

Chapter 25

Boards with three and more dimensions

[We now move on to true three-dimensional boards. The earliest definite reference to three-dimensional chess appears to be to the oft-quoted Kieseritzky board, and the earliest game of which details survive is Maack's 'Raumschach' of 1907. The multiple-board games of Part 1, such as Alice Chess, may also be classified as 3-D games, though we shall normally restrict the term to games where the boards are stacked one above the other rather than being placed side by side. The most popular 3-D board amongst inventors, and at the same time the most mentally indigestible for the players, consists of eight normal boards mounted in this way. Less demanding on spatial vision, and hence more practical, are games confined to two or three 8x8 boards and games with boards smaller than 8x8. A few multi-dimensional games beckon the intellectually courageous.]

The rook generalizes immediately to three dimensions. The bishop does not, and three-dimensional games employ two different pieces: a 'bishop' which moves in a plane with the normal bishop move, and a new piece, often called a 'unicorn', which advances through all three dimensions at once. (Imagine the piece in the middle of a cube. If it is a rook, it moves to the middle of a face of the cube; if a bishop, to the middle of an edge; if a unicorn, to one of the corners.) The queen is sometimes treated as R+B, more usually as R+B+U. When away from the edge, a rook has 6 directions of movement, a bishop 12, a unicorn 8, and a queen 18 or 26. A king away from the edge has 26 squares available to it.

In orthochess, a rook or queen presents a barrier which the opposing king cannot cross. In three dimensions, it doesn't, and mating even a bare king can present difficulties. There are two ways of dealing with this. The first is simply to make the board small enough (if the queen is given the power of R+B+U, K+Q can mate a bare king if they can trap it against the side, and on a 5x5x5 board all the stronger side has to do is to put its king in the centre and let the queen do the rest). The second is to give the rook a double move, so that it can command a whole plane and not just a line. The danger is now that the rook becomes too powerful rather than too weak, but it is an idea that can be made to work and a special section is given to the games which embody it.]

25.1 Square boards on two levels

Peruvian Army Chess, also known as **Military Game [Weaver]** (Walter R. Weaver, 1930). *The West Coast Leader* (Lima) reported that the Peruvian army had hit on the novel idea of substituting the various classes of air attack and ground defence for the chessmen 'to facilitate the teaching of air manoeuvres'. Board 8x8x2; pieces on upper board represent various types of aviation: Bombardment (R), Attack (B), Pursuit (N), Local observation (K), Distant observation (Q). Orthochess on lower board, but men can also be captured from above by bombardment or attack aircraft. King can be checked and mated from above or by ground (lower board) forces, or a combination of the two. Pawns, if unmoved, serve as AA

artillery, the squares above them denied to hostile aircraft. Aircraft, with the exception of observation planes which serve simply as blocks, can only be captured by pursuit aircraft (*British Chess Magazine*, January 1931, also *Abstract Games* 11)

Two-Level Chess [Miller] (Donald L. Miller, 1948). Two 8x8 boards, one above the other; standard array on top board (Level 1), bottom board (a1 white) empty. Play as orthochess on either board. Instead of moving, a player may transfer a man from one board to the corresponding square on the other provided it is vacant, with the exception that a king cannot change levels if in check. Notice that a B

would then change its square colour. A P for its first move may drop to Level 2 and move one square forward but cannot move back to Level 1 unless promoted. A N makes the first step of its two-square move on changing levels and completes the move on the second board (first step is notionally either diagonal or orthogonal, as agreed). The N is the only piece that can change levels and capture in the same move. A P must be promoted on reaching the end rank of Level 2. It may be promoted on end rank of Level 1, but if not, must drop to Level 2 to promote. (*Ye Faerie Chessman*)

Trapdoor Chess [Hills and Bimler] (Greg Hills and Trevor Bimler, 1976). Two 8x8 boards, upper and lower. Four squares on the four central ranks of the upper board, decided by lot, are trapdoors, the corresponding squares on the lower board are mattresses. Usual set-up on upper board. Any piece crossing or landing on a trapdoor descends to a mattress. A piece falling through a trapdoor eliminates a piece of either colour on the mattress below. On each turn, a player moves on either the upper or lower board. Only queens, promoted or otherwise, can ascend to the upper board but must first move to mattress, then to trapdoor (two moves). One

strategy is to drop pawns, perhaps with a piece or two for protection, which come up as queens a few moves later. Kings are dropped only in desperation. If one player dominates one board and his opponent the other, a draw is the likely outcome. (*Ye Faerie Chessman*)

Flying Chess (Proprietary game, David Eltis, 1984). Two-tier board, usual array on lower. R, B, N can attain the upper level and fly. A move directly up or down is permitted, as are various other options: R can make a move on the lower board and ascend to the next upper-board square beyond, B can make a move on the upper board and descend similarly, N can make a move on the upper board and descend directly. All these moves can capture, and additionally any man (not just a man that can fly) can capture by 'head butting': if there is a flying man immediately above it, it can capture this man without moving (but the capture counts as a move). (Author's rules leaflet, also Chess Variant Pages) [Text revised. Apparently the game is normally played on a single large board capable of holding two men per square, pieces on the upper level being indicated by markers, but the two-level presentation seems more appropriate here.]

25.2 Square boards on three levels

Johnson's Three-dimensional Chess (Proprietary game, Rick Johnson, 1966). Board 8x8x3; usual men with White set up on level A and Black at opposite end of level C. Movement of pieces is described as normal except that each has also a vertical capability. The inventor claims to have played well over a thousand games. The game was marketed from 1967 onwards and was featured in the media. (*Nost-algia* 115)

Space Chess [Pacific Games] (Proprietary game, Pacific Games Co, 1969). Board 8x8x3. A proprietary game with rules developed by US chess champion Larry Evans. (Advertisement in *Popular Science*, March 1969, also *Ye Fairie Chessman*)

Star Trek Chess, also known as **Tridimensional Chess**. This game, described as 'the most complex form of the ancient

game yet devised', was issued as a technical order in the *Star Trek Manual* (1970s) and was purportedly played on the *U.S.S. Enterprise* in *Star Trek*. Usual men move in usual way except that they have 'tridimensional freedom to the extent of available consecutive squares'. The board, made up of 64 squares of which 16 are movable in 2x2 groups, is on three levels: (top) Black's defending board; (middle) neutral field board; (bottom) White's defending board. No games, so far as is known, have yet been recorded by space travellers. [Text revised]

Chess in the Third Dimension (Proprietary game, Skor-Mor, 1976). Board 8x8x3; usual array but Black chooses top or bottom level, White is then on the other. Orthochess play, but on its initial move every man must, after moving, transfer to the corresponding square on the middle board (if this square is occupied

the move is illegal). There are minor exceptions: the king may elect to change planes or not, and if castling the player may elect to move both pieces or neither to the central plane. On each subsequent play a man may be moved in the normal way or to the square directly above or below it, but only if it is vacant. Captures, check, and checkmate can only take place on the same plane. (Proprietor's rules pamphlet)

Hagemann's Three-Dimensional Chess (Wally Hagemann, date unclear). Board 8x8x3; usual men with orthochess array, White on top board and Black on bottom. Pawns, which can move up or down, and have two-step option with e.p., promote in cells occupied by opponent's pieces in the array. Moves of K and R as usual but B combines moves of normal bishop and unicorn. N moves to cells of board above or below that correspond to those it can move to in the plane. N on level A or C may also move to the corresponding squares of those that immediately surround it on the other board. Example: NCa1 can move to Cb3, Cc2; Bb3, Bc2; Aa2, Ab1, Ab2. Spatial capturing moves of pawns not given. (Author's rules pamphlet) [The game was dated '1960s?' by David, but the typographical style of the rules pamphlet suggests that it was printed in the late 1980s or late 1970s)

Parallel Worlds Chess (R. Wayne Schmittberger, 1980s). Board 8x8x3. A full array is assembled on both boards A and C, board B being empty. On turn, a player may move one, two or three men provided that no two men end their moves on the same level. Kings do not change level but all other men may move straight up or down one level provided the square moved to is vacant. Level B is a twilight zone in which all men move as queens but cannot capture. Thus a pawn can transfer to level B, later move to the first rank and subsequently move to board A or C on the first rank. It can then move only one square, but on the second rank it regains its two-square option. The object of the game is to capture either of the opponent's kings. Very wild. (*New Rules for Classic Games*)

3 Dimensional Chess [Carney] (Proprietary game, Carney's Compendium of Games; Paul Cope, 1992). Board 6x6x3; 26 men a side. Array (A bottom, C top) Aa1-f1/Ca6-f6: RNQKNR; Aa2-f2/Ca5-f5: PPBBPP; Acd3/Ccd4: PP; Ba1-f1/a6-f6: BRPrPsRB; Ba2-f2/a5-f5: PPPPPP. The Princess (Ps) moves and captures as Q but additionally has 'devotional' power. If the K is mated, it may move to the square occupied by the Ps which is removed from the board. The Prince (Pr) is simply a third knight. Pieces may move from one level to the next only to the square immediately above or below and only if the square is unoccupied. No pawn-two; promotion to captured piece only on Ca6-f6 (White)/Aa1-f1 (Black). The game, which was developed over five years, has approximately the same men-to-squares ratio as orthochess. (Manuscript notes apparently deriving from personal communication)

3 Dimensional Chess [Mind Games] (Proprietary game, Mind Games Manufacturing Ltd; Bernard Kennedy, 1992). Board 8x8x3, a1 black all boards. Each side has 24 pieces and 24 pawns. The new pieces are Prince (Pr), Princess (Ps), Abbey (A), Cannon (C) and Galleon (G). Array (top board: a1-h1/a8-h8) GCAPsPrACG; P x 8 2nd/7th rank; (middle board) orthochess array; (bottom board) as top board. Orthochess men can move between boards, knights and pawns excepted. Pr,Ps,G,A correspond respectively to K,Q,R,B and move exactly as their orthochess equivalents except that they cannot change levels and princes can be taken like any other piece. The move of the cannon defies simple description but always involves a change of level. Win by mating K or capturing both princes. (Manuscript notes deriving from a set in David's game collection)

Millenium 3D Chess (W. D'Agostino, 2001). Board 8x8x3. Blank board on central level, White has standard array on one level, Black on the other. P-two, promotion, castling and e.p. semi-orthodox. [Information presumably taken from a set in David's game collection; no source material in his Encyclopedia files]

25.3 Square boards on four levels

Tedco Three-Dimensional Chess (Proprietary game, Texas Educational Devices Co, 1966). Board 4x4x4 (a1 black all levels, but may also be unchequered). The Tedco board was developed for psychological studies on human ability to think in three dimensions and was used for a number of games in addition to chess. Usual chessmen. Moves: K one cell in any direction on the same level or level immediately above or below, no castling; R changes level straight up and down only (maximum cells covered: 9); B when changing level moves diagonally up or down in a straight line so can change colour; Q = R+B; N one cell at a time diagonally (maximum cells covered: 12); P moves one cell forward or vertically up or down, captures only as orthochess on same plane. Strategy focuses on the four central squares of levels B and C. In the endgame, K+R and K+B only draw against bare K, but K+Q is an easy win. Array (all boards a1-d1/d4-a4): A, PNPR; B, PBKP; C, PQBP; D, RPNP (kings on Bc1 and Bc4). (*Nost-algia* 90)

Isometric Chess (Proprietary game, Isometric Chess International; John Oden, 1977). The board is in the shape of a pyramid built up in four tiers of cubes from an 8x8 base to a 2x2 centre. Pawns are placed on their usual squares whilst pieces are entered one by one at choice on the respective baselines, the only restriction being that the bishops must be on opposite colours. Oden predicted, unwisely as it turned out, that people would be playing Isometric Chess - 'and only Isometric Chess' - in 2001, adding that 'people who know chess and understand its place in history realize right away what a giant step it is in the evolution of the game'. Robert Erkes, president of the Maryland Chess Association (the inventor was from Maryland) commented that 'All it is is a chess board that looks funny'. (Proprietor's publicity leaflet, also photocopy of cutting from a newspaper which appears to be the *Baltimore Sun*)

3-D Chess [Enjoyable Hour] (Proprietary game, Enjoyable Hour Products, 1979). Board 4x4x4, a1 black at all levels; usual men, array (White on D, Black diametrically opposite on

A) RNNR, BKQB, 4xP, 4xP (kings on Db2 and Ac3). Moves (orthochess on same plane, except P): K cannot change level; R can move straight up or down between levels, B can move one cell diagonally up or down; Q=R+B; N moves as orthochess from cell immediately above or below it (maximum 12 moves); Ps can move only down (W) or up (B), one cell at a time, and can capture diagonally only on same level. Pawns promote in any cell on opponent's array level. One of the fastest of the 3-D games. (Photocopies of box cover, board, rules leaflet)

Aztec Chess (Roberto Salvadori, 1982). The 8x8 board is in the form of an Aztec pyramid, viz: 8x8 base, 6x6, 4x4, 2x2 (d4/5,e4/5). Usual men but array (e1-h1/d8-a8 and inwards) PBRK, PBQR, PPNN, PPPP and the board is placed diagonally between the players so that White's 'forwards' direction is along the diagonal h1-a8. Rules of play are elaborate. (*Eterosacco* 21)

Podionic Chess (Proprietary game, Prophecy Games Ltd; Jonathan Pennell, 1994). Four 4x4 boards arranged one above the other in an overlapping spiral formation; usual men. Seen from above, adjacent boards have a row of four overlapping squares, and all four inner corners overlap; these overlaps provide routes between the boards. (Proprietor's rules booklet and publicity material; see also *Variante Chess* 20) [Text revised]

Schach³, also known as **Raum-Schach [Töttger]** (Proprietary game, Peter-René Töttger, 1994). Board 4x4x4; usual pieces plus 4 pawns a side. Array boards (A bottom, D top) Aa1-d1/Dd4-a4: RQKR; (Aa2-D2/Dd3-a3) PPPP; (Ba1-d1/Cd4-a4) NBBN. Moves: K one square orthogonally or corresponding square to that occupied on next level up or down; Q one square in any direction or corresponding or orthogonally vacant square on next level; R as R on same level or vertically to any level; B one square diagonally on same or next level; N see diagram; P on level or next level with usual capture; promotion on end rank of D (White) or A (Black). (Personal communication)

25.4 Square boards on five levels

Raumschach [Maack], also known as **Space Chess** (Ferdinand Maack, 1907 and subsequently). The classic 3-D game. Its inventor contended that to make chess properly analogous to modern warfare, attack must be possible from above and below (air/underwater) as well as on the surface. Maack promoted space chess with demonstrations, articles, booklets and a magazine (*Raumschach*). The game was originally set on an 8x8x8 board as described later, but Maack experimented with other boards and 5x5x5 became the normal form. In 1919 he founded the Hamburg Space-Chess Club, which survived until World War II. Dawson in particular was attracted to Maack's 5x5x5 invention - 'the game which will naturally be the commonplace of the future' - and he ran a series of articles on it (*Chess Amateur*, July-December 1926). Each player has two extra pieces (unicorns as described above), and there are 10 pawns a side; White RNKNR fronted by 5xP on board A, BUQBU fronted by 5xP on board B, Black diametrically opposite on boards E and D (unicorns on Da5 and Dd5). White pawns promote on rank E5, black on rank A1. N makes one step as R and one as B (if you prefer a mathematical definition, it is a '2-1-0 leaper'). P moves one step at a time and captures diagonally forward, all movement being towards the promotion rank. Thus WP at Ab2 can move to either Ab3 or Bb2, and it can capture on any of the five squares Aa3, Ac3,

Ba2, Bc2, Cb3. Another array halves the number of pawns and has all white men on level A, all black men on level E: (Aa1-e1/Ee5-a5 and inwards) RNKNR, BUQBU, 5xP.

The game has attracted many leading problemists. Troitsky studied the endings and showed that K+Q always wins against K.

Stereoschach (Gerhard Jensch, 1975). Derived from Maack's Raumschach above, Stereoschach was introduced by Jensch as a problem theme (*feenschach*, May-July 1975), but its merits as a game were soon appreciated. Board 8x8 + 4x4x4, usual men in normal array positions on the 8x8. The small boards, A (bottom) to D (top), are directly above the squares c3-c6-f6-f3-c3 on the base board. Three-dimensional moves are possible on the 4x4 central squares. Movement on the same level as in orthochess. Pieces and pawns move between levels as in Maack's Raumschach (there is no corresponding piece to the unicorn in Stereoschach). Pawns promote in cells (White) (D)c6-f6; (Black) (D)c3-f3. Openings tend to start normally. An international tournament held at Imperia (January 1987) was won by Friedemann Arnold. Stereoschach was demonstrated by Hans-Peter Rehm at the F.I.D.E. problemists' meeting in Bournemouth, August 1989. **Spiral Chess [Jensch]** (Gerhard Jensch, 1984, dedicated to Peter Kniest) is a refinement in which the a-file is assumed to be above the h-file (*feenschach*, February 1984).

25.5 Square boards on six levels

Cubic Chess [Parton] (V. R. Parton, 1970). Board 6x6x6, levels A-F bottom to top; 6 pieces and 12 pawns a side. Array (Aa1-f1/Af6-a6) KQBUNR; pawns Aa2-f2/ a5-f5 and Ba1-f1/Ba6-f6. Unicorn U moves in straight lines through cell vertices. Pawns move one cell forward orthogonally, diagonally, or through the cell vertex, and capture as they move; a pawn on Bd2 can move or capture to any of 9 cells. In **Compulsion Cubic Chess** capture is compulsory; no checks, aim is to capture enemy king.

Parton also proposed **Timur's Cubic Chess**, which is Timur's Great Chess (see the chapters on historical and regional games) translated onto a 6x6x6 board. He retained on each side a king and a fers, and two each of the rooks, knights, dabbabas, alfils and giraffes together with pawns. In the array the men are arranged on the two lowest levels. Level A (a1-f1/f6-a6) RGQKGR, 6 x P 2nd/5th rank. Level B (a1-f1/f6-a6) DANNAD, again with 6 x P in front. Parton did not expatiate on spatial movement. (*Chessical Cubism*)

25.6 Square boards on seven or eight levels

Cubic Chess [Kieseritzky], also known as **Kubischack** (Kieseritzky, 1851). Kieseritzky is alleged to have shown a cubic game to Anderssen in London in 1851. According to Jean Duffresne, Kieseritzky displayed a large glass case separated into small cube-shaped boxes in which chess pieces were hanging on strings. He is said to have exclaimed 'I shall mate the black king from above with the white knight' and proceeded to do so. The author (Maack?) of an article in *Raumschach* (No.1, 1908), commented that Kieseritzky's model should therefore be in London, adding that 'Enquiries into this affair have remained unanswered. The rudeness accorded the German side would surely not have been suffered by an English investigator'. Maack, when demonstrating his game earlier (September 1907) said that the model was in the British Museum, but there is no trace of it there, nor in any of the major London museums, nor in the collection of exhibits from the Great Exhibition of 1851. [Anthony Dickins, in *A Guide to Fairy Chess*, cites *Deutsche Schachzeitung* 1878, page 117, as the source for the Kieseritzky anecdote. I have assumed that it referred to an eight-level board, or at least that it didn't explicitly refer to anything else.]

Raumschach [original formulation] (Ferdinand Maack, 1907). Maack's original version used an 8x8x8 board with 24 men on each side: the usual eight pieces, and 16 pawns. The array was as orthochess on board A with each player having 8 pawns a1-h1/a8-h8 on board B, the purpose of these pawns being to protect the corresponding pieces from overhead attack. An alternative arrangement had the black pieces on Ha8-h8 and pawns on Ha7-h7 and Ga8-h8. Queen moved as R+B only, K one step as R or B. Pawns moved normally on the plane (no pawn-two), or could move vertically up (with two-step initial option).

For a dozen years Maack experimented with other arrays and smaller boards, ending up with 5x5x5 as described above. One 7x7x7 variant included two Giraffes (4-1 leapers). [There are numerous references in David's files, but the primary sources would appear to

be *Raumschach*, an article in *Wiener Schachzeitung* in 1907, and Maack's booklets *Das Schachraumspiel* (1922 and 1930, apparently two different editions). Dickins, in *A Guide to Fairy Chess*, also cites a 1907 edition of *Das Schachraumspiel* and further booklets *Spielregeln zum Raumschach* (1913) and *Raumschach: Einführung in die Spielpraxis* (1919). I presume that '4-1 leaper' here means '4-1-0 leaper' in the same way that the knight has become a 2-1-0 leaper.]

Kogbetliantz's Game (Ervand Kogbetliantz, 1918). Board 8x8x8; 64 men a side comprising 1 x K, Q; 2 x N, Archbishop, Favourite; 4 x R, B, Hippogriff, Fool; 40 x P. K, Q, R, B as in Maack's game (26 directions for K and Q); Fool as Maack's Unicorn; Archbishop = B+Fo; Favourite = R+B. The knight has three distinct possible move combinations, as R/B (Aa1-Ab3), R/Fo (Aa1-Bb3), or B/Fo (Aa1-Cb3); the Hippogriff is a leaper whose move is made up of one cell as a R, then one as a B, then one as a Fo. The P moves as in Maack's game except that it has an initial two-step option (e.p. possible). At the start, each player's men occupy the first two ranks of the four central boards. Pawns occupy the second ranks on all four boards. The piece array is (a1-h1/h8-a8) (3rd board) PPFBBFPP; (4th) RHNFaKAHR; (5th) RHAQFaNHR; (6th) PPFoBBFoPP. First developed in Russia, where Kogbetliantz was living at the time, the game was launched in the U.S. in 1952 where it received a lot of publicity (*Newsweek*, *Time*, *New Yorker* etc). It attracted a large following according to Boyer (*Nouveaux Jeux d'Echecs Non-orthodoxes*) but this appears to be contradicted by *Life* magazine which reported that there are about 1,500,000 possible positions after the first two moves of both sides, 'which explains why the Western Hemisphere contains only eight players; six are pupils of Dr Kogbetliantz, one is his daughter, and the last and best is the doctor himself'. Don Miller, who attended a presentation on the game, commented that 'the first ten moves of the demonstration game took three hours, at which point the game was abandoned'. Miller nevertheless found the game 'fascinating' and

constructed a model board by welding wire coathangers from which the men were suspended. He described Kogbetliantz's game as 'one of the best of all chess variants, and the best of the three-dimensional ones' (*Ye Faerie Chessman*). [The primary source is presumably what Miller describes as 'a four-page copyrighted booklet' which was on sale at the 1952 presentation, but I don't think David had a copy of this and the present exposition appears to follow Boyer.]

Godson's Three-dimensional Chess (William Godson, 1930). Board 8x8x8; Aa1 black, alternating vertically. Usual eight pieces plus 16 pawns a side. The arrangement differs from Maack's game in that the white array is normal on board A with 8 pawns above (Ba1-h1) while Black's array is on board H with 8 pawns on Ga8-h8. The men move as in Maack's game except that pawns have the initial two-step option but no e.p.; white pawns cannot move down, black pawns cannot move up. Pawns promote in any cell occupied by the opponent's pieces in the array. Castling normal. (Author's rules booklet)

Marks's Three-dimensional Chess (J. David Marks, c.1960). Essentially Maack's 8x8x8 game with Fool = unicorn and Space knight = N. (Manuscript notes presumably deriving from personal communication)

Gollon's Three-dimensional Chess (1960s). Quoted by Gollon in his *Chess Variations* but unascrbed. Board 8x8x8. Normal array and game on level A. When one king is mated, he escapes to the square above him on level B. All the men now assume a 3-D role (see Maack). If this results in the king being simultaneously mated on level B, the game is over; otherwise it continues until a king is again mated when it escapes to the next level, and so on. There are apparently several versions. In one, the initial move upwards of a K opens the whole 8x8x8 board to all pieces; in another, no man may move to a board above the highest-placed K; another version allows the K to move upwards when checked, and yet another version permits a K to move upwards at any time. Gollon, who considered this a 'fine game', admitted to having invented a variant on a 9x9x9 board in which each

player had 141 pieces (of which 81 pawns), the details of which he spared his readers.

3-D Space Chess [Dimensional Enterprises] (Proprietary Game, Dimensional Enterprises Inc, 1967). Kogbetliantz's game, marketed with streamlined pieces. [There is an index pointer to source material in David's Encyclopedia files, but the material itself appears to be missing.]

Atkinson's Three-dimensional Chess (Tom Atkinson, early 1970s). Same as Kogbetliantz's game, marketed by Atkinson who asserted, with what authority is not known, that 3-D Chess was developed in Europe in the late 18th century - 'a game still played in Russia and some other countries'. (*Ye Faerie Chessman*) [David clearly felt obliged to report this assertion, but unless and until some definite evidence comes to light I think it has to be discounted.]

Cubical Chess [Berry] (Clive Berry, 1970s). Board 8x8x8; each side has 1xK, 3xQ, 20xR, B, N, 64xP to achieve the same ratio of men to squares as orthochess. (Author's booklet describing a computer realisation)

Gregory's Three-dimensional Chess (M. Dorian Gregory, 1970s). Board 8x8x8, Aa1 white alternating vertically. Pieces 48 a side comprising 1 x K, Q, Regent, Bar-Q; 2 x R, B, Centaur, Chancellor, Bar-R, Bar-B, Bar-Centaur, Bar-Chancellor; 4 x N; 24 x P. Centaur = B+N; Chancellor = R+N; Regent = R+B+N. Bar pieces are restricted to three levels, their array level and those immediately above or below it. R and N have the same moves as in Maack's game, B=unicorn, Q=R+B, P captures diagonally forward one square (as B) but does not move vertically. Array: White on E,F,H; Black on A,C,D. (H/A a1-h1/h8-a8): RNBReKBNR, 8xP 2nd/7th ranks; (F/C a1-h1/h8-a8): ChNCQQ(B)CNCh, 8xP 3rd/6th ranks; (E/D a1-h1/h8-a8): RCBCChChBCR (all bar pieces), 8xP 2nd/7th ranks. Gregory also proposed a variant with the same pieces but levels 2x2, 4x4, 6x6, 8x8, 8x8, 6x6, 4x4, 2x2, lower boards keyed to h1, upper boards to a8. The game was presented at a symposium at the University of Victoria, B.C. (*Ye Faerie Chessman*)

Harper and Dietrich's Game Board (James W. Harper and Gary L. Dietrich, 1971). A vertical arrangement of seven boards successively of 4, 16, 36, 64, 36, 16, 4 squares, for use in chess or checkers. No details of moves are given, merely that the chess pieces include additional pawns and that the pieces may be moved in both horizontal and vertical directions. (U.S. patent 3,767,201 of 1973, possibly incomplete)

Rohr's Three-dimensional Chess (Chris Rohr, 1975). Board 8x8x8; 28 men a side comprising 1 x K,Q; 4 x R,B,N; 14 x P. The interest is in the unusual array (White): Rs Aa1,h1 Ha1,h1; Ns Bb1,g1 Gb1,g1; Bs Cc1,f1 Fc1,f1; K De1/Q Dd1 or K Ee1/Q Ed1 (Black K/Q on alternative level); pawns on second rank in front of pieces at all levels. No castling. Don Miller suggested a revised array and movement rules. (*Ye Faerie Chessman*)

25.7 Square boards on more than eight levels

Prokofiev's Game. In a letter to Capablanca (November 1922), the composer spoke of a variant which he had invented, and of which Capablanca was aware, that was played 'on 9 compound boards' ('compound' is underlined)

and in which one game 'is often lasting several nights'. In *Izvestia* (May 1936), Prokofiev enthused 'Chess for me is a world apart, a world of combat, of plans and of passion'. (Photocopy of part of original letter)

25.8 Other boards with three dimensions

Lewin's Three-dimensional Chess [C. G. Lewin, 1970). Board 8x8; orthochess array. All squares (cells) on a file are considered to be on the same level, the file level being determined by the number of men of both colours on it at the time. (Photocopy of pages 65-67 of an unidentified typescript)

determined by viewing vertically down from above the board. Subject to the rules of movement of individual pieces, transfer can be made to any cell at another level the whole or part of which is seen to overlap the cell on which the man stands. The object is checkmate. (Inventor's rules leaflet)

Pyramid Chess (Proprietary game, Ruffin Enterprises, 1977). Board is a squat pyramid on a square base. There are 15 cells on each face, progressively reducing bottom to top 5-4-3-2-1. The men are flat, and the pyramid has parallel ledges on which they rest. 11 men a side, one each of the normal pieces and six pawns. The players occupy opposite sides and the men are set up so that each player sees RBKQN from left to right on the bottom rank, with pawns on the next rank up and on the nearest bottom-rank cell round each side. Pawns may move one cell in any direction, K may move two cells initially. Object checkmate. (Proprietor's rules pamphlet)

Dragonchess [Gygax] (Gary Gygax, 1985). The inventor of this fantasy-based version of orthochess is probably the best-known and best creator of fantasy games. Board 12x8x3 chequered (a1 dark all levels). The three levels and their respective (and appropriate) square colourings are, top to bottom: air (blue/white), land (green/amber), subterranean (red/brown). The players are Gold and Scarlet and each has 42 pieces: 1 x Cleric, Dragon, Elemental, King, Mage, Paladin; 2 x Basilisk, Griffon, Hero, Oliphant, Thief, Unicorn; 6 x Dwarf, Sylph; 12 x Warrior. Pieces are adapted from *Dungeons & Dragons*, also a creation of Gary Gygax. The detailed rules, with explanatory diagrams, occupied six pages of the August 1985 issue of *Dragon Magazine*, but the game, although elaborate, is quite playable. Cazaux provides an alternative source. [Text revised]

Xyrixa Chess (David Samuel, c.1980). An exotic three-dimensional game played on seven levels: A - 1x7; B - 2x6; C - 3x5; D - 4x4; E - 5x3; F - 6x2; G - 7x1. Each player has 19 men: 1 x K, 2 x Q, R, B, 12 x P. These are deployed initially, like facing like, on all levels (for example, P and R face P and R on levels A and G). Movement between levels is

Space Hexagonal Chess (John Stratford, 1985, revised 1992). Three hexagonal boards, each of 91 hexes as in Glinski's game, are set one above the other and designated

Underground (bottom), Ground (middle) and Sky (top). The pieces are also identical (1xK, Q, 2xR, N, 3xB, 9xP) but are given military names, respectively Government, Anti-aircraft units, Bomber units, Tank units, Fighter units, Infantry units. The array is on the bottom two levels. A turn consists of three actions (moves); if all three cannot be completed, or the Government falls, the game is lost. All pieces can capture without moving, but only tank units can move and then fire. Moves, including inter-level moves, are comparable to those of orthochess. (Author's rule booklet)

Time Warp Chess (Jacob Richman, 1997). Time is treated as a third dimension, and men

other than kings and pawns may move forwards or backwards in time as in any other dimension (so a knight can move one step forward on the board and two steps forward in time, or two and one, or whatever combination it likes). The 'step' interval in time is one move by each player, so a man which has moved two steps forward in time reappears after two moves by each player. The idea was simplified by Robert McGonigal as **Time Travel Chess**, in which a man may move forward and backward in time instead of making a normal move, and simplified further as **Future Chess** in which only moves forward in time are allowed. (*Nostalgia* 362) [Text editorial]

25.9 Three-dimensional games with double moves

Total Chess (Charles Beatty, 1945). The only variant to have been invented by a living saint, as the inventor was described by the thriller writer Dennis Wheatley, a description that sits uncomfortably with Beatty's reputation as a big-game hunter. Board 8x8x4 (a1 black all boards); vertical sequence of four squares is called a tier. Usual men; three types of move: (1) Flat (same plane), (2) Tier (vertically up or down), (3) Total (different level, different tier). A pawn is held to project a shadow to all cells in its tier. No flat or total move, except that of a knight, may pass over a shadowed cell, and a piece may only move to a shadowed cell in order to capture. If a pawn moves into a tier occupied by a piece, the pawn's shadow is neutralized until the piece moves away or is captured by a pawn. A piece, other than a knight, does not give check if any cell in a tier between it and the opposing king is occupied. No man may pass through an occupied cell in a tier move. Moves: all men behave as in orthochess on the same plane, subject to the restriction of shadowed cells. Space moves: K tier move one cell up or down, total move to any cell on the next level up or down adjacent to the tier in which the K stands. Q, R, B, N total move up or down any number of levels to a cell in the same tier as one which may be occupied in a flat move; in addition, Q and R may make a tier move up or down any number of levels. P tier move up one level, or two levels initially (P cannot capture in a tier move); total move up one

level, forward one cell (captures in either cell immediately above those on which it could capture with a flat move). Promotion on eighth rank of any level; e.p. possible. It will be seen that the game has two guiding principles: (1) a man may move to any vertical projection of its orthochess move; (2) Each pawn is, in a sense, simultaneously present at all levels. The mobility of the pieces compared with orthochess is increased by a factor of about four, which corresponds to the increase in board size. In the array, the men occupy their orthochess positions but on different boards. Level A (bottom) queens and pawns; B bishops; C knights; D (top) kings and rooks. Total Chess received considerable publicity on its launch but interest in the game soon subsided. Dawson, who had earlier nailed his colours to the mast of Maack's 5x5x5 variant, dismissed Total Chess as a geometrical curiosity, likely to be relegated to oblivion. It was however revived in the early 1990s to exercise management trainees at British Aerospace. **Quadrivalent Total Chess**, a four-handed version with nine men a side, was described in Beatty's booklet *Total Chess* (May 1945) but was omitted in subsequent editions. [Dawson was a problemist and theorist rather than a player, and I think he did the game an injustice. Its rules may seem somewhat arbitrary, but like Schmittberger's game below it addresses the fundamental problems of three-dimensional chess in a way that many versions have failed to do.]

Three-Dimensional Hook-Move Chess (R. Wayne Schmittberger, 1980s). The inventor observes that proprietary 3D chess games are mostly marketed with bad rules that make mate difficult, if not impossible, 'even when you are three queens ahead'. He argues that the rules fail to take account of the differences between plane and solid geometry. This game, which might have benefitted from a less cumbersome name, is designed to overcome these problems. For example, it allows K+R to mate a bare K as in orthochess. Board 8x8x3; eight extra pawns a side; array (Aa1-h1/Ca8-h8) RNBQKBNR as usual, (Aa2-h2/Ca7-h7) 8xP, (Ba1-h1/Ba8-h8) 8xP.

Pieces always move within a single plane, either 8x8 or 8x3.

25.10 Games in more than three dimensions

Maack's Four-dimensional Chess (Ferdinand Maack, 1926 or earlier). Maack added an extra dimension to his game to create a board 4x4x4x4 which, whilst appealing to problemists, failed to recruit players. (*Chess Amateur*, December 1926)

Continuum Chess (Yes Laboratories, Suffolk, 1964). Board 9x9x15 and each piece occupies a point along a temporal axis 9 quanta long, giving 10,935 points of play. The rules are calculated to baffle, thus: 'A red king on extra space positive or a white king on extra space negative lines shall be deemed the winner unless adjacent to a minus chessman'. For the resolute there is an advanced version of the game. There appears to be no evidence that either version has been played. (Booklet *Continuum Chess*, British Library X441/255) [Text revised]

Sphinx Chess (V. R. Parton, 1970). Practical chess in the 4th dimension, played on nine 4x4 boards arranged in a 3x3 pattern. The boards are lettered a-i (arranged abc/def/ghi horizontally, thus adg/beh/cfi vertically) and the squares on each board are numbered 1 from (top left) to 16 (bottom right). Squares with the same number are known as corresponding squares. Each side has the usual complement; 1 x K, Q; 2 x R,B; 8xP and two Centauras (modified knights). All men move as in chess within each 4x4 board, the centaura

K as normal K, or vertically to next level.

R as orthochess R, or two R moves perpendicular to each other on the same level, or one in the vertical plane and one laterally.

B similar to R move but diagonally (cannot change square colour).

Q as R+B.

N to any square two moves away, leaping if necessary, or to any adjacent square.

P as orthochess P, but can also capture one square ahead on next level up or down; cannot otherwise change level. Pawns promote on end rank (any level).

Schmittberger points out that the hook mover is an ancient piece found in some of the large shogis of medieval Japan. (*New Rules for Classic Games*)

as a knight, except that there is no pawn-two.

The moves of the pieces are straightforward. A king can move to its corresponding square on an adjacent board; thus Kh6 can move to defg6 but not to abc6. A rook a1 moves to any of bcdg1, a bishop a1 to e1, a queen as a combination of the two. A centaura moves as a queen between boards. A pawn moves to the corresponding square of the board directly ahead (e.g., e11-b11). Capture is by displacement, thus pawn e11 captures on a11 or c11. Array: White Kh15, Qh14, Rg14/i15, Bh13/h16, Cg15/i14, Pe13/14/15/16, g13/16, i13/16; Black Kb3, Qb2, Ra2/c3, Bb1/b4, Ca3/c2, Pa1/4, c1/4, e1/2/3/4. White pawns promote on abc/1,2,3,4 and black pawns on ghi/13,14,15,16. Perpetual check is a win. Parton also proposed a reduced version on four 2x2 boards and a variant, **Compulsion Sphinx Chess**, in which capture is obligatory and the king has no royal powers, the object being to annihilate the opposition. This is extended to **Losing Sphinx Chess**, using Compulsion rules. (*Chessical Cubism*)

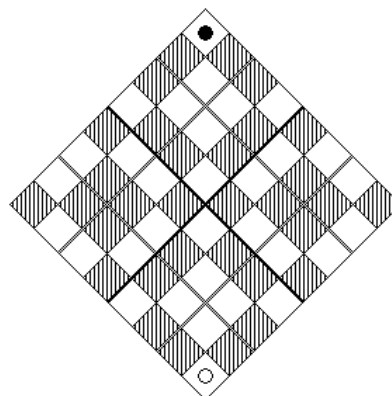
Ecila (V. R. Parton, 1970). A mind-crushing 6-dimensional variant played (?) on a 2x2x2 array of 2x2x2 cubes. The mix of pieces is agreed before play. Basically, there are three types of piece: that of the rook, the bishop (which together embrace the moves of king and queen), and the unicorn, a cubic piece moving through vertices. However, modified

pieces combining these powers are introduced, for example Narwhal (R+U), Hippogriff (a 4-dimensional beast), Wyvern (5-dimensional), these last two having no movement within a single cell. Pieces are placed on the board alternately, kings first, with the sole limitation that kings may not be placed in check. Was Parton perhaps aware of John Jenkins's masque *Cakeless*, an obscure work in which Alice Liddell is given the see-through name of Ecila? Probably not. (*Chessical Cubism*)

Lewin's Six-dimensional Chess (C. G. Lewin, 1978). Ordinary 8x8 board (!) divided into four 4x4 areas. A one-dimensional step takes a man to an orthogonally adjacent square in the same area (the top and bottom ranks within an area are considered as adjacent, as are the left and right files) or to the same square in an orthogonally adjacent area; an n -dimensional step takes a man to a square which can be reached in n one-dimensional steps but not in fewer (the occupancy of the intervening squares is ignored). Each player has 1 x King (has a 1-dimensional move), 4 x Rook (ditto), 2 x Bishop (a 2-dimensional move), 1 x Unicorn (a 3-dimensional move) in a curiously unbalanced initial array. The game is described as 'still experimental'. (*Ye Faerie Chessman*) [Text revised]

[While working on this book, I tried applying Lewin's approach to Ecila, and found it surprisingly effective. Consider an 8x8 board divided into 2x2 regions as for Grid Chess. The six one-dimensional moves from any square can now be now represented by the two orthogonal one-step moves within the 2x2 region, the two orthogonal two-step leaps within the same quarter of the board, and the two orthogonal four-step leaps. The matter can be made clearer by rechequering the board so that a one-dimensional move always takes the man to a square of different colour. In the six-dimensional board, all 64 cells are equivalent (there is no distinction between 'corner', 'edge', and 'central' cells), but each cell has an antipode which is six one-dimensional moves away, and in the case of a cell represented by a corner square on the 8x8 board the antipodean cell is at the far corner. It is therefore natural to give the players a pair of

opposite corners as home bases, and to set the board cornerwise between them. This gives



where the spots denote the home squares.

That has dealt with the geometry; what about the chess? Assume K/R/B/Q as already defined (Q = R+B, and we note that bishops are restricted to squares of a particular colour). K+R v K is hopeless (it takes K+3R to checkmate a bare K). K+Q can checkmate a bare K, but the mate cannot be forced. However, if we allow a K on its home square a double-step move, K+Q can force stalemate against a bare K, so if we count stalemate as a win we have the germ of a playable game.

If K+Q v K is a win, we can look at K+P v K. Give the pawn its natural properties (advance by a forward R move, capture by a forward B move, promote on the opponent's home square). K+P v K now turns out usually to be won if the pawn can be defended, though there are positions of reciprocal zugzwang with the pawn two steps from promotion, and if the defending king can blockade the pawn one step from promotion it always draws (because it has its two-step move and can force or keep the enemy king away from the pawn). But it would seem that a one-pawn advantage should normally be enough to win.

And a final twist: not only can K+Q force stalemate against a lone K, but so can K+B if the bishop runs on white squares (which it will if it has arisen by promotion). So we can consider doing without queens, which may be a good idea since experiment suggests that they are inconveniently powerful.

An article on the subject is scheduled for *Variant Chess* 54.]