

A New Approach to the Analysis of Geo-Political Risk

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Traditional geo-political analysis has a poor record. In particular it has problems in capturing the complex inter-relationships between key factors, and the positive and negative feedback loops which make prediction difficult if not impossible. This paper argues that new techniques, derived from complexity and network theory, offer powerful new tools for both analysis and strategic decision making. The paper focuses on fuzzy cognitive mapping. An illustrative example examines the prospects for disintegration in China. Although highly simplified, this example shows how this technique is able to derive conclusions difficult or impossible to achieve through traditional analysis, and its potential for strategic decision makers, whether in the private or public sector.

1. INTRODUCTION

In the deeply inter-connected and inter-dependent world of the 21st Century, effective geo-political analysis is essential, both to governments and multi-national corporations. The speed with which information, and thus risk, flows through the global networks puts a premium on the ability to anticipate future developments and crises and build them into strategic decision making processes. Unfortunately, existing geo-political analysis has a poor record of prediction, even over short time scales. Davies (2003) lists a series of geo-strategic “surprises,” including the collapse of the Soviet Union, the peaceful reunification of Germany and the East Asian Financial Crisis. Furthermore, much current analysis is presented to policy or decision makers as a “black box,” which can neither be examined nor integrated into the decision making process (Lempert et al., 2003).

We argue that powerful new techniques for thinking about strategic decisions, drawn from complexity and network theory, should be applied to international political analysis. In particular we examine



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the use of techniques, based on the creation and modelling of cognitive maps (Kosko 1994, 1997), that capture the knowledge held within government, companies and the expert community and formalise it in a way that enables it to form an integral part of strategic decision making processes. Unlike traditional political analysis, these techniques are dynamic, incorporating the complex feedback loops of the real world. They produce a series of scenarios that allow agents to test the robustness of their strategies and also to pose a series of “what if” questions.

Section 2 discusses the reasons underlying the failure of standard approaches, and gives an overview of the dynamic alternatives. We give in section 3 an illustration of the latter, based upon understanding the evolution of political stability in China. Section 4 draws some preliminary conclusions.

2. GEO-POLITICAL ANALYSIS

There is an increasing literature on the nature and weaknesses of existing approaches to geo-political analysis (Lempert et al (op cit) and Allison and Zelikov (1999) provide useful overviews; Riordan (2003) examines the weakness of analysis within the British Foreign Office). For the purpose of this paper we have identified the following systemic weaknesses, true of geo-political analysis both within Foreign Ministries and the private sector:

- It is overly dependent on the abilities of individual analysts. Such analysts can only handle a limited number of factors at any given time (Klein (1999) argues that human decision-makers can normally handle only three factors over a maximum of six steps; Ormerod (2003) suggests that in many situations there are severe cognitive constraints on the ability of individual economic agents to learn);
- Their product thus inevitable fails to reflect the full complexity of the interdependent and inter-reacting factors that constitute a globalized world;
- It rarely make explicit the factors it is taking into account, or the relations it has assumed between them, even to itself. The product therefore has to be taken as given, and is difficult to assess or interrogate;
- It tends to deterministic predictions, which either prove right or wrong. If it does offer different scenarios, it tends to do so on on

a simplistic probabilistic basis, assuming a normal distribution of risk. Both tendencies encourage decision-makers to adopt optimal strategies unable to adapt to “surprises” (Lempert et al op cit). In a highly complex world, these are unrealistic ambitions, which mislead more than they inform;

- It takes insufficient account of new players in international relations (e.g. NGOs and multinationals) and social factors. It has been slow to assimilate new forms of risk (eg reputation risk). It is often poor at capturing the interactions between political, social and economic factors;
- It fails to take full account of the complex network of positive and negative feedback loops which are crucial to the outcomes in the real world. It is unable to help governments, companies or international organisations understand the impact and consequences of their actions, or those whom they might influence. Analyses tend to be static snapshots, rather than dynamic strategic tools to assist decision making.

Recent developments in Complexity and Network Theory (e.g. Barabasi 2002), and the modelling techniques derived from them, offer new ways of thinking about and doing geo-political analysis. These modelling techniques have already been extensively applied to economic, commercial and social analysis (Ormerod 1998; a series of more detailed papers by Ormerod and collaborators can be found at www.volterra.co.uk).

Lempert et al., (op cit) outline a new approach to long-term policy analysis drawing on extensive Rand modelling experience, including techniques drawn from complexity theory (eg agent-based modelling). Their approach is complicated and highly resource intensive, and they admit that extensive further soft-ware development is needed. Nevertheless their work offers important insights that can inform a more immediate and practical approach:

- Geo-political analysis and decision-making often takes place under conditions of deep uncertainty. This requires examination of large numbers of possible futures, or scenarios. The probabilities assigned to these futures should be assigned according to a power law rather than a normal distribution. In other words, very bad things may not happen as frequently, but they do happen and should be built into the strategic decision-making process;



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- Against this background, decision-makers should adopt robust, adaptive rather than optimal strategies. But to do this, the analysis must be fully integrated with the decision-making process (and the analysts with the decision-makers);
- Successful geo-political analysis must combine the best qualities of both human analysts and computers. Use of modelling techniques does not offer a spurious objectivity. “Those who reject subjectivity in methodology have no place in high-level planning . . . the challenge is not to make things “objective”, but to structure subjective judgements so that they are well-defined and meaningful as part of an analysis” (Davies 2003).

In light of these considerations, the objectives we set for any effective modelling technique for geo-political risk are that it:

- Captures and formalizes the knowledge within government, companies and the expert community in a way that can form an integral part of the decision-making process;
- Captures the full complexity of international developments, building in the key positive and negative feedback loops;
- Make explicit the assumptions, factors and inter-relationships on which the analysis is based, allowing interrogation by the client;
- Can be structured either to look at the macro-level developments within a country (as in the example above), or at a lower sectoral level at which they can model the consequences agent decisions;
- Be dynamic and evolving, rather than passive snapshots, better capturing the reality of international political, economic and social developments;
- Provide powerful strategic decision-making tools, fully capturing the “what if” nature of commercial and public policy decision-making processes.

Our approach was based on the use of cognitive maps (Kosko op cit). Cognitive maps try to capture the key factors which drive an issue, and the inter-relationships and feedbacks between them. They can be applied to either the prospects for countries or regions, or the strategic decisions of individual companies, governments or organisations. We sought to create cognitive maps which captured the key political, social and economic factors affecting the development of a country, region or global system. The interactions between the factors, including positive and negative feedback loops, were built into



the cognitive map and weighted according to the strength of the influence or impact of each factor on those to which it is linked. Different modelling techniques are applied to the cognitive maps to produce outcome scenarios. Running the models many times, varying the weights of influence of each factor, or changing the assumptions about actions of varying agents would produce a range of scenarios of varying probabilities.

3. ILLUSTRATIVE EXAMPLE OF POLITICAL STABILITY IN CHINA

We sought to explore how such an approach would work by looking at the prospects for disintegration in China. The map is not intended to be an exhaustive study, but to capture the main features. The expertise for the map is largely provided by Riordan, who was a political officer within the British Embassy in Peking 1988–1991.

The key to any successful model is to simplify the problem, whilst at the same time retaining the key features. The principal feature which we wish to understand is the potential evolution of political integration. We assume that this is determined by four main factors:

- the economy
- the military
- the Party
- social unrest

For this example we assumed that:

- weakness in the economy increased social unrest, and that social unrest weakened the economy;
- decline in party/government unity increased social unrest, and increased social unrest undermined the party/government;
- a strong party/government reduced the importance of the military, but that a strengthened military reinforced the party/government;
- a strong and influential military, by strengthening the position of the conservatives, weakened the economy;
- increased social unrest increased the prospects for disintegration, which in turn undermined the party/government.

In the cognitive map illustrated below in Figure 1, these assumptions are shown by the arrows in the cognitive map and the positive or negative sign allotted to each arrow. So, for example, an

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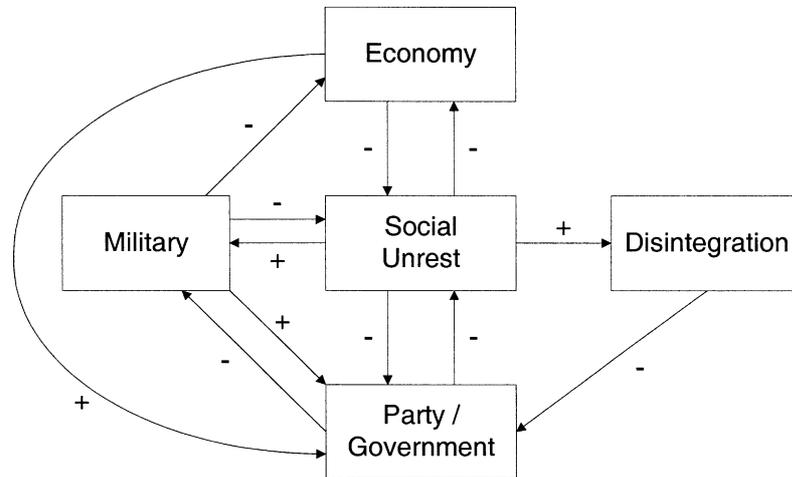


Figure 1. Cognitive Map for Disintegration in China.

improvement in the economy reduces the potential for social unrest. However, an increase in social unrest weakens the economy. These relationships are reflected in the negative signs in the chart.

If we had reasonably reliable quantitative data on these links, we could in principle set the system up as a set of differential equations. Such an approach is taken, for example, by Ormerod et al. (2003) in analysing the evolution of crime in the United Kingdom. Cognitive maps, however, are particularly suited to situations in which we have good evidence of the qualitative nature of a connection, but little by way of quantitative evidence.

We then ran the cognitive map through a computer programme to look at the impact of negative external economic shocks, with three possibilities:

- no external economic shock;
- a weak external economic shock;
- a strong external economic shock.

The outcome for political disintegration can then be compared. The comparison is a *relative* one, in which the scenario with no external shock serves as the base for comparison. In other words, the scale of the numbers which emerge from the map to measure social unrest have no absolute meaning, but are relative to each other.



The map may seem, and indeed at one level is, fairly straightforward. Why is it therefore necessary to put this map into a computer programme?

We can see why when we try to trace the impact of a shock through the map purely descriptively. A weakening of the economy leads directly, for example, to a weakening of the Party. In turn, this increases social unrest (the link between the Party and social unrest is negative, so that a stronger Party reduces social unrest, and vice versa). A higher level of social unrest increases the chances of disintegration.

There are then the self-reinforcing feedbacks to take into account. Higher social unrest itself further weakens the Party, as does a higher chance of disintegration.

But there are also stabilising feedbacks, which complicate matters further. Increased social unrest strengthens the military. A weaker Party also strengthens the military. In addition, a stronger military helps suppress social unrest, and hence the prospect of disintegration. So there is a feed-back loop here which reinforces the Party by reducing the possibility of disintegration, which in turn reduces social unrest. However, a stronger military weakens the economy, which as we have seen weakens the Party, which then increases social unrest.

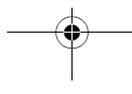
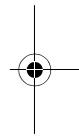
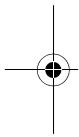
We could go on and discuss the other feedbacks and direct influences in the map. But, clearly, even in an apparently simple cognitive map such as this, descriptive analysis rapidly becomes bogged down, and the consequences of a shock become impossible to analyse clearly.

This is why the map needs to be programmed using appropriate software. The computer can then be used to deal with this complex logic, and shows how the situation evolves over time, taking all the connections and loops into account in a consistent manner.

As would be expected, with no economic external shock, the economy and party/government strengthened, and the influence of the military, social unrest and the prospect for disintegration all fell.

With a small external shock, initially the party/government and economy weaken, and the military, social unrest and prospect for disintegration strengthen. However, the situation then stabilises, with the party/government and economy strengthening and the military, social unrest and prospect for disintegration weakening, with the model moving towards the no external shock scenario. The stabilising links and feedbacks predominate over those which generate disintegration.

But with a large external shock, party/government and economy weaken and the military, social unrest and the prospect for





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disintegration all steadily strengthen. There is no recovery, and China moves to disintegration (and perhaps military warlordism).

The system appears stable with respect to small shocks, but there is a critical threshold of shock beyond which the probability of disintegration rises very rapidly. This type of conclusion would be very hard to reach by purely verbal logic and analysis.

This is obviously a simplified example. Nevertheless it proved surprisingly powerful in getting a handle on western policy failure in China during the Tianamen crisis of 1989. Western analysts of China adopted three successive positions on China in this period:

- Spring 1989 when they failed to see the impact of social unrest on party unity, or the inter-relations between economy, party and social unrest;
- immediately after Tianamen, when analysts predicted civil war and collapse;
- following the military stabilisation, when analysts predicted a prolonged period of conservative domination, and thus economic retrenchment.

In fact, what happened closely mirrored the model's scenario for a mild external shock. Initial weakening of the party/government and the economy, with strengthening of social unrest, the military and the prospect for disintegration, followed by stabilisation and then recovery by the economy and party/government and reduced importance of the military. The failures of the western analysts resulted from their inability to see the interplay between factors of even this very simplified model.

A more detailed model for disintegration in China, drawn up after extensive exchanges with experts, would:

- include more factors in the cognitive map;
- open up the factors, embedding further cognitive maps or other models to get a handle on how each factor operates, or responds to external inputs;
- run the model many times, varying the strengths of the external shocks, varying the strengths of the links and impacts between and even the existence of the links.

This would produce a range of results which could be shown on a graph measuring the **relative** strength of the external shock against the prospect of disintegration.

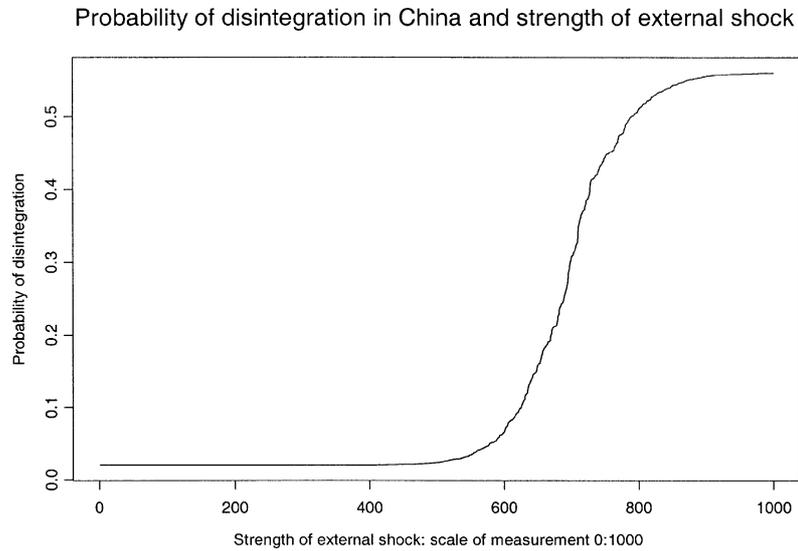


Figure 2.

This gives a clearer idea of how robust, or stable, China is, and of the risk of disintegration for a potential investor. It also allows the identification of the most sensitive links (i.e. those that had most impact on the model). After further investigation and testing, these would identify the key factors affecting China's long term stability and thus the key areas for public policy concern.

We can also add to the functionality of the map by introducing *fuzzy* logical links into the map, turning it from a Cognitive Map into a Fuzzy Cognitive Map (FCM) (Kosko op cit). This is a practical way of translating qualitative judgements about the strength of the links into quantitative ones in a systematic way. Statements such as 'weak,' 'fairly strong,' 'sometimes strong but usually pretty average' can be given logically consistent values.

Although this model was designed to give a handle on the prospect of disintegration in China, it can provide other useful information for a company which can help in the strategic decision making process:

- Increase in the strength of party/government would indicate a strengthening of civil government, and thus the reliability of the legal and regulatory framework in which a foreign company would operate;



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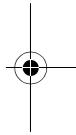
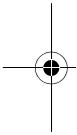
- An increase in the influence and importance of the military may indicate an increase in human rights abuses, and thus in the risk for the company of NGO criticism of its investments;
- an increase in social unrest would have implications for the personal safety of the company's ex-pat staff;
- a strengthening of the economy could be good for the company's investments, but may also indicate an increase over time in labour costs affecting international competitiveness.

4. CONCLUSIONS

Although, as we have said, this was a highly simplified example, it demonstrates the potential of this kind of modelling. It does not pretend to a spurious objectivity, but rather to make explicit the links between factors assumed by the analysts and give coherence and consistency to their judgements. By running the model many times (hundreds or thousands depending on the complexity of the cognitive map and the number of links to be tested), it can produce a large number of possible scenarios which allow analysts to understand the implications of their judgements and link analysis of individual factors to the bigger picture.

A key issue confronting geo-political analysis is how to identify the key factors which cause a country, region or political system to move from one state to a radically different one. Several of the strategic surprises identified by Davies (op cit) fall into this category, eg the collapse of the Soviet Union or the East Asian financial crisis. More recently one might add the collapse of the Argentine economy at the end of 2001. Complexity Theory provides a powerful analogy in the concept of "phase transitions" (e.g. from liquid water to ice or steam). By multiple runs of the cognitive map, we can identify the most sensitive factors and links, ie those in which a small change produces significant changes in the outcome scenario. These are the factors or links most likely to provoke "geo-political" phase transition, and on which policy makers and analysts should focus their attention. For example, in our China model, were we to run it sufficient times, it might emerge that the most sensitive link was between the army and the government. This then should be the relationship on which western analysts and policy makers should focus.

In this paper, the modelling technique has been used to explore a macro-level problem: the political disintegration of China. But one





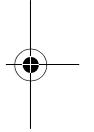
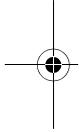
of its strengths is its ability to explore the consequences of decisions by agents, whether they be governments or companies. For example, instead of exploring external economic shock, we could reconstruct the cognitive map for China to explore the consequences of investment decisions by a major company. Although this would be unlikely to have much impact in a country as large as China, it might have in other cases (e.g. the decision of Spanish banks whether to disinvest in Argentina following the economic collapse). The cognitive map can also be constructed to combine geo-political factors with factors more specifically linked to a company and to test the impact of strategic decisions on the company's overall performance, eg the financial performance of a bank. The modelling technique is thus both extremely flexible about the levels at which it can operate, and can be integrated within the decision-making process of a client, whether government or commercial, allowing decision-makers to explore and test the consequences of their strategic decisions.

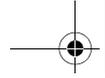
This paper has examined only one modelling technique, based on cognitive mapping. Complexity and Network Theory, and the modelling techniques derived from them, offer a rich vein for concepts and analytical tools to geo-political analysts and decision-makers. For example, the modelling technique described in Ormerod et al. (op cit) in their study for the British Home Office of the factors affecting whether young men become criminals offers a potentially powerful way of understanding the factors that allow terrorist groups such as Al Qaeda to recruit new members. The insights of Network Theory (Barabási op cit) could also prove essential in understanding, and combatting, the operational and logistical structures of such groups. These areas need extensive further study. Both government and the private sector have traditionally failed from their incapacity for medium or long term international geo-political analysis. Recent events make clear that this weakness remains. In an increasingly interdependent world, where information and thus instability moves rapidly through the global networks, both public and private sector must do better. The techniques outlined above offer a way of doing so.

NOTES

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