

choices and the probabilities assigned to the conditions which lead to those outcomes. Thus, the utilities assigned to alternatives in risky situations can be statistically calculated, if positive or negative numerical values are assigned to the possible outcomes of such action according to their relative desirability or undesirability.

Rapoport did not share Frei's view that probabilities represent the most crucial dimension of the accidental nuclear war risk problem. He believed, rather, that utilities are of equal importance and that both must be numerically expressed if their product, risk, is to be defined. Risk must be defined numerically if decision-makers are to make unambivalent choices, since rational choice requires that the alternatives can be rated statistically.

The probability of a non-repeatable event, such as nuclear war, can only be estimated. It cannot be precisely defined. The probability of *accidental* nuclear war can, however, be more readily assessed because it can be assumed that the occurrence of accidental nuclear war can be related to the occurrence of other events which may recur and whose frequency can be observed. Rapoport noted that Leonard and Rosenberg had related the occurrence of accidental nuclear war to that of other repeatable events, such as Missile Display Conferences, Threat Assessment Conferences and frequencies of crises. As probabilities can be assigned to these events on the basis of their occurrence in a given span of time, and since an unfortunate coincidence of such events could trigger nuclear war, a subjective but meaningful probability can be assigned to accidental nuclear war.

Utilities, as defined by Rapoport to embody desirability, are by their very nature a reflection of personal values. Thus, even more than with probabilities, any assessment of them is inevitably subjective. Yet if action is to be taken on the basis of risk assessment, utilities must be determined. Rational choice of action in a risky situation entails comparison of the expected utilities corresponding to the various courses of action. Taking no action is itself considered to be an action; only Sennott's paper made this point. Her discussion of Type I and II errors in missile detection showed that Type I error is to disregard a real attack and the other is to respond to a false alarm as if it were a real attack.

Rapoport pointed out that Type I and II errors are always complementary, as there is a trade-off between risks. One risk can be made smaller only at the expense of making the other larger; reducing the risk of disregarding a real attack will increase the chances of responding to a false alarm. In dealing with the risk of accidental nuclear war Rapoport used the analogy of capital punishment. The abolition of capital punishment ensures that every accused person's life will be spared, including those of brutal murderers, in order to eliminate the chance of executing even one innocent person. The irreversibility of capital punishment is important to those who wish to have it abolished, since because of this they assign an infinite negative utility to executing an innocent person. The