Old Dominion University
ODU Digital Commons

Engineering Management & Systems Engineering Theses & Dissertations

Engineering Management & Systems Engineering

Winter 1995

Comparing Traditional Statistical Models with Neural Network Models: The Case of the Relation of Human Performance Factors to the Outcomes of Military Combat

William Oliver Hedgepeth
Old Dominion University

Follow this and additional works at: https://digitalcommons.odu.edu/emse_etds

Part of the Artificial Intelligence and Robotics Commons, Industrial Engineering Commons, Psychology Commons, and the Statistical Models Commons

Recommended Citation
Hedgepeth, William O.. "Comparing Traditional Statistical Models with Neural Network Models: The Case of the Relation of Human Performance Factors to the Outcomes of Military Combat" (1995). Doctor of Philosophy (PhD), dissertation, Engineering Management, Old Dominion University, DOI: 10.25777/r7qz-xf06
https://digitalcommons.odu.edu/emse_etds/77

This Dissertation is brought to you for free and open access by the Engineering Management & Systems Engineering at ODU Digital Commons. It has been accepted for inclusion in Engineering Management & Systems Engineering Theses & Dissertations by an authorized administrator of ODU Digital Commons. For more information, please contact digitalcommons@odu.edu.

المنارة للاستشارات

www.manaraa.com

COMPARING TRADITIONAL STATISTICAL MODELS WITH NEURAL NETWORK MODELS: THE CASE OF THE RELATION OF HUMAN PERFORMANCE FACTORS TO THE OUTCOMES OF MILITARY COMBAT

by

William Oliver Hedgepeth
B.S. June 1967, Atlantic Christian College
M.E.M. December 1991, Old Dominion University

A Dissertation Submitted to the Faculty of Old Dominion University in Partial Fulfillment of the Requirements for the Degree of

DOCTOR OF PHILOSOPHY

ENGINEERING MANAGEMENT

OLD DOMINION UNIVERSITY
December, 1995

Approved by:

Derya A. Jacobs (Director)

Laurence D. Richards

Billie M. Reed

Mark Scerbo

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

ABSTRACT

COMPARING TRADITIONAL STATISTICAL MODELS WITH NEURAL NETWORK MODELS: THE CASE OF THE RELATION OF HUMAN PERFORMANCE FACTORS TO THE OUTCOMES OF MILITARY COMBAT

William Oliver Hedgepeth
Old Dominion University, 1995
Director: Dr. Derya A. Jacobs

Statistics and neural networks are analytical methods used to learn about observed experience. Both the statistician and neural network researcher develop and analyze data sets, draw relevant conclusions, and validate the conclusions. They also share in the challenge of creating accurate predictions of future events with noisy data.

Both analytical methods are investigated. This is accomplished by examining the veridicality of both with real system data. The real system used in this project is a database of 400 years of historical military combat. The relationships among the variables represented in this database are recognized as being hypercomplex and nonlinear.

The historical database was investigated from two paradigms. Paradigm I states that predicting the winner of combat can be based on post-combat personnel losses. Paradigm II states that predicting the winner can be based

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

on pre-combat initial conditions of personnel strength and skill factors.

The results give evidence that traditional statistical methods may provide greater accuracy in predictions when the data is clean or filtered (perfect) than when it is noisy and unfiltered (imperfect). Neural networks, on the other hand, may provide greater accuracy for the same predictions when the data is left imperfect than when it is cleaned up and filtered (perfect).

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

DEDICATION

To Elizabeth.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

ACKNOWLEDGEMENTS

Obtaining a terminal degree is a path one takes toward learning about learning. But, the journey begins with a helping hand from those who have taken that path. The one who helped guide me onto that path and set the direction was Dr. Derya A. Jacobs. I will always be thankful for her patience and guidance.

Dr. Laurence D. Richards has a special thanks for teaching me how to open my eyes to a lifelong view of learning. Dr. Billie M. Reed was always there when I needed a sympathetic ear, from my first course of instruction in Engineering Management, to the last course I took prior to initiating my Ph.D. research. Alan Pope's initial energy and neural network advice helped formulate the research scope. Dr. Mark Scerbo provided his time and his talent to help keep my research focused.

I am especially grateful for the statistical advice from several researchers from the RAND Arroyo Center: Jan Hanley, who gave generously of her time and talent to teach me SAS™, and her husband, Roger Madison, who taught me how to understand the results; Don McCaffrey, for his insights into statistical data modeling; and Pat Vye, whose recent Ph.D. experience helped focus my research.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Also, special thanks to Sandy Macpherson and Keith Carson, who encouraged and promoted my continuing education.

But, most of all, there can be no limit of words in the English language to say thanks for the total support from Elizabeth Hedgepeth, whose love and devotion helped keep me on the path to see the conclusion of this journey.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

TABLE OF CONTENTS

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

LIST OF TABLES

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

LIST OF FIGURES

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

CHAPTER 1

INTRODUCTION

The prediction of outcomes of military combat is a classic problem. Examples of these outcomes may be which side wins a battle, how many casualties occur, or which route is taken by a convoy of ships. Within the field of operations research, these and similar problems have been tackled by traditional statistical approaches for over 50 years. However, a problem arises in creating these predictions when the number of factors involved in the outcome is large, or when the relationships among the factors are complex and uncertain (Davis 1995). In addition, when examining historical databases of combat situations, there can be missing values within the data sets or variables. Traditional statistical methods often exclude an entire treatment case, e.g., a battle, when a missing data value is detected. These factors make the problem an excellent candidate for using an alternative approach to traditional statistical methods. One possible alternative is artificial neural networks. During this study, an artificial neural network was developed for comparison with a traditional statistical method. Both methods were used to examine their veridicality in the prediction of the outcomes

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

of combat situations, battles or wars, based on an authoritative historical combat database.

Problem Statement

Military combat human-machine interactions may exhibit system hypercomplexity between initial combat conditions and predicted outputs (Geeraerts 1994). A consequence of this hypercomplexity is a high degree of uncertainty in the data that describes these interactions. In the past, military analysts dealt with this uncertainty by giving military decision makers predictions based on more "perfect," i.e., filtered and hard data, such as the number of personnel and equipment engaged in combat and the attrition rates of personnel and equipment. However, with the increased power of today's computer systems, it is now feasible to help decision makers explore an expanded set of possible battle or war outcomes by using this uncertainty, and by using more "imperfect" data, i.e., data with missing values and soft data, such as morale of personnel and leadership skills (Davis 1995; Arquilla 1992).

Artificial neural networks have begun to demonstrate some robust abilities in the analysis of complex data that has eluded traditional statistical approaches in providing accurate predictions of future events (Davis 1995; Cheng and Titterington 1994a; Cleckner 1994).

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Therefore, the problem for this research is that the predictive capabilities of traditional statistical models may not be as robust when applied to noisy and incomplete data as they are when applied to clean, or filtered data, and combat data that focuses on skill-based and human factors tend to be noisy and incomplete. The human factors used in this database are qualitative measures of human performance in combat, such as leadership, morale, training, initiative, and combat effectiveness.

Research Objective

The need for this research comes from the convergence of several trends in rethinking how to analyze complex problems (Cheng and Titterington 1994a; Sharda 1994; Arquilla 1992; Morrison 1992; Padgett and Roppel 1992; White 1989). These are summarized as:

(1) uncertain or soft data may contain causal patterns of behavior different from those contained in clean or hard data;

(2) traditional statistical methods may have difficulty analyzing uncertain, missing, or soft data;

(3) computerized neural network algorithms are beginning to solve complex, nonlinear problems accurately; and,

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

(4) the credible use of neural networks needs further development.

The specific objective of this research was to investigate and compare the use of an artificial neural network and a traditional statistical approach in the analysis of large, complex databases for prediction purposes. A historical combat database of 660 battles and wars, spanning approximately 400 years, was used to design, train and test the statistical and neural network models. These two models were used to predict the winners of the 660 combat engagements. The winner, as either the attacker or defender, is an a priori variable defined by the historians who created the database. Thus, the two analytic models were trained to recognize the relation between multiple input variables describing each combat engagement, and the one output variable, which is the winner of each engagement.

This research should then be considered as a comparison of the inference capabilities of an artificial neural network and a traditional statistical model using a mix of qualitative and quantitative data. As such, this study should contribute to addressing the research need and objective by meeting the following goals:

(1) to identify new causal patterns in uncertain or soft data;

(2) to help fill the statistical gap when analyzing uncertain, missing, or soft data;

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

(3) to demonstrate a neural network's capabilities with a complex and nonlinear problem; and,

(4) to examine a potentially credible use of neural networks.

Research Hypotheses

From the objective and need, the following two hypotheses were formulated for this research:

(1) There is a significant difference in the accuracy of model predictions of combat winners when based on input data that is clean and filtered (perfect) versus input data that is noisy and unfiltered (imperfect).

(1a) The data type that gives higher prediction accuracy for traditional statistical models (i.e., perfect data) is different from the data type that gives higher prediction accuracy for neural network models (i.e., imperfect data).

(2) The accuracy of the predictions of combat winners based on attrition data (i.e., combat casualties, which is Paradigm I) is significantly different from the accuracy of predictions based on strength and skill data (i.e., human factors, environment, force description, and doctrine and operations, which is Paradigm II).

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

CHAPTER 2

REVIEW OF LITERATURE

Finding solutions to prediction problems involving nonlinear human factors and using combat performance data may be accomplished with statistical and neural network methods. There are decades of published research that describe statistical methods for analyzing a variety of such historic combat data (Davis 1995; Arquilla 1992; Helmbold 1987; Dupuy 1979; Stockfisch 1975; Bonder 1971). However, the literature on the use of neural networks as an alternative or complementary approach to these traditional statistical approaches is only beginning to be reported (Jacobs and Hedgepeth 1995; Kilmer 1995; Cheng and Titterington 1994a, 1994b; Cleckner 1994; Kilmer 1994a, 1994b, 1993; Sharda 1994; Bui, Dryer and Laskowski 1992; Eldridge 1992; Morrison 1992; Padgett and Roppel 1992). These reports indicate that neural networks may outperform traditional statistical methods when the data is composed of a large number of quantitative and qualitative variables (Cheng and Titterington 1994a). Thus, this study is a case of how traditional statistical and neural network methods can be used to analyze quantitative and qualitative data,

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

and specifically, to find relations between human performance factors and the outcomes of military combat.

Statistical Methods Used In Combat Analysis

Arquilla (1992) analyzed historic combat data using logistic regression to identify causal patterns that might explain why some battles are won and some are lost. He found sufficient information from this statistical analysis to support the presence of causal patterns that cannot be attributed to chance.

Arquilla used statistical methods to try to find clues to the faulty human performance and behavior that could be causal for battle wins or losses. He analyzed the skill-based or soft data, such as data on technology and perceptions of power differentials between the combatants. His hypothesis rested on the belief that skill, rather than strength, was the dominant factor in combat, and that the relationship of the battle wins and losses to skill and strength is nonlinear.

Helmbold (1987) analyzed a similar historic database and discovered a relationship between casualty ratios and the probability of which side of a battle would win. The Helmbold approach used logistic regression methods. As such, he believes he has found a fundamental relationship in this historic combat data. However, Helmbold reports that the use of logistic regression is not very robust and is

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

subject to influence by errors in the imperfect database (Helmbold 1987), where the imperfect database contains missing data values.

McQuie (1988) examined a similar historic combat database by categorizing the data from the battle histories. He established standard characteristics, e.g., statistical means, for different data elements and compared them to data generated by computer wargames for any differences. He validated the standard characteristics by determining if they fell within a subjectively acceptable range of values (McQuie 1988).

Allen (1992) explored the use of a similar historic combat database for predicting the results of battles. Allen's methodology was to vary the strength of weapon characteristics as well as soft data elements such as environmental factors, terrain and weather, to calculate combat losses for each weapon. The methodology focused on the synergistic aspects of selected weapons used. He presented an advance in the state of the art in modeling combat situations by accounting for the combined weapons effects, which are frequently absent from combat models that employ single weapon effects (Allen 1992).

Trevor Dupuy is credited with creating the first view of combat causal effects that broke with traditional statistical and combat modeling and simulation viewpoints (Davis 1995). He created a complex analytic model, the Quantified Judgment Model or QJM, that predicted combat

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

outcomes as well as casualties. This break with traditional statistical reasoning used not only the force strength combat data, but also many soft data items, such as morale and surprise of the different forces engaged in combat. However, Dupuy's work was widely ignored and rejected by the military community from the 1970s to the early 1990s (Davis 1995; Davis and Blumenthal 1991). It is Dupuy's database, after being reviewed and authenticated over a 10-year period of time by the United States Army, that is the database for this research. And, whereas Dupuy relied on the analytic statistical models available to create his QJM, this research goes to the next step of using robust neural networks that can account for higher-order interactions.

Helmbold (1987) cautions about examining incredibly complex political and military problems with statistics, which is part of the criticism directed toward Dupuy's work. Similarly, DeWeerd (1979) cautions that evaluating a battle quantitatively is unlikely to produce any causal relations.

Simon (1990) prescribes going beyond the number crunching ability of computerized models, such as those used by Helmbold and Allen. His suggestion is to substitute symbolic data for numeric data, which gets closer to the concept of Dupuy. Kilmer (1995) echoes Simon's (1990) exclamation about the need to go beyond brute force statistical analysis to more intelligent approximations of battles, if progress beyond the limitations of statistical combat modeling is to be reached.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Busse (1971) compared the statistical analysis of Lanchester combat equations to actual combat to show that the equations can fit actual combat, proving a link between battle winners and personnel casualties. This parallels the work of Helmbold. However, Busse cautions that statistical analyses are dependent on the veracity of the historic battle data. But, Dupuy (1983) argued that all data were potentially valuable and integrated the entire database into his analytic model, irrespective of judgments of its veracity.

Goldhamer (1979a) cautions that using history to make simple generalizations that accurately predict battle outcomes is unwise, which takes issue with the work of Arquilla, Helmbold and Dupuy. But, this caution has served as a challenge to the operations research community to continue to experiment with simple generalizations.

Stockfisch (1975) summarizes the state of combat models by indicating that they are of questionable worth, due to the lack of empirical study of historic battles. But, he sees the statistical analysis of historic combat by researchers such as Arquilla and Dupuy as helping bridge the gap between theory and fact with respect to how human performance affects combat. Stockfisch recognizes that there may be different causal relations derived from combat data when many different variables, that are both quantitative and qualitative, are analyzed.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Neural Networks and Combat Analysis

Neural networks are nonlinear computational nodes operating in parallel and formed into a pattern that mimic biological neural networks. These nodes are connected through a weighting algorithm that determines what signal is passed from one node to another. The weights and signals are adaptive due to the recursive process of training a neural network. The result is a network algorithm or model that can react to, or observe, a stimulus and produce an outcome (Lippmann 1991; Nelson and Illingworth 1990).

Within historic combat databases, there is noise that is typical of human factors or human performance databases. This noise tends to limit the analytical value of traditional statistical analyses. But, it is this limitation, the noise within the data, and the difficulty of performing trend analysis, that is a motivating criterion for the use of neural networks. Some analysts indicate there is limited or no value in looking at such raw data with statistical models (McQuie 1988). This may not be valid using neural networks which have demonstrated the ability to examine raw, unfiltered data and find significant, and often new, patterns or causal links in some prediction models (Nelson and Illingworth 1990).

Current research indicates that backpropagation neural networks outperform other neural network algorithms for analyzing complex, uncertain data. For example, there are

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

documented advantages in using neural networks to model combat battles and potentially to replace combat simulations (Kilmer 1995; Kilmer, Smith and Shuman 1994; Launsby and Hallowell 1994; Sharda 1994; Kilmer and Smith 1993; Caudill and Butler 1992; Eldridge 1992).

One negative side of neural networks is the lack of any guarantee of producing a significant causal result. Barto (1993) issues a strong warning that neural network capabilities are currently in the exploratory stage for use in solving nonlinear problems. But, he suggests that one reason neural networks are becoming acceptable to engineers is that they are being applied to a wider class of problems (Barto 1993).

The Bridge Between Statistics and Neural Networks

In 1994, statisticians and neural network researchers began to map interfaces between statistical and neural network perspectives and fundamental principles (Cheng and Titterington 1994a; Kilmer 1994a, 1994b). Neural networks were shown to have a mathematical structure similar to regression (Cheng and Titterington 1994a). For example, Kilmer (1995, 1994a, 1994b) indicates success in using neural networks to approximate the capabilities of combat simulations. He reports that neural networks required fewer assumptions and used noisy, or less precise, data. He also indicated that neural networks have structural similarities

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

with nonlinear least squares regression. Similarly, Eldridge (1992) demonstrated the success of a neural network to learn actual tank routes from battlefield test data and to produce accurate predictions of other tank route decisions made by commanders. And, Sharda (1994) demonstrated that a neural network could outperform human decision makers in predicting the outcome of simulated battles.

A difference between statistical regression methods and neural network methods is the freedom that neural networks offer to look at more data in different ways. A caution is that neural networks may need more input values for training (building) them than statistical regression does (Kilmer 1995; Sharda 1994; Kilmer and Smith 1993; Eldridge 1992). Another difference is that error statistics are not as easily derived from neural networks as they are from traditional statistical regressions (Kilmer, Smith and Shuman 1994).

While the data requirements for neural networks and statistical methods are different, a common problem area for both is the difficulty they encounter when there is a lack of input data (Kilmer and Smith 1993).

Many of the limitations identified and cautions expressed with respect to historic combat database analyses were based on a viewpoint from over a decade ago, when computers were not as powerful as they are today. Thus, the gap between traditional statistical and neural network

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

methods needs further exploration. The bridge between these methods, at this time, does seem to be based on the power of the computer. As such, new statistical methods may develop as new neural network methods are developing.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

CHAPTER 3

METHODOLOGY

This research evaluates and compares the performance of artificial neural networks and statistical approaches for the prediction of combat outcomes based on historical battles. This evaluation requires the specification of the models, a data stratification strategy for building and testing these models, and a logic for assessing the performance of the models.

The experimentation process is divided into six tasks and discussed in the following sections.

Task 1: Planning and Data Collection

The historic combat database used in this research is provided by the United States Army Concepts Analysis Agency. This historic database presents treatment cases for battles and wars. Battles and wars can further be categorized as land or land-sea. The number of battles and wars that comprise the database are 660, spanning a time period of approximately 400 years. Each battle and war has 41 possible variables that describe initial and final battle conditions.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Variables used in this experiment are categorized by two paradigms, both linked to prediction of the winner of the battles or wars. In Paradigm I, following Helmbold's (1987) research, the winners of combat battles and wars are predicted using a ratio of casualties:

$$CR = AC/DC \tag{1}$$

where

CR = casualty ratio,

AC = number of attacker casualties, and

DC = number of defender casualties.

In Paradigm II, following Arquilla's (1992) research, the winners of combat battles and wars are predicted using data which includes soft data, such as human factors, skill, technology, terrain, and tactics, as well as hard data, such as force strength.

Helmbold (1987) and Arquilla (1992) both used logistic regression analysis in their research to determine the combat winners. Therefore, a rationale for the use of logistic regression (LR), or logit, as the traditional statistical method of analysis, is to keep constant what appears as a common analytic tool. LR is also appropriate for this type of analysis since the results can be coded as either a 1 or 0. This 1 and 0 code is needed in the

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

research, since a win for the attacker force is represented with a value of 1, and a loss by the attacker force is represented with a value of 0.

There are over 100 artificial neural network algorithms for different types of problems. In the literature, backpropagation neural networks are shown to be successful in learning pattern recognition and time series analysis for prediction activities and problems. Therefore, a backpropagation neural network (BNN) algorithm was selected as the artificial neural network in this research.

The experimental plan relies on the use of LR and BNN mathematical models for the two paradigms as shown in Table 1. The variable types for the two paradigms have been discussed previously.

The data used to examine each paradigm depicted in Table 1 is categorized into two types relating to the quality of the data. Quality is defined as a degree of battle or war data accuracy and completeness as reported by historians and military analysts. For purposes of this study, the quality of the data sets is defined as either perfect or imperfect.

Imperfect data refers to missing or uncertain data values for a particular battle or war. For example, of the 41 variables that describe a battle, an imperfect battle data set would be one with missing values, such as no value for the defender's number of artillery tubes. Conversely, a perfect battle data set would be one where all 41 variables

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

	Paradigm I: (Casualty Ratio) Hard Data		Paradigm II: (Environment, Force Description, Doctrine and Operations, and Human Factors) Soft and Hard Data	
Model Type	LR	BNN	LR	BNN

Table 1. Experimental Plan Showing Paradigms I and II and Model Types.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

have values, that is, no missing or unknown values. After analysis of the data, it was decided to create three subsets of data as described below:

- Data Set A: Includes 149 conflicts from 1600 to 1812.
- Data Set B: Includes 511 conflicts from 1812 to 1982.
- Data Set C: Includes 660 conflicts from 1600 to 1982 (Data Set A + Data Set B).

The breakpoint of 1812 was chosen based on the increased influence of technology on the battlefield from that time forward (Arquilla 1992; Helmbold 1987). Thus, the 149 conflicts of Data Set A can be considered as conflicts involving low technology. For example, from 1600-1812, horse cavalry was an important factor on the battlefield. The 511 conflicts of Data Set B can be considered as conflicts involving high technology. For example, from 1812-1982, different individual weapons and long range weapons were introduced to the battlefield. Data Set C combines both Data Set A and Data Set B.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

The analysis models, LR and BNN, developed for these three data sets, to be used with Paradigm I and II, are shown in Table 2. The values entered into this table are the percentages of correctly predicted battle winners.

Data Set	LR	BNN	LR	BNN
A	LRA(I)	BNNA(I)	LRA(II)	BNNA(II)
B	LRB(I)	BNNB(I)	LRB(II)	BNNB(II)
C	LRC(I)	BNNC(I)	LRC(II)	BNNC(II)

Table 2. Experiment Design.

Task 2: Determining Statistical Algorithm

The algorithm for LR uses a threshold value (0.5) that when reached produces a value or 1 or 0 as the predicted outcome. This threshold is depicted as the midpoint of the S curve created by LR, which produces a range of values from 0 to 1. Additionally, the LR produces other output parameters – number of data items examined, maximum likelihood estimates, and standard errors, which can be used to determine the statistical significance of the LR results.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

The general form of the logistic function used is the univariate binary case defined by the equation:

$$P(AW) = EXP(a+b*CR)/[1 + EXP(a+b*CR)] \qquad (2)$$

where

P(AW) = probability the attacker wins,

CR = casualty ratio from equation 1,

a = logistic regression intercept,

b = logistic regression slope.

Task 3: Determining Neural Network Structure

Artificial neural networks (ANN) are learning systems which attempt to simulate the process of the human nervous system with the hope of capturing some part of the power of these biological systems. A typical ANN consists of one input layer, one or more hidden or middle layers, and one output layer. Each layer consists of many highly interconnected processing elements or artificial neurons, which mimic the neurons in the nervous system. Each neuron

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

or processing element has multiple paths carrying input signals, and one output path. These are analogous to the dendrites and axons of a human neuron. The signal that travels along each path has a specific weight that represents the outcome of a learning process, similar to the process in human synapses. All input signals are weighted and summed before producing an output signal. This output signal is generated by modifying the weighted sum by an a priori transfer function. The weights on the connections are modified by a learning rule and the procedure is repeated until an acceptable level of performance is achieved. This learning rule is critical in defining how the weights are changed in response to the input-output signal pair (Caudill and Butler 1992; Raghaven and Kanal 1992; Weiss and Kulikowski 1991; Nelson and Illingworth 1990; Sung and Johnson 1990).

There are two steps in designing any ANN. Step one is training. Step two is testing the trained model. There are two types of training. One is supervised, and the other is unsupervised. Supervised training is where the neural network is presented sets of input and desired output pairs for each treatment case. In this research, inputs are variables such as casualty ratio, and the output is whether or not the attacker won. An ANN is presented a series of such battles with their known outputs.

Unsupervised training is performed by presenting the input signal pattern only. The output is not presented.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

When an ANN is trained, it is ready to be tested. This is where the network uses learned responses about the input data to predict an output. The test data consists of different inputs, such as battles, that the network has never seen.

The first step in using an ANN begins with defining the architecture of the network. The input layer consists of a processing element or node for each input variable. The output node for this study is whether the attacker won or lost.

All layers are fully connected to each adjacent layer. That is, all input layer nodes are connected to all nodes in the hidden layer. All hidden layer nodes are fully connected to the single output node.

The issue with any ANN is how many hidden layers to use and how many nodes are needed for each of those hidden layers. The number of hidden layers is determined by trial and error. The number of nodes in each hidden layer can be determined by the heuristic rule of de Villiers and Barnard (1992):

$$N = \sqrt{(I * O)} \qquad (3)$$

where

N = number of hidden nodes per layer,

I = number of input nodes, and

O = number of output nodes.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Task 4: Experiment Performance Criteria

Table 3 shows Paradigm I experiments (hard, casualty input data) and forms the basis of development of the performance criteria for analysis. The values for LRA(I), for example would be the percentage of accurate predictions of the winners of the combat situations for logistic regression, for Data Set A, for Paradigm I. Similarly, percentage values would fill the remainder of the table. A similar set of experimental designs is shown for Paradigm II data in Table 4.

Each of the 12 experiments from Tables 3 and 4 is analyzed for all three data sets. Each data set is further analyzed with the two additional categories of perfect and imperfect data. Thus, there is a total of 24 experiments for the study as shown in Table 5, with 6 experimental cells for perfect data and 6 for imperfect data for each model.

Task 5: Analysis of Experimental Results

The results of the LR and ANN models with the perfect and imperfect data sets A, B and C are analyzed according to percentage of accurate predictions. The key performance statistic for comparing LR and ANN for perfect and imperfect data is the percentage of correct predictions, to be displayed in Tables 6, 7 and 8. However, before final interpretation of the percentage of accurate predictions is

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Data Set	Regression Model (LR)	Neural Network Model (BNN)
A	LRA(I)	BNNA(I)
B	LRB(I)	BNNB(I)
C	LRC(I)	BNNC(I)

Table 3. Experiments for Paradigm I.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Data Set	Regression Model (LR)	Neural Network Model (BNN)
A	LRA(II)	BNNA(II)
B	LRB(II)	BNNB(II)
C	LRC(II)	BNNC(II)

Table 4. Experiments for Paradigm II.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Data Set	Regression Model (LR)	Neural Network Model (BNN)
A	LRA(I)	BNNA(I)
B	LRB(I)	BNNB(I)
C	LRC(I)	BNNC(I)
A	LRA(II)	BNNA(II)
B	LRB(II)	BNNB(II)
C	LRC(II)	BNNC(II)

Table 5. Summary of Experiment Design.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Perfect versus Imperfect
LRA(II)P : LRA(II)IP
LRB(II)P : LRB(II)IP
LRC(II)P : LRC(II)IP

Table 6. Evaluation Chart for Satisfying the Problem Statement.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Perfect versus Imperfect
LRA(II)P : LRA(II)IP
LRB(II)P : LRB(II)IP
LRC(II)P : LRC(II)IP
BNNA(II)P : BNNA(II)IP
BNNB(II)P : BNNB(II)IP
BNNC(II)P : BNNC(II)IP

Table 7. Evaluation Chart for Satisfying Hypothesis One.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Paradigm I versus Paradigm II
LRA(I)P : LRA(II)P
LRB(I)P : LRB(II)P
LRC(I)P : LRC(II)P
BNNA(I)IP : BNNA(II)IP
BNNB(I)IP : BNNB(II)IP
BNNC(I)IP : BNNC(II)IP

Table 8. Evaluation Chart for Satisfying Hypothesis Two.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

complete, the statistical significance of those results will be determined using the Chi-Square test.

The criteria used to determine whether or not a military battle or conflict was won by the attacking force or the defending force were selected by historians, and are part of the data values in the database. Their judgments are accepted and are not part of these experiments. However, Dupuy is recognized as the authoritative source for the decision criteria used to determine winners within the database used for these experiments, having evaluated each battle and war for more than 40 years (Davis 1995). Also, the winner value was verified by an independent historical review conducted by the Concepts Analysis Agency, over a 10-year period (Helmbold 1987). Therefore, for these experiments, no a priori judgments are made about winners or losers. However, the statistical and neural network models used in these experiments both use a threshold value of 0.5 to determine whether or not the dependent variable should be posted as a winner for the attacker or defender. That is, if the dependent variable is calculated as a value that is $\geq$ 0.5, the battle is considered a win for the attacker. If the variable is calculated as < 0.5, the battle is considered a win for the defender.

If any battle outcome is changed in any future review of this database, the results of these experiments would be suspect, requiring all models to be redeveloped. Likewise, if any new battles were added to this database, of if any

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

new weapon system effects were added to an existing battle, the results of these experiments would again be suspect, requiring all models to be redeveloped. Any such change in input or output variable values changes the causal relation between those variables.

Task 6: Evaluation and Validation

Evaluation is based on determining whether the problem statement is addressed and whether the tests of hypotheses produce useful results. The models are compared for application to Paradigm I and Paradigm II, and to perfect and imperfect stratified data sets. The results are validated by Chi-Square tests of significance at the alpha = .05 confidence level.

Resource Needs for the Experiments

The use of a neural network shell, Neuralyst™, was used for the actual development. The database was created using Excel™ spreadsheet software. The computer hardware was a Macintosh system.

For the logistic regression, SAS™ was used for actual development. The SAS™ database was created from the same Excel™ spreadsheet as used for the neural network analysis. The computer hardware was a Sun Sparc system.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

CHAPTER 4

EXPERIMENTATION

The first step in the experimentation process was data modeling, which examined the data elements and values within the database. The second step analyzed the data through the LR method. The third step analyzed the data through the BNN method.

There were five tasks required for the data modeling in this study. They involved the development and coding of the data as required by the LR model: data taxonomy, ratio scales, nominal scales, ordinal scales and interval scales. The degree of detail needed in the data modeling process for LR is not needed for neural networks, which is one of the differences between the BNN and LR methods.

Data Taxonomy

The taxonomy begins by understanding that this database involves information that spans approximately 400 years of combat situations, and is described by 660 of these situations. The database was developed by Army historians with each of the more than 27,000 data items analyzed and

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

verified over a 10-year period of time by the U.S. Army Concepts Analysis Agency. Thus, it is one of the authoritative sources of unclassified data on military conflicts.

The data taxonomy classifies data into four types: environment, doctrine and operations, force description, and human factors, which is shown in Table 9, along with the different data variable names. The environmental classification is for data that represent different characteristics or features of the terrain, natural atmospheric conditions, and any man-made conditions. The force description classification is for data that represent the organization of military units, such as personnel and equipment, that reflect command and control relationships and associated performance measures. The doctrine and operations classification is for data that describe the military tactics or doctrine (i.e., how to fight) used by the military forces. Human factors data represent the interaction of the personnel with the environment, the equipment within the force description, and the tactics and doctrine.

For purposes of clarification of language, throughout the remainder of this document, this military combat data will continue to be referred to as "the data," whether the intent is to describe the whole database of 660 combat situations, or any subset of the 660, or other characteristics of the data.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Data Classification	Data Variable Name
Environment	• Terrain • Weather • 1st Width of Front
Force Description	• Total Personnel Strength • Initial Personnel Strength • Horse Cavalry • Total Tanks • Lite Tanks • Artillery Tubes • Close Air Support • Win or Loss • Casualties
Doctrine and Operations	• Defensive Posture • Defender's Primary Defense • Attacker's Primary Tactics • Defender's Primary Tactics

Table 9. Taxonomy for Military Conflict Database.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Table 9 Continued.

Data Classification	Data Variable Name
Human Factors	• Relative Combat Effectiveness • Relative Leadership Advantage • Relative Training Advantage • Relative Morale Advantage • Relative Logistics Advantage • Relative Momentum Advantage • Relative Intelligence Advantage • Relative Technology Advantage • Relative Initiative Advantage • Attacker's Surprise

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Data Coding: Ratio Scale

Data coding involves examining the original 41 data variables to determine how best to define and measure variables. The original data was coded as values belonging to either the attacker or defender force. In some cases, however, there are data pairs, such as the 1st width of the front for the attacker and the 1st width of the front for the defender, that can be combined to form a ratio variable by dividing the attacker value by that of the defender value. The result is a new variable that is coded to represent both the attacker and defender. A survey of the data indicated 20 variables that could be coded as ratios, creating 10 new ratio variables. These 10 ratio variables are listed in Table 10.

The 10 variables in Table 10 are scaled as positive ratio values, with high scores indicating attacker advantage, and low scores indicating defender advantage.

The heuristic rule or equation followed was:

$$\text{INPUT \#1} = \text{ATK1ST/DEF1ST} \tag{4}$$

where INPUT #1 = attacker and defender 1st Width of Front,

ATK1ST = the attacker 1st Width of Front, and

DEF1ST = the defender 1st Width of Front.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

- 1st Width of Front of the Attacker and Defender
- Total Personnel Strength of the Attacker and Defender
- Initial Personnel Strength of the Attacker and Defender
- Horse Cavalry of the Attacker and Defender
- Total Tanks of the Attacker and Defender
- Lite Tanks of the Attacker and Defender
- Main Battle Tanks of the Attacker and Defender
- Artillery Tubes of the Attacker and Defender
- Close Air Support of the Attacker and Defender
- Casualties of the Attacker and Defender

Table 10. Data Variables Coded as Ratios.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Some original data values have a value of -1. For the 1st Width of Front, this indicates that it was an unknown data value. Thus, creating ratios with equation 4, when one or both of the numerator or denominator could be -1, needed further analysis. Therefore, the equation 4 for the final coding of the 1st Width of Front data element is:

IF ATK1ST >0 AND DEF1ST >0, then (5)
INPUT #1 = ATK1ST/DEF1ST, or

IF DEF1ST = -1, then
INPUT #1 = 0,

where DEF1ST = -1 = an unknown value,

and, IF ATK1ST = -1 AND DEF1ST = -1,
INPUT #1 = -1,

where ATK1ST = DEF1ST = -1 = both are unknown.

With this specific variable, there were no cases where both the attacker 1st Width of Front was unknown and the defender known. A sample of the data for the 1st Width of Front variable, labeled as Input #1, with nine of the treatment cases from the total database, is shown in Table 11. This table shows the two original data values for the attacker (i.e., ATK1ST) and defender (i.e., DEF1ST), and the ratio of ATK1ST to DEF1ST, which produced Input #1.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INPUT #1	ATK1ST	DEF1ST
1ST	1ST	1ST
WIDTH	WIDTH OF	WIDTH OF
FRONT	FRONT	FRONT
ATK/DEF RATIO	ATTACKER (ATK)	DEFENDER (DEF)
0.916667	4.4	4.8
1.000000	0.9	0.9
1.000000	1.5	1.5
1.321429	3.7	2.8
-1.000000	-1.0	-1.0
-1.000000	-1.0	-1.0
0.888889	3.2	3.6
0.000000	39.0	-1.0
0.851852	2.3	2.7

Table 11. Data Coding for 1st Width of Front.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

For the 660 treatment cases of the 1st Width of Front variable, there are 13 cases of the attacker and defender having -1 values, and 30 cases of 0 values. Thus, approximately 6.5% of the 1st Width of Front data can be considered as imperfect. All other positive values are defined as perfect data.

In general, when using LR, as implemented by SAS™, an imperfect data value causes the entire treatment case to be eliminated during creation of the logistic regression model. This feature of LR occurs for the ratio coded data and any other coded data. Thus, in Table 11, this means that, of these nine sample treatment cases, the two data values under Input #1 with data values of -1 would be eliminated. The values of 0, although also imperfect, would be used by LR, since zero is a positive value.

When creating the perfect data sets, the 0 and -1 values for this data variable, shown in Table 11, were both transformed. This process involved calculating the mean from the positive variable data and replacing the values of -1 and 0 with this mean value. This method places the unknown case values within the range of values of the total population. In the example of the variable 1st Width of Front, where only 6.5% of the values are unknown, the impact on the regression should be minimal. This process of replacing the unknowns with the mean value of a variable became the general rule for creating perfect data. This does not, however, preclude the use of the earlier imperfect

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

coded data set in neural network modeling. In fact, one of the strengths of the neural network methodology is that it processes such data, whereas regression models would not process much of that data.

A similar coding process was completed on the other data variables shown in Table 10. The final data coding for the ratio variables is shown in Table 12. Appendix A contains the complete listing of these and all coded variables.

Table 12 indicates the degree of complexity of coding the data into useful ratio scales. The degree of uncertainty or unknown values within these 10 ratio variables is approximately 38%. Of course, a significant number of the unknowns come from variables that were not recorded or relevant for the entire 400 years – for example, horse cavalry, tanks and close air support. For these variables, decisions have to be made on their use within the statistical regression and neural network models, which is described later.

Data Coding: Nominal Scale

There are nine data variables that have nominal or symbolic values. The data coding for the three variables of the Defender's Primary Tactics are described here.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Variable Name	Code and Value	Name in Appendix A
• 1st Width of Front	>1.0 = Attacker Advantage <1.0 = Defender Advantage -1 = Uncertainty For Both 0 = Defender Uncertainty	Input #1
• Total Personnel Strength	>1.0 = Attacker Advantage <1.0 = Defender Advantage	Input #7
• Initial Personnel Strength	>1.0 = Attacker Advantage <1.0 = Defender Advantage -1 = Uncertainty For Both 0 = Uncertainty For Either	Input #8
• Horse Cavalry	>1.0 = Attacker Advantage <1.0 = Defender Advantage -1 = Uncertainty For Both 0 = Uncertainty For Either -9 = Information Missing For Both	Input #9

Table 12. Coding Scheme for Attacker to Defender Ratio Variables.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Table 12 Continued.

Variable Name	Code and Value	Name in Appendix A
• Total Tanks	>1.0 = Attacker Advantage <1.0 = Defender Advantage -1 = Uncertainty For Both 0 = Uncertainty For Either -9 = Information Missing For Both 9 = Attacker Known, but Defender 0 0.1 = Attacker 0, Defender Known	Input #10
• Lite Tanks	Same as Input #10	Input #11
• Main Battle Tanks	Same as Input #10	Input #12
• Artillery Tubes	Same as Input #10	Input #13
• Close Air Support	Same as Input #10	Input #14
• Casualties	>1 = Defender Advantage <1 = Attacker Advantage -1 = Uncertainty For Both 0 = Uncertainty For Either	Input #30

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Each variable has a symbolic code to describe the tactic, such as:

DE = feint or a holding attack

EE = single envelopment

FF = frontal attack

PP = penetration

00 = unknown

0 = also unknown

There are 13 such symbolic codes for all the variables that describe the defender's and attacker's tactics. An example of the amount of variation in this data for Defender's Primary Tactics #2 is shown in Table 13.

As shown in Table 13, 63.8% of the information on this second part of three parts of the defender's tactical plan of operations is unknown. However, the known values need to be coded into numeric values for use in the statistical regression model. Therefore, a coding method had to be devised. One method would be to code the five symbolic values as five new variables, given that 00 and 0 are combined, and where each of these variables would be a 0,1 variable. Another method would be to have a five-valued variable.

Rather than increase the number of variables, and in order to reduce the number of values to be included in the analysis, a grouping scheme was devised. It appears in Table 14, where each value is coded such that the lowest

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Symbolic Value	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	392	59.4	392	59.4
00	29	4.4	421	63.8
DE	19	2.9	440	66.7
EE	24	3.6	464	70.3
FF	195	29.5	659	99.8
PP	1	0.2	660	100.0

Table 13. Frequencies of Symbolic Values for Defender's Primary Tactics #2.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Symbolic Value	Combined Frequency	Code and Value
• 0 and 00	421	0 and 00 = 2
• FF	195	FF = 1
• All Others	44	Others = 0

Table 14. Coding Scheme for the Nominal Valued Variable Defender's Primary Tactics #2.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

frequency value is a 0, the next is a 1, and so forth. A similar coding methodology was used for the other nominal or symbolic valued variables. The complete frequency tables for all nine variables is in Appendix B. The complete coding scheme for these nominal values is shown in Table 15.

For the eight input variables in Table 15, approximately 24% of the coded data have unknown values.

The Output #1 is the dependent variable to be used for both the statistical regression modeling and neural network modeling. The original data was coded +1, -1, 0, and "-9". The +1 symbolized the attacker force winning the conflict. The -1 indicated the attacker lost. The 0 indicated either a tie or unknown outcome; the "-9" was the coding for this type of variable. For coding these variables into the two values of 1 or 0, the tied conditions were treated as if the defender won. A tied condition is considered a case where the attacker did not succeed. Therefore, the advantage goes to the defender. Only about 6% of the conflicts are recorded as a tie condition. Therefore, it was assumed the values of the regression coefficients or the weights in the neural networks would be relatively unaffected if these ties were treated differently, i.e., either ignored or an attacker win (Helmbold 1987). The two cases of uncertainty were likewise coded as a defender win. This coding is supported by previous coding experience with this and similar military data (Helmbold 1987). The final coding for Output #1 was that the +1 became the 1, and the 0, -1 and

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Variable Name	Code and Value	Name in Appendix A
• Terrain	RMO = 2 GMO = 1 Others = 0	Input #4
• Weather	DSTT = 3 DSHT = 2 WLTT = 1 Others = 0	Input #5
• Attacker's Primary Tactics #1	FF = 1 Others = 0	Input #24
• Attacker's Primary Tactics #2	0 and 00 = 2 EE = 1 Others = 0	Input #25
• Attacker's Primary Tactics #3	0 and 00 = 1 Others = 0	Input #26
• Defender's Primary Tactics #1	DD = 2 DO = 1 Others = 0	Input #27
• Defender's Primary Tactics #2	0 and 00 = 2 FF = 1 Others = 0	Input #28
• Defender's Primary Tactics #3	0 and 00 = 1 Others = 0	Input #29
• Win or Loss for Attacker	Win = 1 Loss = 0	Output #1

Table 15. Coding Scheme for Nominal Valued Variables.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

-9 became the 0. Thus, we have only two conditions, of attacker wins (value 1) and attacker loses (value 0).

Data Coding: Ordinal Scale

There are 10 variables measured on an ordinal scale. The values range from +4 to -4, as well as the -9 value for unknown information. This scale is depicted in Table 16. Like the ratio scaled variables, these ordinal variables also contain linked information about the attacker and defender, and thus are expected to be strong variables to help explain the complexity of combat. The variables that use this ordinal scale are shown in Table 17.

There are approximately 5% of these 10 ordinal variables that contain -9 values indicating unknown information about the variable. From a statistical viewpoint, this small percentage of uncertainty in this subset of the total population is considered not to have a significant impact on the prediction models. Therefore, for ease of computation, the -9 values were recoded as 0's, which are the midpoint values in the scale range.

Data Coding: Interval Scale

It was decided to code two variables on interval scales, although the logic of this could be debated. These variables are considered inherently different from the other tactical variables coded on nominal scales. These are

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

- +4 = Attacker is Very Strongly Favored
- +3 = Attacker is Strongly Favored
- +2 = Attacker is Favored
- +1 = Attacker is Somewhat Favored
- 0 = Neither Attacker nor Defender is Favored
- -1 = Defender is Somewhat Favored
- -2 = Defender is Favored
- -3 = Defender is Strongly Favored
- -4 = Defender is Very Strongly Favored
- -9 = Unknown Information

Table 16. Coding Scheme for Ordinal Valued Variables.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Variable Name	Name in Appendix A
• Attacker's Surprise Over Defender's Awareness	Input #6
• Relative Combat Effectiveness of Attacker and Defender	Input #15
• Relative Leadership Advantage of Attacker and Defender	Input #16
• Relative Training Advantage of Attacker and Defender	Input #17
• Relative Morale Advantage of Attacker and Defender	Input #18
• Relative Logistics Advantage of Attacker and Defender	Input #19
• Relative Momentum Advantage of Attacker and Defender	Input #20
• Relative Intelligence Advantage of Attacker and Defender	Input #21
• Relative Technology Advantage of Attacker and Defender	Input #22
• Relative Initiative Advantage of Attacker and Defender	Input #23

Table 17. Variable Names for Ordinal Variables.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

the Defensive Posture Type (number of types) and the Defender's Primary Defensive Posture Type. Table 18 shows the coding scheme for these variables.

For the Defensive Posture Type, all values are positive. The uncertain or unknown information is coded as a 3, which assumes more than one posture type. Similarly, for Defender's Primary Defensive Posture Type, the codes are positive, but with a value of -1 for uncertain or missing information. The number of these interval variables that have unknown values was approximately 0.1%. Therefore, it was assumed that the value can be ignored or replaced with the value of the population mean, without introducing significant error.

Treatment Case Data Sets

Paradigms I and II prescribe the kinds of treatment case data sets to analyze. Both paradigms use the Output #1 variable, the attacker win or loss of the military conflict, as the dependent variable. However, Paradigm I uses Input #30, the attacker and defender casualty ratio, as the input or independent variable. Paradigm II uses the range of input variables #1 to #29.

Paradigm I assumes that predicting combat winners can be based on casualty ratios, the outcome of the combat situation. This method ignores all other factors that

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Variable Name	Code and Value	Name in Appendix A
• Defensive Posture Type	0 = 1 Defensive Posture Type 1 = 2 Distinct Defensive Posture Types 2 = >2 Averaged Defensive Posture Types 3 = >1 Defensive Posture Type With Unknowns	Input #2
• Defender's Primary Defensive Posture Type	0 = Hasty Defense 1 = Prepared Defense 2 = Fortified Defense 3 = Delaying Action 4 = Withdrawal -1 = Unknown	Input #3

Table 18. Coding Scheme for Interval Valued Variables.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

preceded the conflict or that took place during the process of battle. Thus, Paradigm I attempts to combine the effects of all input factors, along with their noise and uncertainty, into one outcome variable.

Paradigm II assumes that predicting combat winners can be based on the input conditions of the combat situations. This method takes into account factors leading to the operational planning before combat begins and integrates these factors, along with their inherent noise and uncertainty, into a hypercomplex relationship that reflects the social structure and human aspects of military combat. Whereas Paradigm I forces the complexity of combat into one variable, Paradigm II uses 29 variables. These are shown in Table 19.

Paradigm	Output Variable	Input Variables
I	Output #1	Input #30
II	Output #1	Input #1 to 29

Table 19. Variables for Two Paradigms.

Besides the data sets that support the two paradigms I and II, data sets are also categorized as perfect or imperfect. The perfect data, as described in earlier

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

sections of this document, are those data elements that have been modified to filter the uncertain or unknown values within the database. This modification replaces uncertain or unknown values with mean or midpoint values. The imperfect category is for unmodified data. That is, they contain the indicators of uncertainty, such as -1 or -9.

Additionally, according to historians and analysts of similar historical combat data, there is a natural break point within this 400 years of combat. This occurs around the 1812-1815 time period. This is the time when technology began changing the doctrine and operations of military combat (Arquilla 1992). This led to a stratification of the 660 combat situations into three subsets. The Data Set A, for pre-1812 conflicts, contains 149 treatment cases. The Data Set B, for post-1812 conflicts, contains 511 treatment cases. The Data Set C, for 1500-1982, contains all 660 treatment cases. The overall stratification of the database is presented in Tables 20 and 21.

Summary

Data modeling is a first step in preparing a database for the application of analysis tools. The process of using statistical regression methods forces the analyst to understand each data element and its possible impact on the results from such analysis. This is due to the limitations of statistical regression when applied to highly variable,

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Paradigm	Perfect	Imperfect
I	% LR and BNN	% LR and BNN
II	% LR and BNN	% LR and BNN

Table 20. Contingency Table for Comparing Paradigms I and II with Perfect and Imperfect Data.

Data Set	Perfect	Imperfect
A	% LR and BNN	% LR and BNN
B	% LR and BNN	% LR and BNN
C	% LR and BNN	% LR and BNN

Table 21. Contingency Table for Comparing Data Sets A, B, and C with Perfect and Imperfect Data.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

suspect or imperfect data. On the other hand, the neural network modeling approach does not need such detailed data modeling.

Statistical Modeling

The statistical model for this research is logistic regression. LR or logit is very similar to other regression methods. However, logit or LR can be used to generate a binary dependent variable (Y). Thus, from the perspective of combat where the predicted output is the attacking force's win (1) or loss (0), LR seems appropriate. The classic linear-logistic model to predict some binary or dichotomous variable, such as a combat win or loss, is:

$$P(Y = y_1) = 1/[1+EXP[-(B_0+B_1X_1+B_2X_2+...+B_nX_n)] \quad (6)$$

where

Y1 = the predicted output value of 1,

X_i = the input variables, for i = 1...n,

B_j = the logistic regression coefficients,

for j = 0...n, and,

$$P(Y = y_2) = 1 - P(Y = y_1) \quad (7)$$

where Y2 = the predicted output value of 0.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

This model is usually transformed into the logit equation, which calculates log-odds ratio as follows:

$$\text{Log}_e\,[P(Y = y_1)/P(Y = y_2)] = B_0+B_1X_1+B_2X_2+\ldots+B_nX_n \qquad (8)$$

The above equations 6, 7 and 8 are described in statistics textbooks (Hosmer and Lemeshow 1989; Aldrich and Nelson 1984). And, while other methods such as multiple regression and discriminant analysis have been used for binary or dichotomous output, logistic regression is the one that seems best for such output. The other methods suffer from assumptions of normality of the data. This set of combat data is known for its non-normality (McQuie 1988). As such, the logistic regression handles data that is non-normal, and that has non-constant variance. Therefore, there are several reasons why logistic regression was chosen as the model to compare with neural networks. The rationale can also be seen when a logistic function is graphed, which shows an elongated S curve shape, or sigmoid, as shown in Figure 1, where the calculated dependent variable (Y) is between 1 (a win) and 0 (a loss).

As seen in Figure 1, the calculated value, Y, tends to increase as the values of the dependent variables, X_i, increase. Whether there is one variable or 29 variables, the X_i describe the conditions for an attacker or defender win. For the left side of the curve in Figure 1, the defender wins with certainty. As we move to the right,

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

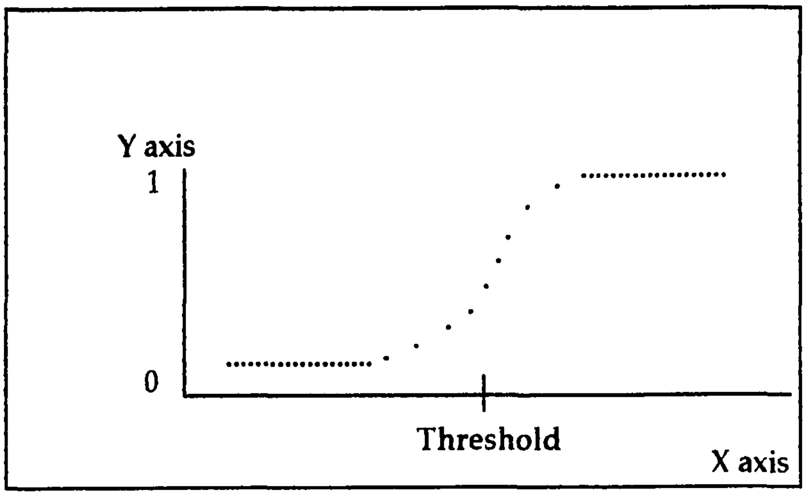


Figure 1. The Logistic Function.

uncertainty is introduced with respect to whether the defender wins or not, but the probability is still higher for a defender win. When the threshold value is exceeded, the odds shift to the attacker and increase as we move further to the right until the curve levels off, at which point the attacker wins with certainty (Arquilla 1992; Aldrich and Nelson 1984).

The logistic model used in this research was developed with SAS™, which places certain demands on the data. For example, logit produces dichotomous dependent variable values of 1 and 0. For the independent variables, logit is structured to accept ratio, ordinal, nominal and interval data. Thus, the coding scheme presented earlier was needed to support logit.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Following a review of the data sets for acceptable numeric values for logit, the sequence was to analyze the simpler data set for Paradigm I, followed by the larger, more complex data set for Paradigm II.

The statistical modeling using logit, then, began with Paradigm I, with the perfect database, where there is only one input variable, the ratio of casualties. Of the 660 combat situations, only five cases had any uncertainty. Therefore, the amount of imperfect data contributed approximately 0.7% to the overall population. As it turned out, the results for the perfect and imperfect databases were identical. These are presented in Table 22. The intercepts and coefficients were -0.0217, -4.8776; -0.3151, -2.6418; 0.5890, -0.5372. While it does not appear that the logit method for analyzing this single variable contributes

Data Sets	Logit
A	55%
B	55%
C	55%

Table 22. Logit Results for Paradigm I.

much to meaningful understanding of the combat data, further statistical analysis was conducted and is presented in Chapter 5. The equivalence of the results for the three

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

data sets is interesting from a theoretical standpoint, and could be part of a future analysis for different stratifications of the database.

Helmbold (1987) reported logistic regression results of 72% accuracy from what would be Data Set B. However, he excluded a significant number of battles that were judged by him to have uncertain conclusions as to which side won.

The next step was to examine Paradigm II data. The experiment began with Paradigm II for Data Set A, using the imperfect data model. Data Set A contained the 149 cases from 1600 to 1812. The imperfect or unknown data values were all used. The logit eliminated variables that it determined were redundant, or for which the values indicated their irrelevance. The variables that were affected were the ratio variables of Total Tanks, Lite Tanks, Main Battle Tanks, and Close Air Support, and the nominal variable Defender's Primary Tactics #1. This automatic transformation of the variables indicates the power of the logit not to be placed in a position of processing data that should not be there. It can be argued, for example, that the variables representing tanks and close air support were not available during the time 1600-1812. However, this a priori knowledge was not used to alter the data in this experiment. These out-of-time variables were part of the population of variables that contributed to the imperfect nature of the data model.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

The results of the logit are shown in Table 23. The prediction accuracy for the values in Table 23 are 94.6% concordant, 3.1% discordant, 2.3% tied. The most influential variables from the Chi-Square, at the alpha = 0.05 level of significance, appear to be Relative Leadership Advantage (Input #16), Relative Combat Effectiveness Advantage (Input #15), and Relative Intelligence Advantage (Input #21). However, care must be taken in considering the results from the Chi-Square with the nonlinear data, as it can be misleading. It assumes that the variables are independent and that there are no higher-order relationships of significance.

The next analysis, for Paradigm II, Data Set B, with imperfect data, is of the post-1812 data, containing 511 cases. The results are shown at Table 24. The prediction accuracies for the values in Table 24 are 83.5% concordant, 16.4% discordant, and 0.1% tied. Chi-Square indicates that the key variables could be Attacker Surprise Over Posture Awareness (Input #6), Relative Leadership (Input #16), Relative Morale (Input #18), and Relative Technology (Input #22).

For Paradigm II, Data Set C, with imperfect data, the results for examining the entire database with logit are shown in Table 25. The prediction accuracies are 85.4% concordant, 14.5% discordant, and 0.1% tied. The key variables estimated from Chi-Square appear to be Attacker Surprise Over Posture Awareness (Input #6), Artillery Tubes

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Variable	DF	Para. Estimate	Standard Error	Wald Chi-Sq.	Pr>Chi-Sq.	Std. Estimate	Odds Ratio
Intercept	1	6.7768	5.4515	1.5453	0.2138	.	877.280
Input #1	1	0.5885	1.0351	0.3232	0.5697	0.24925	1.801
Input #2	1	0.1973	0.9450	0.0436	0.8346	0.04794	1.218
Input #3	1	0.3982	0.7539	0.2791	0.5973	0.10069	1.489
Input #4	1	-0.0310	0.5444	0.0032	0.9546	-0.01236	0.969
Input #5	1	-0.5650	0.3475	2.6432	0.1040	-0.33779	0.568
Input #6	1	-0.1813	0.6051	0.0898	0.7645	-0.09339	0.834
Input #7	1	-1.7401	1.1912	2.1340	0.1441	-1.44819	0.175
Input #8	1	1.2021	1.1706	1.0546	0.3045	1.30805	3.327
Input #9	1	-0.0608	0.1448	0.1762	0.6747	-0.08079	0.941
Input #10	0	0	0	0	0	0	0
Input #11	0	0	0	0	0	0	0
Input #12	0	0	0	0	0	0	0
Input #13	1	0.0301	0.2109	0.0204	0.8864	0.03224	1.031
Input #14	0	0	0	0	0	0	0
Input #15	1	-2.9123	1.4217	4.1963	0.0405	-1.08284	0.054
Input #16	1	-2.7806	0.6125	20.6107	0.0001	-1.50015	0.062
Input #17	1	-0.4740	1.1651	0.1655	0.6841	-0.16217	0.622
Input #18	1	-3.9377	1.7723	4.9365	0.0263	-0.63523	0.019
Input #19	1	-6.8876	5.8981	1.3637	0.2429	-0.62428	0.001
Input #20	1	-1.5413	1.3971	1.2172	0.2699	-0.29491	0.214
Input #21	1	-2.0484	0.9027	5.1495	0.0233	-0.73118	0.129
Input #22	1	-41.8068	5.3246E9	0.0000	1.0000	-3.27794	0.000
Input #23	1	-1.6584	1.8462	1.0254	0.2015	-0.31575	0.2351
Input #24	1	-0.8850	1.9355	0.2091	0.6475	-0.17688	0.413
Input #25	1	0.3315	0.9585	0.1196	0.7294	0.14193	1.393
Input #26	1	-1.3224	1.6461	0.6454	0.4218	-0.23841	0.266
Input #27	0	0	0	0	0	0	0
Input #28	1	0.1712	0.7782	0.0484	0.8259	0.06319	1.187
Input #29	1	-0.6224	1.4557	0.1828	0.6690	-0.09002	0.537

Table 23. Logit Analysis for Paradigm II, for Data Set A with Imperfect Data.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Variable	DF	Para. Estimate	Standard Error	Wald Chi-Sq.	Pr>Chi-Sq.	Std. Estimate	Odds Ratio
Intercept	1	-7.3811	4.0059	3.3950	0.0654	.	0.001
Input #1	1	0.2271	0.4652	0.2384	0.6254	0.04993	1.255
Input #2	1	-0.0909	0.1740	0.2734	0.6011	-0.04902	0.913
Input #3	1	-0.0870	0.1434	0.3679	0.5441	-0.04509	0.917
Input #4	1	0.0040	0.0129	0.0010	0.9752	0.00205	1.004
Input #5	1	0.0290	0.0969	0.0896	0.7647	0.02078	1.029
Input #6	1	-0.4322	0.1544	7.8393	0.0051	-0.21299	0.649
Input #7	1	-0.1643	0.1173	1.9618	0.1613	-0.19419	0.848
Input #8	1	-0.0038	0.0867	0.0020	0.9645	-0.00543	0.996
Input #9	1	-0.0293	0.0450	0.4255	0.5142	-0.05831	0.971
Input #10	1	-0.0606	0.0415	2.1272	0.1447	-0.24098	0.941
Input #11	1	0.0107	0.0224	0.2299	0.6316	0.04388	1.011
Input #12	1	0.0078	0.0447	0.0307	0.8609	0.02856	1.008
Input #13	1	-0.0947	0.0473	4.0160	0.0451	-0.25708	0.910
Input #14	1	-0.0113	0.0178	0.4071	0.5235	-0.04687	0.989
Input #15	1	-0.5544	0.3121	3.1545	0.0757	-0.73303	0.574
Input #16	1	-1.5211	0.2671	32.4389	0.0001	-2.01132	0.218
Input #17	1	0.6038	0.3083	3.8353	0.0502	0.79001	1.829
Input #18	1	-0.7865	0.2535	9.6210	0.0019	-1.05222	0.455
Input #19	1	-0.2158	0.3119	0.4786	0.4890	-0.27854	0.806
Input #20	1	-0.1258	0.2705	0.2161	0.6420	-0.16520	0.882
Input #21	1	-0.3524	0.3114	1.2804	0.2578	-0.45621	0.703
Input #22	1	2.6399	0.4362	36.6231	0.0001	3.35963	14.012
Input #23	1	-0.1305	0.2948	0.7268	0.7592	-0.19820	0.957
Input #24	1	0.3637	0.3609	1.0155	0.3136	0.07022	1.439
Input #25	1	0.2027	0.1775	1.3042	0.2535	0.08442	1.225
Input #26	1	0.4768	0.3959	1.4507	0.2284	0.08409	1.611
Input #27	1	3.0852	1.8365	2.8221	0.0930	0.44670	21.872
Input #28	1	-0.2726	0.2255	1.4610	0.2268	-0.08904	0.761
Input #29	1	-0.0108	0.6957	0.0002	0.9876	-0.00112	0.989

Table 24. Logit Analysis for Paradigm II, for Data Set B with Imperfect Data.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Variable	DF	Para. Estimate	Standard Error	Wald Chi-Sq.	Pr>Chi-Sq.	Std. Estimate	Odds Ratio
Intercept	1	-8.5906	4.0721	4.4505	0.0349	0	0.000
Input #1	1	0.4867	0.3116	2.4406	0.1182	0.13424	1.627
Input #2	1	-0.1208	0.1683	0.5153	0.4729	-0.05968	0.886
Input #3	1	-0.0602	0.1372	0.1924	0.6610	-0.03084	0.942
Input #4	1	-0.0560	0.1205	0.2159	0.6422	-0.02836	0.946
Input #5	1	-0.0552	0.0888	0.3864	0.5342	-0.03905	0.946
Input #6	1	-0.4448	0.1435	9.6073	0.0019	-0.22152	0.641
Input #7	1	-0.2193	0.1097	3.9923	0.0457	-0.24936	0.803
Input #8	1	0.0508	0.0814	0.3899	0.5323	0.06839	1.052
Input #9	1	-0.0607	0.0355	2.9188	0.0876	-0.15645	0.941
Input #10	1	-0.0686	0.0415	2.7236	0.0989	0.27397	0.934
Input #11	1	0.0119	0.0224	0.2825	.05951	0.04658	1.012
Input #12	1	0.0083	0.0443	0.0357	0.8501	0.03028	1.008
Input #13	1	-0.1005	0.0442	5.1817	0.0228	-0.24780	0.904
Input #14	1	-0.0111	0.0178	0.3879	0.5334	-0.04466	0.989
Input #15	1	-0.6515	0.2709	5.7861	0.0162	-0.77265	0.521
Input #16	1	-1.7486	0.2155	65.859	0.0001	-2.10682	0.174
Input #17	1	0.4698	0.2645	3.1545	0.0757	0.54985	1.600
Input #18	1	-0.8261	0.2403	11.8234	0.0006	-0.97710	0.438
Input #19	1	-0.0706	0.3019	0.0548	0.8150	-0.08074	0.932
Input #20	1	-0.1089	0.2558	0.1814	0.6702	-0.12687	0.897
Input #21	1	-0.4273	0.2423	3.1104	0.0778	-0.49677	0.652
Input #22	1	2.9097	0.4054	51.5227	0.0001	3.28203	18.351
Input #23	1	-0.1240	0.2915	0.19651	0.6824	-0.15840	0.921
Input #24	1	0.3867	0.3418	1.2800	0.2579	0.07523	1.472
Input #25	1	0.1465	0.1639	0.7984	0.3716	0.06139	1.158
Input #26	1	0.2825	0.3604	0.6142	0.4332	0.05005	1.326
Input #27	1	4.0431	1.9078	4.4910	0.0341	0.51962	57.000
Input #28	1	-0.0954	0.1984	0.2314	0.6305	-0.03238	0.909
Input #29	1	-0.4406	0.5918	0.5544	0.4565	-0.05063	0.644

Table 25. Logit Analysis for Paradigm II, for Data Set C with Imperfect Data.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

(Input #13), Relative Combat Effectiveness (Input #15), Relative Leadership Advantage (Input #16), Relative Morale Advantage (Input #18), and Relative Technology Advantage (Input #22).

Thus, for the results so far, the prediction accuracies for Paradigm II, with logit and imperfect data, are indicated in Table 26.

Data Sets	Logit Prediction
A	94.6%
B	83.5%
C	85.4%

Table 26. Logit Results for Paradigm II with Imperfect Data.

Inspection of the results indicates that the prediction of accurate battles of conflicts is highest for the time period of 1600 to 1812, for Data Set A. When Data Set B is examined, with its increase in technology, the accuracy is different from Data Set A by 11%. For Data Set C, which combines Data Set A and Data Set B, the results are between those of Data Set A and B, as would be expected.

The summary of the key variables during this phase of experimentation with imperfect data were:

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

»Attacker Surprise Over Posture Awareness (Input #6)

»Artillery Tubes (Input #13)

»Relative Combat Effectiveness (Input #15)

»Relative Leadership Advantage (Input #16)

»Relative Morale Advantage (Input #18)

»Relative Intelligence Advantage (Input #21)

»Relative Technology Advantage (Input #22)

If the objective of this research was to optimize prediction accuracy, these variables would become the critical variables for further model development. This is not part of this research, but is offered as an indication to future researchers of the variables that might be causal for battlefield modeling efforts.

A perfect data set is one where the unknown data values were replaced with the mean values as discussed in earlier sections. For Paradigm II, Data Set A, with perfect data, the logit also dropped Inputs #10, 11, 12, 14, and 27 since logit found these five data variables to be redundant or irrelevant. Again, the five variables were Total Tanks, Lite Tanks, Main Battle Tanks, Close Air Support, and Defender's Primary Tactics #1. The prediction accuracies are shown in Table 27 indicating 94.6% concordant, 3.1% discordant, and 2.3% tied. The significant variable was Relative Leadership Advantage (Input #16).

For Paradigm II, Data Set B, with perfect data, the analysis is shown in Table 28. The prediction accuracies

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Variable	DF	Para. Estimate	Standard Error	Wald Chi-Sq.	Pr>Chi-Sq.	Std. Estimate	Odds Ratio
Intercept	1	6.0176	5.3176	1.2806	0.2578	0	410.601
Input #1	1	-0.6483	1.6516	0.1541	0.6946	-0.22057	0.523
Input #2	1	0.4293	0.9653	0.1978	0.6565	0.10430	1.536
Input #3	1	0.2349	0.7726	0.0925	0.7611	0.05939	1.265
Input #4	1	-0.0161	0.5692	0.0008	0.9775	-0.00640	0.984
Input #5	1	-0.6177	0.3613	2.9229	0.0873	-0.36929	0.539
Input #6	1	-0.1918	0.6153	0.0972	0.7553	-0.09880	0.825
Input #7	1	-1.4531	1.2512	1.3488	0.2455	-1.20933	0.234
Input #8	1	1.0886	1.2884	0.7140	0.3981	1.17896	2.970
Input #9	1	0.0013	0.3497	0.0000	0.9968	0.00090	1.001
Input #13	1	0.3162	0.2814	1.2630	0.2611	0.27658	1.372
Input #15	1	-2.7633	1.4135	3.8218	0.0506	-1.02745	0.063
Input #16	1	-2.9147	0.6700	18.9223	0.0001	-1.57246	0.054
Input #17	1	-0.5255	1.1713	0.2013	0.6537	-0.17978	0.591
Input #18	1	-3.7102	1.9080	3.7815	0.0518	-0.59853	0.024
Input #19	1	-6.1594	5.3457	1.3276	0.2492	-0.55827	0.002
Input #20	1	-2.2259	1.5174	2.1518	0.1424	-0.42589	0.108
Input #21	1	-2.1124	0.9265	5.1979	0.0226	-0.75403	0.121
Input #22	1	-41.3039	5.33E9	0.0000	1.0000	-3.23851	0.000
Input #23	1	-2.3681	1.6524	2.3405	0.1680	-0.45038	0.261
Input #24	1	-0.3144	1.6982	0.0343	0.8531	-0.06284	0.730
Input #25	1	0.1305	0.8761	0.0222	0.8816	0.05588	1.139
Input #26	1	-0.6545	1.5074	0.1886	0.6641	-0.11800	0.520
Input #27	0	0	0	0	0	0	0
Input #28	1	0.1588	0.7665	0.0429	0.8359	0.05860	1.172
Input #29	1	-0.8176	1.5000	0.2971	0.5857	-0.11826	0.441

Table 27. Logit Analysis for Paradigm II, for Data Set A with Perfect Data.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Variable	DF	Para. Estimate	Standard Error	Wald Chi-Sq.	Pr>Chi-Sq.	Std. Estimate	Odds Ratio
Intercept	1	-2.4195	2.2451	1.1613	0.2812	0	0.089
Input #1	1	-0.9121	0.5756	2.5109	0.1131	-0.16547	0.402
Input #2	1	-0.0130	0.1805	0.0052	0.9424	-0.00702	0.987
Input #3	1	0.0088	0.1461	0.0036	0.9520	0.00451	1.009
Input #4	1	0.1494	0.1379	1.1735	0.2787	0.07621	1.161
Input #5	1	0.0152	0.1013	0.0225	0.8806	0.01090	1.015
Input #6	1	-0.4559	0.1716	7.0569	0.0079	-0.22464	0.634
Input #7	1	-0.2380	0.1539	2.3909	0.1220	-0.28129	0.788
Input #8	1	0.0046	0.1434	0.0010	0.9743	0.00539	1.005
Input #9	1	0.1133	0.2253	0.2530	0.6150	0.03419	1.120
Input #10	1	-0.0964	0.0669	2.0740	0.1498	-0.18234	0.908
Input #11	1	-0.0376	0.0458	0.6753	0.4112	-0.06813	0.963
Input #12	1	0.0841	0.0783	1.1546	0.2826	0.13613	1.088
Input #13	1	-0.0453	0.0536	0.7120	0.3988	-0.11746	0.956
Input #14	1	-0.0431	0.0312	1.9103	0.1669	-0.10851	0.958
Input #15	1	-0.4605	0.3342	1.8983	0.1683	-0.16896	0.631
Input #16	1	-1.9442	0.3221	36.4262	0.0001	-0.71724	0.143
Input #17	1	0.4268	0.3311	1.6621	0.1973	0.15190	1.532
Input #18	1	-1.1919	0.2913	16.745	0.0001	-0.39147	0.304
Input #19	1	-0.7498	0.3800	3.8929	0.0485	-0.18725	0.472
Input #20	1	-0.6580	0.3080	4.5643	0.0326	-0.15922	0.518
Input #21	1	-1.0847	0.4097	7.0101	0.0081	-0.30408	0.338
Input #22	1	0.5985	0.5924	1.0206	0.3124	0.09876	1.819
Input #23	1	-0.7025	0.3561	3.1590	0.0910	-0.18056	0.429
Input #24	1	0.5008	0.3935	1.6193	0.2032	0.09670	1.650
Input #25	1	0.0499	0.1963	0.0645	0.7996	0.02076	1.051
Input #26	1	0.5429	0.4286	1.6046	0.2053	0.09574	1.721
Input #27	1	1.1927	0.8036	2.2029	0.1378	0.17269	3.296
Input #28	1	-0.1524	0.2521	0.3654	0.5455	-0.04977	0.859
Input #29	1	0.0920	0.7847	0.0137	0.9067	0.00960	1.096

Table 28. Logit Analysis for Paradigm II, for Data Set B with Perfect Data.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

were 87.4% concordant, 12.4% discordant, and 0.1% tied. The key variables were Attacker's Surprise Over Posture Awareness (Input #6) and Relative Leadership Advantage (Input #16).

For Paradigm II, Data Set C, with perfect data, the analysis is shown in Table 29. The prediction accuracies are 88.8% concordant, 11.1% discordant, and 0.1% tied. The key variables were Attacker's Surprise Over Posture Awareness (Input #6), Relative Leadership Advantage (Input #16), Relative Morale Advantage (Input #18), and Relative Intelligence Advantage (Input #21).

Thus, for Paradigm II with logit, and imperfect and perfect data, the prediction accuracies are indicated in Table 30.

The results indicate that the logistic regression performs better with perfect data versus imperfect data. That is, if the database has significant noise or uncertainty, or missing data, then logistic regression may produce a lower accuracy prediction than if the database represented a more "perfect" system.

Neural Network Modeling

The neural network model identified for use in this experiment was backpropagation. As mentioned earlier, the backpropagation neural network is a nonlinear computational

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Variable	DF	Para. Estimate	Standard Error	Wald Chi-Sq.	Pr>Chi-Sq.	Std. Estimate	Odds Ratio
Intercept	1	-1.5962	2.0031	0.6350	0.4255	.	0.203
Input #1	1	-0.4204	0.4402	0.9120	0.3396	-0.09566	0.657
Input #2	1	0.0139	0.1731	0.0064	0.936	0.00686	1.014
Input #3	1	0.0797	0.1386	0.3310	0.5651	0.04063	1.083
Input #4	1	0.0629	0.1285	0.2393	0.6247	0.03184	1.065
Input #5	1	-0.0688	0.0934	0.5431	0.4611	-0.04869	0.933
Input #6	1	-0.4301	0.1565	7.5528	0.0060	-0.21418	0.659
Input #7	1	-0.2954	0.1514	3.8068	0.0510	-0.33593	0.744
Input #8	1	0.1198	0.1377	0.7558	0.3846	0.14012	1.127
Input #9	1	0.0558	0.1614	0.1195	0.7295	0.02445	1.057
Input #10	1	-0.0979	0.0667	2.1504	0.1425	-0.16606	0.907
Input #11	1	-0.0429	0.0455	0.8892	0.3457	-0.07023	0.958
Input #12	1	0.0891	0.0772	1.3337	0.2481	0.12941	1.093
Input #13	1	-0.0476	0.0515	0.8562	0.3548	-0.11146	0.953
Input #14	1	-0.0458	0.0326	1.9731	0.1601	-0.10251	0.955
Input #15	1	-0.6389	0.2938	4.7293	0.0297	-0.23496	0.528
Input #16	1	-2.0460	0.2530	65.4175	0.0001	-0.84883	0.129
Input #17	1	0.2360	0.2894	0.6651	0.4148	0.08321	1.266
Input #18	1	-1.2958	0.2791	21.5611	0.0001	-0.39460	0.274
Input #19	1	-0.7728	0.3786	4.1664	0.0412	-0.17360	0.462
Input #20	1	-0.6880	0.2920	5.5511	0.0185	-0.16070	0.503
Input #21	1	-0.9985	0.2917	11.7177	0.0006	-0.29908	0.368
Input #22	1	0.6155	0.5750	1.1457	0.2845	0.09245	1.851
Input #23	1	-0.6802	0.3584	3.6980	0.0540	-0.25041	0.439
Input #24	1	0.5051	0.3632	1.9343	0.1643	0.09825	1.657
Input #25	1	-0.0036	0.1766	0.0004	0.9834	-0.00154	0.996
Input #26	1	0.4079	0.3946	1.0686	0.3013	0.07224	1.504
Input #27	1	0.9759	0.7051	1.9158	0.1663	0.12542	2.654
Input #28	1	0.0391	0.2233	0.0307	0.8608	0.01328	1.040
Input #29	1	-0.3117	0.6596	0.2233	0.6365	-0.03582	0.732

Table 29. Logit Analysis for Paradigm II, for Data Set C with Perfect Data.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Data Sets	Logit Imperfect	Logit Perfect
A	94.6%	94.6
B	83.5%	87.4
C	85.4%	88.8

Table 30. Logit Results for Paradigm II with Imperfect and Perfect Data.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

model that uses parallel parocessing. A common metaphor is the human brain, and, like the human nervous system, nodes are connected through a weighting algorithm that determines what signal is passed from one node to another. These weights and signals are adaptive and can change based on learning as the network looks at a pattern of data many times.

Understanding the algorithmic basis of the backpropagation neural network begins at the output node (Neuralyst™ 1994; Nelson and Illingworth 1990). The output of each node for each layer is a function of the input values or weights. For example, the calculated output of the jth node begins with the following equation:

$$U_j = \sum_i (X_i * W_{ij}) \qquad (9)$$

where

U_j = an internal summation for the jth node,

X_i = input from the *i*th node,

W_{ij} = a previously established weight, such as

$$W_{ij} = W'_{ij} + LR * e_j * X_i$$

where

LR = the learning rate,

e_j = an error term for the *j*th node, such as

$$e_j = Y_j * (1 - Y_j) * (d_j - Y_j)$$

where

Y_j = the actual *j*th node computed output value,

$(1-Y_j)$ = the complement of Y_j, and

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

d_j = the desired or known output value.

The summation operation, U_j, in equation 9, is compared to a threshold value, t_j, and passed through a sigmoid activation function, F_{th}, as $Y_j = F_{th}(U_j+t_j)$, which is the output response for the next layer, or the final layer. An example of an artificial neuron is diagrammed in Figure 2.

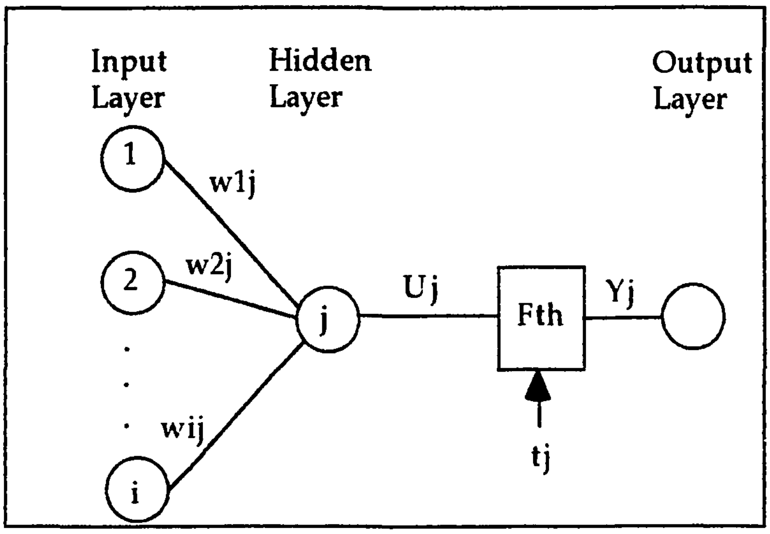


Figure 2. A Model Neuron.

Once the error values are computed for the output layer and adjusted to the next layer back, the error term is modified to be $e_j = Y_j*(1-Y_j)*\sum(e_k*W'_{jk})$, which replaces the difference between the desired and actual output with the sum of the error terms for each node, k, in the next succeeding layer.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

The learning rate, LR, is set by the user to adjust the old weights. Finally, the weight adjustment is modified as $W_{ij} = W'_{ij}+(1-M)*LR*e_j*X_i+M*(W'_{ij}-W''_{ij})$, to add a user set momentum factor, M, which allows some persistence of preceeding weights to the iterations of succeeding weights.

As the neural network is trained, the sum of the errors should become smaller, until it reaches a user set value, which stops the training process. The network is then ready to be applied to a test data set, using the trained weights. This testing provides some validation to the trained network.

The process followed in this section is similar to that followed in the statistical modeling section, that is, to examine the data sets for the different timeframes, for imperfect and perfect data, and for Paradigms I and II.

One difference between the neural network and logit becomes apparent as one begins to structure the network. Unlike logit, one must use trial and error approaches to determine what the network should look like. The number of input variables and the number of output variables affect this process.

The number of input nodes for Paradigm I is one, the casualty ratio. The number of output nodes is also one. According to the heuristic rule, the number of hidden nodes then should be one. However, tests were conducted to determine if this were true. The number of hidden nodes on

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

the one hidden layer were tested in increments of one. Thus, network models of 1-1-1, 1-2-1, 1-3-1, 1-4-1, and 1-5-1 were run with the Paradigm I data set A. The results indicated that 1-3-1 provided better prediction accuracy than the other networks. In fact, the percentage of accurate predictions increased as the number of nodes were increased, to a peak at the 1-3-1, and then fell off for 1-4-1 and 1-5-1. An excursion into two hidden layers of 1-3-3-1 performed poorly. Therefore, the 1-3-1 network was chosen for use with Paradigm I.

For paradigm II, the number of input nodes is set at 29, since there are 29 input variables. The number of output nodes is similarly set as a single node. The issue again was how many hidden layer nodes to use. The heuristic of the square root of the product of the number of nodes in the input and the number in the output is a suitable answer. This came after several tests of Data Set A starting with a network structure of 29-6-1. The number of hidden nodes was changed by increments of two to determine if a better structure would work for this type of data. The tests included networks 29-4-1, 29-6-1, 29-8-1, 29-10-1, and three networks with two hidden layers, 29-6-6-1, 29-6-4-1, and 29-4-4-1. The two hidden layer network performed poorly. The single hidden layer performed best with the 29-6-1 structure as prescribed by the heuristic. Thus, the network structure used for Paradigm II was 29-6-1.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Another difference in using network methodology versus logit is that the network is trained on 80% of the data, and uses the remaining 20% for testing or validating the prediction model (Neuralyst™ 1994; Lippman 1991; Nelson and Illingworth 1990). Since 100% of the data for logit was used to build the model, each network model also revisited the entire data set for 100% of the treatment cases. It is this 100% figure which is used to compare with that from the 100% treatment cases for logit. For purposes of clarity, the 80% and 20% rule for networks is referred to as 80/20 throughout the remainder of this document.

The parameters used for the supervised network building were learning rate 0.9, momentum 0.9, no input noise, 0.1 training tolerance, and 0.3 testing tolerance (that is, t_j's are the same for all j's). Also, the learning rate was adaptive, meaning that the model could search for alternatives to avoid local minima traps.

The network experiment began by examining the case of the single independent variable, casualty ratio, as the basis for predicting winners of combat, that is, Paradigm I. Since there is no imperfect data for Paradigm I, the only data set examined was the perfect data set. There was still the timeframe stratification represented by the three data sets A, B, and C.

The results from Paradigm I, using Data Set A, for the perfect data neural network are shown in Table 31. The

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Statistics	Training Data (80%)	Testing Data (20%)	100% Data
RMS Error	0.5		
Treatments	122	27	149
Number Right	1	0	1
Number Wrong	121	27	148
Percent Right	1%	0%	1%
Percent Wrong	99%	100%	99%
Training Epochs	900		

Table 31. Network Results for Paradigm I, Data Set A with Perfect Data.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

results are quite different from the previous prediction values for logit, where the logit gave a prediction of 55%.

The results from the Data Set B experiment indicate something different, as shown in Table 32.

The final phase of the Paradigm I experiment is an examination of the data set for the entire 1600-1982 timeframe. The results are shown in Table 33. While the prediction accuracy for the test set was 63%, the training results show only one case correctly predicted.

This poor performance of the models for Paradigm I, with perfect data, are indicated by the high RMS errors and the low prediction accuracies. This raises questions concerning the data model, the structure of BNN, and the modeling process. The low prediction accuracies for logit analysis of Paradigm I raise similar questions about the data model.

The summary of the Paradigm I results from both logit and network modeling are given in Table 34.

For Paradigm II, Data Set A, with imperfect data, the neural network's 80/20 and 100% results are shown in Table 35. The model was developed on 80% of the data available. Often with networks, the prediction accuracy during the training stage does not match that of the testing stage.

Another critical part in training a network is to know when the model has stabilized. This is usually seen by the root mean square (RMS) error plateauing. The goal is to drive the RMS error as close to zero as possible, although

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Statistics	Training Data (80%)	Testing Data (20%)	100% Data
RMS Error	0.4		
Treatments	416	95	511
Number Right	20	57	292
Number Wrong	396	38	219
Percent Right	5%	60%	57%
Percent Wrong	95%	40%	43%
Training Epochs	1200		

Table 32. Network Results for Paradigm I, Data Set B with Perfect Data.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Statistics	Training Data (80%)	Testing Data (20%)	100% Data
RMS Error	0.4		
Treatments	549	111	660
Number Right	1	70	399
Number Wrong	548	41	261
Percent Right	1%	63%	60%
Percent Wrong	99%	37%	40%
Training Epochs	1100		

Table 33. Network Results for Paradigm I, Data Set C with Perfect Data.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Data Sets	Logit	Network
A	55%	1%
B	55%	57%
C	55%	60%

Table 34. Paradigm I Comparison of Prediction Accuracies for Logit and Neural Networks.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Statistics	Training Data (80%)	Testing Data (20%)	100% Data
RMS Error	0.06		
Treatments	120	29	149
Number Right	118	25	143
Number Wrong	2	4	6
Percent Right	98%	86%	96%
Percent Wrong	2%	14%	4%
Training Epochs	1500		

Table 35. Network Results for Paradigm II, Data Set A with Imperfect Data.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

for the Paradigm I cases it plateaus at a relative high level.

Table 36 is a copy of the results from the network indicating what the results look like compared to the value for each output variable. The table shows the sequence of treatment cases or military conflicts.

For Paradigm II, Data Set B, with imperfect data, the results are shown in Table 37.

For Paradigm II, Data Set C, with imperfect data, the results are shown in Table 38. The results indicate that the network does well in predicting the winner of combat for Paradigm II with imperfect data.

We now have enough prediction information to take a first view of the inference capabilities of the logit and network modeling approaches. This is shown in Table 39.

The preliminary results create several pieces of information, and questions. The information is that for the two logit cases, logit seems to do slightly better at predicting when the data is more perfect than imperfect.

The range of predictions for logit with imperfect data is from 84% to 95%. The prediction accuracies are relatively high given the type of data and the large number of measurement scales for the input variables. The range of predictions for the network with imperfect data was similar to the range for logit with perfect data.

The next step was to examine the network model with the perfect data set. The perfect data sets were identical to

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Battle Sequence Number	Output #1 Attacker Win (1) or Loss (0)	Predicted Output
1	0	-0.007938
2	1	1.0016266
3	1	1.0002502
4	0	-0.049698
5	1	1.0048828
6	0	0.1070374

Table 36. Sample of Computed Output of Data Set A Network with Imperfect Data.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Statistics	Training Data (80%)	Testing Data (20%)	100% Data
RMS Error	0.06		
Treatments	417	94	511
Number Right	389	81	454
Number Wrong	30	13	57
Percent Right	93%	87%	89%
Percent Wrong	7%	13%	11%
Training Epochs	2900		

Table 37. Network Results for Paradigm II, Data Set B with Imperfect Data.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Statistics	Training Data (80%)	Testing Data (20%)	100% Data
RMS Error	0.07		
Treatments	529	131	660
Number Right	518	111	613
Number Wrong	11	20	47
Percent Right	98%	85%	93%
Percent Wrong	2%	15%	7%
Training Epochs	2300		

Table 38. Network Results for Paradigm II, Data Set C with Imperfect Data.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Data Sets	Logit Imperfect	Logit Perfect	Network Imperfect
A	95%	95%	96%
B	84%	87%	89%
C	85%	89%	93%

Table 39. Preliminary Comparison of Logit and Neural Network Results for Paradigm II.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

those used in the logit model analysis. This was not the case for the imperfect data sets. The imperfect data for the neural network analysis used the orignal symbolic representations for the nominal variables that had been coded for logit.

For Paradigm II, Data Set A, with perfect data, the results from the network are shown in Table 40.

Statistics	Training Data (80%)	Testing Data (20%)	100% Data
RMS Error	0.04		
Treatments	122	27	149
Number Right	122	21	143
Number Wrong	0	6	6
Percent Right	100%	78%	96%
Percent Wrong	0%	22%	4%
Training Epochs	1000		

Table 40. Network Results for Paradigm II, Data Set A with Perfect Data.

The results appear to indicate that the network provides a high percentage of correct predictions. The low RMS is another indication that the network converged. Logit also gave a high percentage for these pre-1812 cases.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

For Paradigm II, Data Set B, with perfect data, the results are shown in Table 41. The results indicate that the network model did not converge as strongly as it did for the previous model. This may be a departure point for comparison of logit and neural networks. That is, for perfect data use logit, and for noisy data use neural networks. However, the experiments reported here were not set up to evaluate rigorously the two methods relative to each other. Further research is needed to verify for which data type each is more appropriate. For now, the two should be regarded as complements to each other.

For Paradigm II, Data Set C, with perfect data, the results are shown in Table 42. The results indicate that the network did not converge, as seen by the high RMS, as well as the low prediction rates for the 80/20 and 100% cases. The relatively low prediction accuracies again raise questions about the data model. The incorporation of artificial data values (i.e., means or midpoints) for missing or uncertain data elements may confuse the neural network, if the network is trying to account for high-order relationships in the data. This is a subject for further investigation.

We can now compare the entire Paradigm II results, which are shown in Table 43.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Statistics	Training Data (80%	Testing Data (20%)	100% Data
RMS Error	0.4		
Treatments	421	90	511
Number Right	213	45	296
Number Wrong	208	45	215
Percent Right	51%	50%	58%
Percent Wrong	49%	50%	42%
Training Epochs	2000		

Table 41. Network Results for Paradigm II, Data Set B with Perfect Data.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Statistics	Training Data (80%)	Testing Data (20%)	100% Data
RMS Error	0.3		
Treatments	533	127	660
Number Right	338	68	380
Number Wrong	195	59	280
Percent Right	63%	54%	58%
Percent Wrong	37%	46%	42%
Training Epochs	1800		

Table 42. Network Results for Paradigm II, Data Set C with Perfect Data.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Data Sets	Logit Imperfect	Network Imperfect	Logit Perfect	Network Perfect
A	95%	96%	95%	96%
B	84% .	89%	87%	58%
C	85%	93%	89%	58%

Table 43. Results of Logit and Neural Network Analysis for Paradigm II.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

CHAPTER 5

ANALYSIS OF EXPERIMENTAL RESULTS

This experiment compared the predictive capabilities of traditional statistical regression and artificial neural network models for noisy, unfiltered data (i.e., imperfect) versus filtered data (i.e., perfect). The preliminary results are shown in Table 44 by percentage and frequency of correct predictions. The cell entries for Paradigm I with perfect data are identical to the cell entries for Paradigm I with imperfect data, since there were no imperfect cases for Paradigm I.

The percentages could be used to propose a possible trend in the future use of logit or neural networks, depending of whether one has perfect or imperfect data. There is also reason to suggest that Paradigm II is superior to Paradigm I for modeling military combat outcomes. However, further statistical analysis of the significance of the experimental results was conducted.

Chi-Square Tests

Analyzing the prediction results for their statistical significance provides evidence about the probability that

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Data Set Types	Analysis Model "LR" Paradigm I	Analysis Model "LR" Paradigm II	Analysis Model "BNN" Paradigm I	Analysis Model "BNN" Paradigm II
Perfect Data Set "A"	55% (82)	95% (141)	1% (1)	96% (143)
Perfect Data Set "B"	55% (281)	87% (447)	57% (292)	58% (296)
Perfect Data Set "C"	55% (363)	89% (586)	60% (399)	58% (380)
Imperfect Data Set "A"	55% (82)	95% (141)	1% (1)	96% (143)
Imperfect Data Set "B"	55% (281)	84% (427)	57% (292)	89% (454)
Imperfect Data Set "C"	55% (363)	85% (564)	60% (399)	93% (613)

Numbers in parenthesis are frequencies of accurate predictions.

Table 44. Summary of Experimental Results.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

these results could not have been produced by chance. The analysis of statistical significance used the Chi-Square test. The problem statement is tested first, followed by tests for hypothesis one, and then tests for hypothesis two. The problem for this research was that the predictive capabilities of traditional statistical models may not be as robust when applied to noisy and incomplete data as they are when applied to clean, or filtered data, and combat data that focuses on skill-based and human factors tend to be noisy and incomplete.

To examine this problem statistically, populations of data that are perfect are compared with populations that are imperfect. Table 44 gives an indication that there may be a significant difference between perfect and imperfect data for the traditional statistical method used – LR or logit. For Data Set A, which consists of military engagements from 1600-1812, the table indicates that the predictions for the imperfect and perfect data type were equal. For Data Set B, which consists of engagements from 1812-1982, however, the table indicates a change in predictions for the two data types. Data Set C consists of both Data Sets A and B, and thus contains the effects of Data Set A. While the differences in the predictions for perfect and imperfect data are small, the slightly better accuracy with perfect data for Data Sets B and C, indicate that the perfect data model may provide more accurate predictions.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

To test this before and after condition of the data transformation from imperfect to perfect, the Chi-Square (X^2) statistic was used. Data Set A was not used in this part of the analysis since the frequencies are equivalent for perfect and imperfect data. Similarly, the logit data for Paradigm I are equivalent for the imperfect and perfect cases, so Paradigm I results were not analyzed.

Table 45 shows a comparison of data type (i.e., perfect and imperfect) against accurate and inaccurate predictions for logit, for Paradigm II, and Data Set B. Table 46 shows the calculated $X^2 = 3.1604$ which is less than (<) the critical X^2 value of 3.841. This indicates that the differences in prediction accuracies caused by perfect and imperfect data are not statistically significant. But, since the computed value of X^2 is different from the critical value by only 0.6806, we conclude that the lack of statistical significance is marginal at an alpha = 0.05 level of significance.

Next, we compute X^2 for Data Set C, Paradigm II, as shown in Tables 47 and 48. The computed $X^2 = 3.2678 < 3.841$, which is again less than the critical value. The difference between the computed and critical X^2 is 0.5732 which, like the case for Data Set B, is evidence for marginal rejection of statistical significance.

Next, we compute the X^2 for hypothesis one, which examines the difference in the accuracy of the two model (i.e., LR and BNN) predictions of combat winners based on

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

	Imperfect	Perfect	Σ
Accurate	427	447	874
Inaccurate	84	64	148
Σ	511	511	1022

Table 45. Comparison of Logit Results by Data Type for Paradigm II, with Data Set B.

	OF	EF	OF-EF	$(OF-EF)^2$	$(OF-EF)^2/EF$
Imperfect Accurate	427	437	-10	100	0.2288
Imperfect Inaccurate	84	74	10	100	1.3514
Perfect Accurate	447	437	10	100	0.2288
Perfect Inaccurate	64	74	-10	100	1.3514
				Σ	3.1604
df = 1, alpha = 0.05, X^2 Critical Value = 3.841					
$X^2 = 3.1604 < 3.841$					

Table 46. X^2 Chart Created from Table 45. (OF = observed frequency; EF = expected frequency)

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

	Imperfect	Perfect	Σ
Accurate	564	586	1150
Inaccurate	96	74	170
Σ	660	660	1320

Table 47. Comparison of Logit Results by Data Type for Paradigm II, with Data Set C.

	OF	EF	OF-EF	$(OF-EF)^2$	$(OF-EF)^2/EF$
Imperfect Accurate	564	575	-11	121	0.2104
Imperfect Inaccurate	96	85	11	121	1.4235
Perfect Accurate	586	575	11	121	0.2104
Perfect Inaccurate	74	85	-11	121	1.4235
				Σ	3.2678
df = 1, alpha = 0.05, X^2 Critical Value = 3.841					
$X^2 = 3.2678 < 3.841$					

Table 48. X^2 Chart Created from Table 47. (OF = observed frequency; EF = expected frequency)

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

data type (i.e., perfect or imperfect). The previous X^2 calculations indicate marginal lack of statistical significance for logit. A similar comparison for Data Sets B and C for neural networks is shown in Tables 49 - 52. For Data Set B the computed X^2 = 125.0648 > 3.841, as seen in Table 50. For Data Set C the computed X^2 = 220.6932 > 3.841. Both computed values are much greater than the critical value indicating that the neural network or BNN exerts much more influence on the difference between perfect and imperfect prediction accuracies than does logit or LR, which had marginal computed X^2 values.

One conclusion is that there is statistically significant evidence that neural networks may perform better when the data type is imperfect than when it is perfect.

Finally, we test hypothesis two to examine the accuracy of predictions of combat winners based on different paradigm types. This test compares paradigm type (Paradigm I or Paradigm II) against accurate and inaccurate predictions, for both logit and neural networks.

In Tables 53 - 58, logit is tested for each of the three Data Sets A, B, and C. For Data Set A, the computed X^2 = 62.0232 > 3.841 as seen in Table 54, which is interpreted as statistically significant at the alpha = 0.05 level of significance. For Data Set B, the computed value of X^2 = 131.5794 > 3.841, from Table 56, which also indicates statistical significance. For Data Set C, the computed X^2 = 187.4418 > 3.841. As seen from the

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

	Imperfect	Perfect	Σ
Accurate	454	296	750
Inaccurate	57	215	272
Σ	511	511	1022

Table 49. Comparison of Neural Network Results by Data Type for Paradigm II, with Data Set B.

	OF	EF	OF-EF	$(OF-EF)^2$	$(OF-EF)^2/EF$
Imperfect Accurate	454	375	79	6241	16.6427
Imperfect Inaccurate	57	136	-79	6241	45.8897
Perfect Accurate	296	375	-79	6241	16.6427
Perfect Inaccurate	215	136	79	6241	45.8897
				Σ	125.0648
df = 1, alpha = 0.05, X^2 Critical Value = 3.841					
$X^2 = 125.0648 > 3.841$					

Table 50. X^2 Chart Created from Table 49. (OF = observed frequency; EF = expected frequency)

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

	Imperfect	Perfect	Σ
Accurate	613	380	993
Inaccurate	47	280	327
Σ	660	660	1320

Table 51. Comparison of Neural Network Results by Data Type for Paradigm II, with Data Set C.

	OF	EF	OF-EF	$(OF-EF)^2$	$(OF-EF)^2/EF$
Imperfect Accurate	613	496.5	116.5	13572.25	27.3359
Imperfect Inaccurate	47	163.5	-116.5	13572.25	83.0107
Perfect Accurate	380	496.5	-116.5	13572.25	27.3359
Perfect Inaccurate	280	163.5	116.5	13572.25	83.0107
				Σ	220.6932
df = 1, alpha = 0.05, X^2 Critical Value = 3.841					
X^2 = 220.6932 > 3.841					

Table 52. X^2 Chart Created from Table 51. (OF = observed frequency; EF = expected frequency)

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

	Paradigm I	Paradigm II	Σ
Accurate	82	141	223
Inaccurate	67	8	75
Σ	149	149	298

Table 53. Comparison of Logit Results by Paradigm, for Perfect Data with Data Set A.

	OF	EF	OF-EF	$(OF-EF)^2$	$(OF-EF)^2/EF$
Paradigm I Accurate	82	111.5	-29.5	870.25	7.8049
Paradigm I Inaccurate	67	37.5	29.5	870.25	23.2067
Paradigm II Accurate	141	111.5	29.5	870.25	7.8049
Paradigm II Inaccurate	8	37.5	-29.5	870.25	23.2067
				Σ	62.0232
df = 1, alpha = 0.05, X^2 Critical Value = 3.841					
$X^2 = 62.0232 > 3.841$					

Table 54. X^2 Chart Created from Table 53. (OF = observed frequency; EF = expected frequency)

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

	Paradigm I	Paradigm II	Σ
Accurate	281	447	728
Inaccurate	230	64	294
Σ	511	511	1022

Table 55. Comparison of Logit Results by Paradigm, for Perfect Data with Data Set B.

	OF	EF	OF-EF	$(OF-EF)^2$	$(OF-EF)^2/EF$
Paradigm I Accurate	281	364	-83	6889	18.9258
Paradigm I Inaccurate	230	147	83	6889	46.8639
Paradigm II Accurate	447	364	83	6889	18.9258
Paradigm II Inaccurate	64	147	-83	6889	46.8639
				Σ	131.5794
df = 1, alpha = 0.05, X^2 Critical Value = 3.841					
X^2 = 131.5794 > 3.841					

Table 56. X^2 Chart Created from Table 55. (OF = observed frequency; EF = expected frequency)

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

	Paradigm I	Paradigm II	Σ
Accurate	363	586	949
Inaccurate	297	74	371
Σ	660	660	1320

Table 57. Comparison of Logit Results by Paradigm, for Perfect Data with Data Set C.

	OF	EF	OF-EF	$(OF-EF)^2$	$(OF-EF)^2/EF$
Paradigm I Accurate	363	474.5	-111.5	12432.25	26.2007
Paradigm I Inaccurate	297	185.5	111.5	12432.25	67.0202
Paradigm II Accurate	586	474.5	111.5	12432.25	26.2007
Paradigm II Inaccurate	74	185.5	-111.5	12432.25	67.0202
				Σ	187.4418
df = 1, alpha = 0.05, X^2 Critical Value = 3.841					
X^2 = 187.4418 > 3.841					

Table 58. X^2 Chart Created from Table 57. (OF = observed frequency; EF = expected frequency)

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

calculated X^2 for all three data sets, there is evidence that logit produces statistically significant differences in prediction accuracies for Paradigms I and II at the 0.05 level of significance.

To complete the test for hypothesis two, we next test neural networks for the same three data sets. These calculations are shown in Tables 59 - 64. For Data Set A, the computed $X^2 = 270.9628 > 3.841$, from Table 60, which is much greater than the critical X^2 value. For Data Set B, the computed $X^2 = 130.2666 > 3.841$, from Table 62, again indicating statistical significance. For Data Set C, the computed $X^2 = 193.9414 > 3.841$, from Table 64, which, once again, indicates strong support for paradigm type influences on prediction accuracies.

All six of the tests for hypothesis two indicate a difference in prediction accuracies based on paradigm type.

While analysis of experimental results does not present statistical (X^2) evidence in support of the problem statement, hypothesis one for BNN and hypothesis two are supported. The lack of statistical significance, at the alpha = 0.05 level, of differences between perfect and imperfect data when applied to an LR model, should not be construed as indicating that there is not a problem. The fact that there were any differences at all between perfect and imperfect data point to a need for further research with logit; and, if the logit model had been optimized, perhaps it would have produced significant differences.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

	Paradigm I	Paradigm II	Σ
Accurate	1	143	144
Inaccurate	148	6	154
Σ	149	149	298

Table 59. Comparison of Neural Network Results by Paradigm, for Imperfect Data with Data Set A.

	OF	EF	OF-EF	$(OF-EF)^2$	$(OF-EF)^2/EF$
Paradigm I Accurate	1	72	-71	5041	70.0139
Paradigm I Inaccurate	148	77	71	5041	65.4675
Paradigm II Accurate	143	72	71	5041	70.0139
Paradigm II Inaccurate	6	77	-71	5041	65.4675
				Σ	270.9628
df = 1, alpha = 0.05, X^2 Critical Value = 3.841					
X^2 = 270.9628 > 3.841					

Table 60. X^2 Chart Created from Table 59. (OF = observed frequency; EF = expected frequency)

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

	Paradigm I	Paradigm II	Σ
Accurate	292	454	746
Inaccurate	219	57	276
Σ	511	511	1022

Table 61. Comparison of Neural Network Results by Paradigm, for Imperfect Data with Data Set B.

	OF	EF	OF-EF	$(OF-EF)^2$	$(OF-EF)^2/EF$
Paradigm I Accurate	292	373	-81	6561	17.5898
Paradigm I Inaccurate	219	138	81	6561	47.5435
Paradigm II Accurate	454	373	81	6561	17.5898
Paradigm II Inaccurate	57	138	-81	6561	47.5435
				Σ	130.2666
df = 1, alpha = 0.05, X^2 Critical Value = 3.841					
X^2 = 130.2666 > 3.841					

Table 62. X^2 Chart Created from Table 61. (OF = observed frequency; EF = expected frequency)

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

	Paradigm I	Paradigm II	Σ
Accurate	399	613	1012
Inaccurate	261	47	308
Σ	660	660	1320

Table 63. Comparison of Neural Network Results by Paradigm, for Imperfect Data with Data Set C.

	OF	EF	OF-EF	$(OF-EF)^2$	$(OF-EF)^2/EF$
Paradigm I Accurate	399	506	-107	11449	22.6265
Paradigm I Inaccurate	261	154	107	11449	74.3442
Paradigm II Accurate	613	506	107	11449	22.6265
Paradigm II Inaccurate	47	154	-107	11449	74.3442
				Σ	193.9414
df = 1, alpha = 0.05, X^2 Critical Value = 3.841					
X^2 = 193.9414 > 3.841					

Table 64. X^2 Chart Created from Table 63. (OF = observed frequency; EF = expected frequency)

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Along with analyzing the problem statement and hypotheses, the research objective included the following goals:

(1) to identify new causal patterns in uncertain and soft data;

(2) to help fill the statistical gap when analyzing uncertain, missing, or soft data;

(3) to demonstrate neural network's capabilities with a complex and nonlinear problem; and,

(4) to examine a potentially credible use of neural networks.

As for the first goal, there were new causal patterns found from this experiment. One pattern is that logit identified key variables that seem to have influence on the winner of battles. These variables are: Attacker Surprise Over Posture Awareness, Number of Artillery Tubes, Relative Combat Effectiveness, Relative Leadership Advantage, Relative Morale Advantage, Relative Intelligence Advantage, and Relative Technology Advantage. If these are key variables in a causal relationship, then their inclusion in military combat models and simulations should be a point for future research.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

The second goal was demonstrated by the comparison of imperfect and perfect data for both logit and neural networks. The experiment did indicate that logit performed slightly better with perfect (i.e., clean, filtered) data than with imperfect (i.e., noisy, unfiltered data), although this difference was not significant at the 0.05 level; but, there was statistical evidence for the reverse with the use of neural networks. Thus, one step further has been taken in filling the statistical gap for the type of imperfect data examined in this study. Additional work is still needed for different databases if a purpose of the research is to develop approaches for handling noisy data by the combined use of statistical regression methods and neural networks.

The third and fourth goals were met by the success of applying neural networks to imperfect data for Paradigm II.

Data

The data coding step was necessary for use with logit. It was not necessary for use with the neural network models. However, the data modeling required for logit produced a rich data taxonomy that can be used for future research. The taxonomy was needed to develop an a priori understanding of the causal relationships between the independent and dependent variables. Thus, the data modeling led to the decision to create artificial data values, such as means or midpoints, for missing or uncertain data. This created the

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

framework for the final definition of perfect and imperfect data.

Logit

The logit model development was an exercise in computer programming. To the novice, the logit process may be difficult to learn and is not user friendly. However, the SAS™ software package was powerful and rich with capabilities for varied statistical analyses. The set up time, however, was longer than expected. The data preparation took several hours, and many more modifications were required over the course of several days.

Neural Networks

Overall, the neural network was more user friendly than the logit model. The time to learn the logit approach was approximately 50 hours, compared to one hour for the neural network. However, since the structure of the network was trial and error, and since many pre-experiments were tried before this experiment, the overall time of use of the neural network was longer than that of the logit approach. Also, one run of logit may take less than a minute, while one run of the neural network may take several hours.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

CHAPTER 6

CONCLUSIONS

The experiments were successful in providing evidence that addresses the problem statement and the hypotheses. The objective of this study was also met. Thus, the primary conclusion is that use of both logit and neural network models, when analyzing complex data sets, seems warranted. However, for perfect data logit appears to be the model of choice. For noisy data, it appears that neural networks may provide an added capability to the logit approach. Also, when the results of the neural network are in question, the logit could be used to check the validity of the neural network.

The question about whether or not to use neural network models or other statistical methodologies is far from resolved. The above experiments only demonstrate that the use of neural networks is still emerging. In fact, it is possible that within the next decade the statistical community could adopt neural networks as just one other method of regression analysis for special case problems. It is also hoped that this research will add another data point in the further analysis of similar practical applications.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

CHAPTER 7

FUTURE RESEARCH

This research is a direct challenge to the linking of combat winner predictions to attrition, i.e., Paradigm I. Paradigm II, on the other hand, provides an alternative on which to base such predictions that appears to provide greater accuracy. Thus, military computer models and simulations of combat could be suspect if not using strength and skill factors. This is one key area for future research.

Other future research could break down further the basic elements of the human factors variables from Paradigm II in order to determine their specific contribution to battle outcomes.

Another suggestion for future research is to use self-organizing neural networks to analyze a complex data set and account for those rare events where the side that wins does so against all the military wisdom concerning accepted tactics, doctrine and training.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

CHAPTER 8

SUMMARY

This research was designed to encourage cross-disciplinary dialogue, with a viewpoint that is not strictly that of a neural network researcher, operations research analyst, statistician or other scientific disciplinarian.

The results of these experiments are expected to contribute to the growing science of neural networks, and especially the growing interface between statistics and neural networks, which only recently began to emerge as an important tool within the statistical community.

The examination of combat data using neural networks and logit will allow the military historian and military operations research analyst, as well as military decision makers, to develop a perspective on the importance of environmental, human, and force structure factors in the analysis of combat situations.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

BIBLIOGRAPHY

Aldrich, John H. and Forrest D. Nelson. 1984. Linear Probability, Logit, and Probit Models. New York: SAGE Publications.

Allen, Patrick. 1992. Situational Force Scoring: Accounting for Combined Arms Effects in Aggregate Combat Models. Santa Monica, California: RAND.

Anderson, James A., Jack W. Silverstein, Stephen A. Ritz, and Randall S. Jones. 1977. "Distinctive Features, Categorial Perception, and Probability Learning: Some Applications of a Neural Model, "Psychological Review 84, no. 5: 413-451.

Amari, S. 1994. Comment to "Neural Networks: A Review from A Statistical Perspective" by Bing Cheng and D.M. Titterington Statistical Science 9, no. 1: 31-32.

Antognetti, Paolo and Veljko Milutinovic, ed. 1991. Neural Networks: Concepts, Applications, and Implementations, vol. 1. New Jersey: Prentice Hall.

Antognetti, Paolo and Veljko Milutinovic, ed. 1991. Neural Networks: Concepts, Applications, and Implementations, vol. 3. New Jersey: Prentice Hall.

Antognetti, Paolo and Veljko Milutinovic, ed. 1991. Neural Networks: Concepts, Applications, and Implementations, vol. 4. New Jersey: Prentice Hall.

Arquilla, John. 1992. Dubious Battles: Aggression, Defeat, and the International System. Washington: Crane Russak.

Arquilla, John and David Ronfeldt. 1993. "Cyberwar is Coming," Comparative Strategy 12: 141-165.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Bader, Brian, John R. Brinkerhoff, Trevor N. Dupuy, C. C. Johnson, and Charles R. Smith. 1986. Combat History Analysis Study Effort (CHASE): Data Enhancement Study (CDES): Introductory Materials and Bibliography, 9 vols. Fairfax, Virginia: Data Memory Systems, Inc.

Bader, Brian, Trevor N. Dupuy, and C. C. Johnson. 1986. Data Base Error Correction (DBEC): Final Report. Fairfax, Virginia: Data Memory Systems, Inc.

Bankes, Steve and James Gillogly. 1994. "Validation of Exploratory Modeling," Proceedings of the Conference on High Performance Computing 1: 382-87.

Barron, Andrew R. 1994. Comment to "Neural Networks: A Review from A Statistical Perspective" by Bing Cheng and D.M. Titterington Statistical Science 9, no 1: 33-35.

Barto, Andrew G. 1993. "Connectionist Learning for Control. " Neural Networks for Control, ed. W. Thomas Miller, III, Richard S. Sutton, and Paul J. Werbos, 5-58. London: The MIT Press, 1990; repr., 1993.

Barton, Russel R. 1992. "Metamodels for Simulation Input -Output Relations," Proceedings of the 1992 Winter Simulations Conference 1: 289-99.

Baum, Eric B. and Frank Wilczek. 1988. "Supervised Learning of Probability Distributions by Neural Networks." Neural Information Processing Systems, ed. Dana Z. Anderson, 52-61. New York: American Institute of Physics.

Baum, Eric B. and David Haussler. 1989. "What Size Net Gives Valid Generalizations," Neural Computation vol 1: 151-60.

Beale, Russell and Janet Finley, ed. 1992. Neural Networks and Pattern Recognition in Human-Computer Interaction. New York: Ellis Horwood.

Bhutani, Kiran R., Ali Farsaie, and Brenda Day. 1991. A Fuzzy Neural Model for Target Recognition. Dahlgren, Virginia: Naval Surface Warfare Center.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Bienenstock, Elle and Stuart Geman. 1994. Comment to "Neural Networks: A Review from A Statistical Perspective" by Bing Cheng and D.M. Titterington Statistical Science 9, no 1: 36-37.

Bonder, Seth. 1971. Topics In Military Operations Research. Ann Arbor, Michigan: Vector Research, Inc.

Bosc, Patrick and Olivier Pivert. 1994. "Imprecise Data Management and Flexible Querying in Databases." Fuzzy Sets, Neural Networks, and Soft Computing, ed. R.R. Yager and L.A. Zadeh, 368-95. New York: Van Nostrand Reinhold.

Breiman, Leo. 1994. Comment to "Neural Networks: A Review from A Statistical Perspective" by Bing Cheng and D.M. Titterington Statistical Science 9, no 1: 38-42.

Bruck, Jehoshua and Joseph W. Goodman. 1988. "On the Power of Neural Networks for Solving Hard Problems." Neural Information Processing Systems, ed. Dana Z. Anderson, 137-43. New York: American Institute of Physics.

Bui, Tung, David Dryer and Matthew Laskowski. 1992. "A Neural-Network Based Behavioral Theory of Tank Commanders." Thesis. Naval Postgraduate School.

Busse, James J. 1971. "An Attempt to Verify Lanchester's Equations," Developments in Operations Research, vol. 2. New York: Gordon and Breach Science Publishers.

Cardaliaguet, Pierre and Guillaume Euvrard. 1992. "Approximation of a Function and its Derivative with a Neural Network," Neural Networks 5: 207-30.

Carpenter, Gail A. 1991. "Neural Network Models for Pattern Recognition and Associative Memory." 1991 Lectures in Complex Systems: The Proceedings of the 1991 Lectures in Complex Systems Summer School, Santa Fe, New Mexico, June, 1991, ed. Lynn Navel and Daniel Stein, 3-42. New York: Addison-Wesley Publishing Company, Inc.

Caudill, Maureen and Charles Butler. 1992. Understanding Neural Networks, 2 vols. Cambridge, Massachusetts: MIT.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Cesar, Edison, Patrick Allen, Steven Bankes, John Bondanella, Rick Eden, H. Edward Hall, Clairice Veit, Loretta Verma, Robert Weissler, and Barry Wilson. 1994. A New Approach for Measuring the Operational Value of Intelligence for Military Operations. Santa Monica, California: RAND.

Cheng, Bing and D. M. Titterington. 1994a. "Neural Networks: A Review from A Statistical Perspective," Statistical Science, 9, no 1: 2-30.

Cheng, Bing and D. M. Titterington. 1994b. "Rejoinder," Statistical Science 9, no 1: 49-54.

Chester, Daniel L. 1991. "Why Two Hidden Layers are Better than One," Proceedings of the International Joint Conference on Neural Networks 1:I-265-68.

Cleckner, William. 1994. "Linking Artificial Intelligence and Operations Research: A Comparison of Neural Networks and Statistical Methods." Unpublished paper.

Colletti, Bruce. 1993. "Neural Network Tutorial." Proceedings for Artificial Intelligence Applications for Logistics, Aerospace Systems, Robotics & Personnel 1: 102-8.

Cybenko, George. 1988. Continuous Valued Neural Networks with Two Hidden Layers are Sufficient. Illinois: University of Illinois.

Cybenko, G. 1989. "Approximation by Superposition's of a Sigmoidal Function," Mathematics of Control, Signals, and Systems 2: 303-14.

Davis, Paul and Donald Blumenthal. 1991. The Base of Sand Problem: A White Paper on the State of Military Combat Modeling. Santa Monica, California: RAND.

Davis, Paul and Lou Finch. 1993a. Defense Planning for the Post-Cold War Era. Santa Monica, California: RAND.

Davis, Paul and Richard Hilestad. 1993b. "Families of Models That Cross Levels of Resolution: Issues for Design, Calibration and Management," Proceedings of the 1993 Winter Simulation Conference 1: 1003-12.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Davis, Paul K. 1994. New Challenges for Defense Planning. Santa Monica, California: RAND.

Davis, Paul K. 1995. "Distributed Interactive Simulation in The Evolution of DoD Warfare Modeling and Simulation," Proceedings of the IEEE, 1995, 83, no. 8: 1138-55.

Denker, John S. and Ben S. Wittner. 1988. "Network Generality, Training Required, and Precision Required." Neural Information Processing Systems, ed. Dana Z. Anderson, 219-22. New York: American Institute of Physics.

de Villiers, Jacques and Etienne Barnard. 1992. "Backpropagation Neural Nets with One and Two Hidden Layers," IEEE Transactions on Neural Networks 4, no. 1: 345-53.

Dewar, J. A., J. J. Gillogly, and M. L. Juncosa. 1991. Non-Monotonicity, Chaos and Combat Modeling. Santa Monica, California: RAND.

DeWeerd, Harvey A. 1979. Foreword to The War Game by Garry D. Brewer and Martin Shubick. Massachusetts: Harvard University Press.

Dockery, John T. and A.E.R. Woodcock, ed. 1993. The Military Landscape: Mathematical Models of Combat. Cambridge, England: Woodhead Publishing Limited.

Dupuy, T.N. 1979. Numbers, Predictions and War: Using History to Evaluate Combat Factors to Predict the Outcome of Battles. New York: The Bobbs-Merrill Company.

Dupuy, T.N. ed. 1983. Analysis of Factors That Have Influenced Outcomes of Battles and Wars: A Data Base of Battles and Engagements, Final Report, 7 vols. Dunn Loring, Virginia: Historical Evaluation and Research Organization.

Dupuy, T.N. 1992. The Evolution of Weapons and Warfare. New York: The Bobbs-Merrill Company.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Efron, Bradley. 1983. "Estimating the Error Rate of a Prediction Rule: Improvement on Cross-Validation," Journal of the American Statistical Association 78, no. 382: 316-31.

Efron, Bradley and R. Tibshirani. 1986. "Bootstrap Methods for Standard Errors, Confidence Intervals, and Other Measures of Statistical Accuracy," Statistical Science 1, no. 1: 54-77.

Eklund, Patrick. 1994. "Network Size versus Preprocessing." Fuzzy Sets, Neural Networks, and Soft Computing, ed. R.R. Yager and L.A. Zadeh, 250-64. New York: Van Nostrand Reinhold.

Eldridge, Dwayne L. 1992. "The Use of Neural Networks for Determining Tank Routes," Thesis. Naval Postgraduate School.

Finnoff, William, Ferdinand Hergert, and Hans Georg Zimmermann. 1993. "Improving Model Selection by Nonconvergent Methods," Neural Networks 6: 771-83.

Fogiel, M., ed. 1988. The Statistics Problem Solver. New Jersey: Research and Education Association, 1978; repr., 1988.

Funahashi, Ken-Ichi. 1989. "On the Approximate Realization of Continuous Mappings by Neural Networks," Neural Networks 2: 183-92.

Geeraerts, Gustaaf. 1991. "Basic Research on War: Theoretical Need and Practical Relevance," Bulletin of Peace Proposals 22, no. 3: 346-52.

Geeraerts, Gustaaf. 1994. "War, Hypercomplexity and Computer Simulation," Systems Research 11, no. 4: 53-66.

Girosi, F. and T. Poggio. 1989. "Networks and the Best Approximation Property," Biological Cybernetics 63: 169-76.

Golden, Samuel R. 1991. Chemical and Conventional Casualty Estimation for Commanders, Decision Support System (DSS). Fort Monroe, Virginia: U.S. Army Deputy Chief of Staff for Analysis.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Goldhamer, Herbert. 1979a. Reality and Belief in Military Affairs. Santa Monica, California: RAND.

Goldhamer, Herbert. 1979b. Reality and Belief in Military Affairs: An Inventory of Additional Material in the File of Herbert Goldhamer, 3 vols. Santa Monica, California: RAND.

Gong, Gail. 1986. "Cross-Validation, the Jackknife, and the Bootstrap: Excess Error Estimation in Forward Logistic Regression," Journal of the American Statistical Association 81, no. 393: 108-13.

Gori, Marco and Alberto Tesi. 1992. "On the Problem of Local Minima in Backpropagation," IEEE Transactions on Pattern Analysis and Machine Intelligence 14, no. 1: 76-86.

Happel, Bart L. M. and Jacob M. J. Murre. 1994. "Design and Evolution of Modular Neural Network Architectures," Neural Networks 7, no. 6-7: 985-1004.

Hart, Anna. 1992. "Using Neural Networks for Classification Tasks: Some Experiments on Datasets and Practical Advice," Journal of the Operational Research Society 43, no. 3: 215-26.

Hastie, Trevor, Robert Tibshirani, and Andreas Buja. 1994. "Flexible Discriminant Analysis by Optimal Scoring," Journal of the American Statistical Association 89, no. 428.

Helmbold, Robert L. and Aqeel A. Khan. 1986. Combat History Analysis Study Effort (CHASE): Progress Report for the Period August 1984-1985. Bethesda, Maryland: U.S. Army Concepts Analysis Agency.

Helmbold, Robert L. 1987. Do Battles and Wars Have A Command Relationship Between Casualties and Victory? Bethesda, Maryland: U.S. Army Concepts Analysis Agency.

Helmbold, Robert L. 1990a. A Survey of Past Work on Rates of Advance in Land Combat Operations. Bethesda, Maryland: U.S. Army Concepts Analysis Agency.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Helmbold, Robert L. 1990b. Rates of Advance in Historical Land Combat Operations. Bethesda, Maryland: U.S. Army Concepts Analysis Agency.

Helmbold, Robert L. 1992a. "Direct and Inverse Solution of the Lanchester Square Law with General Reinforcement Schedules," European Journal of Operational Research 77: 486-95.

Helmbold, Robert L. 1992b. Foundations of the General Theory of Volley Fire. Bethesda, Maryland: U.S. Army Concepts Analysis Agency.

Helmbold, Robert L. 1993a. "Osipov: The Russian Lanchester," European Journal of Operational Research 65: 278-88.

Helmbold, Robert L. 1993b. Personnel Attrition Rates In Historical Land Combat Operations: An Annotated Bibliography. Bethesda, Maryland: U.S. Army Concepts Analysis Agency.

Hornik, Kurt, Maxwell Stinchcombe, and Halbert White. 1989. "Multilayer Feedforward Networks are Universal Approximators," Neural Networks 2: 359-66.

Hornik, Kurt, Maxwell Stinchcombe, and Halbert White. 1990. "Universal Approximation of an Unknown Mapping and Its Derivatives Using Multilayer Feedforward Networks," Neural Networks 3: 551-60.

Hornik, Kurt. 1991. "Approximation Capabilities of Multilayer Feedforward Networks," Neural Networks 4: 251-57.

Hosmer Jr., David W. and Stanley Lemeshow 1989. Applied Logistic Regression. New York: John Wiley & Sons.

Huang, William Y. and Richard P. Lippmann. 1988. "Neural Net and Traditional Classifiers." Neural Information Processing Systems, ed. Dana Z. Anderson, 387-96. New York: American Institute of Physics.

Hurrion, R. D. 1992. "Using a Neural Network to Enhance the Decision Making Quality of a Visual Interactive Simulation Model," Journal of the Operational Research Society 43, no. 4: 333-41.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Hush, Don R. and Bill G. Horne. 1993. "Progress in Supervised Neural Networks: What's New Since Lippmann?" IEEE Signal Processing 10, no. 1: 8-39.

Jacobs, Derya and Oliver Hedgepeth 1995. "Regression and Neural Network Approaches in Evaluation of Historical Combat," Proceedings of the 1995 Summer Computer Simulation Conference, 495-99.

Jacobson, Sheldon H. and Lee W. Schruben. 1989. "Techniques for Simulation Response Optimization," Operations Research Letters 8: 1-9.

Kamgar-Parsi, Behzad and J. Anthony Gualtieri. 1990. "Clustering Taxonomic Data With Neural Networks," Proceedings of the International Joint Conference on Neural Networks 1: I-277-80.

Kelkar, Shubhangi U. 1992. "Formant Estimation From DCTC's Using A Feedforward Neural Network." Ph.D. diss. Old Dominion University.

Kerlinger, Fred N. 1986. Foundations of Behavioral Research, 3rd. ed., Fort Worth: Holt, Rinehart and Winston, Inc.

Kilmer, Robert A. and Alice E. Smith. 1993. "Using Artificial Neural Networks to Approximate A Discrete Event Stochastic Simulation Model," Intelligent Engineering Systems Through Artificial Neural Networks 3: 632-36.

Kilmer, Robert A. 1994a. "Artificial Neural Network Metamodels of Stochastic Computer Simulations." Ph.D. diss., University of Pittsburgh.

Kilmer, Robert A. 1994b. "Applications of Artificial Neural Networks to Combat Simulations." Unpublished paper.

Kilmer, Robert A., Alice E. Smith, and Larry J. Shuman. 1994. "Neural Networks As A Metamodeling Technique For Discrete Event Stochastic Simulation." Unpublished paper.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Kilmer, Robert A. 1995. "Applications of Artificial Neural Networks to Combat Simulations." Unpublished paper.

Kleijnen, Jack P. C. 1979. "Regression Metamodels for Generalizing Simulation Results," IEEE Transactions on Systems, Man, and Cybernetics 9, no. 2: 93-96.

Kohonen, Teuvo, Gyorgy Barna, and Ronald Chrisley. 1988. "Statistical Pattern Recognition with Neural Networks: Benchmarking Studies," IEEE International Conference on Neural Networks 1: I-61-68.

Kreinovich, Vladik Ya. 1991. "Arbitrary Nonlinearity Is Sufficient to Represent All Functions by Neural Networks: A Theorem," Neural Networks 4: 381-83.

Lapedes, Alan and Robert Farber. 1988. "How Neural Nets Work." Neural Information Processing Systems, ed. Dana Z. Anderson, 442-56. New York: American Institute of Physics.

Launsby, Robert G. and David L. Hallowell. 1994. Advanced Experimental Design Using Neural Networks. Fairfax, Virginia: National Technological University.

Leonard, J.A., M.A. Kramer, and L.H. Ungar. 1992. "Using Radial Basis Functions to Approximate a Function and Its Error Bounds," IEEE Transactions on Neural Networks 3, no. 4: 624-27.

Lippmann, Richard P. 1991. "An Introduction to Computing with Neural Nets," IEEE Acoustics, Speech, and Signal Processing 4: 4-22.

MacDonald, Charles B., William M. Glasgow, Jr., George H. Russell, and Graham M. Sibbles. 1987. Independent Review/Reassessment of Anomalous Data, 4 vols. Bethesda, Maryland: Concepts Analysis Agency.

McClelland, James L. 1994. "Comment: Neural Networks and Cognitive Science: Motivation and Applications," Statistical Science 9, no 1: 42-45.

McQuie, Robert. 1988. Historical Characteristics of Combat for Wargames (Benchmarks). Bethesda, Maryland: U.S. Army Concepts Analysis Agency.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Morrison, John D. 1992. "A 'Neural' Network Model That Supports Realtime Learning of Temporal Relationships in Complex Engineering Domains," Simulation 59. no. 3: 152-63.

Murphy, John H. 1990. "Probability-based Neural Networks," Proceedings of the International Joint Conference on Neural Networks 1:I-451-54.

Myers, Raymond H., Andre I. Khuri and Walter H. Carter, Jr. 1989. "Response Surface Methodology: 1966-1988," Technometrics 31, no.2: 137-57.

Nelson, Marilyn McCord and W. T. Illingworth. 1990. A Practical Guide to Neural Nets. Reading, Massachusetts: Addison-Wesley Publishing.

Neuralyst. 1994. User's Guide, Pasadima, CA: Cheshire Engineering Corporation.

Oswalt, Ivar. 1993. "Current Applications, Trends, and Organizations in U. S. Military Simulation and Gaming," Simulation & Gaming 24, no.2: 153-89.

Padgett, Mary Lou and Thaddeus A. Roppel. 1992. "Neural Networks and Simulation: Modeling for Applications," Simulation 58, no. 5: 295-305.

Pasmore, William A. 1988. Designing Effective Organizations: The Sociotechnical Systems Perspective. New York: John Wiley & Sons.

Perrone, Michael P. and Leon N. Cooper. 1993. "Learning from What's Been Learned: Supervised Learning in Multi -Neural Network Systems," World Congress on Neural Networks 3: 354-57.

Poggio, Tomaso and Federico Girosi. 1989. A Theory of Networks for Approximation and Learning. Artificial Intelligence Memorandum No. 1140. C.B.I.P. Paper No. 31. Cambridge, Massachusetts: MIT.

Raghaven, Dr. Srinivasan and Dr. Laveen N. Kanal. 1992. Neural Networks and Applications. Arlington, Virginia: LNK Corporation, Inc.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Rakoff, Stuart H., Kathryn B. Laskey, F. Freeman Marvin, and Jeffrey S. Mandel. 1991. Conceptual Models of Unit Performance. ARI Research Note 91-19. Monterey, California: U. S. Army Research Institute for the Behavioral and Social Sciences.

Ripley, B.D. 1994. Comment to "Neural Networks: A Review from A Statistical Perspective" by Bing Cheng and D.M. Titterington Statistical Science 9, no 1: 45-48.

Sharda, Ramesh. 1994. "Neural Networks for the MS/OR Analyst: An Application Bibliography," Interfaces 24, no. 2: 116-30.

Simon, Herbert A. 1990. "Prediction and Prescription in Systems Modeling," Operations Research 38, no. 1: 7-14.

Siu, K.Y., V. Roychowdhury, and T. Kailath. 1992. "Rational Approximation, Harmonic Analysis and Neural Network," Proceeding of the International Joint Conference on Neural Networks, 1: I-121-26.

Stockfisch, J.A. 1975. Models, Data, and War: A Critique of the Study of Conventional Forces. Santa Monica, California: RAND.

Sung, C.C. and John L. Johnson. 1990. Neural Networks. Alabama: U.S. Army Missile Command.

Tibshirani, Robert. 1994. Comment to "Neural Networks: A Review from A Statistical Perspective" by Bing Cheng and D.M. Titterington Statistical Science 9, no 1: 48-49.

Twomey, Janet M. and Alice E. Smith. 1993. "Nonparametric Error Estimation Methods for Evaluating and Validating Artificial Neural Network Prediction Models," Intelligent Engineering Systems Through Artificial Neural Networks 3, ASME Press: 233-38.

Twomey, Janet M., Alice E. Smith, and Mark S. Redfern. 1994. "A Predictive Model for Slip Resistance Using Artificial Intelligence." Paper submitted for IEEE Transactions.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Ward, David G., Roger L. Barron, and B. Eugene Parker, Jr. 1993. Application of Polynomial Neural Networks to Classification of Acoustic Warfare Signals. Arlington, Virginia: Department of the Navy.

Weiss, Sholom M. and Casimir A. Kulikowski. 1991. Computer Systems That Learn. San Mateo, California: Morgan Kaufmann Publishers, Inc.

White, Halbert. 1989. "Learning in Artificial Neural Networks: A Statistical Perspective," Neural Computation 1, no. 1: 425-64.

Wiggins, Vince L., Jeff Grobman, and Larry T. Looper. 1993. "Statistical Neural Network Analysis Package (SNNAP) Overview and Demonstration of Facilities," Proceedings for Artificial Intelligence Applications for Logistics Aerospace Systems, Robotics & Personnel 1: 109-20.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

APPENDIX A

CONVERTED DATA BASE FOR 400 YEARS OF BATTLE

Input #1. 1st Width of Front. The attacker 1st Width of Front is divided by that of the defender. The result is a numeric ratio. The rules followed to translate the raw input data are:

a. If attacker and defender are positive, then divide attacker by defender.

b. If the defender is -1 indicating an unknown value for the defender, then indicate this by a 0 value.

c. If attacker and defender are both -1, indicating that both values are unknown, then leave as -1.

There are no battles when the attacker front is unknown and the defender known.

Input #2. Defensive Posture Type. The defensive posture type is coded in the historical database as a 0, 1, 2 or 9. The rules followed to translate this data to an interval scale are:

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

a. 0 means at most one defensive posture type

b. 1 means a combination of postures involving two distinct or separate defensive postures

c. 2 means an average of two or more posture types

d. 3 means more than one posture, but information about whether or not it is able to be averaged is not available

Input #3. Defender's Primary Defensive Posture Type. The original data was symbolic, which has been translated into an interval scale. The codes used are:

a. 0 means hasty defense

b. 1 means prepared defense

c. 2 means fortified defense

d. 3 means delaying action

e. 4 means withdrawal

f. -1 means unknown or uncertainty in the information

The unknown value of -1 is consistent with other data items measuring uncertainty.

Input #4. Terrain. The original data was symbolic and has not been converted. Since different terrain can have different effects on attackers and defenders during

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

different parts of the battle, and since many battles are over large areas, a numeric coding scheme is not appropriate. The symbolic coding system uses a 0 for uncertainty with terrain. The code is composed of a finite combination of letters and 0's. The coding scheme is:

a. First character:

(1) G means rugged

(2) R means rolling

(3) F means flat

(4) O means unknown

b. Second character:

(1) W means heavily wooded

(2) M means mixed

(3) B means bare

(4) D means desert

(5) O means unknown

Input #5. Weather. Weather data are also symbolic. There are four characters used to describe the battlefield weather. A O is used for unknown information. The codes used are:

a. First character:

(1) W means wet

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

(2) D means dry

(3) O means unknown

b. Second character:

(1) H means heavy precipitation

(2) L means light precipitation

(3) 0 means no precipitation and overcast

(4) S means no precipitation and sunny

(5) O means unknown

c. Third character:

(1) H means hot

(2) T means temperate

(3) C means cold

(4) O means unknown

d. Fourth character:

(1) E means tropical

(2) D means desert

(3) T means temperate

(4) O means unknown

Input #6. Attacker's Surprise Over Defender's Awareness. Relative surprise achieved by the attacker is coded along a range from +3 to -3 in the original data, with 9 representing unknown information. The +3 is complete

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

surprise, which means total awareness on the attacker's part and no awareness for the defender. The only data change considered was the unknown value of 9, which is changed to -9 to place it at a distance from the +3 to -3 range of values. However, there were no 9 values found in the original data. So the degree of uncertainty was not recorded. The coding scheme is:

a. +3 means attacker had complete surprise
b. +2 means attacker had substantial surprise
c. +1 means attacker had minor surprise
d. 0 means there was no surprise
e. -1 means defender had minor surprise
f. -2 means defender had substantial surprise
g. -3 means defender had complete surprise
h. -9 means unknown information about surprise

Using this input as an initial battle data item is open to argument. Some military operations planners argue that it is, and some that it is not, measurable. For this experiment, the assumption is that it is a measurable variable for military operations planning.

<u>Input #7. Total Personnel Strength of Attacker and Defender.</u> This is a numeric value, a ratio of the number of attackers divided by the number of defenders for the entire

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

conflict. Since all original data values are positive, the coding system does not have an uncertainty code.

Input #8. Initial Personnel Strength of Attacker and Defender. This is a numeric value, a ratio of the number of attackers to number of defenders at the start of the conflict. The ratio coding scheme is:

a. If attacker and defender are known, then divide by defender.

b. If attacker is known and defender unknown, use a value of 0.

c. If attacker is unknown and defender is known, use a value of 0.

d. If both attacker and defender values are unknown, use -1.

Input #9. Horse Cavalry of the Attacker and Defender. This is a numeric value, a ratio of the number of horse cavalry of the attacker divided by those of the defender. This is the first of the technology sensitive data items. The coding scheme used is:

a. If attacker and defender are both known, use a ratio of the attacker divided by the defender value.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

b. If the attacker is known and the defender unknown, use 0.

c. If the attacker is unknown and the defender known, use 0.

d. If both attacker and defender are unknown, use -1.

e. If there is no information about either, use -9.

Input #10. Total Tanks of the Attacker and Defender. This is a numeric value, a ratio of the number of attacker tanks divided by the defender tanks. Due to the diversity in the coding of this data item, the coding scheme is more complex than for previous data items. The coding scheme is:

a. If the attacker and defender are known, use a ratio of the attacker divided by the defender value.

b. If the attacker is known and the defender is unknown, use 0.

c. If the attacker is unknown and the defender is known, use 0.

d. If both are 0 or unknown, use -1.

e. If the attacker is known and the defender is 0, use +9.

f. If the attacker is 0 and the defender is known, use 0.1.

g. If both have no value, use -9.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Input #11. Lite Tanks of the Attacker and Defender. This is a numeric value, a ratio of the lite tanks of the attacker divided by the defender. The same coding scheme used for Input #10 is used for Input #11, due to the similarity of the weapon and the original coding of the data.

Input #12. Main Battle Tanks of the Attacker and Defender. This is a numeric value, a ratio of the main battle tanks of the attacker divided by the defender. The same coding scheme used for Input #10 is used for Input #12, due to the similarity of the weapon and the original coding of the data.

Input #13. Number of Artillery Tubes of the Attacker and Defender. This is a numeric value, a ratio of the number of artillery tubes of the attacker divided by those of the defender. The same coding scheme used for Input #10 is used for Input #13, due to the similarity of the weapon and the original coding of the data.

Input #14. Close Air Support Sorties of the Attacker and Defender. This is a numeric value, a ratio of the number of air sorties of the attacker divided by those of the

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

defender. The same coding scheme used for Input #10 is used for Input #14, due to the similarity of the weapon and the original coding of the data.

Input #15. Relative Combat Effectiveness of Attacker and Defender. This is a scaled numeric value. The coding scheme is:

a. +4 means attacker is very strongly favored
b. +3 means attacker is strongly favored
c. +2 means attacker is favored
d. +1 means attacker is somewhat favored
e. 0 means neither attacker nor defender is favored
f. -1 means defender is somewhat favored
g. -2 means defender is favored
h. -3 means defender is strongly favored
i. -4 means defender is very strongly favored
j. -9 means unknown information

Input #16. Relative Leadership Advantage of Attacker and Defender. The coding scheme is the same as used for Input #15.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Input #17. Relative Training Advantage of Attacker and Defender. The coding scheme is the same as used for Input #15.

Input #18. Relative Morale Advantage of Attacker and Defender. The coding scheme is the same as used for Input #15.

Input #19. Relative Logistics Advantage of Attacker and Defender. The coding scheme is the same as used for Input #15.

Input #20. Relative Momentum Advantage of Attacker and Defender. The coding scheme is the same as used for Input #15.

Input #21. Relative Intelligence Advantage of Attacker and Defender. The coding scheme is the same as used for Input #15.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Input #22. Relative Technology Advantage of Attacker and Defender. The coding scheme is the same as used for Input #15.

Input #23. Relative Initiative Advantage of Attacker and Defender. The coding scheme is the same as used for Input #15.

Input #24. Attacker's Primary Tactical Scheme, Part I. This is a symbolic value. The coding scheme is:

a. FF means frontal attack

b. EE means single envelopment

c. DE means double envelopment

d. FE means feint, or demonstration, or a holding attack

e. DD means defensive plan

f. DO means defensive and/or offensive plan

g. LF means left flank

h. RF means right flank

i. LR means left rear

j. RR means right rear

k. PP means penetration

l. RC means river crossing

m. OO means unknown

n. 0 also means unknown

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Input #25. Attacker's Primary Tactical Scheme, Part II.
This is a symbolic value. The coding scheme is the same as for Input #24.

Input #26. Attacker's Primary Tactical Scheme, Part III.
This is a symbolic value. The coding scheme is the same as for Input #24.

Input #27. Defender's Primary Tactical Scheme, Part I.
This is a symbolic value. The coding scheme is the same as for Input #24.

Input #28. Defender's Primary Tactical Scheme, Part II.
This is a symbolic value. The coding scheme is the same as for Input #24.

Input #29. Defender's Primary Tactical Scheme, Part III.
This is a symbolic value. The coding scheme is the same as for Input #24.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

DUE TO THE SMALL PRINT
THIS REPRODUCTION IS THE
BEST COPY AVAILABLE.
FILMED AS RECEIVED.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

BATTLE SEQUENCE NUMBER	INPUT #1 1ST WIDTH FRONT ATK/DEF RATIO	INPUT #2 DEFENSIVE POSTURE TYPE 0,1,2,3	INPUT #3 DEFENDERS PRIMARY DEFENSIVE POSTURE	INPUT #4 TERRAIN	INPUT #5 WEATHER	INPUT #6 ATTACKER'S SURPRISE OVER DEFENDER'S AWARENESS	INPUT #7 TOTAL PERS STR ATK/DEF RATIO	INPUT #8 INIT PERS STR ATK/DEF RATIO	INPUT #9 HORSE CAV ATK/DEF RATIO	INPUT #10 TOT TANK ATK/DEF RATIO	INPUT #11 LITE TANK ATK/DEF RATIO	INPUT #12 MAIN BTTL TANK ATK/DEF RATIO	INPUT #13 NO. ARTY TUBE ATK/DEF RATIO	INPUT #14 CLOSE AIR SPT SORTS ATK/DEF	INPUT #15 RELATIVE COMBAT EFFECT. ATK (+) TO DEF (-)	INPUT #16 RELATIVE LEADERSHIP ADVANTAGE ATK (+) TO DEF (-)	INPUT #17 RELATIVE TRAINING ADVANTAGE ATK (+) TO DEF (-)
---	---	---	--	---	-----	--	--	--	--	--	--	--	--	--	--	--	--
1	1	0	0	RBD	DSTT	0	1.0176991	1.0176991	1.0714286	-9	-9	-9	1.3333333	-9	-1	-1	0
2	1	1	0	RMO	DSTT	0	1.9047619	1.9047619	0.6818182	-9	-9	-9	1.2	-9	0	0	0
3	1.3214286	0	0	RMO	DSHT	0	1	1	1	-9	-9	-9	0.2	-9	0	1	0
4	-1	0	1	RMO	DSTT	-1	0.53125	0.53125	0.25	-9	-9	-9	0	-9	0	-1	0
5	-1	0	0	RMO	DSTT	0	0.85	0.85	0.7	-9	-9	-9	0.5454545	-9	0	1	0
6	0.8888889	0	0	RMO	DSTT	0	0.8454425	0.8454425	0.8560311	-9	-9	-9	0.26	-9	0	-1	0
7	0.3809524	0	1	RMO	DSTT	0	1.2222222	1.2222222	-1	-9	-9	-9	0	-9	0	1	0
8	0.8518519	0	1	GMO	WLTT	0	0.7666667	0.7666667	1.2307692	-9	-9	-9	-1	-9	0	0	0
9	0.9166667	0	0	RMO	DSTT	0	0.8725769	1.132737	0.675	-9	-9	-9	2.4	-9	0	1	0
10	0.5	0	1	RMO	DSTT	0	0.7142857	0.7142857	0.6666667	-9	-9	-9	1.6	-9	0	1	0
11	1.4666667	0	1	RMO	DSTT	1	0.7333333	0.7333333	0.8571429	-9	-9	-9	0	-9	1	1	0
12	1	0	0	RMO	DSTT	0	0.8333333	0.8333333	1.25	-9	-9	-9	1.5217391	-9	0	1	0
13	1.3333333	0	0	RMO	DSTT	0	0.8846154	0.8846154	1	-9	-9	0.6666667	0.6666667	-9	0	2	0
14	1.5	0	0	RMO	DSTT	2	1.2222222	1.2222222	0.625	-9	-9	0	0	-9	0	2	0
15	1	0	1	GMO	DSTT	0	1.1875	1.1875	1	-9	-9	1.3214286	1.3214286	-9	0	0	0
16	1	0	0	GMO	DSTT	3	1	1	1.1111111	-9	-9	-9	0.325	-9	0	-1	0
17	1	0	0	RMO	DSTT	3	0.9090909	0.9090909	1	-9	-9	0	0	-9	0	1	0
18	1	0	1	RMO	DSTT	0	1.125	1.125	1	-9	-9	-9	0	-9	0	0	0
19	0.5714286	0	0	RMO	DSTT	2	0.7777778	0.7777778	0.625	-9	-9	0	0	-9	0	1	0
20	1	0	0	RMO	DSTT	0	0.9616678	0.9616678	1.4	-9	-9	-9	1.3333333	-9	0	0	0
21	1	0	0	RMO	WHTT	0	1.5428571	1.5428571	1.3846154	-9	-9	-9	1.5625	-9	0	1	0
22	1	0	0	RMO	DSTT	0	2.2666667	2.2666667	0	-9	-9	-9	9	-9	-1	-1	0
23	1	0	0	RMO	DSTT	0	0.7205882	0.7205882	0.625	-9	-9	-9	-9	-9	0	1	0
24	1.4	1	0	RMO	DSTT	0	2.2	2.2	4.75	-9	-9	-9	-1	-9	0	0	0
25	1	0	0	RMO	DSTT	0	0.6923077	0.6923077	0.8333333	-9	-9	-9	0.9230769	-9	0	-1	0
26	1.6666667	0	0	RMO	WHTT	2	0.4285714	0.4285714	0.8333333	-9	-9	-1	-1	-9	1	2	1
27	0.6666667	0	0	RMO	WLTT	2	0.5	0.5	0.5833333	-9	-9	-9	0	-9	0	1	1
28	1	1	0	RMO	DSTT	0	1.75	1.75	2.25	-9	-9	-9	-1	-9	1	1	1
29	1	1	0	OOU	DSHT	0	2	2	-1	-9	-9	-9	0	-9	0	0	0
30	0.9090909	0	0	RBD	DSTT	1	1.25	1.25	0.8571429	-9	-9	-9	0	-9	1	2	0
31	0.9268293	0	0	RMO	DSTT	0	2	2	2	-9	-9	-9	0.8	-9	-1	-1	-1
32	1.1	1	0	RMO	DSTT	2	0.7102804	0.7102804	0.7234043	-9	-9	-9	0.372	-9	1	1	1
33	-1	0	1	RMO	WLCT	3	0.625	0.625	-1	-9	-9	-9	-1	-9	1	1	0
34	1	0	0	RMO	DSTT	0	1.2666667	1.2666667	1	-9	-9	-9	9	-9	0	2	0
35	1	0	0	RMO	DSTT	2	0.7142857	0.7142857	1	-9	-9	-9	-1	-9	0	1	0
36	0.8	1	0	RMO	WHTT	0	0.6940063	0.6940063	0.6898552	-9	-9	-9	0.5172414	-9	0	1	0
37	-1	0	0	RMO	DSTT	1	1.1	1.1	-1	-9	-9	-1	-1	-9	0	1	0
38	1.7	0	0	RMO	DSTT	0	0.9375	0.9375	0.9375	-9	-9	-9	0.3421053	-9	0	1	0
39	0.6666667	0	0	FMO	WLTT	1	1.3333333	1.3333333	1.5686275	-9	-9	-9	0.25	-9	-1	-1	-1
40	1	0	0	GMO	DSTT	0	0.8235294	0.8235294	0	-9	-9	-9	0	-9	0	1	-1
41	1	0	0	RMO	DSTT	0	0.6857143	0.6857143	-1	-9	-9	-9	0	-9	0	-1	0
42	-1	0	0	RMO	DSTT	0	1.3157895	1.3157895	-1	-9	-9	-9	-1	-9	0	1	0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INPUT #18 RELATIVE MORALE ADVANTAGE ATK (+) TO DEF (-)	INPUT #19 RELATIVE LOGISTICS ADVANTAGE ATK (+) TO DEF (-)	INPUT #20 RELATIVE MOMENTUM ADVANTAGE ATK (+) TO DEF (-)	INPUT #21 RELATIVE INTELL. ADVANTAGE ATK (+) TO DEF (-)	INPUT #22 RELATIVE TECHNOLOGY ADVANTAGE ATK (+) TO DEF (-)	INPUT #23 RELATIVE INITIATIVE ADVANTAGE ATK (+) TO DEF (-)	INPUT #24 ATTACKER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #25 ATTACKER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #26 ATTACKER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #27 DEFENDER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #28 DEFENDER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #29 DEFENDER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #30 CASUALTY RATIO ATK/DEF	OUTPUT #1 ATTACKER WIN (1) LOSS(0)
..	..	..	..	..	..	..	..	..	..	..	..	..	..
0	0	1	0	0	1	FF	00	00	DO	FF	00	4	0
0	0	1	0	0	1	FF	00	00	DO	FF	00	0.08	1
0	0	-1	0	0	0	FF	00	00	DD	00	00	0.862069	1
0	0	0	-1	0	-1	FF	00	00	DO	DE	00	3	0
1	0	1	0	0	0	FF	00	00	DO	00	00	0.2857143	1
0	0	0	0	0	0	FF	EE	LF	DO	EE	LR	2.2295082	0
0	0	0	0	0	1	FF	00	00	DO	FF	00	0.3333333	1
0	0	0	0	0	0	FF	00	00	DO	FF	00	2	0
0	0	0	0	0	1	FF	00	00	DO	FF	00	0.8	1
0	0	0	0	0	0	EE	RF	00	DO	00	00	6	0
0	0	0	0	0	1	EE	RF	00	DO	FF	00	0.3888889	1
0	0	0	0	0	1	EE	LF	00	DO	EE	RF	0.3333333	1
0	0	1	1	0	1	EE	LF	00	DO	FF	00	0.2857143	1
0	0	0	1	0	1	FF	00	00	DD	00	00	0.1428571	1
0	0	0	1	0	1	FF	00	00	DD	00	00	2	1
0	0	0	0	0	1	FF	00	00	DD	00	00	4.25	0
0	0	0	1	0	1	FF	00	00	DD	00	00	0.2	1
0	0	0	0	0	1	FF	00	00	DO	EE	RF	1.25	1
0	0	0	1	0	1	DE	00	00	DO	EE	RF	0.4	1
0	0	0	0	0	1	FF	00	00	DO	FF	00	1	1
0	0	0	0	0	0	FF	00	00	DO	FF	00	0.25	1
0	0	0	0	0	0	FF	00	00	DO	FF	00	3000	0
0	0	0	0	0	1	FF	00	00	DD	00	00	0.001	1
0	0	0	0	0	1	FF	00	00	DD	00	00	1	0
0	0	0	0	0	1	FF	00	00	DO	FF	00	6	0
0	0	0	1	0	1	FF	DE	00	DD	00	00	0.06	1
0	0	0	0	0	1	EE	RF	00	DD	00	00	0.0023077	1
0	0	0	0	0	1	FF	00	00	DO	FF	00	0.1111111	1
0	0	0	0	0	1	FF	00	00	DD	00	00	2	1
0	0	0	0	0	1	EE	RF	00	DO	FF	00	0.2857143	1
0	0	0	0	0	0	FF	00	00	DO	DE	00	4	0
0	0	0	0	0	1	EE	RF	00	DD	00	00	0.2	1
0	0	0	0	0	1	FF	00	00	DD	00	00	0.0333333	1
0	0	0	0	0	1	FF	00	00	DO	FF	00	0.6	1
0	0	0	0	0	1	FF	00	00	DD	00	00	0.7142857	1
0	0	0	0	0	0	FF	00	00	DO	FF	EE	1.4	0
0	0	0	1	0	1	EE	RF	00	DD	00	00	0.3235294	1
0	0	0	0	0	1	FF	00	00	DO	FF	00	0.2	1
0	0	0	0	0	1	FF	00	00	DO	DE	00	5	0
0	0	0	0	0	2	FF	00	00	DD	00	00	0.3157895	1
0	0	0	0	0	0	FF	00	00	DO	DE	00	15.384615	0
0	0	0	0	0	1	DE	00	00	DD	00	00	0.3157895	1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

BATTLE SEQUENCE NUMBER	INPUT #1 1ST WIDTH FRONT ATK/DEF RATIO	INPUT #2 DEFENSIVE POSTURE TYPE 0,1,2,3	INPUT #3 DEFENDER'S PRIMARY DEFENSIVE POSTURE	INPUT #4 TERRAIN	INPUT #5 WEATHER	INPUT #6 ATTACKER'S SURPRISE OVER DEFENDER'S AWARENESS	INPUT #7 TOTAL PERS STR ATK/DEF RATIO	INPUT #8 INIT PERS STR ATK/DEF RATIO	INPUT #9 HORSE CAV ATK/DEF RATIO	INPUT #10 TOT TANK ATK/DEF RATIO	INPUT #11 LITE TANK ATK/DEF RATIO	INPUT #12 MAIN BTTL TANK ATK/DEF RATIO	INPUT #13 NO. ARTY TUBE ATK/DEF RATIO	INPUT #14 CLOSE AIR SPT SORTS ATK/DEF	INPUT #15 RELATIVE COMBAT EFFECTIVENES ATK (+) TO DEF (-)	INPUT #16 RELATIVE LEADERSHIP ADVANTAGE ATK (+) TO DEF (-)	INPUT #17 RELATIVE TRAINING ADVANTAGE ATK (+) TO DEF (-)
...	...	...	..	...	.....	..	..	..	..	..	..	..	..	..	..	..	..
43	1.6	0	0	RMO	DSTT	0	1.5217391	1.5217391	1.6	-9	-9	-9	8.3333333	-9	0	1	0
44	1.3333333	1	0	RMO	DSTT	0	0.72	0.72	-1	-9	-9	-9	0	-9	0	0	0
45	0.4615385	1	0	GMO	WLTT	0	1.1052632	1.1052632	1.25	-9	-9	-9	1.1666667	-9	0	-1	0
46	0.6627906	1	0	RMO	DSTT	0	1.6	1 6	1.45	-9	-9	-9	0.8452381	-9	0	1	0
47	-1	0	0	RMO	DSTT	0	1.1111111	1.1111111	0.9090909	-9	-9	-9	0.9677419	-9	0	1	0
48	1 5555556	0	1	FMO	DSTT	1	0.5	0.5	0.4	-9	-9	0.3	0.3	-9	1	1	1
49	0.375	0	1	RMO	DSTT	0	0.26875	0.26875	1	-9	-9	-9	0.04	-9	1	0	1
50	0.9014085	0	0	RMO	DSTT	0	0.9285714	0 9285714	1.1764706	-9	-9	-9	0.6666667	-9	0	2	0
51	0.9230769	1	0	RMO	DSTT	0	1 0333333	1 0333333	0.9411765	-9	-9	-9	1.7142857	-9	0	2	0
52	1.0666667	0	0	RMO	DSTT	0	0.9411765	0.9411765	1.05	-9	-9	-9	0.64	-9	0	2	0
53	0.8318182	0	1	RMO	DSTT	0	1.375	1.375	1	-9	-9	-9	1.6666667	-9	0	0	0
54	-1	0	0	RMO	DSTT	0	1.05	1.05	1.1	-9	-9	-9	0	-9	1	1	1
55	0.627907	0	0	RMO	WLCT	0	0.8227273	0 8227273	2	-9	-9	-9	0.38	-9	-1	-1	0
56	0 9189189	0	0	RMO	DSTT	1	1.1836735	1 1836735	1.4285714	-9	-9	-9	0.4878049	-9	-1	-1	0
57	1.0454545	0	0	RMO	DSTT	0	1 3461538	1.3461538	2	-9	-9	-9	1.75	-9	1	0	0
58	0.7	1	0	RMO	DSTT	0	0.8333333	0.8333333	0.6666667	-9	-9	-9	1.01	-9	0	-1	0
59	0 8727273	0	0	RMO	DSTT	1	0.7575758	0 7575758	0.9045455	-9	-9	-9	1.5867769	-9	2	1	0
60	1 09375	0	0	RMO	DSTT	0	0.5502927	0.5502927	0.4607874	-9	-9	-9	0 6122449	-9	2	1	0
61	1.4666667	0	0	RMO	DSTT	2	0 9935897	0 9935897	1.2857143	-9	-9	-9	0.7857143	-9	2	2	0
62	0 75	0	0	RMO	DSTT	2	1.0909091	1.0909091	0.1	-9	-9	0.0833333	0.1666667	-9	0	1	-2
63	0.4666667	0	0	RMO	WLCT	0	0.6	0.6	0	-9	-9	-9	0.75	-9	0	-1	-2
64	0 5714286	0	0	RMO	DSTT	0	0.8405797	0 8405797	1.44	-9	-9	-9	1.0319149	-9	0	1	0
65	0.9230769	0	0	RMO	DSTT	0	1.0483871	1.0483871	1.3492063	-9	-9	-9	1.2090395	-9	0	1	0
66	4.5714286	0	0	RMO	WHTE	0	16 823529	16.823529	9	-9	-9	-9	4.4166667	-9	-1	-1	-1
67	0.8125	0	0	RMO	DSTT	0	0.7272727	0 7272727	1	-9	-9	-9	0.6068966	-9	0	1	0
68	0.55	0	1	RMO	DSHT	0	1.6666667	1 6666667	2	-9	-9	1.2142857	2 4285714	-9	0	0	0
69	0.675	0	0	RMO	DSTT	-2	1.9090909	1 9090909	1.8518519	-9	-9	-9	1.4556962	-9	-1	-1	-1
70	0.5657895	0	0	RMO	WLTT	2	0.5076923	0 5076923	0.7857143	-9	-9	0.7952381	0.7952381	-9	1	1	0
71	1 4	0	0	FMO	DSTT	1	0.64	0.64	-1	-9	-9	-1	-1	-9	0	1	0
72	0.7083333	0	0	RMO	DSTT	0	0.8314088	0.8314088	1.6452523	-9	-9	-9	0 8391304	-9	1	1	1
73	1.3333333	0	1	RMO	WLTT	2	2.5806452	2 5806452	2.8	-9	-9	1.7	1 7	-9	0	0	0
74	1	1	0	RMO	DSTT	0	0.8	0.8	-1	-9	-9	-9	0 4666667	-9	0	0	0
75	1	0	0	RMO	WHTT	0	0.75	0.75	-1	-9	-9	-9	1 1	-9	1	1	0
76	0 84375	0	1	RBO	DSHT	0	0.8554622	0.8554622	1.3	-9	-9	-9	0 9677419	-9	0	0	0
77	0.8333333	0	0	RMO	DSTT	0	0.9375	0.9375	-9	-9	-9	-9	-1	-9	0	0	0
78	-1	0	0	RMO	DSTT	0	2.8148148	2.8148148	-1	-9	-9	0	0	-9	0	0	0
79	0.78125	0	0	RMO	WLTT	2	1.1176471	1 1176471	1.425	-9	-9	-9	-1	-9	0	0	0
80	0.6	0	0	RMO	DSTT	0	1	1	1.2	-9	-9	-9	1.0833333	-9	0	-1	0
81	0.7017544	0	1	RMO	WLCT	0	0.9363296	0.9363296	0.6	-9	-9	0	0	-9	0	0	0
82	0.7142857	1	0	RMO	DSTT	0	0.828125	0 828125	-9	-9	-9	-9	0	-9	1	0	2
83	1	0	2	OOU	WLCT	0	0.6111111	0 6111111	-1	-9	-9	-9	0.0714286	-9	0	0	-2

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INPUT #18 RELATIVE MORALE ADVANTAGE ATK (+) TO DEF (-)	INPUT #19 RELATIVE LOGISTICS ADVANTAGE ATK (+) TO DEF (-)	INPUT #20 RELATIVE MOMENTUM ADVANTAGE ATK (+) TO DEF (-)	INPUT #21 RELATIVE INTELLIGENCE ADVANTAGE ATK (+) TO DEF (-)	INPUT #22 RELATIVE TECHNOLOGY ADVANTAGE ATK (+) TO DEF (-)	INPUT #23 RELATIVE INITIATIVE ADVANTAGE ATK (+) TO DEF (-)	INPUT #24 ATTACKER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #25 ATTACKER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #26 ATTACKER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #27 DEFENDER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #28 DEFENDER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #29 DEFENDER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #30 CASUALTY RATIO ATK/DEF	OUTPUT #1 ATTACKER WIN (1) LOSS(0)
..	..	..	..	..	..	..	..	..	..	..	..	..	..
0	0	0	0	0	1	FF	EE	LR	DO	FF	00	1.3333333	1
0	0	0	0	0	1	FF	00	00	DD	00	00	0.6136364	1
0	0	0	0	0	1	FF	00	00	DD	00	00	1.1428571	0
0	0	0	0	0	1	FF	00	00	DD	00	00	0.6428571	1
0	0	0	0	0	1	FF	EE	LF	DD	00	00	0.2727273	1
0	0	0	1	0	1	FF	00	00	DD	00	00	0.0166667	1
0	0	0	0	0	1	FF	00	00	DO	FF	00	7.3846154	0
0	0	0	0	0	1	FF	00	00	DD	00	00	0.3768061	1
0	0	0	0	0	1	EE	FF	00	DD	00	00	0.1905263	1
0	0	0	0	1	1	FF	00	00	DO	FF	00	0.2666667	1
0	0	0	0	0	1	FF	00	00	DO	FF	00	2	1
0	0	0	0	0	0	FF	00	00	DO	FF	00	0.75	1
0	0	0	0	0	0	FF	00	00	DO	FF	00	0.9383505	0
0	0	0	0	0	1	FF	00	00	DO	FF	00	1.3139656	0
0	0	0	0	0	0	FF	00	00	DO	FF	00	0.625	1
0	0	0	0	0	1	FF	00	00	DO	FF	00	2	0
0	0	0	0	0	1	FF	00	00	DO	FF	00	0.3595173	1
0	0	0	0	0	1	FF	00	00	DD	00	00	0.5208878	1
0	0	0	0	0	1	FF	00	00	DO	FF	00	0.7541478	1
0	0	0	2	0	3	FF	00	00	DD	00	00	0.0611111	1
0	0	0	0	0	1	FF	00	00	DO	DE	00	5.0420712	0
0	0	0	0	0	0	FF	00	00	DO	FF	00	1.0114863	1
0	0	0	0	0	1	FF	00	00	DO	FF	00	1.0671642	1
0	0	0	0	0	0	FF	00	00	DO	FF	00	7.9365079	0
0	0	0	0	0	0	FF	00	00	DO	FF	00	1.5297778	0
0	0	0	2	0	0	FF	EE	FR	DO	FF	00	1.6666667	1
0	0	0	-1	0	-1	EE	LF	00	DO	FF	EE	18.521898	0
0	0	0	1	0	1	EE	LF	00	DO	FF	00	0.5267727	1
0	0	0	1	0	1	EE	LR	00	DO	FF	00	0.2195122	1
0	0	0	0	0	0	FF	00	00	DO	FF	00	0.6917297	1
0	0	0	1	0	1	FF	DE	00	DD	00	00	0.8340112	1
0	0	0	-1	0	0	FF	00	00	DD	00	00	1.5555556	0
0	0	0	0	0	0	FF	0	0	DD	0	0	0.3897827	1
0	0	0	-1	0	0	FF	0	0	DD	0	0	1.2322581	0
0	0	0	0	0	-1	FF	0	0	DO	FF	0	2.3076923	0
0	0	0	1	0	0	DE	0	0	DD	0	0	1	1
0	0	0	0	0	1	EE	LF	0	DD	0	0	0.3513514	1
0	0	0	0	0	0	EE	LF	0	DO	FF	0	1.6666667	0
0	0	0	1	0	1	EE	FR	0	DD	0	0	1.0619864	1
0	0	0	-1	0	0	FF	0	0	DD	0	0	2.2004175	1
0	0	0	0	0	1	FF	0	0	DD	0	0	27	0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

BATTLE SEQUENCE NUMBER	INPUT #1 1ST WIDTH FRONT ATK/DEF RATIO	INPUT #2 DEFENSIVE POSTURE TYPE 0,1,2,3	INPUT #3 DEFENDER'S PRIMARY DEFENSIVE POSTURE	INPUT #4 TERRAIN	INPUT #5 WEATHER	INPUT #6 ATTACKER'S SURPRISE OVER DEFENDER'S AWARENESS	INPUT #7 TOTAL PERS STR ATK/DEF RATIO	INPUT #8 INIT PERS STR ATK/DEF RATIO	INPUT #9 HORSE CAV ATK/DEF RATIO	INPUT #10 TOT TANK ATK/DEF RATIO	INPUT #11 LITE TANK ATK/DEF RATIO	INPUT #12 MAIN BTTL TANK ATK/DEF RATIO	INPUT #13 NO. ARTY TUBE ATK/DEF RATIO	INPUT #14 CLOSE AIR SPT SORTS ATK/DEF	INPUT #15 RELATIVE COMBAT EFFECTIVENES ATK (+) TO DEF (-)	INPUT #16 RELATIVE LEADERSHIP ADVANTAGE ATK (+) TO DEF (-)	INPUT #17 RELATIVE TRAINING ADVANTAGE ATK (+) TO DEF (-)
...	...	...	..	...	.....	..	..	..	..	..	..	..	..	..	..	..	..
84	0 8571429	0	0	RM0	DSTT	0	1	1	-1	-9	-9	-9	0	-9	2	0	2
85	6.5	0	0	00U	WLCT	2	1.5921053	1.5921053	1	-9	-9	1.5	3	-9	0	3	0
86	2	0	0	RM0	DOCT	2	4	1.5625	-1	-9	-9	1 25	2 5	-9	0	2	0
87	1	0	0	RM0	DSTT	0	0.6285714	0 4714286	-9	-9	-9	-9	0	-9	0	-1	0
88	1.4285714	0	0	00U	WLTT	1	1.2444444	1.2444444	-1	-9	-9	-9	-1	-9	0	1	0
89	0.5	0	2	RM0	DSTT	0	0.4545455	0.4545455	-9	-9	-9	-9	0	-9	0	-1	0
90	0.625	0	0	RM0	DSHT	0	1.1818182	0.4	-1	-9	-9	-9	1.1428571	-9	0	0	0
91	1	0	0	RM0	DSTT	0	0.6885246	0.6885246	-9	-9	-9	-9	0.4444444	-9	2	1	1
92	1	0	0	RM0	DSTT	-3	1.0731707	1.0731707	2.8	-9	-9	-9	0	-9	0	-1	0
93	1	0	0	RW0	DSTT	0	0.4270623	0 4270623	0 775	-9	-9	-9	0.5	-9	2	0	1
94	0.6666667	0	0	RM0	DSTT	1	0.5802708	0 5802708	0 3	-9	-9	0	0	-9	0	0	0
95	1	1	0	FM0	DSTT	1	1.1	1.1	-9	-9	-9	0.4	0.8	-9	-2	0	-2
96	0.875	0	0	RM0	DOTT	0	0.9444444	0.9444444	0	-9	-9	-9	1.0740741	-9	1	0	1
97	0.78125	0	1	RM0	DSTT	0	3.0769231	3.0769231	0	-9	-9	-9	1.8518519	-9	-1	0	-1
98	1 0833333	0	1	RM0	DSTT	0	1.0465116	1 0465116	0.6	-9	-9	-9	0	-9	-1	0	-1
99	1 4285714	0	1	RM0	DSTT	0	3.2307692	3 2307692	2.2727273	-9	-9	-9	0	-9	-1	0	-1
100	1	0	1	RM0	DSTT	1	1.9130435	1.9130435	-1	-9	-9	-9	-1	-9	-1	0	-1
101	0.8	0	0	RM0	DSTT	0	0 630137	0.630137	1.4	-9	-9	-9	-1	-9	-1	0	-1
102	0.6666667	0	0	RM0	DSTT	2	1 7	0.61	-1	-9	-9	-9	1.3333333	-9	1	1	0
103	0.6	0	0	RM0	DSTT	1	1.2	0.84	-1	-9	-9	-9	2	-9	1	1	0
104	1	0	0	RM0	WHTT	1	0.8888889	0.8888889	-1	-9	-9	-1	-1	-9	0	1	0
105	1.5384615	0	0	RM0	DSTT	0	1.4666667	0	2.6	-9	-9	-9	-1	-9	0	1	0
106	1	2	0	RM0	DSTT	1	1.3622047	1 3622047	-1	-9	-9	-9	0.8648649	-9	1	1	0
107	0.75	1	0	GM0	DOTT	0	1.3658537	0	-1	-9	-9	-9	1.75	-9	0	-1	0
108	0.8064516	1	0	FD0	DSHT	0	1.1904762	1.1904762	-1	-9	-9	-9	0.75	-9	1	1	1
109	1.2142857	0	0	GW0	DSTT	0	0.76	0.76	0.4166667	-9	-9	-9	-1	-9	0	-1	0
110	2.34375	0	0	R80	DSHT	0	7.7777778	17.5	0	-9	-9	-9	0.1111111	-9	-1	-1	-1
111	0.8	1	1	GM0	DSTT	0	1.6	1.6	1.88	-9	-9	-9	-1	-9	0	0	0
112	1.1206897	0	1	RM0	DSTT	0	1.4285714	1.4285714	4.5	-9	-9	-9	-1	-9	0	0	0
113	0.4375	1	1	RM0	DOTT	1	1.5217391	1.5217391	1	-9	-9	-9	0	-9	0	1	0
114	1	0	0	FW0	DSTT	0	1	1	0.6666667	-9	-9	-9	-1	-9	0	0	0
115	0.5882353	0	0	RM0	DSTT	1	1.0689655	3.4444444	1.0857143	-9	-9	3.4482759	3.4482759	-9	0	-1	0
116	1	0	0	RW0	WHTT	0	1.0363636	1.7272727	1	-9	-9	-9	-1	-9	0	0	0
117	1.1607143	G	0	RM0	DSTT	-3	1.1666667	1.309816	0.7285974	-9	-9	-9	2	-9	-1	-2	0
118	1	0	0	RM0	DSTT	0	1.8113208	1.2105263	1.1230907	-9	-9	-9	0.95	-9	1	2	1
119	1	0	0	RM0	DSTT	-1	2.3518519	2.3028846	-1	-9	-9	-9	5.75	-9	-1	-2	-1
120	1	0	0	RM0	WHCT	0	0.975	0 6887324	1.1111111	-9	-9	-9	0.4565217	-9	1	0	0
121	1	0	0	RM0	DSTT	1	1.3333333	0.2833333	-1	-9	-9	0.5945946	0.5945946	-9	1	1	0
122	1.0666667	0	1	RM0	DSTT	0	0.6658163	0 6658163	8 125	-9	-9	-9	1.2777778	-9	0	-1	0
123	1.25	0	2	RM0	DSTT	0	1.3918919	1 3918919	0	-9	-9	-9	4.4444444	-9	0	0	0
124	1	0	0	RM0	DSTT	0	1.1212121	2 0555556	0.8	-9	-9	-9	-1	-9	0	-1	0
125	1.5	0	0	00U	DSTT	1	1.5	4 3043478	1.3181818	-9	-9	-9	1.8333333	-9	0	0	0
126	1.15	0	0	RM0	DSTT	0	0.9459459	0.9459459	0.6666667	-9	-9	-9	-1	-9	1	0	1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INPUT #18 RELATIVE MORALE ADVANTAGE ATK (+) TO DEF (-)	INPUT #19 RELATIVE LOGISTICS ADVANTAGE ATK (+) TO DEF (-)	INPUT #20 RELATIVE MOMENTUM ADVANTAGE ATK (+) TO DEF (-)	INPUT #21 RELATIVE INTELLIGENCE ADVANTAGE ATK (+) TO DEF (-)	INPUT #22 RELATIVE TECHNOLOGY ADVANTAGE ATK (+) TO DEF (-)	INPUT #23 RELATIVE INITIATIVE ADVANTAGE ATK (+) TO DEF (-)	INPUT #24 ATTACKER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #25 ATTACKER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #26 ATTACKER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #27 DEFENDER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #28 DEFENDER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #29 DEFENDER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #30 CASUALTY RATIO ATK/DEF	OUTPUT #1 ATTACKER WIN (1) LOSS(0)
..	..	..	..	..	..	..	..	..	..	..	..	..	..
0	0	1	0	0	2	FF	0	0	DD	0	0	2.0866667	1
0	0	0	2	0	2	FF	0	0	DD	0	0	0.0120482	1
0	0	0	2	0	1	FF	0	0	DD	0	0	0.2046512	1
0	0	0	-1	0	0	FF	0	0	DO	FF	0	1.7594937	0
0	0	0	0	0	1	FF	0	0	DO	FF	0	1.9782214	0
0	-1	0	0	0	1	FF	0	0	DO	FF	0	4.6153846	0
0	0	0	0	0	-1	FF	0	0	DD	0	0	0.9889503	0
0	0	0	0	0	1	FF	0	0	DD	0	0	0.3085714	1
0	0	0	0	0	0	FF	0	0	DO	DE	0	12.902778	0
0	0	0	-2	0	0	FF	0	0	DO	FF	0	1.2666667	1
0	0	0	2	0	2	FF	0	0	DO	FF	0	0.6142857	1
0	0	0	2	0	0	FF	0	0	DD	0	0	0.7994228	0
-1	0	0	0	0	0	FF	0	0	DD	0	0	0.875	0
1	0	0	0	0	1	FF	0	0	DD	0	0	1.2	1
1	0	0	0	0	0	FF	EE	0	DO	0	0	1.3333333	0
1	0	0	0	0	1	FF	0	0	DD	0	0	1	1
1	0	1	0	0	1	FF	DE	0	DD	0	0	1.5	1
1	0	0	-1	0	0	FF	0	0	DD	0	0	0.5714286	0
1	0	1	0	0	1	FF	PP	RC	DD	0	0	0.4864865	1
0	0	0	0	0	1	EE	LR	0	DD	0	0	0.5	1
0	0	0	1	0	0	FF	EE	0	DD	0	0	1	1
0	0	1	0	0	0	FF	EE	0	DD	0	0	0.5	1
0	0	0	0	0	0	FF	DD	0	DD	0	0	0.6428571	1
0	0	0	0	0	0	FF	0	0	DO	0	0	2.8	0
0	0	0	0	1	1	DO	0	0	DD	0	0	0.06	1
0	0	0	0	0	1	FF	EE	0	DD	0	0	0.75	0
0	0	0	0	-1	0	FF	0	0	DO	0	0	108.33333	0
0	0	0	0	0	0	FF	0	0	DD	0	0	2.125	0
0	0	0	0	0	0	FF	0	0	DD	0	0	0.8181818	1
1	0	0	0	0	1	RC	FF	EE	DO	0	0	0.5	1
0	0	0	0	0	0	FF	EE	0	DD	0	0	0.8	1
0	0	0	1	0	-1	FF	0	0	DO	0	0	1.5714286	0
0	0	0	0	0	0	FF	EE	0	DO	0	0	8	0
0	1	1	-1	0	-1	FF	EE	LF	DO	FF	0	3.9285714	0
0	0	0	0	0	1	FF	EE	FF	DO	FF	0	0.1333333	1
0	0	0	0	0	0	FF	EE	FF	DO	EE	FF	5	0
0	0	0	-1	0	0	FF	EE	FF	DO	0	0	0.6607143	0
0	0	0	1	0	1	FF	EE	FF	DO	FF	0	0.32	1
0	0	0	0	0	0	FF	EE	LF	DD	0	0	2.4	0
0	0	0	0	0	1	FF	0	0	DD	0	0	1.6	0
0	0	0	0	0	0	FF	0	0	DO	EE	LF	2	0
0	1	0	0	0	1	FF	DE	0	DD	0	0	1.0952381	1
0	0	1	0	0	1	FF	EE	LF	DD	0	0	0.6440187	1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

BATTLE SEQUENCE NUMBER	INPUT #1 1ST WIDTH FRONT ATK/DEF RATIO	INPUT #2 DEFENSIVE POSTURE TYPE 0,1,2,3	INPUT #3 DEFENDERS PRIMARY DEFENSIVE POSTURE	INPUT #4 TERRAIN	INPUT #5 WEATHER	INPUT #6 ATTACKERS SURPRISE OVER DEFENDERS AWARENESS	INPUT #7 TOTAL PERS STR ATK/DEF RATIO	INPUT #8 INIT PERS STR ATK/DEF RATIO	INPUT #9 HORSE CAV ATK/DEF RATIO	INPUT #10 TOT TANK ATK/DEF RATIO	INPUT #11 LITE TANK ATK/DEF RATIO	INPUT #12 MAIN BTTL TANK ATK/DEF RATIO	INPUT #13 NO. ARTY TUBE ATK/DEF RATIO	INPUT #14 CLOSE AIR SPT SORTS ATK/DEF	INPUT #15 RELATIVE COMBAT EFFECTIVENESS ATK (+) TO DEF (-)	INPUT #16 RELATIVE LEADERSHIP ADVANTAGE ATK (+) TO DEF (-)	INPUT #17 RELATIVE TRAINING ADVANTAGE ATK (+) TO DEF (-)
...	...	...	..	...	.....	..	..	..	..	..	..	..	..	..	..	..	..
127	1	0	0	RMO	DSTT	1	1	-1	2	-9	-9	1.1541667	1.1541667	-9	0	1	0
128	1	0	1	RMO	DSTT	0	0.8440367	0.8440367	0.9497207	-9	-9	-9	1.3333333	-9	0	-1	0
129	1	2	0	GBO	DSTT	0	1.2695049	1.2695049	1.58	-9	-9	-9	1.9	-9	0	-1	0
130	1	0	1	00U	DSTT	0	1.2917559	1.2917559	2.4919786	-9	-9	-9	0.7916667	-9	0	-1	0
131	1	0	0	RMO	DSTT	2	0.7666667	0.7666667	1.0810811	-9	-9	-1	-1	-9	0	0	0
132	1.0666667	0	0	RMO	DSTT	0	1.0952381	1.0952381	1.5	-9	-9	-9	0.7692308	-9	0	1	0
133	1	0	0	RMO	DSTT	0	1.1622663	1.1622663	0.8315337	-9	-9	-9	0.6293706	-9	1	1	0
134	0.7894737	1	0	RMO	DSTT	0	1	1	1.5555556	-9	-9	-9	0.9171875	-9	1	1	0
135	1	0	0	RMO	DSTT	1	0.775	2.0666667	3.3333333	-9	-9	2	2	-9	0	-1	1
136	0.8571429	1	0	RMO	WLTT	0	2.0515464	1.185567	0.5769231	-9	-9	0.6666667	0.6666667	-9	0	1	-1
137	1	1	0	RMO	DSTT	0	1.4166667	2.2571429	2	-9	-9	-9	1.6	-9	0	-1	0
138	0.6538462	0	0	RMO	DSTT	1	1.8603466	1.1267606	2	-9	-9	-9	1.930285	-9	0	-1	0
139	0.5	0	0	RMO	DSTT	0	1.5	0.75	1.7142857	-9	-9	-9	1.0144928	-9	0	2	0
140	0.4999999	2	0	RMO	WHTT	1	2.75	1.95	-1	-9	-9	0.7142857	1.4285714	-9	0	-1	1
141	0.6153846	0	0	RMO	DSTT	-2	0.56	0.4423529	-1	-9	-9	-9	0.6666667	-9	0	0	-1
142	1	0	0	RMO	DSTT	2	2.6666667	1.1111111	0	-9	-9	3 75	3.75	-9	0	0	1
143	1	0	0	RMO	WLTT	0	0.8150914	0.5979492	1.5917729	-9	-9	-9	1.0925926	-9	1	1	1
144	1	0	0	RMO	WLTT	0	0.7919739	3.342625	2.4424	-9	-9	-9	1.0588235	-9	0	-1	1
145	0.625	1	0	RMO	WLTT	-2	0.4963031	1.0038971	0.6486181	-9	-9	-9	1.3571429	-9	0	0	0
146	1	0	0	FWO	DSTT	0	1.9444444	1.9444444	-1	-9	-9	-9	-1	-9	0	1	0
147	1	0	0	RMO	DSTT	0	0.7924528	0.7924528	0	-9	-9	-9	1.5	-9	0	0	0
148	0.7142857	0	0	RMO	DSTT	0	0.6666667	0.4117647	-1	-9	-9	-9	1.7777778	-9	0	0	0
149	0.7666667	0	1	FMO	DSTT	0	1.875	1.875	-1	-9	-9	-9	0.96	-9	0	-1	0
150	1	0	0	RMO	DSTT	0	1	1	0	-9	-9	-9	0.1	-9	1	2	0
151	1.28	0	0	RMO	DSTT	0	1.2355212	1.2355212	1.4705882	-9	-9	-9	-1	-9	0	1	0
152	1	0	0	GMO	DSTT	0	0.8181818	0.8181818	-1	-9	-9	-9	0.1	-9	0	0	0
153	1	0	0	GMO	DSTT	0	1.0416667	1.0416667	0.75	-9	-9	-9	9	-9	0	-1	0
154	1	0	0	FMO	DSTT	0	1	1	1	-9	-9	-9	-9	-9	0	1	0
155	1	0	0	RMO	DSTT	0	1.6107266	1.6107266	-1	-9	-9	-9	11	-9	-1	-1	0
156	1.5	0	0	FMO	DSTT	3	0.464375	0.464375	-1	-9	-9	0	0	-9	1	1	0
157	0 75	0	0	FBO	DSHT	0	0.3813333	0.3813333	0	-9	-9	-9	1.6666667	-9	1	2	1
158	0.7037037	0	0	FMO	DSHT	0	0.3035714	0.3035714	-1	-9	-9	-9	2	-9	1	1	1
159	0.5384615	0	0	GBO	WLTT	0	2.9417945	2.9417945	0	-9	-9	-9	0	-9	-1	-2	0
160	0.6	0	1	GMO	DSHT	2	0.7083333	0.7083333	-1	-9	-9	-9	0.175	-9	1	2	1
161	0.9259259	0	1	GBO	DSHT	2	1.125	1.125	-1	-9	-9	0	0	-9	0	2	1
162	1.8181818	0	1	FBO	DSHT	0	0.8092381	0.8092381	-1	-9	-9	-9	-1	-9	0	1	1
163	1.6	0	1	RMO	DSHT	0	0.2583333	0.2583333	-1	-9	-9	-9	0	-9	0	1	1
164	0.5142857	0	2	GMO	DSHT	0	0.4786667	0.4786667	-1	-9	-9	-9	0.6153846	-9	0	1	1
165	0.9090909	1	0	RBO	DSTT	0	1.7857143	1.7857143	0.2941176	-9	-9	-9	1.1525424	-9	1	0	0
166	1	0	1	RBO	WHCT	1	2.625	4.9411765	-1	-9	-9	-9	1.8928571	-9	-1	0	-1
167	1.3333333	0	0	FBO	DSHT	0	0.7804538	0.7804538	0.3513828	-9	-9	-9	0.5723684	-9	0	0	0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INPUT #18 RELATIVE MORALE ADVANTAGE ATK (+) TO DEF (-)	INPUT #19 RELATIVE LOGISTICS ADVANTAGE ATK (+) TO DEF (-)	INPUT #20 RELATIVE MOMENTUM ADVANTAGE ATK (+) TO DEF (-)	INPUT #21 RELATIVE INTELLIGENCE ADVANTAGE ATK (+) TO DEF (-)	INPUT #22 RELATIVE TECHNOLOGY ADVANTAGE ATK (+) TO DEF (-)	INPUT #23 RELATIVE INITIATIVE ADVANTAGE ATK (+) TO DEF (-)	INPUT #24 ATTACKER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #25 ATTACKER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #26 ATTACKER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #27 DEFENDER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #28 DEFENDER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #29 DEFENDER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #30 CASUALTY RATIO ATK/DEF	OUTPUT #1 ATTACKER WIN (1) LOSS(0)
..	..	..	..	..	..	..	..	..	..	..	..	..	..
0	0	0	1	0	1	EE	LF	0	DO	EE	LF	0.7555556	1
0	0	0	0	0	0	FF	EE	LF	DD	0	0	1.0895522	0
0	0	1	0	0	1	FF	0	0	DD	0	0	3.4615385	0
-1	0	0	0	0	0	FF	EE	FF	DO	FF	0	1.5	0
0	0	0	1	0	1	EE	FF	0	DD	0	0	1.0666667	0
0	0	0	0	0	1	FF	0	0	DO	FF	0	0.4615385	1
0	0	1	0	0	1	FF	DE	0	DO	FF	0	0.7354286	1
0	0	0	0	0	1	FF	0	0	DO	FF	0	0.7	1
0	0	0	1	0	0	FF	0	0	DO	FF	0	0.8181818	0
0	0	0	1	0	1	FF	EE	FR	DD	0	0	1.25	1
0	0	0	-1	0	0	FF	0	0	DO	DE	0	4	0
0	0	1	0	0	1	FF	0	0	DO	FP	0	1.0833333	1
-1	0	1	0	0	1	FF	EE	LF	DD	0	0	0.3333333	1
1	0	1	2	0	1	FF	0	0	DO	FF	0	1	1
0	-1	0	-1	0	0	FF	0	0	DO	FF	0	1.5	0
1	0	1	1	0	1	FF	0	0	DO	FF	0	0.6	1
0	0	1	0	0	1	FF	0	0	DD	0	0	0.6666667	1
0	0	1	0	0	1	FF	0	0	DD	0	0	1	0
0	0	1	-1	0	1	FF	0	0	DO	FF	EE	1.1111111	0
0	0	0	0	0	1	FF	0	0	DD	0	0	0.0434132	1
0	0	0	0	0	0	FF	0	0	DO	FF	DE	1.8029851	0
0	0	0	0	0	0	FF	EE	LF	DD	0	0	0.9794989	0
0	0	0	0	0	0	FF	0	0	DD	0	0	36.619718	0
0	0	0	0	0	1	FF	0	0	DD	0	0	0.0366667	1
0	0	0	0	0	1	FF	0	0	DD	0	0	0.0887758	1
0	0	0	0	0	1	FF	0	0	DD	0	0	2.124	1
0	0	0	0	0	1	FF	0	0	DO	FF	0	1.7352941	0
0	0	0	0	0	1	FF	EE	FF	DO	FF	0	0.3125	1
0	0	0	0	0	0	FF	0	0	DO	EE	LF	2.7203482	0
0	0	0	1	0	1	FF	0	0	DD	0	0	0.024375	1
0	0	0	0	0	1	FF	0	0	DO	DE	0	0.12	1
0	0	1	0	0	1	FF	0	0	DD	0	0	0.2033333	1
0	0	0	0	0	1	FF	0	0	DD	0	0	2.6809851	0
0	0	0	0	0	1	FF	0	0	DD	0	0	0.10775	1
0	0	0	1	0	1	FF	0	0	DD	0	0	0.0396563	1
0	0	1	0	0	1	FF	0	0	DD	0	0	0.318822	1
0	0	1	0	0	0	FF	0	0	DD	0	0	0.2933333	1
0	0	1	0	0	1	FF	0	0	DD	0	0	0.4794444	1
0	0	0	0	0	1	FF	0	0	DD	0	0	0.4487651	1
0	-1	0	0	0	0	FF	0	0	DO	FF	0	3.6996346	0
0	0	0	0	0	1	FF	0	0	DO	FF	0	0.4425557	1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

BATTLE SEQUENCE NUMBER	INPUT #1 1ST WIDTH FRONT ATK/DEF RATIO	INPUT #2 DEFENSIVE POSTURE TYPE 0,1,2,3	INPUT #3 DEFENDER'S PRIMARY DEFENSIVE POSTURE	INPUT #4 TERRAIN	INPUT #5 WEATHER	INPUT #6 ATTACKER'S SURPRISE OVER DEFENDER'S AWARENESS	INPUT #7 TOTAL PERS STR ATK/DEF RATIO	INPUT #8 INIT PERS STR ATK/DEF RATIO	INPUT #9 HORSE CAV ATK/DEF RATIO	INPUT #10 TOT TANK ATK/DEF RATIO	INPUT #11 LITE TANK ATK/DEF RATIO	INPUT #12 MAIN BTTL TANK ATK/DEF RATIO	INPUT #13 NO. ARTY TUBE ATK/DEF RATIO	INPUT #14 CLOSE AIR SPT SORTS ATK/DEF	INPUT #15 RELATIVE COMBAT EFFECTIVENESS ATK (+) TO DEF (-)	INPUT #16 RELATIVE LEADERSHIP ADVANTAGE ATK (+) TO DEF (-)	INPUT #17 RELATIVE TRAINING ADVANTAGE ATK (+) TO DEF (-)
---	---	---	--	---	-----	--	--	--	--	--	--	--	--	--	--	--	--
168	1	0	0	RMO	DSHT	0	1.1	1.1	0	-9	-9	-9	0.7835821	-9	0	0	0
169	0.5	0	0	RMO	WHTT	0	1.0232558	0.4883721	1 125	-9	-9	-9	1.012987	-9	0	1	0
170	-1	0	0	RMO	DSTT	0	1.2	0	0	-9	-9	-9	1.1162791	-9	-1	-1	-1
171	1.125	0	0	RMO	DSTT	0	1.0769231	1.147541	0	-9	-9	-9	1.122449	-9	0	-1	0
172	0.8333333	0	0	RMO	DSTT	2	0.5307125	0.5307125	-1	-9	-9	-9	1.0666667	-9	0	0	0
173	1	0	0	FMO	DSTT	0	0.6288	1.2576	-9	-9	-9	1	1	-9	0	1	0
174	0.75	0	0	RMO	WLTT	0	1	1	-1	-9	-9	-9	1.7142857	-9	0	-1	0
175	1	0	0	RMO	DSCT	0	0.7777778	0 7777778	-1	-9	-9	-9	0	-9	0	-1	0
176	1.5	0	0	RMO	DSTT	0	1.5430476	1.5430476	-1	-9	-9	-9	1.0204082	-9	0	0	0
177	1	0	0	RMO	DSTT	0	0 441	0.441	0.3866667	-9	-9	-9	1.25	-9	0	1	0
178	0.75	0	0	RMO	DSTT	2	0.6040083	0.9764094	-1	-9	-9	-9	0.6352941	-9	0	0	0
179	1	1	0	RMO	DSTT	3	15.05174	15.05174	0	-9	-9	24	24	-9	0	1	0
180	1	0	0	RMO	DSTT	0	2.2857143	2.2857143	0	-9	-9	-9	24	-9	0	1	0
181	1	0	0	RMO	DSTT	0	2.1	2.1	-1	-9	-9	-9	1.875	-9	0	-1	0
182	1	0	0	RMO	DSTT	0	5	0.4	0	-9	-9	-9	0.75	-9	0	1	0
183	1	0	0	RMO	DSTT	0	1.0004546	0 9184539	-1	-9	-9	-9	-1	-9	0	0	0
184	1	0	0	RMO	DSTT	0	1.0752991	1.0752991	-1	-9	-9	-9	-1	-9	0	0	0
185	1	0	0	RMO	DSTT	0	1.6865108	0 8626953	-1	-9	-9	-9	-1	-9	0	0	0
186	1	0	0	RMO	DSTT	0	1.0408303	0 4465192	-1	-9	-9	-9	-1	-9	0	0	0
187	0.5	0	0	RMO	DSTT	0	1.0456896	1 0456896	-1	-9	-9	-9	-1	-9	0	0	0
188	1	0	0	RMO	DSTT	0	0.4766144	0.4766144	0 9725	-9	-9	-9	-1	-9	0	-1	0
189	1.6666667	0	0	RMO	DSTT	0	1.5598739	1.75415	0	-9	-9	-9	-1	-9	0	-1	0
190	1.5	0	0	GMO	DSTT	0	1.5953395	1.5953395	0	-9	-9	3.8571429	3.8571429	-9	0	0	0
191	1.6	0	0	RMO	DSTT	0	1.9565217	2.0930233	0	-9	-9	-1	-1	-9	0	-1	0
192	1.1764706	0	1	RMO	DSTT	0	1.0403367	1.0403367	-1	-9	-9	-9	-1	-9	0	0	0
193	0.7499999	0	0	RMO	DSTT	0	2 30875	2.30875	-1	-9	-9	-9	-1	-9	-1	-1	-1
194	0 5909091	0	1	RMO	DSTT	0	1 462226	1.462226	-1	-9	-9	-9	-1	-9	0	-1	0
195	1.2142857	0	0	RMO	WLCT	2	0.8389372	0.8389372	1.40625	-9	-9	-9	1.2	-9	0	0	0
196	0.4358974	0	0	RMO	DSTT	-3	1.8557446	1.7979373	-1	-9	-9	-9	2.3764706	-9	0	-1	0
197	0 5882353	0	0	RMO	DSTT	0	1.46865	1.46865	0	-9	-9	-9	-1	-9	0	1	0
198	1 2222222	0	0	RMO	DSTT	2	1.2	1.05	0	-9	-9	-1	-1	-9	0	0	0
199	1.2439024	0	0	RMO	DSTT	0	0.9011274	1.220339	0.6153846	-9	-9	-9	0.8333333	-9	0	0	0
200	0.8888889	0	0	RMO	DSTT	2	1.1391914	1.1391914	0.8	-9	-9	0	0	-9	0	1	0
201	0.6666667	1	1	GMO	WLTT	0	1.525	1.525	0	-9	-9	-9	-1	-9	0	1	0
202	1.3124998	0	0	RMO	DSTT	0	1.6697255	2.3870968	1.7908002	-9	-9	-9	1.4196429	-9	0	0	0
203	0.6842105	1	0	RMO	DSTT	0	1.8	1 4285714	1.7142857	-9	-9	-9	1.37	-9	0	0	0
204	1	0	0	RMO	WLTT	0	0.9708738	0.9708738	0.9	-9	-9	-9	0.6363636	-9	0	1	0
205	0.8571429	0	1	RMO	DSTT	0	1.8289322	1 8289322	0	-9	-9	-9	-1	-9	0	0	0
206	1	0	1	RMO	DSHT	0	0.9149608	0.9149608	-1	-9	-9	-9	0	-9	0	0	0
207	1	1	0	RMO	DSTT	2	0.935101	0.935101	-1	-9	-9	-9	-1	-9	0	0	0
208	0.75	0	0	RMO	DSTT	2	1.2118647	1.2118647	0	-9	-9	-9	-1	-9	0	-1	0
209	1	0	2	RMO	DSTT	0	1.5373142	2 9814815	0	-9	-9	-9	-1	-9	0	-1	0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INPUT #18 RELATIVE MORALE ADVANTAGE ATK (+) TO DEF (-)	INPUT #19 RELATIVE LOGISTICS ADVANTAGE ATK (+) TO DEF (-)	INPUT #20 RELATIVE MOMENTUM ADVANTAGE ATK (+) TO DEF (-)	INPUT #21 RELATIVE INTELLIGENCE ADVANTAGE ATK (+) TO DEF (-)	INPUT #22 RELATIVE TECHNOLOGY ADVANTAGE ATK (+) TO DEF (-)	INPUT #23 RELATIVE INITIATIVE ADVANTAGE ATK (+) TO DEF (-)	INPUT #24 ATTACKER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #25 ATTACKER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #26 ATTACKER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #27 DEFENDER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #28 DEFENDER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #29 DEFENDER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #30 CASUALTY RATIO ATK/DEF	OUTPUT #1 ATTACKER WIN (1) LOSS(0)
--	--	--	--	--	--	--	--	--	--	--	--	--	--
0	0	0	0	0	1	FF	0	0	DO	FF	0	0.7981651	1
0	0	0	0	0	1	DE	FF	0	DO	FF	0	0.2076749	1
0	0	0	0	0	0	FF	0	0	DO	FF	0	1.4464286	0
0	0	0	0	0	0	EE	LF	0	DO	0	0	1.4611504	0
0	0	0	0	0	1	FF	0	0	DO	0	0	1.1278539	0
0	0	0	1	0	1	FF	0	0	DO	EE	LF	0.9454829	1
0	0	0	0	0	0	FF	0	0	DO	DE	0	2.0343511	0
0	-1	0	0	0	1	FF	0	0	DO	0	0	0.7665772	0
0	0	0	-1	0	0	EE	LR	0	DO	0	0	0.9393084	0
0	0	0	-1	0	0	FF	0	0	DO	0	0	1.2169492	0
0	0	0	0	0	1	FF	0	0	DO	FF	0	0.8200353	0
0	0	1	1	0	1	FF	DE	0	DD	0	0	0.0387168	1
1	0	1	0	0	1	FF	EE	RF	DD	0	0	0.1716839	1
0	0	0	0	0	0	FF	0	0	DO	FF	0	2.375	0
0	0	0	0	0	0	FF	0	0	DO	FF	0	0.7858546	1
0	0	0	0	0	1	FF	0	0	DD	0	0	1.22	0
0	0	0	0	0	1	FF	0	0	DD	0	0	4.1108033	0
0	0	0	0	0	1	FF	0	0	DD	0	0	1.2799473	0
0	0	0	0	0	1	FF	0	0	DD	0	0	0.9545352	0
0	0	1	0	0	1	FF	0	0	DD	0	0	1.6661481	0
0	0	0	0	0	1	FF	0	0	DO	FF	0	1.7585949	0
0	0	0	-2	0	-1	FF	0	0	DO	EE	LF	1.5264936	0
0	0	0	1	0	1	FF	EE	LF	DD	0	0	0.6752328	1
0	0	1	1	0	1	FF	DE	0	DO	0	0	0.9058394	0
0	0	0	0	0	1	FF	DE	0	DD	0	0	1.6797619	0
0	0	0	0	0	1	FF	0	0	DO	FF	EE	1.2399882	0
0	0	0	0	0	0	FF	0	0	DD	0	0	2.7175687	0
0	0	0	0	0	1	FF	DE	0	DD	0	0	0.9095769	0
0	0	0	-1	0	-1	EE	LR	0	DO	EE	FR	1.3476328	0
0	0	0	0	0	1	FF	0	0	DO	FF	0	0.6338613	1
0	0	0	1	0	1	FF	EE	FR	DO	0	0	1.8	1
0	0	0	-1	0	1	FF	DE	0	DD	0	0	1.2175366	0
0	0	0	1	0	1	FF	0	0	DD	0	0	1.1412492	1
0	0	0	0	0	1	FF	EE	RF	DD	0	0	0.8735563	1
0	0	0	0	0	1	FF	EE	RF	DO	0	0	2.2794839	0
0	0	0	0	0	1	FF	DE	0	DO	0	0	1.8399	0
0	0	0	0	0	1	FF	0	0	DD	0	0	0.6943442	1
0	0	0	0	0	1	FF	0	0	DD	0	0	7.3333333	0
0	0	0	0	0	1	FF	0	0	DD	0	0	4.6402715	0
0	0	0	0	0	1	FF	0	0	DD	0	0	1.71625	0
0	0	0	0	0	1	FF	EE	LF	DD	0	0	2.1493821	0
0	0	0	-1	1	1	FF	0	0	DD	0	0	1.7150673	0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

BATTLE SEQUENCE NUMBER	INPUT #1 1ST WIDTH FRONT ATK/DEF RATIO	INPUT #2 DEFENSIVE POSTURE TYPE 0,1,2,3	INPUT #3 DEFENDERS PRIMARY DEFENSIVE POSTURE	INPUT #4 TERRAIN	INPUT #5 WEATHER	INPUT #6 ATTACKERS SURPRISE OVER DEFENDERS AWARENESS	INPUT #7 TOTAL PERS STR ATK/DEF RATIO	INPUT #8 INIT PERS STR ATK/DEF RATIO	INPUT #9 HORSE CAV ATK/DEF RATIO	INPUT #10 TOT TANK ATK/DEF RATIO	INPUT #11 LITE TANK ATK/DEF RATIO	INPUT #12 MAIN BTTL TANK ATK/DEF RATIO	INPUT #13 NO. ARTY TUBE ATK/DEF RATIO	INPUT #14 CLOSE AIR SPT SORTS ATK/DEF	INPUT #15 RELATIVE COMBAT EFFECTIVENES ATK (+) TO DEF (-)	INPUT #16 RELATIVE LEADERSHIP ADVANTAGE ATK (+) TO DEF (-)	INPUT #17 RELATIVE TRAINING ADVANTAGE ATK (+) TO DEF (-)
210	1	0	0	RM0	WHTT	0	1.3720836	0	-1	-9	-9	-9	0	-9	0	0	0
211	0.75	1	0	RM0	DSTT	1	2.2049348	2.2049348	1.9474197	-9	-9	-9	0	-9	0	0	0
212	0.75	0	0	RM0	DSTT	3	0.597165	0.597165	0.487325	-9	-9	-9	0	-9	0	0	0
213	1.1111111	0	1	RM0	DSTT	0	0.9627045	0.9627045	0.78125	-9	-9	-9	0	-9	0	-1	0
214	0.7	0	1	RM0	DSTT	0	2.1447408	2.1447408	10.780556	-9	-9	-9	1.0897436	-9	0	1	0
215	0.7777778	0	0	RM0	DSTT	2	0.45	1.5008338	1.1111111	-9	-9	-9	-1	-9	0	0	0
216	1	1	0	RM0	WHTT	0	2.2589616	3.7142857	2.072807	-9	-9	-9	-1	-9	0	0	0
217	1	0	1	RM0	DSTT	0	3	3	0	-9	-9	-9	0	-9	0	0	0
218	0.2	0	2	RM0	DSTT	0	1.9285714	1.9285714	-1	-9	-9	-9	0	-9	0	0	1
219	1	0	0	RM0	WLTT	0	1.4285714	1.4285714	-1	-9	-9	-9	0	-9	0	0	0
220	2	0	0	GM0	WLTT	2	8.5	8.5	3.4444444	-9	-9	8	8	-9	0	0	0
221	1.25	0	0	GM0	WLTT	0	2	2	0.9333333	-9	-9	-9	2.2900763	-9	0	0	0
222	2.4	2	0	GW0	WLTT	0	1.5	1.1940299	1.2857143	-9	-9	-9	1.2	-9	0	0	0
223	1.2	0	0	RM0	DSTT	0	0.8053097	0.2566372	0.7857143	-9	-9	-9	2.1315789	-9	0	1	0
224	1	0	0	RM0	DSTT	0	1.6548673	1.6548673	1.6153846	-9	-9	-9	1.4076923	-9	0	1	0
225	1	0	0	RM0	DSTT	0	1.6666667	1.6666667	2	-9	-9	-9	1.2429078	-9	0	2	0
226	1	0	0	RM0	WLCT	0	3	3	0	-9	-9	1.5	1.5	-9	0	0	-1
227	1	0	0	RM0	WHCT	0	0.7413793	0.7413793	0.925	-9	-9	-9	1.0625	-9	2	0	2
228	1	0	1	RM0	WHCT	0	0.8181818	0.8181818	-1	-9	-9	-9	0	-9	2	0	2
229	0.5	0	1	RM0	WHCT	0	2.75	2.75	2	-9	-9	-9	0.4010989	-9	-2	-2	-2
230	2.6666667	0	0	RB0	DSHT	2	11.111111	11.111111	0.1	-9	-9	0.1	0.1	-9	-1	0	0
231	1.3333333	0	0	RB0	DSTT	0	3.7615197	3.7615197	0.1	-9	-9	-9	0.1	-9	-1	0	0
232	0.7142857	2	0	GB0	DSHT	0	3.4285714	3.4285714	-9	-9	-9	-9	0	-9	0	1	0
233	1	0	1	FB0	DSTE	2	0.87005	0.87005	0	-9	-9	-9	0.8133333	-9	1	1	1
234	0.7272727	0	0	FB0	DSTT	0	2.1317829	2.1317829	-1	-9	-9	-9	0	-9	-1	-1	-1
235	0.5	0	0	RM0	DSTE	2	5.9256333	5.9256333	-9	-9	-9	0.65625	0.65625	-9	0	1	0
236	0.8333333	0	1	FM0	DSHT	-1	2.2857143	2.2857143	-9	-9	-9	-9	1.7777778	-9	0	-1	1
237	0.5625	0	1	FB0	WHTT	-2	1.6666667	1.6666667	-1	-9	-9	-9	0	-9	0	-1	1
238	0.95	0	1	FB0	DSHT	0	2.4383636	2.4383636	1.672	-9	-9	-9	0	-9	0	-1	1
239	0.4268293	0	1	RB0	DSHT	1	4.8	4.8	-1	-9	-9	-9	4	-9	0	0	1
240	1	0	1	FM0	DSHT	0	3.75	3.75	-1	-9	-9	-9	5.3333333	-9	0	1	1
241	2	0	1	GM0	DSHT	0	9.4629397	9.4629397	-1	-9	-9	-9	9.5	-9	0	0	0
242	0.5714286	0	1	GM0	DSTT	0	3.1111111	3.1111111	0.9	-9	-9	-9	2.75	-9	0	2	0
243	1.2307692	2	0	RM0	DSTT	0	0.9473684	0	0.6666667	-9	-9	1.1489362	1.1489362	-9	0	2	0
244	1	1	1	GM0	DSTT	0	0.9	-1	0.3333333	-9	-9	-9	1.0184502	-9	0	1	0
245	1	1	0	RM0	DSTT	0	1.4482759	-1	2.5714286	-9	-9	-9	1.5163399	-9	0	1	0
246	1	0	1	FM0	WLCT	0	1.45	1.45	-1	-9	-9	-9	0	-9	0	-1	0
247	0.8533333	1	1	FM0	DSTT	0	1.0129032	-1	0.6	-9	-9	-9	0.7483221	-9	0	1	0
248	1	0	0	GM0	WHTT	0	0.9363636	0.5618182	-9	-9	-9	-9	0	-9	1	1	0
249	0.8	1	0	RM0	DSTT	0	1.2727273	0.5909091	-9	-9	-9	-9	-1	-9	1	0	0
250	2.2	2	1	GM0	WHTT	0	2.5	1.25	-9	-9	-9	-9	0	-9	1	1	0
251	1.85	1	0	GM0	WHTT	0	1.3333333	1.3333333	-9	-9	-9	-9	0	-9	1	1	0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INPUT #18 RELATIVE MORALE ADVANTAGE ATK (+) TO DEF (-)	INPUT #19 RELATIVE LOGISTICS ADVANTAGE ATK (+) TO DEF (-)	INPUT #20 RELATIVE MOMENTUM ADVANTAGE ATK (+) TO DEF (-)	INPUT #21 RELATIVE INTELLIGENCE ADVANTAGE ATK (+) TO DEF (-)	INPUT #22 RELATIVE TECHNOLOGY ADVANTAGE ATK (+) TO DEF (-)	INPUT #23 RELATIVE INITIATIVE ADVANTAGE ATK (+) TO DEF (-)	INPUT #24 ATTACKER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #25 ATTACKER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #26 ATTACKER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #27 DEFENDER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #28 DEFENDER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #29 DEFENDER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #30 CASUALTY RATIO ATK/DEF	OUTPUT #1 ATTACKER WIN (1) LOSS(0)
..	..	..	..	..	..	..	..	..	..	..	..	..	..
0	0	0	0	0	1	FF	EE	0	DD	0	0	2.7516986	1
1	0	0	0	0	1	FF	DE	0	DD	0	0	1.2797756	1
-1	0	0	0	0	1	FF	EE	LF	DO	FF	0	0.5136805	0
0	0	0	0	0	1	FF	0	0	DD	0	0	2.6878762	0
1	0	0	0	0	1	FF	EE	LR	DD	0	0	0.5721495	1
-1	0	0	0	0	1	FF	EE	LF	DO	FF	0	1.5832321	0
1	0	0	0	0	1	FF	EE	RF	DO	EE	LF	1.545	0
1	0	0	0	0	1	FF	EE	LR	DD	0	0	0.1056667	1
1	0	1	0	0	1	FF	0	0	DD	0	0	0.1	1
1	1	1	0	0	1	FF	DE	0	DO	FF	0	0.1685714	1
0	0	0	1	0	1	FF	DE	0	DD	0	0	0.7619048	1
0	0	1	0	0	1	FF	DE	0	DD	0	0	0.5270936	1
0	0	0	0	0	1	FF	DE	0	DD	0	0	1.5806452	1
0	0	0	0	0	1	FF	EE	LF	DO	FF	0	1.1428571	1
0	0	1	0	0	1	FF	EE	RF	DO	FF	0	1.578125	1
0	1	1	0	0	1	FF	DE	0	DO	FF	0	0.2368421	1
0	0	0	1	0	1	FF	EE	RF	DD	0	0	1	1
0	0	0	0	0	1	FF	0	0	DD	0	0	0.225	1
0	0	0	0	0	0	FF	EE	LF	DD	0	0	0.1538462	1
0	-2	0	0	0	1	FF	0	0	dd	0	0	4	0
0	0	0	1	-1	0	DE	0	0	DD	0	0	2.0761246	1
0	0	0	0	-1	0	FF	0	0	DO	FF	0	15	0
0	0	0	0	0	1	FF	0	0	DO	FF	0	0.0211268	1
0	0	0	0	0	1	FF	0	0	DD	0	0	0.1876	1
0	0	0	0	-1	0	FF	0	0	DO	FF	0	63.692946	0
0	1	0	1	0	1	DE	0	0	DD	0	0	1.7565613	1
1	0	0	0	0	0	FF	0	0	DD	0	0	3.12	1
0	0	0	-1	0	0	FF	0	0	DD	0	0	4.0169492	0
0	0	0	-1	0	0	FF	0	0	DD	0	0	22.52	0
0	0	0	-1	0	-1	FF	0	0	DD	0	0	5.1761194	0
1	1	1	0	0	1	FF	DE	0	DD	0	0	3.6285714	0
0	0	0	-1	0	1	FF	0	0	DD	0	0	1.8494118	1
0	0	0	0	0	1	EE	LF	RC	DD	0	0	0.444	1
0	0	0	1	0	1	FF	0	0	DD	0	0	0.3157895	1
0	0	0	0	0	1	FF	0	0	DO	0	0	1.0606061	1
0	0	0	0	0	0	FF	0	0	DO	0	0	2.7058824	0
0	0	0	0	0	1	FF	0	0	DO	0	0	1.3829787	0
0	0	0	0	0	1	FF	0	0	DD	0	0	0.4248705	1
1	0	0	0	0	1	FF	0	0	DO	0	0	0.5	1
0	0	1	0	0	1	FF	EE	LF	DD	0	0	0.6666667	1
1	0	1	0	0	1	FF	0	0	DO	FF	0	0.5	1
0	0	1	0	0	1	EE	LF	FF	DO	FF	0	0.25	1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

BATTLE SEQUENCE NUMBER	INPUT #1 1ST WIDTH FRONT ATK/DEF RATIO	INPUT #2 DEFENSIVE POSTURE TYPE 0,1,2,3	INPUT #3 DEFENDER'S PRIMARY DEFENSIVE POSTURE	INPUT #4 TERRAIN	INPUT #5 WEATHER	INPUT #6 ATTACKER'S SURPRISE OVER DEFENDER'S AWARENESS	INPUT #7 TOTAL PERS STR ATK/DEF RATIO	INPUT #8 INIT PERS STR ATK/DEF RATIO	INPUT #9 HORSE CAV ATK/DEF RATIO	INPUT #10 TOT TANK ATK/DEF RATIO	INPUT #11 LITE TANK ATK/DEF RATIO	INPUT #12 MAIN BTTL TANK ATK/DEF RATIO	INPUT #13 NO. ARTY TUBE ATK/DEF RATIO	INPUT #14 CLOSE AIR SPT SORTS ATK/DEF	INPUT #15 RELATIVE COMBAT EFFECTIVENES ATK (+) TO DEF (-)	INPUT #16 RELATIVE LEADERSHIP ADVANTAGE ATK (+) TO DEF (-)	INPUT #17 RELATIVE TRAINING ADVANTAGE ATK (+) TO DEF (-)
...	...	...	..	...	.....	..	..	..	..	..	..	..	..	..	..	..	..
252	2.5	0	2	GM0	WHTT	2	2.0266667	2 0266667	-9	-9	-9	1.776	1.776	-9	1	1	0
253	1	0	0	FB0	DSTT	3	0.8	-1	-9	-1	0	0.2993311	0.2993311	-1	1	1	0
254	1	2	0	FM0	DSTT	0	0.7373272	-1	-9	-1	-1	-1	0.385289	-1	1	1	0
255	1	0	1	FB0	WLCT	2	0.52	0.52	-9	0.7142857	-1	-1	0	0.8333333	0	0	-1
256	1	0	1	GB0	DOTT	1	0.9657534	-1	-9	0.1	0.1	0	0.7	-9	1	2	0
257	1	2	0	GB0	DSHT	0	1.3289037	-1	-9	9	9	9	1.8181818	9	-1	-1	0
258	1	0	1	GB0	DSTT	0	2.5	-1	-9	9	9	9	2.7027027	9	-1	-1	0
259	0.6	0	0	RB0	DSTT	0	1.0586319	-1	-9	9	9	-9	0.2857143	0	0	0	0
260	0.8333333	0	1	RB0	DSHT	2	1.9	1.9	-9	4.15	-1	-1	1.6	-1	0	0	0
261	1	0	0	RM0	WHCT	2	0.3004607	0.334816	-9	0.1	0.1	0.1	0.0833333	-1	1	1	1
262	1	1	3	RM0	DSTT	0	1.3246377	-1	-9	-9	-9	-9	-1	-9	0	0	0
263	1	1	0	RM0	DSTT	0	0.875	-1	-9	-9	-9	-9	-1	-9	0	0	0
264	1	0	0	RW0	WOTT	0	0.9	-1	-9	-9	-9	-9	-1	-9	0	0	0
265	1	0	0	RM0	DSTT	0	1.7322835	-1	-9	-9	-9	-9	-1	-9	0	0	0
266	1	0	0	FM0	DSTT	0	3.7142857	-1	-9	-9	-9	-9	1.8292683	-9	0	0	0
267	1	1	0	RM0	DSTT	0	6.25	-1	-9	-9	-9	-9	0	-9	0	0	0
268	1	0	0	RM0	DSTT	0	1.3	-1	-9	-9	-9	-9	-1	-9	0	0	0
269	1	0	2	RM0	DSTT	0	1.2681159	-1	-9	-9	-9	-9	-1	-9	0	0	0
270	1	0	0	RM0	DSTT	-1	2.2222222	2.2222222	-9	-9	-9	-9	0	-9	0	-1	0
271	1	0	0	RM0	DSTT	0	1.2611465	-1	-9	-9	-9	-9	-1	-9	0	0	0
272	1.3309353	0	0	RM0	DSTT	0	2.7682927	-1	-9	-9	-9	-9	-1	-9	0	1	0
273	1	0	3	RM0	DSTT	0	6.9230769	-1	-9	-9	-9	-9	15.833333	-9	0	0	0
274	1	0	0	FM0	DSTT	0	0.7163121	-1	-9	-9	-9	-9	-1	-9	0	-1	0
275	1	0	0	RM0	DSTT	0	0.6647059	-1	-9	-9	-9	-9	-1	-9	0	0	0
276	1	0	0	RM0	DSTT	0	0.7888889	-1	-9	-9	-9	-9	-1	-9	0	0	0
277	1	2	0	RM0	WLTT	0	1.1827586	-1	-9	-9	-9	-9	-1	-9	0	0	0
278	1	0	0	FM0	DSTT	-1	1.25	0	-9	-9	-9	-9	1.2	-9	-1	-1	-1
279	1	0	0	FM0	DSTT	0	0.8	0.8	-9	-9	-9	0.6666667	0.6666667	-9	1	0	1
280	1	0	0	FW0	DSTT	2	1.16875	-1	-9	-9	-9	1.3633333	1.3633333	-9	1	2	1
281	1	0	1	FW0	DSTT	0	1.0571429	1.0571429	-9	-9	-9	0	0	-9	1	1	1
282	1	0	0	RM0	DSTT	0	1.3461538	-1	-9	-9	-9	-9	1.2681159	-9	0	0	0
283	1	0	0	RM0	DSTT	0	1.1538462	-1	-9	-9	-9	-9	1.0416667	-9	0	0	0
284	1	0	0	RM0	DSTT	0	0.5	-1	-9	-9	-9	-9	0.6349693	-9	0	0	0
285	1	0	0	RM0	DSTT	0	0.9615385	-1	-9	-9	-9	-9	1	-9	0	0	0
286	1	0	0	RM0	WLCT	0	0.65	-1	-9	-9	-9	-1	-1	-9	1	1	1
287	1	0	0	GM0	DSTT	0	1	-1	-9	-9	-9	-9	-1	-9	0	-1	0
288	1	0	1	GM0	WHTT	2	0.6666667	-1	-9	-9	-9	-9	-1	-9	0	1	0
289	1	0	2	FM0	DSTT	0	1.9148322	1.9148322	-9	-9	-9	-9	1.8702128	-1	0	0	0
290	1	0	2	FM0	DOTT	1	2.175	0	-9	-9	-9	-9	0	-1	0	0	0
291	1	0	2	FM0	DSTT	2	0.7894737	-1	-9	-9	-9	-9	-1	-1	0	0	0
292	1	0	2	FM0	WLTT	0	3.0121667	-1	-9	-9	-9	-9	0	-1	0	0	0
293	1	0	2	FM0	DSTT	0	3 97916	-1	-9	-9	-9	-9	-1	-1	0	0	0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INPUT #18 RELATIVE MORALE ADVANTAGE ATK (+) TO DEF (-)	INPUT #19 RELATIVE LOGISTICS ADVANTAGE ATK (+) TO DEF (-)	INPUT #20 RELATIVE MOMENTUM ADVANTAGE ATK (+) TO DEF (-)	INPUT #21 RELATIVE INTELLIGENCE ADVANTAGE ATK (+) TO DEF (-)	INPUT #22 RELATIVE TECHNOLOGY ADVANTAGE ATK (+) TO DEF (-)	INPUT #23 RELATIVE INITIATIVE ADVANTAGE ATK (+) TO DEF (-)	INPUT #24 ATTACKER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #25 ATTACKER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #26 ATTACKER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #27 DEFENDER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #28 DEFENDER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #29 DEFENDER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #30 CASUALTY RATIO ATK/DEF	OUTPUT #1 ATTACKER WIN (1) LOSS(0)
..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	0	1	1	0	1	FF	0	0	DD	0	0	0.62	1
0	0	0	1	0	1	EE	LF	FF	DD	0	0	0.3333333	1
0	0	1	0	0	1	EE	FR	0	DO	FF	0	0.4	1
0	-1	0	0	0	0	FF	0	0	DO	FF	0	0.96997	0
0	0	0	0	0	1	EE	LF	FF	DO	0	0	0.5085714	1
0	0	0	0	0	0	DE	0	0	DD	0	0	9.7560976	0
0	0	0	0	0	0	FF	EE	RF	DO	0	0	3.6363636	0
0	0	0	0	0	1	FF	DE	0	DO	0	0	1.112	0
0	1	0	1	0	1	FF	EE	RF	DO	0	0	0.8695652	1
0	1	0	1	0	1	FF	DE	0	DO	0	0	0.1362245	1
0	0	0	0	0	0	FF	0	0	DD	0	0	1.9872263	0
0	0	0	0	0	0	FF	0	0	DD	0	0	0.5050505	1
0	0	0	0	0	0	FF	0	0	DD	0	0	1.3518868	0
0	0	0	0	0	0	FF	0	0	DO	FF	0	2.62725	1
0	0	0	0	0	0	FF	0	0	DD	0	0	3.7912088	1
0	0	1	0	0	0	FF	DE	0	DD	0	0	1.15	1
0	0	1	-1	0	0	FF	EE	LF	DO	FF	0	1.5	0
0	0	0	0	0	0	FF	0	0	DO	FF	0	1.4423077	0
0	0	0	0	0	-1	FF	0	0	DO	FF	0	2.24	0
0	0	0	0	0	0	FF	0	0	DO	FF	0	1.025641	0
0	0	0	0	0	1	FF	EE	RF	DD	0	0	2.3684211	1
0	0	0	0	0	0	FF	0	0	DD	0	0	0.7142857	1
0	0	0	0	0	0	FF	DE	0	DO	FF	0	0.862069	0
0	0	0	0	0	0	FF	DE	0	DO	FF	0	0.962963	0
0	0	0	0	0	-1	FF	EE	LF	DD	0	0	1	0
0	0	1	-1	0	0	FF	0	0	DO	FF	0	1.6666667	0
0	0	0	-1	0	-1	FF	0	0	DO	EE	LF	1.75	0
0	0	0	1	0	0	FF	EE	RF	DO	FF	0	1	0
0	1	0	1	0	1	FF	DE	0	DO	FF	0	0.1101	1
1	0	0	1	0	1	FF	EE	LF	DD	0	0	0.32	1
0	0	0	0	0	0	FF	EE	RF	DD	0	0	1	1
0	0	0	0	0	0	FF	DE	0	DO	FF	0	0.4444444	1
0	0	0	0	0	0	FF	0	0	DO	FF	0	2.1714286	0
0	0	0	-1	0	0	FF	0	0	DO	FF	0	2.195122	0
0	0	0	1	0	0	FF	DE	0	DO	FF	0	0.6315789	1
0	-1	0	0	0	-1	FF	0	0	DO	FF	0	1.8888889	0
0	1	0	0	0	1	FF	0	0	DD	0	0	0.4891304	1
0	0	0	0	0	0	FF	0	0	DD	0	0	1.8577007	0
0	0	0	0	0	0	FF	0	0	DD	0	0	1.0743333	0
0	0	0	0	1	0	FF	0	0	DD	0	0	0.5	0
0	-1	0	0	0	0	FF	0	0	DO	FF	0	3.3296	0
0	0	0	0	0	0	FF	0	0	DO	FF	0	3.1111615	0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

BATTLE SEQUENCE NUMBER	INPUT #1 1ST WIDTH FRONT ATK/DEF RATIO	INPUT #2 DEFENSIVE POSTURE TYPE 0,1,2,3	INPUT #3 DEFENDER'S PRIMARY DEFENSIVE POSTURE	INPUT #4 TERRAIN	INPUT #5 WEATHER	INPUT #6 ATTACKER'S SURPRISE OVER DEFENDER'S AWARENESS	INPUT #7 TOTAL PERS STR ATK/DEF RATIO	INPUT #8 INIT PERS STR ATK/DEF RATIO	INPUT #9 HORSE CAV ATK/DEF RATIO	INPUT #10 TOT TANK ATK/DEF RATIO	INPUT #11 LITE TANK ATK/DEF RATIO	INPUT #12 MAIN BTTL TANK ATK/DEF RATIO	INPUT #13 NO. ARTY TUBE ATK/DEF RATIO	INPUT #14 CLOSE AIR SPT SORTS ATK/DEF	INPUT #15 RELATIVE COMBAT EFFECTIVENES ATK (+) TO DEF (-)	INPUT #16 RELATIVE LEADERSHIP ADVANTAGE ATK (+) TO DEF (-)	INPUT #17 RELATIVE TRAINING ADVANTAGE ATK (+) TO DEF (-)
...	...	...	..	...	.....	..	..	..	..	..	..	..	..	..	..	..	..
294	1	0	1	RMO	WHCT	2	2.1666667	-1	-9	-9	-9	0	0	-1	1	0	0
295	1	0	1	RMO	DSTT	2	0.9863014	0.9863014	-9	-9	-9	-9	0	-1	2	1	0
296	1	0	2	GMO	DSTT	0	2	-1	-9	-9	-9	-9	0	-1	0	0	0
297	1	0	2	GMO	DSTT	0	1.5564202	-1	-9	-9	-9	-9	-1	-1	0	0	0
298	1	0	2	GMO	DSCT	0	2.2675159	-1	-9	-9	-9	-9	0	-1	0	0	0
299	1	0	2	GMO	DSCT	0	2.2867647	-1	-9	-9	-9	-9	0	-1	0	0	0
300	1	0	1	GBO	DSTT	0	3.2	-1	-9	-9	-9	-9	0	-9	0	0	0
301	1	0	0	GBO	DSTT	1	1.5822785	13.888889	-9	-9	-9	-9	2.8	-9	0	-1	0
302	1	0	2	FBO	DSTT	1	0.9734513	0.9734513	-9	-9	-9	-9	0.7368421	-1	1	1	0
303	0.75625	1	2	FMO	DSTT	0	0.6743137	0	-9	-9	-9	-9	0.5769231	0	1	0	0
304	1	0	2	RMO	WHTT	0	2	2	-9	9	-9	9	3.8425	-1	0	0	0
305	1	0	2	RMO	DSTT	0	3.0526316	3.0526316	-9	-9	-9	-9	0	-1	0	0	0
306	1	0	2	RMO	DSTT	0	4.0357143	4.0357143	-9	-9	-9	-9	-1	-1	0	0	0
307	1	0	2	RMO	DSTT	2	3	3	-9	-9	-9	-9	-1	-1	0	0	0
308	1	0	2	RMO	DSTT	3	2.1111111	2.1111111	-9	9	-9	9	0	-1	1	0	0
309	1	0	2	GMO	WHCT	3	1.6885246	-1	-9	-9	-9	-9	2.39	-1	0	1	0
310	1	0	1	RMO	DSTT	0	1.9444444	-1	-9	-9	-9	-9	2.0159091	-1	-1	0	0
311	1	0	1	RMO	DSTT	2	1.2	1.2	-9	-9	-9	-9	1.0498375	-9	0	0	0
312	1	0	2	GMO	WHCT	0	1.875	-1	-9	-9	-9	-9	-1	-1	0	0	0
313	1	1	0	GMO	DSTT	0	1.8050847	1.8050847	-9	-9	-9	-9	3.2102729	-1	0	0	0
314	1	0	0	GBO	DSTT	0	1.1627907	1.1627907	-9	-9	-9	-9	0.3115	-1	0	0	0
315	1	0	2	GMO	DSTT	1	1.8333333	1.8333333	-9	-9	-9	-9	4.6666667	-1	0	0	0
316	1	0	2	RMO	DSTT	1	2.3	2.3	-9	9	9	9	2.7781065	-1	0	0	0
317	1	0	2	RMO	WHTT	0	2.0833333	-1	-9	9	9	9	0	-1	0	0	0
318	1	0	2	GMO	DSTT	1	1.8	1.8	-9	0	9	9	2.266	-1	0	0	0
319	1	0	2	RMO	DSTT	0	1.9	1.9	-9	0	9	9	2.0903846	-1	0	0	0
320	1	0	2	RMO	DSTT	2	1.2	1.2	-9	9	-9	9	1.1111111	-1	0	0	0
321	1	0	1	RMO	DSTT	1	1.4444444	1.4444444	-9	0	0.1	0.1	1.2	-1	0	0	0
322	1	0	2	GBO	DSTT	0	1.6969697	1.6969697	-9	-9	-9	-9	1.5714286	-1	0	0	0
323	1	0	2	GBO	DSTT	0	2.0555556	2.0555556	-9	-9	-9	-9	0	-1	0	0	0
324	1	0	2	GBO	DSTT	1	1.0487805	-1	-9	-9	-9	-9	1.1111111	-1	2	1	0
325	0.18	0	1	FBO	DSTT	0	4.3809524	-1	-9	-9	-9	-9	1.9120879	-1	1	0	0
326	0.625	0	1	RMO	DSTT	0	0.9615385	0.9615385	-9	-9	-9	-9	-1	-9	0	0	0
327	1	0	2	FMO	DSTT	0	1.25	1.25	-9	-1	-1	-1	-1	-9	0	0	0
328	0.6666667	0	2	RMO	DSTT	2	2.1176471	-1	-9	-1	-1	-1	1.5076923	-1	1	1	0
329	1	0	1	RMO	DSTT	0	5.483871	5.483871	-9	-9	-9	-9	0	-9	1	1	0
330	1	0	2	RMO	WHTT	2	2	2	-9	0.0357143	-1	-1	2.5892	-1	1	0	0
331	1	2	2	RMO	WHTT	0	1.1666667	1.1666667	-9	0.1	-1	-1	1.6	-1	1	0	0
332	1	0	2	FMO	WHTT	1	1.25	-1	-9	0.05	-1	-1	-1	-1	1	0	0
333	1	0	2	RMO	DSTT	2	4.7261538	4.7261538	-9	-9	-9	1.5	1.5	-9	1	1	1
334	1	0	2	GMO	DSTT	2	3.3333333	3.3333333	-9	-1	-1	-1	0	-1	0	-1	0
335	1	0	2	RMO	DOTT	2	11.971034	11.971034	-9	9	9	9	0	0	0	0	-1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INPUT #18 RELATIVE MORALE ADVANTAGE ATK (+) TO DEF (-)	INPUT #19 RELATIVE LOGISTICS ADVANTAGE ATK (+) TO DEF (-)	INPUT #20 RELATIVE MOMENTUM ADVANTAGE ATK (+) TO DEF (-)	INPUT #21 RELATIVE INTELLIGENCE ADVANTAGE ATK (+) TO DEF (-)	INPUT #22 RELATIVE TECHNOLOGY ADVANTAGE ATK (+) TO DEF (-)	INPUT #23 RELATIVE INITIATIVE ADVANTAGE ATK (+) TO DEF (-)	INPUT #24 ATTACKER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #25 ATTACKER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #26 ATTACKER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #27 DEFENDER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #28 DEFENDER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #29 DEFENDER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #30 CASUALTY RATIO ATK/DEF	OUTPUT #1 ATTACKER WIN (1) LOSS(0)
--	--	--	--	--	--	--	--	--	--	--	--	--	--
1	1	0	1	1	1	DE	0	0	DD	0	0	0.6428571	1
2	1	1	0	0	1	FF	0	0	DD	0	0	0.2342926	1
0	0	0	0	0	1	FF	RC	0	DD	0	0	1.5010042	0
0	0	0	0	0	0	FF	RC	0	DD	0	0	0.8976415	0
0	0	0	0	0	0	FF	RC	0	DD	0	0	2.1289954	0
0	0	0	0	0	0	FF	RC	0	DD	0	0	1.2175697	0
0	0	0	0	0	0	FF	0	0	DO	FF	0	1.3846154	0
0	0	0	0	0	-1	FF	0	0	DO	FF	0	12	0
0	-1	0	0	0	1	EE	LR	FF	DD	0	0	0.2320755	1
0	-1	0	0	0	0	EE	LF	0	DO	FF	0	0.7422431	0
0	0	0	0	1	0	FF	0	0	DO	FF	0	1.34	0
0	0	1	0	0	1	FF	0	0	DO	FF	0	7.18125	0
0	0	1	0	0	0	FF	0	0	DO	FF	0	18.224199	0
0	0	1	0	0	1	FF	0	0	DO	FF	0	2.25	0
0	0	1	0	1	1	FF	0	0	DD	0	0	1.1666667	1
0	1	0	0	0	1	FF	DE	0	DD	0	0	0.32	1
0	0	0	0	0	0	FF	0	0	DD	0	0	5	0
0	1	0	0	0	1	FF	0	0	DD	0	0	1.9038462	1
0	0	0	0	0	0	FF	0	0	DD	0	0	1.9143577	0
0	0	0	0	0	1	FF	0	0	DD	0	0	0.5510169	1
0	1	0	0	0	0	FF	0	0	DD	0	0	2.4827586	1
0	1	0	0	0	1	FF	0	0	DD	0	0	1.2246205	1
0	0	0	0	0	1	FF	0	0	DO	FF	0	1.11172	0
0	0	0	0	1	0	FF	0	0	DD	0	0	2.95	0
0	0	0	1	0	1	FF	0	0	DD	0	0	0.5230769	1
0	0	0	0	0	1	FF	0	0	DD	0	0	1.4769347	0
0	0	0	0	1	1	FF	0	0	DO	FF	0	0.6	1
0	0	0	0	0	1	FF	DE	0	DD	0	0	0.9655172	1
0	0	0	0	0	1	FF	0	0	DO	FF	0	2.0739762	1
0	0	0	0	0	0	FF	0	0	DD	0	0	1.9529412	1
1	0	0	0	0	1	FF	0	0	DD	0	0	0.0655738	1
0	0	1	0	0	0	FF	0	0	DD	0	0	0.6395349	1
0	0	1	0	0	1	FF	0	0	DD	0	0	1.6326531	0
0	0	0	0	0	0	FF	0	0	DD	0	0	3.2	0
0	0	0	0	0	1	FF	EE	LR	DD	0	0	0.9138983	1
1	0	1	0	0	1	FF	EE	RF	DD	0	0	0.8333333	1
0	-1	0	0	0	1	FF	0	0	DD	0	0	0.5833333	1
0	-1	1	0	0	1	FF	0	0	DD	0	0	0.95	0
0	-1	1	0	0	1	FF	0	0	DO	FF	0	1.147541	1
0	0	0	1	0	1	FF	0	0	DD	0	0	0.9861111	1
0	0	0	-1	0	1	FF	0	0	DO	FF	0	0.921875	0
1	0	0	0	0	0	FF	0	0	DD	0	0	0.7772021	1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

BATTLE SEQUENCE NUMBER	INPUT #1 1ST WIDTH FRONT ATK/DEF RATIO	INPUT #2 DEFENSIVE POSTURE TYPE 0,1,2,3	INPUT #3 DEFENDER'S PRIMARY DEFENSIVE POSTURE	INPUT #4 TERRAIN	INPUT #5 WEATHER	INPUT #6 ATTACKER'S SURPRISE OVER DEFENDER'S AWARENESS	INPUT #7 TOTAL PERS STR ATK/DEF RATIO	INPUT #8 INIT PERS STR ATK/DEF RATIO	INPUT #9 HORSE CAV ATK/DEF RATIO	INPUT #10 TOT TANK ATK/DEF RATIO	INPUT #11 LITE TANK ATK/DEF RATIO	INPUT #12 MAIN BTTL TANK ATK/DEF RATIO	INPUT #13 NO. ARTY TUBE ATK/DEF RATIO	INPUT #14 CLOSE AIR SPT SORTS ATK/DEF	INPUT #15 RELATIVE COMBAT EFFECTIVENESS ATK (+) TO DEF (-)	INPUT #16 RELATIVE LEADERSHIP ADVANTAGE ATK (+) TO DEF (-)	INPUT #17 RELATIVE TRAINING ADVANTAGE ATK (+) TO DEF (-)
...	...	...	..	...	.....	..	..	..	..	..	..	..	..	..	..	..	..
336	1	2	0	GW0	DSTT	0	1.4662834	1.4662834	-9	-9	-9	-9	1.5	-9	-1	-1	-1
337	1	0	1	RM0	DOTT	0	1.1851098	-1	-9	-9	-9	-9	1.3333333	-1	0	0	-1
338	1	0	1	RM0	DSTT	0	1.5521855	1.559322	-9	-9	-9	-9	1.6	0	0	-1	-1
339	1	0	1	GW0	DSTT	0	2.0214497	2.0214497	-9	-9	-9	-9	1.2857143	-1	-1	-1	-1
340	1	0	1	RM0	DOTT	0	0.912263	0.912263	-9	-9	-9	-9	1.8	-1	-1	-1	-1
341	1	0	1	GW0	WLTT	0	1.8592881	1 8592881	-9	-9	-9	-9	1.7142857	-1	0	-1	-1
342	1	0	1	GW0	DOTT	0	0.8949795	0.8949795	-9	-9	-9	-9	0.9	-1	0	-1	-1
343	1	0	1	RM0	000T	1	1.4035755	1.4035755	-9	-9	-9	-9	2	-1	0	0	1
344	1	0	2	GW0	DOTT	0	1.1883754	1.1883754	-9	-9	-9	-9	0 6	-1	0	0	-1
345	1	0	2	GW0	DOTT	0	0.8025559	0 8025559	-9	-9	-9	-9	0.1	-1	0	0	-1
346	1	0	2	GW0	DSTT	0	2.8803364	-1	-9	-9	-9	-9	2.4	-1	0	0	-1
347	1	0	2	RM0	DSTT	0	1.2369183	0	-9	-1	-1	-1	0.9583333	-1	0	0	-1
348	0.7	0	2	RM0	DSTT	0	0.8712852	0 8712852	-9	-1	-1	-1	0.75	-1	0	0	-1
349	1	0	2	RM0	DSTT	0	0.8707746	0.8707746	-9	-1	-1	-1	1.2777778	-1	0	0	-1
350	1	0	2	RM0	DSTT	0	0.9166667	-1	-9	0.1	-1	-1	1	-1	0	0	0
351	1	0	2	RM0	DSTT	0	0.8888889	-1	-9	9	-1	-1	1	-1	0	0	0
352	1	0	2	RM0	DOTT	1	1.6666667	0	-9	9	9	9	1.75	-1	0	0	0
353	1	0	2	RM0	DOTT	2	1.6608032	1 6608032	-9	9	-9	9	1.0740741	-1	0	0	0
354	1	0	2	RM0	DOTT	2	1.8922268	1.8922268	-9	9	-9	9	0.6041667	-1	0	0	0
355	1	0	2	RM0	DOTT	2	2.875	2.875	-9	9	-9	9	0	-1	0	0	0
356	1	0	2	RM0	DOTT	2	7.9292035	7.9292035	-9	9	9	-9	9	-1	0	0	0
357	1	0	2	RM0	DOTT	2	4.2747934	4.2747934	-9	9	-9	9	1.9333333	-1	0	0	0
358	1	0	2	RM0	DOTT	1	2.01375	2.01375	-9	-9	-9	-9	0.5833333	-1	0	0	-1
359	1	1	2	RM0	DSTT	0	1.8125	-1	-9	0	-1	-1	1.8918919	-1	0	0	0
360	1	0	2	RM0	WLTT	0	11.428571	11.428571	-9	-1	-1	-1	3.2727273	-1	0	0	0
361	1	0	2	RM0	WLTT	0	9.566787	9.566787	-9	-1	-1	-1	6	-1	0	0	0
362	1	0	2	RM0	WLTT	2	1.3235294	-1	-9	0	9	0	1.3333333	-1	0	0	0
363	1	0	2	RM0	DSTT	0	1.5	-1	-9	-1	-1	-1	-1	-1	0	0	0
364	1	1	2	RM0	WOTT	0	4	-1	-9	9	9	-9	3.01	0	0	0	-1
365	1	2	2	RM0	WHTT	1	6.3196172	6.3196172	-9	-9	-9	-9	7.6	-1	0	0	-1
366	1	0	2	GW0	DOTT	1	1.5789474	1.5789474	-9	0	9	0.1	0	0	0	0	-1
367	1	0	2	RM0	DSTT	0	2	-1	-9	9	9	-9	0.950495	-1	0	0	-1
368	1	0	2	RM0	DSTT	0	12.393548	12.393548	-9	9	9	-9	0.24	-1	0	0	-1
369	1	0	2	RM0	DSTT	2	6.5740741	6.5740741	-9	9	9	-9	2.125	-1	0	0	-1
370	1	0	2	RM0	DSTT	2	3.0567686	3.0567686	-9	9	9	-9	4.8	-1	0	0	-1
371	1	0	2	RW0	DSTT	2	13.776119	13.776119	-9	9	9	-9	3.4285714	-1	0	0	-1
372	1	0	2	RM0	DSTT	0	1.8	1.8	-9	0	9	9	0.8135593	-1	0	0	-1
373	1	0	2	RM0	DOTT	0	1.6666667	1.6666667	-9	-1	-1	-1	-1	-1	0	0	-1
374	1	0	2	RM0	DOTT	0	1 644376	1.644376	-9	9	9	-9	1.0285714	-1	0	0	-1
375	1	0	2	RM0	DOTT	0	2 8578199	2.8578199	-9	9	9	-9	2	-1	0	0	-1
376	1	0	2	RM0	DOTT	0	2.7654639	2.7654639	-9	9	9	-9	1 6	-1	0	0	-1
377	1	0	2	RM0	DOTT	0	2.1109393	0	-9	9	9	-9	1.0909091	-1	0	0	-1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INPUT #18 RELATIVE MORALE ADVANTAGE ATK (+) TO DEF (-)	INPUT #19 RELATIVE LOGISTICS ADVANTAGE ATK (+) TO DEF (-)	INPUT #20 RELATIVE MOMENTUM ADVANTAGE ATK (+) TO DEF (-)	INPUT #21 RELATIVE INTELLIGENCE ADVANTAGE ATK (+) TO DEF (-)	INPUT #22 RELATIVE TECHNOLOGY ADVANTAGE ATK (+) TO DEF (-)	INPUT #23 RELATIVE INITIATIVE ADVANTAGE ATK (+) TO DEF (-)	INPUT #24 ATTACKER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #25 ATTACKER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #26 ATTACKER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #27 DEFENDER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #28 DEFENDER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #29 DEFENDER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #30 CASUALTY RATIO ATK/DEF	OUTPUT #1 ATTACKER WIN (1) LOSS(0)
--	--	--	--	--	--	--	--	--	--	--	--	--	--
1	0	0	0	0	0	FF	0	0	DO	FF	0	1.4890411	0
1	0	0	0	0	1	FF	0	0	DO	FF	0	0.8131635	1
1	0	0	0	0	0	FF	0	0	DD	0	0	6.6851852	0
1	0	0	0	0	0	FF	0	0	DD	0	0	1.844086	0
1	0	0	0	0	-1	FF	EE	FF	DO	FF	0	3.908046	0
1	0	0	0	0	1	FF	0	0	DO	FF	0	0.5157116	1
1	0	0	0	0	1	FF	0	0	DO	EE	LR	0.5699659	1
-1	0	0	0	0	1	FF	0	0	DD	0	0	1.2897196	0
1	0	0	0	0	0	FF	0	0	DD	0	0	10.666667	0
1	0	0	0	0	1	FF	0	0	DD	0	0	7	0
1	0	0	0	0	1	FF	0	0	DO	FF	0	0.624714	1
1	0	0	0	0	1	FF	EE	FF	DO	FF	0	0.3128492	1
1	0	0	0	0	1	FF	0	0	DO	FF	0	0.165493	1
1	0	0	0	0	1	FF	EE	FF	DO	FF	0	0.4407115	1
0	0	1	0	0	1	FF	0	0	DO	FF	0	2.2556815	0
0	0	1	0	0	1	DE	0	0	DD	0	0	2.5	0
1	0	0	0	0	1	FF	0	0	DD	0	0	1.1	1
1	0	0	0	0	1	FF	0	0	DD	0	0	0.2120885	1
1	0	0	0	0	1	FF	0	0	DD	0	0	0.3604183	1
1	0	0	0	0	1	FF	0	0	DD	0	0	0.3	1
1	0	1	0	0	1	FF	0	0	DD	0	0	0.6906077	1
1	0	0	0	0	1	FF	0	0	DD	0	0	0.5559006	1
1	0	0	0	0	1	FF	0	0	DD	0	0	0.26	1
2	0	1	0	0	1	FF	0	0	DD	0	0	1.1470588	1
2	0	1	0	0	1	FF	0	0	DD	0	0	1.8103448	1
2	0	1	0	0	1	FF	0	0	DD	0	0	1.2681159	1
2	0	1	1	1	1	FF	0	0	DD	0	0	0.3333333	1
2	0	1	0	1	1	FF	0	0	DD	0	0	0.4375	1
1	0	0	0	0	1	EE	LF	0	DD	0	0	0.35	1
1	0	0	0	0	1	FF	0	0	DD	0	0	0.1719331	1
1	0	0	0	0	1	FF	0	0	DD	0	0	1.0317046	1
1	0	0	0	0	1	FF	0	0	DO	EE	FF	1.175	1
1	0	0	0	0	1	FF	0	0	DD	0	0	2.9759036	1
1	0	0	0	0	1	EE	LF	0	DD	0	0	1.1666667	1
1	0	0	0	0	1	FF	0	0	DD	0	0	1.2780083	1
1	0	0	0	0	1	FF	0	0	DD	0	0	1.3777778	1
1	0	0	0	0	1	FF	0	0	DO	0	0	3.178	0
2	0	0	0	0	1	FF	0	0	DO	FF	0	1.0317046	1
2	0	0	0	0	1	FF	0	0	DO	FF	0	1.8333333	0
2	0	0	0	0	1	FF	0	0	DD	0	0	3.2982456	0
2	0	0	0	0	1	FF	0	0	DD	0	0	5.5737705	1
2	0	0	0	0	1	FF	0	0	DD	0	0	0.968	1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

BATTLE SEQUENCE NUMBER	INPUT #1 1ST WIDTH FRONT ATK/DEF RATIO	INPUT #2 DEFENSIVE POSTURE TYPE 0,1,2,3	INPUT #3 DEFENDERS PRIMARY DEFENSIVE POSTURE	INPUT #4 TERRAIN	INPUT #5 WEATHER	INPUT #6 ATTACKER'S SURPRISE OVER DEFENDER'S AWARENESS	INPUT #7 TOTAL PERS STR ATK/DEF RATIO	INPUT #8 INIT PERS STR ATK/DEF RATIO	INPUT #9 HORSE CAV ATK/DEF RATIO	INPUT #10 TOT TANK ATK/DEF RATIO	INPUT #11 LITE TANK ATK/DEF RATIO	INPUT #12 MAIN BTTL TANK ATK/DEF RATIO	INPUT #13 NO. ARTY TUBE ATK/DEF RATIO	INPUT #14 CLOSE AIR SPT SORTS ATK/DEF	INPUT #15 RELATIVE COMBAT EFFECTIVENES ATK (+) TO DEF (-)	INPUT #16 RELATIVE LEADERSHIP ADVANTAGE ATK (+) TO DEF (-)	INPUT #17 RELATIVE TRAINING ADVANTAGE ATK (+) TO DEF (-)
...	...	...	..	...	.....	..	..	..	..	..	..	..	..	..	..	..	..
378	1	0	2	RM0	DOTT	0	1.5058471	1.5058471	-9	9	9	-9	0.8888889	-1	0	0	-1
379	1	0	2	RM0	DOTT	0	1.6335043	1.6335043	-9	-9	-9	-9	1.4545455	-1	0	0	-1
380	1	0	2	RM0	DOTT	0	1.1509949	1.1509949	-9	-9	-9	-9	1.0322581	-1	0	0	-1
381	1	2	1	RM0	DOTT	0	1.5783659	1.5783659	-9	-1	-1	-1	-1	-1	0	0	-1
382	1	2	1	RM0	WHTT	0	4.0878378	4.0878378	-9	-9	-9	-9	-9	-9	0	0	-1
383	1	2	1	RM0	WLTT	0	1.2018127	1.2018127	-9	-9	-9	-9	9	-1	0	0	-1
384	1	0	2	RM0	WHTT	0	1.0714286	-1	-9	-1	-9	-9	1.0648871	-1	0	0	0
385	1	0	2	RB0	DSTT	2	2.8038356	2.8038356	-9	-9	-9	-9	2.56	20	1	1	1
386	1	1	1	FD0	DSTT	0	1.0333333	1.0333333	-9	1.1444444	-1	-1	0.96875	0	0	0	0
387	1	0	2	FD0	DSTT	2	2.0953214	2.0953214	-9	1.7487352	2.3333333	1.5337838	1.5337838	3.7134615	0	0	0
388	1	0	2	FD0	DSTT	2	2.0953214	2.0953214	-9	1.7487352	2.3333333	1.5337838	1.5337838	-1	0	0	0
389	1	0	2	FD0	DSTT	0	2.1111024	2.1111024	-9	1.5851064	9	-9	0	-1	0	0	0
390	1	0	2	FD0	DSTT	0	2.1752577	2.1752577	-9	2.2580645	-1	-1	0	-1	0	0	0
391	0.375	0	0	RD0	DSTT	-2	2.4734043	2.4734043	-9	0.52	0.1	9	0	-9	0	0	1
392	1	0	0	RD0	DSTT	2	0.4677778	0.4677778	-9	1.3733333	9	-9	0.5	0	0	0	1
393	1	0	2	GM0	DSTT	0	4.8196	4.8196	-9	18.8	9	-9	2.9411765	0	0	0	0
394	1	2	0	RM0	DSTT	1	3.0392941	3.0392941	-9	0	-9	0.1	2.4642857	1.1391304	-1	0	-1
395	1	2	0	RM0	DSTT	1	3.0392941	3.0392941	-9	0	-9	0.1	3	1.1391304	-1	0	-1
396	1	2	0	RM0	DSTT	1	1.4835518	1.4835518	-9	1.3589744	9	-9	0.9111111	2.5714286	-1	0	-1
397	1	0	0	RM0	DSTT	0	1.3116652	1.3116652	-9	2.9666667	-9	-9	0.739726	0.2077922	1	0	1
398	1	0	0	RM0	DSTT	0	1.1612604	1.1612604	-9	3.6	-9	-9	1.1232877	2.8	1	0	1
399	1	0	0	RM0	DSTT	0	1.1609014	1.1609014	-9	0.9245283	0.1	-9	0.9464286	0.1411765	1	0	0
400	1	0	3	RM0	DSTT	0	2.1057898	2.1057898	-9	1.6724138	9	-9	1.9	3.0322581	-1	0	-1
401	1	0	3	RM0	DSTT	0	2.3240824	2.3240824	-9	1.7966102	9	-9	1.325	15.6	-1	0	-1
402	1	0	1	RM0	DSTT	0	0.7032572	0.7032572	-9	1.125	0.1	-9	1.0789474	0.9393939	1	0	1
403	1	0	1	FM0	DSTT	0	1.8042885	1.8042885	-9	4.0512821	9	-9	1.5111111	-9	0	0	0
404	1	0	3	RM0	DSTT	0	2.8298368	2.8298368	-9	2.5238095	9	-9	2.0392157	0.2962963	0	0	0
405	1	0	1	FM0	DSTT	0	2.107125	2.107125	-9	3.3181818	9	-9	2.7118644	9	0	0	0
406	1	0	1	FM0	DSTT	0	2.1776171	2.1776171	-9	1.3076923	-9	-9	4.4222222	9	0	0	0
407	1	0	3	GM0	DSTT	0	3.3045843	3.3045843	-9	2.4090909	9	-9	2.0697674	0.1	0	0	0
408	1	0	1	RM0	DSTT	1	2.5484138	2.5484138	-9	4.8181818	9	-9	1.9152542	3.3	0	0	0
409	1	0	3	RM0	WLTT	0	3.3062888	3.3062888	-9	1.9272727	9	0	1.9803922	0.4655172	0	0	0
410	1	0	1	FM0	WLTT	0	1.7940526	1.7940526	-9	3.95	9	-9	1.5111111	-9	0	0	0
411	1	0	1	RM0	WLTT	0	2.2855063	2.2855063	-9	3.3181818	9	-9	2.2857143	9	-1	0	-1
412	1	0	1	RM0	WLTT	0	2.1530512	2.1530512	-9	1.3076923	-9	-9	3.7333333	8.6666667	-1	0	-1
413	1	0	1	FM0	WLTT	0	1.7309594	1.7309594	-9	4.0512821	9	-9	1.5111111	-9	-1	0	-1
414	1	0	1	RM0	DSTT	0	2.6688815	2.6688815	-9	3.5333333	9	-9	2.2439024	1.7291667	-1	0	-1
415	1	0	2	GM0	WLTT	0	2.8908148	2.8908148	-9	1.1842105	9	-9	3.902439	6.4285714	-1	0	-1
416	1	0	2	GM0	DSTT	0	2.5281754	2.5281754	-9	1.962963	9	-9	2.2	4.9583333	-1	0	-1
417	1	0	2	GM0	WLTT	0	2.6506244	2.6506244	-9	1.962963	9	-9	2.2	0.1232877	-1	0	-1
418	1	2	0	GM0	WLTT	0	1.5273077	1.5273077	-9	9	-9	9	0.3660714	0.7916667	1	0	1
419	1	0	2	GM0	WLTT	0	2.0586754	2.0586754	-9	2.5238095	9	-9	2	2.2758621	-1	0	-1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INPUT #18 RELATIVE MORALE ADVANTAGE ATK (+) TO DEF (-)	INPUT #19 RELATIVE LOGISTICS ADVANTAGE ATK (+) TO DEF (-)	INPUT #20 RELATIVE MOMENTUM ADVANTAGE ATK (+) TO DEF (-)	INPUT #21 RELATIVE INTELLIGENCE ADVANTAGE ATK (+) TO DEF (-)	INPUT #22 RELATIVE TECHNOLOGY ADVANTAGE ATK (+) TO DEF (-)	INPUT #23 RELATIVE INITIATIVE ADVANTAGE ATK (+) TO DEF (-)	INPUT #24 ATTACKER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #25 ATTACKER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #26 ATTACKER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #27 DEFENDERS PRIMARY TACTICAL SCHEME PART 1	INPUT #28 DEFENDERS PRIMARY TACTICAL SCHEME PART 2	INPUT #29 DEFENDERS PRIMARY TACTICAL SCHEME PART 3	INPUT #30 CASUALTY RATIO ATK/DEF	OUTPUT #1 ATTACKER WIN (1) LOSS(0)
..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	0	0	0	0	1	FF	0	0	DD	0	0	1.7398844	1
2	0	0	0	0	1	FF	EE	RF	DD	0	0	1.047619	1
2	0	0	0	0	1	FF	DE	0	DD	FF	0	0.436	1
2	0	0	0	0	1	FF	0	0	DD	0	0	1.0317046	1
2	0	1	0	0	1	FF	0	0	DD	0	0	0.8333333	1
2	0	1	0	0	1	FF	0	0	DD	0	0	0.6043956	1
0	0	0	-1	0	0	FF	0	0	DD	FF	0	2.1714269	0
1	0	0	0	0	1	FF	0	0	DD	0	0	0.4825714	1
0	-1	0	0	0	1	EE	LR	0	DD	EE	RR	1.68	0
0	1	0	1	0	1	FF	0	0	DD	FF	0	0.8477649	1
0	1	0	1	0	1	FF	0	0	DD	FF	0	1.661705	1
0	1	0	0	0	1	FF	0	0	DD	FF	0	0.6666667	1
0	1	1	0	0	1	FF	0	0	DD	0	0	0.5666667	1
0	0	0	-1	0	-1	FF	0	0	DD	DE	0	1.2857143	0
0	0	0	-1	0	1	FF	0	0	DD	0	0	2.2167488	0
1	1	1	0	0	1	FF	0	0	DD	0	0	1.8512397	1
0	0	0	0	0	1	FF	0	0	DD	EE	RF	11.54	1
0	0	0	0	0	1	FF	0	0	DD	EE	LF	12.75	1
0	0	0	0	0	1	FF	0	0	DD	0	0	4.1833333	0
0	0	0	0	0	0	FF	0	0	DD	0	0	0.6784825	0
0	0	0	0	0	0	FF	0	0	DD	0	0	0.7731959	0
1	0	0	0	0	0	FF	0	0	DD	0	0	2.214511	0
0	0	1	0	0	1	FF	0	0	DD	0	0	2.7272727	1
0	0	1	0	0	1	FF	0	0	DD	0	0	3.2166667	1
0	0	0	0	0	0	FF	0	0	DD	0	0	1.5686275	0
0	0	0	0	0	1	RC	0	0	DD	FF	0	4.625	1
0	0	0	0	0	1	RC	0	0	DD	0	0	2.6923077	1
0	0	0	0	0	1	RC	0	0	DD	0	0	4.4680851	0
0	0	0	0	0	1	RC	0	0	DD	FF	0	12.5	1
0	0	0	0	0	1	FF	DE	0	DD	0	0	1.0230769	1
0	0	0	0	0	1	RC	0	0	DD	0	0	3.5131579	1
0	0	0	0	0	1	FF	0	0	DD	0	0	0.631068	0
0	0	0	0	0	1	RC	0	0	DD	0	0	2.7777778	1
0	-1	0	0	0	0	FF	0	0	DD	0	0	3.030303	1
0	0	0	0	0	0	RC	0	0	DD	0	0	1.5942029	1
0	0	0	0	0	0	FF	0	0	DD	0	0	1.7045455	0
0	0	0	0	0	0	FF	0	0	DD	FF	0	2.2486486	1
0	0	0	0	0	0	FF	0	0	DD	0	0	7.2727273	0
0	0	0	0	0	0	FF	0	0	DD	0	0	2.5422535	0
0	-1	0	0	0	0	FF	0	0	DD	0	0	6.2	0
0	0	0	0	0	1	FF	0	0	DD	0	0	0.1096774	1
0	-1	0	0	0	0	FF	EE	LF	DD	FF	0	1.3983051	0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

BATTLE SEQUENCE NUMBER	INPUT #1 1ST WIDTH FRONT ATK/DEF RATIO	INPUT #2 DEFENSIVE POSTURE TYPE 0,1,2,3	INPUT #3 DEFENDER'S PRIMARY DEFENSIVE POSTURE	INPUT #4 TERRAIN	INPUT #5 WEATHER	INPUT #6 ATTACKER'S SURPRISE OVER DEFENDER'S AWARENESS	INPUT #7 TOTAL PERS STR ATK/DEF RATIO	INPUT #8 INIT PERS STR ATK/DEF RATIO	INPUT #9 HORSE CAV ATK/DEF RATIO	INPUT #10 TOT TANK ATK/DEF RATIO	INPUT #11 LITE TANK ATK/DEF RATIO	INPUT #12 MAIN BTTL TANK ATK/DEF RATIO	INPUT #13 NO. ARTY TUBE ATK/DEF RATIO	INPUT #14 CLOSE AIR SPT SORTS ATK/DEF	INPUT #15 RELATIVE COMBAT EFFECTIVENES ATK (+) TO DEF (-)	INPUT #16 RELATIVE LEADERSHIP ADVANTAGE ATK (+) TO DEF (-)	INPUT #17 RELATIVE TRAINING ADVANTAGE ATK (+) TO DEF (-)
...	...	...	..	...	.....	..	..	..	..	..	..	..	..	..	..	..	..
420	1	0	2	GM0	WLTT	0	2.3411966	2 3411966	-9	4.25	-9	-9	3.5135135	9	-1	0	-1
421	1	0	2	GM0	WLTT	0	6.3090024	6 3090024	-9	0.1	-9	0.1	4.1176471	9	-1	0	-1
422	1	0	2	GM0	WHTT	0	1.6882603	1.6882603	-9	0.1	-9	0.1	4.4705882	9	-1	0	-1
423	1	0	0	FM0	WHTT	1	2.8666667	2 8666667	-9	1.5434783	-9	-9	3.6666667	0.1	-1	0	-1
424	1	0	0	FM0	DSCT	0	0.8520806	0.8520806	-9	1.2957746	-9	-9	0.5371901	1.5151515	0	0	0
425	1	0	1	FM0	DSCT	0	1.1767121	1.1767121	-9	0.7717391	-9	-9	1.9674797	0.5333333	-1	0	-1
426	1	0	1	FM0	DSTT	0	2.6468375	2 6468375	-9	3.0571429	-9	-9	1.8196721	1.2045455	1	0	1
427	1	0	1	FM0	DSCT	0	5.8671096	5.8671096	-9	0.7697842	-9	-9	2.695122	2.5714286	1	0	1
428	1	0	1	FM0	DSCT	0	1.4836	1.4836	-9	9	-9	9	0.7631579	1.2857143	0	0	0
429	1	0	1	FM0	DSCT	0	1.5520587	1 5520587	-9	1.13	-9	-9	0.9867257	-9	0	0	0
430	1	2	2	FM0	WLTT	0	1.8934577	1.8934577	-9	2.5	-9	-9	1.5196078	9	1	0	1
431	1	1	2	FM0	DSTT	2	2.0479118	2 0479118	-9	1.8962264	0.1	-9	1.7228261	0.2637795	0	0	0
432	1	1	2	FM0	DSCT	2	2.2003893	2.2003893	-9	0.4067797	-9	-9	0.9027027	0.7758621	1	0	1
433	1	0	2	RM0	WLTT	0	0.7972773	0.7972773	-9	0.4245283	0.1	-9	0.8770053	0.9550562	-1	0	0
434	1	0	2	GB0	DSTT	1	2.0218378	2.0218378	-9	7.3235294	-9	-9	1.300813	9	0	0	0
435	1	0	2	GB0	DSTT	1	2.2073455	2.2073455	-9	5.0952381	9	-9	2.1052632	9	0	0	0
436	1	0	2	GB0	DSTT	0	2.1944	2.1944	-9	5.9047619	9	-9	2.109589	9	0	0	0
437	1	0	3	GB0	DSTT	0	2.2286062	2.7518413	-9	6.225	9	-9	1.296875	9	0	0	0
438	1	0	3	GB0	DSTT	0	3.040514	3.040514	-9	7.5	9	-9	2.7413793	-9	0	0	0
439	1	0	0	RM0	DSTT	0	2.8698225	2.8698225	-9	5.6521739	0	-9	3.3	9	0	0	0
440	1	0	3	GM0	DSTT	0	2.6923193	2.6923193	-9	4	9	-9	3.15	0.25	1	0	0
441	1	0	0	GM0	DSTT	0	2.7100556	2.7100556	-9	5.0384615	9	-9	3.7	9	1	0	0
442	1	0	2	FM0	WLTT	0	1.3799825	1.3799825	-9	9	-9	9	1.0869565	9	0	0	0
443	1	0	2	FM0	WLTT	0	1.5263158	1.5263158	-9	1.8947368	-9	-9	1.0416667	9	0	0	0
444	1	0	2	FM0	WLTT	2	1.7459227	1.7459227	-9	4.7640449	9	-9	1.4205607	9	0	0	0
445	1	0	2	FM0	WLTT	2	1.6742958	1.6742958	-9	2.1632653	9	-9	2.3647059	9	0	0	0
446	1	0	4	RM0	DSTT	0	2.5765416	2.5765416	-9	2.1153846	9	-9	1.5681818	9	0	0	0
447	1	0	2	RM0	DSTT	-1	1.6778616	1.6778616	-9	7.1076923	9	-9	1.4375	9	-1	-1	0
448	1	0	2	RM0	DSTT	0	1.7980742	1 7980742	-9	5.3684211	9	-9	0.9150943	-9	-1	0	0
449	1	0	2	RM0	DSTT	0	1.3124316	1.3124316	-9	1.4366197	9	-9	0.7948718	-9	-1	0	0
450	1	0	2	RM0	DSTT	0	2.0312051	2.0217024	-9	9	-9	9	1.625	-9	0	0	0
451	1	0	2	RM0	DSTT	0	1.880324	1.880324	-9	2.81	9	-9	1.2478632	3.1818182	0	0	0
452	1	0	2	RM0	DSTT	0	2.832351	2.832351	-9	0	0	0.1	1.5409836	33.727273	-1	0	-1
453	1	0	1	RM0	DSTT	0	1.7400092	1.7400092	-9	3.5333333	9	-9	1.0267857	66	0	0	0
454	1	0	2	RB0	DSTT	0	1.2258634	1.2258634	-9	4.4571429	9	-9	0.5990099	19	-1	0	-1
455	1	1	0	RM0	DSTT	0	2.6314905	2.6314905	-9	4.0645161	9	-9	1.3272727	9	0	0	0
456	1	0	2	FM0	DSTT	0	3.5017043	3.5017043	-9	9	-9	9	1.6	9	-1	0	-1
457	1	0	2	RM0	DSTT	0	4.2489189	4 2489189	-9	9	9	9	5	9	0	0	0
458	1	0	2	RM0	DOTT	0	2.4304	2 4304	-9	4.6521739	9	-9	1.4285714	11	0	0	0
459	1	0	2	RM0	DSTT	1	1.3254435	1 3254435	-9	2.592803	9	-9	2.4657534	0	0	0	0
460	1	0	2	RM0	DSTT	0	4.1042345	4 1042345	-9	10.483871	9	-9	2 490566	9	0	0	0
461	1	0	0	RM0	DSTT	2	0.9213674	1.8624543	-9	0.3529412	0.1	-9	1.1354167	0.1	0	0	0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INPUT #18 RELATIVE MORALE ADVANTAGE ATK (+) TO DEF (-)	INPUT #19 RELATIVE LOGISTICS ADVANTAGE ATK (+) TO DEF (-)	INPUT #20 RELATIVE MOMENTUM ADVANTAGE ATK (+) TO DEF (-)	INPUT #21 RELATIVE INTELLIGENCE ADVANTAGE ATK (+) TO DEF (-)	INPUT #22 RELATIVE TECHNOLOGY ADVANTAGE ATK (+) TO DEF (-)	INPUT #23 RELATIVE INITIATIVE ADVANTAGE ATK (+) TO DEF (-)	INPUT #24 ATTACKER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #25 ATTACKER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #26 ATTACKER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #27 DEFENDER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #28 DEFENDER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #29 DEFENDER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #30 CASUALTY RATIO ATK/DEF	OUTPUT #1 ATTACKER WIN (1) LOSS(0)
..	..	..	..	..	..	..	..	..	..	..	..	..	..
0	0	0	0	0	0	FF	0	0	DD	0	0	12.5	0
0	0	0	0	0	0	FF	0	0	DO	FF	0	3.9007092	1
0	0	0	0	0	0	FF	0	0	DD	0	0	4	1
0	0	0	0	0	1	FF	0	0	DD	0	0	8.9076923	1
0	0	0	0	0	1	FF	0	0	DD	0	0	5.9032258	0
0	0	0	0	0	1	FF	0	0	DD	0	0	3.3574661	1
0	0	0	0	0	1	DE	0	0	DD	0	0	0.9089855	1
0	0	0	0	0	1	FF	0	0	DO	FF	0	0.9241192	0
0	0	0	0	0	1	RC	0	0	DD	0	0	1.5607477	0
0	0	0	0	0	1	FF	0	0	DD	0	0	0.8681672	1
0	0	0	0	0	1	FF	0	0	DD	0	0	0.4902913	0
0	0	1	0	0	1	FF	0	0	DO	DE	0	2.1984283	0
0	0	1	0	0	1	RC	0	0	DO	FF	0	0.8570585	1
0	0	0	0	0	0	FF	0	0	DD	0	0	0.6575682	0
0	0	0	0	0	1	FF	0	0	DD	0	0	0.5130435	1
0	0	0	0	0	1	FF	0	0	DD	0	0	2.7416667	1
0	0	1	0	0	1	FF	0	0	DD	0	0	1.2149321	1
0	0	1	0	0	1	FF	0	0	DD	0	0	0.469863	1
0	0	1	0	0	1	FF	0	0	DD	0	0	0.5617198	1
0	0	1	0	0	1	FF	0	0	DD	0	0	0.6114458	1
0	0	1	0	0	1	FF	EE	RF	DD	0	0	0.6763158	1
0	0	1	0	0	1	FF	EE	LF	DD	0	0	0.7552632	1
0	0	0	0	0	0	RC	0	0	DO	FF	0	0.5	0
0	0	0	0	0	1	FF	0	0	DO	FF	0	1.8130841	0
0	0	0	0	0	1	FF	0	0	DD	0	0	0.5239852	1
0	0	0	0	0	1	FF	0	0	DD	0	0	0.9424861	1
0	0	0	0	0	1	FF	0	0	DD	0	0	0.7136564	1
0	0	1	-1	0	1	FF	0	0	DD	0	0	0.5815011	0
0	0	0	0	0	1	FF	0	0	DO	FF	0	0.8913793	0
0	0	0	0	0	1	FF	0	0	DO	FF	0	0.4397993	0
0	0	0	0	0	1	RC	FF	0	DD	0	0	0.6550802	1
0	0	0	0	0	1	FF	0	0	DO	FF	0	0.9456128	0
0	0	0	0	0	1	FF	0	0	DO	FF	0	1.1819484	0
0	0	1	0	0	1	FF	0	0	DD	0	0	0.2792869	1
0	0	0	0	0	1	FF	0	0	DO	FF	0	0.3574661	0
0	0	1	0	0	1	FF	0	0	DO	FF	0	1.25	1
0	0	0	0	0	1	FF	0	0	DD	0	0	0.6729412	1
0	0	0	0	0	0	FF	0	0	DD	0	0	1	1
0	1	0	0	0	1	FF	0	0	DO	FF	0	1.1817021	1
0	1	0	-1	0	0	FF	0	0	DD	0	0	0.8022	0
0	1	0	0	0	1	FF	0	0	DD	0	0	0.302	1
0	-1	0	0	0	1	FF	0	0	DO	FF	0	1.7957351	0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

BATTLE SEQUENCE NUMBER	INPUT #1 1ST WIDTH FRONT ATK/DEF RATIO	INPUT #2 DEFENSIVE POSTURE TYPE 0,1,2,3	INPUT #3 DEFENDER'S PRIMARY DEFENSIVE POSTURE	INPUT #4 TERRAIN	INPUT #5 WEATHER	INPUT #6 ATTACKER'S SURPRISE OVER DEFENDER'S AWARENESS	INPUT #7 TOTAL PERS STR ATK/DEF RATIO	INPUT #8 INIT PERS STR ATK/DEF RATIO	INPUT #9 HORSE CAV ATK/DEF RATIO	INPUT #10 TOT TANK ATK/DEF RATIO	INPUT #11 LITE TANK ATK/DEF RATIO	INPUT #12 MAIN BTTL TANK ATK/DEF RATIO	INPUT #13 NO. ARTY TUBE ATK/DEF RATIO	INPUT #14 CLOSE AIR SPT SORTS ATK/DEF	INPUT #15 RELATIVE COMBAT EFFECTIVENESS ATK (+) TO DEF (-)	INPUT #16 RELATIVE LEADERSHIP ADVANTAGE ATK (+) TO DEF (-)	INPUT #17 RELATIVE TRAINING ADVANTAGE ATK (+) TO DEF (-)
...	...	...	..	...	.....	..	..	..	..	..	..	..	..	..	..	..	..
462	1	0	0	RM0	DSTT	0	1.8793994	1.8793994	-9	21.133333	9	-9	1.9210526	-9	0	0	0
463	1	0	1	RM0	WLTT	0	2.872	2.872	-9	19.875	19.75	-9	4.5625	9	0	0	0
464	1	0	1	RM0	WLTT	0	2.7079333	2 7079333	-9	12.421053	9	-9	3.7	9	0	0	0
465	1	0	3	RM0	WLTT	0	1.4368916	1.4368916	-9	3.65625	9	-9	2 0967742	9	0	0	0
466	1	0	2	RM0	WLTT	0	1.5359778	1 5359778	-9	5.3636364	9	-9	1.1935484	9	0	0	0
467	1	0	0	RM0	WLTT	0	1.5625	0	-9	1.0327869	0.1	-9	0.25	0.1	0	-1	0
468	1	0	2	RM0	WLTT	0	1.6444071	2 3372372	-9	4.952381	9	0	2.0172414	0	0	0	0
469	1	0	2	RM0	WLTT	0	1.012	-1	-9	1.3787879	9	-9	1.5140187	-1	0	0	0
470	1	1	2	RM0	WHCT	1	4.2217653	4 2217653	-9	10.760563	0	0	5.4848485	9	0	0	0
471	1	0	2	RM0	WHCT	0	3.8969155	3.8969155	-9	16.3	9	-9	1.5723684	9	0	0	0
472	1	1	1	RM0	WLCT	0	3.4256784	3 4256784	-9	12.625	9	-9	1.3396226	-9	0	0	0
473	1	1	2	RM0	WLCT	0	3.2553379	3 2553379	-9	8.3174603	9	-9	3.0473373	-9	0	0	0
474	1	1	1	RM0	WLCT	0	1.58736	1.58736	-9	7.1875	9	-9	1.9506173	-9	0	0	0
475	1	1	1	RM0	DOCT	0	2.7454315	2.7454315	-9	9.7272727	9	-9	2.5072464	9	0	0	0
476	1	0	0	RM0	DOCT	0	1.4787551	1.4787551	-9	3.5333333	9	-9	0.796875	-9	0	0	0
477	1	0	1	RM0	DOCT	0	2.2676097	2 2676097	-9	5.8611111	9	-9	2.2298851	-9	0	0	0
478	1	1	1	RM0	WLCT	0	2.4179949	2.4179949	-9	4.9069767	9	-9	1.2839506	-9	0	0	0
479	1	1	1	RM0	WLCT	0	2.9329904	2.9329904	-9	8.32	9	-9	1.1907895	-9	0	0	0
480	1	0	1	RM0	DOTT	0	3.2715089	3.2715089	-9	10.304348	9	-9	1	-9	0	0	0
481	1	0	3	RM0	DOTT	0	2.856322	2.856322	-9	14.857143	9	-9	2.9274611	9	0	0	0
482	1	0	2	RM0	WLCT	0	3.0182395	3.0182395	-9	11.722222	9	-9	1.0505051	-9	0	0	0
483	1	0	0	GM0	WHCT	2	1.1582117	-1	-9	0.1	0 1	-9	1.1333333	-9	0	0	0
484	1	1	0	RM0	WLCT	0	4.3508702	-1	-9	1.6513158	0.1	-9	0.8703704	-9	0	0	0
485	1	1	0	RM0	WLCT	0	7.5640338	-1	-9	2.3618421	0.1	-9	17.388889	-9	0	0	0
486	1	0	1	RM0	DSTT	2	0.8	0.8	-9	3	2.9032258	-9	1.0520833	13.333333	1	1	1
487	1	2	0	RW0	WHHE	1	0.5833333	0.5833333	-9	9	9	9	0.9285714	9	1	1	2
488	1	0	1	RM0	DSTT	3	0.88	0.88	-9	0.8978873	0.5119048	0.5648148	1.1296296	2.6666667	2	2	2
489	1	1	1	RM0	DSCT	0	0.8017493	0 8017493	-9	1.8947368	-1	-1	0 8604373	-1	2	2	2
490	1	1	0	RM0	DSCT	2	1.2048864	1 2048864	-9	0.7847059	-1	-1	1.6780488	-1	0	0	-1
491	1	1	1	FW0	DSTT	1	4.5018695	4 5018695	-9	2.0891473	-1	-1	2.3934426	-1	-1	-1	-1
492	1	0	2	FM0	WLCT	0	4	4	-9	15.8	9	-9	6.4450549	2.5	0	1	1
493	1	0	2	RM0	DSTT	0	1.3777778	1 3777778	-9	5.8181818	-1	-1	0.3474576	-1	1	1	0
494	1	0	1	RM0	WLTT	0	1.8666667	1 8666667	-9	5.6	-1	-1	0.2222222	1.0752688	1	0	0
495	1	1	1	RM0	DSTT	0	0.4026846	-1	-9	0.6222222	-1	-1	0.234375	-1	1	1	1
496	1	1	1	RM0	DOTT	0	0.4341085	-1	-9	0.6612903	-1	-1	0.2167785	-1	1	1	1
497	1	0	0	RM0	DSTT	0	0.9477521	0.9477521	-9	1.2871287	-1	-1	3.2935561	-1	-1	0	-1
498	1	1	1	RM0	DSTT	0	3.5021429	3 5021429	-9	3.8216667	-1	-1	3.8875	-1	-2	1	0
499	1	0	2	RM0	DSTT	0	4.6666667	4 6666667	-9	5.82	9	0	12.210526	-1	-1	0	-1
500	1	0	2	RM0	DSTT	0	2 4986857	2 4986857	-9	2 5933333	-1	-1	2.6538462	-1	-1	0	-1
501	1	1	1	FM0	WHCT	0	3.0171598	3 0171598	-9	1.9694323	-1	-1	3.2004831	0	-1	0	0
502	1	0	2	FM0	WLCT	0	3 0498177	3.0498177	-9	9	-9	9	4.5681818	-1	2	0	0
503	1	0	2	RM0	DSTT	0	5.5223194	5.5223194	-9	9.8	-1	-1	3.7047619	-1	2	2	2

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INPUT #18 RELATIVE MORALE ADVANTAGE ATK (+) TO DEF (-)	INPUT #19 RELATIVE LOGISTICS ADVANTAGE ATK (+) TO DEF (-)	INPUT #20 RELATIVE MOMENTUM ADVANTAGE ATK (+) TO DEF (-)	INPUT #21 RELATIVE INTELLIGENCE ADVANTAGE ATK (+) TO DEF (-)	INPUT #22 RELATIVE TECHNOLOGY ADVANTAGE ATK (+) TO DEF (-)	INPUT #23 RELATIVE INITIATIVE ADVANTAGE ATK (+) TO DEF (-)	INPUT #24 ATTACKER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #25 ATTACKER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #26 ATTACKER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #27 DEFENDER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #28 DEFENDER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #29 DEFENDER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #30 CASUALTY RATIO ATK/DEF	OUTPUT #1 ATTACKER WIN (1) LOSS(0)
--	--	--	--	--	--	--	--	--	--	--	--	--	--
1	1	1	0	0	1	DE	0	0	DD	0	0	0.1951641	0
1	1	1	0	0	1	RC	0	0	DD	0	0	0.2734807	1
1	1	1	0	0	1	RC	0	0	DD	FF	0	0.2582781	1
0	0	0	0	0	0	RC	0	0	DO	FF	0	0.9688235	0
0	0	0	0	0	0	0	0	0	0	0	0	1.7095238	0
0	0	0	0	0	-1	FF	0	0	DO	FF	0	6.5462185	0
0	0	0	0	0	1	RC	FF	0	DO	FF	0	0.4084624	1
0	-1	0	0	0	0	RC	FF	0	DO	DE	FF	1.2276667	0
2	1	1	0	0	1	RC	FF	0	DO	0	0	0.8739754	1
0	1	1	0	0	0	FF	0	0	DO	FF	0	1.6143498	1
0	1	0	0	0	1	FF	0	0	DD	0	0	5.106599	1
0	1	1	0	0	1	FF	0	0	DO	0	0	1.2093809	1
0	0	1	0	0	1	FF	0	0	DD	0	0	1.3120567	1
0	0	1	0	0	1	FF	0	0	DO	0	0	0.6634966	1
0	0	0	0	0	0	RC	FF	0	DO	FF	0	0.2589286	1
0	0	0	0	0	1	FF	0	0	0	0	0	0.2403433	1
0	0	0	0	0	1	FF	0	0	DD	0	0	0.1785714	1
0	0	0	0	0	1	FF	0	0	DO	FF	0	0.594328	0
0	0	1	0	0	1	FF	EE	LF	DO	FF	0	1.8139535	1
0	0	1	0	0	1	FF	0	0	DD	0	0	0.4706877	1
0	0	1	0	0	0	FF	0	0	DD	0	0	1.2809917	0
0	0	0	0	0	1	RC	FF	EE	DD	0	0	2	1
0	0	0	0	0	1	FF	0	0	DD	0	0	2.4875794	0
0	0	0	0	0	1	FF	EE	LF	DD	0	0	2.6064292	0
1	0	1	0	0	1	RC	0	0	DO	FF	0	0.16	1
1	0	1	0	0	1	FF	0	0	DD	0	0	0.5	1
2	2	1	2	2	2	FF	RC	0	DO	DE	0	0.045	1
0	2	1	2	2	2	FF	EE	DE	DO	FF	0	0.2858757	0
2	2	0	2	0	1	FF	DE	0	DD	0	0	1.6295428	1
0	0	0	0	0	0	FF	EE	RC	DO	0	0	3.2640037	1
2	1	0	0	0	2	FF	0	0	DO	FF	0	6.746988	1
0	0	0	-1	0	1	FF	0	0	DD	0	0	0.2401408	1
0	0	0	-1	0	1	FF	0	0	DO	FF	0	0.6489796	1
0	-1	0	-1	0	1	FF	0	0	DO	FF	0	0.1358589	1
-1	-1	0	-1	0	0	FF	0	0	DO	FF	0	0.0960265	0
1	1	0	1	0	0	FF	0	0	DO	FF	0	1.1176471	1
2	2	1	2	0	2	FF	DE	0	DO	0	0	2.9797468	1
1	1	1	1	0	1	FF	0	0	DD	0	0	4.8548857	1
-1	1	1	1	0	0	FF	RC	EE	DO	FF	0	2.1643836	1
1	1	1	1	0	0	DE	0	0	DO	0	0	0.9338235	1
2	2	1	2	0	1	FF	RC	0	DD	0	0	1.2708333	1
2	2	1	2	0	2	FF	DE	0	DD	0	0	0.7319588	1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

BATTLE SEQUENCE NUMBER	INPUT #1 1ST WIDTH FRONT ATK/DEF RATIO	INPUT #2 DEFENSIVE POSTURE TYPE 0,1,2,3	INPUT #3 DEFENDER'S PRIMARY DEFENSIVE POSTURE	INPUT #4 TERRAIN	INPUT #5 WEATHER	INPUT #6 ATTACKER'S SURPRISE OVER DEFENDER'S AWARENESS	INPUT #7 TOTAL PERS STR ATK/DEF RATIO	INPUT #8 INIT PERS STR ATK/DEF RATIO	INPUT #9 HORSE CAV ATK/DEF RATIO	INPUT #10 TOT TANK ATK/DEF RATIO	INPUT #11 LITE TANK ATK/DEF RATIO	INPUT #12 MAIN BTTL TANK ATK/DEF RATIO	INPUT #13 NO. ARTY TUBE ATK/DEF RATIO	INPUT #14 CLOSE AIR SPT SORTS ATK/DEF	INPUT #15 RELATIVE COMBAT EFFECTIVENESS ATK (+) TO DEF (-)	INPUT #16 RELATIVE LEADERSHIP ADVANTAGE ATK (+) TO DEF (-)	INPUT #17 RELATIVE TRAINING ADVANTAGE ATK (+) TO DEF (-)
...	...	...	..	...	.....	..	..	..	..	..	..	..	..	..	..	..	..
504	1	0	0	FWM	DSTT	0	1.8941176	1.8941176	-9	13.066667	-1	-1	2.6219512	-1	0	0	0
505	1	0	1	FMO	DSTT	1	1.3333333	0	-9	2.1988889	-1	-1	2 346875	0	0	-1	0
506	1	1	1	FWO	DSTT	0	11.818182	11.818182	-9	9	9	0	16.590909	0	0	0	0
507	1	0	1	FWO	DSTT	0	2.9844961	2 9844961	-9	0.5339806	-1	-1	6.9708738	0	0	0	0
508	1	0	1	FMO	DSTT	0	2.4901961	2 4901961	-9	0	0.1	0	2.6282051	-1	0	0	0
509	1	0	1	FMO	DSTT	0	2.7421875	2.7421875	-9	1.4166667	-1	-1	1.974359	-1	0	0	0
510	1	0	1	FMO	DSTT	1	1.5625	1.5625	-9	3.57	-1	-1	1.9678571	-1	2	2	2
511	1	0	1	FMO	DSCT	0	3.9285714	3.9285714	-9	3.525	-1	-1	5.8983607	-1	2	2	2
512	1	0	2	RMO	WLCT	0	1.5641026	1 5641026	-9	2.9071429	-1	-1	2.7073171	-1	2	0	2
513	1	0	2	ROO	WLCT	0	3.483871	3.483871	-9	6.0833333	-1	-1	5.3846154	-1	0	0	0
514	1	0	2	ROO	WLCT	0	3.1064103	3.1064103	-9	5.9375	-1	-1	4.9285714	-1	0	0	0
515	1	0	2	GMO	DSTT	0	3.6657682	3.514807	-9	15.6	-1	-1	8.9615385	5.3333333	2	2	2
516	1	0	2	RMO	WLTT	1	1 96	1.96	-9	7.3333333	0	0	3.0582192	6.6666667	1	0	0
517	1	0	2	RMO	DSTT	0	1.8610422	1.0339123	-9	3.2857143	0.1	9	5.245283	0	0	0	0
518	1	0	2	RBO	DSTT	0	1.8532787	1.8532787	-9	3.6	0.1	-9	8.0338983	30	0	0	0
519	1	0	2	GBO	DSTT	0	2	2	-9	9	-9	9	11	4	0	0	0
520	1	0	2	RBO	DSTT	0	11.918063	11.918063	-9	3.6	0.1	-9	6.7	9	1	0	0
521	1	0	3	FMO	DSTT	0	16 348571	16.348571	-9	9	9	9	9	9	1	0	1
522	1	0	2	GMO	DOTT	0	6.3441379	6 3441379	-9	9	9	9	5.40625	9	0	0	0
523	1	0	2	GMO	WHTT	0	3.8281547	3.8281547	-9	9	9	9	6.90625	9	0	0	0
524	1	0	2	GMO	DSTT	0	6.2657692	6.2657692	-9	9	9	9	5.8157895	9	0	0	0
525	1	0	2	GMO	WLTT	0	2.9188	2.9188	-9	9	9	9	5.075	9	0	0	0
526	1	0	2	GMO	DSTT	0	3.5524444	3.5524444	-9	9	9	9	5.65	9	0	0	0
527	1	0	2	GMO	DSTT	0	3.8923457	3.8923457	-9	9	9	9	8.225	9	0	0	0
528	1	0	0	GMO	DSTT	0	0.4462541	0 4462541	-9	0.1	0.1	0.1	0.3030303	0	0	0	0
529	1	0	2	GMO	DSTT	0	2.9394942	2.9394942	-9	9	9	9	6.9666667	9	0	0	0
530	1	0	1	GMO	WHTT	3	4.8061714	4 8061714	-9	-9	-9	-9	25	9	0	0	0
531	1	0	0	RMO	WLTT	2	0.2535336	0.2535336	-9	-9	-9	-9	0.0509554	0.1	0	0	0
532	1	1	2	GMO	WHTT	0	5.28	5.28	-9	-9	-9	-9	7.125	-9	0	0	0
533	1	1	2	GMO	WHTT	0	5.8480769	5 8480769	-9	9	9	9	50	9	1	0	0
534	1	0	2	GMO	DSTT	0	4.5974286	4 5974286	-9	9	9	9	10.75	9	1	0	0
535	1	0	2	GMO	DSTT	0	6.4008	6.4008	-9	9	9	9	15	9	1	0	0
536	1	0	2	GMO	DSTT	0	2.0948	2.0948	-9	9	9	9	8.8333333	-9	1	0	0
537	1	0	2	GMO	DSTT	0	7 904	7.904	-9	9	9	9	23 5	9	1	0	0
538	1	0	3	RMO	DSTT	0	9 541	9.541	-9	9	9	9	9	9	1	0	1
539	1	0	2	RMO	DOTT	0	6.3406897	6 3406897	-9	9	9	9	5.4375	9	0	0	0
540	1	0	2	RMO	WHTT	0	7.0823333	7 0823333	-9	-9	-9	-9	7 6875	9	0	0	0
541	1	0	2	RMO	DSTT	0	5.721	5.721	-9	9	9	9	6.7058824	9	0	0	0
542	1	0	2	RMO	WHTT	0	4.6397436	4.6397436	-9	9	9	9	5.5555556	9	0	0	0
543	1	0	2	RMO	DSTT	0	3.7308857	3.7308857	-9	9	9	9	4.6176471	9	0	0	0
544	1	0	2	RMO	DSTT	0	4.4088711	4.4088711	-9	9	9	9	6.1764706	9	0	0	0
545	1	0	2	RMO	WLTT	0	4.6505796	4.6505796	-9	9	9	9	5.3823529	9	0	0	0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INPUT #18 RELATIVE MORALE ADVANTAGE ATK (+) TO DEF (-)	INPUT #19 RELATIVE LOGISTICS ADVANTAGE ATK (+) TO DEF (-)	INPUT #20 RELATIVE MOMENTUM ADVANTAGE ATK (+) TO DEF (-)	INPUT #21 RELATIVE INTELLIGENCE ADVANTAGE ATK (+) TO DEF (-)	INPUT #22 RELATIVE TECHNOLOGY ADVANTAGE ATK (+) TO DEF (-)	INPUT #23 RELATIVE INITIATIVE ADVANTAGE ATK (+) TO DEF (-)	INPUT #24 ATTACKER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #25 ATTACKER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #26 ATTACKER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #27 DEFENDER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #28 DEFENDER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #29 DEFENDER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #30 CASUALTY RATIO ATK/DEF	OUTPUT #1 ATTACKER WIN (1) LOSS(0)
..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	0	1	0	0	1	FF	DE	0	DD	0	0	0.1397289	1
2	2	1	2	0	2	FF	EE	RF	DO	FF	0	0.1888889	1
1	0	1	0	0	1	FF	0	0	DO	FF	0	1.3611111	1
1	0	1	0	0	1	FF	0	0	DO	FF	0	3.5714286	1
1	0	1	0	0	1	RC	FF	0	DO	FF	DE	3.59375	1
1	0	1	0	0	1	FF	0	0	DO	FF	DE	3.8726115	0
2	2	1	2	2	2	DE	0	0	DO	FF	0	0.1956522	1
2	2	1	2	2	2	FF	DE	0	DO	FF	0	0.3181818	1
2	2	1	0	2	2	FF	DE	0	DO	0	0	0.8888889	1
1	0	1	0	0	0	FF	0	0	DO	FF	0	4.7241379	0
1	0	1	0	0	1	FF	0	0	DO	FF	0	3.6956522	1
2	2	1	0	2	2	FF	0	0	DD	0	0	3.16	1
1	0	0	1	1	1	RC	0	0	DD	0	0	0.2777778	1
0	1	1	0	0	1	FF	0	0	DO	FF	0	0.6827957	1
0	1	1	0	0	1	FF	0	0	DO	FF	0	0.4383606	1
0	1	1	0	0	1	FF	0	0	DD	0	0	0.4142973	1
0	1	1	0	0	0	FF	0	0	DD	0	0	1.4469274	1
1	0	0	0	0	1	FF	0	0	DD	0	0	0.2515924	1
0	0	0	0	0	0	FF	EE	LF	DD	0	0	0.1349057	1
0	0	0	0	0	0	FF	EE	RF	DO	0	0	0.3646322	1
1	0	0	0	0	0	FF	0	0	DO	0	0	0.4455148	1
0	0	0	-1	0	0	DE	0	0	DD	0	0	0.2031722	0
0	0	0	0	0	0	EE	LF	0	DD	0	0	0.2235872	0
0	0	-1	0	0	0	DE	0	0	DO	0	0	0.1748682	0
0	0	0	0	-1	1	FF	EE	LF	DD	0	0	10.926254	0
0	0	0	0	0	0	FF	0	0	DD	0	0	0.0778689	1
1	0	0	0	0	0	EE	RF	0	DD	0	0	0.3556485	1
0	0	0	0	-1	0	FF	EE	RF	DD	0	0	5.2655602	0
1	0	0	0	0	0	FF	0	0	DD	0	0	0.2857143	0
1	0	0	0	0	0	FF	0	0	DD	0	0	0.0709828	1
1	0	0	0	0	0	FF	0	0	DD	0	0	0.1579378	0
1	0	0	0	0	1	FF	0	0	DD	0	0	0.1687075	1
1	0	0	0	0	1	FF	0	0	DD	0	0	0.0199917	1
1	0	0	0	0	1	FF	0	0	DD	0	0	0.1608321	1
0	0	0	0	0	1	FF	0	0	DD	0	0	0.1775819	1
0	0	0	0	0	0	FF	0	0	DD	0	0	0.2246964	1
0	0	0	0	0	0	FF	DE	0	DO	FF	0	0.4371961	0
0	0	1	0	1	1	FF	DE	0	DD	0	0	0.3073427	1
0	-1	0	0	1	1	FF	0	0	DO	FF	0	0.1257218	1
0	0	0	0	1	1	FF	0	0	DO	FF	0	0.124319	0
0	0	0	0	1	1	FF	0	0	DD	0	0	0.1363216	0
1	0	0	0	1	1	EE	RF	0	DD	0	0	0.1035738	1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

BATTLE SEQUENCE NUMBER	INPUT #1 1ST WIDTH FRONT ATK/DEF RATIO	INPUT #2 DEFENSIVE POSTURE TYPE 0,1,2,3	INPUT #3 DEFENDER'S PRIMARY DEFENSIVE POSTURE	INPUT #4 TERRAIN	INPUT #5 WEATHER	INPUT #6 ATTACKER'S SURPRISE OVER DEFENDER'S AWARENESS	INPUT #7 TOTAL PERS STR ATK/DEF RATIO	INPUT #8 INIT PERS STR ATK/DEF RATIO	INPUT #9 HORSE CAV ATK/DEF RATIO	INPUT #10 TOT TANK ATK/DEF RATIO	INPUT #11 LITE TANK ATK/DEF RATIO	INPUT #12 MAIN BTTL TANK ATK/DEF RATIO	INPUT #13 NO. ARTY TUBE ATK/DEF RATIO	INPUT #14 CLOSE AIR SPT SORTS ATK/DEF	INPUT #15 RELATIVE COMBAT EFFECTIVENES ATK (+) TO DEF (-)	INPUT #16 RELATIVE LEADERSHIP ADVANTAGE ATK (+) TO DEF (-)	INPUT #17 RELATIVE TRAINING ADVANTAGE ATK (+) TO DEF (-)
...	...	...	..	...	.....	..	..	..	..	..	..	..	..	..	..	..	..
546	1	2	1	RM0	DSTT	0	4.69425	4.69425	-9	9	9	9	8.4285714	9	1	0	1
547	1	2	1	RM0	DOTT	0	4.3905882	4.3905882	-9	9	9	9	15.636364	-9	1	0	1
548	1	2	1	GM0	DSTT	0	5.8606154	5.8606154	-9	9	9	9	41.2	9	1	0	1
549	1	0	1	GM0	DSHT	2	1.7694805	1.7694805	-9	2.5	-9	-9	1.8	9	1	1	1
550	1	0	2	GM0	DSHT	2	2.0354412	0	-9	2.275	9	-9	2	2.75	1	1	1
551	0.2222222	0	0	GM0	DSHT	1	1.2929293	-1	-9	1.1666667	-9	-9	2	9	1	1	1
552	0.2222222	2	0	GM0	DSHT	1	0.9816514	0.9816514	-9	1.5	-9	-9	1	9	1	1	1
553	3	1	0	GM0	DSHT	1	1.2384259	0	-9	2.1428571	-9	-9	2	9	1	0	1
554	1	2	1	FM0	DSHT	2	1.0010256	1 0010256	-9	1.2182741	8.0769231	-9	1.2352941	0.745098	1	1	1
555	1	2	0	FD0	DSHT	1	1.039801	0	-9	1	3	-9	1	3.8	1	1	1
556	1	0	2	FD0	DSHT	2	1.0449864	1.0449864	-9	1.0526316	3	0.5714286	0.5714286	-9	1	1	1
557	1	2	1	FM0	DSHT	0	0.5421176	0 5421176	-9	1.1538462	0.1	-9	1.3333333	9	1	1	1
558	1	1	1	FD0	DSHT	0	3.6	3.6	-9	3.0666667	9	-9	1	9	1	1	1
559	1	1	1	FM0	DSHT	1	0.6962751	0 6962751	-9	0.7462687	1	-9	0.6315789	3.8	1	1	1
560	1	1	1	FD0	DSHT	0	2.9	-1	-9	3.65	0.1	-9	2	9	1	1	1
561	1	0	0	FD0	DSHT	0	3.0344828	0	-9	2.4888889	9	-9	2.375	0.1	-1	-1	-1
562	1	0	3	FD0	DSHT	0	0.7555556	-1	-9	1.2790698	5.6666667	-9	1.5	9	1	1	1
563	1	0	0	FD0	DSHT	2	1.0178862	1 0178862	-9	1.0526316	0.1	-9	1	9	1	1	1
564	1	0	0	FD0	DSHT	0	0.9722222	0	-9	0.8571429	0.1	-9	-9	-9	-1	-1	-1
565	1	0	2	GM0	DSHT	0	0.658701	0.658701	-9	0.1333333	-9	-9	0.3428571	9	1	1	1
566	1	0	2	GM0	DSHT	1	1.2298851	1.2298851	-9	1.8	-9	-9	0.3157895	-9	1	1	1
567	1	0	2	GM0	DSHT	0	0.6834112	0.6834112	-9	1.2	9	-9	0.2926829	9	1	1	1
568	1	0	1	FM0	DSTT	0	0.7384958	0.7384958	-9	2.1333333	9	-9	0.7362637	9	1	0	0
569	1	1	1	RD0	DSHT	3	6.6195286	0	-9	1	8.3333333	30.575	30.575	1.4857143	-1	-1	0
570	1	1	1	RD0	DSHT	3	7.5662252	-1	-9	1.3653846	15	34.678571	34.678571	1.4857143	-1	-1	0
571	1	2	0	RD0	DSHT	1	4.565	-1	-9	2.4166667	9	-9	15.975	1.4925373	-2	-2	0
572	1.4210526	2	0	RD0	DSHT	1	4.1129326	-1	-9	2.0945946	1.3846154	-9	23.125	1.4925373	-2	-2	0
573	1	0	0	RD0	DSHT	0	0.3833037	0 3833037	-9	1.0271318	1.6666667	-9	0.0688576	0.66	2	2	0
574	1	2	0	RD0	DSHT	0	1.8700461	1.8700461	-9	1.4033613	1	-9	4.0625	0.6111111	-1	-1	-1
575	1	2	0	RD0	DSHT	0	2.0265734	2 0265734	-9	2.0373563	1.25	-9	4.65625	0.6111111	-1	-1	-1
576	1	2	0	RD0	DSHT	2	0.7358734	-1	-9	0.8843188	1	-9	0.2981366	-9	1	1	1
577	1	2	0	RD0	DSHT	0	0.7844734	0	-9	1.0596659	9	-9	0.2074928	1.6280488	1	1	1
578	1	2	0	RD0	DSHT	0	1.0781078	1.0781078	-9	0.7918089	0.8695652	-9	0.605042	1.9125	1	1	1
579	1	2	0	RD0	DSHT	0	0.7124895	-1	-9	0.9430894	1.1764706	-9	0.5255474	1.6666667	1	0	1
580	1	2	0	RD0	DSHT	0	0.4546347	-1	-9	0.7004405	0.5	-9	0.2253521	1.6	1	1	1
581	1	0	0	RD0	DSHT	0	0.6328125	0.6328125	-9	0.7146067	0.8571429	-9	0.45	2.05	1	1	1
582	1	0	0	RD0	DSHT	0	0.5183872	0.5183872	-9	0.4864865	0.5555556	-9	0.3453237	2.7017544	1	2	1
583	1	2	0	RD0	DSHT	0	0.6504652	0.6504652	-9	0.8687259	1.1111111	-9	0.4316547	2.7017544	1	1	1
584	1	0	4	RD0	DSHT	0	0.745554	0.745554	-9	0 8241206	1.3333333	-9	0.4337349	2.2162162	1	1	1
585	1	0	1	GB0	DSHT	2	4.8898072	-1	-9	1.5	0.5	-9	9.5833333	0 4579439	-1	-1	-1
586	1	2	2	GB0	DSHT	2	3.9599652	-1	-9	1.8846154	0.5714286	-9	8.1875	0.5235602	-1	-1	-1
587	1	2	2	GB0	DSHT	2	3.9380799	3 9380799	-9	1.96	0.5714286	-9	5.375	0 525	-1	-1	-1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INPUT #18 RELATIVE MORALE ADVANTAGE ATK (+) TO DEF (-)	INPUT #19 RELATIVE LOGISTICS ADVANTAGE ATK (+) TO DEF (-)	INPUT #20 RELATIVE MOMENTUM ADVANTAGE ATK (+) TO DEF (-)	INPUT #21 RELATIVE INTELLIGENCE ADVANTAGE ATK (+) TO DEF (-)	INPUT #22 RELATIVE TECHNOLOGY ADVANTAGE ATK (+) TO DEF (-)	INPUT #23 RELATIVE INITIATIVE ADVANTAGE ATK (+) TO DEF (-)	INPUT #24 ATTACKER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #25 ATTACKER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #26 ATTACKER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #27 DEFENDER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #28 DEFENDER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #29 DEFENDER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #30 CASUALTY RATIO ATK/DEF	OUTPUT #1 ATTACKER WIN (1) LOSS(0)
--	--	--	--	--	--	--	--	--	--	--	--	--	--
1	-1	0	0	1	1	FF	0	0	DD	0	0	0.1403509	1
1	0	1	0	1	1	FF	0	0	DD	0	0	0.0874751	0
1	1	1	0	1	1	FF	0	0	DD	0	0	0.18	1
0	0	0	0	0	0	FF	DE	0	DO	DE	0	1.125	1
0	0	0	0	0	1	DE	0	0	DO	FF	0	1.1666667	1
0	0	0	0	0	0	FF	0	0	DD	0	0	1.0714286	1
0	0	0	0	0	1	FF	EE	RR	DD	0	0	1	1
1	0	1	0	0	1	FF	EE	RR	DD	0	0	1.0714286	1
0	0	0	0	0	1	DE	0	0	DO	EE	LR	0.2592593	1
0	0	1	0	0	1	FF	EE	RR	DO	FF	0	0.0666667	1
0	0	0	1	0	1	EE	LR	0	DO	0	0	0.3333333	1
1	0	1	0	0	1	FF	0	0	DD	0	0	0.6	1
1	0	1	0	0	1	FF	0	0	DD	0	0	0.1555556	0
0	0	0	0	0	1	FF	0	0	DD	0	0	0.0878594	1
1	0	1	0	0	1	FF	EE	LR	DD	0	0	0.1090909	1
-1	0	0	0	0	-1	FF	0	0	DO	EE	RR	6.1111111	0
1	0	1	0	0	1	EE	LR	0	DO	0	0	0.1363636	1
1	0	1	0	0	1	DE	0	0	DD	0	0	0.096	1
0	0	0	0	0	0	FF	0	0	DO	DE	0	7.5	0
1	0	0	0	0	1	FF	0	0	DD	0	0	0.3529412	1
1	0	0	0	0	1	FF	0	0	DD	0	0	0.5	1
1	0	0	0	0	1	FF	EE	RF	DD	0	0	0.46	1
0	0	0	-1	0	1	FF	DE	0	DO	FF	0	0.4044266	0
0	0	0	1	0	0	RC	FF	0	DO	FF	0	1.4545455	1
0	0	0	1	0	0	RC	FF	0	DO	FF	0	1.5555556	1
2	0	1	0	0	0	FF	0	0	DO	FF	0	1.7777778	1
2	0	1	0	0	0	FF	0	0	DO	FF	0	1.875	1
-2	0	-1	0	0	0	FF	0	0	DO	EE	LF	1	0
0	0	0	0	0	0	FF	0	0	DO	0	0	4.4736842	0
0	0	0	0	0	0	FF	0	0	DD	0	0	5.1923077	0
0	0	0	0	0	1	EE	RR	0	DO	FF	0	0.2	1
0	0	0	0	0	0	FF	DE	0	DO	EE	LF	0.3958333	1
0	0	1	0	0	1	FF	0	0	DO	FF	0	0.375	1
0	0	0	0	0	0	FF	DE	0	DO	FF	0	0.3333333	0
0	0	1	0	0	1	FF	DE	0	DO	FF	0	0.1818182	1
0	0	1	0	0	1	FF	DE	0	DD	0	0	0.1363636	1
1	0	1	0	0	1	FF	0	0	DD	0	0	0.1363636	1
1	0	1	0	0	1	FF	0	0	DD	0	0	0.3090909	0
1	0	1	0	0	1	EE	RR	0	DD	0	0	0.1875	1
0	0	0	0	0	0	FF	EE	LF	DD	0	0	1.75	0
0	0	0	0	0	0	FF	0	0	DD	0	0	2.8	0
0	0	0	0	0	0	FF	EE	RF	DO	FF	0	1.4	1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

BATTLE SEQUENCE NUMBER	INPUT #1 1ST WIDTH FRONT ATK/DEF RATIO	INPUT #2 DEFENSIVE POSTURE TYPE 0,1,2,3	INPUT #3 DEFENDER'S PRIMARY DEFENSIVE POSTURE	INPUT #4 TERRAIN	INPUT #5 WEATHER	INPUT #6 ATTACKER'S SURPRISE OVER DEFENDER'S AWARENESS	INPUT #7 TOTAL PERS STR ATK/DEF RATIO	INPUT #8 INIT PERS STR ATK/DEF RATIO	INPUT #9 HORSE CAV ATK/DEF RATIO	INPUT #10 TOT TANK ATK/DEF RATIO	INPUT #11 LITE TANK ATK/DEF RATIO	INPUT #12 MAIN BTTL TANK ATK/DEF RATIO	INPUT #13 NO. ARTY TUBE ATK/DEF RATIO	INPUT #14 CLOSE AIR SPT SORTS ATK/DEF	INPUT #15 RELATIVE COMBAT EFFECTIVENES ATK (+) TO DEF (-)	INPUT #16 RELATIVE LEADERSHIP ADVANTAGE ATK (+) TO DEF (-)	INPUT #17 RELATIVE TRAINING ADVANTAGE ATK (+) TO DEF (-)
...	...	...	..	...	.....	..	..	..	..	..	..	..	..	..	..	..	..
588	0.625	0	0	GB0	DSHT	2	3.4895238	-1	-9	1.7830189	0.7	-9	3.5833333	0.530303	-1	-1	-1
589	1	0	0	GB0	DSTT	2	1.7995969	0	-9	2.8909091	1.8	-9	1.9722222	0.530303	-1	-1	-1
590	1	0	0	GB0	DSHT	0	0.7508632	-1	-9	0.9841897	2.7272727	-9	0.397351	2.2522523	1	1	1
591	0.6	0	0	GB0	DSHT	0	0.8671934	-1	-9	1.2882353	2.5	-9	0.6382979	2.2432432	1	1	1
592	1	2	2	GB0	DSHT	0	5.8665431	-1	-9	4.7894737	2	-9	6.4583333	0.3557047	-1	-1	-1
593	1	0	2	GM0	DSHT	0	1.7005685	1.7005685	-9	1.8	-9	-9	0.5	2.2	0	0	0
594	1	0	2	RM0	DSHT	0	0.8298969	-1	-9	0.8206687	1.6666667	-9	0.5454545	2.75	1	1	1
595	1	0	1	GB0	DSHT	0	0.6837209	-1	-9	0.8217054	1.5	-9	0.4615385	2.75	1	1	1
596	0.6	0	0	GB0	DSHT	-2	0.8741259	0.8741259	-9	1	0.6	-9	1.1833333	1.4285714	-2	-2	-2
597	1	0	0	GB0	DSHT	2	0.9166667	0.9166667	-9	0.7881041	1.3333333	0.5714286	0.5714286	1.5	2	2	2
598	1	0	1	GB0	DSHT	0	1.0454545	1 0454545	-9	1.2688679	0.45	-9	1	1	-1	-1	-1
599	1	0	1	GB0	DSHT	0	2 2204969	2.2204969	-9	2.0962963	0.7333333	-9	3.3	1	-1	-1	-1
600	1	0	2	GM0	DSHT	0	1.2	1.2	-9	-9	-9	-9	0.4444444	1	1	1	1
601	1	0	2	GM0	DSHT	0	2.4	2.4	-9	-9	-9	-9	0.8888889	2	1	1	1
602	1	0	0	FB0	DSCD	2	1.200075	1.200075	-9	1.9565217	0.1	-9	0.7446809	9	1	1	1
603	1	0	0	FB0	DOCD	0	0.3267303	0.3267303	-9	0 4888889	-9	-9	0.7428571	0.1	-1	-1	-1
604	1	0	0	GB0	WHCD	0	1.3200075	1 3200075	-9	4.1538462	9	1.5333333	1.5333333	-9	1	1	1
605	1	0	2	FB0	WOCT	0	3.6363636	3 6363636	-9	3 5714286	-9	-9	2.5	-9	0	-1	0
606	1	0	2	FB0	WOCT	0	3.4545455	3.4545455	-9	3.5714286	-9	-9	2.5	-9	0	-1	0
607	1	0	2	FB0	WOCT	0	4.2777778	4 2777778	-9	1.0714286	-9	-9	2.9047619	-9	0	-1	0
608	1	0	2	FB0	WOCT	0	4.1877778	4.1877778	-9	1.0714286	-9	-9	2.9047619	-9	0	-1	0
609	1	3	1	FB0	DSTT	2	3.2444444	3.2444444	-9	1.0810811	-9	-9	1.4285714	0.3745318	0	0	0
610	1	3	1	FB0	DSTT	2	3 1160396	3.1160396	-9	2.4	-9	-9	1.4285714	0.4242424	0	0	0
611	1	3	1	FB0	DSTT	2	2.1621622	2 1621622	-9	2.8571429	-9	-9	1.4285714	0.3745318	0	0	0
612	1	0	0	RM0	DSTT	2	2.2027027	2 2027027	-9	9	-9	9	0.5294118	0.22	0	0	0
613	1	0	0	GM0	DSTT	2	1.8478261	1.8478261	-9	3.75	-9	-9	0.7058824	0.22	0	0	0
614	1	3	1	RM0	WLTT	0	1.2338308	1.2338308	-9	0.7333333	-9	-9	1.8684211	9	0	0	0
615	1	3	1	GW0	WLTT	0	1.2608696	1.2608696	-9	-9	-9	-9	1.3947368	-9	0	0	0
616	1	3	1	RW0	WLTT	0	1.3378378	1.3378378	-9	0.1	-9	0.1	1.3947368	9	0	0	0
617	1	3	1	RW0	WLCT	0	5.9285714	5.9285714	-9	9	-9	9	10.333333	-9	0	0	1
618	1	0	0	GW0	WLCT	0	2.4318349	2.4318349	-9	2.2	-9	-9	3	-9	0	0	-1
619	1	0	0	RB0	WLCT	0	1.3787879	1.3787879	-9	3.6666667	-9	-9	1.9038462	-9	0	0	0
620	1	3	1	GW0	DOCT	3	1.0512821	1.0512821	-9	9	-9	9	3.7777778	-9	0	0	1
621	1	3	1	GW0	DOCT	3	2.5581395	2 5581395	-9	9	-9	9	1.1186441	-9	0	0	1
622	1	0	0	RM0	DOCT	3	6.9756098	6.9756098	-9	1.4705882	0.1	9	3.4782609	-9	0	0	0
623	1	3	1	GW0	DOCT	3	3.0843373	3 0843373	-9	9	-9	9	3.1578947	-9	0	0	1
624	1	3	0	GW0	DOCT	3	8.2022472	8.2022472	-9	2.9041096	0.1	5.4166667	10 833333	-9	0	0	0
625	1	3	0	GW0	DOCT	3	2.7874564	2 7874564	-9	19.5	-9	2.1016949	4.2033898	-9	0	0	0
626	0	3	0	0	WLTT	0	0.7236842	-1	-9	0.1	-1	-1	1	-9	-9	-9	-9
627	0	3	3	0	DOTT	0	1 6116505	-1	-9	9	-1	-1	0 9722222	-1	-9	-9	-9
628	0	3	3	0	DOTT	0	1.8222222	-1	-9	9	-1	-1	2.5	-1	-9	-9	-9
629	0	3	3	0	DOTT	0	2.2816901	-1	-9	9	-1	-1	3.1304348	-1	-9	-9	-9

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INPUT #18 RELATIVE MORALE ADVANTAGE ATK (+) TO DEF (-)	INPUT #19 RELATIVE LOGISTICS ADVANTAGE ATK (+) TO DEF (-)	INPUT #20 RELATIVE MOMENTUM ADVANTAGE ATK (+) TO DEF (-)	INPUT #21 RELATIVE INTELLIGENCE ADVANTAGE ATK (+) TO DEF (-)	INPUT #22 RELATIVE TECHNOLOGY ADVANTAGE ATK (+) TO DEF (-)	INPUT #23 RELATIVE INITIATIVE ADVANTAGE ATK (+) TO DEF (-)	INPUT #24 ATTACKER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #25 ATTACKER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #26 ATTACKER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #27 DEFENDER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #28 DEFENDER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #29 DEFENDER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #30 CASUALTY RATIO ATK/DEF	OUTPUT #1 ATTACKER WIN (1) LOSS(0)
--	--	--	--	--	--	--	--	--	--	--	--	--	--
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0.0189753	1
-9	-9	-9	-9	-9	-9	RC	0	0	0	0	0	0.0408497	1
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0.0961538	1
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0.0355649	1
-9	-9	-9	-9	-9	-9	0	0	0	0	0	0	12.191489	1
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	9.7333333	0
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0.0759494	1
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	1	0
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0.1	1
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0.9259259	0
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0.3095238	0
-9	-9	-9	-9	-9	-9	0	0	0	0	0	0	0.1	1
-9	-9	-9	-9	-9	-9	0	0	0	0	0	0	0.1	1
-9	-9	-9	-9	-9	-9	0	0	0	0	0	0	0.1	1
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0.6729412	1
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0.2607229	1
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	1	1
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0.8333333	1
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0.5833333	1
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0.6666667	1
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0.106	0
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0.0433333	1
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0.0667055	1
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0.0608958	1
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	-1	1
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0.75	0
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0.6	0
-9	-9	-9	-9	-9	-9	RC	0	0	0	0	0	0	1
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0	1
-9	-9	-9	-9	-9	-9	EE	0	0	0	0	0	-1	0
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0	0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INPUT #18 RELATIVE MORALE ADVANTAGE ATK (+) TO DEF (-)	INPUT #19 RELATIVE LOGISTICS ADVANTAGE ATK (+) TO DEF (-)	INPUT #20 RELATIVE MOMENTUM ADVANTAGE ATK (+) TO DEF (-)	INPUT #21 RELATIVE INTELLIGENCE ADVANTAGE ATK (+) TO DEF (-)	INPUT #22 RELATIVE TECHNOLOGY ADVANTAGE ATK (+) TO DEF (-)	INPUT #23 RELATIVE INITIATIVE ADVANTAGE ATK (+) TO DEF (-)	INPUT #24 ATTACKER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #25 ATTACKER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #26 ATTACKER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #27 DEFENDER'S PRIMARY TACTICAL SCHEME PART 1	INPUT #28 DEFENDER'S PRIMARY TACTICAL SCHEME PART 2	INPUT #29 DEFENDER'S PRIMARY TACTICAL SCHEME PART 3	INPUT #30 CASUALTY RATIO ATK/DEF	OUTPUT #1 ATTACKER WIN (1) LOSS(0)
..	..	..	..	..	..	..	..	..	..	..	..	..	..
0	0	0	0	0	0	FF	0	0	DO	FF	0	3.3333333	0
0	0	1	0	0	1	FF	0	0	DO	FF	0	2	0
0	0	1	0	0	1	FF	EE	LF	DO	FF	0	0.4	1
0	0	1	0	0	1	FF	0	0	DO	FF	0	0.4	1
0	0	0	0	0	1	FF	0	0	DD	0	0	3	0
0	0	0	0	0	1	FF	0	0	DD	0	0	0.5	0
0	0	0	0	0	1	FF	0	0	DO	FF	0	0.4375	1
0	0	0	0	0	1	FF	0	0	DD	0	0	0.3111111	1
0	0	0	-1	0	-1	FF	0	0	DD	0	0	9	0
0	0	0	1	0	1	EE	RF	0	DD	0	0	0.5	1
0	0	0	0	0	0	FF	0	0	DD	0	0	4.5	0
0	0	0	0	0	0	FF	0	0	DD	0	0	3.4375	0
0	0	0	0	0	1	FF	0	0	DD	0	0	0.75	0
0	0	0	0	0	1	FF	EE	RR	DD	0	0	0.4	1
0	0	1	-1	0	1	DE	0	0	DO	FF	0	0.0217391	1
0	0	-1	-1	0	-1	FF	0	0	DO	DE	0	7.34	0
1	0	1	1	0	1	FF	0	0	DD	0	0	0.3795066	1
0	1	0	-1	0	-1	FF	RC	0	DO	DE	0	31.384615	0
0	0	0	-1	0	-1	FF	RC	0	DO	DE	0	51.230769	0
0	0	0	-1	0	-1	FF	RC	0	DO	EE	0	12.461538	0
0	0	0	-1	0	-1	FF	RC	0	DO	EE	0	44.230769	0
0	0	1	0	0	1	FF	0	0	DD	0	0	2.5542986	0
0	0	1	0	0	1	FF	0	0	DD	0	0	0.8173333	1
0	0	1	0	0	1	FF	0	0	DD	0	0	2.2060302	0
0	0	0	0	0	1	FF	0	0	DD	0	0	1.75	0
0	0	0	0	0	1	FF	0	0	DD	0	0	0.625	0
0	0	0	0	0	0	FF	0	0	DO	DE	0	0.7529412	0
0	0	0	0	0	0	FF	0	0	DO	FF	0	1.63	0
0	0	0	0	0	0	FF	0	0	DO	FF	0	1.75	0
0	0	0	-1	0	1	FF	0	0	DD	0	0	1.48	1
0	0	1	0	0	1	FF	0	0	DD	0	0	0.25	1
0	0	1	0	0	1	FF	0	0	DD	0	0	1.25	0
0	0	1	2	0	1	FF	0	0	DD	0	0	0.0540541	1
0	0	1	2	0	1	FF	0	0	DD	0	0	0.6666667	1
0	0	1	2	0	1	FF	0	0	DO	FF	0	0.3937008	1
0	0	1	2	0	1	EE	LR	0	DD	0	0	0.0565771	1
0	0	1	2	0	1	FF	RC	0	DD	0	0	0.2727273	1
0	0	1	2	0	1	FF	0	0	DO	0	0	1.1	1
-9	-9	-9	-9	-9	-9	FF	0	0	0	0	0	0.255814	0
-9	-9	-9	-9	-9	-9	0	0	0	0	0	0	0.4042553	1
-9	-9	-9	-9	-9	-9	0	0	0	0	0	0	0.1402439	1
-9	-9	-9	-9	-9	-9	0	0	0	0	0	0	0.0740741	1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

BATTLE SEQUENCE NUMBER	INPUT #1 1ST WIDTH FRONT ATK/DEF RATIO	INPUT #2 DEFENSIVE POSTURE TYPE 0,1,2,3	INPUT #3 DEFENDER'S PRIMARY DEFENSIVE POSTURE	INPUT #4 TERRAIN	INPUT #5 WEATHER	INPUT #6 ATTACKER'S SURPRISE OVER DEFENDER'S AWARENESS	INPUT #7 TOTAL PERS STR ATK/DEF RATIO	INPUT #8 INIT PERS STR ATK/DEF RATIO	INPUT #9 HORSE CAV ATK/DEF RATIO	INPUT #10 TOT TANK ATK/DEF RATIO	INPUT #11 LITE TANK ATK/DEF RATIO	INPUT #12 MAIN BTTL TANK ATK/DEF RATIO	INPUT #13 NO. ARTY TUBE ATK/DEF RATIO	INPUT #14 CLOSE AIR SPT SORTS ATK/DEF	INPUT #15 RELATIVE COMBAT EFFECTIVENES ATK (+) TO DEF (-)	INPUT #16 RELATIVE LEADERSHIP ADVANTAGE ATK (+) TO DEF (-)	INPUT #17 RELATIVE TRAINING ADVANTAGE ATK (+) TO DEF (-)
...	...	...	..	...	.....	..	..	..	..	..	..	..	..	..	..	..	..
630	0	3	0	0	DOTT	0	0.9602649	-1	-9	9	-1	-1	0.1111111	0	-9	-9	-9
631	0	3	1	0	DOTT	0	0.9444444	-1	-9	9	-1	-1	0.2165775	-9	-9	-9	-9
632	0	3	0	0	WLTT	0	2.08	-1	-9	9	-1	-1	0.25	0	-9	-9	-9
633	0	3	0	0	WLTT	0	0.7948718	-1	-9	9	-1	-1	0.6990291	9	-9	-9	-9
634	0	3	3	0	WLTT	0	1.1412639	-1	-9	0.1	-1	-1	3.3333333	-1	-9	-9	-9
635	0	3	0	0	WHTT	0	2.6811594	-1	-9	0.1	-1	-1	2.2588235	1	-9	-9	-9
636	0	3	1	G00	WLTT	0	0.3859155	-1	-9	9	-1	-1	1	0	-9	-9	-9
637	0	3	3	FB0	WLTT	0	2.5624772	-1	-9	2.5625	-1	-1	-1	0	-9	-9	-9
638	0	3	1	FM0	D0HD	0	1.6	-1	-9	9	-1	-1	0.125	0	-9	-9	-9
639	0	3	0	FM0	D0HD	0	1.1111111	-1	-9	2.4	-1	-1	0.375	-1	-9	-9	-9
640	0	3	1	RB0	D0HD	0	1	-1	-9	1	-1	-1	1.3333333	0	-9	-9	-9
641	-1	3	1	GM0	D0HD	0	1.2555066	-1	-9	1.0514286	-1	-1	0.6666667	9	-9	-9	-9
642	-1	3	1	GM0	D0HD	0	1.0466989	-1	-9	0.6120219	-1	-1	0.6666667	0	-9	-9	-9
643	-1	3	1	GM0	D0HD	0	0.8549223	-1	-9	0,809901	-1	-1	0.5454545	0	-9	-9	-9
644	0	3	2	FM0	D0TT	0	3.5017043	-1	-9	9	-1	-1	1.6	0	-9	-9	-9
645	0	3	1	RD0	D0HD	0	1.38	-1	-9	2.140884	-1	-1	-1	0	-9	-9	-9
646	0	3	1	FM0	D0TD	0	0.8333333	-1	-9	0.1	-1	-1	0.25	9	-9	-9	-9
647	-1	3	1	RB0	D0HD	0	0.8333333	-1	-9	0.625	-1	-1	0.3333333	0	-9	-9	-9
648	0	3	1	FB0	D0TD	0	1.5	-1	-9	0.8333333	-1	-1	1.5	9	-9	-9	-9
649	0	3	1	FB0	D0TD	0	1.3333333	-1	-9	0.7462687	-1	-1	1.3333333	0	-9	-9	-9
650	0	3	2	FB0	D0HD	0	0.9791667	-1	-9	1.8947368	-1	-1	0.84375	9	-9	-9	-9
651	-1	3	2	FB0	D0HD	0	0.8084848	-1	-9	0.5882353	-1	-1	0.2083333	9	-9	-9	-9
652	0	3	2	FB0	D0HD	0	0.9950249	-1	-9	1	-1	-1	0.2461538	1.4166667	-9	-9	-9
653	0	3	1	FU0	D0HD	0	0.625	-1	-9	3.125	-1	-1	0.2727273	1	-9	-9	-9
654	0	3	1	FM0	D0TE	0	1.7647059	-1	-9	-9	-1	-1	1.2820513	-1	-9	-9	-9
655	0	3	1	GM0	D0TD	0	0.8333333	-1	-9	1.875	-1	-1	0.5	-1	-9	-9	-9
656	0	3	1	RB0	D0HD	0	1.8	-1	-9	1.425	-1	-1	1.75	0	-9	-9	-9
657	0	3	-1	RM0	WLTT	3	0	-1	-9	1.1291667	-1	-1	-1	-1	-9	-9	-9
658	0	3	-1	RM0	WLTT	1	1.3999835	-1	-9	0.9159664	-1	-1	-1	-1	-9	-9	-9
659	0	3	0	RM0	D0TT	0	0.6567222	-1	-9	0.4036697	-1	-1	0	0	-9	-9	-9
660	0	3	1	RM0	WLTT	0	1	-1	-9	1.4	-1	-1	0	0	-9	-9	-9

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

APPENDIX B

LOGIT PROCEDURES

The attached listings are from SAS™ and consist of the procedural language used to set up and run the logit routine, and include the logit coding of the data, frequency distributions of the data, and several charts used for preliminary data analysis.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

```
filename in "/didabal/b/ollie/data/exctotal.csv";
libname out "/didabal/b/ollie/data";

OPTION LS=150 PS=58 replace ;

DATA BATTLE2;
 SET OUT.BATTLE;

* IF LAB54='FF' THEN DLAB54=1;
*    ELSE DLAB54=0;

* ADD OTHER STATEMENTS HERE ;

  IF LAB12='DSTT' THEN DLAB12=4;
   ELSE IF LAB12='DSHT' THEN DLAB12=3;
     ELSE IF LAB12= 'WLTT' THEN DLAB12=2;
        ELSE DLAB12=1;

  IF LAB11='RMO' THEN DLAB11=3;
   ELSE IF LAB11='GMO' THEN DLAB11=2;
     ELSE DLAB11=1;

  IF LAB54='FF' THEN DLAB54=2;
     ELSE DLAB54=1;

  IF LAB55='0' THEN DLAB55=3;
   ELSE IF LAB55='00' THEN DLAB55=3;
    ELSE IF LAB55='EE' THEN DLAB55=2;
      ELSE DLAB55=1;

  IF LAB56='0' THEN DLAB56=2;
    ELSE IF LAB56='00' THEN DLAB56=2;
     ELSE DLAB56=1;

  IF LAB57='DD' THEN DLAB57=2;
   ELSE IF LAB57='DD' THEN DLAB57=2;
    ELSE DLAB57=1;

  IF LAB58='FF' THEN DLAB58=2;
   ELSE IF LAB58='0' THEN DLAB58=3;
    ELSE IF LAB58='00' THEN DLAB58-3;
      ELSE DLAB58=1;

  IF LAB59='0' THEN DLAB59=2;
   ELSE IF LAB59='00' THEN DLAB59=2;
```

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

```
   ELSE DLAB59=1;

  IF LAB61=-9 THEN LAB61=0;

 IF LAB5=-1 THEN LAB5=0.9397405;
 IF LAB10=-1 THEN LAB10=0.8939394;
 IF LAB14=-1 THEN LAB14=2.1176215;
 IF LAB16=-1 THEN LAB16=1.7773871;
 IF LAB26=-1 THEN LABA26=0.2991107;
 IF LAB28=-1 THEN LAB28=2.0964664;
 IF LAB30=-1 THEN LAB30=1.7678282;
 IF LAB32=-1 THEN LAB32=1.4788367;
 IF LAB34=-1 THEN LAB34=2.1457696;
 IF LAB36=-1 THEN LAB36=1.6123929;

/*ADD STATEMENTS TO CHANGE THE INPUT TO BE PERFECT, I.E.,
NOT -9;

ARRAY RECODE (*) lab5 lab9 lab10 LAB13 LAB14 LAB16 LAB26
                 LAB28 LAB30 LAB32 LAB34 LAB36 LAB44 LAB45
                 LAB46 LAB47 LAB48 LAB49 LAB50 LAB51;

 Do I =1 to DIM (RECODE)
    IF RECODE (I)=-9 THEN RECODE (I)=.;
 END;  */

 IF LAB5=-9 THEN LAB5=0.9397405;
 IF LAB9=-9 THEN LAB9=0.4469697;
 IF LAB10=-9 THEN LAB10=0.8939394;
 IF LAB13=-9 THEN LAB13=0.4106061;
 IF LAB14=-9 THEN LAB14=2.1176215;
 IF LAB16=-9 THEN LAB16=1.7773871;
 IF LAB26=-9 THEN LAB26=0.2991107;
 IF LAB28=-9 THEN LAB28=2.0964664;
 IF LAB30=-9 THEN LAB30=1.7678282;
 IF LAB32=-9 THEN LAB32=1.4788367;
 IF LAB34=-9 THEN LAB34=2.1457696;
 IF LAB36=-9 THEN LAB36=1.6123929;
 IF LAB44=-9 THEN LAB44=0.1121212;
 IF LAB45=-9 THEN LAB45=0.14090901;
 IF LAB46=-9 THEN LAB46=0.0242424;
 IF LAB47=-9 THEN LAB47=0.2303030;
 IF LAB48=-9 THEN LAB48=0.0606061;
 IF LAB49=-9 THEN LAB49=0.2166667;
 IF LAB50=-9 THEN LAB50=0.0803030;
 IF LAB51=-9 THEN LAB51=0.0393939;
```

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

```
RUN;

/*  PROC MEANS;
VAR lab5 lab9 lab10 dlab11 DLAB12 LAB13 LAB14 LAB16 LAB26
     LAB28 LAB30 LAB32 LAB34 LAB36 LAB44 LAB45 LAB46 LAB47
     LAB48 LAB49 LAB50 LAB51 DLAB54 DLAB55 DLAB56 DLAB57
     DLAB58 DLAB59;

RUN;  */

PROC PLOT;
   PLOT SEQNUM*LAB5;
   PLOT SEQNUM*LAB14;
   PLOT SEQNUM*LAB44;
   PLOT SEQNUM*LAB45;
   PLOT SEQNUM*LAB46;
   PLOT SEQNUM*LAB47;
   PLOT SEQNUM*LAB48;
   PLOT SEQNUM*LAB49;
   PLOT SEQNUM*LAB50;
   PLOT SEQNUM*LAB51;
   PLOT SEQNUM*LAB52;
   PLOT SEQNUM*LAB16;
   PLOT SEQNUM*LAB34;
   PLOT SEQNUM*LAB61;

ENDSAS;

/*
PROC FREQ;
TABLES lab5 lab9 lab10 dlab11 DLAB12 LAB13 LAB14 LAB16 LAB26
     LAB28 LAB30 LAB32 LAB34 LAB36 LAB44 LAB45 LAB46 LAB47
     LAB48 LAB49 LAB50 LAB51 DLAB54 DLAB55 DLAB56 DLAB57
     DLAB58 DLAB59;
8/

*PROC FREQ;
*   TABLES DLAB11 DLAB12 DLAB54-DLAB59;
*   RUN;

/*PROC FREQ data=battle2;
   TABLES lab61 lab5 lab9 lab10 lab 11 DLAB12 LAB13 LAB14
     LAB16 LAB26 LAB28 LAB30 LAB32 LAB34 LAB36 LAB44 LAB45
     LAB46 LAB47 LAB48 LAB49 LAB50 LAB51 DLAB54 DLAB55
     DLAB56 DLAB57 DLAB58 DLAB59;
```

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

```
    WHERE SEQNUM<=149;
    TITLE" PRE1812 BATTLES";
    RUN; */

/*PROC MEANS DATA=BATTLE2;
 TITLE " MEANS ON VARIABLE";
  RUN; */

*PROC FREQ DATA=BATTLE2;
* TABLES LAB11 LAB12 LAB54-lab59;
* TITLE "FREQENCIES";
* RUN;

proc logistic data=battle2;
   model lab 61=lab5 lab9 lab10 dlab 11 DLAB12 LAB13 LAB14
     LAB16 LAB26 LAB34 LAB44 LAB45 LAB46 LAB47 LAB48 LAB49
     LAB50 LAB51 DLAB54 DLAB55 DLAB56 DLAB57 DLAB58
     DLAB59/CONVERG=0.025 MAXITER=500
     CTABLE;
     WHERE SEQNUM<=149;

     OUTPUT UT=PRE1812 PRED=PRED;
     TITLE " PERFECT PRE 1812 BATTLES";
     RUN;

proc logistic data=battle2;
   model lab61=lab5 lab 9 lab10 dlab 11 DLAB12 LAB13 LAB14
     LAB16 LAB26 LAB28 LAB30 LAB32 LAB34 LAB36 LAB44 LAB45
     LAB46 LAB47 LAB48 LAB49 LAB50 LAB51 DLAB54 DLAB55
     DLAB56 LAB57 DLAB58 DLAB59/CTABLE;
     WHERE SEQNUM>149;
     OUTPUT OUT=PST1812 PRED=PRED;
     TITLE "PERFECT POST 1812 BATTLES";
     RUN;

     proc logistic data=battle2;
      model lab61=lab5 lab9 lab10 dlab11 DLAB12 LAB13 LAB14
      LAB16 LAB26 LAB28 LAB30 LAB32 LAB34 LAB36 LAB44 LAB45
      LAB46 LAB47 LAB48 LAB49 LAB50 LAB51 DLAB54 DLAB55
      DLAB56 DLAB57 DLAB58 DLAB59/CTABLE;
      OUTPUT OUT=TOTAL PRED=PRED;
      TITLE 'PERFECT TOTAL DATASET";
      RUN;

ENDSAS;
```

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

```
proc logistic data=battle2;
     model lab61=lab5 lab9 lab10 dlab11 DLAB12 LAB13 LAB14
     LAB16 LAB26 LAB28 LAB30 LAB32 LAB34 LAB36 LAB44 LABA45
     LAB46 LAB47 LAB48 LAB49 LAB50 LAB51 DLAB54 DLAB55
     DLAB56 DLAB57 DLAB58 DLAB59 ;
     WHERE SEQNUM>149;
     RUN;

ENDSAS;
```

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

```
excctotal.' *        Mon Oct  2 13:42:58 1995        2

                        These are the variable titles                13:42 Monday, October 2, 1995   2

                                CONTENTS PROCEDURE

Data Set Name: OUT.BATTLE                            Observations:          660
Member Type:   DATA                                  Variables:             30
Engine:        V609                                  Indexes:               0
Created:       13:42 Monday, October 2, 1995         Observation Length:    240
Last Modified: 13:42 Monday, October 2, 1995         Deleted Observations:  0
Protection:                                          Compressed:            NO
Data Set Type:                                       Sorted:                NO
Label:

                -----Engine/Host Dependent Information-----

      Data Set Page Size:        24576
      Number of Data Set Pages:  7
      File Format:               607
      First Data Page:           1
      Max Obs per Page:          102
      Obs in First Data Page:    85
      File Name:                 /didabal/b/ollie/data/battle.ssd01
      Inode Number:              499731
      Access Permission:         rw-r--r--
      Owner Name:                pvye
      File Size (bytes):         180224

             -----Alphabetic List of Variables and Attributes-----
```

#	Variable	Type	Len	Pos	Label
9	LAB5	Num	8	64	1ST WIDTH
10	LAB9	Num	8	72	DEFENSIVE POSTURE
11	LAB10	Num	8	80	DEFENDERS PRI DEFENSE
1	LAB11	Char	8	0	TERRAIN
2	LAB12	Char	8	8	WEATHER
12	LAB13	Num	8	88	ATTACKER SURPRISE
13	LAB14	Num	8	96	TOTAL PERS STR
14	LAB16	Num	8	104	INIT PERS STR
15	LAB26	Num	8	112	HORSE CAV
16	LAB28	Num	8	120	TOT TANK
17	LAB30	Num	8	128	LITE TANK
18	LAB32	Num	8	136	MAIN TANK
19	LAB34	Num	8	144	ARTY TUBES
20	LAB36	Num	8	152	CLOSE AIR
21	LAB44	Num	8	160	REL COMBAT EFF
22	LAB45	Num	8	168	REL LEADERSHIP
23	LAB46	Num	8	176	
24	LAB47	Num	8	184	REL MORALE
25	LAB48	Num	8	192	REL LOGISTICS
26	LAB49	Num	8	200	REL MOMENTUM
27	LAB50	Num	8	208	
28	LAB51	Num	8	216	REL TECHNOLOGY
29	LAB52	Num	8	224	REL INITIATIVE
3	LAB54	Char	8	16	ATTACKER TACTICS #1
4	LAB55	Char	8	24	ATTACKER TACTICS #2
5	LAB56	Char	8	32	ATTACKER TACTICS #3
6	LAB57	Char	8	40	DEFENDER TACTICS #1
7	LAB58	Char	8	48	DEFENDER TACTICS #2
8	LAB59	Char	8	56	DEFENDER TACTICS #3

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

exctotal.`'t Mon Oct 2 13:42:58 1995 4

These are the variable titles 13:42 Monday, October 2, 1995 3

CONTENTS PROCEDURE

#	Variable	Type	Len	Pos	Label
30	LAB61	Num	8	232	TARGET OUTPUT WIN(1) LOSS (0)

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

exctotal.` `t   Mon Oct 2 13:42:58 1995   5

This is the data   13:42 Monday, October 2, 1995   4

OBS	LAB5	LAB9	LAB10	LAB13	LAB14	LAB16	LAB26	LAB28	LAB30	LAB32	LAB34	LAB36	LAB44	LAB45	LAB46	LAB47	LAB48	LAB49	LAB50	LAB51	LAB52	LAB61
1	1.00000	0	0	0	1.0177	1.0177	1.0714	-9.0000	-9.0000	-9.0000	1.3333	-9.0000	-1	-1	0	0	0	1	0	0	1	0
2	1.00000	1	0	0	1.9048	1.9048	0.6818	-9.0000	-9.0000	-9.0000	1.2000	-9.0000	0	0	0	0	0	1	0	0	1	1
3	1.32143	0	0	0	1.0000	1.0000	1.0000	-9.0000	-9.0000	-9.0000	0.2000	-9.0000	0	1	0	0	0	-1	0	0	0	1
4	-1.00000	0	1	-1	0.5313	0.5313	0.2500	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	-1	0	0	0	0	-1	0	-1	0
5	-1.00000	0	0	0	0.8500	0.8500	0.7000	-9.0000	-9.0000	-9.0000	0.5455	-9.0000	0	1	0	1	0	1	0	0	0	1
6	0.88889	0	0	0	0.8454	0.8454	0.8560	-9.0000	-9.0000	-9.0000	0.2600	-9.0000	0	-1	0	0	0	0	0	0	0	0
7	0.38095	0	1	0	1.2222	1.2222	-1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	1	0	0	0	0	0	0	1	1
8	0.85185	0	1	0	0.7667	0.7667	1.2308	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	0	0
9	0.91667	0	0	0	0.8726	1.1327	0.6750	-9.0000	-9.0000	-9.0000	2.4000	-9.0000	0	1	0	0	0	0	0	0	1	1
10	0.50000	0	1	0	0.7143	0.7143	0.6667	-9.0000	-9.0000	-9.0000	1.6000	-9.0000	0	1	0	0	0	0	0	0	0	0
11	1.46667	0	1	1	0.7333	0.7333	0.8571	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	1	1	0	0	0	0	0	0	1	1
12	1.00000	0	0	0	0.8333	0.8333	1.2500	-9.0000	-9.0000	-9.0000	1.5217	-9.0000	0	1	0	0	0	0	0	0	1	1
13	1.33333	0	0	0	0.8846	0.8846	1.0000	-9.0000	-9.0000	-9.0000	0.6667	-9.0000	0	2	0	0	0	1	1	0	1	1
14	1.50000	0	0	2	1.2222	1.2222	0.6250	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	2	0	0	0	0	1	0	1	1
15	1.00000	0	1	0	1.1875	1.1875	1.0000	-9.0000	-9.0000	-9.0000	1.3214	-9.0000	0	0	0	0	0	0	1	0	1	1
16	1.00000	0	0	3	1.0000	1.0000	1.1111	-9.0000	-9.0000	-9.0000	0.3250	-9.0000	0	-1	0	0	0	0	0	0	1	0
17	1.00000	0	0	3	0.9091	0.9091	1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	1	0	0	0	0	1	0	1	1
18	1.00000	0	1	0	1.1250	1.1250	1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	0	0	0	0	0	0	0	1	1
19	0.57143	0	0	2	0.7778	0.7778	0.6250	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	1	0	0	0	0	1	0	1	1
20	1.00000	0	0	0	0.9617	0.9617	1.4000	-9.0000	-9.0000	-9.0000	1.3333	-9.0000	0	0	0	0	0	0	0	0	1	1
21	1.00000	0	0	0	1.5429	1.5429	1.3846	-9.0000	-9.0000	-9.0000	1.5625	-9.0000	0	1	0	0	0	0	0	0	0	1
22	1.00000	0	0	0	2.2667	2.2667	0.0000	-9.0000	-9.0000	-9.0000	9.0000	-9.0000	-1	-1	0	0	0	0	0	0	0	0
23	1.00000	0	0	0	0.7206	0.7206	0.6250	-9.0000	-9.0000	-9.0000	-9.0000	-9.0000	0	1	0	0	0	0	0	0	1	1
24	1.40000	1	0	0	2.2000	2.2000	4.7500	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	1	0
25	1.00000	0	0	0	0.6923	0.6923	0.8333	-9.0000	-9.0000	-9.0000	0.9231	-9.0000	0	-1	0	0	0	0	0	0	1	.
26	1.66667	0	0	2	0.4286	0.4286	0.8333	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	1	2	1	0	0	0	1	0	1	.
27	0.66667	0	0	2	0.5000	0.5000	0.5833	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	1	1	0	0	0	0	0	1	.
28	1.00000	1	0	0	1.7500	1.7500	2.2500	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	1	1	1	0	0	0	0	0	1	.
29	1.00000	1	0	0	2.0000	2.0000	-1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	0	0	0	0	0	0	0	1	.
30	0.90909	0	0	1	1.2500	1.2500	0.8571	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	1	2	0	0	0	0	0	0	1	.
31	0.92683	0	0	0	2.0000	2.0000	2.0000	-9.0000	-9.0000	-9.0000	0.8000	-9.0000	-1	-1	-1	0	0	0	0	0	0	.
32	1.10000	1	0	2	0.7103	0.7103	0.7236	-9.0000	-9.0000	-9.0000	0.3720	-9.0000	1	1	1	0	0	0	0	0	1	.
33	-1.00000	0	1	3	0.6250	0.6250	-1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	1	1	0	0	0	0	0	0	1	.
34	1.00000	0	0	0	1.2667	1.2667	1.0000	-9.0000	-9.0000	-9.0000	9.0000	-9.0000	0	2	0	0	0	0	0	0	1	.
35	1.00000	0	0	2	0.7143	0.7143	1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	1	0	0	0	0	0	0	1	.
36	0.80000	1	0	0	0.6940	0.6940	0.6897	-9.0000	-9.0000	-9.0000	0.5172	-9.0000	0	1	0	0	0	0	0	0	0	.
37	-1.00000	0	0	1	1.1000	1.1000	-1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	1	0	0	0	0	1	0	1	.
38	1.70000	0	0	0	0.9375	0.9375	0.9375	-9.0000	-9.0000	-9.0000	0.3421	-9.0000	0	1	0	0	0	0	0	0	1	.
39	0.66667	0	0	1	1.3333	1.3333	1.5686	-9.0000	-9.0000	-9.0000	0.2500	-9.0000	-1	-1	-1	0	0	0	0	0	1	.
40	1.00000	0	0	0	0.8235	0.8235	0.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	1	-1	0	0	0	0	0	2	.
41	1.00000	0	0	0	0.6857	0.6857	-1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	-1	0	0	0	0	0	0	0	.
42	-1.00000	0	0	0	1.3158	1.3158	-1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	1	0	0	0	0	0	0	1	.
43	1.60000	0	0	0	1.5217	1.5217	1.6000	-9.0000	-9.0000	-9.0000	8.3333	-9.0000	0	1	0	0	0	0	0	0	1	.
44	1.33333	1	0	0	0.7200	0.7200	-1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	0	0	0	0	0	0	0	1	.
45	0.46154	1	0	0	1.1053	1.1053	1.2500	-9.0000	-9.0000	-9.0000	1.1667	-9.0000	0	-1	0	0	0	0	0	0	1	.
46	0.66279	1	0	0	1.6000	1.6000	1.4500	-9.0000	-9.0000	-9.0000	0.8452	-9.0000	0	1	0	0	0	0	0	0	1	.
47	-1.00000	0	0	0	1.1111	1.1111	0.9091	-9.0000	-9.0000	-9.0000	0.9677	-9.0000	0	1	0	0	0	0	0	0	1	.
48	1.55556	0	1	1	0.5000	0.5000	0.4000	-9.0000	-9.0000	-9.0000	0.3000	-9.0000	1	1	1	0	0	0	1	0	1	.
49	0.37500	0	1	0	0.2688	0.2688	1.0000	-9.0000	-9.0000	-9.0000	0.0400	-9.0000	1	0	1	0	0	0	0	0	1	.
50	0.90141	0	0	0	0.9286	0.9286	1.1765	-9.0000	-9.0000	-9.0000	0.6667	-9.0000	0	2	0	0	0	0	0	0	1	.
51	0.92308	1	0	0	1.0333	1.0333	0.9412	-9.0000	-9.0000	-9.0000	1.7143	-9.0000	0	2	0	0	0	0	0	0	1	.
52	1.06667	0	0	0	0.9412	0.9412	1.0500	-9.0000	-9.0000	-9.0000	0.6400	-9.0000	0	2	0	0	0	0	0	1	1	.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

exctotal.'-t   Mon Oct 2 13:42:58 1995   7

This is the data   13:42 Monday, October 2, 1995   5

OBS	LAB5	LAB9	LAB10	LAB13	LAB14	LAB16	LAB26	LAB28	LAB30	LAB32	LAB34	LAB36	LAB44	LAB45	LAB46	LAB47	LAB48	LAB49	LAB50	LAB51	LAB52	LAB61
53	0.93182	0	1	0	1.3750	1.3750	1.0000	-9.0000	-9.0000	-9.0000	1.6667	-9.0000	0	0	0	0	0	0	0	0	1	.
54	-1.00000	0	0	0	1.0500	1.0500	1.1000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	1	1	1	0	0	0	0	0	0	.
55	0.62791	0	0	0	0.8227	0.8227	2.0000	-9.0000	-9.0000	-9.0000	0.3800	-9.0000	-1	-1	0	0	0	0	0	0	0	.
56	0.91892	0	0	1	1.1837	1.1837	1.4286	-9.0000	-9.0000	-9.0000	0.4878	-9.0000	-1	-1	0	0	0	0	0	0	1	.
57	1.04546	0	0	0	1.3462	1.3462	2.0000	-9.0000	-9.0000	-9.0000	1.7500	-9.0000	1	0	0	0	0	0	0	0	0	.
58	0.70000	1	0	0	0.8333	0.8333	0.6667	-9.0000	-9.0000	-9.0000	1.0100	-9.0000	0	-1	0	0	0	0	0	0	1	.
59	0.87273	0	0	1	0.7576	0.7576	0.9045	-9.0000	-9.0000	-9.0000	1.5868	-9.0000	2	1	0	0	0	0	0	0	1	.
60	1.09375	0	0	0	0.5503	0.5503	0.4608	-9.0000	-9.0000	-9.0000	0.6122	-9.0000	2	1	0	0	0	0	0	0	1	.
61	1.46667	0	0	2	0.9936	0.9936	1.2857	-9.0000	-9.0000	-9.0000	0.7857	-9.0000	2	2	0	0	0	0	0	0	1	.
62	0.75000	0	0	2	1.0909	1.0909	0.1000	-9.0000	-9.0000	-9.0000	0.1667	-9.0000	0	1	-2	0	0	0	2	0	3	.
63	0.46667	0	0	0	0.6000	0.6000	0.0000	-9.0000	-9.0000	-9.0000	0.7500	-9.0000	0	-1	-2	0	0	0	0	0	1	.
64	0.57143	0	0	0	0.8406	0.8406	1.4400	-9.0000	-9.0000	-9.0000	1.0319	-9.0000	0	1	0	0	0	0	0	0	0	.
65	0.92308	0	0	0	1.0484	1.0484	1.3492	-9.0000	-9.0000	-9.0000	1.2090	-9.0000	0	1	0	0	0	0	0	0	1	.
66	4.57143	0	0	0	16.8235	16.8235	9.0000	-9.0000	-9.0000	-9.0000	4.4167	-9.0000	-1	-1	-1	0	0	0	0	0	0	.
67	0.81250	0	0	0	0.7273	0.7273	1.0000	-9.0000	-9.0000	-9.0000	0.6069	-9.0000	0	1	0	0	0	0	0	0	0	.
68	0.55000	0	1	0	1.6667	1.6667	2.0000	-9.0000	-9.0000	-9.0000	2.4286	-9.0000	0	0	0	0	0	0	2	0	0	.
69	0.67500	0	0	-2	1.9091	1.9091	1.8519	-9.0000	-9.0000	-9.0000	1.4557	-9.0000	-1	-1	-1	0	0	0	-1	0	-1	.
70	0.56579	0	0	2	0.5077	0.5077	0.7857	-9.0000	-9.0000	-9.0000	0.7952	-9.0000	1	1	0	0	0	0	1	0	1	.
71	1.40000	0	0	1	0.6400	0.6400	-1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	1	0	0	0	0	1	0	1	.
72	0.70833	0	0	0	0.8314	0.8314	1.6453	-9.0000	-9.0000	-9.0000	0.8391	-9.0000	1	1	1	0	0	0	0	0	0	.
73	1.33333	0	1	2	2.5806	2.5806	2.8000	-9.0000	-9.0000	-9.0000	1.7000	-9.0000	0	0	0	0	0	0	1	0	1	.
74	1.00000	1	0	0	0.8000	0.8000	-1.0000	-9.0000	-9.0000	-9.0000	0.6667	-9.0000	0	0	0	0	0	0	-1	0	0	.
75	1.00000	0	0	0	0.7500	0.7500	-1.0000	-9.0000	-9.0000	-9.0000	1.1000	-9.0000	1	1	0	0	0	0	0	0	0	.
76	0.84375	0	1	0	0.8555	0.8555	1.3000	-9.0000	-9.0000	-9.0000	0.9677	-9.0000	0	0	0	0	0	0	-1	0	0	.
77	0.83333	0	0	0	0.9375	0.9375	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	-1	.
78	-1.00000	0	0	0	2.8148	2.8148	-1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	0	0	0	0	0	1	0	0	.
79	0.78125	0	0	2	1.1176	1.1176	1.4250	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	1	.
80	0.60000	0	0	0	1.0000	1.0000	1.2000	-9.0000	-9.0000	-9.0000	1.0833	-9.0000	0	-1	0	0	0	0	0	0	0	.
81	0.70175	0	1	0	0.9363	0.9363	0.6000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	0	0	0	0	0	1	0	1	.
82	0.71429	1	0	0	0.8281	0.8281	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	1	0	2	0	0	0	-1	0	0	.
83	1.00000	0	2	0	0.6111	0.6111	-1.0000	-9.0000	-9.0000	-9.0000	0.0714	-9.0000	0	0	-2	0	0	0	0	0	1	.
84	0.85714	0	0	0	1.0000	1.0000	-1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	2	0	2	0	0	1	0	0	2	.
85	6.50000	0	0	2	1.5921	1.5921	1.0000	-9.0000	-9.0000	-9.0000	3.0000	-9.0000	0	3	0	0	0	0	2	0	2	.
86	2.00000	0	0	2	4.0000	1.5625	-1.0000	-9.0000	-9.0000	-9.0000	2.5000	-9.0000	0	2	0	0	0	0	2	0	1	.
87	1.00000	0	0	0	0.6286	0.4714	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	-1	0	0	0	0	-1	0	0	.
88	1.42857	0	0	1	1.2444	1.2444	-1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	1	0	0	0	0	0	0	1	.
89	0.50000	0	2	0	0.4545	0.4545	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	-1	0	0	-1	0	0	0	1	.
90	0.62500	0	0	0	1.1818	0.4000	-1.0000	-9.0000	-9.0000	-9.0000	1.1429	-9.0000	0	0	0	0	0	0	0	0	-1	.
91	1.00000	0	0	0	0.6885	0.6885	-9.0000	-9.0000	-9.0000	-9.0000	0.4444	-9.0000	2	1	1	0	0	0	0	0	1	.
92	1.00000	0	0	-3	1.0732	1.0732	2.8000	-9.0000	-9.0000	-9.0000	9.0000	-9.0000	0	-1	0	0	0	0	0	0	0	.
93	1.00000	0	0	0	0.4271	0.4271	0.7750	-9.0000	-9.0000	-9.0000	0.5000	-9.0000	2	0	1	0	0	0	-2	0	0	.
94	0.66667	0	0	1	0.5803	0.5803	0.3000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	0	0	0	0	0	2	0	2	.
95	1.00000	1	0	1	1.1000	1.1000	-9.0000	-9.0000	-9.0000	-9.0000	0.8000	-9.0000	-2	0	-2	0	0	0	2	0	0	.
96	0.87500	0	0	0	0.9444	0.9444	0.0000	-9.0000	-9.0000	-9.0000	1.0741	-9.0000	1	0	1	-1	0	0	0	0	0	.
97	0.78125	0	1	0	3.0769	3.0769	0.0000	-9.0000	-9.0000	-9.0000	1.8519	-9.0000	-1	0	-1	1	0	0	0	0	1	.
98	1.08333	0	1	0	1.0465	1.0465	0.6000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	-1	0	-1	1	0	0	0	0	0	.
99	1.42857	0	1	0	3.2308	3.2308	2.2727	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	-1	0	-1	1	0	0	0	0	1	.
100	1.00000	0	1	1	1.9130	1.9130	-1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	-1	0	-1	1	0	1	0	0	1	.
101	0.80000	0	0	0	0.6301	0.6301	1.4000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	-1	0	-1	1	0	0	-1	0	0	.
102	0.66667	0	0	2	1.7000	0.6100	-1.0000	-9.0000	-9.0000	-9.0000	1.3333	-9.0000	1	1	0	1	0	1	0	0	1	.
103	0.60000	0	0	1	1.2000	0.8400	-1.0000	-9.0000	-9.0000	-9.0000	2.0000	-9.0000	1	1	0	0	0	0	0	0	1	.
104	1.00000	0	0	1	0.8889	0.8889	-1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	1	0	0	0	0	1	0	0	.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

OBS	LAB5	LAB9	LAB10	LAB13	LAB14	LAB16	LAB26	LAB28	LAB30	LAB32	LAB34	LAB36	LAB44	LAB45	LAB46	LAB47	LAB48	LAB49	LAB50	LAB51	LAB52	LAB61
105	1.53846	0	0	0	1.4667	0.0000	2.6000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	1	0	0	0	1	0	0	0	.
106	1.00000	2	0	1	1.3622	1.3622	-1.0000	-9.0000	-9.0000	-9.0000	0.8649	-9.0000	1	1	0	0	0	0	0	0	0	.
107	0.75000	1	0	0	1.3659	0.0000	-1.0000	-9.0000	-9.0000	-9.0000	1.7500	-9.0000	0	-1	0	0	0	0	0	0	0	.
108	0.80645	1	0	0	1.1905	1.1905	-1.0000	-9.0000	-9.0000	-9.0000	0.7500	-9.0000	1	1	1	0	0	0	0	1	1	.
109	1.21429	0	0	0	0.7600	0.7600	0.4167	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	-1	0	0	0	0	0	0	1	.
110	2.34375	0	0	0	7.7778	17.5000	0.0000	-9.0000	-9.0000	-9.0000	0.1111	-9.0000	-1	-1	-1	0	0	0	0	-1	0	.
111	0.80000	1	1	0	1.6000	1.6000	1.8800	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	0	.
112	1.12069	0	1	0	1.4286	1.4286	4.5000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	0	.
113	0.43750	1	1	1	1.5217	1.5217	1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	1	0	1	0	0	0	0	1	.
114	1.00000	0	0	0	1.0000	1.0000	0.6667	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	0	.
115	0.58824	0	0	1	1.0690	3.4444	1.0857	-9.0000	-9.0000	-9.0000	3.4483	-9.0000	0	-1	0	0	0	0	1	0	-1	.
116	1.00000	0	0	0	1.0364	1.7273	1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	0	.
117	1.16071	0	0	-3	1.1667	1.3098	0.7286	-9.0000	-9.0000	-9.0000	2.0000	-9.0000	-1	-2	0	0	1	1	-1	0	-1	.
118	1.00000	0	0	0	1.8113	1.2105	1.1231	-9.0000	-9.0000	-9.0000	0.9500	-9.0000	1	2	1	0	0	0	0	0	1	.
119	1.00000	0	0	-1	2.3519	2.3029	-1.0000	-9.0000	-9.0000	-9.0000	5.7500	-9.0000	-1	-2	-1	0	0	0	0	0	0	.
120	1.00000	0	0	0	0.9750	0.6887	1.1111	-9.0000	-9.0000	-9.0000	0.4565	-9.0000	1	0	0	0	0	0	-1	0	0	.
121	1.00000	0	0	1	1.3333	0.2833	-1.0000	-9.0000	-9.0000	-9.0000	0.5946	-9.0000	1	1	0	0	0	0	1	0	1	.
122	1.06667	0	1	0	0.6658	0.6658	8.1250	-9.0000	-9.0000	-9.0000	1.2778	-9.0000	0	-1	0	0	0	0	0	0	0	.
123	1.25000	0	2	0	1.3919	1.3919	0.0000	-9.0000	-9.0000	-9.0000	4.4444	-9.0000	0	0	0	0	0	0	0	0	1	.
124	1.00000	0	0	0	1.1212	2.0556	0.8000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	-1	0	0	0	0	0	0	0	.
125	1.50000	0	0	1	1.5000	4.3043	1.3182	-9.0000	-9.0000	-9.0000	1.8333	-9.0000	0	0	0	0	1	0	0	0	1	.
126	1.15000	0	0	0	0.9459	0.9459	0.6667	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	1	0	1	0	0	1	0	0	1	.
127	1.00000	0	0	1	1.0000	-1.0000	2.0000	-9.0000	-9.0000	-9.0000	1.1542	-9.0000	0	1	0	0	0	0	1	0	1	.
128	1.00000	0	1	0	0.8440	0.8440	0.9497	-9.0000	-9.0000	-9.0000	1.3333	-9.0000	0	-1	0	0	0	0	0	0	0	.
129	1.00000	2	0	0	1.2695	1.2695	1.6800	-9.0000	-9.0000	-9.0000	1.9000	-9.0000	0	-1	0	0	0	1	0	0	1	.
130	1.00000	0	1	0	1.2918	1.2918	2.4920	-9.0000	-9.0000	-9.0000	0.7917	-9.0000	0	-1	0	-1	0	0	0	0	0	.
131	1.00000	0	0	2	0.7667	0.7667	1.0811	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	1	0	1	.
132	1.06667	0	0	0	1.0952	1.0952	1.5000	-9.0000	-9.0000	-9.0000	0.7692	-9.0000	0	1	0	0	0	0	0	0	1	.
133	1.00000	0	0	0	1.1623	1.1623	0.8315	-9.0000	-9.0000	-9.0000	0.6296	-9.0000	1	1	0	0	0	1	0	0	1	.
134	0.78947	1	0	0	1.0000	1.0000	1.5556	-9.0000	-9.0000	-9.0000	0.9172	-9.0000	1	1	0	0	0	0	0	0	1	.
135	1.00000	0	0	1	0.7750	2.0667	3.3333	-9.0000	-9.0000	-9.0000	2.0000	-9.0000	0	-1	1	0	0	0	1	0	0	.
136	0.85714	1	0	0	2.0515	1.1856	0.5769	-9.0000	-9.0000	-9.0000	0.6667	-9.0000	0	1	-1	0	0	0	1	0	1	.
137	1.00000	1	0	0	1.4167	2.2571	2.0000	-9.0000	-9.0000	-9.0000	1.6000	-9.0000	0	-1	0	0	0	0	-1	0	0	.
138	0.65385	0	0	1	1.8603	1.1268	2.0000	-9.0000	-9.0000	-9.0000	1.9303	-9.0000	0	-1	0	0	0	1	0	0	1	.
139	0.50000	0	0	0	1.5000	0.7500	1.7143	-9.0000	-9.0000	-9.0000	1.0145	-9.0000	0	2	0	-1	0	1	0	0	1	.
140	0.50000	2	0	1	2.7500	1.9500	-1.0000	-9.0000	-9.0000	-9.0000	1.4286	-9.0000	0	-1	1	1	0	1	2	0	1	.
141	0.61539	0	0	-2	0.5600	0.4424	-1.0000	-9.0000	-9.0000	-9.0000	0.6667	-9.0000	0	0	-1	0	-1	0	-1	0	0	.
142	1.00000	0	0	2	2.6667	1.1111	0.0000	-9.0000	-9.0000	-9.0000	3.7500	-9.0000	0	0	1	1	0	1	1	0	1	.
143	1.00000	0	0	0	0.8151	0.5979	1.5918	-9.0000	-9.0000	-9.0000	1.0926	-9.0000	1	1	1	0	0	1	0	0	1	.
144	1.00000	0	0	0	0.7920	3.3426	2.4424	-9.0000	-9.0000	-9.0000	1.0588	-9.0000	0	-1	1	0	0	1	0	0	1	.
145	0.62500	1	0	-2	0.4963	1.0039	0.6486	-9.0000	-9.0000	-9.0000	1.3571	-9.0000	0	0	0	0	0	1	-1	0	1	.
146	1.00000	0	0	0	1.9444	1.9444	-1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	1	0	0	0	0	0	0	1	.
147	1.00000	0	0	0	0.7925	0.7925	0.0000	-9.0000	-9.0000	-9.0000	1.5000	-9.0000	0	0	0	0	0	0	0	0	0	.
148	0.71429	0	0	0	0.6667	0.4118	-1.0000	-9.0000	-9.0000	-9.0000	1.7778	-9.0000	0	0	0	0	0	0	0	0	0	.
149	0.76667	0	1	0	1.8750	1.8750	-1.0000	-9.0000	-9.0000	-9.0000	0.9600	-9.0000	0	-1	0	0	0	0	0	0	0	.
150	1.00000	0	0	0	1.0000	1.0000	0.0000	-9.0000	-9.0000	-9.0000	0.1000	-9.0000	1	2	0	0	0	0	0	0	1	.
151	1.28000	0	0	0	1.2355	1.2355	1.4706	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	1	0	0	0	0	0	0	1	.
152	1.00000	0	0	0	0.8182	0.8182	-1.0000	-9.0000	-9.0000	-9.0000	0.1000	-9.0000	0	0	0	0	0	0	0	0	1	.
153	1.00000	0	0	0	1.0417	1.0417	0.7500	-9.0000	-9.0000	-9.0000	9.0000	-9.0000	0	-1	0	0	0	0	0	0	1	.
154	1.00000	0	0	0	1.0000	1.0000	1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-9.0000	0	1	0	0	0	0	0	0	1	.
155	1.00000	0	0	0	1.6107	1.6107	-1.0000	-9.0000	-9.0000	-9.0000	11.0000	-9.0000	-1	-1	0	0	0	0	0	0	0	.
156	1.50000	0	0	3	0.4644	0.4644	-1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	1	1	0	0	0	0	1	0	1	.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

exctotal.`'-.   Mon Oct 2 13:42:58 1995   11

This is the data   13:42 Monday, October 2, 1995 7

OBS	LAB5	LAB9	LAB10	LAB13	LAB14	LAB16	LAB26	LAB28	LAB30	LAB32	LAB34	LAB36	LAB44	LAB45	LAB46	LAB47	LAB48	LAB49	LAB50	LAB51	LAB52	LAB61
157	0.75000	0	0	0	0.3813	0.3813	0.0000	-9.0000	-9.0000	-9.0000	1.6667	-9.0000	1	2	1	0	0	0	0	0	1	.
158	0.70370	0	0	0	0.3036	0.3036	-1.0000	-9.0000	-9.0000	-9.0000	2.0000	-9.0000	1	1	1	0	0	1	0	0	1	.
159	0.53846	0	0	0	2.9418	2.9418	0.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	-1	-2	0	0	0	0	0	0	1	.
160	0.60000	0	1	2	0.7083	0.7083	-1.0000	-9.0000	-9.0000	-9.0000	0.1750	-9.0000	1	2	1	0	0	0	0	0	1	.
161	0.92593	0	1	2	1.1250	1.1250	-1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	2	1	0	0	0	1	0	1	.
162	1.81818	0	1	0	0.8092	0.8092	-1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	1	1	0	0	1	0	0	1	.
163	1.60000	0	1	0	0.2583	0.2583	-1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	1	1	0	0	1	0	0	0	.
164	0.51429	0	2	0	0.4787	0.4787	-1.0000	-9.0000	-9.0000	-9.0000	0.6154	-9.0000	0	1	1	0	0	1	0	0	1	.
165	0.90909	1	0	0	1.7857	1.7857	0.2941	-9.0000	-9.0000	-9.0000	1.1525	-9.0000	1	0	0	0	0	0	0	0	1	.
166	1.00000	0	1	1	2.6250	4.9412	-1.0000	-9.0000	-9.0000	-9.0000	1.8929	-9.0000	-1	0	-1	0	-1	0	0	0	0	.
167	1.33333	0	0	0	0.7805	0.7805	0.3514	-9.0000	-9.0000	-9.0000	0.5724	-9.0000	0	0	0	0	0	0	0	0	1	.
168	1.00000	0	0	0	1.1000	1.1000	0.0000	-9.0000	-9.0000	-9.0000	0.7836	-9.0000	0	0	0	0	0	0	0	0	1	.
169	0.50000	0	0	0	1.0233	0.4884	1.1250	-9.0000	-9.0000	-9.0000	1.0130	-9.0000	0	1	0	0	0	0	0	0	1	.
170	-1.00000	0	0	0	1.2000	0.0000	0.0000	-9.0000	-9.0000	-9.0000	1.1163	-9.0000	-1	-1	-1	0	0	0	0	0	0	.
171	1.12500	0	0	0	1.0769	1.1475	0.0000	-9.0000	-9.0000	-9.0000	1.1224	-9.0000	0	-1	0	0	0	0	0	0	0	.
172	0.83333	0	0	2	0.5307	0.5307	-1.0000	-9.0000	-9.0000	-9.0000	1.0667	-9.0000	0	0	0	0	0	0	0	0	1	.
173	1.00000	0	0	0	0.6288	1.2576	-9.0000	-9.0000	-9.0000	-9.0000	1.0000	-9.0000	0	1	0	0	0	0	1	0	1	.
174	0.75000	0	0	0	1.0000	1.0000	-1.0000	-9.0000	-9.0000	-9.0000	1.7143	-9.0000	0	-1	0	0	0	0	0	0	0	.
175	1.00000	0	0	0	0.7778	0.7778	-1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	-1	0	0	-1	0	0	0	1	.
176	1.50000	0	0	0	1.5430	1.5430	-1.0000	-9.0000	-9.0000	-9.0000	1.0204	-9.0000	0	0	0	0	0	0	-1	0	0	.
177	1.00000	0	0	0	0.4410	0.4410	0.3867	-9.0000	-9.0000	-9.0000	1.2500	-9.0000	0	1	0	0	0	0	-1	0	0	.
178	0.75000	0	0	2	0.6040	0.9764	-1.0000	-9.0000	-9.0000	-9.0000	0.6353	-9.0000	0	0	0	0	0	0	0	0	1	.
179	1.00000	1	0	3	15.0517	15.0517	0.0000	-9.0000	-9.0000	-9.0000	24.0000	-9.0000	0	1	0	0	0	1	1	0	1	.
180	1.00000	0	0	0	2.2857	2.2857	0.0000	-9.0000	-9.0000	-9.0000	24.0000	-9.0000	0	1	0	1	0	1	0	0	1	.
181	1.00000	0	0	0	2.1000	2.1000	-1.0000	-9.0000	-9.0000	-9.0000	1.8750	-9.0000	0	-1	0	0	0	0	0	0	0	.
182	1.00000	0	0	0	5.0000	0.4000	0.0000	-9.0000	-9.0000	-9.0000	0.7500	-9.0000	0	1	0	0	0	0	0	0	0	.
183	1.00000	0	0	0	1.0005	0.9185	-1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	1	.
184	1.00000	0	0	0	1.0753	1.0753	-1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	1	.
185	1.00000	0	0	0	1.6665	0.8627	-1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	1	.
186	1.00000	0	0	0	1.0408	0.4465	-1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	1	.
187	0.50000	0	0	0	1.0457	1.0457	-1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	1	0	0	1	.
188	1.00000	0	0	0	0.4766	0.4766	0.9725	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	-1	0	0	0	0	0	0	1	.
189	1.66667	0	0	0	1.5599	1.7542	0.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	-1	0	0	0	0	-2	0	-1	.
190	1.50000	0	0	0	1.5953	1.5953	0.0000	-9.0000	-9.0000	-9.0000	3.8571	-9.0000	0	0	0	0	0	0	1	0	1	.
191	1.60000	0	0	0	1.9565	2.0930	0.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	-1	0	0	0	1	1	0	1	.
192	1.17647	0	1	0	1.0403	1.0403	-1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	1	.
193	0.75000	0	0	0	2.3088	2.3088	-1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	-1	-1	-1	0	0	0	0	0	1	.
194	0.59091	0	1	0	1.4622	1.4622	-1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	-1	0	0	0	0	0	0	0	.
195	1.21429	0	0	2	0.8389	0.8389	1.4063	-9.0000	-9.0000	-9.0000	1.2000	-9.0000	0	0	0	0	0	0	0	0	1	.
196	0.43590	0	0	-3	1.8557	1.7979	-1.0000	-9.0000	-9.0000	-9.0000	2.3765	-9.0000	0	-1	0	0	0	0	-1	0	-1	.
197	0.58824	0	0	0	1.4687	1.4687	0.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	1	0	0	0	0	0	0	1	.
198	1.22222	0	0	2	1.2000	1.0500	0.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	1	0	1	.
199	1.24390	0	0	0	0.9011	1.2203	0.6154	-9.0000	-9.0000	-9.0000	0.8333	-9.0000	0	0	0	0	0	0	-1	0	1	.
200	0.88889	0	0	2	1.1392	1.1392	0.8000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	1	0	0	0	0	1	0	1	.
201	0.66667	1	1	0	1.5250	1.5250	0.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	1	0	0	0	0	0	0	1	.
202	1.31250	0	0	0	1.6697	2.3871	1.7908	-9.0000	-9.0000	-9.0000	1.4196	-9.0000	0	0	0	0	0	0	0	0	1	.
203	0.68421	1	0	0	1.8000	1.4286	1.7143	-9.0000	-9.0000	-9.0000	1.3700	-9.0000	0	0	0	0	0	0	0	0	1	.
204	1.00000	0	0	0	0.9709	0.9709	0.9000	-9.0000	-9.0000	-9.0000	0.6364	-9.0000	0	1	0	0	0	0	0	0	1	.
205	0.85714	0	1	0	1.8289	1.8289	0.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	1	.
206	1.00000	0	1	0	0.9150	0.9150	-1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	0	0	0	0	0	0	0	1	.
207	1.00000	1	0	2	0.9351	0.9351	-1.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	1	.
208	0.75000	0	0	2	1.2119	1.2119	0.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	-1	0	0	0	0	0	0	1	.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

exctotal.' ~ Mon Oct 2 13:42:58 1995 13

This is the data 13:42 Monday, October 2, 1995 8

OBS	LAB5	LAB9	LAB10	LAB13	LAB14	LAB16	LAB26	LAB28	LAB30	LAB32	LAB34	LAB36	LAB44	LAB45	LAB46	LAB47	LAB48	LAB49	LAB50	LAB51	LAB52	LAB61
209	1.00000	0	2	0	1.5373	2.9815	0.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	-1	0	0	0	0	-1	1	1	.
210	1.00000	0	0	0	1.3721	0.0000	-1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	0	0	0	0	0	0	0	1	.
211	0.75000	1	0	1	2.2049	2.2049	1.9674	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	0	0	1	0	0	0	0	1	.
212	0.75000	0	0	3	0.5972	0.5972	0.4873	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	0	0	-1	0	0	0	0	1	.
213	1.11111	0	1	0	0.9627	0.9627	0.7813	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	-1	0	0	0	0	0	0	1	.
214	0.70000	0	1	0	2.1447	2.1447	10.7806	-9.0000	-9.0000	-9.0000	1.0897	-9.0000	0	1	0	1	0	0	0	0	1	.
215	0.77778	0	0	2	0.4500	1.5008	1.1111	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	-1	0	0	0	0	1	.
216	1.00000	1	0	0	2.2590	3.7143	2.0728	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	1	0	0	0	0	1	.
217	1.00000	0	1	0	3.0000	3.0000	0.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	0	0	1	0	0	0	0	1	.
218	0.20000	0	2	0	1.9286	1.9286	-1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	0	1	1	0	1	0	0	1	.
219	1.00000	0	0	0	1.4286	1.4286	-1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	0	0	1	1	1	0	0	1	.
220	2.00000	0	0	2	8.5000	8.5000	3.4444	-9.0000	-9.0000	-9.0000	8.0000	-9.0000	0	0	0	0	0	0	1	0	1	.
221	1.25000	0	0	0	2.0000	2.0000	0.9333	-9.0000	-9.0000	-9.0000	2.2901	-9.0000	0	0	0	0	0	1	0	0	1	.
222	2.40000	2	0	0	1.5000	1.1940	1.2857	-9.0000	-9.0000	-9.0000	1.2000	-9.0000	0	0	0	0	0	0	0	0	1	.
223	1.20000	0	0	0	0.8053	0.2566	0.7857	-9.0000	-9.0000	-9.0000	2.1316	-9.0000	0	1	0	0	0	0	0	0	1	.
224	1.00000	0	0	0	1.6549	1.6549	1.6154	-9.0000	-9.0000	-9.0000	1.4077	-9.0000	0	1	0	0	0	1	0	0	1	.
225	1.00000	0	0	0	1.6667	1.6667	2.0000	-9.0000	-9.0000	-9.0000	1.2429	-9.0000	0	2	0	0	1	1	0	0	1	.
226	1.00000	0	0	0	3.0000	3.0000	0.0000	-9.0000	-9.0000	-9.0000	1.5000	-9.0000	0	0	-1	0	0	0	1	0	1	.
227	1.00000	0	0	0	0.7414	0.7414	0.9250	-9.0000	-9.0000	-9.0000	1.0625	-9.0000	2	0	2	0	0	0	0	0	1	.
228	1.00000	0	1	0	0.8182	0.8182	-1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	2	0	2	0	0	0	0	0	0	.
229	0.50000	0	1	0	2.7500	2.7500	2.0000	-9.0000	-9.0000	-9.0000	0.4011	-9.0000	-2	-2	-2	0	-2	0	0	0	1	.
230	2.66667	0	0	2	11.1111	11.1111	0.1000	-9.0000	-9.0000	-9.0000	0.1000	-9.0000	-1	0	0	0	0	0	1	-1	0	.
231	1.33333	0	0	0	3.7615	3.7615	0.1000	-9.0000	-9.0000	-9.0000	0.1000	-9.0000	-1	0	0	0	0	0	0	-1	0	.
232	0.71429	2	0	0	3.4286	3.4286	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	1	0	0	0	0	0	0	1	.
233	1.00000	0	1	2	0.8701	0.8701	0.0000	-9.0000	-9.0000	-9.0000	0.8133	-9.0000	1	1	1	0	0	0	0	0	1	.
234	0.72727	0	0	0	2.1318	2.1318	-1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	-1	-1	-1	0	0	0	0	-1	0	.
235	0.50000	0	0	2	5.9256	5.9256	-9.0000	-9.0000	-9.0000	-9.0000	0.6563	-9.0000	0	1	0	0	1	0	1	0	1	.
236	0.83333	0	1	-1	2.2857	2.2857	-9.0000	-9.0000	-9.0000	-9.0000	1.7778	-9.0000	0	-1	1	1	0	0	0	0	0	.
237	0.56250	0	1	-2	1.6667	1.6667	-1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	-1	1	0	0	0	-1	0	0	.
238	0.95000	0	1	0	2.4384	2.4384	1.6720	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	-1	1	0	0	0	-1	0	0	.
239	0.42683	0	1	1	4.8000	4.8000	-1.0000	-9.0000	-9.0000	-9.0000	4.0000	-9.0000	0	0	1	0	0	0	-1	0	-1	.
240	1.00000	0	1	0	3.7500	3.7500	-1.0000	-9.0000	-9.0000	-9.0000	5.3333	-9.0000	0	1	1	1	1	1	0	0	1	.
241	2.00000	0	1	0	9.4629	9.4629	-1.0000	-9.0000	-9.0000	-9.0000	9.5000	-9.0000	0	0	0	0	0	0	-1	0	1	.
242	0.57143	0	1	0	3.1111	3.1111	0.9000	-9.0000	-9.0000	-9.0000	2.7500	-9.0000	0	2	0	0	0	0	0	0	1	.
243	1.23077	2	0	0	0.9474	0.0000	0.6667	-9.0000	-9.0000	-9.0000	1.1489	-9.0000	0	2	0	0	0	0	1	0	1	.
244	1.00000	1	1	0	0.9000	-1.0000	0.3333	-9.0000	-9.0000	-9.0000	1.0185	-9.0000	0	1	0	0	0	0	0	0	1	.
245	1.00000	1	0	0	1.4483	-1.0000	2.5714	-9.0000	-9.0000	-9.0000	1.5163	-9.0000	0	1	0	0	0	0	0	0	0	.
246	1.00000	0	1	0	1.4500	1.4500	-1.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	-1	0	0	0	0	0	0	1	.
247	0.85333	1	1	0	1.0129	-1.0000	0.6000	-9.0000	-9.0000	-9.0000	0.7483	-9.0000	0	1	0	0	0	0	0	0	1	.
248	1.00000	0	0	0	0.9364	0.5618	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	1	1	0	1	0	0	0	0	1	.
249	0.80000	1	0	0	1.2727	0.5909	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	1	0	0	0	0	1	0	0	1	.
250	2.20000	2	1	0	2.5000	1.2500	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	1	1	0	1	0	1	0	0	1	.
251	1.85000	1	0	0	1.3333	1.3333	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	1	1	0	0	0	1	0	0	1	.
252	2.50000	0	2	2	2.0267	2.0267	-9.0000	-9.0000	-9.0000	-9.0000	1.7760	-9.0000	1	1	0	1	0	1	1	0	1	.
253	1.00000	0	0	3	0.8000	-1.0000	-9.0000	-1.0000	0.0000	-9.0000	0.2993	-1.0000	1	1	0	0	0	0	1	0	1	.
254	1.00000	2	0	0	0.7373	-1.0000	-9.0000	-1.0000	-1.0000	-1.0000	0.3853	-1.0000	1	1	0	0	0	1	0	0	1	.
255	1.00000	0	1	2	0.5200	0.5200	-9.0000	0.7143	-1.0000	-1.0000	0.0000	0.8333	0	0	-1	0	-1	0	0	0	0	.
256	1.00000	0	1	1	0.9658	-1.0000	-9.0000	0.1000	0.1000	0.0000	0.7000	-9.0000	1	2	0	0	0	0	0	0	1	.
257	1.00000	2	0	0	1.3289	-1.0000	-9.0000	9.0000	9.0000	9.0000	1.8182	9.0000	-1	-1	0	0	0	0	0	0	0	.
258	1.00000	0	1	0	2.5000	-1.0000	-9.0000	9.0000	9.0000	9.0000	2.7027	9.0000	-1	-1	0	0	0	0	0	0	0	.
259	0.60000	0	0	0	1.0586	-1.0000	-9.0000	9.0000	9.0000	-9.0000	0.2857	0.0000	0	0	0	0	0	0	0	0	1	.
260	0.83333	0	1	2	1.9000	1.9000	-9.0000	4.1500	-1.0000	-1.0000	1.6000	-1.0000	0	0	0	0	1	0	1	0	1	.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

exctotal.'·t Mon Oct 2 13:42:58 1995 15

This is the data 13:42 Monday, October 2, 1995 9

OBS	LAB5	LAB9	LAB10	LAB13	LAB14	LAB16	LAB26	LAB28	LAB30	LAB32	LAB34	LAB36	LAB44	LAB45	LAB46	LAB47	LAB48	LAB49	LAB50	LAB51	LAB52	LAB61
261	1.00000	0	0	2	0.3005	0.3346	-9.0000	0.1000	0.1000	0.1000	0.0833	-1.0000	1	1	1	0	1	0	1	0	1	.
262	1.00000	1	3	0	1.3246	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	0	.
263	1.00000	1	0	0	0.8750	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	0	.
264	1.00000	0	0	0	0.9000	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	0	.
265	1.00000	0	0	0	1.7323	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	0	.
266	1.00000	0	0	0	3.7143	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	1.8293	-9.0000	0	0	0	0	0	0	0	0	0	.
267	1.00000	1	0	0	6.2500	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	0	0	0	0	1	0	0	0	.
268	1.00000	0	0	0	1.3000	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	1	-1	0	0	.
269	1.00000	0	2	0	1.2681	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	0	.
270	1.00000	0	0	-1	2.2222	2.2222	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	-1	0	0	0	0	0	0	-1	.
271	1.00000	0	0	0	1.2611	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	0	.
272	1.33094	0	0	0	2.7683	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	1	0	0	0	0	0	0	1	.
273	1.00000	0	3	0	6.9231	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	15.8333	-9.0000	0	0	0	0	0	0	0	0	0	.
274	1.00000	0	0	0	0.7163	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	-1	0	0	0	0	0	0	0	.
275	1.00000	0	0	0	0.6647	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	0	.
276	1.00000	0	0	0	0.7889	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	-1	.
277	1.00000	2	0	0	1.1828	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	1	-1	0	0	.
278	1.00000	0	0	-1	1.2500	0.0000	-9.0000	-9.0000	-9.0000	-9.0000	1.2000	-9.0000	-1	-1	-1	0	0	0	-1	0	-1	.
279	1.00000	0	0	0	0.8000	0.8000	-9.0000	-9.0000	-9.0000	-9.0000	0.6667	-9.0000	1	0	1	0	0	0	1	0	0	.
280	1.00000	0	0	2	1.1688	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	1.3633	-9.0000	1	2	1	0	1	0	1	0	1	.
281	1.00000	0	1	0	1.0571	1.0571	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	1	1	1	1	0	0	1	0	1	.
282	1.00000	0	0	0	1.3662	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	1.2681	-9.0000	0	0	0	0	0	0	0	0	0	.
283	1.00000	0	0	0	1.1538	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	1.0417	-9.0000	0	0	0	0	0	0	0	0	0	.
284	1.00000	0	0	0	0.5000	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	0.6350	-9.0000	0	0	0	0	0	0	0	0	0	.
285	1.00000	0	0	0	0.9615	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	1.0000	-9.0000	0	0	0	0	0	0	-1	0	0	.
286	1.00000	0	0	0	0.6500	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	1	1	1	0	0	0	1	0	0	.
287	1.00000	0	0	0	1.0000	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	-1	0	0	-1	0	0	0	-1	.
288	1.00000	0	1	2	0.6667	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	1	0	0	1	0	0	0	1	.
289	1.00000	0	2	0	1.9148	1.9148	-9.0000	-9.0000	-9.0000	-9.0000	1.8702	-1.0000	0	0	0	0	0	0	0	0	0	.
290	1.00000	0	2	1	2.1750	0.0000	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-1.0000	0	0	0	0	0	0	0	0	0	.
291	1.00000	0	2	2	0.7895	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-1.0000	0	0	0	0	0	0	0	1	0	.
292	1.00000	0	2	0	3.0122	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-1.0000	0	0	0	0	-1	0	0	0	0	.
293	1.00000	0	2	0	3.9792	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-1.0000	0	0	0	0	0	0	0	0	0	.
294	1.00000	0	1	2	2.1667	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-1.0000	1	0	0	1	1	0	1	1	1	.
295	1.00000	0	1	2	0.9863	0.9863	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-1.0000	2	1	0	2	1	1	0	0	1	.
296	1.00000	0	2	0	2.0000	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-1.0000	0	0	0	0	0	0	0	0	1	.
297	1.00000	0	2	0	1.5564	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-1.0000	0	0	0	0	0	0	0	0	0	.
298	1.00000	0	2	0	2.2675	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-1.0000	0	0	0	0	0	0	0	0	0	.
299	1.00000	0	2	0	2.2868	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-1.0000	0	0	0	0	0	0	0	0	0	.
300	1.00000	0	1	0	3.2000	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	0	0	0	0	0	0	0	0	0	.
301	1.00000	0	0	1	1.5823	13.8889	-9.0000	-9.0000	-9.0000	-9.0000	2.8000	-9.0000	0	-1	0	0	0	0	0	0	-1	.
302	1.00000	0	2	1	0.9735	0.9735	-9.0000	-9.0000	-9.0000	-9.0000	0.7368	-1.0000	1	1	0	0	-1	0	0	0	1	.
303	0.75625	1	2	0	0.6743	0.0000	-9.0000	-9.0000	-9.0000	-9.0000	0.5769	0.0000	1	0	0	0	-1	0	0	0	0	.
304	1.00000	0	2	0	2.0000	2.0000	-9.0000	9.0000	-9.0000	9.0000	3.8425	-1.0000	0	0	0	0	0	0	0	1	0	.
305	1.00000	0	2	0	3.0526	3.0526	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-1.0000	0	0	0	0	0	1	0	0	1	.
306	1.00000	0	2	0	4.0357	4.0357	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-1.0000	0	0	0	0	0	1	0	0	0	.
307	1.00000	0	2	2	3.0000	3.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-1.0000	0	0	0	0	0	1	0	0	1	.
308	1.00000	0	2	3	2.1111	2.1111	-9.0000	9.0000	-9.0000	9.0000	0.0000	-1.0000	1	0	0	0	0	1	0	1	1	.
309	1.00000	0	2	3	1.6885	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	2.3900	-1.0000	0	1	0	0	1	0	0	0	1	.
310	1.00000	0	1	0	1.9444	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	2.0159	-1.0000	-1	0	0	0	0	0	0	0	0	.
311	1.00000	0	1	2	1.2000	1.2000	-9.0000	-9.0000	-9.0000	-9.0000	1.0498	-9.0000	0	0	0	0	1	0	0	0	1	.
312	1.00000	0	2	0	1.8750	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-1.0000	0	0	0	0	0	0	0	0	0	.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

exctotal.' 't Mon Oct 2 13:42:58 1995 17

This is the data 13:42 Monday, October 2, 1995 10

OBS	LAB5	LAB9	LAB10	LAB13	LAB14	LAB16	LAB26	LAB28	LAB30	LAB32	LAB34	LAB36	LAB44	LAB45	LAB46	LAB47	LAB48	LAB49	LAB50	LAB51	LAB52	LAB61
313	1.00000	1	0	0	1.8051	1.8051	-9.0000	-9.0000	-9.0000	-9.0000	3.2103	-1.0000	0	0	0	0	0	0	0	0	1	.
314	1.00000	0	0	0	1.1628	1.1628	-9.0000	-9.0000	-9.0000	-9.0000	0.3115	-1.0000	0	0	0	0	1	0	0	0	0	.
315	1.00000	0	2	1	1.8333	1.8333	-9.0000	-9.0000	-9.0000	-9.0000	4.6667	-1.0000	0	0	0	0	1	0	0	0	1	.
316	1.00000	0	2	1	2.3000	2.3000	-9.0000	9.0000	9.0000	9.0000	2.7781	-1.0000	0	0	0	0	0	0	0	0	1	.
317	1.00000	0	2	0	2.0833	-1.0000	-9.0000	9.0000	9.0000	9.0000	0.0000	-1.0000	0	0	0	0	0	0	0	1	0	.
318	1.00000	0	2	1	1.8000	1.8000	-9.0000	0.0000	9.0000	9.0000	2.2660	-1.0000	0	0	0	0	0	0	1	0	1	.
319	1.00000	0	2	0	1.9000	1.9000	-9.0000	0.0000	9.0000	9.0000	2.0904	-1.0000	0	0	0	0	0	0	0	0	1	.
320	1.00000	0	2	2	1.2000	1.2000	-9.0000	9.0000	-9.0000	9.0000	1.1111	-1.0000	0	0	0	0	0	0	0	1	1	.
321	1.00000	0	1	1	1.4444	1.4444	-9.0000	0.0000	0.1000	0.1000	1.2000	-1.0000	0	0	0	0	0	0	0	0	1	.
322	1.00000	0	2	0	1.6970	1.6970	-9.0000	-9.0000	-9.0000	-9.0000	1.5714	-1.0000	0	0	0	0	0	0	0	0	1	.
323	1.00000	0	2	0	2.0556	2.0556	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-1.0000	0	0	0	0	0	0	0	0	0	.
324	1.00000	0	2	1	1.0488	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	1.1111	-1.0000	2	1	0	1	0	0	0	0	1	.
325	0.18000	0	1	0	4.3810	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	1.9121	-1.0000	1	0	0	0	0	1	0	0	0	.
326	0.62500	0	1	0	0.9615	0.9615	-9.0000	-9.0000	-9.0000	-9.0000	-1.0000	-9.0000	0	0	0	0	0	1	0	0	1	.
327	1.00000	0	2	0	1.2500	1.2500	-9.0000	-1.0000	-1.0000	-1.0000	-1.0000	-9.0000	0	0	0	0	0	0	0	0	0	.
328	0.66667	0	2	2	2.1176	-1.0000	-9.0000	-1.0000	-1.0000	-1.0000	1.5077	-1.0000	1	1	0	0	0	0	0	0	1	.
329	1.00000	0	1	0	5.4839	5.4839	-9.0000	-9.0000	-9.0000	-9.0000	0.0000	-9.0000	1	1	0	1	0	1	0	0	1	.
330	1.00000	0	2	2	2.0000	2.0000	-9.0000	0.0357	-1.0000	-1.0000	2.5892	-1.0000	1	0	0	0	-1	0	0	0	1	.
331	1.00000	2	2	0	1.1667	1.1667	-9.0000	0.1000	-1.0000	-1.0000	1.6000	-1.0000	1	0	0	0	-1	1	0	0	1	.
332	1.00000	0	2	1	1.2500	-1.0000	-9.0000	0.0500	-1.0000	-1.0000	-1.0000	-1.0000	1	0	0	0	-1	1	0	0	1	.
333	1.00000	0	2	2	4.7262	4.7262	-9.0000	-9.0000	-9.0000	-9.0000	1.5000	-9.0000	1	1	1	0	0	0	1	0	1	.
334	1.00000	0	2	2	3.3333	3.3333	-9.0000	-1.0000	-1.0000	-1.0000	0.0000	-1.0000	0	-1	0	0	0	0	-1	0	1	.
335	1.00000	0	2	2	11.9710	11.9710	-9.0000	9.0000	9.0000	9.0000	0.0000	0.0000	0	0	-1	1	0	0	0	0	0	.
336	1.00000	2	0	0	1.4663	1.4663	-9.0000	-9.0000	-9.0000	-9.0000	1.5000	-9.0000	-1	-1	-1	1	0	0	0	0	0	.
337	1.00000	0	1	0	1.1851	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	1.3333	-1.0000	0	0	-1	1	0	0	0	0	1	.
338	1.00000	0	1	0	1.5522	1.5593	-9.0000	-9.0000	-9.0000	-9.0000	1.8000	0.0000	0	-1	-1	1	0	0	0	0	0	.
339	1.00000	0	1	0	2.0215	2.0215	-9.0000	-9.0000	-9.0000	-9.0000	1.2857	-1.0000	-1	-1	-1	1	0	0	0	0	0	.
340	1.00000	0	1	0	0.9123	0.9123	-9.0000	-9.0000	-9.0000	-9.0000	1.8000	-1.0000	-1	-1	-1	1	0	0	0	0	-1	.
341	1.00000	0	1	0	1.8593	1.8593	-9.0000	-9.0000	-9.0000	-9.0000	1.7143	-1.0000	0	-1	-1	1	0	0	0	0	1	.
342	1.00000	0	1	0	0.8950	0.8950	-9.0000	-9.0000	-9.0000	-9.0000	0.9000	-1.0000	0	-1	-1	1	0	0	0	0	1	.
343	1.00000	0	1	1	1.4036	1.4036	-9.0000	-9.0000	-9.0000	-9.0000	2.0000	-1.0000	0	0	1	-1	0	0	0	0	1	.
344	1.00000	0	2	0	1.1884	1.1884	-9.0000	-9.0000	-9.0000	-9.0000	0.6000	-1.0000	0	0	-1	1	0	0	0	0	0	.
345	1.00000	0	2	0	0.8026	0.8026	-9.0000	-9.0000	-9.0000	-9.0000	0.1000	-1.0000	0	0	-1	1	0	0	0	0	1	.
346	1.00000	0	2	0	2.8803	-1.0000	-9.0000	-9.0000	-9.0000	-9.0000	2.4000	-1.0000	0	0	-1	1	0	0	0	0	1	.
347	1.00000	0	2	0	1.2369	0.0000	-9.0000	-1.0000	-1.0000	-1.0000	0.9583	-1.0000	0	0	-1	1	0	0	0	0	1	.
348	0.70000	0	2	0	0.8713	0.8713	-9.0000	-1.0000	-1.0000	-1.0000	0.7500	-1.0000	0	0	-1	1	0	0	0	0	1	.
349	1.00000	0	2	0	0.8708	0.8708	-9.0000	-1.0000	-1.0000	-1.0000	1.2778	-1.0000	0	0	-1	1	0	0	0	0	1	.
350	1.00000	0	2	0	0.9167	-1.0000	-9.0000	0.1000	-1.0000	-1.0000	1.0000	-1.0000	0	0	0	0	0	1	0	0	1	.
351	1.00000	0	2	0	0.8889	-1.0000	-9.0000	9.0000	-1.0000	-1.0000	1.0000	-1.0000	0	0	0	0	0	1	0	0	1	.
352	1.00000	0	2	1	1.6667	0.0000	-9.0000	9.0000	9.0000	9.0000	1.7500	-1.0000	0	0	0	1	0	0	0	0	1	.
353	1.00000	0	2	2	1.6608	1.6608	-9.0000	9.0000	-9.0000	9.0000	1.0741	-1.0000	0	0	0	1	0	0	0	0	1	.
354	1.00000	0	2	2	1.8922	1.8922	-9.0000	9.0000	-9.0000	9.0000	0.6042	-1.0000	0	0	0	1	0	0	0	0	1	.
355	1.00000	0	2	2	2.8750	2.8750	-9.0000	9.0000	-9.0000	9.0000	0.0000	-1.0000	0	0	0	1	0	0	0	0	1	.
356	1.00000	0	2	2	7.9292	7.9292	-9.0000	9.0000	9.0000	-9.0000	9.0000	-1.0000	0	0	0	1	0	1	0	0	1	.
357	1.00000	0	2	2	4.2748	4.2748	-9.0000	9.0000	-9.0000	9.0000	1.9333	-1.0000	0	0	0	1	0	0	0	0	1	.
358	1.00000	0	2	1	2.0138	2.0138	-9.0000	-9.0000	-9.0000	-9.0000	0.5833	-1.0000	0	0	-1	1	0	0	0	0	1	.
359	1.00000	1	2	0	1.8125	-1.0000	-9.0000	0.0000	-1.0000	-1.0000	1.8919	-1.0000	0	0	0	2	0	1	0	0	1	.
360	1.00000	0	2	0	11.4286	11.4286	-9.0000	-1.0000	-1.0000	-1.0000	3.2727	-1.0000	0	0	0	2	0	1	0	0	1	.
361	1.00000	0	2	0	9.5668	9.5668	-9.0000	-1.0000	-1.0000	-1.0000	6.0000	-1.0000	0	0	0	2	0	1	0	0	1	.
362	1.00000	0	2	2	1.3235	-1.0000	-9.0000	0.0000	9.0000	0.0000	1.3333	-1.0000	0	0	0	2	0	1	1	1	1	.
363	1.00000	0	2	0	1.5000	-1.0000	-9.0000	-1.0000	-1.0000	-1.0000	-1.0000	-1.0000	0	0	0	2	0	1	0	1	1	.
364	1.00000	1	2	0	4.0000	-1.0000	-9.0000	9.0000	9.0000	-9.0000	3.0100	0.0000	0	0	-1	1	0	0	0	0	1	.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

OBS	LAB5	LAB9	LAB10	LAB13	LAB14	LAB16	LAB26	LAB28	LAB30	LAB32	LAB34	LAB36	LAB44	LAB45	LAB46	LAB47	LAB48	LAB49	LAB50	LAB51	LAB52	LAB61
365	1.00000	2	2	1	6.3196	6.3196	-9.0000	-9.0000	-9.0000	-9.0000	7.6000	-1.0000	0	0	-1	1	0	0	0	0	1	.
366	1.00000	0	2	1	1.5789	1.5789	-9.0000	0.0000	9.0000	0.1000	0.0000	0.0000	0	0	-1	1	0	0	0	0	1	.
367	1.00000	0	2	0	2.0000	-1.0000	-9.0000	9.0000	9.0000	-9.0000	0.9505	-1.0000	0	0	-1	1	0	0	0	0	1	.
368	1.00000	0	2	0	12.3936	12.3936	-9.0000	9.0000	9.0000	-9.0000	0.2400	-1.0000	0	0	-1	1	0	0	0	0	1	.
369	1.00000	0	2	2	6.5741	6.5741	-9.0000	9.0000	9.0000	-9.0000	2.1250	-1.0000	0	0	-1	1	0	0	0	0	1	.
370	1.00000	0	2	2	3.0568	3.0568	-9.0000	9.0000	9.0000	-9.0000	4.8000	-1.0000	0	0	-1	1	0	0	0	0	1	.
371	1.00000	0	2	2	13.7761	13.7761	-9.0000	9.0000	9.0000	-9.0000	3.4286	-1.0000	0	0	-1	1	0	0	0	0	1	.
372	1.00000	0	2	0	1.8000	1.8000	-9.0000	0.0000	9.0000	9.0000	0.8136	-1.0000	0	0	-1	1	0	0	0	0	1	.
373	1.00000	0	2	0	1.6667	1.6667	-9.0000	-1.0000	-1.0000	-1.0000	-1.0000	-1.0000	0	0	-1	2	0	0	0	0	1	.
374	1.00000	0	2	0	1.6444	1.6444	-9.0000	9.0000	9.0000	-9.0000	1.0286	-1.0000	0	0	-1	2	0	0	0	0	1	.
375	1.00000	0	2	0	2.8578	2.8578	-9.0000	9.0000	9.0000	-9.0000	2.0000	-1.0000	0	0	-1	2	0	0	0	0	1	.
376	1.00000	0	2	0	2.7655	2.7655	-9.0000	9.0000	9.0000	-9.0000	1.8000	-1.0000	0	0	-1	2	0	0	0	0	1	.
377	1.00000	0	2	0	2.1109	0.0000	-9.0000	9.0000	9.0000	-9.0000	1.0909	-1.0000	0	0	-1	2	0	0	0	0	1	.
378	1.00000	0	2	0	1.5058	1.5058	-9.0000	9.0000	9.0000	-9.0000	0.8889	-1.0000	0	0	-1	2	0	0	0	0	1	.
379	1.00000	0	2	0	1.6335	1.6335	-9.0000	-9.0000	-9.0000	-9.0000	1.4545	-1.0000	0	0	-1	2	0	0	0	0	1	.
380	1.00000	0	2	0	1.1510	1.1510	-9.0000	-9.0000	-9.0000	-9.0000	1.0323	-1.0000	0	0	-1	2	0	0	0	0	1	.
381	1.00000	2	1	0	1.5784	1.5784	-9.0000	-1.0000	-1.0000	-1.0000	-1.0000	-1.0000	0	0	-1	2	0	0	0	0	1	.
382	1.00000	2	1	0	4.0878	4.0878	-9.0000	-9.0000	-9.0000	-9.0000	-9.0000	-9.0000	0	0	-1	2	0	1	0	0	1	.
383	1.00000	2	1	0	1.2018	1.2018	-9.0000	-9.0000	-9.0000	-9.0000	9.0000	-1.0000	0	0	-1	2	0	1	0	0	1	.
384	1.00000	0	2	0	1.0714	-1.0000	-9.0000	-1.0000	-9.0000	-9.0000	1.0649	-1.0000	0	0	0	0	0	0	-1	0	0	.
385	1.00000	0	2	2	2.8038	2.8038	-9.0000	-9.0000	-9.0000	-9.0000	2.5600	20.0000	1	1	1	1	0	0	0	0	1	.
386	1.00000	1	1	0	1.0333	1.0333	-9.0000	1.1444	-1.0000	-1.0000	0.9688	0.0000	0	0	0	0	-1	0	0	0	1	.
387	1.00000	0	2	2	2.0953	2.0953	-9.0000	1.7487	2.3333	1.6937	1.5338	3.7135	0	0	0	0	1	0	1	0	1	.
388	1.00000	0	2	2	2.0953	2.0953	-9.0000	1.7487	2.3333	1.6937	1.5338	-1.0000	0	0	0	0	1	0	1	0	1	.
389	1.00000	0	2	0	2.1111	2.1111	-9.0000	1.5851	9.0000	1.8665	0.0000	-1.0000	0	0	0	0	1	0	0	0	1	.
390	1.00000	0	2	0	2.1753	2.1753	-9.0000	2.2581	-1.0000	-1.0000	0.0000	-1.0000	0	0	0	0	1	1	0	0	1	.
391	0.37500	0	0	-2	2.4734	2.4734	-9.0000	0.5200	0.1000	9.0000	0.0000	-9.0000	0	0	1	0	0	0	-1	0	-1	.
392	1.00000	0	0	2	0.4678	0.4678	-9.0000	1.3733	9.0000	1.2800	0.5000	0.0000	0	0	1	0	0	0	-1	0	1	.
393	1.00000	0	2	0	4.8196	4.8196	-9.0000	18.8000	9.0000	14.4000	2.9412	0.0000	0	0	0	1	1	1	0	0	1	.
394	1.00000	2	0	1	3.0393	3.0393	-9.0000	0.0000	-9.0000	0.1000	2.4643	1.1391	-1	0	-1	0	0	0	0	0	1	.
395	1.00000	2	0	1	3.0393	3.0393	-9.0000	0.0000	-9.0000	0.1000	3.0000	1.1391	-1	0	-1	0	0	0	0	0	1	.
396	1.00000	2	0	1	1.4836	1.4836	-9.0000	1.3590	9.0000	1.1410	0.9111	2.5714	-1	0	-1	0	0	0	0	0	1	.
397	1.00000	0	0	0	1.3117	1.3117	-9.0000	2.9667	-9.0000	2.9667	0.7397	0.2078	1	0	1	0	0	0	0	0	0	.
398	1.00000	0	0	0	1.1613	1.1613	-9.0000	3.6000	-9.0000	3.6000	1.1233	2.8000	1	0	1	0	0	0	0	0	0	.
399	1.00000	0	0	0	1.1609	1.1609	-9.0000	0.9245	0.1000	1.1011	0.9464	0.1412	1	0	0	1	0	0	0	0	0	.
400	1.00000	0	3	0	2.1058	2.1058	-9.0000	1.6724	9.0000	1.6034	1.9000	3.0323	-1	0	-1	0	0	1	0	0	1	.
401	1.00000	0	3	0	2.3241	2.3241	-9.0000	1.7966	9.0000	1.5085	1.3250	15.6000	-1	0	-1	0	0	1	0	0	1	.
402	1.00000	0	1	0	0.7033	0.7033	-9.0000	1.1250	0.1000	1.1739	1.0789	0.9394	1	0	1	0	0	0	0	0	0	.
403	1.00000	0	1	0	1.8043	1.8043	-9.0000	4.0513	9.0000	3.9744	1.5111	-9.0000	0	0	0	0	0	0	0	0	1	.
404	1.00000	0	3	0	2.8298	2.8298	-9.0000	2.5238	9.0000	2.1190	2.0392	0.2963	0	0	0	0	0	0	0	0	1	.
405	1.00000	0	1	0	2.1071	2.1071	-9.0000	3.3182	9.0000	3.2727	2.7119	9.0000	0	0	0	0	0	0	0	0	1	.
406	1.00000	0	1	0	2.1776	2.1776	-9.0000	1.3077	-9.0000	1.3077	4.4222	9.0000	0	0	0	0	0	0	0	0	1	.
407	1.00000	0	3	0	3.3046	3.3046	-9.0000	2.4091	9.0000	2.0227	2.0698	0.1000	0	0	0	0	0	0	0	0	1	.
408	1.00000	0	1	1	2.5484	2.5484	-9.0000	4.8182	9.0000	4.0455	1.9153	3.3000	0	0	0	0	0	0	0	0	1	.
409	1.00000	0	3	0	3.3063	3.3063	-9.0000	1.9273	9.0000	0.0000	1.9804	0.4655	0	0	0	0	0	0	0	0	1	.
410	1.00000	0	1	0	1.7941	1.7941	-9.0000	3.9500	9.0000	3.8750	1.5111	-9.0000	0	0	0	0	0	0	0	0	1	.
411	1.00000	0	1	0	2.2655	2.2655	-9.0000	3.3182	9.0000	3.2727	2.2857	9.0000	-1	0	-1	0	-1	0	0	0	0	.
412	1.00000	0	1	0	2.1531	2.1531	-9.0000	1.3077	-9.0000	1.3077	3.7333	8.6667	-1	0	-1	0	0	0	0	0	0	.
413	1.00000	0	1	0	1.7310	1.7310	-9.0000	4.0513	9.0000	3.9744	1.5111	-9.0000	-1	0	-1	0	0	0	0	0	0	.
414	1.00000	0	1	0	2.6689	2.6689	-9.0000	3.5333	9.0000	2.9667	2.2439	1.7292	-1	0	-1	0	0	0	0	0	0	.
415	1.00000	0	2	0	2.8908	2.8908	-9.0000	1.1842	9.0000	1.1579	3.9024	6.4286	-1	0	-1	0	0	0	0	0	0	.
416	1.00000	0	2	0	2.5282	2.5282	-9.0000	1.9630	9.0000	1.6481	2.2000	4.9583	-1	0	-1	0	0	0	0	0	0	.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

This is the data

OBS	LAB5	LAB9	LAB10	LAB13	LAB14	LAB16	LAB26	LAB28	LAB30	LAB32	LAB34	LAB36	LAB44	LAB45	LAB46	LAB47	LAB48	LAB49	LAB50	LAB51	LAB52	LAB61
417	1.00000	0	2	0	2.6506	2.6506	-9.0000	1.9630	9.0000	1.6481	2.2000	0.1233	-1	0	-1	0	-1	0	0	0	0	.
418	1.00000	2	0	0	1.5273	1.5273	-9.0000	9.0000	-9.0000	9.0000	0.3661	0.7917	1	0	1	0	0	0	0	0	1	.
419	1.00000	0	2	0	2.0587	2.0587	-9.0000	2.5238	9.0000	2.1190	2.0000	2.2759	-1	0	-1	0	-1	0	0	0	0	.
420	1.00000	0	2	0	2.3412	2.3412	-9.0000	4.2500	-9.0000	4.2500	3.5135	9.0000	-1	0	-1	0	0	0	0	0	0	.
421	1.00000	0	2	0	6.3090	6.3090	-9.0000	0.1000	-9.0000	0.1000	4.1176	9.0000	-1	0	-1	0	0	0	0	0	0	.
422	1.00000	0	2	0	1.6883	1.6883	-9.0000	0.1000	-9.0000	0.1000	4.4706	9.0000	-1	0	-1	0	0	0	0	0	0	.
423	1.00000	0	0	1	2.8667	2.8667	-9.0000	1.5435	-9.0000	1.5435	3.6667	0.1000	-1	0	-1	0	0	0	0	0	1	.
424	1.00000	0	0	0	0.8521	0.8521	-9.0000	1.2958	-9.0000	1.2958	0.5372	1.5152	0	0	0	0	0	0	0	0	1	.
425	1.00000	0	1	0	1.1767	1.1767	-9.0000	0.7717	-9.0000	0.7717	1.9675	0.5333	-1	0	-1	0	0	0	0	0	1	.
426	1.00000	0	1	0	2.6468	2.6468	-9.0000	3.0571	-9.0000	3.0571	1.8197	1.2045	1	0	1	0	0	0	0	0	1	.
427	1.00000	0	1	0	5.8671	5.8671	-9.0000	0.7698	-9.0000	0.7698	2.6951	2.5716	1	0	1	0	0	0	0	0	1	.
428	1.00000	0	1	0	1.4836	1.4836	-9.0000	9.0000	-9.0000	9.0000	0.7632	1.2857	0	0	0	0	0	0	0	0	1	.
429	1.00000	0	1	0	1.5521	1.5521	-9.0000	1.1300	-9.0000	1.1300	0.9867	-9.0000	0	0	0	0	0	0	0	0	1	.
430	1.00000	2	2	0	1.8935	1.8935	-9.0000	2.5000	-9.0000	2.5000	1.5196	9.0000	1	0	1	0	0	0	0	0	1	.
431	1.00000	1	2	2	2.0479	2.0479	-9.0000	1.8962	0.1000	2.2584	1.7228	0.2638	0	0	0	0	0	1	0	0	1	.
432	1.00000	1	2	2	2.2004	2.2004	-9.0000	0.4068	-9.0000	0.4068	0.9027	0.7759	1	0	1	0	0	1	0	0	1	.
433	1.00000	0	2	0	0.7973	0.7973	-9.0000	0.4245	0.1000	0.5056	0.8770	0.9551	-1	0	0	0	0	0	0	0	0	.
434	1.00000	0	2	1	2.0218	2.0218	-9.0000	7.3235	-9.0000	5.8235	1.3008	9.0000	0	0	0	0	0	0	0	0	1	.
435	1.00000	0	2	1	2.2073	2.2073	-9.0000	5.0952	9.0000	4.2857	2.1053	9.0000	0	0	0	0	0	0	0	0	1	.
436	1.00000	0	2	0	2.1944	2.1944	-9.0000	5.9048	9.0000	4.2857	2.1096	9.0000	0	0	0	0	0	1	0	0	1	.
437	1.00000	0	3	0	2.2286	2.7518	-9.0000	6.2250	9.0000	4.9500	1.2969	9.0000	0	0	0	0	0	1	0	0	1	.
438	1.00000	0	3	0	3.0405	3.0405	-9.0000	7.5000	9.0000	5.2333	2.7416	-9.0000	0	0	0	0	0	1	0	0	1	.
439	1.00000	0	0	0	2.8698	2.8698	-9.0000	5.6522	9.0000	4.1739	3.3000	9.0000	0	0	0	0	0	1	0	0	1	.
440	1.00000	0	3	0	2.6923	2.6923	-9.0000	4.0000	9.0000	2.9231	3.1500	0.2500	1	0	0	0	0	1	0	0	1	.
441	1.00000	0	0	0	2.7101	2.7101	-9.0000	5.0385	9.0000	3.7308	3.7000	9.0000	1	0	0	0	0	1	0	0	1	.
442	1.00000	0	2	0	1.3800	1.3800	-9.0000	9.0000	-9.0000	9.0000	1.0870	9.0000	0	0	0	0	0	0	0	0	0	.
443	1.00000	0	2	0	1.5263	1.5263	-9.0000	1.8947	-9.0000	1.8947	1.0417	9.0000	0	0	0	0	0	0	0	0	1	.
444	1.00000	0	2	2	1.7459	1.7459	-9.0000	4.7640	9.0000	3.0562	1.4206	9.0000	0	0	0	0	0	0	0	0	1	.
445	1.00000	0	2	2	1.6743	1.6743	-9.0000	2.1633	9.0000	1.8163	2.3647	9.0000	0	0	0	0	0	0	0	0	1	.
446	1.00000	0	4	0	2.5765	2.5765	-9.0000	2.1154	9.0000	1.7885	1.5682	9.0000	0	0	0	0	0	0	0	0	1	.
447	1.00000	0	2	-1	1.6779	1.6779	-9.0000	7.1077	9.0000	4.6769	1.4375	9.0000	-1	-1	0	0	0	1	-1	0	1	.
448	1.00000	0	2	0	1.7981	1.7981	-9.0000	5.3684	9.0000	4.6842	0.9151	-9.0000	-1	0	0	0	0	0	0	0	1	.
449	1.00000	0	2	0	1.3124	1.3124	-9.0000	1.4366	9.0000	1.2535	0.7949	-9.0000	-1	0	0	0	0	0	0	0	1	.
450	1.00000	0	2	0	2.0312	2.0217	-9.0000	9.0000	-9.0000	9.0000	1.6250	-9.0000	0	0	0	0	0	0	0	0	1	.
451	1.00000	0	2	0	1.8803	1.8803	-9.0000	2.8100	9.0000	2.0400	1.2479	3.1818	0	0	0	0	0	0	0	0	1	.
452	1.00000	0	2	0	2.8324	2.8324	-9.0000	0.0000	0.0000	0.1000	1.5410	33.7273	-1	0	-1	0	0	0	0	0	1	.
453	1.00000	0	1	0	1.7400	1.7400	-9.0000	3.5333	9.0000	2.9667	1.0268	66.0000	0	0	0	0	0	1	0	0	1	.
454	1.00000	0	2	0	1.2259	1.2259	-9.0000	4.4571	9.0000	3.9714	0.5990	19.0000	-1	0	-1	0	0	0	0	0	1	.
455	1.00000	1	0	0	2.6315	2.6315	-9.0000	4.0645	9.0000	3.8387	1.3273	9.0000	0	0	0	0	0	1	0	0	1	.
456	1.00000	0	2	0	3.5017	3.5017	-9.0000	9.0000	-9.0000	9.0000	1.6000	9.0000	-1	0	-1	0	0	0	0	0	1	.
457	1.00000	0	2	0	4.2489	4.2489	-9.0000	9.0000	9.0000	9.0000	5.0000	9.0000	0	0	0	0	0	0	0	0	0	.
458	1.00000	0	2	0	2.4304	2.4304	-9.0000	4.6522	9.0000	3.9130	1.4286	11.0000	0	0	0	0	1	0	0	0	1	.
459	1.00000	0	2	1	1.3254	1.3254	-9.0000	2.5928	9.0000	2.2045	2.4658	0.0000	0	0	0	0	1	0	-1	0	0	.
460	1.00000	0	2	0	4.1042	4.1042	-9.0000	10.4839	9.0000	7.6452	2.4906	9.0000	0	0	0	0	1	0	0	0	1	.
461	1.00000	0	0	2	0.9214	1.8625	-9.0000	0.3529	0.1000	0.5405	1.1354	0.1000	0	0	0	0	-1	0	0	0	1	.
462	1.00000	0	0	0	1.8794	1.8794	-9.0000	21.1333	9.0000	15.9333	1.9211	-9.0000	0	0	0	1	1	1	0	0	1	.
463	1.00000	0	1	0	2.8720	2.8720	-9.0000	19.8750	19.7500	19.9167	4.5625	9.0000	0	0	0	1	1	1	0	0	1	.
464	1.00000	0	1	0	2.7079	2.7079	-9.0000	12.4211	9.0000	8.8158	3.7000	9.0000	0	0	0	1	1	1	0	0	1	.
465	1.00000	0	3	0	1.4369	1.4369	-9.0000	3.6563	9.0000	2.6938	2.0968	9.0000	0	0	0	0	0	0	0	0	0	.
466	1.00000	0	2	0	1.5360	1.5360	-9.0000	5.3636	9.0000	3.8068	1.1935	9.0000	0	0	0	0	0	0	0	0	0	.
467	1.00000	0	0	0	1.5625	0.0000	-9.0000	1.0328	0.1000	1.4483	0.2500	0.1000	0	-1	0	0	0	0	0	0	-1	.
468	1.00000	0	2	0	1.6444	2.3372	-9.0000	4.9524	9.0000	0.0000	2.0172	0.0000	0	0	0	0	0	0	0	0	1	.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

exctotal.' ˜ Mon Oct 2 13:42:58 1995 23

This is the data 13:42 Monday, October 2, 1995 13

OBS	LAB5	LAB9	LAB10	LAB13	LAB14	LAB16	LAB26	LAB28	LAB30	LAB32	LAB34	LAB36	LAB44	LAB45	LAB46	LAB47	LAB48	LAB49	LAB50	LAB51	LAB52	LAB61
469	1.00000	0	2	0	1.0120	-1.0000	-9.0000	1.3788	9.0000	1.1212	1.5140	-1.0000	0	0	0	0	-1	0	0	0	0	.
470	1.00000	1	2	1	4.2218	4.2218	-9.0000	10.7606	0.0000	0.0000	5.4848	9.0000	0	0	0	2	1	1	0	0	1	.
471	1.00000	0	2	0	3.8969	3.8969	-9.0000	16.3000	9.0000	12.4000	1.5724	9.0000	0	0	0	0	1	1	0	0	0	.
472	1.00000	1	1	0	3.4257	3.4257	-9.0000	12.6250	9.0000	9.5625	1.3396	-9.0000	0	0	0	0	1	0	0	0	1	.
473	1.00000	1	2	0	3.2553	3.2553	-9.0000	8.3175	9.0000	5.7619	3.0473	-9.0000	0	0	0	0	1	1	0	0	1	.
474	1.00000	1	1	0	1.5874	1.5874	-9.0000	7.1875	9.0000	5.3750	1.9506	-9.0000	0	0	0	0	0	1	0	0	1	.
475	1.00000	1	1	0	2.7454	2.7454	-9.0000	9.7273	9.0000	7.3030	2.5072	9.0000	0	0	0	0	0	1	0	0	1	.
476	1.00000	0	0	0	1.4788	1.4788	-9.0000	3.5333	9.0000	2.5333	0.7969	-9.0000	0	0	0	0	0	0	0	0	0	.
477	1.00000	0	1	0	2.2676	2.2676	-9.0000	5.8611	9.0000	4.2222	2.2299	-9.0000	0	0	0	0	0	0	0	0	1	.
478	1.00000	1	1	0	2.4180	2.4180	-9.0000	6.9070	9.0000	3.5349	1.2840	-9.0000	0	0	0	0	0	0	0	0	1	.
479	1.00000	1	1	0	2.9330	2.9330	-9.0000	8.3200	9.0000	5.9733	1.1908	-9.0000	0	0	0	0	0	0	0	0	1	.
480	1.00000	0	1	0	3.2715	3.2715	-9.0000	10.3044	9.0000	7.4783	1.0000	-9.0000	0	0	0	0	0	1	0	0	1	.
481	1.00000	0	3	0	2.8563	2.8563	-9.0000	14.8571	9.0000	10.6667	2.9275	9.0000	0	0	0	0	0	1	0	0	1	.
482	1.00000	0	2	0	3.0182	3.0182	-9.0000	11.7222	9.0000	8.4444	1.0505	-9.0000	0	0	0	0	0	1	0	0	0	.
483	1.00000	0	0	2	1.1582	-1.0000	-9.0000	0.1000	0.1000	0.2000	1.1333	-9.0000	0	0	0	0	0	0	0	0	1	.
484	1.00000	1	0	0	4.3509	-1.0000	-9.0000	1.6513	0.1000	2.2411	0.8704	-9.0000	0	0	0	0	0	0	0	0	1	.
485	1.00000	1	0	0	7.5640	-1.0000	-9.0000	2.3618	0.1000	3.4190	17.3889	-9.0000	0	0	0	0	0	0	0	0	1	.
486	1.00000	0	1	2	0.8000	0.8000	-9.0000	3.0000	2.9032	3.3333	1.0521	13.3333	1	1	1	1	0	1	0	0	1	.
487	1.00000	2	0	1	0.5833	0.5833	-9.0000	9.0000	9.0000	9.0000	0.9286	9.0000	1	1	2	1	0	1	0	0	1	.
488	1.00000	0	1	3	0.8800	0.8800	-9.0000	0.8979	0.5119	1.2731	1.1296	2.6667	2	2	2	2	2	1	2	2	2	.
489	1.00000	1	1	0	0.8017	0.8017	-9.0000	1.8947	-1.0000	-1.0000	0.8604	-1.0000	2	2	2	0	2	1	2	2	2	.
490	1.00000	1	0	2	1.2049	1.2049	-9.0000	0.7847	-1.0000	-1.0000	1.6780	-1.0000	0	0	-1	2	2	0	2	0	1	.
491	1.00000	1	1	1	4.5019	4.5019	-9.0000	2.0891	-1.0000	-1.0000	2.3934	-1.0000	-1	-1	-1	0	0	0	0	0	0	.
492	1.00000	0	2	0	4.0000	4.0000	-9.0000	15.8000	9.0000	11.3000	6.4451	2.5000	0	1	1	2	1	0	0	0	2	.
493	1.00000	0	2	0	1.3778	1.3778	-9.0000	5.8182	-1.0000	-1.0000	0.3475	-1.0000	1	1	0	0	0	0	-1	0	1	.
494	1.00000	0	1	0	1.8667	1.8667	-9.0000	5.6000	-1.0000	-1.0000	0.2222	1.0753	1	0	0	0	0	0	-1	0	1	.
495	1.00000	1	1	0	0.4027	-1.0000	-9.0000	0.6222	-1.0000	-1.0000	0.2344	-1.0000	1	1	1	0	-1	0	-1	0	1	.
496	1.00000	1	1	0	0.4341	-1.0000	-9.0000	0.6613	-1.0000	-1.0000	0.2168	-1.0000	1	1	1	-1	-1	0	-1	0	0	.
497	1.00000	0	0	0	0.9478	0.9478	-9.0000	1.2871	-1.0000	-1.0000	3.2936	-1.0000	-1	0	-1	1	1	0	1	0	0	.
498	1.00000	1	1	0	3.5021	3.5021	-9.0000	3.8217	-1.0000	-1.0000	3.8875	-1.0000	-2	1	0	2	2	1	2	0	2	.
499	1.00000	0	2	0	4.6667	4.6667	-9.0000	5.8200	9.0000	0.0000	12.2105	-1.0000	-1	0	-1	1	1	1	1	0	1	.
500	1.00000	0	2	0	2.4987	2.4987	-9.0000	2.5933	-1.0000	-1.0000	2.6538	-1.0000	-1	0	-1	-1	1	1	1	0	0	.
501	1.00000	1	1	0	3.0172	3.0172	-9.0000	1.9694	-1.0000	-1.0000	3.2005	0.0000	-1	0	0	1	1	1	1	0	0	.
502	1.00000	0	2	0	3.0498	3.0498	-9.0000	9.0000	-9.0000	9.0000	4.5682	-1.0000	2	0	0	2	2	1	2	0	1	.
503	1.00000	0	2	0	5.5223	5.5223	-9.0000	9.8000	-1.0000	-1.0000	3.7048	-1.0000	2	2	2	2	2	1	2	0	2	.
504	1.00000	0	0	0	1.8941	1.8941	-9.0000	13.0667	-1.0000	-1.0000	2.6220	-1.0000	0	0	0	1	0	1	0	0	1	.
505	1.00000	0	1	1	1.3333	0.0000	-9.0000	2.1989	-1.0000	-1.0000	2.3469	0.0000	0	-1	0	2	2	1	2	0	2	.
506	1.00000	1	1	0	11.8182	11.8182	-9.0000	9.0000	9.0000	0.0000	16.5909	0.0000	0	0	0	1	0	1	0	0	1	.
507	1.00000	0	1	0	2.9845	2.9845	-9.0000	0.5340	-1.0000	-1.0000	6.9709	0.0000	0	0	0	1	0	1	0	0	1	.
508	1.00000	0	1	0	2.4902	2.4902	-9.0000	0.0000	0.1000	0.0000	2.6282	-1.0000	0	0	0	1	0	1	0	0	1	.
509	1.00000	0	1	0	2.7422	2.7422	-9.0000	1.4167	-1.0000	-1.0000	1.9744	-1.0000	0	0	0	1	0	1	0	0	1	.
510	1.00000	0	1	1	1.5625	1.5625	-9.0000	3.5700	-1.0000	-1.0000	1.9679	-1.0000	2	2	2	2	2	1	2	2	2	.
511	1.00000	0	1	0	3.9286	3.9286	-9.0000	3.5250	-1.0000	-1.0000	5.8984	-1.0000	2	2	2	2	2	1	2	2	2	.
512	1.00000	0	2	0	1.5641	1.5641	-9.0000	2.9071	-1.0000	-1.0000	2.7073	-1.0000	2	0	2	2	2	1	0	2	2	.
513	1.00000	0	2	0	3.4839	3.4839	-9.0000	6.0833	-1.0000	-1.0000	5.3846	-1.0000	0	0	0	1	0	1	0	0	0	.
514	1.00000	0	2	0	3.1064	3.1064	-9.0000	5.9375	-1.0000	-1.0000	4.9286	-1.0000	0	0	0	1	0	1	0	0	1	.
515	1.00000	0	2	0	3.6658	3.5148	-9.0000	15.6000	-1.0000	-1.0000	8.9615	5.3333	2	2	2	2	2	1	0	2	2	.
516	1.00000	0	2	1	1.9600	1.9600	-9.0000	7.3333	0.0000	0.0000	3.0582	6.6667	1	0	0	1	0	0	1	1	1	.
517	1.00000	0	2	0	1.8610	1.0339	-9.0000	3.2857	0.1000	9.0000	5.2453	0.0000	0	0	0	0	1	1	0	0	1	.
518	1.00000	0	2	0	1.8533	1.8533	-9.0000	3.6000	0.1000	4.8000	8.0339	30.0000	0	0	0	0	1	1	0	0	1	.
519	1.00000	0	2	0	2.0000	2.0000	-9.0000	9.0000	-9.0000	9.0000	11.0000	4.0000	0	0	0	0	1	1	0	0	1	.
520	1.00000	0	2	0	11.9181	11.9181	-9.0000	3.6000	0.1000	4.8000	6.7000	9.0000	1	0	0	0	1	1	0	0	0	.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

OBS	LAB5	LAB9	LAB10	LAB13	LAB14	LAB16	LAB26	LAB28	LAB30	LAB32	LAB34	LAB36	LAB44	LAB45	LAB46	LAB47	LAB48	LAB49	LAB50	LAB51	LAB52	LAB61
521	1.00000	0	3	0	16.3486	16.3486	-9.0000	9.0000	9.0000	9.0000	9.0000	9.0000	1	0	1	1	0	0	0	0	1	.
522	1.00000	0	2	0	6.3441	6.3441	-9.0000	9.0000	9.0000	9.0000	5.4063	9.0000	0	0	0	0	0	0	0	0	0	.
523	1.00000	0	2	0	3.8282	3.8282	-9.0000	9.0000	9.0000	9.0000	6.9063	9.0000	0	0	0	0	0	0	0	0	0	.
524	1.00000	0	2	0	6.2658	6.2658	-9.0000	9.0000	9.0000	9.0000	5.8158	9.0000	0	0	0	1	0	0	0	0	0	.
525	1.00000	0	2	0	2.9188	2.9188	-9.0000	9.0000	9.0000	9.0000	5.0750	9.0000	0	0	0	0	0	0	-1	0	0	.
526	1.00000	0	2	0	3.5524	3.5524	-9.0000	9.0000	9.0000	9.0000	5.6500	9.0000	0	0	0	0	0	0	0	0	0	.
527	1.00000	0	2	0	3.8923	3.8923	-9.0000	9.0000	9.0000	9.0000	8.2250	9.0000	0	0	0	0	0	-1	0	0	0	.
528	1.00000	0	0	0	0.4463	0.4463	-9.0000	0.1000	0.1000	0.1000	0.3030	0.0000	0	0	0	0	0	0	0	-1	1	.
529	1.00000	0	2	0	2.9395	2.9395	-9.0000	9.0000	9.0000	9.0000	6.9667	9.0000	0	0	0	0	0	0	0	0	0	.
530	1.00000	0	1	3	4.8062	4.8062	-9.0000	-9.0000	-9.0000	-9.0000	25.0000	9.0000	0	0	0	1	0	0	0	0	0	.
531	1.00000	0	0	2	0.2535	0.2535	-9.0000	-9.0000	-9.0000	-9.0000	0.0510	0.1000	0	0	0	0	0	0	0	-1	0	.
532	1.00000	1	2	0	5.2800	5.2800	-9.0000	-9.0000	-9.0000	-9.0000	7.1250	-9.0000	0	0	0	1	0	0	0	0	0	.
533	1.00000	1	2	0	5.8481	5.8481	-9.0000	9.0000	9.0000	9.0000	50.0000	9.0000	1	0	0	1	0	0	0	0	0	.
534	1.00000	0	2	0	4.5974	4.5974	-9.0000	9.0000	9.0000	9.0000	10.7500	9.0000	1	0	0	1	0	0	0	0	0	.
535	1.00000	0	2	0	6.4008	6.4008	-9.0000	9.0000	9.0000	9.0000	15.0000	9.0000	1	0	0	1	0	0	0	0	1	.
536	1.00000	0	2	0	2.0948	2.0948	-9.0000	9.0000	9.0000	9.0000	8.8333	-9.0000	1	0	0	1	0	0	0	0	1	.
537	1.00000	0	2	0	7.9040	7.9040	-9.0000	9.0000	9.0000	9.0000	23.5000	9.0000	1	0	0	1	0	0	0	0	1	.
538	1.00000	0	3	0	9.5610	9.5610	-9.0000	9.0000	9.0000	9.0000	9.0000	9.0000	1	0	1	0	0	0	0	0	1	.
539	1.00000	0	2	0	6.3407	6.3407	-9.0000	9.0000	9.0000	9.0000	5.4375	9.0000	0	0	0	0	0	0	0	0	0	.
540	1.00000	0	2	0	7.0823	7.0823	-9.0000	-9.0000	-9.0000	-9.0000	7.6875	9.0000	0	0	0	0	0	0	0	0	0	.
541	1.00000	0	2	0	5.7210	5.7210	-9.0000	9.0000	9.0000	9.0000	6.7059	9.0000	0	0	0	0	0	1	0	1	1	.
542	1.00000	0	2	0	4.6397	4.6397	-9.0000	9.0000	9.0000	9.0000	5.5556	9.0000	0	0	0	0	-1	0	0	1	1	.
543	1.00000	0	2	0	3.7309	3.7309	-9.0000	9.0000	9.0000	9.0000	4.6176	9.0000	0	0	0	0	0	0	0	1	1	.
544	1.00000	0	2	0	4.4089	4.4089	-9.0000	9.0000	9.0000	9.0000	6.1765	9.0000	0	0	0	0	0	0	0	1	1	.
545	1.00000	0	2	0	4.6506	4.6506	-9.0000	9.0000	9.0000	9.0000	5.3824	9.0000	0	0	0	1	0	0	0	1	1	.
546	1.00000	2	1	0	4.6943	4.6943	-9.0000	9.0000	9.0000	9.0000	8.4286	9.0000	1	0	1	1	-1	0	0	1	1	.
547	1.00000	2	1	0	4.3906	4.3906	-9.0000	9.0000	9.0000	9.0000	15.6364	-9.0000	1	0	1	1	0	1	0	1	1	.
548	1.00000	2	1	0	5.8606	5.8606	-9.0000	9.0000	9.0000	9.0000	41.2000	9.0000	1	0	1	1	1	1	0	1	1	.
549	1.00000	0	1	2	1.7695	1.7695	-9.0000	2.5000	-9.0000	2.5000	1.8000	9.0000	1	1	1	0	0	0	0	0	0	.
550	1.00000	0	2	2	2.0356	0.0000	-9.0000	2.2750	9.0000	1.8250	2.0000	2.7500	1	1	1	0	0	0	0	0	1	.
551	0.22222	0	0	1	1.2929	-1.0000	-9.0000	1.1667	-9.0000	1.1667	2.0000	9.0000	1	1	1	0	0	0	0	0	0	.
552	0.22222	2	0	1	0.9817	0.9817	-9.0000	1.5000	-9.0000	1.5000	1.0000	9.0000	1	1	1	0	0	0	0	0	1	.
553	3.00000	1	0	1	1.2384	0.0000	-9.0000	2.1429	-9.0000	2.1429	2.0000	9.0000	1	0	1	1	0	1	0	0	1	.
554	1.00000	2	1	2	1.0010	1.0010	-9.0000	1.2183	8.0769	0.7337	1.2353	0.7451	1	1	1	0	0	0	0	0	1	.
555	1.00000	2	0	1	1.0398	0.0000	-9.0000	1.0000	3.0000	0.7500	1.0000	3.8000	1	1	1	0	0	1	0	0	1	.
556	1.00000	0	2	2	1.0450	1.0450	-9.0000	1.0526	3.0000	0.8654	0.5714	-9.0000	1	1	1	0	0	0	1	0	1	.
557	1.00000	2	1	0	0.5421	0.5421	-9.0000	1.1538	0.1000	1.2329	1.3333	9.0000	1	1	1	1	0	1	0	0	1	.
558	1.00000	1	1	0	3.6000	3.6000	-9.0000	3.0667	9.0000	2.7333	1.0000	9.0000	1	1	1	1	0	1	0	0	1	.
559	1.00000	1	1	1	0.6963	0.6963	-9.0000	0.7463	1.0000	0.7258	0.6316	3.8000	1	1	1	0	0	0	0	0	1	.
560	1.00000	1	1	0	2.9000	-1.0000	-9.0000	3.6500	0.1000	4.8667	2.0000	9.0000	1	1	1	1	0	1	0	0	1	.
561	1.00000	0	0	0	3.0345	0.0000	-9.0000	2.4889	9.0000	2.2667	2.3750	0.1000	-1	-1	-1	-1	0	0	0	0	-1	.
562	1.00000	0	3	0	0.7556	-1.0000	-9.0000	1.2791	5.6667	0.8599	1.5000	9.0000	1	1	1	1	0	1	0	0	1	.
563	1.00000	0	0	2	1.0179	1.0179	-9.0000	1.0526	0.1000	1.1538	1.0000	9.0000	1	1	1	1	0	1	0	0	1	.
564	1.00000	0	0	0	0.9722	0.0000	-9.0000	0.8571	0.1000	2.0000	-9.0000	-9.0000	-1	-1	-1	0	0	0	0	0	0	.
565	1.00000	0	2	0	0.6587	0.6587	-9.0000	0.1333	-9.0000	0.1333	0.3429	9.0000	1	1	1	1	0	0	0	0	1	.
566	1.00000	0	2	1	1.2299	1.2299	-9.0000	1.8000	-9.0000	1.8000	0.3158	-9.0000	1	1	1	1	0	0	0	0	1	.
567	1.00000	0	2	0	0.6834	0.6834	-9.0000	1.2000	9.0000	0.8000	0.2927	9.0000	1	1	1	1	0	0	0	0	1	.
568	1.00000	0	1	0	0.7385	0.7385	-9.0000	2.1333	9.0000	2.0000	0.7363	9.0000	1	0	0	0	0	0	-1	0	1	.
569	1.00000	1	1	3	6.6195	0.0000	-9.0000	1.0000	8.3333	0.2787	30.5750	1.4857	-1	-1	0	0	0	0	1	0	0	.
570	1.00000	1	1	3	7.5662	-1.0000	-9.0000	1.3654	15.0000	0.2292	34.6786	1.4857	-1	-1	0	0	0	0	1	0	0	.
571	1.00000	2	0	1	4.5650	-1.0000	-9.0000	2.4167	9.0000	2.2760	15.9750	1.4925	-2	-2	0	2	0	1	0	0	0	.
572	1.42105	2	0	1	4.1129	-1.0000	-9.0000	2.0946	1.3846	2.1630	23.1350	1.4925	-2	-2	0	2	0	1	0	0	0	.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

exctotal.ˆ ˆt Mon Oct 2 13:42:58 1995 27

This is the data 13:42 Monday, October 2, 1995 15

OBS	LAB5	LAB9	LAB10	LAB13	LAB14	LAB16	LAB26	LAB28	LAB30	LAB32	LAB34	LAB36	LAB44	LAB45	LAB46	LAB47	LAB48	LAB49	LAB50	LAB51	LAB52	LAB61
573	1.00000	0	0	0	0.3833	0.3833	-9.0000	1.0271	1.6667	0.9877	0.0689	0.6600	2	2	0	-2	0	-1	0	0	0	.
574	1.00000	2	0	0	1.8700	1.8700	-9.0000	1.4034	1.0000	1.4472	4.0625	0.6111	-1	-1	-1	0	0	0	0	0	0	.
575	1.00000	2	0	0	2.0266	2.0266	-9.0000	2.0374	1.2500	2.1396	4.6563	0.6111	-1	-1	-1	0	0	0	0	0	0	.
576	1.00000	2	0	2	0.7359	-1.0000	-9.0000	0.8843	1.0000	0.8747	0.2981	-9.0000	1	1	1	0	0	0	0	0	1	.
577	1.00000	2	0	0	0.7845	0.0000	-9.0000	1.0597	9.0000	0.9642	0.2075	1.6280	1	1	1	0	0	0	0	0	0	.
578	1.00000	2	0	0	1.0781	1.0781	-9.0000	0.7918	0.8696	0.7852	0.6050	1.9125	1	1	1	0	0	1	0	0	1	.
579	1.00000	2	0	0	0.7125	-1.0000	-9.0000	0.9431	1.1765	0.9258	0.5255	1.6667	1	0	1	0	0	0	0	0	0	.
580	1.00000	2	0	0	0.4546	-1.0000	-9.0000	0.7004	0.5000	0.7310	0.2254	1.6000	1	1	1	0	0	1	0	0	1	.
581	1.00000	0	0	0	0.6328	0.6328	-9.0000	0.7146	0.8571	0.7024	0.4500	2.0500	1	1	1	0	0	1	0	0	1	.
582	1.00000	0	0	0	0.5184	0.5184	-9.0000	0.4865	0.5556	0.4813	0.3453	2.7018	1	2	1	1	0	1	0	0	1	.
583	1.00000	2	0	0	0.6505	0.6505	-9.0000	0.8687	1.1111	0.8506	0.4317	2.7018	1	1	1	1	0	1	0	0	1	.
584	1.00000	0	4	0	0.7456	0.7456	-9.0000	0.8241	1.3333	0.7826	0.4337	2.2162	1	1	1	1	0	1	0	0	1	.
585	1.00000	0	1	2	4.8898	-1.0000	-9.0000	1.5000	0.5000	1.5870	9.5833	0.4579	-1	-1	-1	0	0	0	0	0	0	.
586	1.00000	2	2	2	3.9600	-1.0000	-9.0000	1.8846	0.5714	2.0141	8.1875	0.5236	-1	-1	-1	0	0	0	0	0	0	.
587	1.00000	2	2	2	3.9381	3.9381	-9.0000	1.9600	0.5714	2.1029	5.3750	0.5250	-1	-1	-1	0	0	0	0	0	0	.
588	0.62500	0	0	2	3.4895	-1.0000	-9.0000	1.7830	0.7000	1.8958	3.5833	0.5303	-1	-1	-1	0	0	0	0	0	0	.
589	1.00000	0	0	2	1.7996	0.0000	-9.0000	2.8909	1.8000	3.0000	1.9722	0.5303	-1	-1	-1	0	0	1	0	0	1	.
590	1.00000	0	0	0	0.7509	-1.0000	-9.0000	0.9842	2.7273	0.9050	0.3974	2.2523	1	1	1	0	0	1	0	0	1	.
591	0.60000	0	0	0	0.8672	-1.0000	-9.0000	1.2882	2.5000	1.2284	0.6383	2.2432	1	1	1	0	0	1	0	0	1	.
592	1.00000	2	2	0	5.8665	-1.0000	-9.0000	4.7895	2.0000	5.0286	6.4583	0.3557	-1	-1	-1	0	0	0	0	0	1	.
593	1.00000	0	2	0	1.7006	1.7006	-9.0000	1.8000	-9.0000	1.8000	0.5000	2.2000	0	0	0	0	0	0	0	0	1	.
594	1.00000	0	2	0	0.8299	-1.0000	-9.0000	0.8207	1.6667	0.7717	0.5455	2.7500	1	1	1	0	0	0	0	0	1	.
595	1.00000	0	1	0	0.6837	-1.0000	-9.0000	0.8217	1.5000	0.7847	0.4615	2.7500	1	1	1	0	0	0	0	0	1	.
596	0.60000	0	0	-2	0.8741	0.8741	-9.0000	1.0000	0.6000	1.0417	1.1833	1.4286	-2	-2	-2	0	0	0	-1	0	-1	.
597	1.00000	0	0	2	0.9167	0.9167	-9.0000	0.7881	1.3333	0.7559	0.5714	1.5000	2	2	2	0	0	0	1	0	1	.
598	1.00000	0	1	0	1.0455	1.0455	-9.0000	1.2689	0.4500	1.3542	1.0000	1.0000	-1	-1	-1	0	0	0	0	0	0	.
599	1.00000	0	1	0	2.2205	2.2205	-9.0000	2.0963	0.7333	2.2667	3.3000	1.0000	-1	-1	-1	0	0	0	0	0	0	.
600	1.00000	0	2	0	1.2000	1.2000	-9.0000	-9.0000	-9.0000	-9.0000	0.4444	1.0000	1	1	1	0	0	0	0	0	1	.
601	1.00000	0	2	0	2.4000	2.4000	-9.0000	-9.0000	-9.0000	-9.0000	0.8889	2.0000	1	1	1	0	0	0	0	0	1	.
602	1.00000	0	0	2	1.2001	1.2001	-9.0000	1.9565	0.1000	2.5472	0.7447	9.0000	1	1	1	0	0	1	-1	0	1	.
603	1.00000	0	0	0	0.3267	0.3267	-9.0000	0.4889	-9.0000	0.4889	0.7429	0.1000	-1	-1	-1	0	0	-1	-1	0	-1	.
604	1.00000	0	0	0	1.3200	1.3200	-9.0000	4.1538	9.0000	2.3077	1.5333	-9.0000	1	1	1	1	0	1	1	0	1	.
605	1.00000	0	2	0	3.6364	3.6364	-9.0000	3.5714	-9.0000	3.5714	2.5000	-9.0000	0	-1	0	0	1	0	-1	0	-1	.
606	1.00000	0	2	0	3.4545	3.4545	-9.0000	3.5714	-9.0000	3.5714	2.5000	-9.0000	0	-1	0	0	0	0	-1	0	-1	.
607	1.00000	0	2	0	4.2778	4.2778	-9.0000	1.0714	-9.0000	1.0714	2.9048	-9.0000	0	-1	0	0	0	0	-1	0	-1	.
608	1.00000	0	2	0	4.1878	4.1878	-9.0000	1.0714	-9.0000	1.0714	2.9048	-9.0000	0	-1	0	0	0	0	-1	0	-1	.
609	1.00000	3	1	2	3.2444	3.2444	-9.0000	1.0811	-9.0000	1.0811	1.4286	0.3745	0	0	0	0	0	1	0	0	1	.
610	1.00000	3	1	2	3.1160	3.1160	-9.0000	2.4000	-9.0000	2.4000	1.4286	0.4242	0	0	0	0	0	1	0	0	1	.
611	1.00000	3	1	2	2.1622	2.1622	-9.0000	2.8571	-9.0000	2.8571	1.4286	0.3745	0	0	0	0	0	1	0	0	1	.
612	1.00000	0	0	2	2.2027	2.2027	-9.0000	9.0000	-9.0000	9.0000	0.5294	0.2200	0	0	0	0	0	0	0	0	1	.
613	1.00000	0	0	2	1.8478	1.8478	-9.0000	3.7500	-9.0000	3.7500	0.7059	0.2200	0	0	0	0	0	0	0	0	1	.
614	1.00000	3	1	0	1.2338	1.2338	-9.0000	0.7333	-9.0000	0.7333	1.8684	9.0000	0	0	0	0	0	0	0	0	0	.
615	1.00000	3	1	0	1.2609	1.2609	-9.0000	-9.0000	-9.0000	-9.0000	1.3947	-9.0000	0	0	0	0	0	0	0	0	0	.
616	1.00000	3	1	0	1.3378	1.3378	-9.0000	0.1000	-9.0000	0.1000	1.3947	9.0000	0	0	0	0	0	0	0	0	0	.
617	1.00000	3	1	0	5.9286	5.9286	-9.0000	9.0000	-9.0000	9.0000	10.3333	-9.0000	0	0	1	0	0	0	-1	0	1	.
618	1.00000	0	0	0	2.4318	2.4318	-9.0000	2.2000	-9.0000	2.2000	3.0000	-9.0000	0	0	-1	0	0	1	0	0	1	.
619	1.00000	0	0	0	1.3788	1.3788	-9.0000	3.6667	-9.0000	3.6667	1.9038	-9.0000	0	0	0	0	0	1	0	0	1	.
620	1.00000	3	1	3	1.0513	1.0513	-9.0000	9.0000	-9.0000	9.0000	3.7778	-9.0000	0	0	1	0	0	1	2	0	1	.
621	1.00000	3	1	3	2.5581	2.5581	-9.0000	9.0000	-9.0000	9.0000	1.1186	-9.0000	0	0	1	0	0	1	2	0	1	.
622	1.00000	0	0	3	6.9756	6.9756	-9.0000	1.4706	0.1000	9.0000	3.4783	-9.0000	0	0	0	0	0	1	2	0	1	.
623	1.00000	3	1	3	3.0843	3.0843	-9.0000	9.0000	-9.0000	9.0000	3.1579	-9.0000	0	0	1	0	0	1	2	0	1	.
624	1.00000	3	0	3	8.2022	8.2022	-9.0000	2.9041	0.1000	3.7193	10.8333	-9.0000	0	0	0	0	0	1	2	0	1	.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

This is the data   13:42 Monday, October 2, 1995 16

OBS	LAB5	LAB9	LAB10	LAB13	LAB14	LAB16	LAB26	LAB28	LAB30	LAB32	LAB34	LAB36	LAB44	LAB45	LAB46	LAB47	LAB48	LAB49	LAB50	LAB51	LAB52	LAB61
625	1.00000	3	0	3	2.7875	2.7875	-9.0000	19.5000	-9.0000	19.5000	4.2036	-9.0000	0	0	0	0	0	1	2	0	1	.
626	0.00000	3	0	0	0.7237	-1.0000	-9.0000	0.1000	-1.0000	-1.0000	1.0000	-9.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
627	0.00000	3	3	0	1.6117	-1.0000	-9.0000	9.0000	-1.0000	-1.0000	0.9722	-1.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
628	0.00000	3	3	0	1.8222	-1.0000	-9.0000	9.0000	-1.0000	-1.0000	2.5000	-1.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
629	0.00000	3	3	0	2.2817	-1.0000	-9.0000	9.0000	-1.0000	-1.0000	3.1304	-1.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
630	0.00000	3	0	0	0.9603	-1.0000	-9.0000	9.0000	-1.0000	-1.0000	0.1111	0.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
631	0.00000	3	1	0	0.9444	-1.0000	-9.0000	9.0000	-1.0000	-1.0000	0.2166	-9.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
632	0.00000	3	0	0	2.0800	-1.0000	-9.0000	9.0000	-1.0000	-1.0000	0.2500	0.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
633	0.00000	3	0	0	0.7949	-1.0000	-9.0000	9.0000	-1.0000	-1.0000	0.6990	9.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
634	0.00000	3	3	0	1.1413	-1.0000	-9.0000	0.1000	-1.0000	-1.0000	3.3333	-1.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
635	0.00000	3	0	0	2.6812	-1.0000	-9.0000	0.1000	-1.0000	-1.0000	2.2588	1.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
636	0.00000	3	1	0	0.3859	-1.0000	-9.0000	9.0000	-1.0000	-1.0000	1.0000	0.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
637	0.00000	3	3	0	2.5625	-1.0000	-9.0000	2.5625	-1.0000	-1.0000	-1.0000	0.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
638	0.00000	3	1	0	1.6000	-1.0000	-9.0000	9.0000	-1.0000	-1.0000	0.1250	0.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
639	0.00000	3	0	0	1.1111	-1.0000	-9.0000	2.4000	-1.0000	-1.0000	0.3750	-1.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
640	0.00000	3	1	0	1.0000	-1.0000	-9.0000	1.0000	-1.0000	-1.0000	1.3333	0.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
641	-1.00000	3	1	0	1.2555	-1.0000	-9.0000	1.0514	-1.0000	-1.0000	0.6667	9.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
642	-1.00000	3	1	0	1.0467	-1.0000	-9.0000	0.6120	-1.0000	-1.0000	0.6667	0.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
643	-1.00000	3	1	0	0.8549	-1.0000	-9.0000	0.8099	-1.0000	-1.0000	0.5455	0.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
644	0.00000	3	2	0	3.5017	-1.0000	-9.0000	9.0000	-1.0000	-1.0000	1.6000	0.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
645	0.00000	3	1	0	1.3800	-1.0000	-9.0000	2.1409	-1.0000	-1.0000	-1.0000	0.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
646	0.00000	3	1	0	0.8333	-1.0000	-9.0000	0.1000	-1.0000	-1.0000	0.2500	9.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
647	-1.00000	3	1	0	0.8333	-1.0000	-9.0000	0.6250	-1.0000	-1.0000	0.3333	0.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
648	0.00000	3	1	0	1.5000	-1.0000	-9.0000	0.8333	-1.0000	-1.0000	1.5000	9.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
649	0.00000	3	1	0	1.3333	-1.0000	-9.0000	0.7463	-1.0000	-1.0000	1.3333	0.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
650	0.00000	3	2	0	0.9792	-1.0000	-9.0000	1.8947	-1.0000	-1.0000	0.8438	9.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
651	-1.00000	3	2	0	0.8085	-1.0000	-9.0000	0.5882	-1.0000	-1.0000	0.2083	9.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
652	0.00000	3	2	0	0.9950	-1.0000	-9.0000	1.0000	-1.0000	-1.0000	0.2462	1.4167	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
653	0.00000	3	1	0	0.6250	-1.0000	-9.0000	3.1250	-1.0000	-1.0000	0.2727	1.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
654	0.00000	3	1	0	1.7647	-1.0000	-9.0000	-9.0000	-1.0000	-1.0000	1.2821	-1.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
655	0.00000	3	1	0	0.8333	-1.0000	-9.0000	1.8750	-1.0000	-1.0000	0.5000	-1.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
656	0.00000	3	1	0	1.8000	-1.0000	-9.0000	1.4250	-1.0000	-1.0000	1.7500	0.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
657	0.00000	3	-1	3	0.0000	-1.0000	-9.0000	1.1292	-1.0000	-1.0000	-1.0000	-1.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
658	0.00000	3	-1	1	1.4000	-1.0000	-9.0000	0.9160	-1.0000	-1.0000	-1.0000	-1.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
659	0.00000	3	0	0	0.6567	-1.0000	-9.0000	0.4037	-1.0000	-1.0000	0.0000	0.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.
660	0.00000	3	1	0	1.0000	-1.0000	-9.0000	1.4000	-1.0000	-1.0000	0.0000	0.0000	-9	-9	-9	-9	-9	-9	-9	-9	-9	.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

The SAS System 15:48 Tuesday, October 3, 1995 1

1ST WIDTH

LABS	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	30	4.6	30	4.6
0.18	1	0.2	31	4.8
0.2	1	0.2	32	5.0
0.222222	2	0.3	34	5.3
0.375	2	0.3	36	5.6
0.380952	1	0.2	37	5.7
0.426829	1	0.2	38	5.9
0.435897	1	0.2	39	6.0
0.4375	1	0.2	40	6.2
0.461538	1	0.2	41	6.3
0.466667	1	0.2	42	6.5
0.5	8	1.2	50	7.7
0.514286	1	0.2	51	7.9
0.538462	1	0.2	52	8.0
0.55	1	0.2	53	8.2
0.5625	1	0.2	54	8.4
0.565789	1	0.2	55	8.5
0.571429	3	0.5	58	9.0
0.588235	2	0.3	60	9.3
0.590909	1	0.2	61	9.4
0.6	6	0.9	67	10.4
0.615385	1	0.2	68	10.5
0.625	4	0.6	72	11.1
0.627907	1	0.2	73	11.3
0.653846	1	0.2	74	11.5
0.662791	1	0.2	75	11.6
0.666667	6	0.9	81	12.5
0.675	1	0.2	82	12.7
0.684211	1	0.2	83	12.8
0.7	3	0.5	86	13.3
0.701754	1	0.2	87	13.5
0.703704	1	0.2	88	13.6
0.708333	1	0.2	89	13.8
0.714286	3	0.5	92	14.2
0.727273	1	0.2	93	14.4
0.75	9	1.4	102	15.8
0.75625	1	0.2	103	15.9
0.766667	1	0.2	104	16.1
0.777778	1	0.2	105	16.3
0.78125	2	0.3	107	16.6
0.789474	1	0.2	108	16.7
0.8	4	0.6	112	17.3
0.806452	1	0.2	113	17.5
0.8125	1	0.2	114	17.6
0.833333	4	0.6	118	18.3
0.84375	1	0.2	119	18.4
0.851852	1	0.2	120	18.6
0.853333	1	0.2	121	18.7
0.857143	3	0.5	124	19.2
0.872727	1	0.2	125	19.3
0.875	1	0.2	126	19.5

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

1ST WIDTH

LABS	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0.888889	2	0.3	128	19.8
0.901408	1	0.2	129	20.0
0.909091	2	0.3	131	20.3
0.916667	1	0.2	132	20.4
0.918919	1	0.2	133	20.6
0.923077	2	0.3	135	20.9
0.925926	1	0.2	136	21.1
0.926829	1	0.2	137	21.2
0.931818	1	0.2	138	21.4
0.95	1	0.2	139	21.5
1	444	68.7	583	90.2
1.045455	1	0.2	584	90.4
1.066667	3	0.5	587	90.9
1.083333	1	0.2	588	91.0
1.09375	1	0.2	589	91.2
1.1	1	0.2	590	91.3
1.111111	1	0.2	591	91.5
1.12069	1	0.2	592	91.6
1.125	1	0.2	593	91.8
1.15	1	0.2	594	92.0
1.160714	1	0.2	595	92.1
1.176471	1	0.2	596	92.3
1.2	1	0.2	597	92.4
1.214286	2	0.3	599	92.7
1.222222	1	0.2	600	92.9
1.230769	1	0.2	601	93.0
1.243902	1	0.2	602	93.2
1.25	2	0.3	604	93.5
1.28	1	0.2	605	93.7
1.3125	1	0.2	606	93.8
1.321429	1	0.2	607	94.0
1.330935	1	0.2	608	94.1
1.333333	5	0.8	613	94.9
1.4	2	0.3	615	95.2
1.421053	1	0.2	616	95.4
1.428571	2	0.3	618	95.7
1.466667	2	0.3	620	96.0
1.5	5	0.8	625	96.7
1.538462	1	0.2	626	96.9
1.555556	1	0.2	627	97.1
1.6	3	0.5	630	97.5
1.666667	2	0.3	632	97.8
1.7	1	0.2	633	98.0
1.818182	1	0.2	634	98.1
1.85	1	0.2	635	98.3
2	3	0.5	638	98.8
2.2	1	0.2	639	98.9
2.34375	1	0.2	640	99.1
2.4	1	0.2	641	99.2
2.5	1	0.2	642	99.4
2.666667	1	0.2	643	99.5

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

1ST WIDTH

LAB5	Frequency	Percent	Cumulative Frequency	Cumulative Percent
3	1	0.2	644	99.7
4.571429	1	0.2	645	99.8
6.5	1	0.2	646	100.0

Frequency Missing = 14

DEFENSIVE POSTURE

LAB9	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	501	75.9	501	75.9
1	70	10.6	571	86.5
2	42	6.4	613	92.9
3	47	7.1	660	100.0

DEFENDERS PRI DEFENSE

LAB10	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	293	44.5	293	44.5
1	164	24.9	457	69.5
2	179	27.2	636	96.7
3	20	3.0	656	99.7
4	2	0.3	658	100.0

Frequency Missing = 2

DLAB11	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	227	34.4	227	34.4
2	80	12.1	307	46.5
3	353	53.5	660	100.0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst   Tue Oct 3 15:48:07 1995   4

The SAS System   15:48 Tuesday, October 3, 1995   4

DLAB12	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	169	25.6	169	25.6
2	68	10.3	237	35.9
3	77	11.7	316	47.6
4	346	52.4	660	100.0

ATTACKER SURPRISE

LAB13	Frequency	Percent	Cumulative Frequency	Cumulative Percent
-3	3	0.5	3	0.5
-2	6	0.9	9	1.4
-1	6	0.9	15	2.3
0	474	71.8	489	74.1
1	64	9.7	553	83.8
2	87	13.2	640	97.0
3	20	3.0	660	100.0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

TOTAL PERS STR

LAB14	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	1	0.2	1	0.2
0.253534	1	0.2	2	0.3
0.258333	1	0.2	3	0.5
0.26875	1	0.2	4	0.6
0.300461	1	0.2	5	0.8
0.303571	1	0.2	6	0.9
0.32673	1	0.2	7	1.1
0.381333	1	0.2	8	1.2
0.383304	1	0.2	9	1.4
0.385915	1	0.2	10	1.5
0.402685	1	0.2	11	1.7
0.427062	1	0.2	12	1.8
0.428571	1	0.2	13	2.0
0.434109	1	0.2	14	2.1
0.441	1	0.2	15	2.3
0.446254	1	0.2	16	2.4
0.45	1	0.2	17	2.6
0.454545	1	0.2	18	2.7
0.454635	1	0.2	19	2.9
0.464375	1	0.2	20	3.0
0.467778	1	0.2	21	3.2
0.476614	1	0.2	22	3.3
0.478667	1	0.2	23	3.5
0.496303	1	0.2	24	3.6
0.5	3	0.5	27	4.1
0.507692	1	0.2	28	4.2
0.518387	1	0.2	29	4.4
0.52	1	0.2	30	4.5
0.530713	1	0.2	31	4.7
0.53125	1	0.2	32	4.8
0.542118	1	0.2	33	5.0
0.550293	1	0.2	34	5.2
0.56	1	0.2	35	5.3
0.580271	1	0.2	36	5.5
0.583333	1	0.2	37	5.6
0.597165	1	0.2	38	5.8
0.6	1	0.2	39	5.9
0.604008	1	0.2	40	6.1
0.611111	1	0.2	41	6.2
0.625	2	0.3	43	6.5
0.628571	1	0.2	44	6.7
0.6288	1	0.2	45	6.8
0.630137	1	0.2	46	7.0
0.632813	1	0.2	47	7.1
0.64	1	0.2	48	7.3
0.65	1	0.2	49	7.4
0.650465	1	0.2	50	7.6
0.656722	1	0.2	51	7.7
0.658701	1	0.2	52	7.9
0.664706	1	0.2	53	8.0
0.665816	1	0.2	54	8.2

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

TOTAL PERS STR

LAB14	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0.666667	2	0.3	56	8.5
0.674314	1	0.2	57	8.6
0.683411	1	0.2	58	8.8
0.683721	1	0.2	59	8.9
0.685714	1	0.2	60	9.1
0.688525	1	0.2	61	9.2
0.692308	1	0.2	62	9.4
0.694006	1	0.2	63	9.5
0.696275	1	0.2	64	9.7
0.703257	1	0.2	65	9.8
0.708333	1	0.2	66	10.0
0.71028	1	0.2	67	10.2
0.71249	1	0.2	68	10.3
0.714286	2	0.3	70	10.6
0.716312	1	0.2	71	10.8
0.72	1	0.2	72	10.9
0.720588	1	0.2	73	11.1
0.723684	1	0.2	74	11.2
0.727273	1	0.2	75	11.4
0.733333	1	0.2	76	11.5
0.735873	1	0.2	77	11.7
0.737327	1	0.2	78	11.8
0.738496	1	0.2	79	12.0
0.741379	1	0.2	80	12.1
0.745554	1	0.2	81	12.3
0.75	1	0.2	82	12.4
0.750863	1	0.2	83	12.6
0.755556	1	0.2	84	12.7
0.757576	1	0.2	85	12.9
0.76	1	0.2	86	13.0
0.766667	2	0.3	88	13.3
0.775	1	0.2	89	13.5
0.777778	2	0.3	91	13.8
0.780454	1	0.2	92	13.9
0.784473	1	0.2	93	14.1
0.788889	1	0.2	94	14.2
0.789474	1	0.2	95	14.4
0.791974	1	0.2	96	14.5
0.792453	1	0.2	97	14.7
0.794872	1	0.2	98	14.8
0.797277	1	0.2	99	15.0
0.8	4	0.6	103	15.6
0.801749	1	0.2	104	15.8
0.802556	1	0.2	105	15.9
0.80531	1	0.2	106	16.1
0.808485	1	0.2	107	16.2
0.809238	1	0.2	108	16.4
0.815091	1	0.2	109	16.5
0.818182	2	0.3	111	16.8
0.822727	1	0.2	112	17.0
0.823529	1	0.2	113	17.1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

TOTAL PERS STR

LAB16	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0.828125	1	0.2	114	17.3
0.829897	1	0.2	115	17.4
0.831409	1	0.2	116	17.6
0.833333	5	0.8	121	18.3
0.838937	1	0.2	122	18.5
0.84058	1	0.2	123	18.6
0.844037	1	0.2	124	18.8
0.845443	1	0.2	125	18.9
0.85	1	0.2	126	19.1
0.852081	1	0.2	127	19.2
0.854922	1	0.2	128	19.4
0.855462	1	0.2	129	19.5
0.867193	1	0.2	130	19.7
0.87005	1	0.2	131	19.8
0.870775	1	0.2	132	20.0
0.871285	1	0.2	133	20.2
0.872577	1	0.2	134	20.3
0.874126	1	0.2	135	20.5
0.875	1	0.2	136	20.6
0.88	1	0.2	137	20.8
0.884615	1	0.2	138	20.9
0.888889	2	0.3	140	21.2
0.89498	1	0.2	141	21.4
0.9	2	0.3	143	21.7
0.901127	1	0.2	144	21.8
0.909091	1	0.2	145	22.0
0.912263	1	0.2	146	22.1
0.914961	1	0.2	147	22.3
0.916667	2	0.3	149	22.6
0.921367	1	0.2	150	22.7
0.928571	1	0.2	151	22.9
0.935101	1	0.2	152	23.0
0.93633	1	0.2	153	23.2
0.936364	1	0.2	154	23.3
0.9375	2	0.3	156	23.6
0.941176	1	0.2	157	23.8
0.944444	2	0.3	159	24.1
0.945946	1	0.2	160	24.2
0.947368	1	0.2	161	24.4
0.947752	1	0.2	162	24.5
0.960265	1	0.2	163	24.7
0.961538	2	0.3	165	25.0
0.961668	1	0.2	166	25.2
0.962704	1	0.2	167	25.3
0.965753	1	0.2	168	25.5
0.970874	1	0.2	169	25.6
0.972222	1	0.2	170	25.8
0.973451	1	0.2	171	25.9
0.975	1	0.2	172	26.1
0.979167	1	0.2	173	26.2
0.981651	1	0.2	174	26.4

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

TOTAL PERS STR

LAB14	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0.986301	1	0.2	175	26.5
0.99359	1	0.2	176	26.7
0.995025	1	0.2	177	26.8
1	13	2.0	190	28.8
1.000455	1	0.2	191	28.9
1.001026	1	0.2	192	29.1
1.012	1	0.2	193	29.2
1.012903	1	0.2	194	29.4
1.017699	1	0.2	195	29.5
1.017886	1	0.2	196	29.7
1.023256	1	0.2	197	29.8
1.033333	2	0.3	199	30.2
1.036364	1	0.2	200	30.3
1.039801	1	0.2	201	30.5
1.040337	1	0.2	202	30.6
1.04083	1	0.2	203	30.8
1.041667	1	0.2	204	30.9
1.044986	1	0.2	205	31.1
1.045455	1	0.2	206	31.2
1.04569	1	0.2	207	31.4
1.046512	1	0.2	208	31.5
1.046699	1	0.2	209	31.7
1.048387	1	0.2	210	31.8
1.04878	1	0.2	211	32.0
1.05	1	0.2	212	32.1
1.051282	1	0.2	213	32.3
1.057143	1	0.2	214	32.4
1.058632	1	0.2	215	32.6
1.068966	1	0.2	216	32.7
1.071429	1	0.2	217	32.9
1.073171	1	0.2	218	33.0
1.075299	1	0.2	219	33.2
1.076923	1	0.2	220	33.3
1.078108	1	0.2	221	33.5
1.090909	1	0.2	222	33.6
1.095238	1	0.2	223	33.8
1.1	3	0.5	226	34.2
1.105263	1	0.2	227	34.4
1.111111	2	0.3	229	34.7
1.117647	1	0.2	230	34.8
1.121212	1	0.2	231	35.0
1.125	2	0.3	233	35.3
1.139191	1	0.2	234	35.5
1.141264	1	0.2	235	35.6
1.150995	1	0.2	236	35.8
1.153846	1	0.2	237	35.9
1.158212	1	0.2	238	36.1
1.160901	1	0.2	239	36.2
1.16126	1	0.2	240	36.4
1.162266	1	0.2	241	36.5
1.162791	1	0.2	242	36.7

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

TOTAL PERS STR

LAB14	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1.166667	2	0.3	244	37.0
1.16875	1	0.2	245	37.1
1.176712	1	0.2	246	37.3
1.181818	1	0.2	247	37.4
1.182759	1	0.2	248	37.6
1.183673	1	0.2	249	37.7
1.18511	1	0.2	250	37.9
1.1875	1	0.2	251	38.0
1.188375	1	0.2	252	38.2
1.190476	1	0.2	253	38.3
1.2	6	0.9	259	39.2
1.200075	1	0.2	260	39.4
1.201813	1	0.2	261	39.5
1.204886	1	0.2	262	39.7
1.211865	1	0.2	263	39.8
1.222222	2	0.3	265	40.2
1.225863	1	0.2	266	40.3
1.229885	1	0.2	267	40.5
1.233831	1	0.2	268	40.6
1.235521	1	0.2	269	40.8
1.236918	1	0.2	270	40.9
1.238426	1	0.2	271	41.1
1.244444	1	0.2	272	41.2
1.25	4	0.6	276	41.8
1.255507	1	0.2	277	42.0
1.26087	1	0.2	278	42.1
1.261146	1	0.2	279	42.3
1.266667	1	0.2	280	42.4
1.268116	1	0.2	281	42.6
1.269505	1	0.2	282	42.7
1.272727	1	0.2	283	42.9
1.291756	1	0.2	284	43.0
1.292929	1	0.2	285	43.2
1.3	1	0.2	286	43.3
1.311665	1	0.2	287	43.5
1.312632	1	0.2	288	43.6
1.315789	1	0.2	289	43.8
1.320008	1	0.2	290	43.9
1.323529	1	0.2	291	44.1
1.324638	1	0.2	292	44.2
1.325443	1	0.2	293	44.4
1.328904	1	0.2	294	44.5
1.333333	5	0.8	299	45.3
1.337838	1	0.2	300	45.5
1.346154	2	0.3	302	45.8
1.362205	1	0.2	303	45.9
1.365854	1	0.2	304	46.1
1.372084	1	0.2	305	46.2
1.375	1	0.2	306	46.4
1.377778	1	0.2	307	46.5
1.378788	1	0.2	308	46.7

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

TOTAL PERS STR

LAB14	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1.379982	1	0.2	309	46.8
1.38	1	0.2	310	47.0
1.391892	1	0.2	311	47.1
1.399984	1	0.2	312	47.3
1.403576	1	0.2	313	47.4
1.416667	1	0.2	314	47.6
1.428571	2	0.3	316	47.9
1.436892	1	0.2	317	48.0
1.444444	1	0.2	318	48.2
1.448276	1	0.2	319	48.3
1.45	1	0.2	320	48.5
1.462226	1	0.2	321	48.6
1.466283	1	0.2	322	48.8
1.466667	1	0.2	323	48.9
1.46865	1	0.2	324	49.1
1.478755	1	0.2	325	49.2
1.483552	1	0.2	326	49.4
1.4836	1	0.2	327	49.5
1.5	5	0.8	332	50.3
1.505847	1	0.2	333	50.5
1.521739	2	0.3	335	50.8
1.525	1	0.2	336	50.9
1.526316	1	0.2	337	51.1
1.527308	1	0.2	338	51.2
1.535978	1	0.2	339	51.4
1.537314	1	0.2	340	51.5
1.542857	1	0.2	341	51.7
1.543048	1	0.2	342	51.8
1.552059	1	0.2	343	52.0
1.552186	1	0.2	344	52.1
1.55642	1	0.2	345	52.3
1.559874	1	0.2	346	52.4
1.5625	2	0.3	348	52.7
1.564103	1	0.2	349	52.9
1.578366	1	0.2	350	53.0
1.578947	1	0.2	351	53.2
1.582278	1	0.2	352	53.3
1.58736	1	0.2	353	53.5
1.592105	1	0.2	354	53.6
1.595339	1	0.2	355	53.8
1.6	3	0.5	358	54.2
1.610727	1	0.2	359	54.4
1.61165	1	0.2	360	54.5
1.633504	1	0.2	361	54.7
1.644376	1	0.2	362	54.8
1.644407	1	0.2	363	55.0
1.654867	1	0.2	364	55.2
1.660803	1	0.2	365	55.3
1.666511	1	0.2	366	55.5
1.666667	5	0.8	371	56.2
1.669726	1	0.2	372	56.4

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst Tue Oct 3 15:48:07 1995 11

The SAS System 15:48 Tuesday, October 3, 1995 11

TOTAL PERS STR

LAB14	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1.674296	1	0.2	373	56.5
1.677862	1	0.2	374	56.7
1.68826	1	0.2	375	56.8
1.688525	1	0.2	376	57.0
1.69697	1	0.2	377	57.1
1.7	1	0.2	378	57.3
1.700569	1	0.2	379	57.4
1.730959	1	0.2	380	57.6
1.732283	1	0.2	381	57.7
1.740009	1	0.2	382	57.9
1.745923	1	0.2	383	58.0
1.75	1	0.2	384	58.2
1.764706	1	0.2	385	58.3
1.769481	1	0.2	386	58.5
1.785714	1	0.2	387	58.6
1.794053	1	0.2	388	58.8
1.798074	1	0.2	389	58.9
1.799597	1	0.2	390	59.1
1.8	4	0.6	394	59.7
1.804289	1	0.2	395	59.8
1.805085	1	0.2	396	60.0
1.811321	1	0.2	397	60.2
1.8125	1	0.2	398	60.3
1.822222	1	0.2	399	60.5
1.828932	1	0.2	400	60.6
1.833333	1	0.2	401	60.8
1.847826	1	0.2	402	60.9
1.853279	1	0.2	403	61.1
1.855745	1	0.2	404	61.2
1.859288	1	0.2	405	61.4
1.860347	1	0.2	406	61.5
1.861042	1	0.2	407	61.7
1.866667	1	0.2	408	61.8
1.870046	1	0.2	409	62.0
1.875	2	0.3	411	62.3
1.879399	1	0.2	412	62.4
1.880324	1	0.2	413	62.6
1.892227	1	0.2	414	62.7
1.893458	1	0.2	415	62.9
1.894118	1	0.2	416	63.0
1.9	2	0.3	418	63.3
1.904762	1	0.2	419	63.5
1.909091	1	0.2	420	63.6
1.913043	1	0.2	421	63.8
1.914832	1	0.2	422	63.9
1.928571	1	0.2	423	64.1
1.944444	2	0.3	425	64.4
1.956522	1	0.2	426	64.5
1.96	1	0.2	427	64.7
2	8	1.2	435	65.9
2.01375	1	0.2	436	66.1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

TOTAL PERS STR

LAB14	Frequency	Percent	Cumulative Frequency	Cumulative Percent
2.02145	1	0.2	437	66.2
2.021838	1	0.2	438	66.4
2.026573	1	0.2	439	66.5
2.026667	1	0.2	440	66.7
2.031205	1	0.2	441	66.8
2.035461	1	0.2	442	67.0
2.047912	1	0.2	443	67.1
2.051546	1	0.2	444	67.3
2.055556	1	0.2	445	67.4
2.058675	1	0.2	446	67.6
2.08	1	0.2	447	67.7
2.083333	1	0.2	448	67.9
2.0948	1	0.2	449	68.0
2.095321	2	0.3	451	68.3
2.1	1	0.2	452	68.5
2.10579	1	0.2	453	68.6
2.107125	1	0.2	454	68.8
2.110939	1	0.2	455	68.9
2.111102	1	0.2	456	69.1
2.111111	1	0.2	457	69.2
2.117647	1	0.2	458	69.4
2.131783	1	0.2	459	69.5
2.144741	1	0.2	460	69.7
2.153051	1	0.2	461	69.8
2.162162	1	0.2	462	70.0
2.166667	1	0.2	463	70.2
2.175	1	0.2	464	70.3
2.175258	1	0.2	465	70.5
2.177617	1	0.2	466	70.6
2.1944	1	0.2	467	70.8
2.2	1	0.2	468	70.9
2.200389	1	0.2	469	71.1
2.202703	1	0.2	470	71.2
2.204935	1	0.2	471	71.4
2.207346	1	0.2	472	71.5
2.220497	1	0.2	473	71.7
2.222222	1	0.2	474	71.8
2.228606	1	0.2	475	72.0
2.258962	1	0.2	476	72.1
2.265506	1	0.2	477	72.3
2.266667	1	0.2	478	72.4
2.267516	1	0.2	479	72.6
2.26761	1	0.2	480	72.7
2.28169	1	0.2	481	72.9
2.285714	2	0.3	483	73.2
2.286765	1	0.2	484	73.3
2.3	1	0.2	485	73.5
2.30875	1	0.2	486	73.6
2.324082	1	0.2	487	73.8
2.341197	1	0.2	488	73.9
2.351852	1	0.2	489	74.1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

TOTAL PERS STR

LAB14	Frequency	Percent	Cumulative Frequency	Cumulative Percent
2.4	1	0.2	490	74.2
2.417995	1	0.2	491	74.4
2.4306	1	0.2	492	74.5
2.431835	1	0.2	493	74.7
2.438364	1	0.2	494	74.8
2.473404	1	0.2	495	75.0
2.490196	1	0.2	496	75.2
2.498686	1	0.2	497	75.3
2.5	2	0.3	499	75.6
2.528175	1	0.2	500	75.8
2.548414	1	0.2	501	75.9
2.55814	1	0.2	502	76.1
2.562677	1	0.2	503	76.2
2.576542	1	0.2	504	76.4
2.580645	1	0.2	505	76.5
2.625	1	0.2	506	76.7
2.63149	1	0.2	507	76.8
2.646838	1	0.2	508	77.0
2.650624	1	0.2	509	77.1
2.666667	1	0.2	510	77.3
2.688882	1	0.2	511	77.4
2.681159	1	0.2	512	77.6
2.692319	1	0.2	513	77.7
2.707933	1	0.2	514	77.9
2.710056	1	0.2	515	78.0
2.742188	1	0.2	516	78.2
2.745432	1	0.2	517	78.3
2.75	2	0.3	519	78.6
2.765464	1	0.2	520	78.8
2.768293	1	0.2	521	78.9
2.787456	1	0.2	522	79.1
2.803836	1	0.2	523	79.2
2.814815	1	0.2	524	79.4
2.829837	1	0.2	525	79.5
2.832351	1	0.2	526	79.7
2.856322	1	0.2	527	79.8
2.85782	1	0.2	528	80.0
2.866667	1	0.2	529	80.2
2.869822	1	0.2	530	80.3
2.872	1	0.2	531	80.5
2.875	1	0.2	532	80.6
2.880336	1	0.2	533	80.8
2.890815	1	0.2	534	80.9
2.9	1	0.2	535	81.1
2.9188	1	0.2	536	81.2
2.93299	1	0.2	537	81.4
2.939494	1	0.2	538	81.5
2.941794	1	0.2	539	81.7
2.984496	1	0.2	540	81.8
3	3	0.5	543	82.3
3.012167	1	0.2	544	82.4

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

TOTAL PERS STR

LAB14	Frequency	Percent	Cumulative Frequency	Cumulative Percent
3.01716	1	0.2	545	82.6
3.018239	1	0.2	546	82.7
3.034483	1	0.2	547	82.9
3.039294	2	0.3	549	83.2
3.040514	1	0.2	550	83.3
3.049818	1	0.2	551	83.5
3.052632	1	0.2	552	83.6
3.056769	1	0.2	553	83.8
3.076923	1	0.2	554	83.9
3.084337	1	0.2	555	84.1
3.10641	1	0.2	556	84.2
3.111111	1	0.2	557	84.4
3.11604	1	0.2	558	84.5
3.2	1	0.2	559	84.7
3.230769	1	0.2	560	84.8
3.244444	1	0.2	561	85.0
3.255338	1	0.2	562	85.2
3.271509	1	0.2	563	85.3
3.304584	1	0.2	564	85.5
3.306289	1	0.2	565	85.6
3.333333	1	0.2	566	85.8
3.425678	1	0.2	567	85.9
3.428571	1	0.2	568	86.1
3.454545	1	0.2	569	86.2
3.483871	1	0.2	570	86.4
3.489524	1	0.2	571	86.5
3.501704	2	0.3	573	86.8
3.502143	1	0.2	574	87.0
3.552444	1	0.2	575	87.1
3.6	1	0.2	576	87.3
3.636364	1	0.2	577	87.4
3.665768	1	0.2	578	87.6
3.714286	1	0.2	579	87.7
3.730886	1	0.2	580	87.9
3.75	1	0.2	581	88.0
3.76152	1	0.2	582	88.2
3.828155	1	0.2	583	88.3
3.892346	1	0.2	584	88.5
3.896916	1	0.2	585	88.6
3.928571	1	0.2	586	88.8
3.93808	1	0.2	587	88.9
3.959965	1	0.2	588	89.1
3.97916	1	0.2	589	89.2
4	3	0.5	592	89.7
4.035714	1	0.2	593	89.8
4.087838	1	0.2	594	90.0
4.104235	1	0.2	595	90.2
4.112933	1	0.2	596	90.3
4.187778	1	0.2	597	90.5
4.221765	1	0.2	598	90.6
4.248919	1	0.2	599	90.8

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst Tue Oct 3 15:48:07 1995 15

The SAS System 15:48 Tuesday, October 3, 1995 15

TOTAL PERS STR

LAB14	Frequency	Percent	Cumulative Frequency	Cumulative Percent
4.274793	1	0.2	600	90.9
4.277778	1	0.2	601	91.1
4.35087	1	0.2	602	91.2
4.380952	1	0.2	603	91.4
4.390588	1	0.2	604	91.5
4.408871	1	0.2	605	91.7
4.50187	1	0.2	606	91.8
4.565	1	0.2	607	92.0
4.597429	1	0.2	608	92.1
4.639744	1	0.2	609	92.3
4.65058	1	0.2	610	92.4
4.666667	1	0.2	611	92.6
4.69425	1	0.2	612	92.7
4.726154	1	0.2	613	92.9
4.8	1	0.2	614	93.0
4.806171	1	0.2	615	93.2
4.8196	1	0.2	616	93.3
4.889807	1	0.2	617	93.5
5	1	0.2	618	93.6
5.28	1	0.2	619	93.8
5.483871	1	0.2	620	93.9
5.522319	1	0.2	621	94.1
5.721	1	0.2	622	94.2
5.848077	1	0.2	623	94.4
5.860615	1	0.2	624	94.5
5.866543	1	0.2	625	94.7
5.86711	1	0.2	626	94.8
5.925633	1	0.2	627	95.0
5.928571	1	0.2	628	95.2
6.25	1	0.2	629	95.3
6.265769	1	0.2	630	95.5
6.309002	1	0.2	631	95.6
6.319617	1	0.2	632	95.8
6.34069	1	0.2	633	95.9
6.344138	1	0.2	634	96.1
6.4008	1	0.2	635	96.2
6.574074	1	0.2	636	96.4
6.619529	1	0.2	637	96.5
6.923077	1	0.2	638	96.7
6.97561	1	0.2	639	96.8
7.082333	1	0.2	640	97.0
7.564034	1	0.2	641	97.1
7.566225	1	0.2	642	97.3
7.777778	1	0.2	643	97.4
7.904	1	0.2	644	97.6
7.929204	1	0.2	645	97.7
8.202247	1	0.2	646	97.9
8.5	1	0.2	647	98.0
9.46294	1	0.2	648	98.2
9.541	1	0.2	649	98.3
9.566787	1	0.2	650	98.5

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

TOTAL PERS STR

LAB14	Frequency	Percent	Cumulative Frequency	Cumulative Percent
11.11111	1	0.2	651	98.6
11.62857	1	0.2	652	98.8
11.81818	1	0.2	653	98.9
11.91806	1	0.2	654	99.1
11.97103	1	0.2	655	99.2
12.39355	1	0.2	656	99.4
13.77612	1	0.2	657	99.5
15.05174	1	0.2	658	99.7
16.34857	1	0.2	659	99.8
16.82353	1	0.2	660	100.0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INIT PERS STR

LAB16	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	21	3.9	21	3.9
0.253534	1	0.2	22	4.1
0.256637	1	0.2	23	4.2
0.258333	1	0.2	24	4.4
0.26875	1	0.2	25	4.6
0.283333	1	0.2	26	4.8
0.303571	1	0.2	27	5.0
0.32673	1	0.2	28	5.2
0.334616	1	0.2	29	5.4
0.381333	1	0.2	30	5.5
0.383304	1	0.2	31	5.7
0.4	2	0.4	33	6.1
0.411765	1	0.2	34	6.3
0.427062	1	0.2	35	6.5
0.428571	1	0.2	36	6.6
0.441	1	0.2	37	6.8
0.442353	1	0.2	38	7.0
0.446254	1	0.2	39	7.2
0.446519	1	0.2	40	7.4
0.454545	1	0.2	41	7.6
0.464375	1	0.2	42	7.7
0.467778	1	0.2	43	7.9
0.471629	1	0.2	44	8.1
0.476614	1	0.2	45	8.3
0.478667	1	0.2	46	8.5
0.488372	1	0.2	47	8.7
0.5	2	0.4	49	9.0
0.507692	1	0.2	50	9.2
0.518387	1	0.2	51	9.4
0.52	1	0.2	52	9.6
0.530713	1	0.2	53	9.8
0.53125	1	0.2	54	10.0
0.542118	1	0.2	55	10.1
0.550293	1	0.2	56	10.3
0.561818	1	0.2	57	10.5
0.580271	1	0.2	58	10.7
0.583333	1	0.2	59	10.9
0.590909	1	0.2	60	11.1
0.597165	1	0.2	61	11.3
0.597949	1	0.2	62	11.4
0.6	1	0.2	63	11.6
0.61	1	0.2	64	11.8
0.611111	1	0.2	65	12.0
0.625	1	0.2	66	12.2
0.630137	1	0.2	67	12.4
0.632813	1	0.2	68	12.5
0.64	1	0.2	69	12.7
0.650465	1	0.2	70	12.9
0.658701	1	0.2	71	13.1
0.665816	1	0.2	72	13.3
0.683411	1	0.2	73	13.5

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INIT PERS STR

LAB16	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0.685714	1	0.2	74	13.7
0.688525	1	0.2	75	13.8
0.688732	1	0.2	76	14.0
0.692308	1	0.2	77	14.2
0.694006	1	0.2	78	14.4
0.696275	1	0.2	79	14.6
0.703257	1	0.2	80	14.8
0.708333	1	0.2	81	14.9
0.71028	1	0.2	82	15.1
0.714286	2	0.4	84	15.5
0.72	1	0.2	85	15.7
0.720588	1	0.2	86	15.9
0.727273	1	0.2	87	16.1
0.733333	1	0.2	88	16.2
0.738496	1	0.2	89	16.4
0.741379	1	0.2	90	16.6
0.745554	1	0.2	91	16.8
0.75	2	0.4	93	17.2
0.757576	1	0.2	94	17.3
0.76	1	0.2	95	17.5
0.766667	2	0.4	97	17.9
0.777778	2	0.4	99	18.3
0.780454	1	0.2	100	18.5
0.792453	1	0.2	101	18.6
0.797277	1	0.2	102	18.8
0.8	3	0.6	105	19.4
0.801749	1	0.2	106	19.6
0.802556	1	0.2	107	19.7
0.809238	1	0.2	108	19.9
0.818182	2	0.4	110	20.3
0.822727	1	0.2	111	20.5
0.823529	1	0.2	112	20.7
0.828125	1	0.2	113	20.8
0.831409	1	0.2	114	21.0
0.833333	2	0.4	116	21.4
0.838937	1	0.2	117	21.6
0.84	1	0.2	118	21.8
0.84058	1	0.2	119	22.0
0.844037	1	0.2	120	22.1
0.845443	1	0.2	121	22.3
0.85	1	0.2	122	22.5
0.852081	1	0.2	123	22.7
0.855662	1	0.2	124	22.9
0.862695	1	0.2	125	23.1
0.87005	1	0.2	126	23.2
0.870775	1	0.2	127	23.4
0.871285	1	0.2	128	23.6
0.874126	1	0.2	129	23.8
0.88	1	0.2	130	24.0
0.884615	1	0.2	131	24.2
0.888889	1	0.2	132	24.4

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

The SAS System

INIT PERS STR

LAB16	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0.89498	1	0.2	133	24.5
0.909091	1	0.2	134	24.7
0.912263	1	0.2	135	24.9
0.914961	1	0.2	136	25.1
0.916667	1	0.2	137	25.3
0.918454	1	0.2	138	25.5
0.928571	1	0.2	139	25.6
0.935101	1	0.2	140	25.8
0.93633	1	0.2	141	26.0
0.9375	2	0.4	143	26.4
0.941176	1	0.2	144	26.6
0.944444	1	0.2	145	26.8
0.945946	1	0.2	146	26.9
0.947752	1	0.2	147	27.1
0.961538	1	0.2	148	27.3
0.961668	1	0.2	149	27.5
0.962704	1	0.2	150	27.7
0.970874	1	0.2	151	27.9
0.973451	1	0.2	152	28.0
0.976409	1	0.2	153	28.2
0.981651	1	0.2	154	28.4
0.986301	1	0.2	155	28.6
0.99359	1	0.2	156	28.8
1	9	1.7	165	30.4
1.001026	1	0.2	166	30.6
1.003897	1	0.2	167	30.8
1.017699	1	0.2	168	31.0
1.017886	1	0.2	169	31.2
1.033333	2	0.4	171	31.5
1.033912	1	0.2	172	31.7
1.040337	1	0.2	173	31.9
1.041667	1	0.2	174	32.1
1.044986	1	0.2	175	32.3
1.045455	1	0.2	176	32.5
1.04569	1	0.2	177	32.7
1.046512	1	0.2	178	32.8
1.048387	1	0.2	179	33.0
1.05	2	0.4	181	33.4
1.051282	1	0.2	182	33.6
1.057143	1	0.2	183	33.8
1.073171	1	0.2	184	33.9
1.075299	1	0.2	185	34.1
1.078108	1	0.2	186	34.3
1.090909	1	0.2	187	34.5
1.095238	1	0.2	188	34.7
1.1	3	0.6	191	35.2
1.105263	1	0.2	192	35.4
1.111111	2	0.4	194	35.8
1.117647	1	0.2	195	36.0
1.125	2	0.4	197	36.3
1.126761	1	0.2	198	36.5

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INIT PERS STR

LAB16	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1.132737	1	0.2	199	36.7
1.139191	1	0.2	200	36.9
1.147541	1	0.2	201	37.1
1.150995	1	0.2	202	37.3
1.160901	1	0.2	203	37.5
1.16126	1	0.2	204	37.6
1.162266	1	0.2	205	37.8
1.162791	1	0.2	206	38.0
1.166667	1	0.2	207	38.2
1.176712	1	0.2	208	38.4
1.183673	1	0.2	209	38.6
1.185567	1	0.2	210	38.7
1.1875	1	0.2	211	38.9
1.188375	1	0.2	212	39.1
1.190476	1	0.2	213	39.3
1.19403	1	0.2	214	39.5
1.2	3	0.6	217	40.0
1.200075	1	0.2	218	40.2
1.201813	1	0.2	219	40.4
1.204886	1	0.2	220	40.6
1.210526	1	0.2	221	40.8
1.211865	1	0.2	222	41.0
1.220339	1	0.2	223	41.1
1.222222	2	0.4	225	41.5
1.225063	1	0.2	226	41.7
1.229885	1	0.2	227	41.9
1.233831	1	0.2	228	42.1
1.235521	1	0.2	229	42.3
1.244444	1	0.2	230	42.4
1.25	3	0.6	233	43.0
1.2576	1	0.2	234	43.2
1.26087	1	0.2	235	43.4
1.266667	1	0.2	236	43.5
1.269505	1	0.2	237	43.7
1.291756	1	0.2	238	43.9
1.309816	1	0.2	239	44.1
1.311665	1	0.2	240	44.3
1.312432	1	0.2	241	44.5
1.315789	1	0.2	242	44.6
1.320008	1	0.2	243	44.8
1.325443	1	0.2	244	45.0
1.333333	2	0.4	246	45.4
1.337838	1	0.2	247	45.6
1.346154	1	0.2	248	45.8
1.362205	1	0.2	249	45.9
1.375	1	0.2	250	46.1
1.377778	1	0.2	251	46.3
1.378788	1	0.2	252	46.5
1.379982	1	0.2	253	46.7
1.391892	1	0.2	254	46.9
1.403576	1	0.2	255	47.0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INIT PERS STR

LAB16	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1.428571	3	0.6	258	47.6
1.436892	1	0.2	259	47.8
1.444444	1	0.2	260	48.0
1.45	1	0.2	261	48.2
1.462226	1	0.2	262	48.3
1.466283	1	0.2	263	48.5
1.46865	1	0.2	264	48.7
1.478755	1	0.2	265	48.9
1.483552	1	0.2	266	49.1
1.4836	1	0.2	267	49.3
1.500834	1	0.2	268	49.4
1.505847	1	0.2	269	49.6
1.521739	2	0.4	271	50.0
1.525	1	0.2	272	50.2
1.526316	1	0.2	273	50.4
1.527308	1	0.2	274	50.6
1.535978	1	0.2	275	50.7
1.542857	1	0.2	276	50.9
1.543048	1	0.2	277	51.1
1.552059	1	0.2	278	51.3
1.559322	1	0.2	279	51.5
1.5625	2	0.4	281	51.8
1.564103	1	0.2	282	52.0
1.578366	1	0.2	283	52.2
1.578947	1	0.2	284	52.4
1.58736	1	0.2	285	52.6
1.592105	1	0.2	286	52.8
1.595339	1	0.2	287	53.0
1.6	2	0.4	289	53.3
1.610727	1	0.2	290	53.5
1.633504	1	0.2	291	53.7
1.644376	1	0.2	292	53.9
1.654867	1	0.2	293	54.1
1.660803	1	0.2	294	54.2
1.666667	4	0.7	298	55.0
1.674296	1	0.2	299	55.2
1.677862	1	0.2	300	55.4
1.68826	1	0.2	301	55.5
1.69697	1	0.2	302	55.7
1.700569	1	0.2	303	55.9
1.727273	1	0.2	304	56.1
1.730959	1	0.2	305	56.3
1.740009	1	0.2	306	56.5
1.745923	1	0.2	307	56.6
1.75	1	0.2	308	56.8
1.75415	1	0.2	309	57.0
1.769481	1	0.2	310	57.2
1.785714	1	0.2	311	57.4
1.794053	1	0.2	312	57.6
1.797937	1	0.2	313	57.7
1.798074	1	0.2	314	57.9

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INIT PERS STR

LAB16	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1.8	2	0.4	316	58.3
1.804289	1	0.2	317	58.5
1.805085	1	0.2	318	58.7
1.828932	1	0.2	319	58.9
1.833333	1	0.2	320	59.0
1.847826	1	0.2	321	59.2
1.853279	1	0.2	322	59.4
1.859288	1	0.2	323	59.6
1.862454	1	0.2	324	59.8
1.866667	1	0.2	325	60.0
1.870046	1	0.2	326	60.1
1.875	1	0.2	327	60.3
1.879399	1	0.2	328	60.5
1.880324	1	0.2	329	60.7
1.892227	1	0.2	330	60.9
1.893458	1	0.2	331	61.1
1.894118	1	0.2	332	61.3
1.9	2	0.4	334	61.6
1.904762	1	0.2	335	61.8
1.909091	1	0.2	336	62.0
1.913043	1	0.2	337	62.2
1.914832	1	0.2	338	62.4
1.928571	1	0.2	339	62.5
1.944444	1	0.2	340	62.7
1.95	1	0.2	341	62.9
1.96	1	0.2	342	63.1
2	6	1.1	348	64.2
2.01375	1	0.2	349	64.4
2.02145	1	0.2	350	64.6
2.021702	1	0.2	351	64.8
2.021838	1	0.2	352	64.9
2.026573	1	0.2	353	65.1
2.026667	1	0.2	354	65.3
2.047912	1	0.2	355	65.5
2.055556	2	0.4	357	65.9
2.058675	1	0.2	358	66.1
2.066667	1	0.2	359	66.2
2.093023	1	0.2	360	66.4
2.0948	1	0.2	361	66.6
2.095321	2	0.4	363	67.0
2.1	1	0.2	364	67.2
2.10579	1	0.2	365	67.3
2.107125	1	0.2	366	67.5
2.111102	1	0.2	367	67.7
2.111111	1	0.2	368	67.9
2.131783	1	0.2	369	68.1
2.144741	1	0.2	370	68.3
2.153051	1	0.2	371	68.5
2.162162	1	0.2	372	68.6
2.175258	1	0.2	373	68.8
2.177617	1	0.2	374	69.0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INIT PERS STR

LAB16	Frequency	Percent	Cumulative Frequency	Cumulative Percent
2.1944	1	0.2	375	69.2
2.2	1	0.2	376	69.4
2.200389	1	0.2	377	69.6
2.202703	1	0.2	378	69.7
2.204935	1	0.2	379	69.9
2.207346	1	0.2	380	70.1
2.220497	1	0.2	381	70.3
2.222222	1	0.2	382	70.5
2.257143	1	0.2	383	70.7
2.265506	1	0.2	384	70.8
2.266667	1	0.2	385	71.0
2.26761	1	0.2	386	71.2
2.285714	2	0.4	388	71.6
2.3	1	0.2	389	71.8
2.302885	1	0.2	390	72.0
2.30875	1	0.2	391	72.1
2.324082	1	0.2	392	72.3
2.337237	1	0.2	393	72.5
2.341197	1	0.2	394	72.7
2.387097	1	0.2	395	72.9
2.4	1	0.2	396	73.1
2.417995	1	0.2	397	73.2
2.4304	1	0.2	398	73.4
2.431835	1	0.2	399	73.6
2.438364	1	0.2	400	73.8
2.473404	1	0.2	401	74.0
2.490196	1	0.2	402	74.2
2.498686	1	0.2	403	74.4
2.528175	1	0.2	404	74.5
2.548414	1	0.2	405	74.7
2.55814	1	0.2	406	74.9
2.576542	1	0.2	407	75.1
2.580645	1	0.2	408	75.3
2.63149	1	0.2	409	75.5
2.646838	1	0.2	410	75.6
2.650624	1	0.2	411	75.8
2.668882	1	0.2	412	76.0
2.692319	1	0.2	413	76.2
2.707933	1	0.2	414	76.4
2.710056	1	0.2	415	76.6
2.742188	1	0.2	416	76.8
2.745432	1	0.2	417	76.9
2.75	1	0.2	418	77.1
2.751841	1	0.2	419	77.3
2.765464	1	0.2	420	77.5
2.787456	1	0.2	421	77.7
2.803836	1	0.2	422	77.9
2.814815	1	0.2	423	78.0
2.829837	1	0.2	424	78.2
2.832351	1	0.2	425	78.4
2.856322	1	0.2	426	78.6

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INIT PERS STR

LAB16	Frequency	Percent	Cumulative Frequency	Cumulative Percent
2.85782	1	0.2	427	78.8
2.866667	1	0.2	428	79.0
2.869822	1	0.2	429	79.2
2.872	1	0.2	430	79.3
2.875	1	0.2	431	79.5
2.890815	1	0.2	432	79.7
2.9188	1	0.2	433	79.9
2.93299	1	0.2	434	80.1
2.939496	1	0.2	435	80.3
2.941794	1	0.2	436	80.4
2.981481	1	0.2	437	80.6
2.984496	1	0.2	438	80.8
3	3	0.6	441	81.4
3.01716	1	0.2	442	81.5
3.018239	1	0.2	443	81.7
3.039294	2	0.4	445	82.1
3.040516	1	0.2	446	82.3
3.049818	1	0.2	447	82.5
3.052632	1	0.2	448	82.7
3.056769	1	0.2	449	82.8
3.076923	1	0.2	450	83.0
3.084337	1	0.2	451	83.2
3.10681	1	0.2	452	83.4
3.111111	1	0.2	453	83.6
3.11604	1	0.2	454	83.8
3.230769	1	0.2	455	83.9
3.244444	1	0.2	456	84.1
3.255338	1	0.2	457	84.3
3.271509	1	0.2	458	84.5
3.304584	1	0.2	459	84.7
3.306289	1	0.2	460	84.9
3.333333	1	0.2	461	85.1
3.342625	1	0.2	462	85.2
3.425678	1	0.2	463	85.4
3.428571	1	0.2	464	85.6
3.444444	1	0.2	465	85.8
3.454545	1	0.2	466	86.0
3.483871	1	0.2	467	86.2
3.501704	1	0.2	468	86.3
3.502143	1	0.2	469	86.5
3.514807	1	0.2	470	86.7
3.552444	1	0.2	471	86.9
3.6	1	0.2	472	87.1
3.636364	1	0.2	473	87.3
3.714286	1	0.2	474	87.5
3.730886	1	0.2	475	87.6
3.75	1	0.2	476	87.8
3.76152	1	0.2	477	88.0
3.820155	1	0.2	478	88.2
3.892346	1	0.2	479	88.4
3.896916	1	0.2	480	88.6

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

The SAS System

INIT PERS STR

LAB16	Frequency	Percent	Cumulative Frequency	Cumulative Percent
3.928571	1	0.2	481	88.7
3.93808	1	0.2	482	88.9
4	1	0.2	483	89.1
4.035714	1	0.2	484	89.3
4.087838	1	0.2	485	89.5
4.104235	1	0.2	486	89.7
4.187778	1	0.2	487	89.9
4.221765	1	0.2	488	90.0
4.248919	1	0.2	489	90.2
4.274793	1	0.2	490	90.4
4.277778	1	0.2	491	90.6
4.304348	1	0.2	492	90.8
4.390588	1	0.2	493	91.0
4.408871	1	0.2	494	91.1
4.50187	1	0.2	495	91.3
4.597429	1	0.2	496	91.5
4.639744	1	0.2	497	91.7
4.65058	1	0.2	498	91.9
4.666667	1	0.2	499	92.1
4.69425	1	0.2	500	92.3
4.726154	1	0.2	501	92.4
4.8	1	0.2	502	92.6
4.806171	1	0.2	503	92.8
4.8196	1	0.2	504	93.0
4.941176	1	0.2	505	93.2
5.28	1	0.2	506	93.4
5.483871	1	0.2	507	93.5
5.523319	1	0.2	508	93.7
5.721	1	0.2	509	93.9
5.848077	1	0.2	510	94.1
5.860615	1	0.2	511	94.3
5.86711	1	0.2	512	94.5
5.925633	1	0.2	513	94.6
5.928571	1	0.2	514	94.8
6.265769	1	0.2	515	95.0
6.309002	1	0.2	516	95.2
6.319617	1	0.2	517	95.4
6.34069	1	0.2	518	95.6
6.344138	1	0.2	519	95.8
6.4008	1	0.2	520	95.9
6.574074	1	0.2	521	96.1
6.97561	1	0.2	522	96.3
7.082333	1	0.2	523	96.5
7.904	1	0.2	524	96.7
7.929204	1	0.2	525	96.9
8.202247	1	0.2	526	97.0
8.5	1	0.2	527	97.2
9.46294	1	0.2	528	97.4
9.541	1	0.2	529	97.6
9.566787	1	0.2	530	97.8
11.11111	1	0.2	531	98.0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

INIT PERS STR

LAB16	Frequency	Percent	Cumulative Frequency	Cumulative Percent
11.42857	1	0.2	532	98.2
11.81818	1	0.2	533	98.3
11.91806	1	0.2	534	98.5
11.97103	1	0.2	535	98.7
12.39355	1	0.2	536	98.9
13.77612	1	0.2	537	99.1
13.88889	1	0.2	538	99.3
15.05174	1	0.2	539	99.4
16.34857	1	0.2	540	99.6
16.82353	1	0.2	541	99.8
17.5	1	0.2	542	100.0

Frequency Missing = 118

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

HORSE CAV

LAB26	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	30	17.6	30	17.6
0.1	3	1.8	33	19.4
0.25	1	0.6	34	20.0
0.294118	1	0.6	35	20.6
0.3	1	0.6	36	21.2
0.333333	1	0.6	37	21.8
0.351383	1	0.6	38	22.4
0.386667	1	0.6	39	22.9
0.4	1	0.6	40	23.5
0.416667	1	0.6	41	24.1
0.460787	1	0.6	42	24.7
0.487325	1	0.6	43	25.3
0.576923	1	0.6	44	25.9
0.583333	1	0.6	45	26.5
0.6	3	1.8	48	28.2
0.615385	1	0.6	49	28.8
0.625	3	1.8	52	30.6
0.640618	1	0.6	53	31.2
0.666667	5	2.9	58	34.1
0.675	1	0.6	59	34.7
0.681818	1	0.6	60	35.3
0.689655	1	0.6	61	35.9
0.7	1	0.6	62	36.5
0.723404	1	0.6	63	37.1
0.728597	1	0.6	64	37.6
0.75	1	0.6	65	38.2
0.775	1	0.6	66	38.8
0.78125	1	0.6	67	39.4
0.785714	2	1.2	69	40.6
0.8	2	1.2	71	41.8
0.831536	1	0.6	72	42.4
0.833333	2	1.2	74	43.5
0.856031	1	0.6	75	44.1
0.857143	2	1.2	77	45.3
0.9	2	1.2	79	46.5
0.904545	1	0.6	80	47.1
0.909091	1	0.6	81	47.6
0.925	1	0.6	82	48.2
0.933333	1	0.6	83	48.8
0.9375	1	0.6	84	49.4
0.941176	1	0.6	85	50.0
0.949721	1	0.6	86	50.6
0.9725	1	0.6	87	51.2
1	14	8.2	101	59.4
1.05	1	0.6	102	60.0
1.071429	1	0.6	103	60.6
1.081081	1	0.6	104	61.2
1.085714	1	0.6	105	61.8
1.1	1	0.6	106	62.4
1.111111	3	1.8	109	64.1
1.123091	1	0.6	110	64.7

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

HORSE CAV

LAB26	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1.125	1	0.6	111	65.3
1.176471	1	0.6	112	65.9
1.2	1	0.6	113	66.5
1.230769	1	0.6	114	67.1
1.25	2	1.2	116	68.2
1.285714	2	1.2	118	69.4
1.3	1	0.6	119	70.0
1.318182	1	0.6	120	70.6
1.349206	1	0.6	121	71.2
1.384615	1	0.6	122	71.8
1.4	2	1.2	124	72.9
1.40625	1	0.6	125	73.5
1.425	1	0.6	126	74.1
1.428571	1	0.6	127	74.7
1.44	1	0.6	128	75.3
1.45	1	0.6	129	75.9
1.470588	1	0.6	130	76.5
1.5	1	0.6	131	77.1
1.555556	1	0.6	132	77.6
1.568627	1	0.6	133	78.2
1.591773	1	0.6	134	78.8
1.6	1	0.6	135	79.4
1.615385	1	0.6	136	80.0
1.645252	1	0.6	137	80.6
1.672	1	0.6	138	81.2
1.68	1	0.6	139	81.8
1.714286	2	1.2	141	82.9
1.7908	1	0.6	142	83.5
1.851852	1	0.6	143	84.1
1.88	1	0.6	144	84.7
1.94742	1	0.6	145	85.3
2	9	5.3	154	90.6
2.072807	1	0.6	155	91.2
2.25	1	0.6	156	91.8
2.272727	1	0.6	157	92.4
2.4424	1	0.6	158	92.9
2.491979	1	0.6	159	93.5
2.571429	1	0.6	160	94.1
2.6	1	0.6	161	94.7
2.8	2	1.2	163	95.9
3.333333	1	0.6	164	96.5
3.444444	1	0.6	165	97.1
4.5	1	0.6	166	97.6
4.75	1	0.6	167	98.2
8.125	1	0.6	168	98.8
9	1	0.6	169	99.4
10.78056	1	0.6	170	100.0

Frequency Missing = 490

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

The SAS System

TOT TANK

LAB28	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	11	3.6	11	3.6
0.035714	1	0.3	12	3.9
0.05	1	0.3	13	4.2
0.1	13	4.2	26	8.4
0.133333	1	0.3	27	8.7
0.352941	1	0.3	28	9.1
0.40367	1	0.3	29	9.4
0.40678	1	0.3	30	9.7
0.424528	1	0.3	31	10.0
0.486486	1	0.3	32	10.4
0.488889	1	0.3	33	10.7
0.52	1	0.3	34	11.0
0.533981	1	0.3	35	11.3
0.588235	1	0.3	36	11.7
0.612022	1	0.3	37	12.0
0.622222	1	0.3	38	12.3
0.625	1	0.3	39	12.6
0.66129	1	0.3	40	12.9
0.700441	1	0.3	41	13.3
0.714286	1	0.3	42	13.6
0.716607	1	0.3	43	13.9
0.733333	1	0.3	44	14.2
0.746269	2	0.6	46	14.9
0.769784	1	0.3	47	15.2
0.771739	1	0.3	48	15.5
0.784706	1	0.3	49	15.9
0.788104	1	0.3	50	16.2
0.791809	1	0.3	51	16.5
0.809901	1	0.3	52	16.8
0.820669	1	0.3	53	17.2
0.821705	1	0.3	54	17.5
0.826121	1	0.3	55	17.8
0.833333	1	0.3	56	18.1
0.857143	1	0.3	57	18.4
0.868726	1	0.3	58	18.8
0.884319	1	0.3	59	19.1
0.897887	1	0.3	60	19.4
0.915966	1	0.3	61	19.7
0.924528	1	0.3	62	20.1
0.943089	1	0.3	63	20.4
0.98419	1	0.3	64	20.7
1	5	1.6	69	22.3
1.027132	1	0.3	70	22.7
1.032787	1	0.3	71	23.0
1.051429	1	0.3	72	23.3
1.052632	2	0.6	74	23.9
1.059666	1	0.3	75	24.3
1.071429	2	0.6	77	24.9
1.081081	1	0.3	78	25.2
1.125	1	0.3	79	25.6
1.129167	1	0.3	80	25.9

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

The SAS System 15:48 Tuesday, October 3, 1995 30

TOT TANK

LAB28	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1.13	1	0.3	81	26.2
1.144444	1	0.3	82	26.5
1.153846	1	0.3	83	26.9
1.166667	1	0.3	84	27.2
1.184211	1	0.3	85	27.5
1.2	1	0.3	86	27.8
1.218274	1	0.3	87	28.2
1.268868	1	0.3	88	28.5
1.27907	1	0.3	89	28.8
1.287129	1	0.3	90	29.1
1.288235	1	0.3	91	29.4
1.295775	1	0.3	92	29.8
1.307692	2	0.6	94	30.4
1.358974	1	0.3	95	30.7
1.365385	1	0.3	96	31.1
1.373333	1	0.3	97	31.4
1.378788	1	0.3	98	31.7
1.4	1	0.3	99	32.0
1.403361	1	0.3	100	32.4
1.416667	1	0.3	101	32.7
1.425	1	0.3	102	33.0
1.43662	1	0.3	103	33.3
1.470588	1	0.3	104	33.7
1.5	2	0.6	106	34.3
1.543478	1	0.3	107	34.6
1.585106	1	0.3	108	35.0
1.651316	1	0.3	109	35.3
1.672414	1	0.3	110	35.6
1.748735	2	0.6	112	36.2
1.783019	1	0.3	113	36.6
1.79661	1	0.3	114	36.9
1.8	2	0.6	116	37.5
1.875	1	0.3	117	37.9
1.884615	1	0.3	118	38.2
1.894737	3	1.0	121	39.2
1.896226	1	0.3	122	39.5
1.927273	1	0.3	123	39.8
1.956522	1	0.3	124	40.1
1.96	1	0.3	125	40.5
1.962963	2	0.6	127	41.1
1.969432	1	0.3	128	41.4
2.037356	1	0.3	129	41.7
2.089147	1	0.3	130	42.1
2.094595	1	0.3	131	42.4
2.096296	1	0.3	132	42.7
2.115385	1	0.3	133	43.0
2.133333	1	0.3	134	43.4
2.140884	1	0.3	135	43.7
2.142857	1	0.3	136	44.0
2.163265	1	0.3	137	44.3
2.198889	1	0.3	138	44.7

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

TOT TANK

LAB20	Frequency	Percent	Cumulative Frequency	Cumulative Percent
2.2	1	0.3	139	45.0
2.258065	1	0.3	140	45.3
2.275	1	0.3	141	45.6
2.361842	1	0.3	142	46.0
2.4	2	0.6	144	46.6
2.409091	1	0.3	145	46.9
2.416667	1	0.3	146	47.2
2.488889	1	0.3	147	47.6
2.5	2	0.6	149	48.2
2.52381	2	0.6	151	48.9
2.5625	1	0.3	152	49.2
2.592803	1	0.3	153	49.5
2.593333	1	0.3	154	49.8
2.81	1	0.3	155	50.2
2.857143	1	0.3	156	50.5
2.890909	1	0.3	157	50.8
2.90411	1	0.3	158	51.1
2.907143	1	0.3	159	51.5
2.966667	1	0.3	160	51.8
3	1	0.3	161	52.1
3.057143	1	0.3	162	52.4
3.066667	1	0.3	163	52.8
3.125	1	0.3	164	53.1
3.285714	1	0.3	165	53.4
3.318182	2	0.6	167	54.0
3.525	1	0.3	168	54.4
3.533333	3	1.0	171	55.3
3.57	1	0.3	172	55.7
3.571429	2	0.6	174	56.3
3.6	3	1.0	177	57.3
3.65	1	0.3	178	57.6
3.65625	1	0.3	179	57.9
3.666667	1	0.3	180	58.3
3.75	1	0.3	181	58.6
3.821667	1	0.3	182	58.9
3.95	1	0.3	183	59.2
4	1	0.3	184	59.5
4.051282	2	0.6	186	60.2
4.064516	1	0.3	187	60.5
4.15	1	0.3	188	60.8
4.153846	1	0.3	189	61.2
4.25	1	0.3	190	61.5
4.457143	1	0.3	191	61.8
4.652174	1	0.3	192	62.1
4.764045	1	0.3	193	62.5
4.789474	1	0.3	194	62.8
4.818182	1	0.3	195	63.1
4.906977	1	0.3	196	63.4
4.952381	1	0.3	197	63.8
5.038462	1	0.3	198	64.1
5.095238	1	0.3	199	64.4

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

TOT TANK

LAB28	Frequency	Percent	Cumulative Frequency	Cumulative Percent
5.363636	1	0.3	200	64.7
5.368421	1	0.3	201	65.0
5.6	1	0.3	202	65.4
5.652174	1	0.3	203	65.7
5.818182	1	0.3	204	66.0
5.82	1	0.3	205	66.3
5.861111	1	0.3	206	66.7
5.904762	1	0.3	207	67.0
5.9375	1	0.3	208	67.3
6.083333	1	0.3	209	67.6
6.225	1	0.3	210	68.0
7.107692	1	0.3	211	68.3
7.1875	1	0.3	212	68.6
7.323529	1	0.3	213	68.9
7.333333	1	0.3	214	69.3
7.5	1	0.3	215	69.6
8.31746	1	0.3	216	69.9
8.32	1	0.3	217	70.2
9	75	24.3	292	94.5
9.727273	1	0.3	293	94.8
9.8	1	0.3	294	95.1
10.30435	1	0.3	295	95.5
10.48387	1	0.3	296	95.8
10.76056	1	0.3	297	96.1
11.72222	1	0.3	298	96.4
12.42105	1	0.3	299	96.8
12.625	1	0.3	300	97.1
13.06667	1	0.3	301	97.4
14.85714	1	0.3	302	97.7
15.6	1	0.3	303	98.1
15.8	1	0.3	304	98.4
16.3	1	0.3	305	98.7
18.8	1	0.3	306	99.0
19.5	1	0.3	307	99.4
19.875	1	0.3	308	99.7
21.13333	1	0.3	309	100.0

Frequency Missing = 351

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst Tue Oct 3 15:48:07 1995 33

LITE TANK

LAB30	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	4	2.2	4	2.2
0.1	25	13.5	29	15.7
0.45	1	0.5	30	16.2
0.5	2	1.1	32	17.3
0.511905	1	0.5	33	17.8
0.555556	1	0.5	34	18.4
0.571429	2	1.1	36	19.5
0.6	1	0.5	37	20.0
0.7	1	0.5	38	20.5
0.733333	1	0.5	39	21.1
0.857143	1	0.5	40	21.6
0.869565	1	0.5	41	22.2
1	3	1.6	44	23.8
1.111111	1	0.5	45	24.3
1.176471	1	0.5	46	24.9
1.25	1	0.5	47	25.4
1.333333	2	1.1	49	26.5
1.384615	1	0.5	50	27.0
1.5	1	0.5	51	27.6
1.666667	2	1.1	53	28.6
1.8	1	0.5	54	29.2
2	1	0.5	55	29.7
2.333333	2	1.1	57	30.8
2.5	1	0.5	58	31.4
2.727273	1	0.5	59	31.9
2.903226	1	0.5	60	32.4
3	2	1.1	62	33.5
5.666667	1	0.5	63	34.1
8.076923	1	0.5	64	34.6
8.333333	1	0.5	65	35.1
9	118	63.8	183	98.9
15	1	0.5	184	99.5
19.75	1	0.5	185	100.0

Frequency Missing = 475

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

The SAS System

MAIN TANK

LAB32	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	9	3.9	9	3.9
0.1	10	4.3	19	8.3
0.133333	1	0.4	20	8.7
0.2	1	0.4	21	9.1
0.229167	1	0.4	22	9.6
0.278689	1	0.4	23	10.0
0.40678	1	0.4	24	10.4
0.481328	1	0.4	25	10.9
0.488889	1	0.4	26	11.3
0.505618	1	0.4	27	11.7
0.540541	1	0.4	28	12.2
0.702439	1	0.4	29	12.6
0.725806	1	0.4	30	13.0
0.730964	1	0.4	31	13.5
0.733333	1	0.4	32	13.9
0.733696	1	0.4	33	14.3
0.75	1	0.4	34	14.8
0.755906	1	0.4	35	15.2
0.769784	1	0.4	36	15.7
0.771704	1	0.4	37	16.1
0.771739	1	0.4	38	16.5
0.782609	1	0.4	39	17.0
0.784741	1	0.4	40	17.4
0.785185	1	0.4	41	17.8
0.8	1	0.4	42	18.3
0.850622	1	0.4	43	18.7
0.859873	1	0.4	44	19.1
0.865385	1	0.4	45	19.6
0.874652	1	0.4	46	20.0
0.904959	1	0.4	47	20.4
0.935764	1	0.4	48	20.9
0.9642	1	0.4	49	21.3
0.987654	1	0.4	50	21.7
1.041667	1	0.4	51	22.2
1.071429	2	0.9	53	23.0
1.081081	1	0.4	54	23.5
1.101124	1	0.4	55	23.9
1.121212	1	0.4	56	24.3
1.13	1	0.4	57	24.8
1.141026	1	0.4	58	25.2
1.153846	1	0.4	59	25.7
1.157895	1	0.4	60	26.1
1.166667	1	0.4	61	26.5
1.173913	1	0.4	62	27.0
1.228395	1	0.4	63	27.4
1.232877	1	0.4	64	27.8
1.253521	1	0.4	65	28.3
1.273148	1	0.4	66	28.7
1.28	1	0.4	67	29.1
1.295775	1	0.4	68	29.6
1.307692	2	0.9	70	30.4

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

The SAS System

MAIN TANK

LAB32	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1.354167	1	0.4	71	30.9
1.447205	1	0.4	72	31.3
1.448276	1	0.4	73	31.7
1.5	1	0.4	74	32.2
1.508475	1	0.4	75	32.6
1.543478	1	0.4	76	33.0
1.586957	1	0.4	77	33.5
1.603448	1	0.4	78	33.9
1.648148	2	0.9	80	34.8
1.693727	2	0.9	82	35.7
1.788462	1	0.4	83	36.1
1.8	2	0.9	85	37.0
1.816327	1	0.4	86	37.4
1.825	1	0.4	87	37.8
1.866477	1	0.4	88	38.3
1.894737	1	0.4	89	38.7
1.895833	1	0.4	90	39.1
2	2	0.9	92	40.0
2.014085	1	0.4	93	40.4
2.022727	1	0.4	94	40.9
2.04	1	0.4	95	41.3
2.102941	1	0.4	96	41.7
2.119048	2	0.9	98	42.6
2.13961	1	0.4	99	43.0
2.142857	1	0.4	100	43.5
2.162963	1	0.4	101	43.9
2.2	1	0.4	102	44.3
2.204545	1	0.4	103	44.8
2.241071	1	0.4	104	45.2
2.258427	1	0.4	105	45.7
2.266667	2	0.9	107	46.5
2.276042	1	0.4	108	47.0
2.307692	1	0.4	109	47.4
2.4	1	0.4	110	47.8
2.5	2	0.9	112	48.7
2.533333	1	0.4	113	49.1
2.54717	1	0.4	114	49.6
2.69375	1	0.4	115	50.0
2.733333	1	0.4	116	50.4
2.857143	1	0.4	117	50.9
2.923077	1	0.4	118	51.3
2.966667	3	1.3	121	52.6
3	1	0.4	122	53.0
3.05618	1	0.4	123	53.5
3.057143	1	0.4	124	53.9
3.272727	2	0.9	126	54.8
3.333333	1	0.4	127	55.2
3.419048	1	0.4	128	55.7
3.534884	1	0.4	129	56.1
3.571429	2	0.9	131	57.0
3.6	1	0.4	132	57.4

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst   Tue Oct 3 15:48:07 1995   36

The SAS System   15:48 Tuesday, October 3, 1995 36

MAIN TANK

LAB32	Frequency	Percent	Cumulative Frequency	Cumulative Percent
3.666667	1	0.4	133	57.8
3.719298	1	0.4	134	58.3
3.730769	1	0.4	135	58.7
3.75	1	0.4	136	59.1
3.806818	1	0.4	137	59.6
3.83871	1	0.4	138	60.0
3.875	1	0.4	139	60.4
3.913043	1	0.4	140	60.9
3.971429	1	0.4	141	61.3
3.974359	2	0.9	143	62.2
4.045455	1	0.4	144	62.6
4.173913	1	0.4	145	63.0
4.222222	1	0.4	146	63.5
4.25	1	0.4	147	63.9
4.285714	2	0.9	149	64.8
4.676923	1	0.4	150	65.2
4.686211	1	0.4	151	65.7
4.8	2	0.9	153	66.5
4.866667	1	0.4	154	67.0
4.95	1	0.4	155	67.4
5.028571	1	0.4	156	67.8
5.233333	1	0.4	157	68.3
5.375	1	0.4	158	68.7
5.761905	1	0.4	159	69.1
5.823529	1	0.4	160	69.6
5.973333	1	0.4	161	70.0
7.30303	1	0.4	162	70.4
7.478261	1	0.4	163	70.9
7.645161	1	0.4	164	71.3
8.444444	1	0.4	165	71.7
8.815789	1	0.4	166	72.2
9	56	24.3	222	96.5
9.5625	1	0.4	223	97.0
10.66667	1	0.4	224	97.4
11.3	1	0.4	225	97.8
12.4	1	0.4	226	98.3
14.4	1	0.4	227	98.7
15.93333	1	0.4	228	99.1
19.5	1	0.4	229	99.6
19.91667	1	0.4	230	100.0

Frequency Missing = 430

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst   Tue Oct 3 15:48:07 1995   37

The SAS System   15:48 Tuesday, October 3, 1995 37

ARTY TUBES

LAB34	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	73	12.7	73	12.7
0.04	1	0.2	74	12.8
0.050955	1	0.2	75	13.0
0.068858	1	0.2	76	13.2
0.071429	1	0.2	77	13.3
0.083333	1	0.2	78	13.5
0.1	5	0.9	83	14.4
0.111111	2	0.3	85	14.7
0.125	1	0.2	86	14.9
0.166667	1	0.2	87	15.1
0.175	1	0.2	88	15.3
0.2	1	0.2	89	15.4
0.207493	1	0.2	90	15.6
0.208333	1	0.2	91	15.8
0.216578	1	0.2	92	15.9
0.216779	1	0.2	93	16.1
0.222222	1	0.2	94	16.3
0.225352	1	0.2	95	16.5
0.234375	1	0.2	96	16.6
0.24	1	0.2	97	16.8
0.246154	1	0.2	98	17.0
0.25	4	0.7	102	17.7
0.26	1	0.2	103	17.9
0.272727	1	0.2	104	18.0
0.285714	1	0.2	105	18.2
0.292683	1	0.2	106	18.4
0.298137	1	0.2	107	18.5
0.299331	1	0.2	108	18.7
0.3	1	0.2	109	18.9
0.30303	1	0.2	110	19.1
0.3115	1	0.2	111	19.2
0.315789	1	0.2	112	19.4
0.325	1	0.2	113	19.6
0.333333	1	0.2	114	19.8
0.342105	1	0.2	115	19.9
0.342857	1	0.2	116	20.1
0.345324	1	0.2	117	20.3
0.347458	1	0.2	118	20.5
0.366071	1	0.2	119	20.6
0.372	1	0.2	120	20.8
0.375	1	0.2	121	21.0
0.38	1	0.2	122	21.1
0.385289	1	0.2	123	21.3
0.397351	1	0.2	124	21.5
0.401099	1	0.2	125	21.7
0.431655	1	0.2	126	21.8
0.433735	1	0.2	127	22.0
0.444444	2	0.3	129	22.4
0.45	1	0.2	130	22.5
0.456522	1	0.2	131	22.7
0.461538	1	0.2	132	22.9

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

ARTI TUBES

LAB34	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0.466667	1	0.2	133	23.1
0.487805	1	0.2	134	23.2
0.5	4	0.7	138	23.9
0.517241	1	0.2	139	24.1
0.525547	1	0.2	140	24.3
0.529412	1	0.2	141	24.4
0.53719	1	0.2	142	24.6
0.545455	3	0.5	145	25.1
0.571429	2	0.3	147	25.5
0.572368	1	0.2	148	25.6
0.576923	1	0.2	149	25.8
0.583333	1	0.2	150	26.0
0.594595	1	0.2	151	26.2
0.59901	1	0.2	152	26.3
0.6	1	0.2	153	26.5
0.604167	1	0.2	154	26.7
0.605042	1	0.2	155	26.9
0.606897	1	0.2	156	27.0
0.612245	1	0.2	157	27.2
0.615385	1	0.2	158	27.4
0.629371	1	0.2	159	27.6
0.631579	1	0.2	160	27.7
0.634969	1	0.2	161	27.9
0.635294	1	0.2	162	28.1
0.636364	1	0.2	163	28.2
0.638298	1	0.2	164	28.4
0.64	1	0.2	165	28.6
0.65625	1	0.2	166	28.8
0.666667	7	1.2	173	30.0
0.699029	1	0.2	174	30.2
0.7	1	0.2	175	30.3
0.705882	1	0.2	176	30.5
0.736264	1	0.2	177	30.7
0.736842	1	0.2	178	30.8
0.739726	1	0.2	179	31.0
0.742857	1	0.2	180	31.2
0.744681	1	0.2	181	31.4
0.748322	1	0.2	182	31.5
0.75	4	0.7	186	32.2
0.763158	1	0.2	187	32.4
0.769231	1	0.2	188	32.6
0.783582	1	0.2	189	32.8
0.785714	1	0.2	190	32.9
0.791667	1	0.2	191	33.1
0.794872	1	0.2	192	33.3
0.795238	1	0.2	193	33.4
0.796875	1	0.2	194	33.6
0.8	2	0.3	196	34.0
0.813333	1	0.2	197	34.1
0.813559	1	0.2	198	34.3
0.833333	1	0.2	199	34.5

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

ARTY TUBES

LAB34	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0.83913	1	0.2	200	34.7
0.84375	1	0.2	201	34.8
0.845238	1	0.2	202	35.0
0.860437	1	0.2	203	35.2
0.864865	1	0.2	204	35.4
0.87037	1	0.2	205	35.5
0.877005	1	0.2	206	35.7
0.888889	2	0.3	208	36.0
0.9	1	0.2	209	36.2
0.902703	1	0.2	210	36.4
0.911111	1	0.2	211	36.6
0.915094	1	0.2	212	36.7
0.917188	1	0.2	213	36.9
0.923077	1	0.2	214	37.1
0.928571	1	0.2	215	37.3
0.946429	1	0.2	216	37.4
0.95	1	0.2	217	37.6
0.950495	1	0.2	218	37.8
0.958333	1	0.2	219	38.0
0.96	1	0.2	220	38.1
0.967742	2	0.3	222	38.5
0.96875	1	0.2	223	38.6
0.972222	1	0.2	224	38.8
0.986726	1	0.2	225	39.0
1	12	2.1	237	41.1
1.01	1	0.2	238	41.3
1.012987	1	0.2	239	41.4
1.014493	1	0.2	240	41.6
1.01845	1	0.2	241	41.8
1.020408	1	0.2	242	41.9
1.026786	1	0.2	243	42.1
1.028571	1	0.2	244	42.3
1.031915	1	0.2	245	42.5
1.032258	1	0.2	246	42.6
1.041667	2	0.3	248	43.0
1.049837	1	0.2	249	43.2
1.050505	1	0.2	250	43.3
1.052083	1	0.2	251	43.5
1.058824	1	0.2	252	43.7
1.0625	1	0.2	253	43.8
1.064887	1	0.2	254	44.0
1.066667	1	0.2	255	44.2
1.074074	2	0.3	257	44.5
1.078947	1	0.2	258	44.7
1.083333	1	0.2	259	44.9
1.086957	1	0.2	260	45.1
1.089744	1	0.2	261	45.2
1.090909	1	0.2	262	45.4
1.092593	1	0.2	263	45.6
1.1	1	0.2	264	45.8
1.111111	2	0.3	266	46.1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

ARTY TUBES

LAB34	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1.116279	1	0.2	267	46.3
1.118644	1	0.2	268	46.4
1.122449	1	0.2	269	46.6
1.123288	1	0.2	270	46.8
1.12963	1	0.2	271	47.0
1.133333	1	0.2	272	47.1
1.135417	1	0.2	273	47.3
1.142857	1	0.2	274	47.5
1.148936	1	0.2	275	47.7
1.152542	1	0.2	276	47.8
1.154167	1	0.2	277	48.0
1.166667	1	0.2	278	48.2
1.183333	1	0.2	279	48.4
1.190789	1	0.2	280	48.5
1.193548	1	0.2	281	48.7
1.2	5	0.9	286	49.6
1.20904	1	0.2	287	49.7
1.235294	1	0.2	288	49.9
1.242908	1	0.2	289	50.1
1.247863	1	0.2	290	50.3
1.25	1	0.2	291	50.4
1.268116	1	0.2	292	50.6
1.277778	2	0.3	294	51.0
1.282051	1	0.2	295	51.1
1.283951	1	0.2	296	51.3
1.285714	1	0.2	297	51.5
1.296875	1	0.2	298	51.6
1.300813	1	0.2	299	51.8
1.321429	1	0.2	300	52.0
1.325	1	0.2	301	52.2
1.327273	1	0.2	302	52.3
1.333333	9	1.6	311	53.9
1.339623	1	0.2	312	54.1
1.357143	1	0.2	313	54.2
1.363333	1	0.2	314	54.4
1.37	1	0.2	315	54.6
1.394737	2	0.3	317	54.9
1.407692	1	0.2	318	55.1
1.419643	1	0.2	319	55.3
1.420561	1	0.2	320	55.5
1.428571	5	0.9	325	56.3
1.4375	1	0.2	326	56.5
1.454545	1	0.2	327	56.7
1.455696	1	0.2	328	56.8
1.5	6	1.0	334	57.9
1.507692	1	0.2	335	58.1
1.511111	3	0.5	338	58.6
1.514019	1	0.2	339	58.8
1.51634	1	0.2	340	58.9
1.519608	1	0.2	341	59.1
1.521739	1	0.2	342	59.3

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst   Tue Oct 3 15:48:07 1995   41

The SAS System   15:48 Tuesday, October 3, 1995 41

ARTY TUBES

LAB34	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1.533333	1	0.2	343	59.4
1.533784	2	0.3	345	59.8
1.540984	1	0.2	346	60.0
1.5625	1	0.2	347	60.1
1.568182	1	0.2	348	60.3
1.571429	1	0.2	349	60.5
1.572368	1	0.2	350	60.7
1.586777	1	0.2	351	60.8
1.6	6	1.0	357	61.9
1.625	1	0.2	358	62.0
1.666667	2	0.3	360	62.4
1.678049	1	0.2	361	62.6
1.7	1	0.2	362	62.7
1.714286	3	0.5	365	63.3
1.722826	1	0.2	366	63.4
1.75	4	0.7	370	64.1
1.776	1	0.2	371	64.3
1.777778	2	0.3	373	64.6
1.8	4	0.7	377	65.3
1.818182	1	0.2	378	65.5
1.819672	1	0.2	379	65.7
1.829268	1	0.2	380	65.9
1.833333	1	0.2	381	66.0
1.851852	1	0.2	382	66.2
1.868421	1	0.2	383	66.4
1.870213	1	0.2	384	66.6
1.875	1	0.2	385	66.7
1.891892	1	0.2	386	66.9
1.892857	1	0.2	387	67.1
1.9	2	0.3	389	67.4
1.903846	1	0.2	390	67.6
1.912088	1	0.2	391	67.8
1.915254	1	0.2	392	67.9
1.921053	1	0.2	393	68.1
1.930265	1	0.2	394	68.3
1.933333	1	0.2	395	68.5
1.950617	1	0.2	396	68.6
1.96748	1	0.2	397	68.8
1.967857	1	0.2	398	69.0
1.972222	1	0.2	399	69.2
1.974359	1	0.2	400	69.3
1.980392	1	0.2	401	69.5
2	11	1.9	412	71.4
2.015909	1	0.2	413	71.6
2.017241	1	0.2	414	71.8
2.039216	1	0.2	415	71.9
2.069767	1	0.2	416	72.1
2.090385	1	0.2	417	72.3
2.096774	1	0.2	418	72.4
2.105263	1	0.2	419	72.6
2.109589	1	0.2	420	72.8

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

ARTI TUBES

LAB34	Frequency	Percent	Cumulative Frequency	Cumulative Percent
2.125	1	0.2	421	73.0
2.131579	1	0.2	422	73.1
2.2	2	0.3	424	73.5
2.229885	1	0.2	425	73.7
2.243902	1	0.2	426	73.8
2.258824	1	0.2	427	74.0
2.266	1	0.2	428	74.2
2.285714	1	0.2	429	74.4
2.290076	1	0.2	430	74.5
2.346875	1	0.2	431	74.7
2.364706	1	0.2	432	74.9
2.375	1	0.2	433	75.0
2.376471	1	0.2	434	75.2
2.39	1	0.2	435	75.4
2.393443	1	0.2	436	75.6
2.4	2	0.3	438	75.9
2.428571	1	0.2	439	76.1
2.464286	1	0.2	440	76.3
2.465753	1	0.2	441	76.4
2.490566	1	0.2	442	76.6
2.5	4	0.7	446	77.3
2.507246	1	0.2	447	77.5
2.56	1	0.2	448	77.6
2.5892	1	0.2	449	77.8
2.621951	1	0.2	450	78.0
2.628205	1	0.2	451	78.2
2.653846	1	0.2	452	78.3
2.695122	1	0.2	453	78.5
2.702703	1	0.2	454	78.7
2.707317	1	0.2	455	78.9
2.711864	1	0.2	456	79.0
2.741379	1	0.2	457	79.2
2.75	1	0.2	458	79.4
2.778107	1	0.2	459	79.5
2.8	1	0.2	460	79.7
2.904762	2	0.3	462	80.1
2.927461	1	0.2	463	80.2
2.941176	1	0.2	464	80.4
3	3	0.5	467	80.9
3.01	1	0.2	468	81.1
3.047337	1	0.2	469	81.3
3.058219	1	0.2	470	81.5
3.130435	1	0.2	471	81.6
3.15	1	0.2	472	81.8
3.157895	1	0.2	473	82.0
3.200483	1	0.2	474	82.1
3.210273	1	0.2	475	82.3
3.272727	1	0.2	476	82.5
3.293556	1	0.2	477	82.7
3.3	2	0.3	479	83.0
3.333333	1	0.2	480	83.2

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

ARTY TUBES

LAB34	Frequency	Percent	Cumulative Frequency	Cumulative Percent
3.428571	1	0.2	481	83.4
3.448276	1	0.2	482	83.5
3.478261	1	0.2	483	83.7
3.513514	1	0.2	484	83.9
3.583333	1	0.2	485	84.1
3.666667	1	0.2	486	84.2
3.7	2	0.3	488	84.6
3.704762	1	0.2	489	84.7
3.733333	1	0.2	490	84.9
3.75	1	0.2	491	85.1
3.777778	1	0.2	492	85.3
3.8425	1	0.2	493	85.4
3.857143	1	0.2	494	85.6
3.8875	1	0.2	495	85.8
3.902439	1	0.2	496	86.0
4	1	0.2	497	86.1
4.0625	1	0.2	498	86.3
4.117647	1	0.2	499	86.5
4.20339	1	0.2	500	86.7
4.416667	1	0.2	501	86.8
4.422222	1	0.2	502	87.0
4.444444	1	0.2	503	87.2
4.470588	1	0.2	504	87.3
4.5625	1	0.2	505	87.5
4.568182	1	0.2	506	87.7
4.617647	1	0.2	507	87.9
4.65625	1	0.2	508	88.0
4.666667	1	0.2	509	88.2
4.8	1	0.2	510	88.4
4.928571	1	0.2	511	88.6
5	1	0.2	512	88.7
5.075	1	0.2	513	88.9
5.245283	1	0.2	514	89.1
5.333333	1	0.2	515	89.3
5.375	1	0.2	516	89.4
5.382353	1	0.2	517	89.6
5.384615	1	0.2	518	89.8
5.40625	1	0.2	519	89.9
5.4375	1	0.2	520	90.1
5.484848	1	0.2	521	90.3
5.555556	1	0.2	522	90.5
5.65	1	0.2	523	90.6
5.75	1	0.2	524	90.8
5.815789	1	0.2	525	91.0
5.898361	1	0.2	526	91.2
6	1	0.2	527	91.3
6.176471	1	0.2	528	91.5
6.445055	1	0.2	529	91.7
6.458333	1	0.2	530	91.9
6.7	1	0.2	531	92.0
6.705882	1	0.2	532	92.2

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst   Tue Oct 3 15:48:07 1995   44

The SAS System   15:48 Tuesday, October 3, 1995 44

ARTY TUBES

LAB34	Frequency	Percent	Cumulative Frequency	Cumulative Percent
6.90625	1	0.2	533	92.4
6.966667	1	0.2	534	92.5
6.970874	1	0.2	535	92.7
7.125	1	0.2	536	92.9
7.6	1	0.2	537	93.1
7.6875	1	0.2	538	93.2
8	1	0.2	539	93.4
8.033898	1	0.2	540	93.6
8.1875	1	0.2	541	93.8
8.225	1	0.2	542	93.9
8.333333	1	0.2	543	94.1
8.428571	1	0.2	544	94.3
8.833333	1	0.2	545	94.5
8.961538	1	0.2	546	94.6
9	8	1.4	554	96.0
9.5	1	0.2	555	96.2
9.583333	1	0.2	556	96.4
10.33333	1	0.2	557	96.5
10.75	1	0.2	558	96.7
10.83333	1	0.2	559	96.9
11	2	0.3	561	97.2
12.21053	1	0.2	562	97.4
15	1	0.2	563	97.6
15.63636	1	0.2	564	97.7
15.83333	1	0.2	565	97.9
15.975	1	0.2	566	98.1
16.59091	1	0.2	567	98.3
17.38889	1	0.2	568	98.4
23.125	1	0.2	569	98.6
23.5	1	0.2	570	98.8
24	2	0.3	572	99.1
25	1	0.2	573	99.3
30.575	1	0.2	574	99.5
34.67857	1	0.2	575	99.7
41.2	1	0.2	576	99.8
50	1	0.2	577	100.0

Frequency Missing = 83

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

CLOSE AIR

LAB36	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	32	15.5	32	15.5
0.1	7	3.4	39	18.9
0.123288	1	0.5	40	19.4
0.141176	1	0.5	41	19.9
0.207792	1	0.5	42	20.4
0.22	2	1.0	44	21.4
0.25	1	0.5	45	21.8
0.26378	1	0.5	46	22.3
0.296296	1	0.5	47	22.8
0.355705	1	0.5	48	23.3
0.374532	2	1.0	50	24.3
0.424242	1	0.5	51	24.8
0.457944	1	0.5	52	25.2
0.465517	1	0.5	53	25.7
0.52356	1	0.5	54	26.2
0.525	1	0.5	55	26.7
0.530303	2	1.0	57	27.7
0.533333	1	0.5	58	28.2
0.611111	2	1.0	60	29.1
0.66	1	0.5	61	29.6
0.745098	1	0.5	62	30.1
0.775862	1	0.5	63	30.6
0.791667	1	0.5	64	31.1
0.833333	1	0.5	65	31.6
0.939394	1	0.5	66	32.0
0.955056	1	0.5	67	32.5
1	5	2.4	72	35.0
1.075269	1	0.5	73	35.4
1.13913	2	1.0	75	36.4
1.204545	1	0.5	76	36.9
1.285714	1	0.5	77	37.4
1.416667	1	0.5	78	37.9
1.428571	1	0.5	79	38.3
1.485714	2	1.0	81	39.3
1.492537	2	1.0	83	40.3
1.5	1	0.5	84	40.8
1.515152	1	0.5	85	41.3
1.6	1	0.5	86	41.7
1.628049	1	0.5	87	42.2
1.666667	1	0.5	88	42.7
1.729167	1	0.5	89	43.2
1.9125	1	0.5	90	43.7
2	1	0.5	91	44.2
2.05	1	0.5	92	44.7
2.2	1	0.5	93	45.1
2.216216	1	0.5	94	45.6
2.263243	1	0.5	95	46.1
2.252252	1	0.5	96	46.6
2.275862	1	0.5	97	47.1
2.5	1	0.5	98	47.6
2.571429	2	1.0	100	48.5

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

CLOSE AIR

LAB36	Frequency	Percent	Cumulative Frequency	Cumulative Percent
2.666667	1	0.5	101	49.0
2.701754	2	1.0	103	50.0
2.75	3	1.5	106	51.5
2.8	1	0.5	107	51.9
3.032258	1	0.5	108	52.4
3.181818	1	0.5	109	52.9
3.3	1	0.5	110	53.4
3.713462	1	0.5	111	53.9
3.8	2	1.0	113	54.9
4	1	0.5	114	55.3
4.958333	1	0.5	115	55.8
5.333333	1	0.5	116	56.3
6.428571	1	0.5	117	56.8
6.666667	1	0.5	118	57.3
8.666667	1	0.5	119	57.8
9	79	38.3	198	96.1
11	1	0.5	199	96.6
13.33333	1	0.5	200	97.1
15.6	1	0.5	201	97.6
19	1	0.5	202	98.1
20	1	0.5	203	98.5
30	1	0.5	204	99.0
33.72727	1	0.5	205	99.5
66	1	0.5	206	100.0

Frequency Missing = 434

REL COMBAT EFF

LAB44	Frequency	Percent	Cumulative Frequency	Cumulative Percent
-2	6	1.0	6	1.0
-1	76	12.2	82	13.1
0	401	64.2	483	77.3
1	122	19.5	605	96.8
2	20	3.2	625	100.0

Frequency Missing = 35

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst Tue Oct 3 15:48:07 1995 47

The SAS System 15:48 Tuesday, October 3, 1995 47

REL LEADERSHIP

LAB45	Frequency	Percent	Cumulative Frequency	Cumulative Percent
-2	7	1.1	7	1.1
-1	93	14.9	100	16.0
0	357	57.1	457	73.1
1	137	21.9	594	95.0
2	30	4.8	624	99.8
3	1	0.2	625	100.0

Frequency Missing = 35

LAB46	Frequency	Percent	Cumulative Frequency	Cumulative Percent
-2	6	1.0	6	1.0
-1	96	15.4	102	16.3
0	412	65.9	514	82.2
1	98	15.7	612	97.9
2	13	2.1	625	100.0

Frequency Missing = 35

REL MORALE

LAB47	Frequency	Percent	Cumulative Frequency	Cumulative Percent
-2	1	0.2	1	0.2
-1	9	1.4	10	1.6
0	483	77.3	493	78.9
1	101	16.2	594	95.0
2	31	5.0	625	100.0

Frequency Missing = 35

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

REL LOGISTICS

LAB48	Frequency	Percent	Cumulative Frequency	Cumulative Percent
-2	1	0.2	1	0.2
-1	22	3.5	23	3.7
0	549	87.8	572	91.5
1	42	6.7	614	98.2
2	11	1.8	625	100.0

Frequency Missing = 35

REL MOMENTUM

LAB49	Frequency	Percent	Cumulative Frequency	Cumulative Percent
-1	4	0.6	4	0.6
0	474	75.8	478	76.5
1	147	23.5	625	100.0

Frequency Missing = 35

LAB50	Frequency	Percent	Cumulative Frequency	Cumulative Percent
-2	2	0.3	2	0.3
-1	45	7.2	47	7.5
0	498	79.7	545	87.2
1	58	9.3	603	96.5
2	22	3.5	625	100.0

Frequency Missing = 35

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

REL TECHNOLOGY

LABS1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
-1	6	1.0	6	1.0
0	593	94.9	599	95.8
1	20	3.2	619	99.0
2	6	1.0	625	100.0

Frequency Missing = 35

DLABS4	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	96	14.5	96	14.5
2	564	85.5	660	100.0

DLABS5	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	109	16.5	109	16.5
2	75	11.4	184	27.9
3	476	72.1	660	100.0

DLABS6	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	77	11.7	77	11.7
2	583	88.3	660	100.0

DLABS7	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	38	5.8	38	5.8
2	622	94.2	660	100.0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst Tue Oct 3 15:48:07 1995 50

The SAS System 15:48 Tuesday, October 3, 1995 50

DLAB58	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	44	6.7	44	6.7
2	195	29.5	239	36.2
3	421	63.8	660	100.0

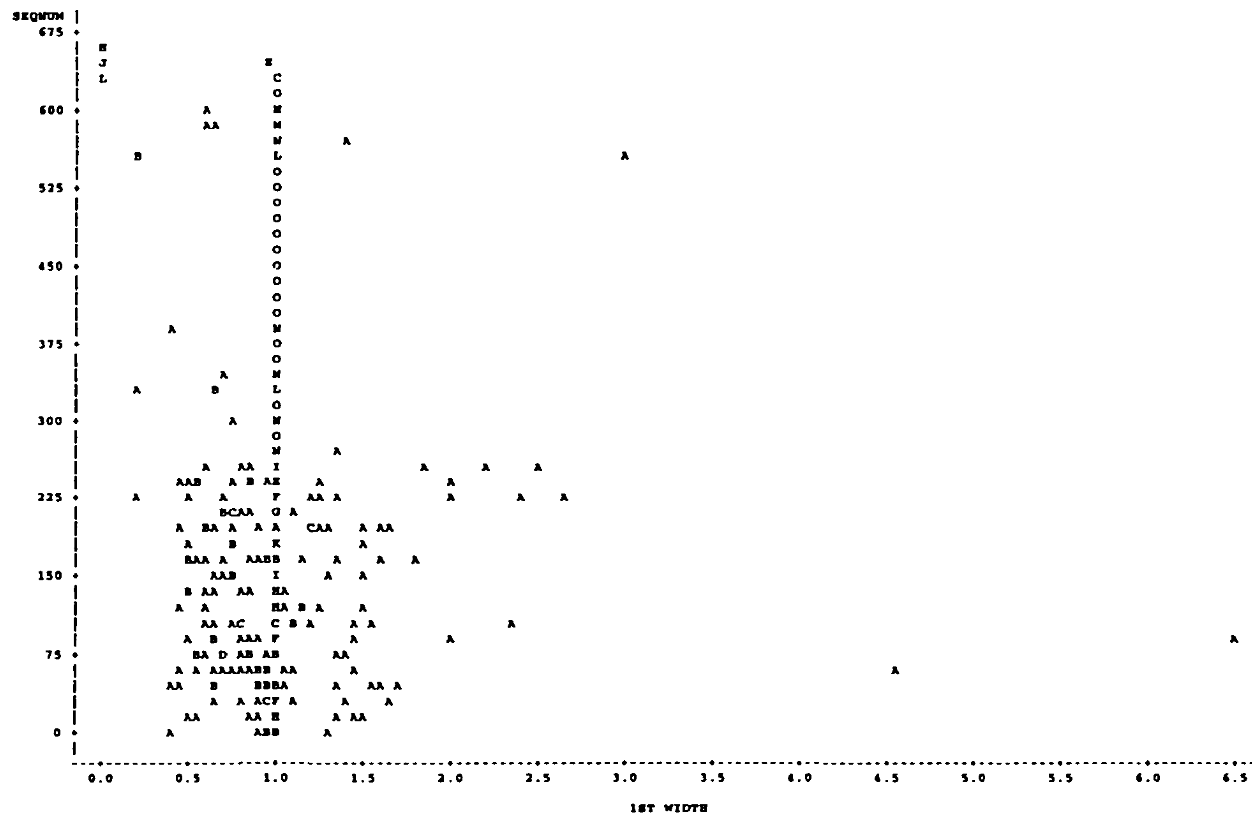
DLAB59	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	30	4.5	30	4.5
2	630	95.5	660	100.0

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst   Tue Oct 3 17:53:23 1995   1

The SAS System   17:53 Tuesday, October 3, 1995   1

Plot of SEQNUM*LABS. Legend: A = 1 obs, B = 2 obs, etc.

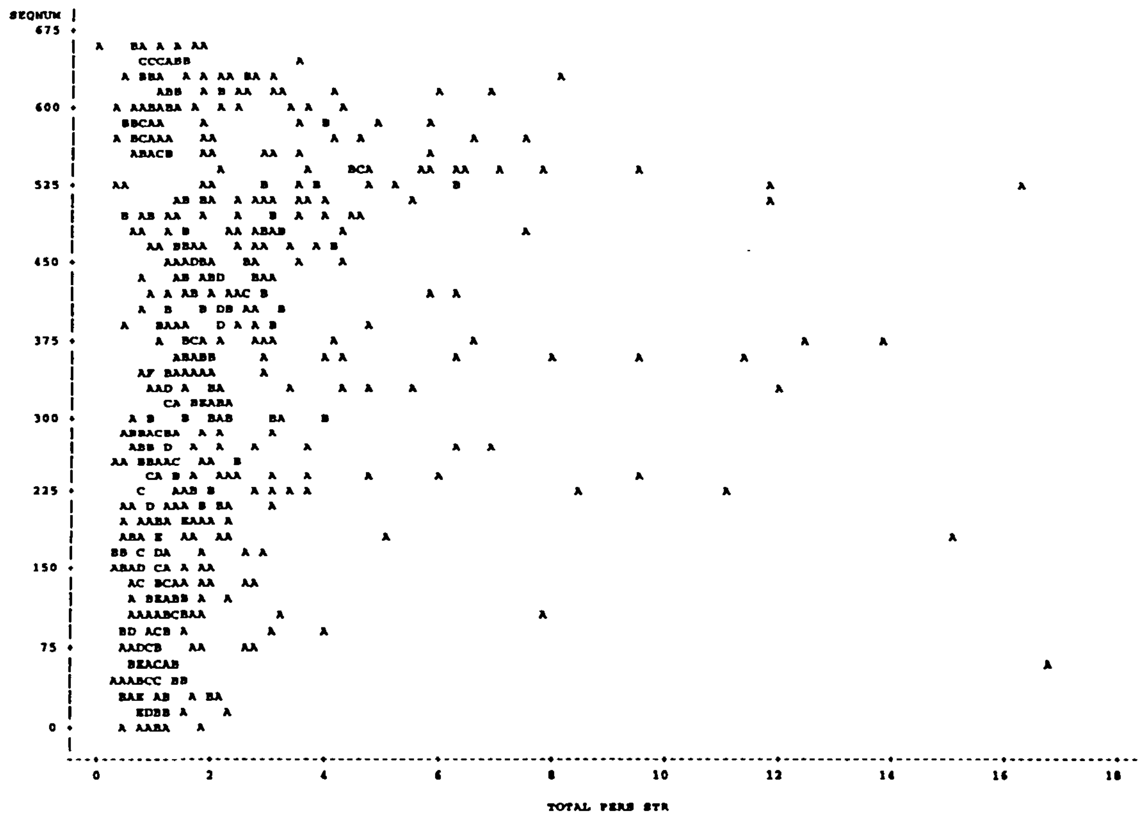


Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst Tue Oct 3 17:53:23 1995 2

The SAS System 17:53 Tuesday, October 3, 1995 2

Plot of SEQNUM*LAB14. Legend: A = 1 obs, B = 2 obs, etc.

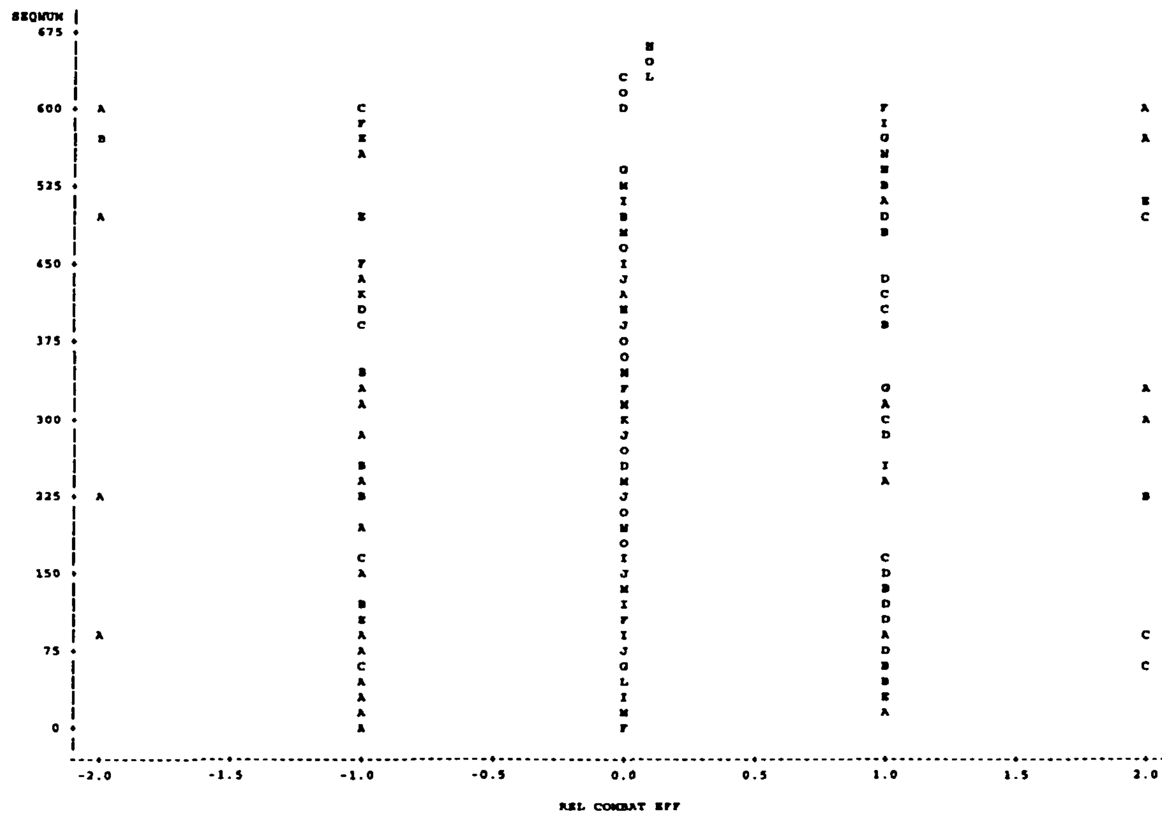


Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst Tue Oct 3 17:53:23 1995 3

The SAS System 17:53 Tuesday, October 3, 1995 3

Plot of SEQNUM*LAB44. Legend: A = 1 obs, B = 2 obs, etc.

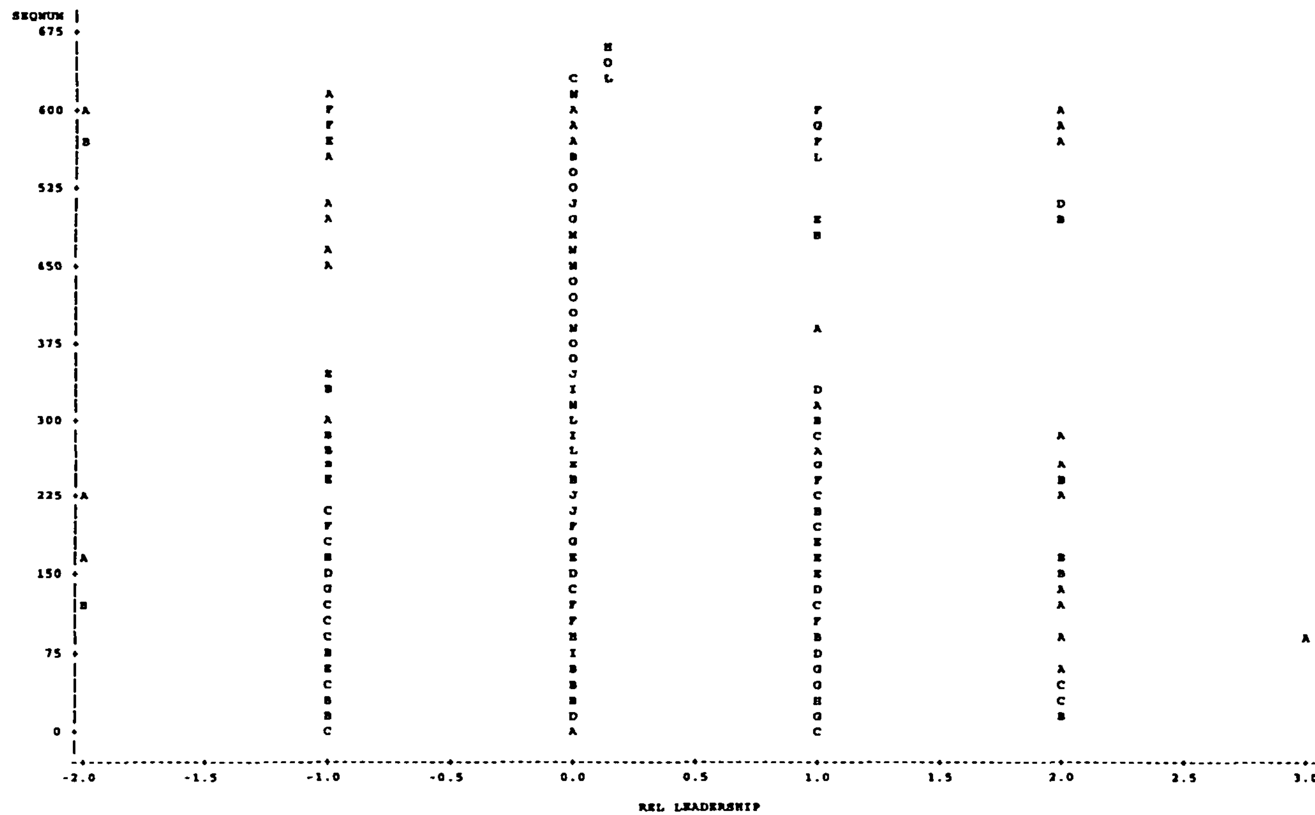


Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst Tue Oct 3 17:53:23 1995 4

The SAS System 17:53 Tuesday, October 3, 1995 4

Plot of SEQNUM*LAB45. Legend: A = 1 obs, B = 2 obs, etc.

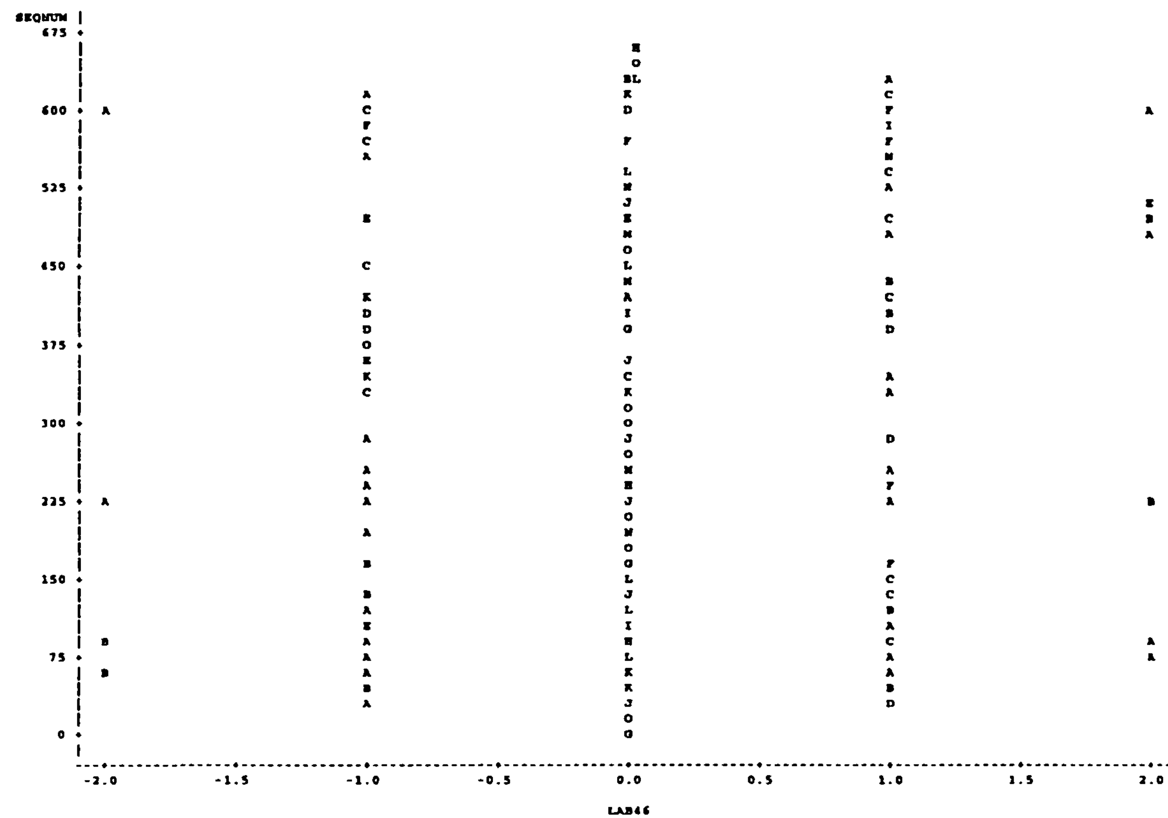


Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst Tue Oct 3 17:53:23 1995 5

The SAS System 17:53 Tuesday, October 3, 1995 5

Plot of SEQNUM*LAB46. Legend: A = 1 obs, B = 2 obs, etc.

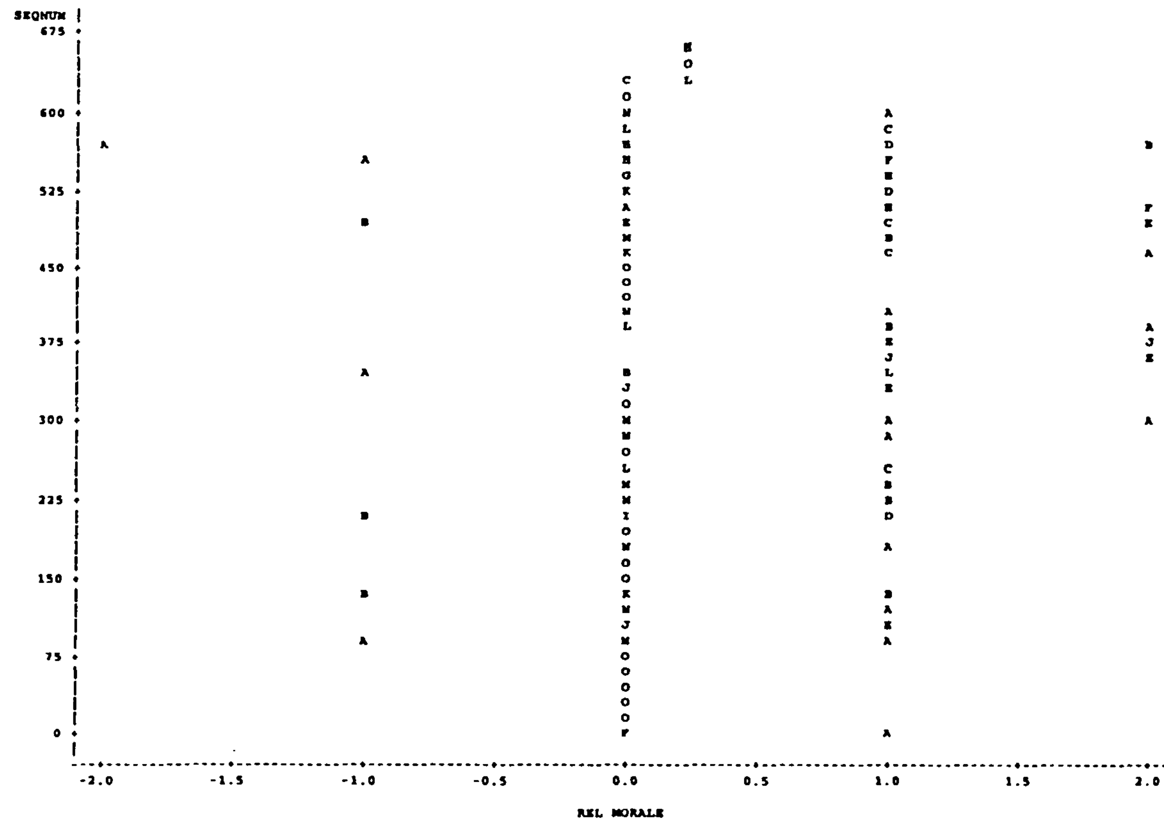


Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst Tue Oct 3 17:53:23 1995 6

The SAS System 17:53 Tuesday, October 3, 1995 6

Plot of SEQNUM*LAB47. Legend: A = 1 obs, B = 2 obs, etc.

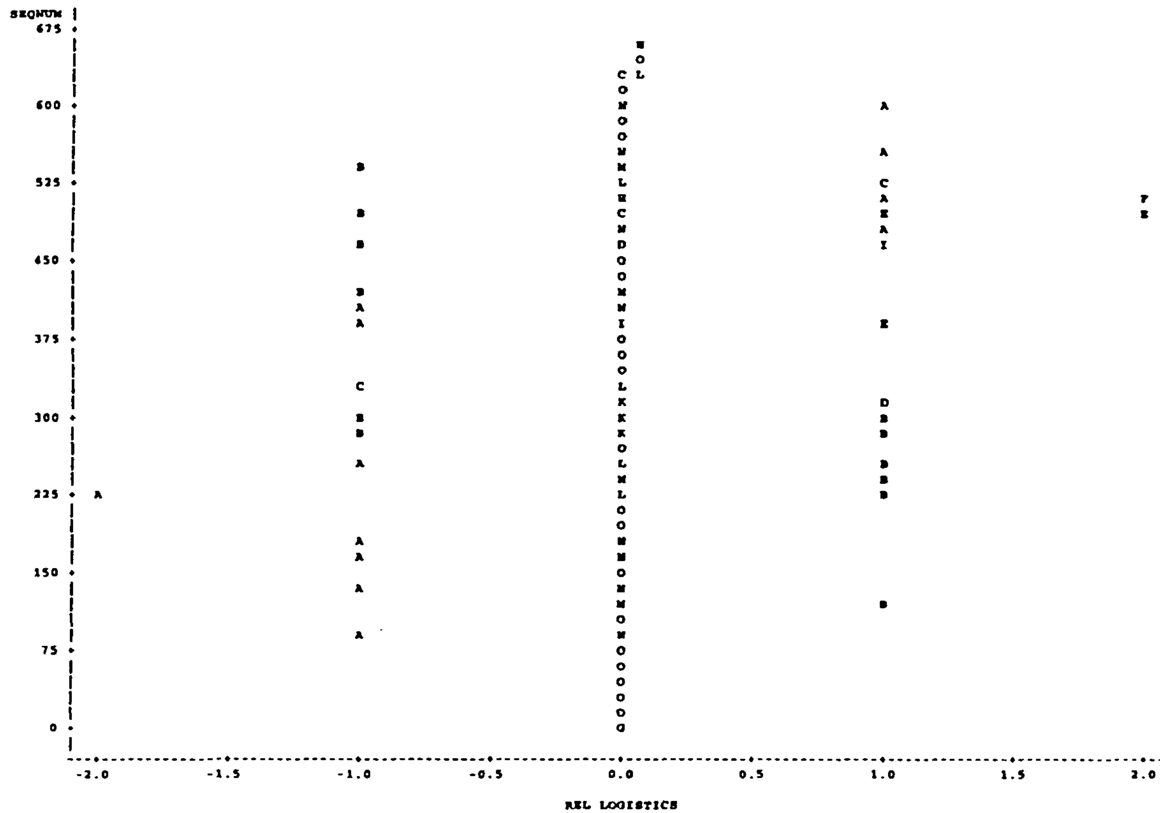


Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst Tue Oct 3 17:53:23 1995 7

The SAS System 17:53 Tuesday, October 3, 1995 7

Plot of SEQNUM*LAB48. Legend: A = 1 obs, B = 2 obs, etc.

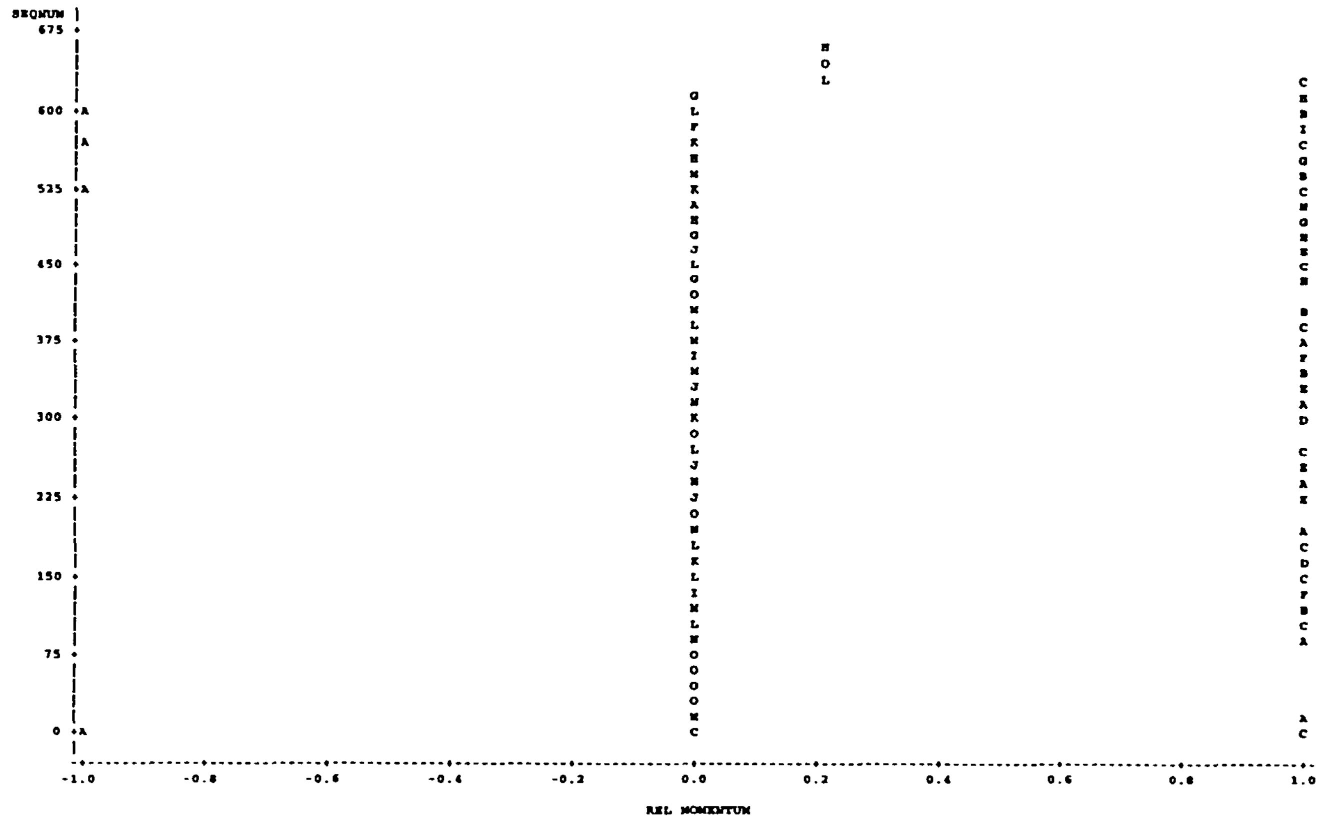


Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.1st Tue Oct 3 17:53:23 1995 8

The SAS System 17:53 Tuesday, October 3, 1995 8

Plot of SEQNUM*LAB49. Legend: A = 1 obs, B = 2 obs, etc.

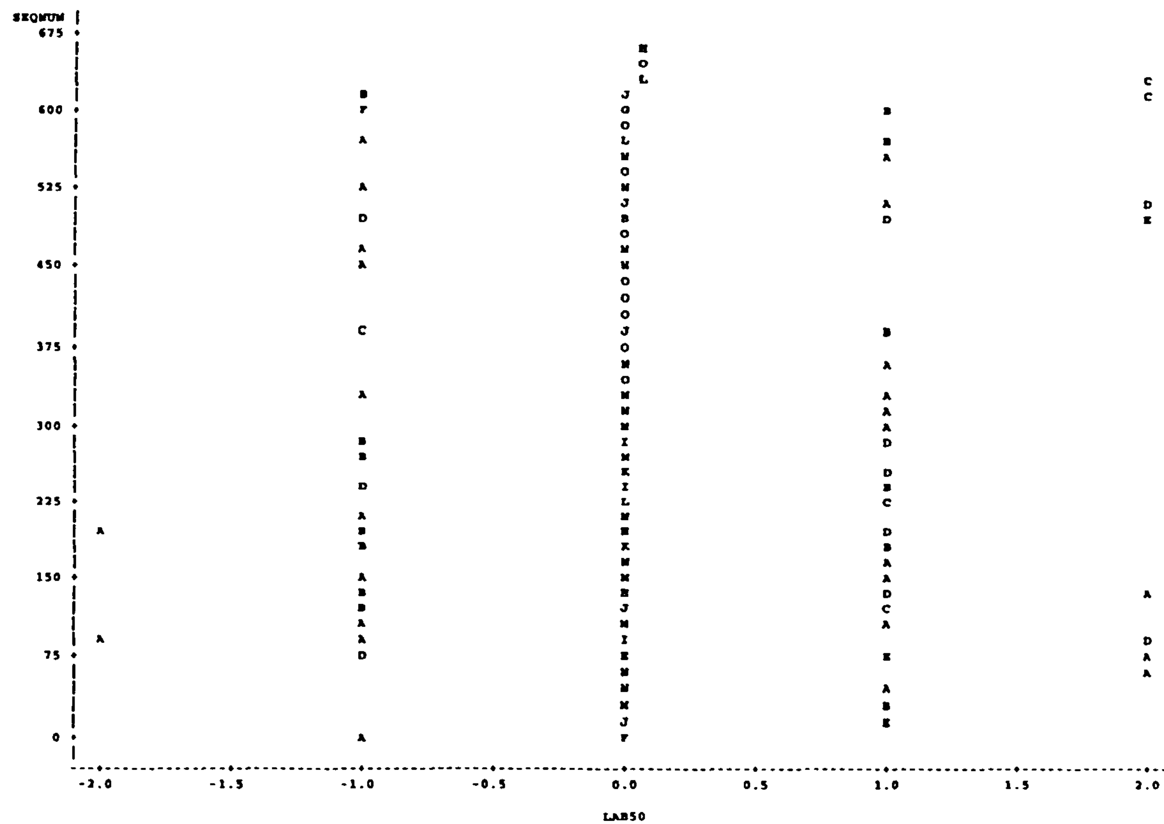


Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst Tue Oct 3 17:53:23 1995 9

The SAS System 17:53 Tuesday, October 3, 1995 9

Plot of SEQNUM*LAB50. Legend: A = 1 obs, B = 2 obs, etc.

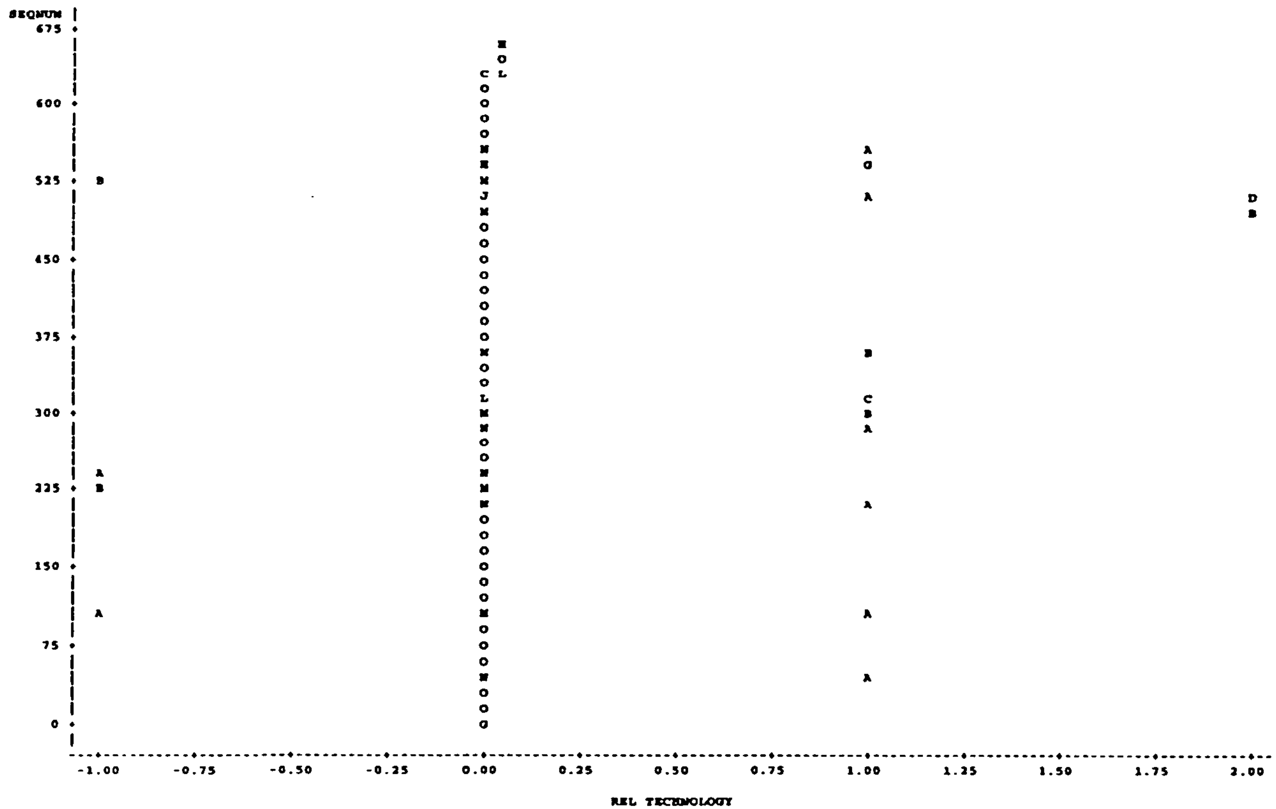


Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst Tue Oct 3 17:53:23 1995 10

The SAS System 17:53 Tuesday, October 3, 1995 10

Plot of SEQNUM*LAB51. Legend: A = 1 obs, B = 2 obs, etc.

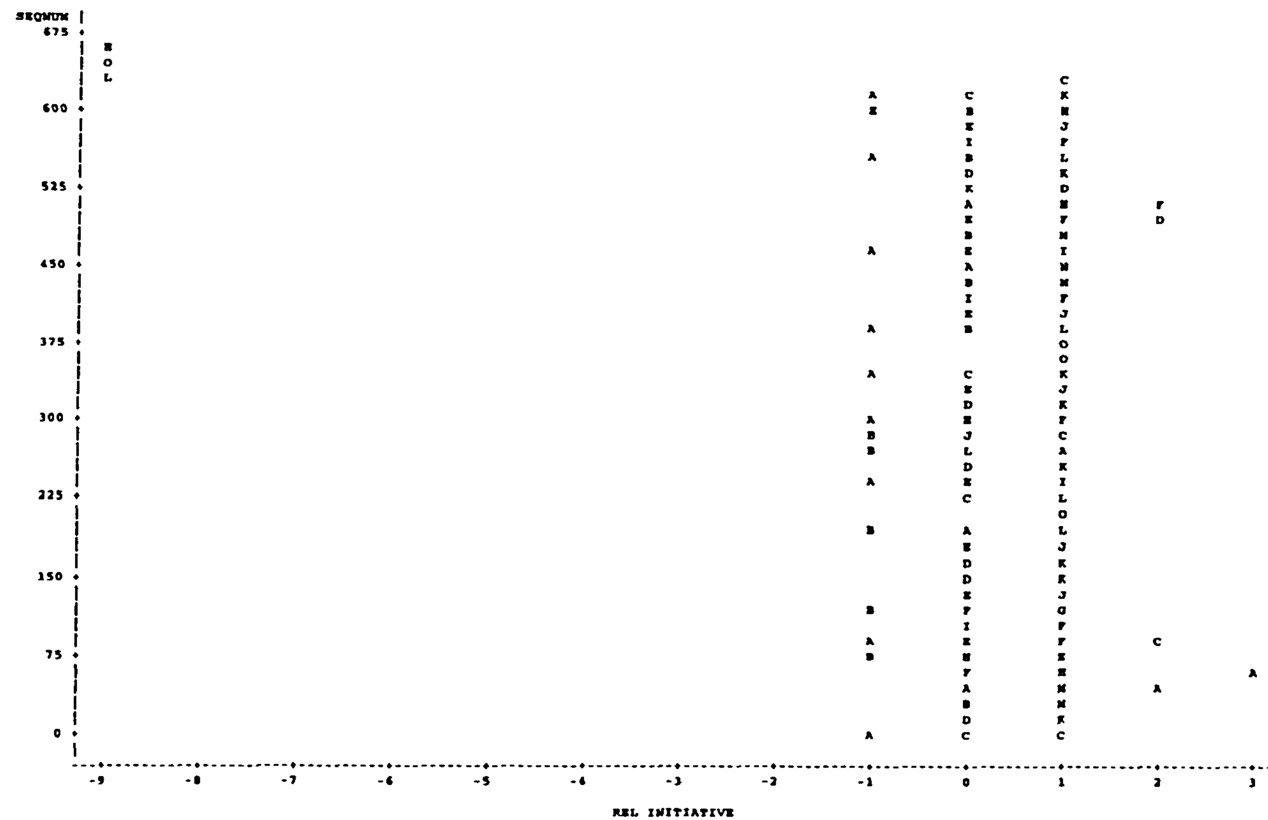


Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst Tue Oct 3 17:53:23 1995 11

The SAS System 17:53 Tuesday, October 3, 1995 11

Plot of SEQNUM*LAB52. Legend: A = 1 obs, B = 2 obs, etc.

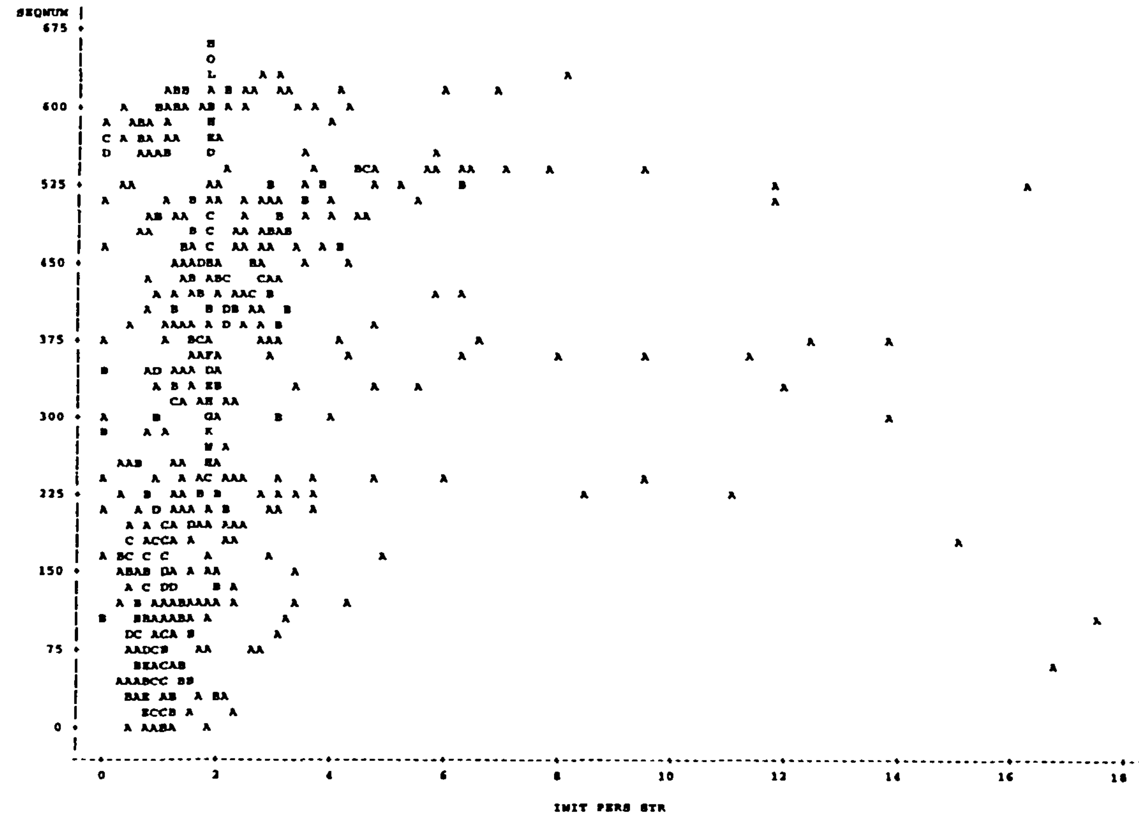


Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst Tue Oct 3 17:53:23 1995 12

The SAS System 17:53 Tuesday, October 3, 1995 12

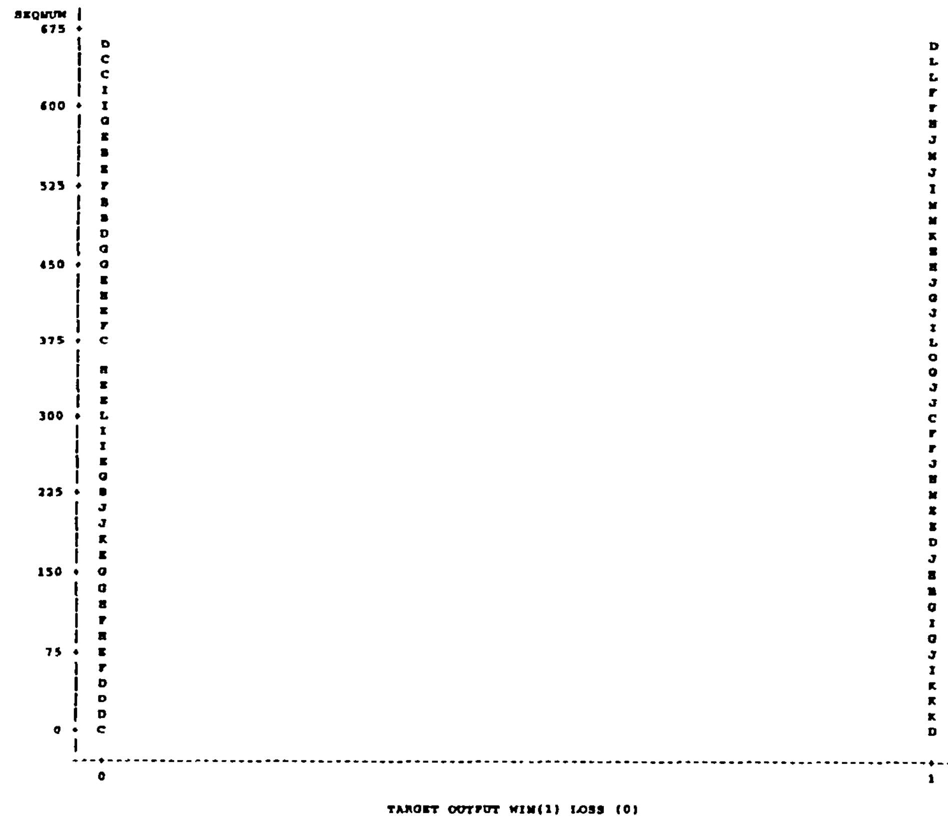
Plot of SEQNUM*LAB16. Legend: A = 1 obs, B = 2 obs, etc.



Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

The SAS System 17:53 Tuesday, October 3, 1995 14

Plot of SEQNUM*LAB61. Legend: A = 1 obs, B = 2 obs, etc.

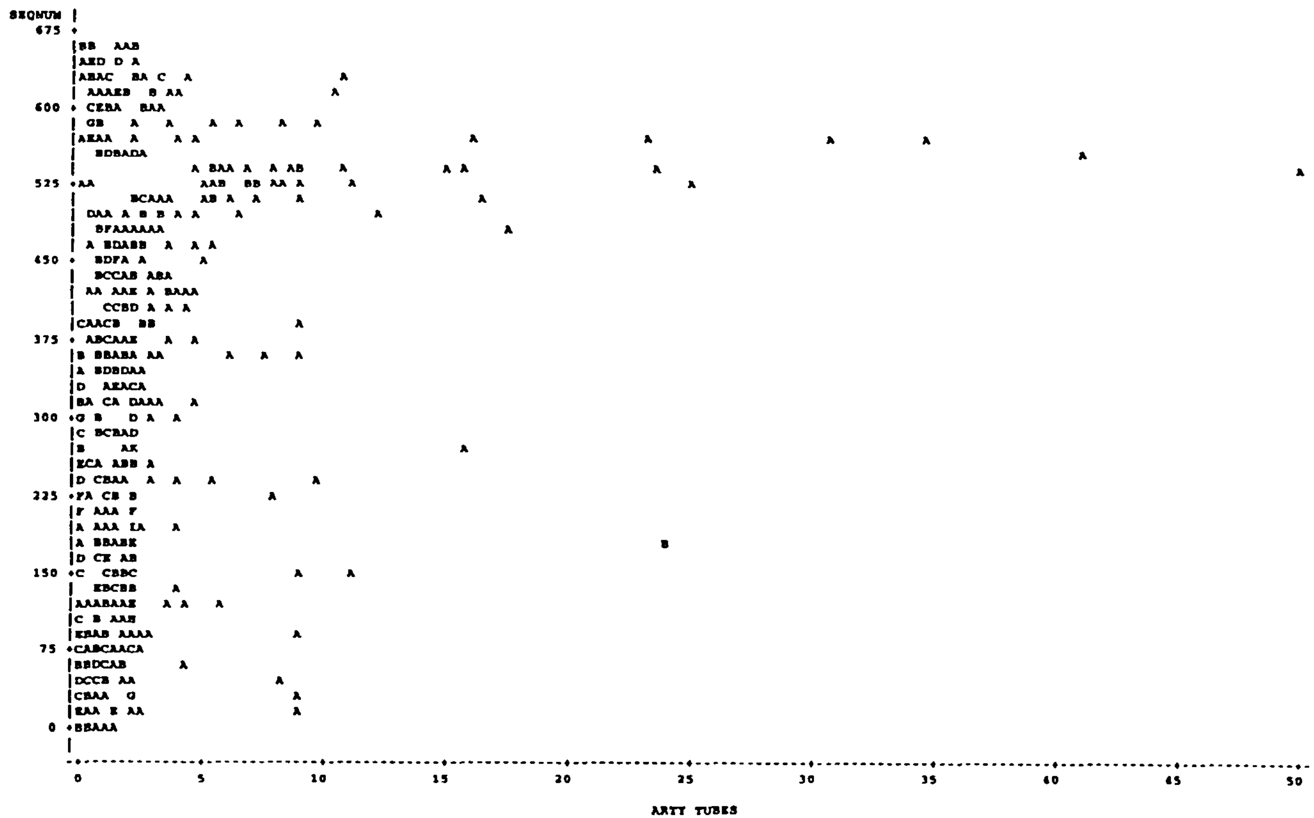


Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

temp2.lst Tue Oct 3 17:53:23 1995 13

The SAS System 17:53 Tuesday, October 3, 1995 13

Plot of SEQNUM*LAB36. Legend: A = 1 obs, B = 2 obs, etc.



Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.