

EXPANDED CHESS FOR THE NEW MILLENNIUM

**TAKING TRADITIONAL CHESS INTO MANY NEW
DIMENSIONS**

WEBSITE MANUAL



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WEBSITE MANUAL

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This manual explains Expanded Chess in detail and complements the Expanded Chess website <http://expandedchess.com>.

Table of Contents

<i>Chapter 1 – Introduction</i>	1
Origins	1
General Themes to Expand Traditional Chess	2
Variants of Chess	5
<i>Chapter 2 – Classification and Analysis of Traditional Chess Pieces</i>	7
Classification of Traditional Chess Pieces	8
Descriptive Classification	8
Movement Classification	9
Value of Traditional Pieces	13
Analysis of Traditional Chess Movements	15
<i>Chapter 3 – Addition of Expanded Chess Pieces</i>	18
The New Pieces	18
Description of Expanded Chess Pieces	21
<i>Chapter 4 – Movements of Expanded Chess Pieces</i>	22
Expansions of L-Type Movements	22
Combining Components of Movements and Pieces	25
<i>Chapter 5 – Values Of Expanded Chess Pieces</i>	29
Methods of Establishing Values for Chess Pieces	29
Approach for Establishing Values for Expanded Chess Pieces	29
Creating a Value System for Expanded Chess Pieces	31
Start of Game Configuration	31
Types/Components of Movements Summary Matrix – Appendix D	32
Types/Components of Movements Summary Table – Appendix E	33
Weighting/Rating Summary Matrix – Appendix F	34
Value of Expanded Chess Pieces	34
<i>Chapter 6 – Size of Game Board</i>	49
Minimum Board Size	49
Protective Pawns	49
Four Rows Deep	50
Five Rows Deep	50
Six Rows Deep	51

Table of Contents

Minimum Board Width _____	52
Maximum Size of Board _____	53
<i>Chapter 7 – Arrangement of Game Board _____</i>	<i>54</i>
Shape of the Game Board _____	54
Square and Rectangle Shapes _____	54
Board Arrangement and Notation _____	55
Other Shapes _____	57
Number of Spatial Dimensions of the Board _____	59
Number of Colors Used on the Board _____	60
Three Color Board _____	60
Four Color Board _____	63
<i>Chapter 8 – Number of Players During Game _____</i>	<i>67</i>
Traditional Chess _____	67
Expanded Chess _____	67
<i>Chapter 9 – Types and Number of Pieces at Start of Game _____</i>	<i>72</i>
Open Rows _____	72
Defining Low, Intermediate and High Level pieces _____	72
Scaling Up _____	76
Scaling Up Types of Pieces _____	76
Scaling Up Number of Pieces _____	77
Small Board - Table 9-3A _____	79
Medium Board – Table 9-3B _____	80
Large Board – Table 9-3C _____	81
Relationship to Major and Minor Pieces in Traditional Chess _____	81
<i>Chapter 10 – Placement of Pieces at Start of Game _____</i>	<i>84</i>
Guidelines _____	84
Low Level Pieces _____	85
Intermediate Level Pieces _____	85
High Level Pieces _____	85
Checkmate Level Pieces _____	86
Positions of Level of Pieces @ Start of Game _____	87
<i>Chapter 11 – Penalties and Rewards for Capture and Check _____</i>	<i>96</i>

Table of Contents

Capture of Playing Pieces _____	96
Penalties and Rewards for Capture _____	97
Penalties and Rewards for Check _____	99
Penalties and Rewards Summary _____	101
<i>Chapter 12 – Promotion of Playing Pieces</i> _____	<i>102</i>
Pieces That Can Be Promoted _____	102
Range and Value of Promotable Pieces _____	102
Range of a Promotable Piece _____	103
Value of a Promotable Piece _____	103
Quantifying Promotability _____	104
Effect of Strength (value) of Piece Being Promoted _____	105
No. of Pieces of Specific Type at Start of Game _____	105
Size of the Game Board _____	105
Calculating Promotion Reward Factor _____	106
Combining the Two Approaches for Promotion _____	109
<i>Chapter 13 – Special Rules for Expanded Chess</i> _____	<i>111</i>
Castling _____	111
En Passant _____	112
Replacement of a King on a Larger Board Game _____	114
Multiple Players / Multiple Movements per Turn _____	115
Slide Bishop _____	115
<i>Chapter 14 – Describing and Cataloging New Games</i> _____	<i>117</i>
Major Game Parameters _____	117
<i>Chapter 15 – Conclusions and New Expanded Chess Games</i> _____	<i>122</i>
New Pieces _____	122
New Boards _____	123
New Rules _____	123
Final Challenge – The New Expanded Chess Games _____	124
<i>Bibliography</i> _____	<i>125</i>

Table of Contents

Appendix A – DESCRIPTION OF PIECES & MOVEMENT/CAPTURE DIAGRAM

Appendix B – DESCRIPTION OF PIECES ON CLASS BASIS

Appendix C – GAME DESCRIPTION & GAME ARRANGEMENT FOR NEW GAMES

Appendix D – TYPES/COMPONENTS OF MOVEMENTS SUMMARY MATRIX.

Appendix E – TYPES/COMPONENTS OF MOVEMENTS SUMMARY TABLE

Appendix F – WEIGHTING/RATING SUMMARY MATRIX

Chapter 1 – Introduction

Origins

Expanded Chess originates from the most significant historical event in chess in our lifetime. This event occurred in 1997 when, for the first time, a computer defeated the best chess player in the world. The IBM supercomputer Deep Blue defeated Garry Kasparov in a six game match with two wins, one loss and three draws in May, 1997 in New York City, USA. Until 1997 there was still a popular perception that a computer could not defeat the best human player in the world. Since that match, the software has become much better and the hardware much less expensive and now no human can defeat the best chess playing computer program in tournament play.

I feel that chess now requires an industrial strength, rigorous intellectual upgrade to meet modern technology head-on and survive in a world of the modern computer and the Internet. The traditional game now risks becoming stale and intellectually unappealing because computers can now win against the best humans and computers now play the best chess. Chess needs its complexity increased to the level where humans can again easily defeat the best computer to meet the challenges of the computerized world and its honor restored. Expanded Chess is the method to restore this honor by creating a series of Expanded Chess games which are new, undocumented, unanalyzed, untrended, and therefore ripe for exploration and discovery, which automatically ensures that they have not been over-analyzed and cataloged for the past 100 years.

Increasing the complexity of chess also obligates the technology to develop more elegant theories, algorithms and software to win against humans with this new series of games in play. Relying on historical experience and brute force number crunching will be less successful for

the programmers and humans will occupy the high ground in this battle of wits.

General Themes to Expand Traditional Chess

The purpose of this manual is to expand traditional chess into a rich, new set of games that will carry chess into the new millennium and beyond. Expanded Chess accepts the challenge and presents a rigorous analysis and thoughtful expansion of traditional chess in a way that is intuitive and follows directly from the traditional game. This approach has many benefits. The most obvious benefit is that you do not lose the huge base of traditional chess players. This is accomplished by expanding from traditional chess and following the same philosophies, but expanding the approach of those philosophies in ways that are logical, meaningful and intuitive to traditional chess player. Our goal here is to retain our flagship of chess with its rich history and tradition but strengthen and expand the game to meet the demands of the technological future and better understand and appreciate the role games as an important human endeavor.

Expanded Chess proposes to develop a larger base of standard pieces with standard moves. There is a major benefit to this approach because many versions of the game can be developed with the same piece base. Players can move intuitively from one expanded game to another because they already know any new pieces and their moves.

This manual is really a guide for developing new versions of Expanded Chess. It begins with traditional pieces with standard moves and recommends the following:

- addition of Expanded Chess pieces
- movements of Expanded Chess pieces
- minimum and maximum size of the game board
- value of Expanded Chess pieces as the size of the game board increases

- arrangement of the game board as the size of the game board increases
- number of players as the size of the game board increases
- number of moves per player as the size of the game board increases
- type and number of pieces at the start of the game as the size of the game board increases
- placement of the pieces at the start of the game as the size of the game board increases
- rules for the capture of pieces
- rules for Checkmate
- rules for promotion of pieces
- other rules for new games
- recommendations for describing and cataloging expanded versions of chess
- and inclusion of eight new Expanded Chess games

Before we begin to expand traditional chess, we need to break down the game down into its most salient characteristics, analyze the structure of these characteristics and then expand the characteristics in multi-dimensional ways.

The analysis in this manual uses a three-part approach. The first part of this approach classifies the most salient features of a major aspect of traditional chess. The second part takes these most salient characteristics and expands them in multiple dimensions. Here we study the implications and limitations of our expansion process. The third part then reviews the expansions of the second part and synthesizes them into coherent generalized format. Finally, in the third part of the approach, methods of cataloging the expansions are presented in order to create each specific expanded version. This

approach is used throughout the manual including each major aspect of the game that is expanded.

The general approach for expanding the traditional realm of chess is to keep changes as intuitive as possible. This is a subjective exercise. However, I want to be as non-arbitrary as possible and try to explain each expansion leap in terms of people's present general knowledge of traditional chess and common sense.

Let us examine the traditional game of chess and extract the implicit assumptions and procedures. Then we will state each assumption or procedure explicitly and expand it. Finally we will test the expanded assumption or procedure and determine if the intent of the original assumption or procedure can still be met in the expanded format. If this is the case, the expansion can be permutated to some practical limit and adopted.

There are several intuitive and common sense themes that make up traditional chess and are implicit when one expands chess into new dimensions. The traditional chess pieces should retain their traditional properties to the greatest extent possible in any expanded version of traditional chess. If a traditional property is altered, then the alteration should be done in a systematic way, with the least significant property being changed first. Themes that are examined include:

- When the size of the game board becomes either larger than traditional chess (8x8 squares) then the number of pieces should increase in a relatively proportional manner.
- New pieces that are added should be added in such a way that they have some connection with the traditional chess pieces.
- Completing the game by capturing the "King" can be expanded to capturing other than the "King" to end the game.

- Making one move then giving the opponent one move can be expanded so that a player may have, under certain circumstances, more than one move at a time.
- The number of players playing the game at one time can be expanded. More than one player per side can participate in the game and increase the number of moves per side for each turn.
- The arrangement of the strength of the pieces on the board should generally remain strongest to weakest from middle to outside and from back to front.
- There needs to be a front line piece (Pawn type) that allows the game to start in an orderly manner. The Pawn-like piece has key attributes that requires preserving and include:
 - Limited range on each move
 - Forward only direction of movement to make the start of the game irreversible.
 - Each piece should be protected by other pieces in the front row so they can advance without being subject to immediate capture.
- Pieces other than Pawns can be promoted.

All these aspects of traditional chess will be examined in extensive detail in the forthcoming chapters and chess will be expanded after thorough exploration of the major aspects.

Variants of Chess

A common approach to develop a new variant of chess has been to add a new piece or two with new movements and perhaps expand the board by a row or column or two. Another approach is to modify existing variants even more. Some radical variants use completely new boards or new types of movements and have significantly modified rules. There are literally hundreds of variants of chess and over one hundred new

pieces based on these variants. The major issue that I have with most of these variants of chess is that you cannot use what you learned in one variant of chess to play another variant of chess. You have to keep learning over and over new rules, new moves and new pieces each time you learned a new variant of chess. This lack of standardization is the most significant issue impeding the growth for any variant of chess, which in turn results in the following drawbacks:

- The possibility of a new piece with a particular name and image having more than one movement pattern.
- Possibility of differing and contradictory rules for each variant
- Possibility of non-intuitive structural modifications

This non-standardized approach is, in my opinion, anarchy. It results in a chaotic hodge-podge of pieces, rules, and game boards with most variants having few followers and a short lifespan. Most of these variants never obtain any kind of critical mass and most traditional chess players do not seriously consider playing variants. My approach is to avoid all these drawbacks and to use traditional chess as the foundation upon which to build Expanded Chess games in an intuitive, structured, logical manner so that people will innately feel that nothing is lost and no major change of direction is needed when playing an Expanded Chess game. The progression will be natural and seamless.

With this expansion plan in place, we can now begin to describe, classify and analyze traditional chess so we can develop detailed dimensions to begin the expansion of traditional chess. This analysis and classification is the subject of the next chapter.

Chapter 2 – Classification and Analysis of Traditional Chess Pieces

To begin this chapter some basic definitions are needed. In traditional chess, a piece is often considered all the non-Pawn material on the chess board. As well, there are minor pieces (Knights and Bishops) and major pieces (Rooks and Queens) in traditional chess. Major pieces are defined as pieces that in combination with a King can checkmate the opposing King. In this manual, we will not use these definitions for Expanded Chess because they end up being too constrictive or are currently undefined. In Expanded Chess, pieces are any and all material on the game board. The commonly used terms of rank and file are also not used in Expanded Chess because they are not immediately obvious to the inexperienced chess players. The more common terms of row and column are used instead of rank and file for immediate recognition and understanding, since the game board arrangement is constantly being discussed and it is important for the reader not to get bogged down always trying to recall that a rank is a horizontal lines of squares and a file is a vertical line of squares on the game board. Also note that the term Rook is used for traditional chess and Castle is used for Expanded Chess. The different name is used to recognize that the role of the Rook is modified for Expanded Chess.

The classification and analysis of traditional chess pieces is necessary to be able to understand the inherent underlying structure of each dimension of chess so that expansion can take place along that dimension. Once these underlying structures are identified and understood, each one can be explored for potential expansion. To the greatest extent possible, expansion will take place, and in a structured manner so it is relatable to traditional chess. The classification and analysis of traditional chess pieces is divided up into the following categories:

- Classification of traditional pieces including:
 - Descriptive Classification







- Movement Classification
- Valuation of traditional chess pieces
- Analysis of traditional chess pieces

This classification, valuation and analysis form the fundamental framework for the expansion of the number of chess pieces.

Classification of Traditional Chess Pieces

Descriptive Classification

When applying a descriptive classification to traditional chess, an obvious approach used is to base the classification of the pieces on the real life roles of the pieces. At present, there are six (6) pieces in traditional chess. These are the Queen, King, Castles, Bishops, Knights, and Pawns. Each piece, except the Castle is human. The human pieces are part of a medieval European society. With consideration for expansion to include new pieces, traditional chess pieces are classified as presented in Table 2-1.

Table 2-1 Descriptive Classification of Traditional Chess Pieces			
No.	Classification	Pieces	
1.	Ruling	 QUN Queen	 KING King
2.	Architectural	 CSL Castle	----
3.	Religious	 BSP Bishop	----
4.	Military	 KNT Knight	----
5.	Special	 PWN Pawn	----

The Queen and the King are obvious candidates for the Ruling Classification. The Castle is a building and is placed in an Architectural Classification. The Bishop is a member of the Church and is part of the

Religious Classification. As for the Knight, it is an instrument of war and belongs in the Military Classification.

Although a Pawn is usually described as a foot soldier, and in principle could be placed in the Military Classification, a more metaphorical chess-based definition of the Pawn as a small, weak, sacrificial piece which is easy to manipulate and has special movements is used by Expanded Chess. A Pawn is defined as a Special Character since it has the special ability to be promoted but is not allowed to move in the backward direction, cannot capture directly ahead and cannot move diagonally ahead.

The purpose of the descriptive classification of the pieces is to provide a framework to add new pieces. It is one of the most intuitive ways to expand traditional chess.

Movement Classification

At present, there are six (6) pieces in traditional chess. These are the Queen, King, Castles, Bishops, Knights, and Pawns. Along with these six pieces, there are three (3) types of movement. The movements are orthogonal, diagonal and L-Type movements. The orthogonal and diagonal movements can be further classified as unlimited or limited.

Orthogonal movements advance only along a single row or single column of the game board in one move.

Diagonal movements advance an equal number of squares along a row and along a column simultaneously and remain on the same color square.

L-Type movements are made by moving X squares along a row and Y squares along a column from a square of origin or vice versa such that :

- X does not equal Y
- and the sum of $X + Y$ is greater or equal to three.

This is symbolically expressed as:

$$X \neq Y \text{ and } \sum X + Y \geq 3 \quad [Eqn. 2.1]$$

The three types of movements can be combined together in various ways to create a basis for the movements for new pieces in Expanded Chess. These types of movements are presented in Tables 2-2, 2-3 and 2-4 following.















Table 2-2 8x8 Game Board Orthogonal Moves								
08				+				
07				+				
06				+				
05				+				
04	+	+	+	•	+	+	+	+
03				+				
02				+				
01				+				
	a	b	c	d	e	f	g	h

Table 2-3 8x8 Game Board Diagonal Moves								
08								X
07	X						X	
06		X				X		
05			X		X			
04				•				
03			X		X			
02		X				X		
01	X						X	
	a	b	c	d	e	f	g	h

Table 2-4 8x8 Game Board L-Type Moves								
08								
07								
06			L		L			
05		L				L		
04				•				
03		L				L		
02			L		L			
01								
	a	b	c	d	e	f	g	h







With consideration for expansion to include new pieces, traditional chess piece movements are classified as follows in Table 2-5, which places the movements shown in Tables 2-2 to 2-4 with each of the traditional chess pieces. Table 2-5 describes each piece's movements as

orthogonal, diagonal or L-Type or the appropriate combination of these and also shows whether each type of movement is limited, unlimited or special. The purpose of movement classification of the pieces is to provide a framework to add new pieces to Expanded Chess. It is another intuitive way to expand traditional chess.

Table 2-5 Movement Classification of Traditional Chess Pieces			
No.	Piece	Type of Movement	Movement Classification
1.	 Queen	 Castle +  Bishop =  Queen	Unlimited Orthogonal + Unlimited Diagonal
2.	 Castle	 Castle	Unlimited Orthogonal
3.	 Bishop	 Bishop	Unlimited Diagonal
4.	 Knight	 Knight	L-Type (2,1)
5.	 King	 Queen	Limited Orthogonal + Limited Diagonal
6.	 Pawn	 Pawn (Special)	Limited Orthogonal (Forward only, optional two moves for 1 st move and then one move + Limited Diagonal (Forward only, capture only, one move) Promotion

Value of Traditional Pieces

Traditional Chess typically assigns the following values to pieces as shown in Table 2-6.

Piece	Value
 Queen	9
 King	*
 Castle	5
 Bishop	3
 Knight	3
 Pawn	1

* Rating the King is not considered viable because the King cannot be traded. However, the King has attacking capability and can assist in a checkmate so the piece does have limited value.

This value system is empirical, based on experience and is not based on a specific mathematical formulation or algorithm. As an example of the empirical nature of this value system, a Castle and a Bishop combine together to equal the movements of a Queen; however, the sum of the value of a Castle (5) + a Bishop (3) does not equal the value of a Queen (9). The value system is simple because each piece has a whole number value with the Pawn as unit value. With this approach, it is simple to assess the relative strength of any pieces involved in a trade. For example, one Castle is equal to one Bishop and two Pawns.

The values listed are also average values over the entire span of the game. Depending on the position of the piece, the number of other pieces on the board and the how far the game has progresses, the value of each piece will vary. Bishops and Knights tend to be of greater value early in the game while Castles, Queens and Pawns tend to be of greater value later in the game when the board is more open and the opportunity for Pawn promotion is most likely.

When new pieces are introduced to the game, it is important that each piece is assigned a value so that players know the relative strength of each piece and can position pieces safely and trade wisely. This can be done based on experience, but it would take years for new pieces to acquire a widely agreed upon value. The problem becomes more daunting if one considers increasing the size of the game board beyond the traditional 8x8 size. Do pieces have different relative strengths on different sized boards? Again, it would take years to answer the question. Empirical values require the experience of thousands of players playing thousands of games that require documentation and analysis.

With 36 pieces in Expanded Chess as shown in Table 3-1, there needs be a quantitative value for each piece and a subsequent ranking based on the value.

The value of a Chess piece is strongly related to its movement capability. Classifying this movement is the first step to developing a systematic method for establishing the value of a chess piece. Once this movement classification is established, each of the components can be evaluated for its contribution to the overall value of the piece. Once the components are evaluated, they can be reassembled in new combinations for new pieces and the summed to determine the value of a new piece. This is the approach that is used to determine the value new chess pieces in Chapter 5.

Analysis of Traditional Chess Movements







There are three major types of movements in traditional Chess. The movements are orthogonal, diagonal and L-Type movements. These movements are illustrated in Figure 2.1

Orthogonal moves can be limited or unlimited and forward, backward, left or right (sideward). Limited Orthogonal Moves [LOM] can be defined as:

$$LOM \leq (n-1)/2 \quad [Eqn. 2.2]$$

where n is the number of rows or columns on a game board (assuming a square board).

Table 2-7 presents the classification of orthogonal moves for the traditional chess pieces.







Table 2-7 Components of Orthogonal Moves – Traditional Chess				
Piece	Component			
	Unlimited	Forward / Backward Left / Right (Sideward)		
		Limited		
		0	1	2
 Queen	F/B/L/R			
 King			F/B/L/R	
 Castle	F/B/L/R			
 Bishop		X		
 Knight		X		
 Pawn			F	F*
*Opening move only				

Diagonal moves can be limited or unlimited and forward or backward. Limited diagonal moves [LDM] can be defined as:







$$LDM \leq (n-1)/2 \quad [Eqn. 2.3]$$

where n is the number of rows or columns on a game board (assuming a square board).

Table 2-8 presents the classification of diagonal moves for the traditional chess pieces.

Table 2-8 Components of Diagonal Moves – Traditional Chess				
Piece	Component			
	Unlimited	Forward / Backward		
		Limited		
		0	1	2
 Queen	F/B			
 King			F/B	
 Castle		X		
 Bishop	F/B			
 Knight		X		
 Pawn			F*	
*Capturing opponent only				

L-Type moves are limited by definition and are forward, backward, left or right. Table 2-9 presents the classification of L-Type moves for the traditional chess pieces.

Table 2-9 Components of L-Type Moves – Traditional Chess			
Piece	Component		
	Unlimited	Forward / Backward	Left / Right
		Limited	
		0	2,1
 Queen		X	
 King		X	
 Castle		X	
 Bishop		X	
 Knight			F/B/L/R
 Pawn		X	

The classification and analysis of traditional chess pieces has been divided up into the following categories:





































- Classification of traditional pieces including:
 - Descriptive Classification
 - Movement Classification
- Valuation of traditional chess pieces
- Analysis of traditional chess pieces

Tables 2-7, 2-8 and 2-9 have provided an analytical basis for determining the structure of the components of the orthogonal, diagonal and L-Type moves for traditional chess pieces. New chess pieces can be created and provided with movements based on expanding and/or recombining these components in a manner the follows rationally from the existing movements. This classification, valuation and analysis form the fundamental framework for the expansion of the number of chess pieces. Adding these new pieces is the subject of the next chapter.

Chapter 3 – Addition of Expanded Chess Pieces

The New Pieces

Expanded Chess will increase the number of type of chess pieces to thirty-six (36). The new pieces are based on classifications that will extend naturally from traditional chess. At first this might seem like a large increase in the number of types of pieces for Expanded Chess. However, not only are the number of pieces increasing, but the size of the game board is also increasing in size. With the larger game board, new pieces are needed. It is not the intent of Expanded Chess to use all pieces in anyone game. The intent of Expanded Chess is to create a new set of games where a unique subset of the 36 pieces is used for each new game. These pieces will have the same movements in every game that they are used. There are six (6) classifications with six (6) types of pieces in each classification. The results are as shown in Table 3-1.

Table 3-1 Additional Types of Expanded Chess Pieces									
Classification		"Y" Index							
	"X" Index	Type of Movement	6	5	4	Type of Movement	3	2	1
Ruling	6	Queen/ Knight	 Empress EPS	 Chancellor CHL	 *Emperor EPR	Queen	 Queen QUN	 Duke DUK	 King KNG
Architectural	5	Castle / Knight	 Fortress FTS	 Citadel CDL	 Cathedral CTL	Castle	 Castle CSL	 Armory ARM	 Abbey ABY
Religious	4	Bishop / Knight	 Pope POP	 Archbishop ARB	 Cardinal GRD	Bishop	 Bishop BSP	 Priest PRS	 Nun NUN
Military	3	Knight / Knight	 Marshall MSL	 Captain CPN	 Sergeant SGT	Knight	 Guard GRD	 Archer ARC	 Knight KNT
Weaponry	2	Pawn / Knight	 Catapult CTP	 Ram RAM	 Mace MAC	Partial Knight	 Lance LNC	 Hatchet HCT	 Sword SWD
Special Characters	1	Special	 Angel AGL	 Saint SNT	 Wizard WZD	Pawn	 Squire SOR	 Knave KNV	 Pawn PWN

*Emperor does not have Knight- type of movement. An overly mobile Emperor is very difficult to checkmate.

The classification system does pre-suppose that any new pieces will fit into a model that approximates cultural coherence. The chosen model for the classification is a medieval Catholic society. This model is used in Expanded Chess because it is the one that is already assumed in traditional chess. It is also the one that is rich enough in history and literature to support any an expansion, such as the one that is being proposed, with relative ease. The model is also a familiar one to much of the world even though it carries a Euro-centric cultural bias.

Each row lists a *Type of Movement* which is representative for that class of piece. For example, the Ruling Class *Type of Movement* is listed as Queen/Knight. This means that each piece in the Ruling class will have movement on the chess board that is a combination of Queen-like and Knight-like moves. The salient features of Queen-like moves or Knight-like moves or any types of movements are explained in detail in Table 2-2.

A combination movement is defined as a piece having the movements of two lesser pieces. In traditional chess, the main example of this concept is the Queen. She has the combined moves of a Castle and a Bishop, which creates the more powerful piece. A significant benefit to using combined moves is the economy of recall required by players. The less arbitrary and random the moves of a more powerful piece are (and the more these moves are a combination of the already learned moves of lesser pieces) then the easier it is for a player to learn and recall the moves of more powerful pieces. As the number of types of pieces is expanded, this concept becomes important because it is difficult recall a large number of types of pieces with no obvious pattern to their movements.

Table 3-1 presents the structure of the pattern of movements. As you move down Table 3-1 in class from Row 6 to Row 1, the *Type of Movement* becomes a less powerful combination. As you move across Table 3-1 in the same class from Row 6 to Row 4, the *Type of Move* generally remains the same combination but the movements from unlimited to limited and decrease in range. As you move across Table 3-1 in the same class from Row 3 to Row 1, the *Type of Movement*

eliminates the combination but retains the more powerful component of the combination and again the movements from unlimited to limited and decrease in range. Table 3-1 gives a description of each class of pieces and then lists the pieces in that row in order of relative strength. The row and column index generally gives the overall relative strength of the piece. For example, the piece with the 6 6 index is the strongest, 3 3 is a medium strength piece and the 1 1 is the weakest piece. The present number of types of pieces in traditional chess is six (6). An expansion to thirty-six (36) types of pieces does provide a tremendous wealth of possibilities for all the new Expanded Chess games. The main objective of having all these new types of pieces is to standardize, now and for the future, the concept that each type of piece will have the same movements and rules governing its play for all the new Expanded Chess games.

The traditional chess pieces will, keep the same movements in Expanded Chess as they now have in traditional chess. The only noteworthy exception is the slide bishop. The slide bishop will be explained in detail in Chapter 13.

The new pieces selected are ones that fit with the concept that all items in a row in Table 3-1 belong in that class and are also obviously arranged from pieces of greatest importance to least importance from left to right within a row in Table 3-1. Some of the pieces selected are similar to ones that appear in variant games of chess. This includes pieces like the Marshall, Cardinal, Archbishop, Duke, Empress, Chancellor, Sergeant, Guard and Wizard.

Since there are hundreds of variants of chess, this naming situation is unavoidable because the use of common items from medieval culture in variant chess has existed since the origin of traditional chess and is inherently obvious for adding new pieces. The Queen and the Bishop originated as new pieces in a variant of Arab game Shatranj created in fifteenth century Italy, which is now traditional chess. The firz and the fil (elephant), were transformed to the Queen and the Bishop respectively.

This, however, was not a rigorous survey. It is a subjective selection. The types of pieces selected are pieces that are intuitive extensions of pieces that are now in existence. For example, a Duke would be an obvious choice for a piece that would be related to the King and Queen.

Expanded Chess provide a complete new iconography where traditional chess pieces maintain their standard iconography and each new type of piece has its own new and unique iconography that also includes a three letter abbreviation of the piece to simplify identification and minimize effort to recall the name of each piece. There is no attempt in Expanded Chess to combine the images of two existing pieces to synthesize the image of a new piece if the movements of the two lesser pieces are combined to form a greater piece. This is not done in traditional chess when the movement of a Bishop and a Castle are combined to create a Queen. Expanded Chess maintains this approach and gives each piece a unique identity as is done in traditional chess.

No attempt has been made to harmonize the existing pieces in different variants with each other or Expanded Chess. The problems associated with such an undertaking are manifest. You would need to harmonize pieces, names, movements and iconography for hundreds of variants. What criteria would be used to select one game's pieces, names, movements and iconography over any other game? It would be a major challenge and difficult to imagine creating such a set of rules to achieve this harmonization of the existing variants because these variants never followed any expansion guideline when they were created. Expanded Chess will build these entities from the ground up with a structured set of guidelines for expansion and create a coherent set of pieces, names, movement and iconography for all the variants of Expanded Chess.

Description of Expanded Chess Pieces

Appendix A presents a detailed description of each piece including the image of each piece and its movements/capture diagram.

The description of the new types of pieces is provided on a class-by-class basis in Appendix B.