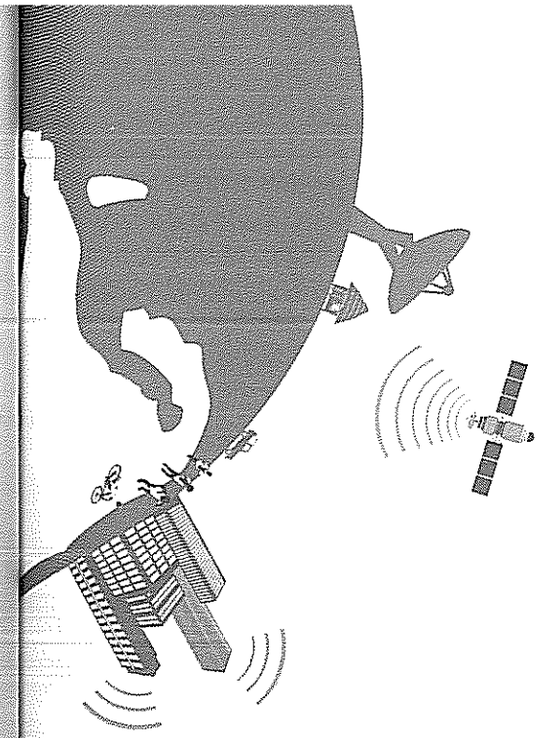
UN History Project – http://unhistoryproject.org/research/research_guides.html

Wikileaks – databases of leaked government and other documents

Checking internet sources – www.Whois.net – www.checkdomain.com/cgi-bin/checkdomain.pl?domain=who

NVivo – documentary and textual analysis

QDA Miner – mixed-methods qualitative analysis



PART IV

Using the findings

Research *findings*, resulting from *data collection* and *initial analysis* (C7–C13), provide the bases for *further analysis* and *reporting* the research.

Chapter 14 explains how, during *further analysis*, a researcher should 'see what others see but think what others have *not* thought' through *comparisons*, establishing *causation*, *predictive* evidence, creating *indexes*, and *generalization and theorization*.

Chapter 15 then outlines how to *report* the research effectively, using international style, for academic, professional and public audiences, to influence and perhaps change things in the world.

FOURTEEN

Further analysis

Two men saw little baby geese following big mother goose – as we all do. But they thought – could we get baby geese to follow a human? The result was the theory of 'imprinting', and Nobel prizes for Conrad Lorenz and Nikolaas Tinbergen. They saw what other people see, but thought what other people had *not* thought.[1] That is the purpose of *further analysis*.

Further analysis builds on *initial analysis* and *findings* to create broader meanings. Within a 'critical theory' approach, analysis will go beyond discovering "what is" to assess "what could be".[2] This involves *comparisons*, establishing *causation*, explaining *predictive* value, creating *indexes*, and *generalization* and *theorization* to fit research within world frameworks. *Analytical frameworks* help to structure analysis, and examples are provided throughout this chapter and on the website. All *methods of analysis* should be described in the *methods* section of a research report. But Stephen Jay Gould provides a useful warning: 'The more important the subject and the closer it cuts to the bone of our hopes and needs, the more we are likely to err in establishing a framework for analyses.'[3]

14.1 Comparison – the basis of analysis

Analysis *is* comparison – noting similarities and differences between two or more things. Some studies may be designed specifically within a comparative framework (C6.2), but all studies will compare findings with other studies, literature and theories. Comparison is the basis of knowledge creation. John Locke pointed out in 1690: 'Knowledge is the perception of the agreement or disagreement of two ideas.'[4] Knowledge is more than raw data and simple facts.

Formal comparative analysis needs a set of clear ***questions*** that are common across the units being compared. Comparisons may be *overt* – "Iran, Syria, Afghanistan and North Korea have ratified the UN Convention on the Rights of the Child, but America has not". But they may also be *implied* – "powerless" would imply a comparison with a group that has more power, "talented" with others less talented. Comparative analysis accommodates multi-methods research, to 'move beyond' the old qualitative–quantitative divide.[5]

Analysis considers the reasons for ***similarity*** and ***difference*** (*dependent variables*) in relation to *common factors* (*constants* and *independent* variables). This entails comparative presentation, which requires *standardization* to ensure that comparisons are of like-with-like (C9.3.1). For statistical data this might mean creating percentages or averages, and often *aggregation* (below). For qualitative data, standardization may be based on determining categories which can create typologies (Figure 14.1). Software permits quick analysis of many forms of data. Similar texts, such as versions of political speeches, can be compared with online resources such as *TextCompare*, and *Excel* can compare spreadsheets.

The Korean class system

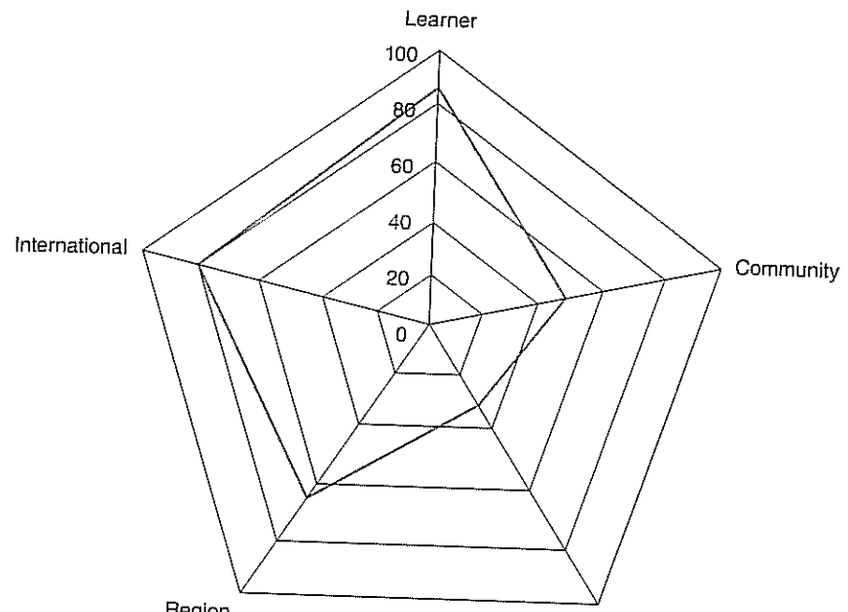
Choson era *Sinbun* class system	Hierarchical status
Yang-ban	Intellectuals
Jung-in	Professional and military
Nong-sang-min	Farmers and commercial
Chun-min	Untouchable

Nobi (slaves) were not ranked.

Figure 14.1 A typology of the Korean class system

Standard *templates* can help to ***present*** analysis. *Area charts* help to compile country data. Qualitative concepts can be combined with quantitative ratings on *star plots* for comparative multivariate, mixed-methods, analysis – the variables can be compared, but also the volume of the star may compare the overall effect (bigger is better) (Figure 14.2).[6] Checking how comparison sites envision their data can

propose how to present similar forms of data. *Index Mundi*[7] presents country profiles very effectively, *Country Reports*[8] has a 'compare and contrast' function, and *If It Were My Home* enables diverse ways to compare countries with 'your home' (or anywhere else), including disasters.[9]



Stabilizing effects of 'English language programmes' in Cambodia. (See website for other examples)

Figure 14.2 Star plot

Source: Johnstone, C. (2014) 'Adult education as a stabilizing response to conflict'. Unpublished PhD Thesis, Institute of Education, University of London.

Jarad Diamond's comparative approach to *historical natural experiments*[10] examines *similarities* or *differences* in:

- *initial conditions* – relevant starting points.
- *perturbations* – *endogenous* (internal) or *exogenous* (external) influences.
- *outcomes* – factors that can be shown to have a *causal* link to *initial conditions*.

Comparisons may be of cases with similarities and differences in *initial conditions* or *perturbations*. *Confounders* are alternative explanations that may interfere with identifying a causal link. In the example on the website, cases 3–8 had the *initial condition* of access to TV; 1 and 2 did not. Cases 5–8 all had the *perturbation* of access to English Language (EL) TV programmes; cases 3 and 4 did not. Cases 5 and 6 only had *endogenous* influence from Soviet EL programmes, but cases 7 and 8 also had *exogenous* influence from access to European EL programmes. So, cases 1 and 2 with

no *initial condition* (TV), and 3 and 4 with TV but no *perturbations* (EL TV) had less political awareness. Cases 5 and 8 had similar *initial conditions* (access to EL TV), but the *perturbations* were different (endogenous Soviet/exogenous European). Yet the *outcomes* were similar – more political awareness. For both there were no *confounders* (poor TV transmission, prohibitions on using English), and a *causal* link seems likely. This creates grounds for a *conclusion* that EL TV may have influenced political awareness, whether or not it was *endogenous*/national or *exogenous*/international, i.e. simply having access to EL TV had an effect irrespective of the content. This could inform present-day policies about cultural diplomacy, for example about providing English language classes in North Korea.

Philosopher David Deutsch argues that knowledge is information that is a basis for action – it has 'reach'.[11] A significant strength of international comparisons, particularly in the form of indexes (C14.4), is that they provide very persuasive evidence for political change, on the basis that, "Other countries are better than us."

14.2 Causation

If a woman pushes a man who has a weak heart, and he dies, is the 'cause' of death her push or his heart? Conundrums like this are central to legal and social arguments about cause and effect. Causation is very significant in world studies because of the need to argue if things were caused systematically – by governments, TNCs, or online networks (C12).

A ***hypothesis*** is often a guess that one thing causes another, and is based on causal theories. Therefore research that is focused by causal hypotheses *must* provide analysis and conclusions about causation.[12] Some research questions have similar causal implications – "Do TV images influence the choices of tourists?" Causal analysis needs to show how *independent variables* and *constants* influenced *dependent variables* (C9.3.2). The theoretical assumptions that explain causal links can be tested through *hypothetical comparison*[13] – "that low police pay causes low morale, low morale causes inefficient policing, and inefficient policing causes corruption".

The fundamental considerations of causation are ***philosophical*** and ***culturally formed***, which must be considered in world research.[14] Indian traditions might argue that an 'effect' is inherent within a 'cause' – that an effect is simply a modification of a cause, and the process is less relevant.[15] Buddhists might add that everything is both an 'effect' and a 'cause', and that every 'effect' results from infinite chains of 'causes'. Confucian writers could say that causation does not arise from human action, but from things that happen independently of humans and are dependent on one another.[16] Diverse traditions underlie how people argue and accept causal links across cultures. Before the 2014 South African elections, (then) President Zuma argued that if people leave the ANC, 'they will attract the wrath of the ancestors who will also bring that person bad luck'.[17]

Causation must be ***theorized***. If environmental health researchers found an increase in lung disease near a new polluting factory, it is not enough just to say "the factory caused it".[18] They would need to explain the *mechanism* – can the presence of those pollutants cause the particular lung disease, were the ill people exposed, were they healthy before the factory opened, does similar pollution seem to cause a similar impact elsewhere? This might entail laboratory research to show how the poison causes damage in the lung, and what dose levels are harmful. For forensic use, the causation would also need to be theorized in terms of environmental science and law (Figure 14.3). But theorization is not always complicated. We do it every day. If a deodorant caused our armpits to stop smelling, we might try it on our feet, but we would not spray it in our mouth to stop bad breath.

Environmental theory of causation	**Legal theory of causation**	
	Act	*Omission*
***Presence* of environmental agents**	e.g. The *presence* of methyl isocyanate. (*Union Carbide* gas poisoning, Bhopal, India)	e.g. The *presence* of excess lead in water supplies. (Regulatory failure, US)
***Absence* of environmental agents**	e.g. The *absence* of micro-nutrient – iron. (Caused by heavy metal pollution on farmland, Poland)	e.g The *absence* of iodine in salt. (Regulatory failure, Bangladesh)

Combining a theoretical model of the environmental (scientific) causes of brain injury (*presence–absence*), and a legal theory of causation (*act* or *omission*).

Figure 14.3 Theorizing causation

Source: Williams, C. (1997) *Terminus Brain: The Environmental Threats to Human Intelligence*. London: Cassell, p. 230.

Legal processes help to understand the concept of causation in the social world. Some legal philosophers prefer to use the form, 'Z was a *consequence* of Y', rather than 'Y caused Z'.[19] In a court, causal *proof* 'beyond reasonable doubt' is required in criminal cases, and reflects a notional 95% certainty. In civil cases, 'balance of probabilities' reflects 51% certainty – it is more likely than not. But a court never claims a decision is 100% certain. Law also considers both the actions (*actus reus*) and the mental rationale (*mens rea*). For social causation, distinctions can be made between the:[20]

- *responsibility* of relevant individuals or leaders, for their actions, and/or the actions of agents and others over whom they have effective authority and control.
- *blame* for wrongdoing, which may attract punishment or other sanction.

- *liability* of individuals, organizations or states to provide remedy.
- *accountability*, which implies that a senior person has a duty to answer initial questions about events that she or he oversees.[21]

In law, cause and effect must be *adjacent* – 'proximate', 'immediate', 'continuing and operating' – but that becomes difficult when arguing on a world scale, for example about environmentally-mediated impacts.[22]

In the ***natural sciences***, Popper's well-known argument about scientific method is that research can only create a better 'corroborated' hypothesis, not 'truth'. He argues that an initial hypothesis can be disproved ('falsified'), but it can never be confirmed as completely correct, because however many times the research is repeated and gives the same result, the next time may provide a different outcome. He therefore argued for the use of 'null hypotheses', a default position, written in a negative form to be disproved – "That A does not cause B". This reflects the court assumption that a person is 'innocent until proven guilty'.

European ***philosophers*** provide useful distinctions. Aristotle defined elements of causal chains:

- *material* – the *physical* things that are involved (toxic waste).
- *formal* – the *plan* that determines the form of the 'effect' (illegal waste dumping).
- *efficient* – the *agency* creating the result (Italian *Mafia*).
- *final* – the *reason* (blackmail to extort money).

But this does not eliminate *confounders*. Arguing that A caused B implies that B was not caused by C, D, E, etc., and eliminating the other likely causes is very difficult in social research. It is therefore relevant to consider the *ontological* and *epistemological*[23] bases (C1.1) – do the causal factors and links really exist, and how do we come to know about them?

Scottish philosopher David Hume argued the need to identify '***necessary connections***', the 'causal nexus',[24] and relational ontology has developed this.[25] Do the ties, causal chains and links exist and are they effective? If mass executions by a despot "caused" people to stop meeting in public, what were the 'connections' that informed them about those executions – TV footage, press photos, posters, gossip – and did people experience these and say that they were consequently afraid? It is also helpful also to consider '*agency*' – the degree to which people could have acted freely and independently – in relation to 'structure' – the systems that limit the choices and opportunities available.[26]

Recent philosophers have made distinctions about the relative influence of the causal factors, but terminology is not used consistently. Calling a causal factor '*necessary*' usually implies that if it were not there, the effect could not have happened. A '*sufficient*' set of factors (which includes the *necessary* factors) means that together they were adequate to cause the effect without any additional factors, and this helps to identify *missing* factors. *Contributory* factors may have influenced the details of the cause and effect, but were not vital for it to happen.

The influences can be tested through '***counterfactual***' analysis[27] – "what if" particular factors had been absent, present or different. Actual and hypothetical data can be compared when assessing or evaluating[28] the impact of an intervention, such as a new policy – "If the new well had *not* been built, would health have improved?" A counterfactual argument might also be used when causation is investigated through an *experiment* – actual or 'natural' (above) – in which one group was exposed to an intervention, compared with another similar group that was not.[29]

Like systems analysis (C12), *mapping* causal systems can help to make explanations clear, each stage of the causal chain can be tested, and contextual factors that may not seem immediately relevant can be included. (The diagrams on the website are just outlines – real-life events are much more complex.)

- *Fishbone diagrams*[30] *map* problems in commercial systems. The main causal factors (weather, maintenance) must be easy to identify and well understood. But the method might omit the more fundamental causes (flawed contracts, corrupt CEOs).
- *Why-Because Analysis* (WBA) was originally designed to assess the causes of accidents.[31] Potential causal factors are identified, the causal links are then tested to see if they were '*necessary*', '*sufficient*' or '*contributory*', and if anything is *missing*.
- *Causal loop diagrams* integrate forward and reverse factors, and show how causal trajectories can be impeded or expedited.[32] This is useful because most causal diagrams are one-directional.

Diagrams can clarify explanations, but can also encourage mechanistic and deterministic thinking. In the social world, nothing is, or was, inevitable, and context can permit or inhibit most human endeavours. Cause and effect in human systems is never automatic.

14.3 Prediction

An English vicar, Thomas Malthus famously predicted, in 1798, that population increase would exceed the availability of our planet to provide food and other life-support resources, and consequently people would die. He seems to have been wrong, so far.[33] Even if correct, predictive knowledge does not always make humans behave sensibly, or encourage policy-makers to make good policies.[34] On a world scale, prediction often fails, but seems vital.

Like causal analysis (above), the fundamentals of predictive analysis are often ***philosophical***.[35] Again law provides useful insights. The decision whether to hold a suspect in prison ('on remand'), before a trial has established guilt, is often on the basis of 'likelihood of further offending', and this prediction can be based on whether the suspect has committed similar crimes before. This might seem reasonable, but if you made a mistake such as burning the rice, does that mean you are more likely to do the same thing again or less likely because you have learned a lesson? If

the 'likelihood of further offending' logic were used within international relations, academics should all be arguing for America to give up its nuclear weapons because it is the only country to have used them previously against civilians, twice.

Studies may be designed to be predictive, or predictive patterns may be sought during further analysis of general data. Almost all research has a predictive element, even if unstated. Every day we make predictions that permit us to plan ahead and survive productively, but predictive analysis goes beyond these everyday understandings, and explores two types of 'unknowns':

Epistemological prediction is based on assuming that the 'truth' exists in some way, but we do not know what it is – predicting the 'known unknowns' (C1.1). This often relates to predictive hypotheses about *natural systems* and *human biology* (quantum mechanics, epigenetics). *Inference* and *generalization*, from samples to populations (C9.3.3) is similar, because we do not know if the whole population is the same as the sample, but the 'truth' exists within the population. The problem is not that the truth does not exist, but that we don't know how to find out what it is.

Temporal prediction implies that the truth has not happened yet – predicting the future 'unknown unknowns' (C1.1). This might relate to *natural systems* and *biological populations* (asteroids hitting Earth, epidemics) but it is also relevant to *human populations* and *individuals* (voting,[36] customer purchasing).[37]

Predictive analysis about humans often combines the two, and becomes very complicated. For example, – could humans be cloned (*epistemological*), and if so, will humans do it (*temporal*)?[38]

Within this framework, predictive research design and analysis therefore includes:

Epistemological

- *hypothetical* – X relates to Y. "People (X) are angry about GM foods (Y)."
- *investigative* – W did Z. "The prime minister (W) deceived parliament (Z)."
- *inferential* – The population is like the sample. "If 80% of the sample does not believe in god, 80% of the population does not believe" (C9.3.3).

Temporal

- *future causation* – X in the present may cause Y in the future. "An increasing public addiction to sweet food now (X) may cause a diabetes epidemic in the future (Y)."
- *causal projection* – If A causes B in the present, then A will cause B in the future. "The death rate among heroin addicts next year will be the same as this year."
- *projected analogy* – If Q relates to T now, q will relate to t in the future. "The sales pattern of a new sports car next year should be like that of a similar model this year."
- *trends* – Trajectories and patterns from the past to present may (or may not) continue in the future. "Sales of tablet devices are overtaking sales of PCs, which is likely to continue."

In these and other forms, the underlying assumption reflects Stephen Hawking's 'time cones' and his profound but simple truth that the future is simply everything from the past, which passes through, and is mediated by, the present.[39]

But the world is ***complex***, and many factors can disrupt predictive analyses, including:

- *self-fulfilling prophecies* – the research findings "find" what they have created. If a study predicts that water shortage could cause war between two countries, a war might happen because national leaders hear about that prediction.[40]
- *pre-emptive deceit* – powerful people deploy 'an incorrect or misleading statement or process...to preclude subsequent truth and/or obscure subsequent acts or omissions', such as the British *Iraq Dossier*.[41]
- *optimism bias*[42] – we tend to believe that outcomes will always be better than the evidence suggests, and so underestimate risk. This effect can be compounded in group assessments. 'Smart' people are often 'stupid',[43] for example 'positive illusions'[44] about risk.
- *brain lag* – the human brain is essentially Stone Age, and cannot perceive the present and future clearly. We know that sugar, salt and fat were rare in a Stone Age environment, and so now we gorge on them. Despite that knowledge, our brain still cannot predict that they are harmful.[45]
- *complexity* and *chaos* – human-influenced systems rapidly become too muddled and unstable for traditional predictions to be made, for example organizations like *al-Qaeda*.[46]

Complex systems are often analysed by changing the *scale* of observation, and looking for *patterns*. There is no clear pattern when tossing a coin a few times, but observe many coins tossed many times, and the 50–50 pattern becomes evident.

So prediction is never completely ***certain***, and the likelihood of things happening is often described as ***probabilities*** – in percentages (90% certain), frequency (every century), ratios (a 1 in 5 chance), or consistent terms (high, moderate, low). ***Uncertainty*** describes factors that cannot be described or measured accurately. *Understandinguncertainty.org* provides ongoing discussions. The pattern across most forms of prediction is a paradox. In both the natural and social world it seems harder to make small-scale predictions (a child will suffer depression if its father dies) than to make large-scale predictions (20% of children will suffer depression). The broad trajectories of climate change are now well understood. But is very hard to predict how communities, nations and individuals will respond – increased war or humanitarian assistance, crime or altruism.

Certainty usually diminishes as the human aspect of the prediction becomes greater.

- Predictions about ***natural systems*** (physical, chemical, biological[47]) are *epistemological*, and so usually *more certain*, because the correct answers exist in some form (unless the laws of physics evolve[48]).
- Predictions about ***engineered systems*** (machines, buildings, infrastructure) are also more certain because we engineer on the basis of natural laws and understand how we do it. But human influence (corruption, incompetence), or *environmental* impacts (earthquakes, floods), can change the dynamics.
- Predictions about ***biological populations*** (evolution, disease) can be moderately certain, unless human behaviour (genetic modification, synthetic biology) or *environmental* factors (temperature change, land erosion) influence what happens. Prediction about ***human populations*** *is more difficult* because the dynamics are influenced by human decision-making which is affected by *social contexts*. The fact

that 20% of a population used painkillers in the past does not mean 20% will do the same in the future – a scare story about painkillers could dramatically alter that behaviour. 'Crowd behaviour' can sometimes be predicted (avoiding threats, fighting injustice), but the triggers are still not well understood.[49] Projections that view *human populations* as *biological populations* (health outcomes, birth-rates) can be quite accurate. If, in the past, 20% of a population with X severity of Y disease died within one year, it is very likely that, within a similar population, 20% with the same condition may die in the future. But that could be radically changed by a new cure, for example from pharmacogenetics, or aggravating environmental factors like new viruses.

- **Population predictions** (biological, human) are generally much better than predictions about *individual behaviour.* On an individual level *social context* becomes very significant – if you go to observe a Catholic priest leading a service in a church, you can be almost certain you will hear Catholic doctrine; if you meet him in the pub an hour later, his topic might be very unpredictable.

The distinction between non-human and human probabilities is often muddled.

thinking zone: are tossers more predictable than placers?

tossers

Toss a coin many times and record each time how it falls – heads or tails. The result will be a seemingly random pattern. But over a long period, the ratio will be about 50–50. If we did an analogous experiment using an animal, machine or natural occurrence to generate the coin tossing, the outcome would be the same. We could devise an experiment that apparently permits an (untutored) animal to exercise its independent behaviour by choosing to place a coin heads or tails, but over time there will be a 50–50 distribution.

placers

Ask a human to *place* the coin, and the result might be the same, but it might not. The outcome could reflect some form of plan resulting in a seemingly regular pattern – heads, tails, heads, tails... But this pattern could change at any time. The outcome could also be the persistent placing of one side – heads, heads, heads... A human might place the coin – tails, heads, heads, heads... This removes any element of predictability that we might have concluded in relation to the previous outcomes.

predictability

Coin *placing* is unique to humans because our behaviour stems from reason, not just reaction or cause and effect. The consequence sounds like a paradox.

Non-human behaviour creates an outcome that, although seeming random, *is* broadly predictable. Human behaviour can create an outcome that is *not* random, but therefore *not* broadly predictable.

pertinacity

Humans destroy the environment because they can be pertinacious, 'very or extremely (per) tenacious' – 'persistent or stubborn in holding to one's own opinion or design...Chiefly as a bad quality' (OED).

so

In terms of predictability, what type of human behaviour is more like that of animals or machines, and why?

[See References for further information.[50]]

14.3.1 Frameworks for predictive analyses

Predictive analysis is very popular, especially *forecasting,*[51] within economics and strategic studies. The annual *State of the Future Report* covers world issues, and journals like the *International Journal of Forecasting* discuss methods. Relevant analytical frameworks fall into two broad categories – *physical-human*, which uses physical factors that are more certain as a basis for estimating human factors that are less certain (*risk analysis*, *scenario analysis*), and *crowd* which uses 'collective intelligence' of large groups (*prediction markets*, *big data*).

Risk analysis involves predictions that something negative may happen, and usually involves *uncertainty.* Methods can be *quantitative,*[52] and *qualitative.*[53] On a world scale this reflects Ulrich Beck's concept of the *Risk Society,*[54] and the *Journal of Risk Research* provides ongoing discussions. Risk *assessments* are often expressed in terms of the *probability* (*likelihood – risk*) of something happening, then the *probable impact* from those *threats* or *hazards* actually causing harm, and then an estimation of the *cost* of the harm (or opportunities for business) if it occurs. Examples of quantitative risk analysis include actuarial analysis for insurance – linking claims for burglaries to postcodes can automatically change premiums on the basis of postcode. But even seemingly sophisticated statistical assessments will usually entail qualitative judgements – guesswork – somewhere in the process.

Assessments may start by *identifying* and then *categorizing* possible *threats* (acid rain, corruption) in relation to *mitigating factors* (anti-pollution technology, regulatory systems). Then ***probability assessment*** may use quantitative data (previous weather

patterns), together with qualitative judgements (honesty of factory managers), and is based on factors such as:

- *threat* – "acid rain caused by pollution from a cement factory".
- *impact* – "forests dying from acid rain".
- *magnitude* – "1000 trees dying".
- *frequency* – "1000 trees in 10 years".
- *probability* (*likelihood*) – ranging from "certainly will not happen" (0) to "certainly will happen" (1, 10, or 100%).
- *when* – "while the cement factories are operating".
- *where* – "around Chengdu".
- *assumptions* – "the cement factories will not improve their pollution controls".

The above factors need to be included in research questions – "If the cement factories do not improve pollution controls, how probable is it that more than 1000 trees will die each decade, because of acid rain caused by pollution from the factories, around Chengdu?" To reduce bias from individual judgements, relevant groups (experts/locals/administrators) may be asked to rate risks numerically, and the results then averaged and presented in relevant forms.

The *impact*, and the cost of *harm* is then assessed, but this is often based on accountancy or procurement data, which may be accurate but very limited. In world contexts, assessments of harm should include intangible 'loss costs' such as biodiversity, mental decline, disability.[55] Like probability, *harm* can also be assessed by qualitative judgements.[56] Risk assessment of complex systems may use specialized flow charts – *event trees* which *map* possible problems outwards from the present, and *fault trees* which track backwards from hypothetical problems.

Scenario analysis came to public attention in the 1970s when *Shell* oil used it to survive fluctuating oil prices better than other companies[57] – *www.shell.com/scenarios* is useful. The strength of scenarios is that they accommodate uncertainties and unknowns better than linear models, because they model more than one possible future 'world', and only claim to predict what *could* happen, not what *will* happen.[58] Scenario analysis is a form of *causal projection* and is based on frameworks:

- Defining

  long-term assumptions – things that are likely to stay predictable over long periods (languages, law).

- Identifying

  drivers – influencing factors that are more certain (economic, demographics, climate change).

- Agreeing

  likely *outcomes* of drivers – factors that are less certain (floods, political stability, migration).

- Creating

  scenarios based on different *assumptions* (1. Refugees will try to migrate to the nearest safe place. 2. Governments will try to prevent immigration. 3. Some countries will accept managed immigration).

Although the *scenarios* might be very different from one another, they each have their own *internal causal logic*, and share a common *external causal logic* based on the *drivers* and *outcomes*. Common *factors* are then sought across the *scenarios*, which can permit planning *priorities* on the basis of criteria such as *scale*, *frequency* and *severity*.

Trend driver analysis is similar to scenario analysis, and is applied to global security problems, using analytical frameworks such as: *input data > trends and drivers > outcomes > predictions and explorations*.[59] This is often used within military training, and 'wild cards' can be identified from the frequency of unexpected or unpredictable events mentioned in relevant literature. The 'wild card' is then often introduced in training or group analysis at critical moments, to see how people respond to unexpected events. *Backcasting* inverts these methods, and works backwards from a desired or hypothesized future scenario, to identify how policies and actions might bring about that scenario.[60]

Crowd predictions use the 'collective intelligence' of large numbers of people, as advocated in James Suroweicki's *The Wisdom of Crowds*,[61] and are an aspect of *crowd-sourced research* (C6.4). Crowd assessment can work well for *epistemological predictions* ("How many sweets in that big jar?"), because the answer exists, and so the average of many guesses is likely to be more accurate than the guess of any single individual. The weakness of this approach is that if a few people have expertise (in filling bottles with sweets), their informed and probably more accurate estimates will probably disappear in the aggregation of incorrect guesses. Crowds are less likely to be useful for *temporal predictions* ("If we leave the room, will the children start stealing the sweets?"), because no one can know what the correct answer is, and the answer could be determined by group dynamics or a particularly persuasive leader.

Prediction markets ('information markets', 'event futures') are an innovative way to harness collective intelligence.[62] The *Journal of Prediction Markets* provides ongoing discussions, and interesting examples include *ideosphere.com* and *newsfutures.com*. Researchers set up online systems, similar to futures trading or online betting, to permit people to "invest" in geopolitical risk such as the outcomes of wars, terrorism, elections or resource depletion. The assumption is that if more people back a particular prediction, it is more likely to be correct, which can be expressed as means or probabilities – a €60 bid for a €1 "share" could imply 60% certainty. The criteria need to be clear and simple – what, when, where. Results can provide direct measures (that X% of a population would use euthanasia), or proxies (a probable decline in church attendance means an increase of secularism). The type of "bet" includes winner-takes-all, index ('totalizer'), or spread. Rewards can be real or virtual and those who bet correctly can be rewarded for improving the effectiveness of the systems, and *vice versa*. The "gamblers" are likely to do research to get accurate information to inform their choices,

so the crowd tangibly extends the ambit of evidence gathering beyond the researcher. Prediction markets seem to compare well with other methods for accuracy.[63]

A *prediction market* could utilize *findings* presented as *scenarios*. On a small scale this can be done as a *focus group* (C8.2). Face-to-face group results might even be better than the online markets because group discussion provides feedback and modification of participants' ideas. ***Citizen Juries*** are an example.[64] Around 12 lay, local people are permitted to hear evidence from, and cross-examine, experts in relevant fields, about local decisions, such as where best to site a waste disposal centre, or how to reduce crime. The idea can also be applied to research.[65] The general conclusion about the success of these juries is that they are no worse than experts – that, "The worse possible outcome from a Citizen Jury will be the same views as the experts."

Big data also presents interesting new ways to use crowds (C9.4). Sites like *culturomics.org* provide access to tools and ideas such has searching for 'sentiment' in literature. Whereas markets and groups (above) use crowds as an extended researcher network, big data uses online crowds as a source of data. *Machine learning*[66] has led to *predictive analytics*,[67] which can be based on extracting data from social media sites, and uses patterns to suggest future trends. Big data can also be used to validate small-scale conclusions about social trends. *Google Trends* can be used to check general usage of words and phrases, and the occurrence of events, over time. *Google Books Ngram Viewer* provides evidence of the use of terms in books since 1800 (Box 3.1), but be aware of what type of books are likely to be in this database before making conclusions about the findings.

But, as a predictive method, big data is based on big assumptions. Fundamentally, it assumes that human decisions can be predicted. Can they?

- Do *you* know exactly what you will do tomorrow? If not, how can an algorithm know,[68] unless it is measuring something subconscious and biological, like behaviour during the early stages of pregnancy?
- Is the *context* of our decisions predictable? Do you know which friends will phone you tomorrow with what news and how you will respond?
- Computer programmers are assumed to be objective, but inevitably embed their beliefs and biases in the programs – would a CIA employee program in the same way as an *al-Qaeda* operative?
- Computer predictions often jump directly from the independent variable to the (apparently) dependent variable. If someone does an online search for terrorist sites, this might lead to a conclusion that this person is a potential terrorist, yet she or he could be a police officer studying terrorism for a PhD.

14.4 Creating indexes

Indexes provide a way to consolidate and compare large amounts of diverse world data. They may cover many countries, cities or other places.[69] *Rankings* (league

tables), like those from the OECD,[70] attract ongoing critical discussion.[71] *Indicators* imply caution when interpreting the data – indicators *only* indicate.[72] *Indexes* usually include little descriptive analysis, but they sometimes include qualitative data.[73] *Indexes* that cover the whole world may be unreliable, because basic data from less wealthy countries is often not accurate.[74] The point of indexes is that they permit *comparisons* (C14.1) – "1278 children in Hanoi hospitals" is just a statistic, but comparing Hanoi with other city hospitals creates knowledge.

The data for indexes comes from *secondary* sources (government or commercial statistics), surveys (C9.3), or participatory methods.[75] The easiest way to determine a methodology for creating an index is to adapt the methodology from a similar index. Many explain how they are created.[76]

Most indexes start from ***concepts*** that cannot be measured because they are too abstract – health, integrity, happiness – including 'fuzzy' concepts such as 'democracy'.[77] But studies are often designed around things that are easy to measure ("death"), rather than things that are important ("pain reduction"). Concepts also mean different things to different people, and so they need to be *defined* ("Good health is...").

Concepts are then operationalized as ***proxy indicators*** that can be measured. The concept of 'state legitimacy' may be assessed through indicators such as 'political violence', 'political prisoners', 'mass emigration', 'anti-system movements'.[78]

Indicators (e.g. for the concept 'health care') might be *direct* (number of nurses) and/or *indirect* (access to fresh water). They might measure *inputs* (vaccination) and/or *outputs* (child mortality). *Longitudinal studies* (e.g. trends in commercial airline policy) might start from *baseline indicators* (miles flown by commercial airlines), to monitor and evaluate interventions (cutprice airlines). But if the baselines are not accurate, the rest of the study is useless.

Individual *indicators* do not usually, on their own, provide accurate measurements of a *concept*, and so diverse data is usually ***aggregated*** (C9.3.1). The data from many different indicators is *standardized* to give a single score to measure the whole concept and create a *composite index*. The *Human Development Index* aggregates a large amount of statistical data to assess concepts such as 'poverty' or 'health', and the *World Press Freedom Index* is similar (Figure 13.1). Aggregate data can be used to create 'constitutive' or 'substitutive' indicators, for example to compare the success of governments or other entities in relation to achieving 'latent' conceptual goals.[79] On the basis that political leaders have the responsibility to ratify international conventions and other codes, and for creating wars and environmental harm, indicators about war, corruption and environment can be aggregated to create an index and rankings about the *concept* 'global leadership responsibility'.

Creating indexes, especially indicators, usually involves many methodological compromises but, in general:

- Use as few indicators as possible, but enough to create a comprehensive, reasonably unbiased, picture of what is being assessed.

- Use indicators that:
  - clearly operationalize the concept
  - are simple but robust
  - can be easily followed over time
  - can be easily compared with other places
  - can create useful composite indexes
  - can be created and used within available resources (cash, people, expertise)
  - use existing data, if possible
  - use the best quality data.

Rankings are often based on pollicized methodologies, as with the Olympic Games (Figure 0.2). The more credible rankings are adjusted or 'weighted' for population size and other factors. *Musicmetric's Digital Music Index* (2012) *weights* 'downloads' in relation to 'country population', to provide a 'per capita' figure for rankings. The UK has the most downloads, but Australia has more per person (Figure 14.4).[80] But if a *measure* becomes a *target*, it becomes a bad measure, because the target then changes what is being measured, and the indicator becomes meaningless.

***Musicmetric's* Digital Music Index (DMI) 2012**
Top countries for total BitTorrent downloads
during first half of 2012, per capita

	Country name	Total downloads	Approx songs	Country population
1	Australia	19,232,252	154,242,661	21,766,711
2	Ireland	3,434,737	27,546,591	4,670,976
3	Slovenia	1,416,433	11,359,793	2,000,092
4	Canada	23,959,924	192,158,590	34,030,586
5	United Kingdom	43,263,582	346,973,928	62,698,362
6	Norway	2,827,508	22,676,614	4,691,849
7	Italy	33,158,943	265,934,723	61,016,804
8	Portugal	5,607,910	44,975,438	10,760,305
9	Croatia	2,305,095	18,486,862	4,483,804
10	Greece	4,933,478	39,566,494	10,760,136

Figure 14.4 File-sharing rankings

Source: Pakinkis, T. (2012) 'The state of music piracy: in-depth data from new global report', *Musicweek*, 17 Septembe

14.5 Generalization, theories and concepts

"So *what's the big idea?*" is the question that journalists enjoy asking, and researchers hate answering. For a study to have international or global relevance, usually some form of *generalization* or *scaling* is necessary. Generalization usually entails locating findings in broader frames of reference so that they have greater relevance and can contribute to higher level thinking.

Generalization is usually seen as ***scaling up*** the findings of a study. Using micro-data may need to inform macro-theories, for example about state crime:

> Interviewing violence perpetrators and constructing their place within state hierarchies of violence requires inserting micro-level findings into macro-level theories of State, of social organization, of framing ideologies, and of work and career...Placing micro-level findings about Brazilian torturers into a macro-level framework captures State torture's systemic nature, with its five 'actor types'—"perpetrators", "facilitators", "framing ideologies", "bureaucratic organizations", and "bystanders"...By studying only torturers perpetrators, and not theorizing State, researchers bypass torture's systemic nature and can promote State torture system longevity.[81]

But it may also be necessary to generalize by ***scaling down*** from findings about international and global systems to local and individual circumstances. This is a distinct aspect of world-scale research, and is often ignored – why did research for the *World Bank* 'structural adjustment' plans of the 1990s not consider how encouraging governments to privatize bus services would reduce school attendance in rural villages? There is also an absence of *mezzo-level* (mid-level) understanding. There is good macro-data about the Chinese economy, and quite good micro-data about household economies in China, but little about what is happening in between at city or town level.[82]

Studies about ***people*** (C8) are often qualitative and interpretative,[83] and may be generalized in terms of their 'fittingness' or 'transferability' to analogous contexts.[84] Within human biology, studies on a few individuals are thought to be universally applicable because human biology seems universal. Psychologists also assume that their work is universally applicable. But, 'we have no notion of human psychology on a global scale. Most research is carried out on Americans and Europeans – samples from just over 10 percent of the world's population'.[85] Certain small-scale studies can be scaled up by locating them within international law – girls' health within human rights frameworks, child labour within ILO standards. Interviews with a few Ministry officials may need to be theorized in relation to theories about whole bureaucracies. Cultural research might also have global relevance. Discovering better ways to interpret the music of J.S. Bach has global significance for the present-day performance of Bach's music anywhere in the world.[86]

Population studies (C9) can be scaled up statistically, including non-human populations such as documents (C13). This need not be complicated. Standardizing data immediately makes it comparable more broadly (C9.3.1). If the sample is *representative*

of a specific population, the findings of the study can usually be generalized to that population, and sometimes to similar populations (C7.4). *Sampling error* describes the degree of the chance difference between a population and its probability sample, such as a different percentage of children or women, and can be assessed and often corrected during analysis. *Non-sampling error* arises from factors such as bad questions or data processing, or low response rate, and this cannot be corrected. *Non-representative* samples cannot be scaled up statistically. But, although it is wrong for a researcher to over-claim the generalizability of findings from non-representative samples, a reader can generalize from relevant findings. The way a despotic regime used torture in South America may indicate, to an African reader, how torture is used in an African country.

Missing, or ***overlapping***, ***data*** is a particular problem with population studies, particularly about issues such as human rights abuses. Innovative methods such as *Multiple Systems Estimation* (MSE) try to address this problem.[87] MSE makes use of data from probability and non-probability samples so that missing data can be inferred from existing data, much as the picture on the missing pieces of a jigsaw puzzle can be inferred from the surrounding pieces. This may entail comparing different lists of names of relevant people – hospital, NGO and press lists of victims of torture – and deleting the overlaps. Or it may use past norms to assess a new circumstance. During a war, the number of village graves dug during the year of that war (G), minus the average number of graves dug annually before that year (g/per annum), could indicate the number of war-related deaths (WD). (G – g/per annum = WD).

Places (C10) often provide data at mezzo level, which can be scaled up and down. Much data is scalable because it follows physical laws, particularly infrastructure data – all rivers flow towards the sea and so factory pollution in rivers will behave in much the same way anywhere, the earthquake-proofing of buildings in Japan can be applied to countries that experience similar types of earthquakes. ***Mapping*** (C11) also entails decisions about scaling. Scaling up loses detailed information but improves context, and scaling down improves detail but loses context, as with online maps. Thinking about how cartographers overcome this provides useful insights for other approaches. They focus on the *purpose* of the map, highlight what matters and omit what does not. A London Underground map is perfect for travelling by train, but useless for cyclists.

Systems (C12) may provide data that is intrinsically generalizable. If a new law is said to affect a few gay people in a particular way, it is likely potentially to affect most gay people in the whole jurisdiction, in the same way. But it is necessary to check that those few people understood and reported what happened accurately, and that the law was applied correctly. Most importantly, for some purposes systems data can have great impact without being generalizable. Good, non-representative data about mass killings of civilians in a war can be sufficient to evidence war crimes without knowing how many people in a whole population were affected.

Theoretical generalization (C2) entails locating a study within a particular theory or theoretical framework, and comparing findings with theory[88] – "How does government

enthusiasm for a war fit with theories of 'military Keynesianism'?"[89] Stephen Jay Gould elaborates,

> Facts do not "speak for themselves"; they are read in the light of theory. Creative thought...is the motor of changing opinion. Science is a quintessentially human activity, not a mechanized, robotlike accumulation of objective information, leading by laws of logic to inescapable interpretation.[90]

Theorization includes broad *general theory*, *specific theory* about unique situations, and practical and *functional theory* which relates closely to practice (Figure 14.5).[91] *Meta-theory* is an overview of theories – theories of theories – and can include an assessment of the methods used to support those theories. *Theoretical research* is based on reason, logic, calculation, modelling and argument, and may address issues like bargaining and conflict, justice and equity, and legitimization processes.[92]

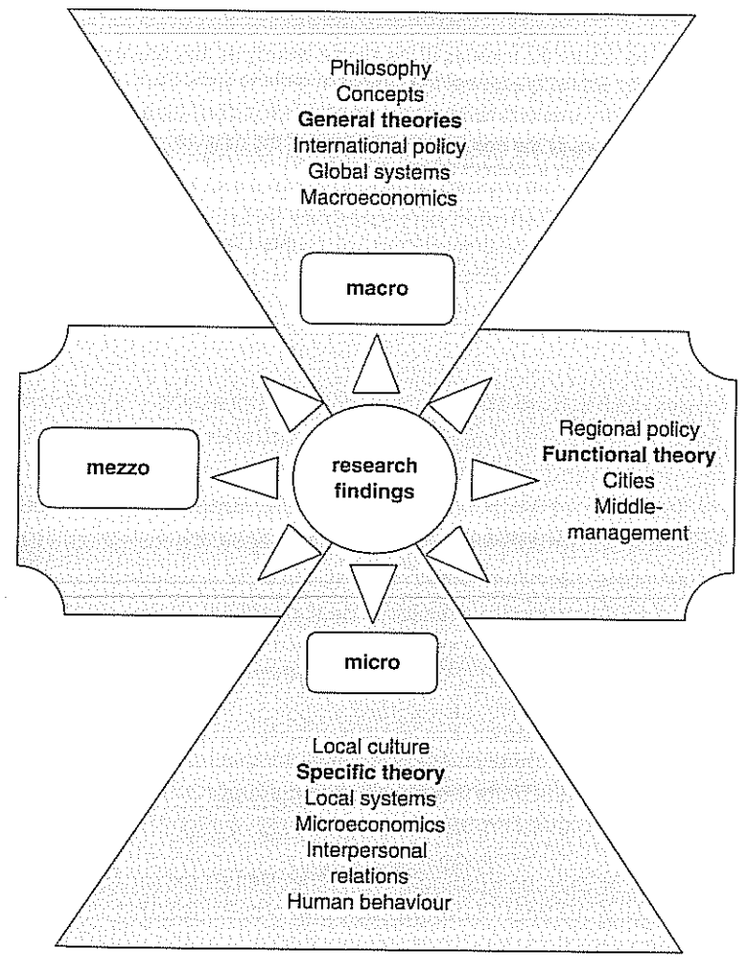


Figure 14.5 Theorizing world research

When a study is being designed (C4), decisions will be made about the use of theory. It can be *deductive* – existing theory is tested by observations and findings – or *inductive* – observations and findings are explained by existing or new theory. But in practice, research is often a mixture of both inductive and deductive analyses. A *grounded theory* approach starts, without a theory or hypothesis, from data collection. Significant data is identified and coded, and codes are grouped into concepts. From these concepts categories are built, from which new theories and hypotheses may emerge.

International theorization usually compares *others* with European-American theoretical constructs. But historically, there have been interesting attempts to understand *others*, from a less partisan viewpoint. In his book *India* (1030AD), al-Bīrūnī termed theory 'truth in the abstract', and his comparative method was based on theories *from* different cultures, not *about* different cultures (Figure 14.6).[93] It is hard to think of present-day examples of theories being compared on their own culturally distinct terms.

> I shall place before the reader the theories of the Hindus exactly as they are, and I shall mention in connection with them similar theories of the Greeks in order to show the relationship existing between them.
>
> I like to confront the theories of the one nation with those of the other simply on account of their close relationship, not in order to correct them.
>
> ابو ريحان بن محمد البيروني
>
> Abū Rayhān al-Bīrūnī, *India* (circa 1030)

Figure 14.6 Theory (al-Bīrūnī)

Formal theories derive from two sources: *empirical* research – a particularly robust piece of primary research, or a meta-analysis of a number of similar research studies, and/or *reason* – logical and consistent chains of evidence-based argument. Usually there is a combination of both. Conclusions may support, contradict or modify existing theory, or occasionally construct a new theory. Theories can inform future research by suggesting new *hypotheses* to test, or new *research questions* to address (C4.1). Johnson and Christensen provide a neat checklist for assessing theories:[94]

1. Is it logical and coherent?
2. Is it clear and parsimonious?
3. Does it fit the available data?
4. Does it provide testable claims?
5. Have theory-based predictions been tested and supported?
6. Has it survived numerous attempts by researchers to identify problems with it or to falsify it?
7. Does it work better than competing or rival theories or explanations?
8. Is it general enough to apply to more than one place, situation or person?
9. Can practitioners use it to control or influence things in the world?

In time, theories can create and elaborate ***concepts*** (terms implying a distinct idea or meaning) – 'security', 'sovereignty', 'discrimination' – and consensual *norms* or *moral values* – 'tolerance', 'international understanding' 'global justice'. Research findings, theoretical ideas and concepts may also be related to ***philosophy*** and ***ethics***.

But generalization on a world scale can go wrong, and theorization can culminate in the creation of simplistic paradigms. Karl Marx's theories were relevant to 19th century Britain, but mutated into Stalinist and Maoist ideologies which permitted the powerful to repress the powerless. In 1946, Bertrand Russell warned of the problem of 'theoretical imperialism', which continues.

> It is mainly through theorists that the maxims regulating the policy of advanced countries become known to less advanced countries. In the advanced countries, practice inspires theory; in the others, theory inspires practice. This difference is one of the reasons why transplanted ideas are seldom so successful as they were in their native soil.[95]

There are many explanations about why we distort generalizations.[96] 'Confirmation bias' means that we tend to favour information that fits our prevailing worldviews.[97] 'Pathological analysis' happens when small pieces of information are given too much importance because they fit a prevailing paradigm. 'Cherry picking and stove-piping' means selecting favoured evidence and channelling it to decision-makers.[98] But the bigger problem is that indigenous and minority group perspectives are ignored by theorists.

thinking zone: how do we create culturally-based theories?

identifying

- Which indigenous, traditional or culturally-based ideas could contribute to a theoretical framework for a present-day research study?
- Which non-European/American philosophical systems might provide ideas that can be compared with European-American theories?
- Could any religious *beliefs* (not historical events) form the basis of a theory that could be compared with non-religious theories?

applying

- How could the Confucian idea of *filial piety* (respect for family and elders) be compared with British theories of state welfare provision for older people, without trying to 'correct' either viewpoint?
- How can indigenous ideas of agriculture and forestry be compared with concepts such as 'sustainable development' or 'green growth'?
- How might different cultural ideas of gender roles be compared to inform international human rights theories?

World research often gets away with massive erroneous claims that would not be tolerated within small-scale studies.[99] Any analysis needs ongoing consideration of the ***integrity*** of conclusions, and what they will mean for the people, the research concerns and others. This is discussed further on the website.

main ideas

- ***Comparison*** is the basis of all analysis and knowledge-creation. It is also a specific approach to international research, based on *common questions*. *Historical natural experiments* are an example.
- ***Causation*** on a world scale is hard to demonstrate. The bases are philosophical, and differ across cultures. Causal diagrams can identify *necessary*, *sufficient* and *contributory* factors, and *causal loop diagrams* help to include causal factors in all directions.
- ***Predictive analysis*** can be *epistemological* (hypothetical, investigative, inferential) or/and *temporal (future causation, causal projection, projected analogy, trends)*. Analytical frameworks include *risk analysis*, *scenario analysis*, *collective crowd intelligence* and big data.
- ***Indexes*** *aggregate* secondary data, in relation to *concepts*, to create rankings, *league tables* and indicators.
- ***Generalizing*** findings extends their relevance to *macro*, *mezzo* and *micro* levels. Analysis may include *statistical*, *interpretive*, *theoretical* and *philosophical* arguments.

key reading

Cua, A.S. (1975) 'The problems of causation: East and West', *Philosophy East and West*, 25 (1): 1–10.

Kutach, D. (2014) *Causation*. Cambridge: Polity.

Morse, S. (2004) *Indices and Indicators in Development: An Unhealthy Obsession with Numbers*. London: Earthscan.

Ragin, C.C. (1992) *The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies*. Berkeley: University of California Press.

Scott, A.J. (ed.) (2001) *Principles of Forecasting: A Handbook for Researchers and Practitioners*. Norwell, MA: Kluwer Academic.

online resources

To access the resources – search on the name in italics, use the http, or search on the generic term in 'quote marks'.

Index Mundi – compares country profiles

TextCompare – finds differences in similar texts

Excel – can compare spreadsheets

culturomics.org – access to big data tools and discussion

Google Books Ngram – *"big data"* searches in books since 1800

Prediction markets – ideosphere.com – newsfutures.com

International ranking indexes – http://en.wikipedia.org/wiki/List_of_top_international_rankings_by_country

UN Statistics – http://unstats.un.org/unsd/default.htm

EC MDG Dashboard – http://esl.jrc.ec.europa.eu/envind/db_meths.htm

UNDP – Human Development Index – http://hdr.undp.org/en/statistics/hdi

World Bank Institute – governance indicators – http://info.worldbank.org/governance/wgi/index.aspx#doc

MORE ON THE WEBSITE