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The decisions that politicians have to make with respect to foreign policy are in general very complex because the possible strategies have multiple uncertain consequences. For such complex problems the mathematical decision theory has developed procedures to arrive at optimal decisions. Accordingly, the politicians formulate the decision problems in terms of possible strategies and possible consequences with their probabilities and utilities, but they don´t have the numeric information and the calculation facilities to use the suggested optimal "Subjective Expected Utility model" to derive conclusions. Therefore we have studied in a long term project the decision rules the politicians use to derive their choices. We have suggested 7 decision rules which are specific for the description of the decision problem with respect to the use or not of the rank ordering of utilities and/or probabilities. It turns out that these 7 decision rules are sufficient to near perfectly predict the choices in 231 observed decision situations. To check whether the argumentation is similar with respect to crucial decisions i.e. going to war or not, we studied arguments of decision makers concerning the start of the First and Second World War, the Cuba missile crisis and recently the use of the atomic bomb in 1945. In most of these situations one of the decision rules specific to the form of description of the observed decision problem predicts the chosen action.
Surprised by the limited us of evaluations of utilities by the politicians we decided to study the arguments of scientists concerning the use of the atomic bomb against Japan or not. We were wondering whether they would use the same procedure for argumentation and possibly use more elaborated arguments. The result of this study was that they use the same procedures for argumentation but they use more frequently arguments involving evaluations of utilities but this was more determined by the situation than by a different way of argumentation.

Most foreign policy decisions are characterized by the fact that the decision makers have to take into account the multiple consequences of the possible strategies, consequences on national and international level, consequences on the short term and the long term, consequences for public opinion in the own population and other countries while taking into account that these consequences are not certain. For such so called "Multi Attribute Utility problems under uncertainty" mathematical decision theory (Fisburn 1964, Keeney and Raiffa 1976) has developed procedures to arrive to optimal choices. However the decision makers in such situations don´t have the information and the tools to use these procedures. This raises the question how they solve these decision problems. Since we cannot study the way individual decision makers come to their decisions, we have studied the second best alternative the arguments they use to convince each other to choose a certain strategy. These arguments can be found in minutes of meetings in which the decision makers indicate their arguments for their preferred strategy (Gallhofer and Saris 1996).

A lot has been written about the formulation of arguments, but the approach that is most in agreement with ours is the one of Toulmin (1958). He specifies three basic components of an argument: the ”grounds”, the ”claim” and the” warrant”. The “claim” represents the conclusion drawn. The “grounds” present the data for the claim. The “warrant” represents the rule that indicates why the data (ground) are enough to draw the conclusion (claim). One of Toulmin´s examples is: “I am born in Bermuda (ground), so I am British” (claim). This conclusion is based on the rule (warrant) that “people born in Bermuda are British”. The arguments will vary from topic to topic but the basic concepts may be used although it should be said that the warrant is often not mentioned implying that this rule should be obvious to the audience of the speaker (Toulmin).

The mathematical decision theory (e.g. Fishburn 1964, Keeney and Raifa 1976) fits very well in this frame work: The grounds are descriptions of the possible strategies and their consequences including the probabilities of these outcomes and their utilities.The warrant is the Subjective Expected Utility rule which suggests that one has to choose the strategy (claim) with the maximal Subjective Expected utility (SEU).The SEU for strategy i is defined as $\Sigma_j\, p_{ij}u_{ij}$ where p_{ij} is the probability of outcome j in strategy i and u_{ij} is the expected utility of this outcome.

It will be clear that in meetings of decision makers the speakers cannot use this formal approach because they don´t have the necessary information about the utilities and probabilities and cannot use this numeric information, if they would have it available at all. However they could approach this model by specifying as ground the possible strategies and the possible consequences including their probabilities and utilities, present as a warrant some rule and derive from these two the claim i.e. the strategy to be chosen. Let us look at an example.
In 1947 in the Dutch East Indies an independence movement declared the Republic of Indonesia. The Dutch Governor General in the Dutch East Indies wanted to get permission of the Dutch government to occupy the seat of the Republican Government. In one of his letters to his government he indicates the following argument (Saris and Gallhofer (1996, 220):

”If we occupy the seat of the Republic, the Republic may capitulate or be liquidated completely. If we do nothing it is possible that the republic capitulates but it is also possible that our position in the Dutch East Indies will not improve (ground). Therefore, I suggest to occupy the seat of the Republic (Claim)”

The description of the choice problem is such that it seems rather obvious to choose the first option but it is not so obvious which decision rule could serve in this case as a warrant. Most of the time the rule (warrant) is not specified. This seems to suggest that the rule is rather obvious and known by the audience. It would be interesting to know these rules that are so obvious that they don´t have to be mentioned.

It is also remarkable that the decision maker makes such a simple argument for a problem that involves a lot of casualties at both sides, international consequences and also serious problems for the government with respect to the public opinion. We will come back to this issue later.

We began with a study of a sample of 231 decisions of the Dutch government in the period between 1900 and 1955. Later we extended the research to arguments of politicians about the start of the First and Second World War, the Cuba missile crisis and finally we studied the arguments of scientists about the use of the first atomic bombs in 1945.

Empirical research of decision arguments

A complication in the study of arguments is that often they are not complete because decision makers specify one possible consequence for a strategy but do not mention that this consequence can also not happen. They suppose that this is obvious. Another complication is that the speeches can contain informatio to strengthen the belief that the description is true or to contradict arguments of other people. This makes it complicated to detect the three basic components, the ground, the claim and the warrant, in minutes of speeches.

A method to derive arguments from the minutes has been developed by Gallhofer and Saris (1996 Appendix A). The arguments are presented in decision trees and decision tables. How such arguments look like has been illustrated in Figure 1 by presenting the previously provided argument of the governor of Dutch East Indies in a decision tree.

S1		*S2*	
Occupation of the seat of the Republic		*Do nothing*	
O11capitulation of the Republic	*(O12) liquidation of the Republic*	*O21 capitulation of the republic*	*O22 no improvement at all*
P11= possible	*P12= possible*	*P21= possible*	*P22=possible*

Si=strategy i, Oij= outcome j of Si, Pij=probability of Oij

Figure 1. The decision tree presenting the argument of the governor of Dutch East Indies to occupy the seat of the Republic of Indonesia

As we see also in this example the politicians use the concepts of the decision theory mentioned above, but, as expected, not with the precision needed for the mathematical decision theory. The utilities are often only implied by the positive or negative connotation of the terms used for the consequences. They can also explicitly indicate that consequences are positive or negative or use rank ordering suggesting that one outcome would be more positive or negative than another one. With respect to the probabilities the decision makers may indicate that a consequence can happen or not or indicate that the probability of one outcome is larger than the occurrence of another. Following the procedure developed by Gallhofer and Saris 1996 (Appendix B) we studied what these arguments looked like.

Table 1 The structure of the problem descriptions of the 231 Dutch foreign policy problems

	Nominal probabilities	Rank ordered probabilities	Total
Nominal Utilities	109	70	179
Rank ordered Utilities	49	3	52
Total	158	73	231

In the table the descriptions of the decision problems are classified on the basis of the amount of detail in the description of the utilities and the probabilities. In total 231 arguments have been studied. The table shows that most politicians only indicated possible consequences without the rank ordering of utilities and probabilities (109). Besides that, frequently they used either utilities with rank ordering (49) or probabilities with rank ordering (79) but hardly ever both were rank ordered (3). If we assume that most foreign policy decision problems are Multi Attribute Utility problems with uncertainty, then this table indicates that the politicians considerable simplify the decision problems. This is done by omitting many aspects and ignoring differences in utilities or probabilities between different consequences or even in both.

Decision rules

Given that in the descriptions of the problems only limited information about the utilities and probabilities is provided, this raises the question how the choices can be derived from these descriptions of the decision problems. This question is even more challenging because the politicians hardly ever specify these rules.

So the next problem was to detect rules that are so obvious given the description of the problem that the rule does not have to be specified. We were looking for rules that were different for the different situations specified in Table 1. This means that we assumed that the rules should be using the information that is given in the description, i.e., if utilities are given with rank ordering the rule should use this information. The same if probabilities are presented with rank ordering and also if both are specified with rank ordering. This basic assumption leads to the suggestion of the following "decision rules".

In case no rank ordering is specified at all the rule should be capable of suggesting a choice without such information. In this class we specified two rules inspired by the work of Simon (1957), the so called Simons rules. Simon suggested that people do not evaluate all possible actions before to make a choice but that they select the first strategy that provides a satisfactory result. We could not use the sequential aspect of this rule but concentrated on the satisficing

aspect. In doing so we specified two rules. We called it the Simon rule and the Reversed Simon rule. They are formulated as follows (Gallhofer and Saris 1979).

The Simon rule says:

If the outcomes of one strategy are all positive while for the other strategies at least one of the outcomes is negative then the strategy with only positive outcomes should be chosen

The Reversed Simon rule states:

If for one strategy at least one positive outcome is possible while for all other strategies only negative outcomes are obtained, the strategy which can lead to a positive result should be chosen.

If only the probabilities are specified with rank ordering we thought that the rules should take these rank ordering into account (Gallhofer and Saris 1979). There were two rules specified: a positive and negative risk avoiding rule.

The positive Risk Avoiding rule suggests:

If the probability of a positive result is larger for one strategy than for any other strategy the former strategy has to be chosen.

The negative Risk Avoiding rule suggests:

If the probability of a negative result is smaller for one strategy than for any other strategy the former strategy has to be chosen.

If only the utilities were specified with rank ordering the rules should be based on these rank ordering. In this case there were 5 decision rules specified but only three of these rules have been observed in our research. The first is the Dominance rule (Keeny and Raifa,1976), the second is the Lexicographic rule and the third is the Addition of Utilities rules (Fishburn 1974).

The Dominance rule suggests:

If one strategy is better on at least one aspect (outcome) and equally good with respect to all other aspects (outcomes) compared with the other strategies then the former strategy has to be chosen.

The Lexicographic rule says:

If one strategy is better on the most important aspect of the decision problem than the other strategies the former one has to be chosen

The Addition of Utilities rule states:

If the total of the outcomes of one strategy is better that the total of outcomes for the other strategies the former strategy has to be chosen

It will be clear that the application of the last two rules requires that the decision maker not only specifies the decision problem but also provides further information about the importance of the different aspects or the evaluation of utilities of the total outcomes of the strategies.

For the situation with rank ordering for utilities and probabilities we suggested an ordinal version of the SEU decision rule. However this rule can only under a very special condition be applied. For details of these rules we refer to Gallhofer and Saris (1996).

A minimum requirement to accept these rules as the ”warrants” in the arguments is that these rules with nearly hundred percent certainty can predict on the basis of the description of the decision problem the choice of the decision maker. In Table 2 the titles of the different rules are listed and we see that in 97% of the cases the chosen rules indeed predict correctly the choice.

Table 2 The prediction quality of the expected decision rules given the problem description

Information about utilities and probabilities	predicted decision rule	Correct prediction	wrong prediction	total
Utilities and probabilities nominal	Simon, Reversed Simon	103	6	109
Utilities nominal probabilities rank ordered	Risk Avoi-dance rules	68	2	70
Utilities rank ordered, proba-bilities nominal	Dominance, Lexicographic Addition of utilities	46	3	49
Utilities and probabilities rank ordered	SEU	2	1	3
Total		219	12	231

This table shows very clearly that these rules may be the proper rules that the decision maker and the listeners apply to derive the conclusion. However this strong relationship is not a proof because the decision maker does not specify the rule. Therefore we did a study described in the next section where people had to specify the used decision rule.

Are these rules generally known?

We wished to know if these rules are indeed known by the audiences of such speeches. This led to the following research questions:

1. Do listeners to such arguments indeed make the same choice as the speaker?
2. Can we show that the listeners indeed apply the expected decision rule?
3. Are all people able to do so or is there a difference with respect to age and education

In the next study 59 randomly selected people of the Dutch population were presented with 13 different decision problems derived from the larger study of real life arguments about decisions. In this study we presented only the formal structure of the argument in order to prevent biased responses due to the specific context of the argument. A typical specification would be:

Strategy 1 leads with certainty to outcome A. Outcome A is negative
Strategy 2 leads probably to outcome B , Outcome B is positive. But there is also a very small probability that outcome C will occur. Outcome C is negative.

Given such descriptions of the problem the respondents were asked to choose between the specified strategies and to indicate why they have chosen this strategy. In this way we asked the respondents to specify the rule they applied. This procedure is suggested by Ericson and Simon (1984). To detect the rules the respondents specified, a coding procedure has been developed that had a very high reliability (Gallhofer and Gallhofer 1996, Appendix C). The result was that the respondents have chosen in 100% of the cases the strategy that was chosen by the decision maker who specified this argument in the first place in a real life situation.

The most important result of the second part of the study is that all rules mentioned above have been specified by the respondents but sometimes they specified an acceptable rule using less information than specified in the description of the decision problem. Only in a very limited number of cases an incorrect rule was mentioned (Gallhofer, Saris and Schellekens 1988).
It was also detected that lower educated people ignored sometimes the rank ordering and used more simple rules if possible.
If the A,B and C were substituted by real life information for example about the decisions of the Dutch government concerning Indonesia, some people were inclined to use other rules then indicated here. Some used norms, others criticized the description or ignored components.

Arguments about war and peace in other countries

Given that we have seen that foreign policy decision makers in the Netherlands were using relative simple arguments to convince their colleagues about their choice, we were wondering if decision makers in other countries and other times behave differently. Therefore we studied minutes of speeches concerning the start of the First World War, the Second World War and the Cuba missile crisis. Below we present a summary of the results of this research. For the detailed information about the arguments we refer to Gallhofer and Saris (1996, Part 1)

In none of the cases was the decision rule specified, yet, the appropriate decision rule, given the way the problem was described, could predict the chosen strategy. This means that also in decisions about war or peace the arguments were of the same kind as the arguments studied in

the Netherlands. It seems that this is the way politicians with different political orientations formulate their decisions in different countries and in different time periods.

A surprising result of these studies was that in none of these cases concerned with going to war there was an evaluation of the utilities of the outcomes of the decisions. They were all presented just as good or bad or this was only implied by the formulation used. In this sense these arguments about going to war or not were also very simple omitting a lot of important information.

Arguments of physicists about the use of the atomic bomb

Somewhat surprised by the level of argumentation by the politicians in such serious situations we carried out another study. During the Second World War a large group of physicists have worked on the Manhattan project to develop nuclear bombs. At the end of the war, the discussion was to use these bombs against Japan or not. Some physicists were invited to participate in these discussions. Others were so concerned about the consequences of their work that they wanted to prevent the use of this bomb by formulating petitions for the president.

We studied their arguments to see whether physicists would make more elaborate arguments about the use of the first atomic bomb. The minutes of their arguments can be found in Stoff et.al. (1991). We have found 8 complete arguments about the use of the nuclear bomb in the available sources. A summary of our analyses are presented below[1].

The first argument studied was mentioned in a letter of the director of the Metallurgic laboratory in Chicago (Compton) to the secretary of state (Harrison) at June 12 1945. He considers two strategies: S1: to make a technical but not military demonstration plus recommendation by the US to outlaw the military use of atomic explosives and S2: military use of the bomb by the US. He specifies outcome without uncertainty but because the second strategy has a positive and the first strategy has the positive outcome which he evaluates as more important than the positive outcome of the second strategy he choose for the first strategy using a lexicographic rule.

The second argument from Franck specified in the preamble of the report of the metallurgic laboratory dated 11 June 1945. In that report two strategies are compared: S1: an arms race and S2: an international agreement. The report argues that science cannot provide protection against nuclear weapons so in case of the arms race the most likely outcome is mutual total destruction while in case S2 is tried there is a possibility to prevent the mutual destruction. In this case the international agreement is chosen based on Risk avoiding rule.

[1] The elaborate analyses plus documents can be found in document (URL of RECSM)

The third argument has been derived from the elaborate main part of the report of the Franck report. In this elaborate report 6 strategies are considered.

S1: Keeping our discoveries secret for an indefinite time. The report suggest that that is not possible and that it will lead to an arms race with all consequences.

S2: rapid development of nuclear weapons for retaliation. This strategy will lead to accumulation of better nuclear bombs and an overwhelming temptation to a first strike and to mutual destruction.

S3: Use of the present nuclear bomb without warning on an appropriately selected object in Japan. S3 may have the positive effect of finishing the war but on the other hand, undoubtedly destroy the chances on an international agreement on abolishing nuclear weapons.

S4: Demonstration of the nuclear bomb immediately in the desert. This strategy is the best possibility to get an international agreement and possibly also an end of the war

S5: Use of the nuclear bomb against Japan. This will lead to a humanitarian disaster and an arms race

S6: Delay the demonstration. May lead to temporary advantage but in the end it will worsening the chances of an international agreement and increase the chances of an arms race

It seems to be clear that they want to prevent an arm race with as a possible consequence a total destruction of the world. But because of the complexity of the description of the decision problem with rank ordered probabilities and utilities there is no simple rule that can predict their choice.

The fourth argument comes from a letter from Glen Seaborg of the Radiation Laboratory at Berkeley to Ernest O Lawrence at June 13 1945. He looks at two strategies. S1: use the atomic weapon directly upon Japan without warning. S2: A demonstration of the bomb and an ultimatum to Japan and eventually use of the Bomb against Japan. By the first strategy the US will lose the confidence of their allies and deteriorate the possibility of outlawing the future use of the weapon. The second strategy will strengthen our moral position and with support of the UN and others the bomb can still be used against Japan. In this case the risk avoiding rule predicts the chosen strategy.

The fifth argument comes from the scientific panel, the author is J.R. Oppemheimer at June 16 1945. S1: A purely technical demonstration. S2: A military application in the best way designed to induce surrender. S1 aims at the outlaw of the use of nuclear weapons. S2 may prejudice our position in future negotiations about the use of the weapons but will save a lot of American lives. This specification of the decision problems does not provide a possibility to make a choice. But if one takes into account the evaluation of the utilities by the different groups of scientists the choice is clear. Those who see outlawing the use of nuclear weapons as more important than the outcomes of the use of the weapon now chose S1. Those who see prevention of war and saving lives of Americans as more important prefer strategy S2.

The sixth argument comes from Szilard and is the first petition he made for the president of the US at July 3 1945. S1: Use of the nuclear bombs in Japan. S2: an ultimatum to Japan and after that eventually use of the bomb if necessary. S1 may lead to surrender of Japan but will also open the door to an era of devastation on an unimaginable scale. S2 may lead to a surrender of Japan and then the use of the bomb is not necessary anymore and the US has no responsibility for the possible devastation in the future. While it is also possible that Japan does not surrender but then the use of the bomb is still possible. In this case, given the specification of the probabilities without rank ordering there is no rule that leads to the preferred choice S2.

It seems that his colleagues had the same opinion as our analysis showed because later the problem description of the petition was corrected and in the second version the decision and the decision rule are clear.

So the seventh argument was the second petition specified by Szilard and accorded by many scientists, send to the president of the US at July 17 1945. S1: the use of the atomic bomb and S2: providing Japan with an ultimatum to surrender and eventually use of the nuclear bomb. S1 will bring the war to an end but starts an arms race with all its consequences. S2 may also lead to surrender without use of the bomb but if Japan does not surrender S2 allows the use of the bomb to force surrender but then the arms race with all its consequences will follow. The decision problem formulated in this way leads using the reversed Simon rule to the preferred strategy S2.

The eighth argument is formulated by R.Oppenheimer, on behalf of the scientific panel, in a letter to the secretary of War of the US at August 17 1945. S1: the development of more effective atomic weapons. S2: Making all necessary international arrangement to make future wars impossible. S1 does not lead to essentially and permanently prevention of war while S2 is the only basis for the safety of our nation. In this case the Risk avoiding rule leads to the preferred strategy S2.

Compared with the politicians mentioned before, the physicists used more often utilities with rank ordering. While the way they described the decision problem is similar, the content of their arguments is rather different. They were looking not only at the short term effects but also at long term effects of these decisions. This point is illustrated very well by the first argument formulated by Robert Oppenheimer on behalf of several other scientists. Figure 2 presents the description of the decision problem by Oppenheimer about this issue (Stoff et al. 149-150).

S1	*S2*
A technical demonstration of the bomb	*Use of the bomb on a city*
O1	*O2*
a11; outlaw of nuclear weapons	*a21; no outlaw of nuclear weapons*
a12; lives of US soldiers not saved	*a22: lives of many US soldiers saved*
a13: no deterrence of war in general	*a23: Deterrence of war in general*
p1=certain	*p2=certain*

Si=strategy i, Oi= outcome i, aij= aspect j of outcom i, U(aij)= the utility of aij, pi=probability of Oi

Figure 2 The argument presented by Oppenheimer about the use of the first nuclear bomb

The probabilities and utilities of the outcomes are specified without rank ordering and as it is formulated now the conclusion is not clear. Both strategies lead to positive and negative consequences. Many scientists were afraid that the weapons they had developed would lead to an arms race in weapons against which no defense was possible and consequently they expected the total destruction of the world. Therefore they thought that the only possibility to prevent this to happen was by international agreements between countries to outlaw these weapons. These scientists were afraid that the use of the weapon against Japan would destroy this possibility. Therefore they were in favor of the first strategy (Franck Report Stoff, 140).

Oppenheimer (Stoff, 149-150) suggests based on the arguments mentioned above that some scientists say that it is more important to outlaw the nuclear weapons than the short term results and therefore they chose strategy 1. On the other hand there are scientists who think that saving lives is more important and therefore they chose strategy 2.

So considering the short term results and the long term results at the same time requires an evaluation of the utilities of the possible consequences in order to come to a conclusion. This suggests that the kind of problem in this case forced the scientists to say something about the utilities of the outcomes. The lexicographic rule predicts for both groups their choice.

Conclusion

Our research has shown that arguments about decisions consist of the three components suggested by Toulmin (1968/2003): a description of the decision problem (ground), a choice (claim) and a decision rule (warrant). The grounds were described using the concepts of mathematical decision theory, especially strategies, consequences, probabilities and utilities. The difference with the mathematical decision theory is that the utilities and probabilities of the consequences are not expressed in numeric values but with or without rank ordering. Due to this deviation of the mathematical approach it was not clear how, the "warrant", the decision rule has to be specified to derive the preferred strategy.

We have suggested 7 decision rules which are specific for the description of the decision problem with respect to the use or not of rank ordering of utilities and probabilities. It turned out that these 7 decision rules are sufficient to near perfectly predict the choices in 231 decision situations.

We have shown that politicians and scientists from different countries and different time periods in very crucial decision problems, use the suggested argumentation rules. Variation in the use of these decision rules is partially due to the situation they are confronted with. However they all argue like the decision makers in our large scale research in the Netherlands.

A remarkable result of this research is that the speakers in the meetings don´t think that the specification of the rule is necessary in order to derive from the problem description the conclusion. The reason is that they know by intuition that the audience has no problem in deriving the suggested choice of strategy from the description of the decision problem. In a test we showed that the people who read such arguments agree in 100% of the cases with the choices of the decision makers. We also showed that the rules used can be specified even by ordinary citizens although they sometimes suggested a decision rule that does not use all available information (rank ordering), if that is not necessary. These results suggest that these decision rules are known by all people and are so familiar that they don´t have to be specified. This is true while these rules are not part of a formal education. It seems that we learn these rules by real life experience in the same way as we learn languages and other cognitive skills.

Our research of the arguments made in the context of the First and Second World War, the Cuba crisis showed that also in other countries decision makers follow the same argumentation as derived for the Dutch decision makers. However because in this large scale Dutch study and the small scale international studies the arguments were rather simple even when the decision makers discussed about serious issues like going to war or not, we decided to make one more study.
In this study we looked at the arguments of physicists who worked at the development of the nuclear bomb and were concerned about the use of the weapon. We were wondering whether they also followed the same argumentation rules as we derived from the earlier studies. The conclusion of this study was that they indeed do so. The procedures are very similar, arguments are relative simple, except in one case and in general the decision rule that are in line with the problem description predicts the preferred strategy.

Based on all these studies we think that we have discovered the basic procedures for argumentation about foreign policy issues. Whether these procedures hold for other policy decisions as well requires further research.

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