Understanding terrorism and radicalisation: a network approach

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Executive summary

- New research on networks has put individual well connected agents at the centre of the spread of many social phenomena, including religious ideas.
- England in the 1550s provides a model of how a society can be radicalized through heavy-handed public persecution.
- Much can be learnt from the spread of the medieval Cathar heresy by relatively few individuals, the 'perfecti'. The inquisitors sent to suppress them used various unsuccessful strategies, whose failures can be illuminated by modern network theory.
- Eventually the Inquisition was successful, by prioritizing the gaining of information about the movements of heretics and the isolating of local contacts.
- The lessons for fighting religious terrorism are the premium on local intelligence and the importance of relying on the judgement of local communities to police themselves
- Terrorist movements which promote martyrdom (e.g. suicide bombings) would have a much greater chance of influencing opinion in their favour if prominent individuals in the movement were the martyrs rather than the rank and file

Introduction

The combination of detailed historical analysis and recent developments in the theory of social networks can offer useful policy lessons with respect to contemporary Islamic terrorist movements. This is not to claim that the specific circumstances surrounding any particular historical event will be repeated, whether in whole or in the main. But there are certain principles which history can teach us. In 2007-08 the historian Andrew Roach and the economist, Paul Ormerod of Volterra Consulting collaborated in an AHRC Knowledge Transfer Fellowship designed to cast light on contemporary issues using historical examples.

The essence of history is the careful evaluation of a wide range of possible causes and a recognition that historical events are 'dense', each being determined by multiple factors. In contrast, in the natural, biological and social sciences such as economics, there is a desire to simplify, to try to identify a small number of key drivers in any particular situation. All such theories are of course known to be approximations to reality. Even quantum physics, which has so far survived the most rigorous empirical testing, still consists of approximations, extremely good ones, but approximations nevertheless

In looking at the spread and suppression of religious movements and ideologies our most recent work has concentrated upon the conversion of England to Protestantism in the mid-16th century, and the suppression of the Cathar heresy by the Inquisition in the 13th century.

Network theory and the impact of burnings

Historians have long debated the harsh policies of 'bloody Mary' and the impact of almost 300 public burnings on public opinion between 1555 and 1558. In our analysis, we make deliberate simplifications and ask, for example, how far can the burnings themselves account for the conversion of England to Protestantism? We know that there are many reasons for the spread of Protestantism, but it is useful to set up a framework in which by assumption this is postulated to be the only one.

We make a further dramatic simplification and assume that any point in time, individuals see themselves as either being Catholic or Protestant. There is a refinement to this, and we permit Protestants to hold one of two versions of the faith, namely the predestinarian views of the elite which had established itself by the end of the reign of Mary's predecessor, Edward VI , or alternative forms of Protestantism represented by the well known, but poorly documented sect of the Freewillers. We make no allowance for fervency of belief, or the complex internalisation of political pragmatism or economic opportunism. For simplicity, individuals can simply be in one of three mutually exclusive categories: Catholic, Predestinarian Protestant, Freewill Protestant.   Agnostics and unbelievers are not allowed in the analytical framework we set up, though this assumption is purely for purposes of clarity as far as understanding the properties of the model which we set up.   It would be straightforward to accommodate a much larger number of categories of belief than the three which we assume, but then the results become more complicated.

The religious beliefs of an individual are formed in many ways, but here we focus on the process of conversion. We assume that an individual can only be persuaded to change his or her religious beliefs by observing the beliefs of other individuals whose opinion the individual in question values.   This dramatic simplification is in fact a good approximation to reality in many modern contexts, especially in cultural markets. On 'YouTube', for example, a video can suddenly and inexplicably become incredibly popular, receiving many millions of viewings, whilst others which appear very similar in terms of both content and quality receive hardly any.

During the past decade, our understanding of such phenomena has been dramatically increased by advances in our mathematical knowledge of networks. In particular in the current context, of how cascades can either spread or be contained across such networks. The word 'cascade' can be applied equally to ideas, consumer behaviour, or even epidemic disease. All readers will be familiar, for example, with the common cold. When a new form of it evolves, the chances of catching it are increased if a close family member has the virus. In general, however, the common cold is spread by purely random contact with other individuals. Someone on the tube you will never meet again sneezes, and you have caught the cold.

When epidemiologists think about how a particular virus spreads, they often use, as in the example above, the assumption that individuals are connected at random. While it is not totally correct, it is a sufficiently good approximation to reality to enable meaningful analysis of the spread of a virus. The assumption simplifies the task because it is impossible to discover the exact structure of the social

network, the connections between individuals, of the group at risk from the virus, even in the modern world where data proliferates.

By contrast, the assumption that individuals are connected at random turns out not to be a reasonable one to make in the case of the spread of sexual diseases. This is the case even if we confine our analysis to a group which is in general at higher risk than the population as a whole, people in their 20s say are at higher risk then people in their 80s.

There is a fundamental difference between the patterns of connections in a randomly connected network and that which is observed in the patterns of connections of sexual partners. In networks in which individuals have a random chance of interacting with each other, the number of people with which each of the individuals has contact will be very similar. But in terms of sexual contacts, a completely different pattern of connection is observed. A few people have an enormous number of partners over any given period of time, whilst in contrast most people have only a very small number. The Internet has a similar sort of mathematical structure, with a small number of sites receiving huge number of visits, and most sites having relatively few.

Such networks are called 'scale-free'. Although a small number of classic articles in the social sciences can be identified going back almost 100 years which describe such networks, it is only in the past decade or so that they have come to be recognised as being pervasive in many social and cultural situations. Detailed analysis of their properties only commenced in the late 1990s.

Scale-free networks have some very distinctive mathematical properties. For example, in a random network, there is a threshold which has to be reached of 'infected' individuals before a 'virus' (an actual virus, an idea, the purchase of a particular type of product or brand) can spread generally throughout the population. But in a scale free network, in principle even if a single individual becomes infected, this can percolate across the entire network. Naturally, the chances of this happening if the person only has a few connections is very low, but it can still happen.

But the most important feature of such networks is the role of the 'hubs', those individuals with large numbers of connections. Suppose we want to inoculate a population against the spread of a virus, again using this in a general sense to encompass not just diseases but ideas. A policy of inoculating people at random, even if a high percentage of the population is dealt with in this way, has only a small probability of success. If only one of the 'hubs' escapes this policy, the virus will eventually reappear, even though it might be thought to have been eradicated.

Suppressing a network: Inquisitors and Cathars

The Catholic church faced such a problem with 'hubs' in attempting to deal with the Cathar heresy in the 13th century, the first organised challenge faced by orthodoxy for many centuries. Medieval observers were quick to use the analogy of diseases in the context of the heresy. As the chronicler Peter of Vaux-de-cernay observed "Just as one bunch of grapes can take on a sickly colour from the aspect of its neighbour, and in the fields the scab of one sheep or the mange of one pig destroys an entire herd."

Initially, a policy of attempting to 'inoculate' the population of Southern France by terror was tried through the Albigensian crusade in 1209. The policy of suppression was essentially random, with individuals and groups singled out and punished. The problem was famously recognised in the quote attributed to the papal legate and monk, Arnaud Aimery at the storming of Béziers: 'Knowing from the confessions of these Catholics that they were mixed up with heretics, [the crusaders] said to the abbot. "What shall we do, lord? We cannot tell the good from the bad." The abbot, ……is said to have said: "Kill them. For God knows who are his." Thus innumerable persons were killed in that city.'

However, the very structure of Catharism, based as it was on a small number of highly mobile and influential *perfecti* (holy men and women), militated against the success of such a strategy. Indeed, as early as the 1220s, when the above account was written, the policy of mass intimidation by terror was recognised to have failed. In general, the heresy lingered for long periods of time even when it was believed to be suppressed. This is a characteristic of scale-free networks, so that, for example, computer viruses persist on the Internet for what are, relatively speaking, very long periods of time compared to their expected lifetimes under alternative network structures. Catholic writers preparing reports for the 1274 Council of Lyon thought the threat was over, yet the last Cathar was only burnt in 1321 and a Cathar revival led by only ten *perfecti* around 1300 caused a major panic among churchmen.

A very effective strategy of inoculation in scale-free networks is to target the hubs themselves, though obviously this is far from easy. The contemporary example of Osama bin Laden illustrates this point: not only has he been difficult to pursue, but even if he is in fact, dead, it is difficult to prove.   After 1231 specialist inquisitors started to be employed, mainly drawn from the learned order of Dominican or black friars. Following early failures they began to assemble a body of expertise which was summarised in a number of handbooks for inquisitors.

The best known of these was by the Dominican friar, Bernard Gui (the name was used by Umberto Eco for the caricature of an inquisitor in *The Name of the Rose*), the *Practica Inquisitionis*, completed in 1323-24 from which most of the following is taken. The sickness metaphor was still present, but Gui saw himself as a physician applying 'different and specific medicines' for the varied diseases of heresy. He was interested in the connections of heretical sects; in the section dealing with Cathars he suggests suspects be asked: 'Whether he had any familiar association with heretics; when; how; And who was

responsible for it'. He was also keen to obtain information on the physical organisation of the network, interrogators should ask: 'Whether he received any heretical person or persons in his home; Who they were; who brought them there;...who visited them there and escorted them thence.'

Gradually, the inquisitors evolved the strategy of what is now known as 'acquaintance immunisation' for preventing the spread of viruses across a scale free network. Catching the hubs – the *perfecti* – would be ideal but failing that, close contacts of the *perfecti* could be persuaded in a variety of ways not to disseminate news of their activities. Whilst the threat of torture or the stake remained in the background, it was rarely used. A particularly effective strategy was to target guides, individuals who made a living by travelling from village to village disseminating news. Gui himself realised that the beliefs of this group of people was largely irrelevant, provided that they did not spread news about the *perfecti.*

The various attempts made to contain and suppress the medieval Cathar heresy are almost a textbook for dealing with modern terrorist movements which approximate this type of structure, in which there is a small number of key individuals. General suppression by force and counter-terror has only a low probability of success.

The pragmatic 'inquisitorial approach' is not incompatible with a 'hearts and minds', of persuading people to effectively ignore the terrorists and their ideology. The American mistake in Iraq was to treat the post-invasion situation from an ideological perspective, and to assume that most members of the Baathist Party were fervent supporters of Saddam Hussein. As a result, officials were dismissed en masse, and the basic functions of the state became difficult to carry out. Of course, there were some fanatics, but most were almost certainly rather innocuous careerists, just as happy to serve a different master. The Allies in 1945, for example, recognised exactly this, and, after some initial screening, most former Nazi party functionaries continued to operate the machinery of the state and ensure that the framework of society functioned.

Targeting the key leaders of a terror movement is obviously a policy which is hard to resist, though as we have note the chances of success are low if the structure of influence approximates a scale-free one. Indeed, such a policy can backfire spectacularly, as the Marian persecution in England in the 1550s illustrates.

Spreading a network; Marian England

During the second half of the 16th century, England could be depicted in modern terms as a 'terrorist state'. It was officially at war between 1585 and 1603 with the then imperial power, Spain. But almost throughout Elizabeth's reign (1558-1603), in addition to conventional state-backed military engagement, there were actively encouraged unofficial actions such as Drake's and Hawkins' piratical raids on Spanish property both at sea and on land. This was combined with speculative interference in the religious civil war in France, aid to the rebellious Spanish territories in Flanders, as well as the execution of Mary, the legitimate Catholic ruler of neighbouring Scotland. There is little doubt that had queen Elizabeth herself not been so cautious her government would have been even keener 'to make fire in other men's houses', as her chief minister put it.

At the same time the regime struggled to maintain ideological unity at home. Catholics were closely policed and those suspected of treason swiftly dealt with. However, fellow Protestants faced imprisonment, maiming and worse, even if they swore loyalty to the monarch. In much the same way as under 20th century ideologies such as Leninism and contemporary Islamic extremists, the 'enemy within' was seen as being particularly threatening. Those who ran Elizabeth's church had emerged from persecution and a fierce competition among rival brands of the same Protestant ideology. One alternative group who were persecuted by Protestants under Edward VI and then Catholics under Mary were the Freewillers. Most historians consider them a small fringe group, despite being based in the influential prosperous south east of England and an attractive emphasis on free will as opposed to the predestination fashionable in mainstream Protestantism. Writing from prison in January 1555, for example, John Bradford commented that 'more hurt will come by them [the Freewillers], than ever came by the papists, inasmuch as their life commendeth them to the world more than papists.'

Despite support for Protestantism amongst the elite, it appears to have still been the case when the Catholic Queen Mary came to the throne in 1553 that the bulk of the population retained an affection for Catholicism. Yet, within a relatively short space of historical time, religious affiliation in England underwent a marked change. Again, there are arguments about the extent and timing of the change. It would certainly be reasonable to say that by the 1570s, a sizeable minority within England not only paid lip service to the official doctrine, but embraced it enthusiastically and by the 1580s many adults had known nothing else. However, even as early as Elizabeth's accession in 1559, people in general were prepared to accept a settlement which has been described as 'a snapshot of King Edward VI's Church as it had been in 1552' with its doctrine of predestination and stripping out of most of the ceremonial elements of the 'old religion'.

Certainly, the increased threat to England from Spain during Elizabeth's reign increased both support for the Protestant settlement and hostility to Catholicism. But however we qualify the evidence, it does seem to be the case that within the space of a couple of decades, genuine support for Protestantism had grown markedly in England. How could such a rapid shift in opinion take place?

Modern network analysis points firmly to the impact of the policies adopted by Mary to restore Catholicism at least as far as it might have opened minds to the possibility of sympathy with the Protestant cause, and there is some evidence of this in contemporary accounts. In particular, the burnings of the Protestant leaders exercised a strong influence on public opinion. This had two aspects. First, the main one of a switch of allegiance from Catholicism to Protestantism. But, second, the effective elimination of the rival Protestant sect of the Freewillers, who were not persecuted on anything like the scale of their predestinarian contemporaries.

Church leadership under Edward VI formed a scale free network in terms of the number of people in the country who were *aware* of their existence. Many more people would know of the Archbishop of Canterbury or York or the local bishop, than a village priest. But in terms of influencing people's religious choices, this network was latent rather than active. All this changed under Mary. The Catholic authorities had the intention of creating a climate of fear which they believed would suppress what they regarded as the Protestant heresy. They rapidly imprisoned many of the leaders of 'Reformed

Protestantism' as the Edwardine doctrines have come to be known by historians and went on to articulate a policy of elimination of key figures through public burnings.

In contrast, the Protestant clerical elite were convinced from the outset that their death could cause the policy to rebound on the persecutors. They were well aware of the necessity of creating a good impression at the stake. To this end then they encouraged one another, On 8 February 1555, on the morning of his execution Laurence Saunders, a noted Protestant preacher in London and the Midlands, wrote to his wife and supporters:

> God's people shall prevayle: yea our blood shal be their perdition
> Who do most triumphantly spill it. (Foxe, 1576, p. 1428)

A few weeks earlier he had written to Cranmer, Latimer and Ridley who were in prison also on the verge of execution. These three were probably the most prominent of all the Reformed Protestant leaders. Cranmer was the Archbishop of Canterbury, the religious head of the English Church, Latimer was Bishop of Worcester and a famous preacher, and Ridley, Bishop of Rochester, was the author of the 1552 *Book of Common Prayer* which defined the liturgy of the Reformed Protestant faction. Saunders' message was to make the most of what he termed God's 'unspeakable gift' and put on a good show. Latimer and Ridley famously rose to the occasion, with perhaps the most memorable of all the quotes of the English martyrs:

> Be of good comfort, master Ridley, and play the man.
> We shall this day light such a candle, by God's grace
> in England, as I trust shall never be put out.

The net effect was to transform a scale free network of mere awareness into one in which individuals were actively influenced by the beliefs and actions of others. Under such conditions, an ideology (or a virus) can spread rapidly through a population. In network terms the martyrs were influential hubs who could in turn influence opinion formers in smaller local and familial networks. Far fewer Freewillers were burned, in general they may even have decided to live and fight another day as a matter of policy. However, in network terms this was to forego the opportunity of becoming the kind of hubs the martyrs were. Their disappearance by the early years of Elizabeth's reign was almost total. We discuss in detail the methodology and the results of the analysis in our *Cultural Science* paper, and interested readers are referred to this.

Our key finding is that the burnings, and the resulting creation of an active scale-free network on which the actions of the martyrs influenced opinions, could be a sufficient condition for the conversion of England to Protestantism. We also carry out counter-factuals, which suggest that had Mary's government not burnt anybody, England might very well have remained a Catholic country. This is not completely surprising to historians, given the longstanding emphasis the historical literature has placed on the role of the martyrs and the conservatism of the population revealed by modern research. There

were plenty of reasons why her English subjects disliked Mary, such as her marriage to the King of Spain, her close relationship with the Pope (tension between the monarchy and papacy long pre-dated the reformation), and her loss of Calais, England's last colonial territory in France. Her death and Elizabeth's accession were welcomed by many. But even so, without the martyrs, the reformers under Elizabeth might have found their task of restoring Protestantism much harder.

Our results suggest that the persecuted Protestants were right and that the burnings offered an unprecedented opportunity to influence opinion. England still remains in most scenarios a broadly Catholic country at the death of Mary. But the scale of the changes caused by assigning a relatively small number of opinion formers to Protestantism suggests that enough people had switched allegiances to significantly weaken support for traditional religion even by the early years of Elizabeth's reign. Moreover, the persecution concentrated attention on the Reformed Protestants and helped to effectively eliminate the attractions of competing Protestant groups.

The spread of Protestantism throughout England and the complete marginalisation of Catholicism took several decades to complete, but the seeds were sown in the 1550s. Those who were persecuted by the Marian government shrewdly chose martyrdom as an opinion-changing strategy as well as for its own spiritual benefits. Modern understanding of network theory shows that they were right to do so.

There are lessons in this for dealing with terrorist groups. Martyrdom is potentially much more powerful if it is undergone by prominent adherents of the ideology. Although the Army Council of the IRA, for example, do not appear to have been amongst those who starved themselves to death, some of them were already prominent in Sinn Fein/IRA sections of the population. In contrast, militant Islamic terrorists tend be drawn much more from the rank and file. It would be more effective for their cause if Osama bin Laden and some of his top associates became suicide bombers, but while they do not the opinion forming potential of martyrdom is self-limiting. What is crucial is that opinion formers within local communities and families are left alone to make their own judgements on extreme Islamist ideologies unless they can be shown to have strong active links with terrorism.

Our work also is an illustration of a recent important discovery about systems in which social influence is an important determinant of behaviour/ideas. Somewhat paradoxically, deep knowledge about such systems can be extracted from very limited information. We do not need to know the exact details of a network in order to be able to draw valuable implications; very limited information is sufficient. Our analysis of both the Cathar heresy and the Reformation in England shows that examination of a relatively small amount of contemporary evidence can provide an analytical framework which can give useful insights into effective counter-terrorism strategies.

Further Reading

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Homegrown Terrorism and Transformative Learning: An Interdisciplinary Approach to Understanding Radicalization Alex Wilner, Ph.D. (Swiss Federal Institute of Technology (ETH-Zurich)) wilner@sipo.gess.ethz.ch & Claire-Jehanne Dubouloz, Ph.D. (University of Ottawa) dubouloz@uottawa.ca Canadian Political Science Association Conference (University of Ottawa, Canada, May 2009)

ABSTRACT International Islamic terrorism is an evolving phenomenon. 18 Raf Casert, "Six Alleged Islamic Extremists charged in Belgium", Associated Press, (December 12, 2008), Alain Grignard, "The Islamist Network in Belgium: Between Nationalism and Globalisation", in Jihadi Terrorism and the Understanding what drives extremism and radicalization is perhaps the most http://0-www.ciaonet.org.wam.leeds.ac.uk/olj/si/si_4_3/si_4_3_caw01.pdf; Homeland Security Policy Institute (HSPI) and the University of Virginia Critical Incident Analysis Group (CIAG) (2007) NETworked Radicalization: A Counter-Strategy, available from [5] Archetti, C. (2012) Understanding Terrorism in the Age of Global Media: A Communication Approach (Basingstoke: Palgrave). The opening sentence of a Congressional Research Service (CRS) report reads: 'The Internet is used by international insurgents, jihadists, and terrorist organizations as a tool for radicalization and recruitment, a Gaining access to terrorists (those convicted under UK terrorism legislation) or extremists (identified by the police and multi-agency partners based on an assessment of risk) is extremely difficult. Obtaining primary data relating to these individuals' cases held in court records or by the police is labour-intensive and a logistical challenge. However, empirical research is needed in order to rigorously test assertions about radicalisation and formulate evidence based approaches to addressing challenges associated with radicalisation. We examine this question in order to understand the importance (or lack thereof) of the internet for radicalisation. What role does the internet play with regard to the apparent phenomenon of online radicalisation?