Problem representation and variation in the forecasts of 'political experts'

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ABSTRACT

Forecasts often involve judgments about "ill-structured" problems that lack an optimal solution or agreement about boundary conditions. This paper describes how the degree of structure of the problem and the forecasting time frame can be used to form a classification scheme of different types of forecasting problems. This scheme can be used as a guide for choosing the most appropriate approach and methods to use in analyses and predictions. The paper next describes a method for summarizing how individuals or groups of problem solvers analyze "ill-structured" social and political problems. Examples of this method, based on the construction of free-hand causal diagrams of novice and expert political forecasters, are presented. Experience to date using these schematic summaries indicate that such summaries are useful for understanding the reasoning processes of clients and to check the reasoning process used by experts from different backgrounds and experiences in making forecasts.

Keywords: political forecasts, problem representation, ill-structured problems

Introduction

Many political forecasting exercises focus on discrete events such as election outcomes. Other forecasting efforts in American Politics examine similarly "well-structured" policy outcomes such as governmental appointments or future budgets (Sigelman, Batchelor, Stekler, 1999: 125). A similar pattern is evident in forecasting research in International Relations. In this field, much of the forecasting research has tried to develop aggregate models to predict discrete policy events such as political coups (Johnson, Slater and McGowan, 1984) or the outbreak of war (Singer and Small, 1968). In contrast, government officials and corporate clients are usually interested in political risk forecasts of complex and highly uncertain problems. Modeling efforts often trigger disagreements about underlying assumptions or relationships among variables because there is no general agreement on how to define the problem at hand. A lack of agreement on fundamental aspects of the problem is also fueled by high levels of uncertainty about probability outcomes or scenarios.

The pervasiveness and importance of these poorly structured and uncertain problems in the political realm has led some researchers interested in socio-political forecasts to use insights generated by research on how people solve a variety of problems (Voss, 1998). A recurring finding from this diverse body of research is that it is critical to understand how individuals and groups develop a mental model or Ashared representation of problem@ to understand subsequent decision making, choice and forecast (Sylvan and Voss, 1998).

This paper builds upon research using the concept of "shared problem representation" to understand better how political risk forecasts of Αill-structured@ problems are reached. Ill-structured problems are a class of problems that lack a single or optimal solution. The problems are often poorly structured because there is a lack of agreement about the assumptions and implicit model s that shape how novice or expert forecasters frame the problem. This paper uses the idea of problems having varying degrees of structure to develop a classification scheme of different types of problems. The classification scheme is based on two dimensions: 1) the degree of structure of the problem at hand and, 2) the time perspective of the prediction, i.e., whether it is a short-term, medium-, or long-term forecast. This scheme is offered as one approach for obtaining a better understanding of the best forecasting approach and methods to use in making predictions. Underlying the scheme is the assumption that if end users of systematic predictions understand and agree with the way the prediction problem is define, they will be more likely to accept and use the obtained results.

Many other factors may effect whether the results of forecasting efforts of ill-structured problems are actually used. Two factors stand out as especially difficult ones for political forecasting efforts. One is cognitive conceit or the pervasive tendencies of people to have an unwarranted faith in the adequacy of their intuitive analyses. A second one relates to the fact that political expertise is often tied to one=s position or reputation as an expert rather than mastery of a set of problem solving skills. These two factors often are critical in determining whether the results of systematic forecasting efforts will in fact be used. The paper concludes with a description of one method that can be used to explicate the usually implicit models of forecasters, analysts, or end users. The method is based on free-hand causal schematic summaries of either the think aloud protocols of individuals or the shared problem representation developed by a small group. Two examples of problem representation diagrams are presented to illustrate how the method can be used to better understand the reasoning processes and performance accuracy of political clients or political Αexperts@ who have very different background and experiences. Use of this approach may also help in communicating and gaining client=s acceptance of the results of complex forecasting tasks.

Classifying forecasting problems based on the degree of problem structure and the time frame of the prediction

Table 1 is a classification scheme that is based on two fundamental dimensions of social, economic or political problems. The types of problems studied by social scientists are classified by the values of two variables: the degree of structure of the problem to be analyzed and the time frame of the prediction.

The degree of problem structure refers to the extent that there is an inter-subjective consensus among experts on the boundary conditions, the parameters and problem solving logics that should be used to obtain a correct or optimal solution for a particular type of problem. Well-structured problems are ones that have a high degree of agreement about what constitute a correct or optimal solution. At the other end of this continuum are Αill-structured problems@ where there is little or no agreement about how to define or represent the problem. Variation in problem structure can also refer to the extent to which there is agreement on the important variables, the roles or relationships among these variables within a model or the specificity with which variables are conceptualized and measured.

This continuum is based on past problem solving research that suggests that people use

different types of problem solving logics to solve different types of problems (Simon, 1973; Voss, 1998; Voss, Greene, Post and Penner, 1983). The basic thesis of this paper is that forecast methods and forecasts will be more likely to be accepted and used, if the results are related to the implicit model of the problem employed by end users. Psychologists who study problem-solving behavior make a distinction between Awell-structured@ and Aill-structured@ problems (Voss, 1998). Highly-structured problems have well-known boundary conditions, generally agreed-upon or optimal solutions, and little or no uncertainty associated with the correct or known solution. In contrast, ill-structured problems are more ambiguous types of problems with no agreed-upon definition or boundary conditions. There is usually a large degree of uncertainty associated with the outcomes of ill-structured problems because this class of problems has no single optimal solution or often no agreement on the correct solution paths.

The relevant time frame for a prediction is a second fundamental dimension of any forecast. Past social and cognitive research suggests that when people make decisions or forecasts intuitively they typically employ vague distinctions such as tomorrow, the next couple of weeks, and an ill-defined longer term future. This longer term can range from next year to an unspecified future. The width of class intervals and the concepts used to distinguish between the short-term, medium-term and long-term seems to vary with the type of problem being examined. Thus, the desire for certainty and demands for specificity are undoubtedly greater when the forecast is associated with a diagnosis of a life threatening disease than when the forecasting task is one of deciding which class intervals, operational indicators and data should be use to make the most accurate age-groups projections about average life expectancy.

Despite these differences there is one important similarity between the two types of problems. This commonality is the evidence that has been accumulating for decades that humans generally are only capable of using a limited number (e.g., 2-5) of analytical dimensions systematically in their intuitive analyses and predictions. Thus, limitations in the capacity of working memory ensure that there will be recurring patterns in the time frame used in intuitive analysis of different problems within a particular problem area or domain. For example in pubic policy analyses, the short-term for most policy makers is typically a few days or weeks. The medium term typically refers to several weeks or month, and the long-term is usually a vague time reference beyond the next budgetary or election cycle.

By segmenting these two dimensions into three categories, it is possible to illustrate how this classification system can be used to distinguish different types of problems in a particular field. This table is designed to be illustrative of the different types of problems that analysts and practitioners often encounter in the course of making political forecasts about future domestic and international politics.

Table 1

SPECIFICITY OF PROBLEM

	Well-specified problems	**Moderately structured problems**	**Ill-structured problems**
T I M *Short-* **E** *term*	Will the President's popularity in the polls be higher or lower tomorrow?	Will the President renounce the ABM Treaty tomorrow?	What will Saddam Hussein do tomorrow?
Medium term	Will Republicans gain control of the Senate in the 2002 elections?	Will the Feds lower interest rates again in 2001?	Which Presidential policy initiative will be judged the most successful one initiated during 2001/2?
F R *Long* **A** *term* **M E**	How many new eligible votes will actually vote in 2004?	Will there be a coup in Nigeria during next 5 years	Which states will Afail@in the future

The first row of the table provides examples of short-term political forecasting questions of varying degrees of problem specificity. The first two cells are examples of a well-specified forecasts that can be estimated using simple extrapolation logic. The third example illustrates the type of short-term, ill-structured problem that senior government officials in all countries want their intelligence service to answer with complete certainty. Even though the dependent variable

or prediction to be made is not specified, policy makers want analyses and predictions to cover all likely contingencies. This demand is even greater when the subject is an actor such as Saddam Hussein who has proven to be very adept at using surprise moves to his advantage.

The medium term prediction questions also involve problems with varying degrees of specificity, uncertainty about the most probable outcome, or the meaning of the phenomena to be predicted. The first example taps a type of political problem that can be modeled using a regression equation and only a few independent variables (see election analyses in Sideman, Batchelor, and Stekler, 1999). These models can be used to predict election outcomes as long as the end user is willing to accept the caveat of Aall other conditions@ remaining constant. However, predictions would have to be conditional and updated since the values of key variables like candidate image, what campaign issue(s) will be identified as the most important ones, and voter turn-out rates among undecided and weak partisans will change between now and the next election.

The second question is moderately well-structured and has also been modeled extensively using economic models based on free-market principles of supply and demand of several key parameters. However, there is a some uncertainty in generated predictions tied to the fact that decisions made by the members of the Federal Reserve Board often take into account other information and values than those incorporated in economic models. Moreover, the supply-and-demand free-market model often generates predictions that are incorrect in the short-to-medium term. What is interesting about this type of forecast is that so many people continue to believe in the validity of the economic model even though many predictions (e.g., about the rise of inflation associated with sustained economic growth) have not been accurate for near term trends in the United States.

Ill-structured problems that ask for medium term predictions often approximate the one listed in the last cell of row 2. This type of problem is difficult to predict in part because the implications of the party leadership change in the US Senate on Bush's legislative agenda is not yet known. A more general problem is that there is no objective criteria or inter-subjective consensus on what will constitute Asuccessful policy indicatives@ among political novices (e.g., the mass public) or the Aexperts@(e.g., policy analysts and politicians).

All long-term forecasting problems introduce more elements of uncertainty due to the increased likelihood that other unspecified factors may influence the outcome. However, the question of how many women will vote in the 2004 election is well-structured and may be addressed by combining extrapolations of recent trends in such critical variables as voter registration and turn-out by gender. The second question can use existing regression models that have predicted past political coups with a high degree of accuracy (Johnson, Slater, and McGowan, 1984). However, even though this problem is fairly well-structured, it is very complex. Nigeria, for example, may be a special case when compared to other sub-Saharan African states because of it=s size, dependency on oil revenues for economic growth, and due to a reoccurring pattern of prolonged military rule following periods of extreme political unrest and economic instability. Since existing Acoup-proneness@ models use annual time series data, this data may be too crude to capture the sharp economic decline and political unrest that is likely to occur following a major drop in oil prices or the disruption of oil exports of this single-commodity, oil exporting economy.[1]
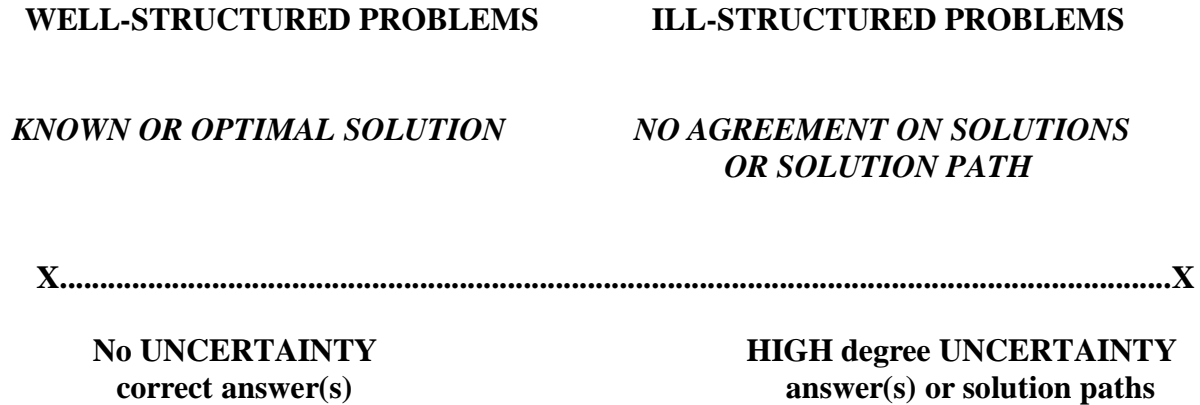
The last question is one that has been systematically addressed by recent modeling efforts sponsored by the US government (Esty, et al, 1998). The State Failure Project has identified a

number of variables that seem to be important predictors of state failure. When the modeling effort is limited to African states, the predictive power of this model increases significantly. The State failure project projections, based on inductive artificial intelligence classification techniques rather than statistical models, has identified three factors as the most efficient discriminations between Afailed states@ and stable states during the post-World War II era: the level of material living standards, the level of trade openness; and the level of democracy. This model had a 70 % success rate in post-dictive predictions of which states in Africa would fail using a yes/no dichotomous dependent variable. Despite this reasonable good fit between data and the model, the acceptance and use of such models is rare among policy makers One reason may be due to the fact that while policy makers are likely to want answers to questions addressed in these recent systematic research efforts, the way they frame the question is likely to be very different. As indicated in Table 1, policy makers are most likely to want specific answer to a much vaguer and more controversial question, to wit: which states will fail and when? This question is difficult to answer using existing data-based models because it is asking for point predictions across an unspecified future time frame. An even more problematic aspect of this Aill-structured@ problem is that there is no widely agreed upon definition of Astate failure. @

The pervasiveness of Aill-structured@ problems

Most of the problems studied in the humanities & social sciences are ill-structured problems. Typically there is little or no agreement on how to define or frame the problem. Analysts dealing with this class of problem rely heavily upon their prior beliefs, knowledge, experiences and value preferences to define the parameters of a simplified problem representation. Usually all relevant information is not used to understand the initial problem definition or framing even though this initial framing is critical, a major determinant of the solution or solution path. This recognition has led some researcher to focus on how problems that need immediate attention are represented. Understanding the initial framing is critical since the solution or solution path that is adopted is embedded in the way the problem is defined.

Figure 1

WELL-STRUCTURED PROBLEMS   **ILL-STRUCTURED PROBLEMS**

KNOWN OR OPTIMAL SOLUTION   *NO AGREEMENT ON SOLUTIONS*
                                                                        OR SOLUTION PATH

X...X

No UNCERTAINTY   **HIGH degree UNCERTAINTY**
correct answer(s)   **answer(s) or solution paths**

Focusing on how people solve ill-structured problems has proven to be a productive strategy for identifying recurring patterns in the way people think, make decisions, and predictions about a wide range of problems. In contrast to the predominant approach of voting studies which focus on the likely behaviors of mass public or voters, many analysts working at the micro-level have found the concept of problem representation to be a useful device for understanding more ambiguous situations. These researchers are interested in understanding and predicting the behavior of elites and the processes they use to make decisions and predictions. Typically, the unit of analysis is a group although some work has focused on individual decision makers or analysts

The concept of problem representation has proven to be a useful concept for understanding how the options that were considered in a particular situation were generated (Sylvan, 1998:3). Cottam and McCoy (1998: 116-44) used the concept to examine the relationship between the type of image used by various political decision makers= and the problem representation they develop, Gannon (1998: 249-60) has used it to study problem representation from Senate Judiciary Committee hearings. Young (1998: 213-48) combined the concept with a computational model to analyze Jimmy Carter speeches. A few analysts have used the concept to model the social discourse about a particular topic. For example, Rubino-Hallman (1998:261-278) used the concept to guide the construction of an inductive artificial intelligence classification of the themes that were used by the Presidential Commission on Women in Combat.

Psychological constraints to political forecasting of Aill-structured@ political problems: Cognitive conceit and political expertise

Individuals use simplifying heuristics (e.g., mental decision rules) when they solve problems. Individuals and groups use more general meta-heuristics (e.g., mental strategies) to understand, to make inferences and decisions about ill-structured problems across a number of

different domains (Plous, 1993). In politics one of the most pervasive metaheuristic is Asatisficing@ (Simon, 1955). Rather than engage in comprehensive information search and analysis of the probabilities and utilities associated with all possible outcomes, Simon=s early research documented that people in public organizations usually search for a Agood enough@ or satisfactory solution for the immediate problem at hand (Lindblom, 1959; Wildavsky, 1964; Dyson and Purkitt, 1986).

The universal reliance on heuristics is necessitated by the limitations in the amount of information that can be processed systematically within the confines of working memory. A reliance on heuristics leads individuals to commit a large number of cognitive biases or errors in judgment when compared to normative principles of rational decision making (Plous, 1993). An extensive body of experimental research literature indicates that people rarely make adequate adjustments from their initial anchor or reference point (Kahneman, Slovic and Tversky, 1992; Quanttrone and Tversky, 1988). Individuals are frequently unaware of their errors because there is a tendency for people to have an unwarranted faith in the adequacy of their intuitive judgments (Nisbitt and Ross, 1980). This persistence faith in one=s intuitive analytical processes has been called Acognitive conceit.@

The persistence of cognitive conceit helps to explain why intuitive analysts usually believe that they have used all relevant information. Nnumerous studies, however, document that people have difficulty judging what information they actually used and frequently report using more information than they did in experimental tasks. Ironically, an individual=s faith in the adequacy of prior intuitive predictions seems to increase with the amount of available information whether their predictions were correct or not (Oskamp, 1965; Lichtenstein and Fishhoff, 1977). Overconfidence in the adequacy of past predictions has been found to persist for most experimental subjects even when the subjects are given feedback information about the inaccuracy of their prior judgments Cognitive conceit seems to limit the ability of most individuals to recognize inadequacies in their past intuitive judgments and thus, their ability to make adjustments to the cognitive routines and models used to improve predictive abilities. The tendency also makes it difficult for intuitive experts to correctly calibrate judgments with incoming information or to learn from past mistakes (Plous, 1993).[2]

We see evidence of the pervasiveness of cognitive conceit among individuals and groups involved in politics. Most policy experts and policy makers continue to rely on their intuitive analyses and prefer to use Aseat-of-the-pants@ problem solving logics even when they have the results of highly reliable formal forecasting models available to them. Tetlock (1999) has compiled extensive evidence that political experts and politicians rely on their intuitive analytical models even when confronted with evidence that these models generated incorrect predictions. Even famous political experts such as Kissinger and Brezinski, when asked to explain a number of their more famous erroneous predictions about future events and trends in foreign policy responded in very similar ways. These two experts, and many other experts, usually claim that they were Anearly right@ (Moran, 1999).

Cognitive conceit in politics is compounded by the fact that Aexpertise@ is often associated with a person=s occupation, social position and reputation as a political expert. The expertise of political experts, like expertise in other several other fields, is rooted in part on their prior knowledge or cognitive skills at solving difficult political problems. However, unlike domains such as chess or music where expertise is associated with the mastery of certain

performance skills, there is no generally agreed upon criteria for distinguishing between political experts and novices. Instead political scientists usually divide a population into experts (elite, policy makers , or their advisors) and novices (citizens or the mass public). In studies of the mass public, political researchers collect data on the extent of a person=s knowledge of local or national affairs, and whether they think of politics in abstract terms on mainly on the basis of personal experience. Thus, cognitive complexity, social awareness and minimalism provide standards for differentiating experts (Dawes, 1988; Fiske and Taylor 1984; Sniderman, Brody and Tetlock, 1991). Only a few studies have systematically examined the nature of political expertise or the differences between political novices and experts.(Chan, 1982; Dyson and Purkitt, 1986; Hermann, Tetlock, and Diascro, 2001; Taber and Steenbergen, 1993: Tetlock, 1992, Voss, 1998).

In contrast, controls for expert-novice differences is standard practice in psychology. Cognitive psychologists who have studied how experts and novices solve various types of problems in different fields have found some important differences in the problem-solving activities of experts and novices including: (1) Experts have a more extensive and better-organized knowledge base than novices; (2) experts deal more effectively with problems that have structure and known Abest solutions@; (3) experts tend to work from problem understanding to problem solution while novices tend to immediate look for solutions and to use possible solutions to achieve problem-understanding; and (4) experts draw upon a larger set of heuristic than novices during problem solving (See Anderson 1988; Chi, Glaser and Farr, 1988; Larkin et al. 1980; Shanteau 1989; and Voss, 1998). These findings help to explain why experts are usually better prepared to solve certain types of problem when compared to domain novices. Experts in many fields are individuals who have better organized memories that contain more interrelated cognitive elements and often have precompiled subroutines to help them frame and then solve a problem.

Since many political experts and politicians gain their expertise from their prior experiences in appointed or elected positions, the problem solving behavior of political experts will not necessarily approximate the behaviors typically associated with expertise in other fields. Moreover, the sharp distinction between novices and experts tends to blur in many fields as individuals and groups are asked to tackle ill-structured problems that cannot be solved by well developed algorithm or problem solving skills. In politics, where many problems are poorly structured ones without a known or single optimal solution, it is hardly surprising that the meaning of expertise and effective problem solving skills remains ambiguous and controversial.

A limited amount of research on political expertise has tended to find that Aexpertise@ is tightly coupled with verbal articulateness and related attributes such as social status and race (Chan, 1982; Purkitt, 1998). Researchers have also found a great deal of variation across Aexperts@ in terms of the structure and amount of detail included in their cognitive representation of ill-structure problems (Purkitt, 1998, Taber and Steenbergen, 1993).

The pervasiveness of cognitive conceit and the ambiguous nature of expertise in politics are serious obstacles to those interested in having political experts and policy makers rely more on the results of formal forecasting methods and explicit decision aids. Recognition of these tendencies underscore the importance of an analyst having a thorough understanding of how the end user represents the forecasting problem. A better understanding of the usually implicit mental representation of the problem of the end user may help the forecaster to more effectively communicate the results of forecasting efforts.

Using schematic summaries to explicate the mental model of
novice and expert forecasters & clients

One approach for obtaining a better understanding of how clients think about or represent a particular forecasting problem is to ask individuals or small groups to Athink aloud@ about the important features of the problem. These verbatim verbal protocols can be coded using well-established protocol coding techniques (Ericsson and Simon, 1993). I have used the results of protocol analysis of two different sets of political experts to determine whether the individuals were using a Alist-like@ or Ascript-based@ approach to problem representation (1998, 2000). I find that this classification exercise helps me to understand whether an individual=s thought process more closely approximated of experts or novices in other fields.

In the most recent study (2000), a diverse sample of 64 individuals, whose job involved working on environmental and political problems in Southern Africa, were asked to identify the important environmental issues or problems in specific countries, or in the Southern African region as a whole, that might lead to future political instability or conflict. Participants in the study constituted a convenience sample of 64 individuals working in a variety of governmental and non-governmental organizations in the United States and in six countries in Southern Africa.[3] In this sample, 31 of the participants used a Alist-like@ approach while 33 discussed most issues within the context of prior scripts and beliefs. This dichotomy of problem-solving logic is not a logically pure division as the problem-solving logic used by the individuals range along a continuum from simple lists through a completely script-based perspective with explicit assumptions, beliefs, inferences and predictions about future outcomes that flowed from their initial statement of the problem.

I also found that individuals with extensive prior experiences working in bureaucratic positions that required them to deal with and to justify policies related to a wide range of environmental policy issues (i.e., such as employees of the US DOD Office of Environmental Security, US Environmental Officers in foreign embassies, or a foreign country=s national or national security forces >environmental officer) were more likely to develop well-structured and detailed problem representations. In contrast, individuals working in more specialized policy areas, especially those with little or no experience with similar analytical tasks, were more likely to develop a list-like problem representation that approximates the general problem-solving structure of a Anovice.@

The data suggest that individuals whose jobs required them to analyze the linkages between environment problems and politics used an existing analytical framework or political script rather than adopt a list-like approach to identify environmental-security problems. I anticipated and found that individuals working on specific substantive problem areas (i.e., water forestry, agriculture) were more likely to focus on problems related to their substantive area of expertise rather than attempt a broader regional perspective .

The majority of the participants in this study focused their attention primarily on salient issues and problems in one country. Only twenty of the 64 participants focused on future probable political consequences of current problems and issues. Of the 20, most had prior or current experience working in political positions. Only a few of them used time interval distinctions when talking about future probable events or trends (e.g., 17% (N=11). Among this

subset only a few made any effort to identify when future probable events or trends would be likely to occur or distinguish among short, medium, or longer term future trends. The eleven individuals who made the effort were working on specific policy problems that required specific time estimates (e.g., future projections of absolute water scarcities) or were politicians or analysts who were focused only on near-term political events such as upcoming elections.

The structure of these problem representations are consistent with past information processing generalizations. Seventy-four percent of the participants who adopted a list-like approach cited five or more problems or issues. No one in this sub-group listed more than twelve. This finding is consistent with Miller=s (1956) insight that individuals can only process a few (i.e., 7 + or - 2) bits of information in working memory. The individuals who tried to discuss specific issues using a more general script-based perspective also quickly experienced information processing constraints in efforts to develop a problem representation. These individuals were only able to use a few (i.e., 2-5) abstract dimensions in developing a mental representation of the problem. This result is also consistent with a past research which has found that individuals can only use 2-5 abstract analytical dimensions to systematically analyze complex problems (see Purkitt, 1991 for a review of this literature).

 This environmental-political study replicated the results of my earlier (1998) study that found that individuals from higher socio-economic status groups with extensive experience with similar verbal tasks tended to be more articulate and thus, generated longer verbal protocol than non-native English speakers. There were differences in the verbal articulateness across ethnic groups. These findings are consistent with other studies that have found that a person=s verbal articulateness is tightly coupled with a person=s socio-economic status as well as the perception of others as to a person=s >political expertise= (Mohammed, 1993; Purkitt and Dyson, 1988; Shanteau, 1989; Voss, Tyler, Yengo, 1983). I found that by summarizing the Athink aloud@ protocols, it was easier to identify the analytical dimensions used by each respondent in their Athink aloud@ protocol. The summaries also helped to disentangle differences in the analytical structure and content of each participant=s Athink aloud@ analysis from Alevel of verbosity.@

By summarizing verbatim statements associated with free-hand cognitive diagrams it was possible to compare and contrast both the content and structure of the mental representations of the participants. The diagrams were a useful way to identify and summarize the most salient issues, actors and linkages between environmental and political problems of individuals with diversely different backgrounds and experiences. I found that a synthesis of the issues identified in the summaries was a useful approach for identifying current and future environmental issues that might lead to conflict in the Southern African region. Disagreements in the analyses of the protocols of similar problems highlighted differences of opinion in how specific environmental policy issues should be framed and may be a useful indicator of fundamentally different policy scripts or ideologies shared by relevant political elites that may form the basis of future political conflicts.

Figures 2 and 3 illustrate the wide variation among political experts who were asked to think aloud about the same general forecasting task, to wit, what current environmental problems are likely to lead to future political problems? Figure 2 summarizes the verbal protocol of a female African American who was a career State Department Agricultural Officer working in the US embassy in an African country. This

individual initially focused on the region and stated that food security was a major problem throughout the region. The analyst quickly shifted to listing important agricultural issues in South Africa. The analyst concluded by referencing the importance of food security in the region. This sequence is interesting given the extensive amount of past research documenting that political solutions are typically embedded in the initial framing of the problem developed by political decision makers. Perhaps by gaining a better understanding of the preferred framing of key individuals to specific problems within a given organization, we may better understand and predict future choices and policies of key political actors. As Cohen, March, and Olsen (1988: 296-7) stress, Aan organization is a collection of choices looking for problemsY(and) solutions looking for issues to which they might be the answer.@

Figure 2

EXAMPLES OF ALIST-LIKE@ PROBLEM REPRESENTATIONS

Ex 1: Pure List-like framing

Food Security
> **World Food Program dead**
> **US Dept. of Agriculture not sensitive to problems of**
> **African farmers (South Africa, Botswana)**

> **South Africa**
> **1-distribution of land**
> **who owns,**
> **Who will pay,**
> **Different organized actors by sector,**
> **2-water**
> **3-desertification**

> **Other issues related to agriculture**
> **-Role of Banks how to give people access to capital**
(BATA)
> **-Bioengineering of seeds**

 -Few are focusing on broader issue of food security

Figure 3 summarizes the verbal protocols of a script-based problem representation. I classified this representation as script-based because it contains several interrelated themes and causal inferences that can be used to explain a variety of current environmental problems in the region and within a specific country, Mozambique. The partial script-based analyses was generated by a former US military officer working in a senior position for a private security firm in Mozambique. He identified and related three variable clusters - environmental degradation, lack of state capacity, and corruption of political officials and the military B to explain both general conditions found in countries throughout the region and to explain the factors fueling specific environmental problems in Mozambique (See Figure 3). Thus, environmental degradation throughout Africa and uncontrolled fishing off the coast of Mozambique derive from extensive poverty, the limited resources of the state to cope with environmental and economic problems, and extensive corruption among political and military leaders in many African governments. Environmental degradation fueled by poverty, the lack of state capacity, and corruption of public officials are identified as both causes and consequences of environmental security problems.

Figure 3

A SCRIPT-BASED APPROACH

MACRO THEME: Mozambique is poor, Aexpecter@, Aungovernable@ state

Threats to environment:
#1 THREAT (All African states) - ENVIRONMENTAL DEGRADATION

Population density & Limited resources of state...>
...> Inability of state to plan or enforce regulations...> Wide scale corruption among senior political officials...>
...>why there are a Alarge number of basket cases in Africa@

Environmental degradation manifested as...>
1 Deforestation
 -illegal use of charcoal, wood , oil Y>worsening desertification & climate change
  ...>ANo one: looking towards future@

EXAMPLE#1: MOZAMBIQUE Rural women walking 50 kilometers for fire wood
CONSTRAINTS IN MOZAMBIQUE:
   -No agency monitors reforestation programs
   -Widespread crime
-Defense forces in disarray

EXAMPLE#2: Lake Malawi potential as protein basin for region
EXAMPLE#3: 2 ARape of Indian Ocean@

Illegal fishing (Japanese large harvesters) using vacuum methods to
or Spaniards, maybe Russians) ....> Αclean out waters@...>
 ...>depleting fish stocks and ...>destroying coral
 CONSTRAINTS & EXAMPLES:
   US organized operation to cut nets, size ships, fines
   ...>US prohibition against countries exports w/o protective BUT
      turtle nets are irrelevant to Mozambique=s problems

AND MORE IMPORTANTLY Mozambique government doesn=t recognize there
are problems with environment (forestry, agriculture, fishing) OR political system

   Military lack capacity or resources (Αfor a parade@).....>

            soldiers work for Αtea and smokes@
            AND   ΑNobody in military cares@

#2 THREAT   (ALL COUNTRIES IN REGION) IS LACK OF CAPACITY
   ...>little joint thinking in region
            Mozambique has 2 boats (100-150 ft.) that Αbarely float@

            ΑNobody cares in military@
-No Training missions
-No Interest in effective aid...> No Effect

EXAMPLE: US tried to give coast guard capability (1995)
 ...>Illegal Fishing continues (Trawlers with 12-20,000 ton capacity)...>
       ...>AND Domestic pilfering...>

RESULT..>only 4 tons of fish coming into country for legal sales...>Mozambique is
downloading and selling off capacity with cooperation of the police

#3 THREAT CORRUPTION <.....>competition for scare resources (in poorest
country in region)

CONSTRAINTS:
-Little spending on social welfare (1.8% healthcare;.8 ed.)
-Hollow military (11,000 or 3% GNP but couldn=t mobilize Αfor a parade@)
-No awareness of need to conserve or long-term perspective

            Αif can=t eat it, sell it, use it, trade it@
...>ΑNo one in government views environment as a Αfront burner issue@

      Ministry of Defense (military in name only)
            .   .

.   .
          Armed Forces of   Senior Army General
             Mozambique

                     .   .
                     .   .
                army   police   custom officials

          ᴀ**Nothing moves without their cooperation**@**...>**

        ..>must pay National Directors & Minister of Defense 200/mo.
         ...>No recognition or government pressure for social welfare programs

      2- Solution: 1) Pressure from outside actors (donor countries,
      UN)...>environmental planning and monitoring &
                2) Use outside contractors for public functions (e.g., customs collection)

This analyst concluded with a simple causal map that identified the central role played by the military in Mozambique=s current political system. According to this analyst, this military establishment is controlled by three top national ministers who supplement their meager official salaries by controlling virtually everything coming into or going out of the country. The continuation of this system is assured by the fact that the individuals who direct the army, police, and customs are key players in this political system. According to this script, solutions to Mozambique=s political and environmental problems, and many other African states, will require pressure from outside donor community and the use of private contractors to run essential government services .

Despite important differences in the content and structure of the two cognitive diagrams, the diagrams suggest that forecasting effort about environmental-security linkages in the region that exclude agricultural issues will not be accepted as valid or relevant to Subject 1 (Figure 2). In a similar vein, forecasting efforts that fail to incorporate issues related to poverty, aid efforts, and government corruption in Mozambique and throughout Sub-saharan Africa are unlikely to be accepted as valid or used by the second subject (Figure 3).

Conclusion

The basic thesis of this paper is that forecasting methods and forecasts are more likely to be accepted and used, if the results are related to the implicit model of the problem employed by decision makers The two-fold classification scheme developed is offered as one way to determine the type of forecasting methods that may be most appropriate for a particular forecasting task. When the problem at hand is an ill-structured problems, past studies indicate a need for an analyst to understand better the mental representation of the problem. The data also support the proposition that political experts will evidence important individual differences in the way they represent ill-structured problems. Thus, the mental representations of specific problems of political experts may be expected to vary in structure from list-like representations to well-developed, script-based mental representations. Construction of summary cognitive

diagrams from think aloud individual protocols or analysis of small group discussions about the forecasting problem is one way for an analyst to understand better the implicit model of the problem employed by clients. A better understanding of the mental representation(s) of end users may allow the forecaster to more effectively communicate why and how specific forecasting methods or results are relevant to understanding the immediate problem at hand.

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Endnotes

1. Recent events in Nigeria illustrate how rapidly economic and political conditions can change in less developed countries that are dependent on a single primary product for foreign exchange earnings. On June 1, 2000 the Nigerian government by decree raised domestic gasoline prices by 50 percent. This sudden price increase triggered a general strike that quickly spread to the oil sector. Less than a week after the onset of this strike, President Obusegun Obasanjo apologized for not consulting widely on sharp increases in gasoline prices. Since the strike quickly crippled the economy, Obasanjo was desperate to end the strike. Economic turmoil generated by a prolonged strike is precisely the type of situation that triggered military coups in Nigeria in the past. Thus, Nigeria in a few weeks moved from a low-to-moderate risk of a military coup to a high coup-proneness.

2.It should be noted that professional Aodds makers@ including expert bridge players, gamblers and National Weather Service forecasters, who received regular feedback about the accuracy of specific judgments, did not exhibit the same degree of resistance to changing their predictions on the basis of feedback information (Lichtenstein, Fichoff, and Phillips, 1982; Murphy and Winkler, 1984).

3. While care must be taken in making generalizations from a non-random sample, interviewee were knowledgeable and influential individuals who had extensive experience dealing with political and environmental problems in Southern Africa. Each of the individual who participated in this study had past experience dealing with the linkages between politics and at least one environmental policy area. About half of the interviewees were government officials. Their occupations ranged from cabinet level ministers, heads of bureaucratic departments in national or provincial levels of government, and officials with national parks, police, or military forces who had recent first-hand experience working on problems relevant to the concept of

environmental security. Other individuals worked in senior positions for international or regional organizations; non-governmental organizations with programs in the region, or were researchers working in universities, policy institutes, or non-governmental organizations. The majority of these interviewees worked in positions that focused on a particular set of environmental problems (i.e., water, forestry, wildlife), or monitored trends about a particular set of problems in a specific country (i.e., US military and diplomatic officials) assigned to specific countries and policy areas. Approximately 20 per cent of the interviewees worked in roles that required them to think broadly in terms of the linkages between environmental and security policies as part of their current job requirement.