A FRAMEWORK FOR MILITARY DECISION MAKING UNDER RISKS

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Acknowledgments

The idea for this thesis stemmed from a discussion I had with a classmate over risk and why military leaders respond the way they do to risks. With the advantage of hindsight, responses did not always make sense even when only the known facts at the time were considered. Interested and looking for a thesis, I quizzed Colonel Maris McCrabb on this subject. He suggested I take a look at prospect theory. From that I developed the thesis that follows.

During my research, I happened across a dissertation by Rose M. McDermott. It proved to be one of the most valuable finds of my research. In her dissertation she used prospect theory to analyze risk taking in international politics. Her thorough and detailed explanation of prospect theory and operationalization of key variables provided me a way to structure my thesis. Although she does not know me, I owe her special thanks for the work she has done and the assistance it provided me.

Also, I would like to thank the staff and faculty at The School of Advanced Airpower Studies for their patience and uncompromising assistance during my endeavors to complete this thesis. I will mention two individuals who deserve special recognition. Both Colonel McCrabb's and Karl Mueller's wit and constant supervision throughout the completion of this project helped immeasurably. Karl Mueller, whose long hours paralleled mine as I waded through innumerable articles and books provided inspiration and the humor that kept me going. Without their assistance this project would not be as

complete or as lucid as I have attempted to make it. Any shortcomings of this thesis, I profess are entirely my own.

I would also like to thank my wife, Patti and both our children, Scott and Heidi, who have had to tolerate the long hours spent in the completion of this project. Their support and understanding have been an inspiration and in keeping with the motto of my old regiment, the 9th Infantry, *Keep Up The Fire*.

Abstract

This is a study of the applicability of prospect theory to military decision making. Prospect theory posits that the decision maker's reference point determines the domain in which he makes a decision. If the domain is one of losses, the decision maker will tend to be risk seeking, if gains, then he will be risk averse. The author proposes that if prospect theory's propositions are correct, then it may be possible for the decision maker, by assessing his own domain, to make better informed decisions. One implication of this study is that if he can do the same for a subordinate or for an enemy, he may be better able to predict their responses in a given situation. The project's goal is to develop a framework for assessing risk propensity. It does this by first describing the military decision making process and concluding that it is a rational decision making process. Next, the paper describes prospect theory and matches the key aspects of the theory with the military decision making process. Next, it proposes a framework for assessing risk propensity. The theory is tested in a case study of General Dwight D. Eisenhower's 1944 decision to launch Operation Market Garden. This decision is analyzed in terms of Graham Allison's three models for decision making and prospect theory to determine which model or theory seems to provide the best explanations for Eisenhower's decision. The last chapter applies the risk propensity framework to the case study to test if it can predict risk propensity and its impact an decision making. The author concludes that prospect theory's propositions are valid and that this theory provides a prescriptive way to

consider decision making under risk. Although prospect theory does not predict the choice a decision maker will select, it should reveal his bias toward a risky or over cautious solution. This tendency may limit the types of alternatives developed or considered. The framework developed for determining risk propensity provides insights but its use may be limited by the time and information available. The author found that assessing the true reference point from which a problem is considered is problematic. Also, that knowing one's risk propensity does not necessarily enable the decision maker to change his frame of reference or to consider the choice problem from different perspectives. Finally, additional study should be conducted in this area to further validate prospect theory's propositions and refine techniques for improving decision making under risks.

Chapter 1

Introduction

> *If we now consider briefly the subjective nature of war– the means by which war has to be fought – it will look more than ever like a gamble. . . .*
>
> *In short, absolute, so–called mathematical, factors never find a firm basis in military calculations. From the very start there is an interplay of possibilities, probabilities, good luck and bad that weaves its way throughout the length and breadth of the tapestry. In the whole range of human activities, war most closely resembles a game of cards.*
>
> —Carl von Clausewitz
> *On War,* Book One

If war is a gamble, then the operational commander must stack the deck in his favor. If he is wise, he accepts calculated risks but not reckless ones. With the former, odds are in his favor and he wagers only what he can afford to lose. But the commander who gambles plays against the odds and if the wager is too high and if the outcomes of an action go with the odds, he loses more than he can afford. How does he figure the odds? He uses his estimate of the situation, his experience, and his knowledge of himself and the enemy.

Before hostilities, the commander assesses the situation and determines his goals and objectives. These are based on the guidance he receives from the national command authority and his higher headquarters, his personal understanding of the situation, and input from his staff. A multitude of players influence the commander as he develops

alternatives to accomplish his goals. In turn, he influences what actions are to be taken by others through his discussions with those above him and beside him and the guidance he provides to those below him. As the commander formulates his plans, he considers the risks involved in the actions he might take. We assume the commander will select those actions that have the highest probability of success, that he is a rational actor. He will look at the costs and benefits of the proposed alternatives and select the one that maximizes benefits and minimizes costs.

If this were true, then a commander's risk propensity, his willingness to accept or decline risks, would only be a function of how he perceives the odds. It does not seem that simple in practice. A commander who is losing may be inclined to accept more risks than one who is winning. Douglas MacArthur's decision to conduct the Inchon Landing during the Korean War serves as an example. Would he have considered the potential gains worth the risks if U. S. forces were not about to be overrun at the Pusan perimeter? That is the purpose of this paper, to determine how the situation affects the commander's risk propensity. The focus will be at the strategic and operational levels of decision making. The paper will also discuss limitations of the military decision making process with respect to the influence of risk propensity on output (decisions). Ultimately, a process for identifying risk propensity and its influence on decision making will be proposed.

Military and political leaders assume that they make their decisions rationally. However, most decisions, when reviewed after the fact, clearly indicate that other non–rational factors affected decision making. Specifically, significant decisions do not always appear, in retrospect, simply to have maximized gains. For example, Graham Allison in

his book *Essence of Decision: Explaining the Cuban Missile Crisis,*[1] attempts to explicate President Kennedy's actions in terms of three models: Rational Actor, Organizational Process and Governmental Politics. Each model adds new insight into President Kennedy's and his administration's decision making process, but none explains or predicts how the situation itself may predispose decisions. *Prospect theory* postulates that the situation in which an event occurs significantly affects the decision making process. In short, prospect theory predicts that people are more likely to take risks in bad situations and more likely to be cautious when times are going well. Understanding how the situation affects decision making should help decision makers to keep options open that otherwise might be discounted, options that if considered rationally, might lead to better solutions.

This thesis argues that prospect theory allows a decision maker to assess his own risk propensity. It follows that given the same information about a subordinate or an adversary in a given situation, one should also be able to assess others' risk propensities. In the case of subordinate commanders, this knowledge could provide forewarning and possibly facilitate intervention, as appropriate. Toward an adversary, it should facilitate predicting enemy reaction to a selected course of action (COA). Intuition alone might suggest to some readers that a decision maker's mindset can influence the way he thinks about resolving a problem. This paper will show that prospect theory provides a means to determine that "mindset" in terms of risk. This is important, because, even though a situation may rationally call for a particular solution, the decision maker's perception of and reaction to risk may drive him to another choice.

Current joint doctrine provides a deliberate decision making model that can be described as normative and rational. Doctrine describes how decisions ought to be made. The process is logical, scientific and sequential. Doctrine recognizes the importance of the commander. It implies that the "genius" of the commander in applying operational art within the decision making process is the essence of decision making. The apparent dichotomy between what "ought to be" and "what is" highlights the shortcomings of a purely rational normative model for military decision making. This paper outlines a prescriptive process for identifying the impact a situation can have on a decision maker's risk propensity and hence a means to assess that impact.

Chapter 2 of this thesis develops a framework for assessing the predictive power of prospect theory, identifies key predictive variables within the theory and integrates those into the military decision making process. It starts with descriptions of the military decision–making process and of prospect theory. Next, prospect theory's explanations for decision making under risk are aligned with the six step estimate process outlined in Joint Publication 3–0.[2] A recommended framework follows for assessing risk propensity.

Chapter 3 considers General Dwight D. Eisenhower's September 1944 decision to conduct Operation Market Garden, the Allied airborne invasion of Holland. It provides empirical evidence with which to judge prospect theory's predictive power and the utility of the established framework for establishing risk propensity. This case study examines the relevant domain of action for Eisenhower in order to characterize it as either one of gains or losses. Options which Eisenhower considered at the time are identified and investigated to determine how the staff framed the relevant issues and questions to the commander. Differences in the desires and goals of various players are identified. Next,

Eisenhower's risk propensity at the time of the decision is established. Predictions based on prospect theory are then compared with Eisenhower's actual decisions. Finally, selected key factors for predicting risk propensity are assessed. Determining an individual's risk propensity is a subjective process. Therefore, when possible, personal notes, diaries and opinions of close advisors are used to substantiate these assessments. Conclusions about the validity of prospect theory's propositions rest on the accuracy of predictions compared to actual outcomes.

In the final chapter, the framework proposed in Chapter 2 is tested and further refined. The goal is a framework for measuring risk propensity that may prove useful to military leaders in predicting their own risk propensity as well as those of subordinates or adversaries. The thesis ends with a summary of conclusions, implications and recommended areas for future research.

Notes

[1] Graham T. Allison, *Essence of Decision, Explaining the Cuban Missile Crisis* (New York: HarperCollins Publishers, 1971).

[2] Joint Chiefs of Staff Publication 3–0, *Doctrine for Planning Joint Operations* (Washington, D.C.: Joint Chiefs of Staff, 1 February 1995), B–1.

Chapter 2

Military Decision Making and Prospect Theory

Introduction

The leading prescriptive and explanatory theory of decision making under risk is the expected utility model. For example, Allison used three models for analyzing the Cuban Missile Crisis.[1] Each provided a different perspective of the decision making process but all assumed that decision making was ultimately rational. Allison's Rational Actor model assumed a unitary decision making individual or body and a rational decision making process that was centrally controlled, completely informed and value maximizing.[2] His Organizational Process model considered the dynamics of organizations and their impact on the decision making process. His third and final model, Governmental Politics, considered the impact of decision making in a pluralistic body where compromise and bargaining lead to the selection of a decision. The second and third model seek to explain limitations to rational decision making, but do not question the basic model's validity.

Prospect theory does not deny that individuals maximize utility but posits that this function is non–linear. Decision makers tend to overweigh utility values while underweighing probability values. Expected utility models expect that preference ordering is constant but prospect theory posits that preference ordering can vary. This variance is

caused by a key assumption of prospect theory. Outcomes are not thought of as absolute states but as changes from a reference point. The reference point is determined by the way the decision maker edits and evaluates the decision problem. Editing and framing are dynamic processes, thus reference points can change. The changes in reference point can lead to changes in the decision maker's perception of a given outcome as a gain or a loss. It is domain, gains or losses, that determines the decision maker's risk propensity which in turn influences his decision.

This chapter looks at the military decision making process and concludes it is in theory a rational process based on expected utility. Next prospect theory is described and its propositions are explained. The chapter concludes with recommendations about how to integrate key propositions of prospect theory into the military decision making process. The resulting framework establishes the criteria for determining a decision maker's frame of reference and risk propensity, and is the basis for evaluating Eisenhower's decision to approve Operation Market Garden in 1944 in the next chapter.

Key Definitions

Goals and Objectives: The purpose toward which an endeavor is directed. Goals and objectives are translated into a preference function, which represents the value of alternative sets of consequences.[3]

Gains or losses: Gain or losses, in prospect theory, represent changes from a neutral reference outcome.

Decision making process: A formal or informal procedure used by an individual or a group to analyze a problem, identify objectives and goals, develop alternatives and determine consequences for each alternative. The result is a choice or decision.

Decisions (products): If the decision maker wants to optimize, his decision is a choice among the alternatives considered that seeks to maximize benefits or minimize costs. He evaluates options against each other to determine which choice has the most beneficial or the least detrimental outcome. If on the other hand, the decision maker is interested in only finding an alternative that satisfies some external criteria he may select a choice that is merely acceptable.[4] Herbert Simon called this type of decision making *satsificing*. In either case, the choice is considered in terms of the outcomes each alternative is expected to produce based on the decision maker's preferences and expectations.

Rationality: Rationality refers to consistent, value–maximizing choice within specified constraints.[5] Decision makers choose among alternatives on the basis of their expected consequences, but those consequences are not known with certainty.[6] "Limited rationality recognizes that not all alternatives are known, that not all consequences are considered, and that not all preferences are evoked at the same time."[7] Thus only a limited number of elements are considered and then only sequentially rather than simultaneously. The concept of limited rationality recognizes that human limitations do not allow exhaustive consideration of all alternatives and consequences. Further, as problems increase in complexity, information will be increasingly incomplete.

Risk/risk propensity: Risk may be viewed as the potential for failure based on subjective evaluation of the probability for failure or success for a particular decision problem. Failure in this definition means that goals and objectives are not reached (outcomes fall

short of expectations) or important criteria are not met. A r*isk averse* decision maker will tend to select a sure gain over a smaller chance to gain an equal or larger amount. A *risk seeking* decision maker will tend to select a choice that provides a chance to gain a larger amount over a smaller, more certain gain. Risks are the existence of factors beyond the decision maker's control that affect the outcomes of choices. Degree of risk is a function of the size of the potential loss and the probability of that loss. In every risky decision something is at stake. The greater the stake, the greater the risk. There is some probability of loss. The greater the probability of loss, the greater the risk. Loss means becoming worse off than one is or than one would have been had one chosen differently.[8]

Ambiguity and Uncertainty: Ambiguity refers to the contradictions, inconsistencies, and fuzziness of reality, preferences and identities. Uncertainty refers to imprecision in estimates of future consequences which are conditional on present actions.[9]

Contingency: Contingencies are outcomes or events that may occur but are not likely or intended. They are possibilities for which the decision maker may or may not prepare depending upon his own preferences. Contingencies are dependent on chance. Thus, a contingency may or may not affect a decision maker's choice based on his perception of the likelihood of its occurring and the cost associated with it should it occur.

Joint Doctrine Decision Making Process

Joint publications outline the intended planning process for joint level operations. "Joint operations planning employs an integrated process entailing similar policies and procedures during war and military operations other than war, providing for orderly and coordinated problem solving and decisionmaking."[10] In peacetime it is a highly structured

process which leads to deliberate plans that are thoroughly and fully coordinated. In crisis, the process is tailored to accommodate changing requirements and events. In wartime the process is adaptable to the needs of greater decentralization of the joint planning process.[11]

The Joint Forces Commander (JFC) and his staff use the estimate process[12] to formulate and update military requirements for any situation. According to JP 3.0, ". . . its central framework for organizing inquiry and decision is essentially the same for any level of command . . ."[13] The level and type of operation determine the specific detailed questions planners should address within this framework. This process has six distinct steps; (1) mission analysis; (2) situation analysis; (3) Course of Action (COA) development; (4) COA analysis; (5) COA comparison; and (6) decision.

In general terms, mission analysis identifies what the JFC must accomplish – his goals, objectives and desired outcomes – and his tasks required to achieve them. Situation analysis provides the context for development of courses of action (COAs). The JFC considers the domestic and international situation, the characteristics of the operational area, the enemy and friendly situation, and other restrictions. He develops assumptions based on expected outcomes of future events that are critical to his plan. From this analysis, the JFC deduces his relative combat power and enemy capabilities that could affect mission accomplishment. During COA analysis, the JFC develops alternative COAs which outline how he might accomplish the mission. The time available affects COA development, but the JFC is expected to "State all practical COAs open to the commander that, if successful, will accomplish the mission."[14] Once the COAs are developed, the JFC considers each COA's expected consequences or outcomes to determine its feasibility,

adequacy and suitability. He then compares identified advantages and disadvantages based on considerations specific to joint operations, other critical factors and mission accomplishment.[15] Based on the results of the comparisons, the JFC selects a COA to be translated into a "concise statement of what the force, as a whole, is to do and [to] explain, as may be appropriate . . . when, where, how, and why."[16]

Expected Utility Theory (EUT)

The estimate of the situation formalizes what is essentially a rational decision making process for the military commander and his staff. The decision maker is expected to make choices that satisfy the requirements of consistency and coherence. The assumptions are that this process is consequential and preference based. In other words, action depends on anticipation of the future effect of current actions. Thus, COAs are considered in terms of their expected consequences. Additionally, COA selection is based upon the preferences of the decision maker, and COAs are compared in terms of the extent to which their expected consequences appear to serve the preferences of the decision maker. The preferences of the decision maker result from his experiences which form his norms, habits and attitudes and from analysis of the context of the problem itself.

The utility of a risky prospect is equal to the expected utility of its outcomes, obtained by weighting the utility of each possible outcome by its probability. A rational decision maker will prefer the prospect that offers the highest overall utility.[17] The following lengthy quote shows the utility of a risky prospect mathematically and integrates the assumption that value is seen in terms of final assets.

> Decision making under risk can be viewed as a choice between prospects or gambles. A prospect $(x_1, p_1;...;x_n,p_n)$ is a contract that yields outcome

> x_i with probability p_i, where $p_1+p_2...+p_n=1$. To simplify notation, we omit null outcomes and use (x,p) to denote the prospect (x,p;0,1–p) that yields x with probability 1–p. The (riskless) prospect that yields x with certainty is denoted by (x). The present discussion is restricted to prospects with so–called objective or standard probabilities.
>
> The application of expected utility theory to choices between prospects is based on the following three tenets.
>
> (i) Expectation: $U(x_1,p_1;...;x_n,p_n)=p_1u(x_1)+...=p_nu(x_n)$
>
> That is, the overall utility of a prospect, denoted by U, is the expected utility of its outcomes.
>
> (ii) Asset integration: $(x_1,p_1;...;x_n,p_n)$ is acceptable at asset position w if $U(w+x_1,p_1;...;w+x_n,p_n) > u(w)$.
>
> That is, a prospect is acceptable if the utility resulting from integrating the prospect with one's assets exceeds the utility of those assets alone. Thus, the domain of the utility function is final states (which includes one's asset position) rather than gains or losses.[18]

The expected utility model is based on several axioms that should govern the preferences of a rational decision maker.[19] The first axiom, *transitivity*, provides criteria for choice. First, if option A is preferred to option B and option B is preferred to option C then A will be preferred to C. Second, if option A is preferred to option B, A and C should be preferred to B and C.[20] The second axiom is *dominance*. If prospect A is at least as good as prospect B in every respect and better than B in at least one respect, then A should be preferred to B. The third, *invariance*, requires that the preference order between prospects not depend on the manner or order in which they are described. Finally, *cancellation* is the property that allows the representation of preferences between prospects as maximization of expected utility. It is, "The key quality that gives rise to expected utility theory," and means, "the elimination of any state of the world that yields the same outcome regardless of one's choice."[21] "The main argument for cancellation is

that only one state will actually be realized, which makes it reasonable to evaluate the outcomes of options separately for each state."[22]

Allison's Models

The following is a review of Allison's three models of decision making. They are presented in terms of the estimate process. The rational decision making model is the estimate process without modification. The estimate is changed for the second and third models to reflect the impact each has on decision making. They are used in the case study to provide perspective. The models give insight into the goals, preferences and values of the key players.[23]

Rational Actor Model.

Table 1 Estimate

1. Mission Analysis
2. Situation Analysis
3. COA Development
4. COA Analysis
5. COA Comparison
6. Decision

The decision maker follows the steps listed in the table below. He identifies goals and objectives based on his mission analysis. He then analyzes the situation to determine strategic context, characteristics of the operational area, friendly and enemy situation, restrictions, assumptions and deductions. Based on his analysis, he then develops COAs. Each COA is analyzed for suitability, adequacy and feasibility. Each COA is modified as required and advantages and disadvantages are listed. COAs are then evaluated based on their advantages an disadvantages and then compared. The best COA is selected based on fixed values for military operations such as the principles of war, other critical values deemed to be important, and mission accomplishment.

Organizational Process Model

. Unlike the previous model, this model recognizes and incorporates the impact of multiple actors. Processes internal to the decision maker's organization are as influential in decision making as the external influences. Problems are factored and power is fractionated. Parochial priorities and biases limit response and option development. Standard operating procedures (SOPs), programs and repertoires standardize and further limit the responses which are available. Organizations avoid uncertainty and conduct problem directed searches. Action is determined largely by SOPs and present programs. Organizations have limited flexibility and make changes incrementally. Thus, previous actions and responses will look similar to current actions and responses, which will in turn be similar to those in the future.

Political Decision Making.

In this model politics determine decision selection. Different bureaucratic players each have their own goals, interests, stakes and stands. Relative power and available action channels greatly influence problem shaping and choice selection. Parochial priorities and perceptions influence decision making. Decision makers have limited time to resolve issues. Decisions are a result of compromise and bargaining between players. Proffered alternatives reflect the competing interests of the players involved. These alternatives are intended to further the interest of the players, even if at the expense of the common good.

Prospect Theory

Prospect theory (PT) describes how individuals and groups make choices under risk and is designed to explain preferences, whether or not they appear rational. This theory, according to its authors, attempts to articulate some of the principles of perception and judgment that limit the rationality of choice. The authors argue that expected utility theories of decision making under risk were developed from a logical analysis of games of chance rather than from a psychological analysis of risk and value. Thus, these theories are normative and reflect how idealized decision makers ought to think instead of describing how real people actually make choices.[24]

Amos Tversky and Daniel Kahneman developed prospect theory based on their analysis of experimental and other empirical evidence regarding how people make decisions. They demonstrated that the most basic rules of decision making as described in normative expected utility theories are commonly violated in practice by decision makers. Based on their findings, Tversky and Kahneman offer modifications to expected utility theory to accommodate their observations.[25]

PT identifies two phases of decision making: editing and evaluation. In the editing phase, acts, outcomes and contingencies are framed. "Framing is controlled by the manner in which the choice problem is presented as well as by norms, habits and expectancies of the decision maker."[26] The framing of a problem involves various operations to simplify prospects such as combining events or outcomes, or discarding negligible components.[27] Framed prospects are then evaluated and the prospect with the highest value is selected. It is during this phase that the decision maker's reference point is established. As will be discussed later, it is reference point that determines risk propensity and thus tendencies

toward a particular type of solution. It is the changing of the reference point that leads to violations of the EUT axioms, notably invariance.

In the evaluation phase the decision maker is assumed to evaluate each of the edited prospects. Evaluation involves two scales, one linked to probability, the other to subjective value.[28]

> The first scale π, associates with each probability p a decision weight $\pi(p)$, which reflects the impact of p on the over–all value of the prospect. However π is not a probability measure . . . The second scale assigns to each outcome x a number v(x), which reflects the subjective value of that outcome . . . The overall value V, is expressed in terms of...[these two scales].[29]

The individual makes his choice either by detecting that one option dominates another or by comparing their values.[30]

According to Tversky and Kahneman, prospects have the following relationships to outcomes and probabilities.

> Let (x, p; y, q) denote a prospect that yields x with probability p and y with probability q and that preserves the status quo with probability (1–p–q). According to PT, there are values $v(\bullet)$, defined on gains and losses, and decision weights $\pi(\bullet)$, defined on stated probabilities, such that the overall value [V] of the prospect equals $\pi(p)v(x) + \pi(q)v(y)$.[31]

Figure 1. Typical Value Function

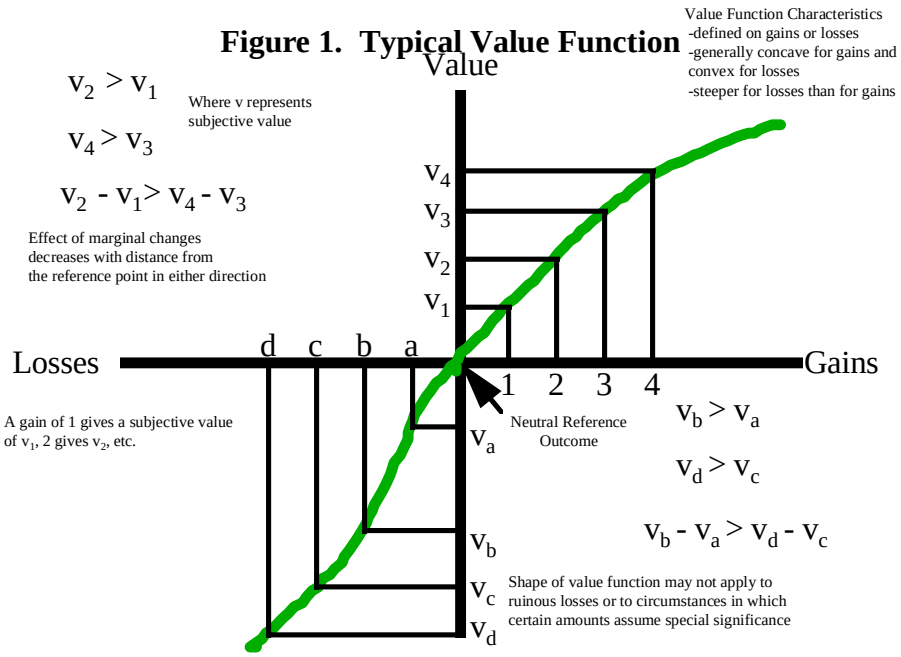

Figure 1. A typical value function (v(•)) [32]

The value function, as proposed by the authors, is defined on gains and losses. Outcomes are expressed as positive or negative deviations (gains or losses) from a neutral reference outcome, which is assigned the value of zero. The curve, which is generally concave for gains and convex for losses and steeper for losses than for gains, reflects that individuals respond to losses more extremely than they do to gains. Coined as "loss aversion" by the authors, it simply means that "losing hurts more than a comparable gain pleases."[33] The S–shape of the curve also reflects another important property of PT. Marginal changes are valued less the further they occur from the neutral reference outcome for gains or losses. This means, for instance, that an individual attributes more value to a change in gain from \$100 to \$200 than he would from \$1100 to \$1200, even though the difference in both cases is \$100.[34] This property is also reflected in Figure 1. Note that the relative differences for values v_1 and v_2 are greater than for v_3 and v_4. This is even more

pronounced for values when in the realm of losses. Again, note that the relative differences for values v_a and v_b are greater than for v_c and v_d.

Changes in the neutral reference outcome affect preferences. This reference point is determined by how an individual frames the problem he faces. Shifts may occur by different decompositons of outcomes into risky and riskless components. The authors also demonstrate that shifts can occur by how outcomes are labeled. The effective carriers of value are gains and losses, which are relative. This means that a gain or loss is not considered in absolute values but in terms of change from the reference point. The authors observed two common patterns of preference. Outcomes stated in positive terms elicit risk averse choices and those stated in negative terms tend to produce risk seeking choices.[35]

We now come to the weighting function. The authors point out that in expected utility theory, the utility of each possible outcome is weighted by its probability. Not so for PT. Instead, the value of an uncertain outcome is multiplied by a decision weight $\pi(p)$. It is a monotonic function of p but is not a probability.[36] In the words of the authors, the weighting function has the following properties.

> First, impossible events are discarded, that is, $\pi(0) = 0$, and scale is normalized so that $\pi(1) = 1$, but the function is not well behaved near the end point . . . Secondly, for low probabilities, $\pi(p) > p$, but $\pi(p) + \pi(1–p) \leq 1$ (subcertainty). Thus low probabilities are overweighted, moderate and high probabilities are underweighted, and the latter effect is more pronounced than the former. Thirdly, $\pi(pr)/\pi(p) < \pi(pqr)/ \pi(pqr)/ \pi(pq)$ for all $0 < p, q, r \leq 1$ (subproportionality). That is, for any fixed probability ratio r, the ratio of decision weights is closer to unity when the probabilities are low than when they are high, for example, $\pi(.1)/\pi(.2) > \pi(.4)/\pi(.8)$ . . . The major characteristics of the weighting function is the overweighting of probability differences involving certainty and impossibility, for example $\pi(1.0) – \pi(.9)$ or $\pi(.1) – \pi(0)$, relative to comparable differences in the

middle of the scale, for example, $\pi(.3) - \pi(.2)$. In particular, for small p, π is generally subadditive, for example, $\pi(.01) + \pi(.06) > \pi(.07)$.[37]

A typical weighting function is depicted below (Figure 2) and demonstrates the properties as described by the authors above[38].

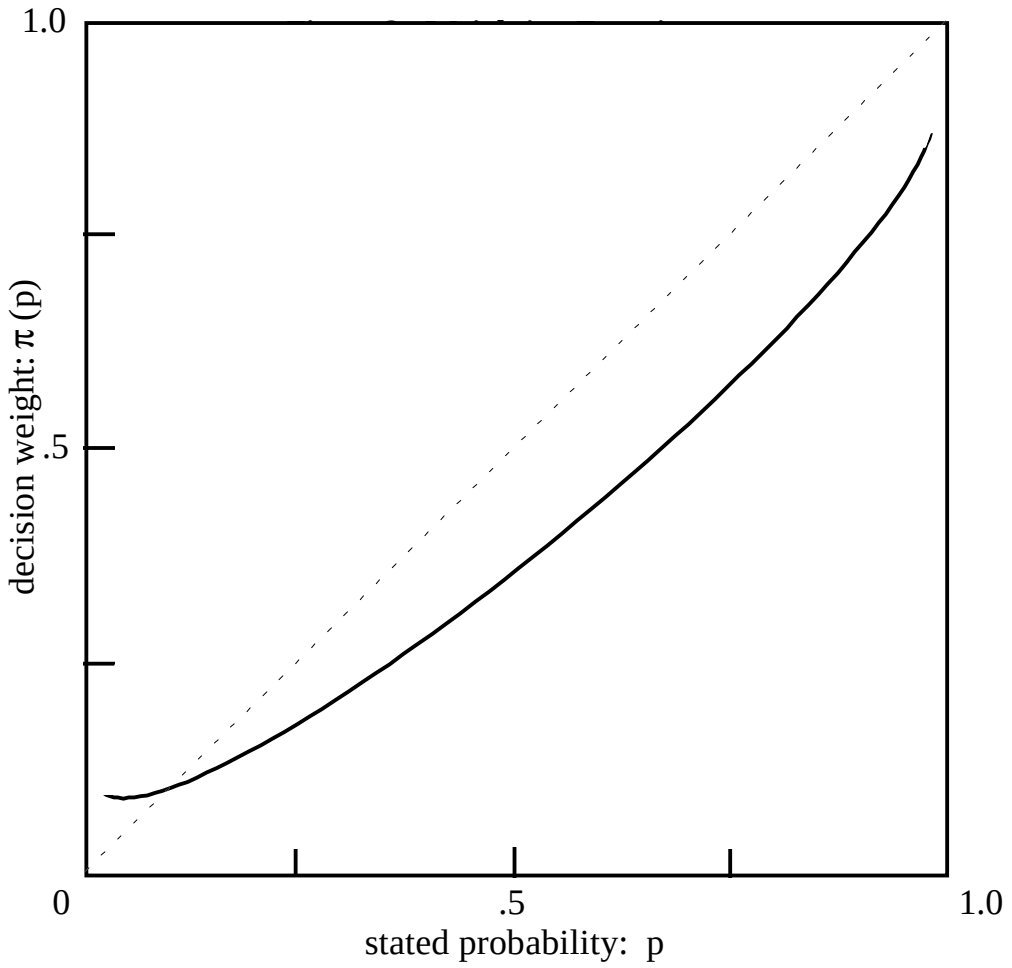

Figure 2. A typical weighting function

Decision weights, according to the authors, are not probabilities in that they do not obey probability axioms. They reflect the impact that the probability has on the over–all value of the prospect. Decision weights measure the impact of events on the desirability of prospects, and not merely the perceived likelihood of these events.[39] As figure 2, decision weights are typically less than true probabilities between the endpoints. However, at the

endpoint the are *not well behaved*. This feature explains the difficulty individuals have with extreme probabilities. "They are limited in their ability to comprehend and evaluate extreme probabilities, highly unlikely events are either ignored or overweighted, and the difference between high probability and certainty is either neglected or exaggerated."[40]

In empirical studies, Tversky and Kahneman observed the following common violations of EUT: (1) Two formulations of the same problem elicit different preference, in violation of invariance; (2) the dominance rule is obeyed when its application is transparent; (3) dominance is masked by a frame in which the inferior option yields a more favorable outcome in an identified state of the world; and (4) the discrepancy preferences are consistent with the subadditivity of decision weights. Experience and framing affect the decision maker's ability to determine the dominance of one option over another.[41]

Summary of Key Prospect Theory Propositions

1. Choice problems are framed around a reference point.
2. Losses are overweighted with respect to comparable gains (loss aversion).
3. Individuals are risk averse with respect to gains.
4. Individuals are risk seeking with respect to losses.
5. Decision makers adjust to gains much more quickly than to losses in defining their reference point.
6. Response to differences in probabilities for a given choice tends to be non–linear.
7. Reference points can shift based on framing and re–framing of the choice problem. In other words, preference ordering can vary.
8. Individuals maximize, but this is non–linear. Individuals tend to overweight utility values while underweighting probability values.[42]

Integration

Prospect theory does not tell the decision maker if he is making a good or bad decision. However, it may allow him to determine if he is inclined to make a risk averse or risk seeking decision by determining his reference point and domain for the decision based

on framing effects. Knowing this, the decision maker and his staff may, during the estimate process, be able to determine if their propensity for risk limits their perspective and predisposes them to a particular type of decision when developing COAs, allowing them deliberately to compensate for this bias. Table 2 matches decision making as proposed by prospect theory with the steps of the estimate process.

Table 2. Prospect Theory and Estimate Process Matching

Mission Analysis Situation Analysis COA Development COA Analysis COA Comparison Decision	Framing Acts, Contingencies, and Outcomes Evaluation (Value and Weighting Functions)

The framing that occurs during mission and situation analysis and COA development establishes the reference point and hence the domain and the resulting risk propensity of the decision maker. COA analysis and comparison that lead to the decision can be expected to be influenced by the frame adopted by the decision maker. However, framing is a cognitive process. The effects of framing have been demonstrated through empirical tests but it is not a well developed theory. Trying to assess framing effects while identifying upon options, outcomes and contingencies would likely prove to be an

impossible task. However, after COAs are developed looking for possible framing effects may prove more feasible.

How does one establish his frame of reference? First, gains and losses are defined by a reference point. By considering outcomes in these terms the question becomes, "What defines the desired outcome as a gain or a loss.?" Are the actions designed to prevent a loss or attain a gain relative to the status quo? Do the considered actions intend to cause a chance to gain versus a sure loss if no action were taken or some other COA chosen? Or, do the considered actions create a chance to lose versus a sure gain for some other alternative? The answer to these questions may establish the domain as one of losses or of gains. If losses, then the decision maker would tend to be risk seeking. If gains, then the decision maker would tend to be risk averse. From the established domain, identification of the reference point should follow.

Knowing risk propensity next leads to determining if the risks are acceptable. Are the potential gains worth the potential losses? Evaluation according to prospect theory involves two scales. One measures the subjective value of the outcomes and the other measures the desirability of those outcomes. The weighting function measures the desirability of an outcome. Distinguishing desirability from probability should improve the decision maker's assessment for chances of success.

Framework

The following framework is based on prospect theory's propositions. The decision maker determines his risk propensity by assessing the domain and reference point. He then uses this information to consider the COAs he has developed. Next, he considers

COAs from different reference points to assess his willingness to accept or not to accept risks as sociated with the given COA.

Step 1. Determine the intent of the action considered.
Step 2. Characterize the situation (past, present and future) and determine if the status quo is changing.
Step 3. identify domain, reference point and risk propensity.
Step 4. Conduct analysis to determine potential gains/advantages, potential losses, risks/disadvantages and critical events for success of the considered operation.
Step 5. Identify alternate reference points.

This simple framework will be tested to determine if it provides the decision maker with a way to establish his risk propensity and evaluate COAs further in Chapter 4.

Assumptions and Limitations

Tversky and Kahneman identify three limitations of PT. [43] First, the S–shaped value function and decision weight function are based on experimental evidence and may not accurately represent the preferences of some individuals. Nor is there a test readily available to determine the shapes of these curves for an individual. The above framework, however, assumes the curves are representative enough of the population generally to serve as indicators of decision makers' value and decision functions.

Second, decision weights may be affected by other characteristics of an event such as ambiguity or uncertainty. Decision making in complex situations will include both of these factors. They can be reduced but will always be present. This thesis does not base its conclusions on the shape of the value or decision weight curve. The goal is to develop a framework that allow assessment of risk propensity and general guidelines for its impact on decision making.

Finally, reference points may change, further increasing the difficulty of establishing the domain in which a decision is being made. Even after the domain is established, a decision maker may be unable to respond in a manner different from his established risk propensity. Knowing one's risk propensity more than likely does not change it. However, intentionally changing frames and thus reference points may allow the development or consideration of alternatives that might otherwise have been overlooked or unwisely neglected.

This thesis will consider only one case study, Operation Market Garden. The objective is to highlight the theory and to apply the risk propensity framework. If it proves to provide explanatory and predictive power beyond that of other models applied to the case, it will imply that further study is merited to assess the frameworks applicability to other, different situations.

Notes

[1] Graham T. Allison, *Essence of Decision: Explaining the Cuban Missile Crisis* (New York: HarperCollins Publishers, 1971).

[2] Allison, *Essence of Decision*, 67.

[3] Allison, *Essence of Decision*, 29.

[4] John D. Mullen and Byron m. Roth, *Decision–Making, Its Logic and Practice* (Savage: Rowan & Littlefield Publishers, Inc., 1991), 3.

[5] Allison, *Essence of Decision*, 30.

[6] James G. March, *A Primer on Decision Making* (New York: The Free Press, 1994), 5.

[7] Ibid., 8–9.

[8] Mullen and Roth, *Decision–Making, Its Logic and Practice*, 192. The definition of risk primarily comes from this source.

[9] March, *A Primer on Decision Making*, 178.

[10] Joint Chiefs of Staff Publication 5–0, *Doctrine for Planning Joint Operations*, (Washington, D.C.: Joint Chiefs of Staff, 13 April 1995), viii.

[11] Ibid., viii.

[12] The estimate process is a formal procedure for military decision making.

[13] Joint Chiefs of Staff Publication 3–0, *Doctrine for Planning Joint Operations* (Washington, D.C.: Joint Chiefs of Staff, 1 February 1995), B–1.

Notes

[14] Ibid., B–2.

[15] Ibid., B–3.

[16] Ibid., B–3

[17] Daniel Kahneman and Amos Tversky, "The Framing of Decisions and the Psychology of Choice," *Science*, 30 January 1981, 453.

[18] Daniel Kahneman and Amos Tversky, "Prospect Theory: An Analysis of Decision Under Risk," *Econometrica*, March 1979, 263–264.

[19] Kahneman and Tversky, "The Framing of Decisions, 453.

[20] Daniel Kahneman and Amos Tversky, "Choices, Values, and Frames," *American Psychologist*, April 1984, 343.

[21] Daniel Kahneman and Amos Tversky, "Rational Choice and the Framing of Decisions", in *Decision Making: Descriptive, Normative, and Prescriptive Interactions*, ed. David E. Bell, Howard Raiffa, and Amos Tversky, Cambridge: Cambridge University Press, 1988), 168.

[22] Ibid., 168.

[23] Allison, *Essence of Decision*, 256. Models are summarized from Allison's table of the models.

[24] Kahneman and Tversky, "Rational Choice and the Framing of Decisions," 167.

[25] Kahneman and Tversky, "The Framing of Decisions," 453.

[26] Kahneman and Tversky, "Rational Choice and the Framing of Decisions," 172

[27] Tversky and Kahneman identify multiple operations that occur which transform the outcomes and probabilities associated with the offered prospects. These operations are *coding*, *combination*, *segregation*, *cancellation*, *simplification* and *detection of dominance*. For a further discussion of these operations see their "Prospect Theory: An Analysis of Decision Under Risk," 274–275.

[28] Rose M. McDermott, "Risk–Taking in International Politics: Prospect Theory in Postwar American Foreign Policy," (Ph.D. diss., Stanford University, 1991), 61.

[29] Kahneman and Tversky, "Prospect Theory: An Analysis of Decision Under Risk," 275.

[30] Kahneman and Tversky, "Rational Choice and the Framing of Decisions," 172.

[31] Ibid., 173.

[32] Ibid., 174. The value function has been modified to visually the differences in values as the get further from the neutral reference outcome.

[33] McDermott, "Risk–Taking in International Politics," 74.

[34] Kahneman and Tversky, "Rational Choice and the Framing of Decisions," 173.

[35] Ibid., 174–5.

[36] For clarification of a monotonic function the following definition is provided from the American Heritage Dictionary. "Designating sequences, the successive members of which either consistently increase or decrease but do not oscillate in relative value. Each member of a monotone increasing sequence is greater or equal to the preceding member; each member of a monotone decreasing sequence is less than or equal to the preceding member."

[37] Kahneman and Tversky, "Rational Choice and the Framing of Decisions," 177–8.

Notes

[38] Kahneman and Tversky, "The Framing of Decisions and the Psychology of Choice," 455.

[39] Kahneman and Tversky, "Prospect Theory: An Analysis of Decision Under Risk," 280.

[40] Ibid., 282–3.

[41] Kahneman and Tversky, "Rational Choice and the Framing of Decisions," 179–80.

[42] Scott Levy, paper to the Triangle Institute of Securit Studies, September 1995, as paraphrased in proceedings, 5–6.

[43] Kahneman and Tversky, "The Framing of Decisions and the Psychology of Choice," 454.

Chapter 3

Market Garden: Calculated Risk or Foolish Gamble?

Against a defeated and demoralized enemy almost any reasonable risk is justified and the success attained by the victor will ordinarily be measured in the boldness, almost foolhardiness, of his movements.

Dwight D. Eisenhower
Crusade in Europe

Introduction

Operation Market Garden is an appropriate case study for decision making under risk. It was an operation that required the insertion of the Allied Airborne Army deep behind enemy lines to seize key bridges in Holland, followed by a link–up with ground forces that would first have to penetrate German defenses through very restrictive terrain. Success depended upon the Allies' ability to maintain surprise and to concentrate force quickly enough to generate the combat power necessary to seize the bridges and force the penetration. Success was also related to German capabilities and intent. Based on General Dwight D. Eisenhower's assessment of relative combat power, he as the Supreme Allied Commander approved the operation even though he had other, less risky, alternatives from which to choose.

To answer why Eisenhower thought the gamble was worth the risks requires considering the situation in which the decision was made. This chapter provides that

background along with a survey of the pertinent issues affecting his choice. Next the operation is discussed focusing on Eisenhower's alternatives, the influences of different actors on the decision and the risks involved. Allison's three models are then used to explain the decision from rational, organizational and political actor viewpoints followed in turn by prospect theory's explanations. The analysis that concludes the chapter seeks to determine which of the four models provides the best explanation for Eisenhower's choice.

Background

Allied forces invaded Europe in June 1944 and, after two months of hard fighting, broke out of the Normandy beachhead at the end of July.[1] By mid–September 1944, they had regained control of France and Belgium. Stunning successes against their German opponent led to Allied optimism that the war could be over before winter. The race across France and Belgium left the impression that the German military was so demoralized and disorganized that it would be unable to stop the Allies anywhere along the front. Success also brought into question the wisdom of Eisenhower's broad front strategy. This strategy attacked the Wehrmacht along the entire front and aimed at seizing the Ruhr and Saar industrial complexes as precursors to attacking Berlin. Had the situation now changed so that a narrower penetration aimed at Berlin, the heart of Germany, would more quickly bring the war to an end? Would not the broad front strategy give Germany time to reorganize, thus prolonging the war unnecessarily?

The broad front strategy was inextricably linked to logistics. Eisenhower had two army groups of two armies each requiring vast amounts of supply and maintenance to

sustain their operations. His main port for supplies was Cherbourg, some 400 miles or more from the forward units of his two army groups.[2] Additionally, pre–invasion Allied bombing of Western Europe had severely damaged road and railroad networks, further exacerbating supply difficulties. Not only did the Allies' equipment need a rest but so did the troops. Many units had been fighting continuously since the Normandy invasion. Rapid success had prevented adequate development of the logistics infrastructure and had denied the armies time to rest and refit.

Eisenhower and his staff in the Supreme Headquarters, Allied Expeditionary Force (SHAEF) had worked out the strategy for the defeat of Germany months prior to the Normandy invasion. The plan, according to Eisenhower, had received the agreement of Generals Omar Bradley, the 12th Army Group Commander, and George S. Patton, Bradley's US Third Army commander, as well as the SHAEF staff.[3] After the landings, Allied forces would build up sufficient resources for the breakout from the Normandy beachhead. Then, in Eisenhower's words, the Allied armies would

> Pursue on a broad front with two army groups, emphasizing the left to gain necessary ports and reach the boundaries of Germany and threaten the Ruhr. On our right we would link up with the forces that were to invade France from the south. Build up our new bases along the western border of Germany, by securing ports in Belgium and in Brittany as well as in the Mediterranean. While building up our forces for the final battles, keep up an unrelenting offensive to the extent of our means, both to wear down the enemy and to gain advantages for the final fighting. Complete the destruction of enemy forces west of the Rhine, in the meantime constantly seeking bridgeheads across the river. Launch the final attack as a double envelopment of the Ruhr, again emphasizing the left, and follow this up by an immediate thrust through Germany, with the specific direction to be determined at the time. [Finally c]lean out the remainder of Germany.[4]

Thus, Eisenhower would defeat Germany with a methodical strategy that relied initially on two army groups maintaining their momentum across Western Europe along a broad front. Gaining ports and logistics planning were critical to the plan's success. Above all, the port to which Eisenhower was referring was Antwerp, Belgium.

General Situation

In late August the Allies had experienced great success along their whole front. The enemy was falling back in disarray wherever the Allies pushed. The enemy situation as the Allies understood it is reflected in a message from Eisenhower to his commanders on 29 August 1944.

> The German Army in the West has suffered a signal defeat in the campaign of the Seine and the Loire at the hands of the combined Allied Forces. He is being defeated in the East, in the South and in the North; he has experienced internal dissension and signs are not wanting that he is nearing collapse. His forces are scattered throughout Europe and he has given the Allied Nations the opportunity of dealing a decisive blow before he can concentrate them in the defense of his vital areas.[5]

Indeed the enemy had suffered disastrously. Hitler's directives to hold in the West, denying his commanders authority to withdraw, insured the destruction of these forces once the Allies began their pursuit operations. The Germans had lost 400,000 troops killed, wounded or captured, along with almost 1,300 tanks and 1,500 artillery pieces.[6] By the first week of September, the Allies thought German resistance was near the point of collapse.[7] The Allies estimated that the Germans had two weak Panzer and nine infantry divisions northwest of the Ardennes, but these units were characterized as "disorganized, in full retreat, and unlikely to offer any appreciable resistance if given no respite."[8] The Germans' situation to the south was no better. "South of the Ardennes the

enemy forces are estimated as the equivalent of two Panzer Grenadier and four poor infantry divisions."[9] As for the force withdrawing from southwest France, the Allies estimated 100,000 men, "but its fighting value is estimated as the equivalent of about one division."[10] Forces in the south of France were estimated at one–half Panzer and two infantry divisions being driven northwards up the Rhône.[11] It was accurately believed that the enemy intended to establish defenses along the Siegfried Line to "block the main approaches to Germany [via] . . . the Ruhr and the Saar."[12] But to do this Germany would have to reorganize the forces it had in Western Europe, plus bring in reinforcements from Germany.

In early September, Eisenhower had two Army Groups of two armies each under his operational control. Field Marshal Bernard Law Montgomery commanded the mostly British and Canadian 21st Army Group which was operating in the north. Bradley commanded the US 12th Army Group, operating in the south. Additionally, the 6th Army Group of one French and one American army was attacking northward from the Rhône Valley in southern France. By the end of the month, Eisenhower expected this army group, commanded by General Jacob Devers, to link up with Patton's US Third Army and come under Eisenhower's operational control. Finally, Eisenhower had as his strategic reserve the First Allied Airborne Army commanded by General Brereton. This army consisted of all American and British airborne forces within the European Theater of Operations including the US 82nd and 101st and British 1st Airborne Divisions.

Eisenhower still intended to destroy the enemy forces throughout Western Europe. Montgomery's 21st Army Group was the main effort, tasked to secure Antwerp including clearing the Germans from the 75–mile Scheldt estuary that controlled the approaches to

the port located there. Additionally, he was to "breach the sector of the Siegfried Line covering the Ruhr and then seize the Ruhr."[13] In accomplishing this task, Montgomery was given authority to coordinate flank security requirements with General Hodges, Commander, US First Army, who was operating north of the Ardennes. Finally, as agreed during a 23 August meeting between Eisenhower and Montgomery, the 21st Army Group would have control of the 1st Allied Airborne Army in support of operations in its sector.[14] Additionally, Eisenhower stated he would give Montgomery priority for supplies in support of operations in the north.[15] Bradley's 12th Army Group was tasked to capture Brest, to protect Montgomery's southern flank, to occupy the part of the Siegfried Line covering the Saar, and to seize Frankfurt.[16]

Issues

Although Eisenhower's subordinate commanders had signed on to the broad front strategy while it was being planned, the recent successes and assessment of German military strength were beginning to bring this strategy into question. Eisenhower would begin to fill pressure to modify his strategy as early a 2 July 1944, during a meeting with Montgomery and Bradley. During the meeting Montgomery suggested that the Normandy plan be abandoned, and instead he should lead three armies, including Bradley's US First Army, directly toward the Pas de Calais. By 13 August the plan had grown into the single thrust concept under which Montgomery's forces

> . . . would sweep northeastward, wipe out the remainder of the German Fifteenth Army at Pas De Calais, establish a powerful Allied airfield network in Belgium, seize Antwerp and Rotterdam (thus solving logistical problems), destroy V–1 and V–2 launching sites, capture the Ruhr and then drive straight through to Berlin.[17]

Montgomery would pursue this line of reasoning with Eisenhower through Operation Market Garden. Bradley thought a thrust by his First and Third Armies would be more successful.[18] Both continued to lobby Eisenhower through the rest of August.[19]

Eisenhower insisted that the strategy would remain unchanged, but through Montgomery's maneuvering the effort in the north would continue to get additional support. Montgomery would be authorized to coordinate with Bradley's First Army for flank security, essentially empowering him to direct its operations. Eisenhower also stated he would give Montgomery priority for logistics. However, Montgomery's priority objective remained unchanged, at least until the approval of Market Garden: the opening of the Channel ports and Antwerp.[20]

German V–1 and V–2 missiles had a significant impact on British Prime Minister Winston Churchill.[21] He had even considered the use of poison gas and biological agents to deter Germany from continuing to use these weapons against England.[22] Prior to the Normandy invasion and well before these weapons were operational, Britain took great pains to delay their employment starting with the bombing of Peenemünde, the location of the Germans' secret rocket program, in August 1943. The bombing mission was conducted at low level during a moonlit night to maximize accuracy. This significantly increased the risk to the bombing force, but the risks were considered worthwhile because of the importance of the target.[23] Both British and American aircraft were assigned to bomb suspected rocket sites and facilities through the winter of 1943–44. The bombing raids were formalized into Operation Crossbow in late December 1943.[24]

The psychological impact of the secret V–1s and V–2s was tremendous, due mainly to speculation about their capabilities.[25] At one point, Churchill, based on his staff's

assessment, wrote President Roosevelt to inform him that these weapons might be able to carry up to 20 tons of high explosive.[26] Eisenhower informed Churchill that he would do everything feasible to prevent Germany from launching any V–weapon attacks, or at least to degrade them.[27] The bombing of suspected launch sites continued, but the Allies agreed that the best alternative was to capture and control territory from which the Germans planned to launch the weapons.

In June 1944, the Germans began the V–1 attacks against Britain. Although military insignificant, they had significant psychological impact on Churchill and the British population.[28] British air defense measures began to reduce the effectiveness of the V–1s in July and continued to improve through September when the attacks ended with the Allied occupation of the Pas de Calais. The Allies knew about the V–2 rockets and realized that, because of their speed, air defense measures would not have any effect.[29] The threat of the V–2s remained a British concern. "[O]n August 2 the British Chiefs of Staff informed the American Chiefs of Staff that German attacks by flying bombs and possibly future rockets would at best impede and at worst may seriously interrupt British war effort."[30] They also knew that these rockets would be launched from western Holland. Thus, if operations by the 21st Army Group could isolate western Holland, Germany would be unable to launch V–2s against England.

On 8 August 1944, the 1st Allied Airborne Army was activated as a result of Generals Marshall's and Arnold's interest in ensuring effective use of airborne troops. General Brereton, as the commander, controlled both troop carrier aircraft and airborne units and was directly subordinate to Eisenhower. Eisenhower, feeling pressure from Marshall to get the Allied Airborne Army into action planned dozens of airborne

operations. However, none was conducted because Allied ground forces kept overrunning the planned objectives. [31] US airborne units had not been used since the Normandy invasion and were sitting idle at their bases in England. The British First Airborne Division had yet to see combat. Thus, it was no surprise that the airborne army was targeted to support operations in the north, where Eisenhower had determined his main effort would be.

The pace of the Allied advance across Europe had thrown the logistics plan into disarray. Planners had assumed that the Allied armies would pause before attacking across the Seine, during which time the armies would be resupplied and refitted and supply depots built up.[32] Eisenhower's decision to cross the Seine on 19 August did away with the pause and the chance for logistics to catch up. The Allies had one major operational port at Cherbourg, plus minor ports along the Normandy coast. Additionally, the beaches at Utah and Omaha were able to receive significant amounts of tonnage. However, the on coming winter made it imperative that Eisenhower gain additional port capacity or his armies would grind to a halt.[33] The significance of Eisenhower's combat decisions on logistics are addressed by Roland G. Ruppenthal:

> From the point of view of logistics these decisions to cross the Seine and continue the pursuit, and to augment the forces employed south of the Ardennes, constituted a radical departure from earlier plans. They carried with them a supply task out of all proportion to planned capabilities. They were much more far–reaching in their effects than the alteration in plans of early August by which the bulk of the Third Army's forces had been directed eastward rather than into Brittany. With the supply structure already severely strained by the speed with which the last 200 miles had been covered, these decisions entailed the risk of a complete breakdown.[34]

Lack of supply and maintenance threatened Eisenhower's ability to keep his forces moving against an enemy that was beginning to get re–organized.

On 1 September, Eisenhower assumed overall operational control of ground forces from Montgomery. Montgomery retained command of the 21st Army Group. This action resolved one issue but created another. From the US point of view, an American as the overall ground forces commander made perfect sense. The majority of men and equipment were now being provided by US The American public expected and demanded that an American lead the forces in Europe. An article that appeared in the *New York Times* caused Marshall to relay the following to Eisenhower:

> The recent statement form your headquarters that Montgomery continues in command of all ground forces has produced a severe reaction in the New York *Times* and many other papers and I feel is to be deplored. Just what lay behind the confusion in announcements I do not know, but the Secretary and I and apparently all America are strongly of the opinion that the time has come for you to assume direct exercise of command of the American contingent. I think you will have to consider this matter very carefully because the reaction here is serious and will be, A am afraid, injected into the debates in Congress within the next 24 hours.[35]

President Roosevelt and Marshall reacted to this political pressure, and instructed Eisenhower to assume operational control of the Allied ground forces as soon as possible.

The British did not share the American enthusiasm for this change. The British point of view, they had been fighting the Germans far longer than the Americans. Montgomery was a war hero who had successfully defeated the Germans in North Africa. He had been the ground forces operational commander during the Normandy invasion, the breakout, and the pursuit. Eisenhower, in their opinion, was a good man, but he was an administrator, not an operational commander.[36] Montgomery having to relinquish operational control of all Allied land forces was seen as a demotion of sorts.[37] In fact his promotion to Field Marshal while in an operational command was the first to be handed out in the field, an act by Churchill to soften the blow.[38] In response to the pressure

generated over who was in *operational command*, Eisenhower told Bradley, "It seems that so far as the press and public are concerned a resounding victory is not sufficient; the question of 'how' is equally important."[39]

Eisenhower believed that his position as Supreme Allied Commander made him personally responsible for ensuring that the Anglo–American relations remained strong and cohesive. On authority, Eisenhower said, "Only trust and confidence can establish the authority of an Allied Commander in Chief so firmly that he need never fear the absence of this legal power."[40] Eisenhower believed Allied effectiveness rested upon, "adjust[ing] all nationalistic differences that affect the strategic employment of combined resources, and in the war theater, to designate a single commander who is supported to the limit."[41]

The successes of August brought Eisenhower one more unexpected problem. It created for a majority of the Allies euphoric optimism which then fueled expectations that the war could be won before winter.[42] He reflected this same optimism himself in his messages to Marshall and to his subordinates. At the same time, in early September, he sensed that the enemy was beginning to reorganize. They had fallen back on their homeland and would defend it fanatically. In addition, the Germans now had a smaller front to hold in defensible terrain with shorter lines of communication. This did not bode well for future successes coming as easily as those in August had.

Operation Market Garden

Eisenhower had considered three alternative plans for continued operations against the Germans. All three were variations on his broad front strategy. He could weight the

effort by each army group equally, or make his main effort in the north or in the south. He had already determined that the main effort should be in the north as discussed above. On 10 September, Montgomery presented Eisenhower with a fourth alternative, another version of the Field Marshal's earlier proposal for a narrow front attack with the goal of seizing Berlin. The new proposal was Operation Market Garden.

The plan was essentially a larger and riskier version of an operation that Eisenhower had approved weeks earlier but which Montgomery canceled due to concerns about enemy strength. Operation Comet had planned for the seizure of bridges at Nijmegen and Arnhem by the First British Airborne Division and the Polish Airborne Brigade. As the bridges were being seized, General Dempsey's Second Army led by Horrocks's XXX Corps was to have penetrated German defenses to link up with the airborne forces at the bridges. Now, though the concept remained essentially the same, Montgomery determined that enemy activity in the area required more than twice the original force to succeed.

The prospective benefits, if this operation was successful, were great. By establishing a bridgehead over the Rhine at Arnhem, the Allies would unhinge the northern flank of the Siegfried Line and gain access to the German Northern Plain. This in turn would set the conditions for a quicker defeat of Germany, either by directly attacking Berlin or by enveloping the Ruhr Valley and then attacking Berlin from the Arnhem bridgehead. It would seal off western Holland from Germany, which would in turn speed the clearing of the approaches to the much needed deep water port at Antwerp. Isolating western Holland also offered the prospect of gaining a second deep water port at Rotterdam, and of ending German V–2 rocket attacks against England.

Market Garden had other attractive features. It would be an opportunity to employ airborne forces and doctrine that had been successful at Normandy. Additionally, this operation's indirect approach of vertical envelopment might make such an advance less costly than more direct and potentially bloody ground assaults against front line German defenses. It also held the promise of maintaining Allied morale by maintaining the pace of success that had become the norm with the pursuit operations that followed the breakout from the Normandy beachheads at the end of July.

This operation also had the prospect of creating losses for the Allies, however. It was a risky course of action (COA) which stood a real chance of failing. If it did, the Allies would increase their own logistical shortfalls, first by delaying the establishment of an additional logistics base at Antwerp, and second by having committed already scarce resources to a failed operation. Also, being a large operation, its failure would have significant and adverse repercussions for Allied morale, both military and domestic. Eisenhower stood to lose those airborne forces committed to deep objectives if they could not be reached by relieving ground forces in time. As the details of the plan were developed, Eisenhower had to accept non–doctrinal employment of the airborne forces that further increased the risk. It would take three days to complete the airborne assaults, compromising surprise and mass. Airborne forces would be employed against Panzer divisions without adequate support. The operation would be planned and executed within one week of approval and during a time of the year when weather could be expected to delay or stop the airborne operations, further adding to risk. Additionally, the ground forces had to attack along a narrow corridor. Bad weather and determined enemy resistance could significantly slow the penetration of German defenses.

Eisenhower approved the operation with certain conditions. Market Garden would commence on 17 September. Securing the approaches to the port at Antwerp would be delayed until Montgomery seized bridgeheads over the Rhine. His priority after seizing the bridgeheads would be gaining the much needed deep water port. He would not continue the attack to Berlin as he had proposed. Montgomery would get priority for logistics. Eisenhower had made this commitment on 23 August, but when confronted by Bradley and Patton on 2 September, he waffled giving Bradley enough logistical support to continue his operations.[43] Now, the commitment to Market Garden would substantially decrease supply to Bradley. Additionally, for all intents and purposes, Montgomery would have control of the US First Army, which would move north to provide the flank security Montgomery insisted he needed.

The Operation

Market Garden was a two–part plan with its components coordinated to occur simultaneously. Market was the airborne portion of the plan and Garden the ground portion. As planned, the airborne operations would take three days to complete due to aircraft shortages and the decision to deploy the corps headquarters. The US 101st Airborne Division would seize three bridges and assist ground forces with the capture of Eindhoven. The US 82d Airborne Division would capture bridges over the rivers Maas and Waal at Grave and Nijmegen, plus five other bridges. Additionally, they would have secure the Groesbeek heights to protect their right flank as well as the flanks of the ground forces that would later conduct the link–up. The British 1st Airborne Division, along with the Polish Airborne Brigade, would capture the bridge over the Lower Rhine at Arnhem,

the deepest objective. The British 52nd Lowland Division was to be airlanded at Arnhem once suitable airstrips had been secured by the 1st Airborne Division. Meanwhile, XXX Corps, from the British Second Army, would penetrate German defenses and linkup in turn with the three airborne divisions securing the bridges. The final link–up, at Arnhem, was expected on the third day of the operation, if everything went well.[44]

Several assumptions were made by the planners. First was that the Germans would be unable to devise any type of effective defense against the Allied armies.[45] Second was that enemy forces that were identified within the area of operations would be too weak and ill–trained to affect Allied operations significantly.[46] Third was that the enemy would be unable to reinforce quickly enough to upset Allied plans.[47] Fourth was that the weather, even though typically bad at this time of year, would not significantly affect airborne drops and air resupply, or ground operations.

Limited availability of transport aircraft and locations of suitable drops zones and landing zones near Arnhem also affected planning. The airborne force would be inserted over three days, giving up surprise. Landing six to eight miles away from the bridge at Arnhem also compromised surprise and would give the enemy more time to react. The length of time required for the landings also prevented the quick build–up of force to concentrate on taking the objectives.

Several days prior to Market Garden, German Panzer units were discovered in the vicinity of Arnhem by aerial reconnaissance. Although this was known to Eisenhower, Montgomery and Brereton, they did not modify plans for action at Arnhem.

Optimistic assumptions about the enemy proved to be incorrect. Landing far from the bridges and extending airborne operations over three days gave the enemy time to react to

the attack. Although the British paratroopers initially seized the far side of the bridge at Arnhem, the enemy prevented their reinforcement and in the end regained control of the bridge. Additionally, the Germans were able to prevent the Allied ground force from penetrating fast enough to provide relief. In the end, the British and Polish paratroopers suffered losses of more than 10 percent killed and about 50 percent captured.[48] German resistance at the other bridge sites also inflicted heavy casualties on the US airborne forces and further delayed the penetration. In the end, the enemy was able to reinforce quick enough to deny Eisenhower his bridgeheads over the Rhine.

Weather in fact did affect both air and ground operations. Planned drops were delayed and aerial resupply was reduced to 30 percent effectiveness.[49] The Polish airborne brigade was delayed from landing at Arnhem for three days and then different drop zones had to be used.[50] Poor trafficability along the penetration route, made worse by bad weather, combined with enemy resistance to delay the ground forces.[51]

Decisions and Impacts

Eisenhower's decisions preceding Operation Market Garden impacted Allied operations in several ways. By approving the increase in size of the airborne component of the operation, Eisenhower substantially increased the operations. Insisting it occur within seven days of his approval reduced the time for planning and preparation. Increased size and limited time along with increased coordination requirements increased the potential for failure.

Allied logistics suffered considerably. The increased size of the operation indirectly added to the strain of an already overburdened supply system. Troop carrier aircraft

previously used for resupply of ground forces along the front were no longer available, increasing the ground transportation requirements for this task. Antwerp's port facilities would remain unusable through November. By the time Canadian forces cleared the approaches to Antwerp, bad weather continued to limit its use. Allied offensive operations ground to a halt for lack of supplies. [52] The slowing of these operations provided the Germans additional time to reorganize and reinforce their western front.

The size of the operation coupled with the desire to use airborne forces almost dictated that their attack occur in the north. Thus, Eisenhower constrained the options open to him. Had he considered designating Bradley's as his main effort, he would have had to forego use of the airborne forces to support this option. Eisenhower was also inclined to shift orient Hodges army north to protect Montgomery's right flank, which created a thinning of the lines between Patton's army and Hodges's. Thus, pressure was reduced against the Germans in the middle of the Allied front, which was counter to Eisenhower's broad front strategy.

The Allied attack also caused the Germans to increase the tempo of their defensive operations in Montgomery's sector. This led to both US airborne divisions remaining in the line with the 21st Army Group soldiers. Thus, Eisenhower's strategic reserve had been reduced by three airborne divisions, well over half of its combat strength. Future requirements for a large strategic reserve would be left unmet.

Market Garden did advance the British lines almost 50 miles from their original positions at the start of the operation. The Allies did keep bridgeheads over the Maas and the Waal at Grave and Nijmegen. But Montgomery very possibly could have achieved the

same or similar results without committing the 1st Allied Airborne Army in support of his advance.

Both Eisenhower's and Montgomery's reputations suffered in the eyes of the public and at the hands of each other's supporters. In Eisenhower's camp, Montgomery was blamed for the failure of the XXX Corps to push hard enough to link up with the airborne forces. Montgomery's side blamed Eisenhower for not providing sufficient support or for not allowing the operation to occur early enough to make it a success.[53]

Any thoughts of a quick end to the war with Germany were dashed. In the end Allied morale suffered from the failure of Market Garden. The Allies now realized they were in the war for the long haul.

Allison's Models

Eisenhower's decision to conduct Operation Market Garden is a departure from his broad front strategy. His strategy was based on strength throughout the western front. His decisions to use the 1st Allied Airborne Army, reallocate logistics, and give Montgomery control of Hodges's army to support gaining bridgeheads across the Rhine in the north are more characteristic of the narrow front strategy proposed by the Field Marshal. Eisenhower did not see these decisions as a change, but as a way to take advantage of transitory German disorganization and weakness.

Eisenhower as a rational actor would be assumed to utilize a decision making process akin to the estimate process currently in use by US military forces. The Allies' overall purpose was the total defeat of Germany by a combined coalition effort. The overall concept was to defeat Germany by seizing the Ruhr and Saar followed by the seizure of

Berlin. The mechanism for defeat was the destruction of German forces. Eisenhower's immediate goals were twofold: to seize bridgeheads over the Rhine and to at least secure accessible deep water ports to improve logistics. He had received guidance (or considerable pressure) to employ the 1st Allied Airborne Army in any future operations.[54]

Eisenhower understood that the enemy was disorganized but acting concertedly to establish cohesive defenses along the West Wall forward of the Rhine. Enemy strength northwest of the Ardennes was estimated at two weak Panzer and nine infantry divisions. Enemy strength south of the Ardennes was estimated at two Panzer Grenadier and four poor infantry divisions. Additionally, on 8 September, the Germans had begun launching V–2 rockets from western Holland at England. Eisenhower realized the Germans would expect the Allies to attack either north or south to seize bridgeheads to threaten the Ruhr or Saar. Also, the Ruhr, in the north, would be considered a more valuable center of gravity than the Saar in the south. The expectation, then, would be that the Germans would make their greatest defensive effort in the north.

Eisenhower's alternatives were to continue his broad front strategy, meaning equal effort across his front, or to concentrate combat power in either Montgomery's or Bradley's area of operation. In deciding, Eisenhower had to consider his guidance from Marshal about using the airborne army. It would be far easier to use them in the north because of shorter air routes from England. Additionally, operations with the main effort in the north would complement his objective of securing a deep water port, if initial operations were successful in isolating western Holland. Isolating Holland would also end German V–2 rocket attacks against England. Logistically he could not support equal efforts in the north and south and still expect to gain bridgeheads. Moreover, employing

the airborne forces required the diversion of aircraft from resupply missions. After the war, General Bradley's assessment of the main effort in the south contended that Patton and his First US Army Commander, General Hodges, could have pushed to the German border but would have halted there for lack of supplies.[55] Although enemy strength in the north was estimated to be stronger than that in the south, it seems reasonable that Eisenhower would chose to make his main effort in the north.

Eisenhower's theater level objectives translated into several general tactical level tasks: clearing the approaches to the port at Antwerp; conducting airborne assaults to secure routes and seize critical sites; attacking to penetrate German defenses and subsequent linkups between the airborne and ground forces. An implied task was protecting the flanks of the penetration and clearing enemy forces between the start point of the attack and the bridgeheads.

As a rational actor, Eisenhower's approval of Operation Market Garden was based on his expectations that it will be successful. A typical way to determine if an operation will be successful is to consider the relative combat power that can be generated and whether forces are being employed according to doctrine. The Allies had learned that successful airborne assaults required surprise and mass. This is achieved by landing on or as close to the objective and with as much force as possible. In Market Garden, the shortage of troop carrying aircraft required three days to insert all the airborne forces. Surprise would be lost after the initial landings. The locations of landing zones at Arnhem were six to eight miles from the objective. Additionally, the drops would be done in daylight. Finally, the enemy would be expected to concentrate great effort against the threat of an Allied bridgehead across the Rhine.

Terrain analysis assesses its impact on operations. Poor off–road trafficability required the relieving armor units to stay on the road. The zone of attack was so restrictive that it was characterized as attacking on a one–tank front.[56] Additionally, enemy activity was increasing substantially in the area, and most significantly, reports had confirmed Panzer units located at Arnhem. [57] Thus, the unit landing farthest from its objectives and which would have to hold out the longest until relief would arrive would also face German Panzer units.

The SHAEF Chief of Staff, Lieutenant General Bedell Smith, confronted Eisenhower with the reports of Panzer units at Arnhem, possibly two divisions, two days prior to Operation Market Garden. The exact strength of the Panzer units were not confirmed, but they did cause Eisenhower concern. If the reports were true, the British would not be able to hold out at Arnhem. Instead of canceling the operation, however, Eisenhower deferred to Montgomery.[58]

It is difficult for the rational actor model to explain Eisenhower's continued approval of Market Garden. Eisenhower admits he was aware of and concerned about the enemy activity, especially at Arnhem.[59] He goes on to say,

> My decision to concentrate our efforts in this attempt to thrust into the heart of Germany before the enemy could consolidate his defenses along the Rhine had resulted in a delay in opening Antwerp and in making the port available as our main supply base. I took full responsibility for this, and I believe that the possible and actual results warranted the calculated risks involved.[60]

However, based upon the facts known by Eisenhower, his planners, Montgomery and the airborne forces, the prospects for Market Garden gaining bridgeheads and speeding the

opening of the port at Antwerp seemed very risky. Yet, the risks were accepted without modification of the plan.

Organizational influences provide a second perspective on Eisenhower's decision to approve Market Garden. Montgomery wanted to conduct this operation. Market Garden provided an opportunity to gain control over additional forces, logistical support and prestige.[61] Second, if Market Garden were successful, Montgomery would be more influential when future actions were being planned. Montgomery's previous World War I experiences led him to believe that the broad front strategy was the wrong approach. Montgomery was thus motivated for several reasons to conduct Market Garden and to convince Eisenhower to allow him to do so.

Eisenhower, at the top of the organizational ladder, had many concerns, Market Garden being only one of them.

> Eisenhower had to worry about coordinating strategy with the Russians, responding to an assortment of proposals from the British Chiefs of Staff and Churchill personally about possible operations elsewhere in Europe, dealing with De Gaulle, fielding a flood of communications from the US chiefs of staff and the War Department, and badgering Washington for additional troops and equipment to wind up the war in Europe at a time when Congress, which considered Hitler effectively beaten, was already pressing for the conversion of some war–producing factories to civilian production. In addition an endless flow of senior American visitors, including members of Roosevelt's cabinet, passed through London to confer with him on crucial issues—including how Germany would be dealt with after the defeat of its armies and even demobilization plans for the largest army the United States had ever put in the field.[62]

He was not able to focus his time and energy on this decision alone. He had to rely on subordinates within the organization to define the problem and propose solutions. As early as 2 July, Montgomery began persuading Eisenhower that action in the north would bring the greatest gains. Once Eisenhower made his decision, he then relied on the subordinate

organization to execute it. The same was true in turn for the subordinate organization. Thus, the 21st Army Group relied on the airborne army to plan the airborne operation and ensure it would be successful. Subordinate organizations are tasked to do a job and expected to raise the issue if they will not be able to accomplish it. For example, Operation Comet was canceled when the Major General Sosabowski, the commander of the First Polish Independent Parachute Brigade stated that enemy strength was too great. The organizational response in this case was to increase the size of the airborne forces involved.

Eisenhower's two major subordinate commanders competed for limited equipment and resources. Montgomery and Bradley both argued for being assigned the main effort. Eisenhower initially agreed that Montgomery's would be the main effort and would accordingly receive priority for logistics. However, when confronted by Bradley on the same subject, Eisenhower agreed to divide these resources more evenly between the army groups, although Montgomery would get the larger share. Later, after approving Market Garden and being confronted by Montgomery about priority, Eisenhower finally gave him absolute priority.

By satisficing between competing demands, Eisenhower approved Market Garden with some restrictions. Satisficing is not maximizing utility but instead the search for and selection of a "good enough" alternative that exceeds a pre–established target or criterion.[63] In this case, Eisenhower constrained Montgomery by limiting the attack to the seizure of bridges and positioning of forces forward. After this had been accomplished, Eisenhower would reassess the situation to determine what should happen next. Eisenhower was unwilling to commit totally to Montgomery's desires for Market Garden

because of the inertia created by his previous organizational goals, the broad front strategy. If Montgomery were allowed to continue his attack, then Eisenhower would have to commit his other subordinate organizations to support Montgomery and provide him with flank security. Bradley also had the same concern.

Market Garden provided Eisenhower with an opportunity to utilize his airborne forces for the mission that they have been designed, organized and trained to conduct. Of all the sectors in Europe, Holland would be the easiest to reach from existing airbases in England. Eisenhower appreciating General Marshall's desire to get these forces into combat would first, approve Operation Market Garden, and second, he would be hesitant to cancel the operation.

According to Allison, large organizations maintain inertia. This may in part explain reactions to the reports of increased enemy and Panzer divisions in the vicinity of Arnhem. This information simply would not be allowed to change the plan. First, Montgomery would have to give up the opportunity to prove the soundness of his strategy. For the airborne units, it might be the last opportunity to participate in the war.

Again Allison's model seems unsatisfactory. One would have to assume that Eisenhower was too busy with other organizational duties to focus on the major operation occurring in Europe, Market Garden, an operation he had made the primary effort and committed an airborne army to accomplishing. Montgomery was motivated to demonstrate the correctness of his strategy. Failure would diminish his prestige as well as future chances for his organization to play a major role in the defeat of Germany. He assumed his ground forces would be able to smash through German defenses, but two Panzer divisions should have given him cause to reconsider at least the Arnhem objective,

especially with his previous experiences fighting the Germans. This model seems more appropriate for explaining why actions are different from those intended by the decision makers, not why the decisions were made in the first place.

Organizations are expected to change incrementally. The fact that Montgomery had a reputation for being cautious brings into question the proposition that organizations' future actions will be similar to previous actions. In retrospect, Montgomery's Comet and Market Garden proposals are out of character and do not reflect previous organizational tendencies.

A look at Eisenhower's decision in terms of bureaucratic political influences, Allison's third model, also provides insights. Some players have more power to influence a decision than others. Montgomery was convinced his plan would win the war. This opinion was supported by Churchill. Also, the British continuously sought greater influence over the decision making process. If Eisenhower was unwilling to compromise, it would adversely affected the Allied coalition. Eisenhower had to take into account the desires of President Roosevelt, and US domestic public opinion. He could not appear to acquiesce to British demands at the expense of American control. After all, the Americans were providing more divisions and doing more of the fighting than the British. Other important players included Bradley and Patton, who also influenced Eisenhower's decision making. The decision to approve Market Garden was a compromise based on bargaining with the other major players in the decision making process. Eisenhower constrained the scope of Market Garden as part of the compromise. Thus, he satisfied Bradley's and Patton's desire to pursue their own goals without being overly committed to supporting Montgomery.

The key features of the bureaucratic politics model are persuasion, bargaining and compromise. As described earlier, Montgomery continuously tried to convince Eisenhower to pursue a narrow advance instead of the broad front strategy. Bargaining over Market Garden did require compromise. Eisenhower believed approval would reduce conflict between himself and Montgomery. Each would get something out of the deal. Montgomery would get to demonstrate the brittleness of German defenses. Eisenhower would get Antwerp, and his forces would be positioned to envelop the Ruhr. Montgomery's power to influence Eisenhower results from his position as the senior British officer in the Allied forces. Montgomery had made it very clear that Britain was very interested in the war ending as soon as it possibly could. Going on the defensive could affect relations with Britain in the short run and undermine Eisenhower's authority if he does not take actin to shorten the conflict with Germany.[64]

Compromise does not mean agreeing to a plan that will not work. The reported Panzer divisions at Arnhem had to be considered because they would determine success or failure. Eisenhower and Montgomery both could have been reasonably convinced that the armor thrust would have been successful, but neither could expect an airborne division to tackle two Panzer divisions. As with the two preceding models, the risks associated with the capture of the bridge at Arnhem argued against Market Garden proceeding as planned.

Prospect Theory

Prospect theory posits that the decision maker's reference point establishes his domain as one of losses or gains. This domain, in turn, determines whether he will be risk seeking or risk averse, respectively. Framing of the problem establishes the reference

point and, over time, reframing may again alter the reference point. Changes in reference point can lead to changes in domain and hence in risk propensity. Evaluation determines overall value of the alternatives and is a function of two scales: subjective value and decision weighting of probabilities.

Eisenhower had settled on a broad front strategy for the defeat of Germany. Allied successes after the breakout from the Normandy beachhead far exceeded both expectations and logistics. Two Allied army groups were being supplied from ports hundreds of miles to their rear over roads and railroads that had been severely damaged by earlier bombing efforts. By September the logistics situation was almost in crisis. The solution was gaining a deep water port at Antwerp, but German control of the Scheldt estuary would delay its use.

Eisenhower attributed Allied success, in part, to German disorganization. But in September, as German lines of communication become shorter, the enemy was beginning to show signs of developing a cohesive defense along the West Wall. The better organized the Germans became, the harder the fight would be for the Allies. The time required to open Antwerp would be to the Germans' advantage if Eisenhower tried to pressure them across their whole front. From this reference point, it follows that Eisenhower would take risks to gain as much as he could before the Germans were organized enough to put up a fight. Ultimate Allied victory was not in question. But how much the Allies could gain before the Germans established cohesive defenses along the West Wall was in question.

Eisenhower's reference point began to shift by the end of August based on relative combat power. Relative combat power is a function of morale, weapons that can be

brought to bear, terrain, type of operation (defense, attack), logistics, surprise, and many other factors.

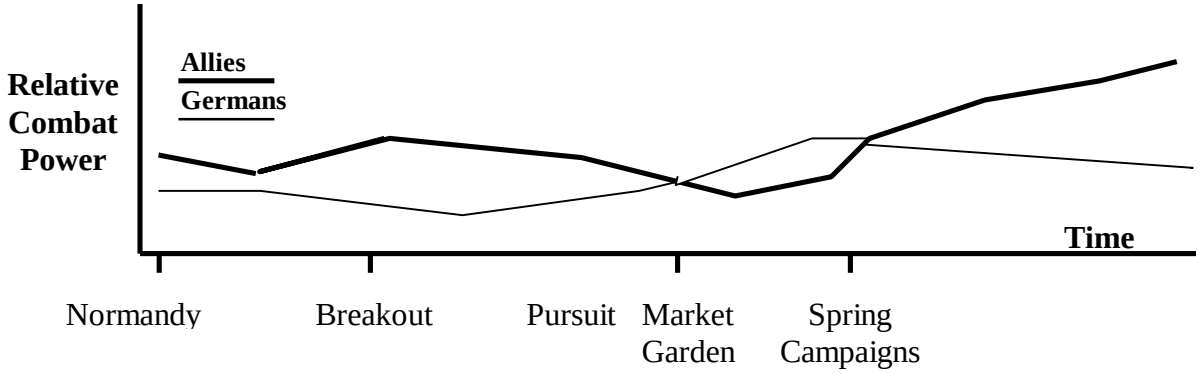

Figure 3. Relative Combat Power Over Time

Figure 3 depicts relative combat power over time for the broad front strategy. At Normandy, Allied relative combat power at the beachheads was greater than that of the Germans. After the landings until the breakout, relative combat power was almost equal, but continued bombing and buildup by the Allies combined with German losses caused Allied relative combat power to increase. From the breakout through the pursuit, Allied combat power was greater than the Germans' but logistics, maintenance and the broad front strategy began to dissipate this relative advantage in the face of German reorganization efforts, reinforcements and withdrawal to more defensible terrain.

Logistics is a critical variable. Eisenhower fully appreciated the difficulty caused by having only one major port, at Cherbourg, to supply his armies. His intent was that Montgomery would seize and open Antwerp for Allied use. Montgomery and Bradley also realized that logistics constraints would slow their armies' advances. By reallocating logistics from one of his army groups to the other, Eisenhower could generate the relative combat power to seize bridgeheads over the Rhine before the Germans became too strong.

The Allies could still make significant gains in at least one army group's sector. Both Montgomery and Bradley had several discussions with Eisenhower about which army group would get priority for supply. In early September, Eisenhower chose to make Montgomery's his primary effort. Eisenhower's reference point had changed based on the success of the pursuit operations in August. Prior to the Allied breakout from the Normandy beachheads, Eisenhower's reference point was based on a time line his SHAEF planners had developed during the planning of Overlord. In September, some 90 days into the operation, his forces were almost 200 days beyond planning estimates.[65] He was now seeking to gain as much as he could before supply brought both army groups to a standstill. He saw an opportunity to gain bridgeheads across the Rhine. Additionally, he would be able to use his airborne army in this same endeavor, potentially increasing the gains he could achieve.

The change in Eisenhower's reference point was caused by several factors. First, Eisenhower sensed the changing situation for the Germans and the Allies. Second, Eisenhower's expectations changed based on the Allied successes through the August pursuit operations. Third, Eisenhower was influenced by his discussions with Montgomery and Bradley. It is interesting to note that Eisenhower approved Market Garden immediately after Montgomery's presentation of his plan on 10 September. Montgomery's presentation and the prospects of gaining a bridgehead over the Rhine were appealing to Eisenhower in spite of the risks and disadvantages involved. The opening of Antwerp would be delayed. Montgomery would be moving north away from the Ruhr. Bradley would have to move his First US Army north, accordingly, to try to cover the gap that would be created.[66]

Eisenhower's domain based on his reference point in September became one of losses. If he continued his present policy of dividing supplies equally among his army groups he would reach the Rhine but not secure bridgeheads across it. If he reallocated supplies to one of his army groups, he could then generate the combat power to force the bridgeheads over the Rhine. Thus, Eisenhower became risk seeking. He was willing to delay the opening of Antwerp. He was willing to commit his strategic reserve. He was willing to violate principles of surprise and mass. He was willing to gamble that the ground forces would be able to penetrate along a narrow corridor that was easily defended. Finally, he was willing to gamble on weather during a time of year when the odds were that it would delay the airborne assaults and aerial resupply. Eisenhower accepted high risk for the chance to gain bridgeheads over the Rhine and to cut off Western Holland from German support.

Concluding Remarks

Eisenhower was aware of the risks involved in the Market Garden operation. Up to the point he approved Market Garden he had followed a course of action that was risk averse, his broad front strategy. This strategy ensured that it would be difficult for the Germans to conduct and sustain counterattacks against the Allies, that flanks would be protected and that massive and decisive force would be available throughout the area of operations. Eisenhower refused to consider conducting a single thrust penetration because of the risks involved. Yet he soon approved Market Garden, just such a demonstrably risky operation. Allison's three models do not adequately account for

Eisenhower's acceptance of the known risks. Prospect theory's propositions of reference point, domain and framing provide a more plausible explanation.

Notes

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[2] Martin Middlebrook, *Arnhem, 1944, The Ariborne Battle*, 17–26 September (Boulder: Westview Press, 1994), 5.

[3] Eisenhower, Dwight D., *Crusade in Europe* (New York: Da Capo, 1977), 228.

[4] Eisenhower, *Crusade in Europe*, 228–9.

[5] Alfred D. Chandler, *The Papers of Dwight David Eisenhower, The War Years: IV* (Baltimore: The John Hopkins Press, 1970), 2100.

[6] Eisenhower, *Crusade in Europe*, 302.

[7] Chandler, *The Papers of Dwight David Eisenhower,* 2115.

[8] Ibid., 2115.

[9] Ibid., 2115–6.

[10] Ibid., 2116.

[11] Ibid., 2116.

[12] Ibid., 2116.

[13] Ibid., 2116.

[14] Ibid., 2101. Eisenhower, in a message dated August 29, 1944 directed that, "the First Allied Airborne Army, in conjunction with the Northern Group of Armies, will plan and prepare for launching an airborne assault to insure the destruction of the retreating enemy forces.

[15] Cornelius Ryan, *A Bridge Too Far* (New York: Simon and Schuster, 1974), 68.

[16] Chandler, *The Papers of Dwight David Eisenhower,* 2116.

[17] Clay Blair and Omar Bradley, *A General's Life* (New York: Simon and Schuster, 1983), 310.

[18] Carlo D'Este, *A Genius for War* (New York: HarperCollins Publishers, 1995), 646.

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[21] Richard Lamb, *Churchill as War Leader* (New York: Carroll & Graf Publishers Inc., 1991), 307.

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[34] Roland G. Ruppenthal, *Logistical Support of the Armies* Vol. II (Washington D. C.: Government Printing Office, 1959), p 6.

[35] Forrest C. Pogue, *George C. Marshall: Organizer of Victory*, (New York: The Viking Press, 1973), 425.

[36] Eisenhower, *Eisenhower: At War 1943–1945*, 433.

[37] Norman Gelb, *Ike and Monty, Generals at War* (New York: William Morrow and Company, Inc., 1994), 346.

[38] David Eisenhower, *Eisenhower: At War 1943–1945* (New York: Random House, 1986), 434.

[39] Pogue, *George C. Marshall: Organizer of Victory*, 425.

[40] Eisenhower, *Crusade in Europe*, 29.

[41] Ibid., 451.

[42] Pogue, *George C. Marshall: Organizer of Victory*, 430.

[43] Eisenhower, *Eisenhower: At War 1943–1945*, 438.

[44] Martin Middlebrook, *Arnhem 1944: The Airborne Battle* (Boulder: Westview Press, 1994), 13–14. The plan for Operation Market Garden was summarized from Middlebrook's account of the operation.

[45] Eisenhower, *Crusade in Europe*, 282.

[46] Ibid., 283

[47] Ibid., 286.

[48] Middlebrook, *Arnhem 1944: The Airborne Battle*, 438–9.

[49] Eisenhower, *Crusade in Europe*, 286.

[50] Ibid., 286

[51] Ibid., 286

[52] Norman Gelb, *Ike and Monty, Generals at War* (New York: William Morrow and Company, Inc., 1994), 363

[53] Gelb, *Ike and Monty, Generals at War*, 363.

[54] Eric Larrabee, *Commander in Chief : Franklin Dleano Roosevelt, His Lieutenants, and Their War* (New York: Harper & Row, Publishers, 1987), 485

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[57] Peter Herclerode, *Arnhem: A Tragedy of Errors* (Bodmin, Cornwall: Hartnolls Ltd., 1994), 40–41.

[58] Ryan, *A Bridge Too Far*, 158.

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[59] Dwight D. Eisenhower, *Eisenhower's own Story about the War* (New York: Arco Publishing Company, 1946), 67.

[60] Eisenhower, *Eisenhower's own Story about the War*, 68.

[61] Middlebrook, *Arnhem 1944: The Airborne Battle*, 9. Montgomery would receive increased supplies and the support of American forces on his right flank.

[62] Gelb, *Ike and Monty, Generals at War*, 344.

[63] James G. March, *A Primer on Decision Making: How Decisions Happen* (New York: The Free Press, 1994), 18.

[64] Gelb, Norman, *Ike and Monty*, 370.

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[66] Ambrose, *The Supreme Commander*, 516.

Chapter 4

Applying the Framework

Introduction

This chapter begins with a review of the relevant issues that Eisenhower faced as he considered the Market Garden proposal from Field Marshal Montgomery. Next, the framework proposed in Chapter 2 is applied to the Market Garden case study to determine if it can predict risk propensity, and whether it could have provided ways to broaden Eisenhower's consideration of his alternatives prior to his fateful decision. At the conclusion of the discussion, concluding comments focus on the validity of prospect theory, the proposed format for predicting and illuminating decision making under risk, and prospect theory's general applicability to military decision making.

Situation Analysis

As the Supreme Allied Commander, Eisenhower was responsible for winning a war and maintaining cohesion within the Allied coalition. In doing so he had to maintain a balance between the desires of multiple actors from President Franklin D. Roosevelt and Prime Minister Winston Churchill down to his army group and army commanders. Prior to D–Day, and through the rest of the war, several issues continued to resurface. Three of the most important were command relationships within the coalition, the strategy for

defeating Germany, and how to deal with the Soviets. As the war progressed, Eisenhower also had to contend with growing Allied optimism in the face of stiffening German resistance and with logistics difficulties that were slowing Allied momentum. Understanding these issues and the relationships between Eisenhower and his political bosses and military superiors and subordinates provides the context for his decision to conduct Market Garden.

The Allied strategy to defeat Germany in western Europe involved a choice between pushing a strong force directly toward Berlin or moving three army groups in coordinated effort across a broad front to encircle the Ruhr and then proceed toward Berlin. Prime Minister Churchill, Chief of the Imperial General Staff, Field Marshal Alan Brooke, and Field Marshal Bernard Montgomery, Commander of the 21st Army Group assumed at the end of August that the earlier successes of the Allies indicated that Germany was ripe for the narrow front strategy. The benefits which attracted them were a quick defeat of Germany leading to a stronger negotiating position with the Soviets and less cost in manpower and equipment. General Omar Bradley, US 12th Army Group Commander and General George Patton, US 3rd Army Commander under Bradley also preferred a single thrust strategy.

On 26 July 1944 the Allies broke out of the Normandy beachhead and began a broad front pursuit across western Europe. Within two weeks the Germans were in retreat on every front in both the East and the West except the Vistula.[1] In Europe, it appeared that the German resistance had totally collapsed, but signals were mixed. The Germans were withdrawing and in most cases it appeared they were powerless to contain the Allied attacks. But the Germans were withdrawing Panzer units from Italy and possibly

positioning them at Dijon to threaten Patton's right flank. Patton's G–2 warned that the enemy was still able to exercise overall command and control of his front.[2] While Eisenhower remained cautious, Montgomery, Bradley and Patton felt it was time to penetrate on a narrow front and complete the defeat of the German army.

Eisenhower also felt pressures from President Roosevelt and Chief of Staff General George C. Marshall. The US war effort in men and equipment exceeded Britain's. Roosevelt, Marshall and US public opinion demanded that Americans take the lead in Allied strategic decisions and control of Allied forces in Europe. This placed pressure on Eisenhower to assume operational control of the ground forces from Montgomery.

As Eisenhower assumed operational control of the ground forces on 1 September, the tension between his doubts and British euphoria came to a head. Eisenhower directed Bradley to

> . . . divide his forces north and south of the Ardennes Forest, and advance to the West Wall on a line from Aachen to Trier, while Patton's Third Army crossed the Meuse beyond Nancy, linked with DRAGOON and strengthened its southern flank against the reported concentration of German forces on the upper Moselle.[3]

He also directed Montgomery to secure Antwerp, a SHAEF pre–condition to contingency plans for crossings of the Rhine.[4] Antwerp's port was essential to improving Allied logistics. Its location would substantially shorten the lines of communication to Montgomery's army group, thus reducing transportation requirements for moving supplies. But access to the port was still controlled by German forces. Montgomery wanted American assistance with clearing the port's approaches so he could have his Second Army continue to push toward the Rhine. Eisenhower refused and made it one of Montgomery's objectives. To the British, Eisenhower's directive to clear Antwerp

appeared to cost the Allies an opportunity to reach the Rhine while German forces were still disorganized. This brought into question, at least in the minds of Brooke and the British Chiefs of Staff, not only the broad front strategy but Eisenhower's capabilities as the overall land forces commander. They felt that prioritizing logistics to support Montgomery would be enough to carry his Second Army to the Rhine. Brooke thought that Eisenhower's directives to split American forces and to link–up with DRAGOON, together with the timing of his assuming operational control of land forces would "add three to six months to the war."[5]

Eisenhower not only had to contend with high level British sentiment and criticism but with the expectations and optimism of the American and British public as well. In a news conference at the end of August, Eisenhower warned against unrestrained optimism. "He reminded the press that Germany could quickly draw on garrisons in Norway and Denmark, and on units extricated from Finland."[6] Rising expectations, increasing German resistance, coalition squabbles over strategy and command, and slowing Allied momentum all influenced Eisenhower's decision to approve Operation Market Garden.

Operation Market Garden offered the following prospects: flanking the German Siegfried Line on the north, cutting off western Holland allowing the Allies to quickly gain control of the ports at Antwerp and providing access to an additional deep water port at Rotterdam, and denying the Germans the ability to launch V–2 rockets from sites located there. These outcomes supported Eisenhower's broad front strategy by placing Montgomery's army group in a position to envelop the Ruhr Valley from the north.

The plan entailed great risk, however. It required the First Allied Airborne Army to conduct airborne assaults deep into German held territory to capture the bridges, followed

by an armored corps conducting an equally deep penetration of German defenses to link up with the airborne forces. Eisenhower also had to commit limited logistics to the operation which would stall the operations of Bradley's 12th Army Group in the south. The major assumption was that the Allies would have enough combat power to seize the bridges and conduct the penetrations so that the linkups could occur. This assumption implied another, that the Germans would be weak and disorganized enough for these operations to succeed, an assumption that Eisenhower doubted.

Although Eisenhower had several alternatives from which to choose, he decided his main effort would be in the north. He then approved Market Garden as opposed to other less risky alternatives for action in the north. The main alternative was first to secure Antwerp and then proceed with the ground offensive to the Rhine. The cost of this alternative was giving up the opportunity to gain bridgeheads across the Rhine while the Germans were still disorganized and risking loss of bridges along the penetration route to German demolition teams. What follows is an analysis of Eisenhower's decision using the framework developed in Chapter 2.

Framework Application

Step 1. Determine intent of actions considered. Eisenhower's intent was to gain bridgeheads before the Germans could reorganize and establish cohesive defenses along the West Wall.

Step 2. Characterize situation (past, present and future) and determine if status quo is changing.

- Past situation. Allies conducted Operation Overlord, breakout and pursuit.
- Current. Allies are continuing pursuit operations.

* Future. Allies will most likely conduct relatively static operations along the West Wall.
* Status Quo. Current status quo is based upon successful pursuit operations, but logistics shortfalls and stiffening German resistance threaten to change it.

Step 3. Identify domain, reference point and risk propensity.

* The domain is one of losses
* The reference point is based on Allied momentum and increasing German resistance.
* Risk propensity will tend toward risk seeking due to domain of losses.

Step 4. Analysis. This step requires identifying potential gains/advantages, potential losses, risks/disadvantages and critical events for success for Operation Market Garden.

* Potential gains/advantages:
    - Threatens German North Flank
    - Positions Allies to attack into Germany
    - Uses airborne army
    - Isolates western Holland
    - Speeds gaining Antwerp
    - Gains Rotterdam ports
    - Stops V–2 attacks on England
    - Reduces time for German reorganization
    - Positions to Allies to attack Berlin

* Potential losses:
    - Airborne units committed at deep objectives may be isolated
    - Could delay clearing of Antwerp
    - Loss of army strategic reserve
    - Focus of operations in north shifts to saving airborne units surrounded by German forces
    - Loss of prestige
    - War extended

* Risks/disadvantages
    - Short planning time
    - Complexity of operation
    - Violates airborne doctrine
        - Daylight insertion
        - Arnhem drop zones six to eight miles from objectives
        - Lacks mass
        - Loss of surprise after initial drops

- Narrow penetration route
- Enemy armor located at Arnhem
- Hodges's Army moving north creates gap in Allied front
- Limits pressure on Germans in Bradley's sector
- Reallocating supplies slows 12th Army Group's operations

* Critical events for success.
    - Hold bridges
    - Penetrate for link–up

Step 5. Identify alternate reference points.

* Consider the operation from its impact on Allied morale. If the Allies fail during Operation Market Garden what impact will it have on morale? Is morale a more important reference point than the one from which I am currently framing action and outcomes? Soldiers are currently nearing exhaustion from continuous operations. Is the chance to gain bridgeheads worth the potential impact on morale if I am not successful?

Conclusions and Final Comments

Prospect theory provides a prescriptive way to consider decision making under risks. This thesis has applied prospect theory propositions to the rational decision making estimate process used by the military. The resulting framework is intended to allow the decision maker to determine his risk propensity for a given choice problem and to enable him to appreciate and minimize the impact risk propensity has on decision making.

The study of Market Garden demonstrates the validity of prospect theory's propositions. Prospect theory does not predict the choice a decision maker will make but should reveal his tendency to follow a risk seeking or risk averse course of action (COA). This tendency may limit or bias the types of alternatives developed or considered. Elicited choices may not be rationally value maximizing.

Eisenhower selected a risky course of action. He understood that the opportunity to secure bridgeheads across the Rhine was slipping away. Allied combat power was decreasing relative to German combat power and would continue to do so until Allied logistics improved. Any action Eisenhower took to improve logistics delayed more decisive action against the Germans. Any delay saw his force become relatively weaker. Quick action, made possible by reallocating resources from one army group to the other, allowed response before relative combat power declined. Thus delaying was seen as a loss while immediate action was seen as a gain.

Eisenhower was presented with several choices. He chose the one that offered the largest gain and the greatest risk. Equally weighting efforts in the north and south would not gain bridgeheads across the Rhine. Concentrating resources on the effort in the south might do so, but it would give up the chance to threaten the Ruhr Valley, to gain access to the German Northern Plain, and to threaten the German flank. It would also sacrifice the opportunity to isolate western Holland for Allied action against German V–2 rockets and ports at Rotterdam and Antwerp, and could not easily take advantage of the capabilities of the Allied airborne forces.

Market Garden also meant accepting odds that favored enemy success and Allied failure. Little planning time and the operation's complexity increased risks. Both known and suspected enemy troop locations and terrain favored the defenders. Daylight air drops, drop zone locations and extended drop times over three days forfeited surprise and mass. Eisenhower's decision to defer to Montgomery once he was aware of German Panzer units at Arnhem indicated that Eisenhower still saw a chance for the operation to

succeed if Montgomery also thought so. Eisenhower was definitely risk seeking and prospect theory predict that he would be.

The framework provides insights, but the right questions have to be asked. It was applied here to a situation that has already generated much interest and study. Operational commanders will not have this luxury. If a commander believes that his inclination is one of over cautiousness or boldness, he may pause to reconsider his decision. But key facts may be hard to come by. Uncertainty and ambiguity cause the commander to depend on his judgment, experience and intuition. His realization that the situation as he has framed it will tend to cause him to favor cautiousness or boldness irrespective of the known probabilities may cause him to analyze his decision further. Considering different frames may lead to a better appreciation of the odds for success and failure.

Many aspects of framing are subjective and as yet are not fully understood. Maintaining close contact with a decision maker in order to determine how others affect his framing of the choice problem may not be possible. Accordingly, trying to determine the reference point for an enemy is likely to be even more difficult.

Time, uncertainty, ambiguity and experience affect decision making. Limited time and availability of information may prevent collecting and analyzing many pertinent facts. Lack of experience may lead to wrong conclusions. The decision maker may not understand the risks he faces and as a result may select an alternative that to him appears risk averse but may in fact be risk seeking.

The conclusions of this thesis rely on only one case study. One obvious weakness is their possibly limited applicability across the broad range of situations that face the military decision maker. The explanatory and predictive power of prospect theory beyond that of

the other models applied to the case study imply that further study is merited to assess its applicability to other, different situations. The Japanese decision to attack Pearl Harbor and MacArthur's decision to conduct the Inchon Landings are only two of the myriad of risky decisions military leaders have made that deserve re–investigation from prospect theory's perspective on decision making. Not only such blatantly risky decisions need be analyzed, however.

Prospect theory should provide explanations for over cautious responses as well. Recent US experiences in the war against Iraq offer appealing case studies. For instance, US reaction to Iraqi Scud missile launches based on concern over Israeli response and its potential impact on the Arab partners within the coalition caused modification to the coalition's operational plans. Risks were accepted and declined by CENTCOM's Joint Forces Air Component Commander, Lieutenant General Charles Horner, not only for forces dedicated to Scud hunting but also in areas where those same assets would have been used to maintain air superiority. In the end, Scud hunting was determined to be an overall failure in terms of destroying missile systems although it did reduce the Scud launch rate. Patriot anti–missile systems may have contributed more to Israeli reluctance to conduct reprisals against Iraq than Scud hunting. Prospect theory may be able to explain US willingness to accept risks in this case.

This thesis began with Clausewitz's statement that war is a gamble. Abundant military experience bears out his observation. The operational commander's appreciation of the odds allows him to calculate acceptable risk. But, as we have seen, situations arise when risks are accepted against the odds. A particular situation may predispose a commander toward risky solutions. According to prospect theory, the same situation

framed differently could cause an overcautious response instead. In either case, if the commander had recognized the impact the situation had upon his risk propensity, he might have considered other alternatives. Entrusted with the lives of his subordinates and the welfare of his country, it is crucial for the commander to make the best decision he can. Prospect theory may provide an important new means to further improve the commander's consideration of the alternatives from which he has to choose.

Notes

[1] Eisenhower, David, *Eisenhower at War*, (New York: Random House), 430.
[2] Ibid., 431.
[3] Ibid., 432.
[4] Ibid., 432.
[5] Ibid., 434.
[6] Ibid., 434.

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