

Little Chess Evaluation Compendium

By Lyudmil Tsvetkov, Sofia, Bulgaria

Version from 2012, an update to an original version first released in 2010

The purpose will be to give a fairly precise evaluation for all the most important terms. Some authors might find some interesting ideas.

For abbreviations, p will mean pawns, cp – centipawns, if the number is not indicated it will be centipawns, mps - millipawns; b – bishop, n – knight, k- king, q – queen and r –rook. Also b will mean black and w – white.

We will assume that the bishop value is 3ps, knight value – 3ps, rook value – 4.5 ps and queen value – 9ps.

In brackets I will be giving purely speculative numbers for possible Elo increase if a specific function is implemented (only for the functions that might not be generally implemented).

The exposition will be split in 3 parts, reflecting that opening, middlegame and endgame are very different from one another.

Definitions of stages of the game

For the purposes of this compendium, the stages of the game will be defined in relation to the overall piece strength present on the board.

Opening - Piece strength 60-45. Actually opening is just a part of middlegame, with the special feature of being the part when pieces are developed. As there are only 7 pieces each side that have to be developed, and a couple of them can stay at their initial squares and still be counted as developed, opening usually does not span more than 5 or 6 moves.

The above-mentioned material strength also matches the definition for early middlegame.

Middlegame

Middlegame will be subsplit into early and late middlegame stages.

Early middlegame - material strength in the interval 60-45

Late middlegame - strength in the interval 45-30

Endgame

Endgame could also be split in two different stages, the early and late endgame.

Early endgame - overall piece strength in the interval 30-15

Late endgame - piece strength in the interval 15-0

Grading of pieces and pawns

Pieces and pawns will be graded throughout the game

Pieces will be graded in relation to the overall number of pawns on the board, while pawns the other way round - in relation to the overall material strength of pieces on the board, reflecting the fact that pawns and pieces complement each other.

Grading of pieces

There are 4 types of positions bearing in mind the ps left on the board:

closed positions - 13-16 ps left

semi-closed positions - 9-12 ps left

semi-open positions - 5-8 ps
open positions - 0-4 ps

Those 4 types should not be mistaken for closed and semi-closed pawn structures, reflecting the fact of positioning of ps on central and semi-central files, as well as space advantage, with due assignment of certain bonus points.

Grading of pieces for closed positions:

queen -10% of real standard value
rook - 15% of standard value
bishop will have no change, standard value
knight +10% of standard value

Grading of pieces for semi-closed positions

q -5% of standard value
r -10%
b +5%
n +10%

Grading of pieces for semi-open positions

q +20%
r +10%
b +15%
n -10%

Grading of pieces for open positions

q +30%
r +10%
b +20%
n -15%

The grading of pieces reflects the fact that pieces have changing degrees of mobility when there are different number of ps on the board, and that has a direct impact on their power. Therefore they should be graded. It is evident that the queen gains the most from the decreasing number of ps, while the knight is the big loser, with rs and bs in between.

Grading of pawns

Pawns will be graded in relation to the pieces left on the board (defining middlegame or endgame; if 60 is the overall piece strength, then middlegame starts from 30 piece strength upwards, and endgame downwards). It is obvious that with decreasing piece strength left ps become gradually more powerful, in respect to their structure, passer status and influence on the board.

Pawns might be graded in four categories in decreasing order:

Piece strength 60-45 - no change from standard value
Piece strength 45-30 - +5% standard value
Piece strength 30-15 - +10% standard value
Piece strength 15-0 - +15%

The piece values

This could be regarded as an alternative suggestion to that in the Grading of Pawns and Pieces section. It all depends on where your starting point is. What concerns the splitting in intervals for piece values, they could possibly be done using only pawns, but also the overall number of pawns and pieces, because usually the number of pawns and the number of pieces on the board are related. With the disappearance of more pawns, more pieces disappear too, although there are always exceptions, of course.

Piece values are always an abstraction. They depend on a variety of factors and change throughout the game depending primarily on the overall piece and pawn material on the board. So the best you can do is approximate. Some almost real values for the pieces could be obtained only under the supposition of an ideal environment where the mobility of a piece is not influenced in any way by intervening factors of whatever kind. This could be done by measuring the average mobile squares for each piece and the average pawn when there are not other pieces or pawns on the board.

We check the number of mobile squares (mobility) for each piece for each square on the board, and then divide the sum total for all squares by 64. Then we will have the average mobile squares for the pieces, which will be the closest possible approximation of strength. The values for the queen and the knight shall be multiplied by a factor of 1.5, in the case of the queen because on each move it has 2 alternative ways of moving, but can choose only one of them at a time, and in the case of the knight because of having access to squares to which linear pieces do not have access; half of the linear pieces might have, but the other half with different linear capacity will not have.

In the end we get the following values for the pieces:

Strength of the queen 34.125 average mobile squares
strength of the rook 14 average mobile squares
strength of the bishop 8.75 average mobile squares
strength of the knight 7.875 average mobile squares

Obviously, those values will be valid only for the very late endgame (0-4 pawns and pieces on the board).

To have approximate values for pieces for other stages of the game, we could do a division in intervals of 4 pawns and pieces (material present on the board): 5-8; 9-12; 13-16, etc., until we reach the initial position with 29-32 pawns and pieces.

Another thing that could be ascertained is that with bigger numbers of pawns and pieces on the board the knight gets relatively more mobile (stronger), while the linear pieces all get less mobile (less stronger), with the queen strength decreasing proportionately more than that of the rook, and the rook strength decreasing proportionately more than that of the bishop. In that case we could gradually increase the strength of the knight, by 1/50 for each interval, while decreasing the strength of the linear pieces for the same intervals (1/50 would be a good starting point, but obviously experimenting is necessary). Thus we could have the closest possible values for what the real situation on the board demands. But, of course, piece values will depend also on other factors, such as fixed structures, available piece configurations, etc.

We could also find the average mobile squares (strength) for the average pawn. Taking into consideration that while most pawns have 3 options available for mobility at each move (in their advancing and capturing abilities), pawns on initial positions have a spare option, and end-file pawns have an option less, we get a value of 35/12 average mobile squares for the average pawn, or close to 2.91 average mobile squares.

In this way, in the very late stage of the game (the 0-4 interval) a queen will be worth more than 10 pawns, and the values for the pieces would be the following:

Queen 34.125/2.91 pawns

rook 14/2.91 pawns

bishop 8.75/2.91 pawns

and knight 7.875/2.91 pawns

Substantial piece values

Substantial piece values would be the piece values assigned to a particular stage of the game plus all additional bonus points or penalties dispensed in relation to specific functions pieces perform on the board, either by themselves or collectively. The real piece values are always the substantial piece values and not the ones that are basic for the stage of the game, but just an abstraction.

A good evaluation should consider as wide an array of functions as possible.

In the case of the knight, the least important piece, for example, we might have to consider some of the following elements:

- mobility
- general piece positioning
- space advantage gained (a knight on the 5th rank, for example)
- enemy objects attacked
- squares of the enemy king shelter attacked
- squares the knight controls (for example, in front of enemy weak ps)
- defending own pieces
- defending squares of the own king shelter
- possible intersections with other own pieces
- possible tandems, for example, with the queen
- control of complementary squares collectively with other pieces (capacities for different piece configurations might be considered)
- control of enemy weak spots
- control of continuous squares, for example, in tandem with a pawn
- blocking enemy passers (separate)
- blocking when part of bigger fixed structures
- possibility for enemy ps to attack the knight (outposts)
- number of own ps defending the knight, etc., etc.

These elements might multiply in considering a wide variety of possible other, more or less subtle, functions.

In this way, in order for an evaluation of a single, even the least important, piece to be accurate, you need to consider at least some 20 different elements. I am absolutely convinced that an engine that evaluates more will do better in 80% of cases, although in 20% of cases an engine that evaluates less might still do better. Of course, tuning the parameters will be important. It is better to have 5 parameters that are well tuned than 15 that are badly tuned. The 5 well tuned parameters might do well in a variety of situations, including such supposed to be covered by parameters that are not covered, while the 15 badly tuned parameters might be unable to produce good decisions even for the situations supposed to be covered by the most important terms.

Substantial pawn values

Substantial pawn values would be the values assigned to pawns for different stages of the game plus additional bonus points or penalties in terms of the different functions pawns accomplish on the board. Substantial pawn values are the real values of pawns and not the values assigned to pawns for game stages.

A good evaluation of a pawn would take into consideration:

- controlling central squares
- defending pawns that control central squares
- space advantage
- defending ps gaining space advantage
- file and rank the pawn is on
- being or not a passer, potential passer or unopposed p
- being or not a backward pawn, possibly even part of the king shelter
- its status as a double and isolated p; and is it isolated horizontally or vertically
- pertaining or not to a group of ps
- status as a lead or root p; lead p on a weak spot, possibly part of the enemy king shelter
- controlling weak spots
- being or not part of the king shelter; specific square of the shelter
- intersections with own pieces
- fixing enemy pawns
- possibility to attack the enemy king position, etc., etc.

These are just a small portion of the elements that could be applied to a pawn. In general, the more detailed the evaluation, the more accurate the understanding of the position will be, as smaller, but important elements do not fit into the picture of an inconsiderable number of parameters, although extremely well tuned.

Functionality of pieces

Functionality of pieces will refer to the number of functions a piece performs and the area on the board where it performs it. The assumption will be that performing simultaneously more functions at wider areas of the board will have some added value not covered by measuring the separate factors.

For the purpose we will check for each piece the number of functions it performs, and the 4 functions of a piece are, of course, attacking, defending, blocking, and controlling squares.

If a piece performs just one function, it will get a bonus of 5mps.

If it performs 2 functions at the same time, the bonus will be 15mps.

For 3 functions 30mps will be assigned, and if a piece performs all 4 functions at the same time, the points will rise to 50mps.

The areas of the board where the piece performs its functions will also be checked. The 4 areas will consist of the 4 quadrants on the board (when the board is split vertically and horizontally in 2, we get the 4 quadrants): a1-a4-d4-d1, a5-a8-d8-d5, e8-h8-h5-e5 and e4-e1-h1-h4. For performing functions in each quadrant some bonus points will be assigned.

When the piece performs functions in just one quadrant, 5mps will be assigned.

When it performs its functions in 2 quadrants, it will get 15mps.

For performing functions in 3 quadrants, the bonus will be 30mps, and it will rise to 50mps when the piece performs functions in all 4 quadrants.

Degrees of functionality

The lowest degree for a certain piece will be 1 (performing a single function in just 1 quadrant) and the highest degree of functionality will be 8 (when the piece performs all 4 functions in all 4 quadrants). 2 will be when the piece performs one function in 2 quadrants or 2 functions in one quadrant.

Degrees of functionality may be used when deciding to change or not to change a certain piece. It would be unwise to change a piece with higher degree of functionality for a piece with lower degree, especially when the difference in degrees is bigger.

Relative importance of tactical and positional factors

If pieces are responsible for tactics on the board, and pawns are responsible for positional play, there is not a reason not to believe that the relative importance of the two factors is what the relative material strength of the two factors is. In my view pieces would account for an overall material strength of 30ps, and pawns would account for 8ps. That would make a ratio of 15 to 4, which is about 4 to 1. If we take into consideration blocking, where pieces perform positional roles, then we could more or less round up the ratio to 4 to 1. That would mean that tactical factors are 4 times more important than positional ones.

And when pawn structure is exhausted (i.e. factors like backward, isolated, double ps, passers, etc.), I think this will be quicker to come, there will still remain the difficult task of optimising tactical factors like mobility, attacks, complementarity and intensity of interaction.

Subsplitting of positional factors

The 6 most important positional factors would be passers, backward ps, isolated ps, double ps, unopposed ps and blocking.

I might more or less suggest the following would be true about interrelation of the factors:

Passers would account for 1/2 of what backward ps (all types) account for.

Blocking would account for what passers account for. (1 to 1 relationship)

Double ps would be twice as important as isolated ps.

Double ps would account for 1/5 of what backward ps account for.

Unopposed ps would account for 1/3 of what passers account for.

In the end we will have an interrelation of positional factors as follows:

Backward ps to passers to blocking to double ps to unopposed ps to isolated ps -
2:1:1:2/5:1/3:1/5

Subsplitting of tactical factors

The 6 most important tactical factors would be mobility, piece positioning, attacks, defence potential, complementarity and intensity of interaction.

I think the following might more or less be true about the interrelation of the factors:

Mobility would be as important as piece positioning (1 to 1 relationship)

Attacks would account for 1/2 of what mobility account for.

Defence potential would account for 2/3 of what attacks account for.

Complementarity would account for 1/3 of what mobility accounts for.

Intensity of interaction would account for 1/2 of what defence potential accounts for.

In the end we will have an interrelation of tactical factors along the following lines:
Mobility to piece positioning to attacks to defence potential to complementarity to intensity of interaction - 1 to 1 to 1/2 to 1/3 to 1/3 to 1/6.

Of course, we should bear in mind that these numbers would be different for specific positions, but the overall pattern could fit a large variety of positions.

In the endgame positional factors should be increased and tactical decreased.

Outstanding positional issues with engines

Currently top engines still exhibit a wide range of outstanding positional problems. Apart from the most important deficiency in that respect, the lack of consideration of attacks gradually building up with bigger fixed structures and lead ps close to the enemy king, top engines still have recognizable deficiencies (accounting for decent elo points in terms of positional play) in the following areas:

- difficulties to recognize drawing chances with bigger existing structures of fixed ps on the board (some engines seem to optimistic and readily close the game, pair after pair of fixed ps); humans often take advantage of this to try drawing games
- difficulties with unopposed pawns; engines seem to disregard such ps entirely, but they are important positional tools that have to be considered separately from double pawns. Double ps account for some positional deficiencies associated with the possibility of enemy attacks, but unopposed ps are indicative of a side's ability to exert efficient positional pressure because of optimal structural makeup, and those are 2 different things. Optimal structural makeup bodes well for the future, even when it is difficult to observe immediate consequences. Therefore, it is especially important not to disregard unopposed ps.
- difficulties with some separate passers (especially end file ones); engines sometimes do not hold such ps in high esteem, thinking tactics could compensate for them, but that is not always the case
- difficulties with connected passers (a pair of connected passers, for example) when those are part of bigger fixed structures; such ps are stronger than usual connected passers, because the fixed structures make it difficult for the opposite side to organize sufficiently its majority of pieces for stopping the advance of the ps. This might justify sacrificing a piece for 2 enemy ps.
- difficulties with some types of backward ps, especially when part of the king shelter (backward ps, but also backward-fated ps and semi-backward ps, part of the king shelter); engines seem to completely disregard such ps
- difficulties with backward-fated ps when they do not cancel each other except in terms of ranks; such ps are really a major positional weakness with long-lasting consequences, but engines often are oblivious of their existence
- difficulties with control of complementary squares; it seems most engines do not have optimal code for tracking this, and sometimes understanding of complementarity might well make the big difference
- difficulties with space advantage in some situations, but this is a tricky one, as a variety of other factors should be considered at the same time

- difficulties with understanding and application of blockade; not all top engines make an efficient use of blockade, especially pieces (usually a knight) blocking enemy separate passers and blocking enemy ps to prevent them from gaining space advantage; another deficiency associated with blocking is that there is almost not an engine that would consider a blocking knight when part of an own diagonal connection and also part of larger fixed structures, but such a knight is very useful both for attacking purposes and for the integrity of the connection, it could be considered both as a pawn in terms of the integrity of the connection, and as a knight in terms of attacking the enemy king.

- difficulties with functionality of pieces; most engines do not recognize the fact that there is an added value to pieces performing a variety of duties in a number of different sectors on the board: own and enemy camp, king and queen side. But performing more duties at the same time would bode well for the piece's overall strength, because, although you can choose only a single function of the piece being salient at a certain point of time, there is still the option to choose from many possible functions, and that, of course, only underscores a piece's usefulness. Functionality of pieces is one of their most positional qualities and has a direct bearing on compensation.

- difficulties with compensation; being down in material but having certain real, although more or less intangible, assets in the form of prevailing number of steady positional features, like considerably bigger number of weak ps for the enemy side, considerably bigger number of own objects gaining space advantage, etc., is a concept with which engines are not familiar. Engines fail to consider such factors, if they are unable to calculate an advantage, but with most cases of compensation the consequences of a material sacrifice are only to recognize in the very distant future, very often deeper than the calculating abilities of modern engines. In this way the logical way of proceeding is exactly the opposite: you must assign some bonus points for a variety of positional assets associated with compensation, even if you are not able to compute everything with a fair amount of precision; in a couple of moves, if the compensatory assets are correctly specified, things will become much more clear.

Compensation is very important to do, because positions based on compensation make up some 10 to 15% of all chess positions. Playing with an eye on positional compensation for material shortages could provide a big boost to an engine's elo and make the engine's play much more attractive. It is true that compensation for material shortages is a tricky affair, because it is not that easy to specify compensatory assets that will work in every situation and, besides, play along the lines of compensation is often subject to very deep calculation, so the tables could turn at some point of time. Compensation is, as a whole, an unexplored area of computer chess, and humans usually also have big difficulties with it.

Opening

The general principles of middlegame will apply, except for the following.

Control of center

Control of focal center (i.e. the squares e4,d4,e5,d5)

Pawns occupying the focal center

+40 for each p on such a square

Pieces occupying the focal center

+20 for a minor piece and +30 for q on such a square

Pawns keeping control of focal center

+10 for such a function (eg. the c3,d3,e3,f3 ps are controlling one square each as well as the c4,d4,e4,f4 ps do)

Pieces keeping control of focal center

+10 for such a function for each square a piece controls (eg. the wnf3 has under control the d4 and e5 squares, so it would get a bonus of +20). This concerns all pieces.

Control of wider center (i.e. the squares bound by c3-f3-f6-c6 excluding the focal center squares)

Pieces occupying the wider center

+10 is given for every piece on a square of the wider center

Order of development

+20 for developing n before b

-30 for developing q before 2 minor pieces are developed

-50 for developing r before 2 minors are developed

+60 for castling to developing pieces on the other side

+50 for castling short to castling long if both possible

-35 for playing twice with the same piece in the opening

When the engine can choose between 2 variations more or less equal in score, one involving doing a pawn push and the other developing a piece - +20 for the developing move is given

-20 for a minor piece placed immediately before a central e or d pawn if the p is on the second rank.

Underdevelopment

In the case that one side has developed 2 light pieces more than the enemy side then - + 1.75ps for the better developed side.

Phalagian development (also middlegame)

Probably borrowed by Phalanx, I do not know. This assumes development of pawns and pieces in compact order. -20 for own p into the enemy camp unsupported by other ps (eg. wpb5, wpa2, no c pawn). -30 for own piece into the enemy camp unsupported by other pawns or pieces.

Losing castling rights

When losing castling rights, if the king stays in the center with that – then -2ps for that k

If the k goes to a more secure square on one of the sides but at the same time shuts in one of the own rooks in the corner from where it is difficult to develop – then -80 for the shut-in r (eg. bkf8 with brh8)

Temporary prevention of castling

+50 for a move, most often a rook or a bishop, that prevents temporarily the possibility of the enemy king to castle (that is, the king has not moved and can castle later) – eg. wke1, bba6, +50 for placing the b on a6 keeping the f1 square under control. This will often result in mating attacks.

Early exchange of queens with loss of right to castle

In the case of an early exchange of queens with a loss of castling rights for one of the sides (eg. exchange on d1 or d8) - -40 for the side losing that right

Bishop pair - +25 as a general rule as there are chances the pair will stay till the endgame

Repeated moves in the opening

Repeated moves with the same piece or pawn in the opening (up till move 6 or 7) are usually bad, they are a waste of time and stand in the way of development.

-20cps for a repeated move with a piece

-10cps for a repeated move with a pawn

Adjusting piece values for the opening stage

The opening stage (up till moves 6 or 7) is a peculiar one, because some pieces are more difficult to develop than others and their real values are different from the default ones.

10% lower value for this stage for the queen as its development is not easy at all

15% lower value for the rook, because this piece is even more difficult to develop

Pins

+40 for b pinning a n with k at the other end of the pin

Middlegame

Mobility

+ 10 for each free square a piece has access to

Calculating mobility

When calculating mobility, not only the free squares, where the piece could go, but also the squares, where it can be captured for nothing or just for a pawn by an enemy pawn, should be taken into account.

If a certain number is assigned for each free square the piece could go, then for a square where it can be captured by an enemy pawn for just a pawn a value a portion of the value for the free square should be assigned. That portion will be the ratio between the value of a p and the value of the relevant piece.

For a square where the piece can be captured for nothing by an enemy pawn the value should be 1/2 the above value.

Calculating mobility in terms of different pieces

I think this is extremely important.

I am not sure how many engines do that.

Not all pieces will get same values for available mobility squares.

While the bishop and the rook will get standard values, the knight and the queen will get 1.5 times higher values. So, if a bishop gets 10cps for each available free mobile square, the rook will also get 10cps, but the knight and the queen will get 15cps instead. What is the reasoning behind this?

The knight will get 1.5 times higher value because of control of complementary squares, not accessible to other pieces. In the initial position on the board, if we acknowledge that the queen shares the capacities of the rook and the bishop, there are 3 rooks and 3 bishops, but only 2 knights, so that the moves of the knight, that control complementary squares to the

squares controlled by the diagonal and linear pieces, are 1.5 times more important, as complementarity has a direct bearing on mobility.

Concerning the queen, it shares the capacities of the rook and the bishop, so complementarity is not the issue here, but the ability to quickly transfer to different locations on the board, which constitutes mobility in its essence with a time dimension. On each move the queen has the option to choose between 2 alternative ways of going: either along a diagonal, or along a line. This makes it going 2 times faster than other pieces. But, although it can choose between one of 2 ways to go, on each move it can go in only one direction; it can go 2 ways, but chooses in reality only one. That makes its moves 1.5 times more valuable than those of other pieces, because, although it chooses only one way, it can do so going in a variety of directions, which makes it more easier to span the board. The higher value is due to superiority in mobility with a time dimension.

Those values are much more precise, in my understanding, than having all pieces get the same values for available mobile squares. The difference should not be all that overwhelming, but with quite real impact on board events in a wide range of situations, difficult to track if scoring mobility for all pieces in the same way.

Spatial mobility

Spatial mobility will be defined in relation to the number of directions a piece can go to. Directions for the knight will be the existence of free squares in front of it, behind it, as well as to the left and right of it. +3cps for each existing direction with available mobility. For the rook directions will be defined in the same way, giving the same bonus. For the bishop, directions will be defined in the same way, but along diagonals. For all three pieces the maximum number of existing directions will be, of course, 4. The queen has maximum 8 existing directions with available mobility, defined as those for the r and the b, and receiving a bonus of +3 each.

The bigger the number of available mobility directions, the higher the probability a piece could do well in its different functions, while a smaller number, even if the overall value for mobility is good, would mean that the piece has certain limitations to do satisfactorily in all its functions. That would have some repercussions on its strength.

Mobility in terms of centralisation

When calculating mobility, more central squares will give a bigger bonus than less central ones. If the board is split in 4 square shapes in terms of centralisation (see general piece positioning in terms of centralisation), then controlling a square of the most centralised shape will score 1/4 higher than if the square was within the second shape in degree of centralisation, which in turn will score 1/4 higher in relation to controlling a square within the 3rd shape, etc.

I think this might be very useful as some squares for mobility are really far better than other ones.

Moves freeing squares for own pieces

+2mps for each square a piece frees on its move for occupation by another own piece. That would have some impact on future developments, of course.

Mobility of pawns

+5 for each possible move, including captures

The primary importance of mobility

Mobility is undoubtedly the most important factor of all. Pieces attack with mobility, they defend with mobility, and with mobility they move around. It is a representation of their strength. Mobility at a certain point of time for a given piece measures its objective strength in a specific environment, which is not exactly the same as the more or less abstract value assigned to it. Pieces with lower power but higher mobility might well be more important for the overall development of events on the board. Therefore, the impact of mobility should not be underestimated at all. If a piece has an extremely low mobility, this could be an indication of upcoming problems. Having such pieces should be avoided at all costs.

A particular feature of mobility that makes it suitable for predicting future events, is that it (if measured for all pieces as a whole) only changes gradually with time. This makes it especially relevant for deeper search. Moreover that the trend in mobility values usually stays the same for a longer period of time. If mobility values start increasing, they are bound to increase even further with time, and if mobility values start decreasing, they are bound to decrease even further with time. And this will usually be decisive for the outcome of the game. Measuring mobility is most often synonymous with knowing where the game is going. Therefore, it is especially important to always mind your mobility. If you have good values for other factors, but low mobility, you will, as a rule, not have sufficient compensation for your low mobility. But if your mobility is good enough, with others factors suffering, you will have good chances of winning the game.

This makes it possible for mobility to be the single most important factor for gauging real progress. It is utterly justified to discard all variations with low mobility. Whenever your mobility starts getting worse than the enemy's, you might drop further consideration of the variation. A wise trick might be to check mobility on 2 consecutive moves, and if the trend is the same, this could let you make a decision on pretty solid grounds. If 2 consecutive moves in a variation return low mobility values, just drop the variation. And if 2 consecutive moves in a variation return good mobility values, this might warrant considering it deeper. So, a prudent advice would be to first consider mobility without any other factors, and only then proceed to evaluation of other factors, but only for the variations that have returned reasonable mobility scores. In this way a substantial amount of variations could be successfully pruned.

Control of center (as in Opening)

General positioning of pieces

General positioning of pieces in terms of space advantage

For a piece positioned on the first rank a penalty of -15 mps will be given

For a piece positioned on the second rank a bonus of 15 mps will be given

Positioning on the third rank will carry +30 mps

The fourth rank +45, the fifth +60, the sixth +75, the seventh +60 and the last, eighth rank will carry a bonus of 30mps.

General positioning of pieces in terms of centralisation

For the purpose the entire board will be divided into 4 square shapes:

- the central squares of e4, d4, e5, d5
- the board squares of the square shape with borders on the f3-f6-c6-c3 squares, excluding the squares of the above shape
- the board squares of the square shape with borders on b2-g2-g7-b7, excluding the squares of the above 2 shapes
- the board squares of the square shape a1-h1-h8-a8, excluding the squares of the above 3 shapes.

The first shape, first in degree of centralisation, will carry a bonus of 100 mps for all pieces. The second shape, second in degree of centralisation, will carry a bonus of 75 mps for all pieces.

The third shape will give a bonus of 50, and the fourth 25.

Piece positioning in terms of file placements

E and d files will get a bonus of 50mps, c and f files will get +30mps, and b and g files will get +15mps.

General holistic positioning of pieces

General holistic positioning of pieces will be the average value of positioning in terms of space advantage and centralisation.

Smart positioning of pieces

For the purpose at least 3 factors must be taken into account: let's say these will be mobility, attack and general holistic positioning. The proposition is that variations should be considered displaying the lowest cumulative sum of the percentual differences between the three factors, i.e. the sum of the values of the differences in percentage points between the highest scoring factor and the second highest, and the second highest scoring factor and the third highest, should be the lowest possible. Thus, if we have a variation with scores for mobility of 20, attack of 15 and holistic positioning of 10, this should be chosen instead of a variation displaying for the piece scores of 22, 15 and 8 respectively. I would even go as far as to assert that a 10 percent lower score for smart positioning of pieces would compensate for 10 percent higher score of the sum of the three factors measured in the ordinary way. Thus, variations will lower smart positioning could be left out early in the search.

Coordination of pieces on the board

General piece attacking potential

1/10 the value of each enemy piece or pawn attacked by own piece or pawn; attacking knights and bishops will score 30cps, attacking rooks 45cps, attacking queen 90cps, and attacking a pawn just 10cps.

Proximity of attack for linear pieces

When attacking, linear pieces (queen, rook and bishop) will get a bonus for being closer to the enemy piece or pawn attacked. The less the distance in between the attacker and the attacked piece or pawn, the better.

+20mps for no squares in between
+15mps for 1 square in between
+10mps for 2 squares in between
+5mps for 3 squares

Rule for more than one linear pieces attacking objects

When more than one linear pieces attack objects (pawns and pieces) along the same line (a diagonal, file or rank) and are placed one after the other, the second piece (placed after the first) will score 1/7 lower points, and the third, if there is such, 1/7 lower than the second.

This rule will apply also to control of specific squares (in front of weak pawns, etc.). It will concern too, importantly, attacking squares of the enemy king shelter.

Attacking objects in different ways

Attacking objects in different ways (along a diagonal, along a file, along a rank and with a knight) should score some additional bonus points, as usually this will be useful from a tactical point of view. The supposition will be that attacking a pawn, for example, with a queen along a diagonal and a rook on a file will be preferable to attacking the same pawn with a queen on a file and a rook on the same file.

1/10 higher value for a second way of attacking the same object
another 1/10 over that for attacking the same object in a third way
and still another 1/10 over that (3/10 above standard value) for attacking the object in a fourth way

Attacking squares of the enemy king shelter in different ways

Attacking squares of the enemy king shelter in different ways (with pieces on files, ranks, diagonals or with a knight) will score some additional bonus points, as this will be conducive to tactical solutions.

1/5 higher value for attacking the same square of the shelter in a second way (the first will be the way most pieces attack this square, etc.)

still 1/5 above that (2/5 overall) for attacking the same square in a third way
and another 1/5 for possibly attacking the square in a fourth way

In the case that pieces attack different squares of the enemy shelter in different ways, they might score 1/15 higher values for each subsequent way of attacking the shelter after the first.

Attacking static objects

Attacking static objects (objects that could not move), usually pawns, but in some cases also pieces, is due some additional bonus (1/10 higher value), because such objects are easier targets. Eg. wpsb3,a4, bpa5 - a4 and a5 would be such ps, but also b3. Of course, ps that are defended by other own ps might be skipped when applying this rule.

General piece defending potential

1/20 the value of each piece or pawn defended by other own pawns or pieces; thus, defending bishops and knights will score 15cps, defending rooks 22.5cps, defending queen 45cps, and defending a pawn just 5cps. This principle is very important as with other factors being about equal the position should be won for the side whose pieces are better defended among themselves.

X-ray attacks

X-ray attacks (x-raying, or indirect attacks) are possibly the single most important tactical weapon on the board. Pins are actually only a particular case of x-ray attacks. An x-ray attack would be an attack by a piece with a ray of action on a file, rank or along a diagonal; that is to say a queen, rook or a bishop. Knights are excluded from x-raying. The difference from ordinary attacks is that the attack may not be directly upon a piece or pawn, but indirectly, i.e. between the attacking piece and the piece being attacked there are one more own or enemy pieces or pawns along the ray. When there is only one piece or pawn in between the x-ray attack will be once removed and will be scored $1/2$ the usual value for a direct attack (let's say that the usual value for a direct attack upon a queen is 9cps, then an indirect attack once removed will give 4.5 cps, upon a pawn 0.5 cps, etc.). When there are 2 pieces or pawns in between (an x-ray attack twice removed), the indirect attack will be scored by $1/4$ the value usually assigned to a direct attack. Thus, attacking the q by a rook or bishop will give 2.25cps. An attack thrice removed will carry a bonus of $1/8$ the usual value and an attack four times removed a bonus of $1/16$.

When attacking the king along an x-ray, the value for the king may be 2 times that of a queen, in the specific case carrying with it a bonus of 18 and divided according to the number of removals.

X-raying has 2 major advantages in that it gives a fuller picture of almost any existing tactical interaction on the board; and at the same time engines might be aware of events that are to happen a couple of moves further down the tree. For humans, being aware of such possibilities means that their tactical ability would rise sharply in a very short time, of course after some decent practicing.

Of course, engines are tactically very strong and usually aware of such possibilities, but I honestly think they could do even better.

A possible way of doing x-ray attacks (to avoid extreme complications) could be to do just diagonal pieces (queens and bishops) attacking rooks and knights, and linear pieces (queens and rooks) attacking bishops and knights. Pawns might fit into both.

Intensity of interaction

For each point of intersection of 2 own pieces on the board (that would include empty squares, as well as squares occupied by enemy pawns and pieces) a certain bonus is given. Point of intersection would be, for eg., c2 and b3 for wbd1 and wnd4; d6 and d4 for wnf5 and wqd5, etc. The bonus points would be as follows: +5cps for an intersection of 2 minors; +7cps for an intersection of a minor piece and a rook; +10 for 2 rooks; +12 for minor and q and +15 for q and r. Intersections of q and b along the same diagonal are not taken into account, as well as intersections of heavy pieces along same files and ranks. For intersections of q and r only one square along each q diagonal is taken into account (eg. bqg5, bre8 – squares d8 or e7 would be counted, as well as e3, as long as there is not a wp or w piece on f4, or black such). This way of computing might boost somewhat the tactical power of engines.

For endgame the value will be factored by $1/2$.

For king attack the value will be factored by 5, and for king attack in endgame $1/2 \times 5$.

Intersections of pawns and pieces

$1/500$ the sum of the values of the pawn and the piece for the square upon which the rays of action of the pawn and the piece intersect (for the p diagonal-wise representing its capturing ability).

X-ray intensity of interaction

For each square on the board whereupon the rays of interaction of a queen, rook or bishop intersect, be it horizontally, vertically or diagonally, and regardless the number of own or enemy pawns and pieces in between (that is the x-ray quality), a certain bonus is given (it might be equal to one hundredth the sum of the values of both pieces, divided by the number of own or enemy pawns and pieces along both rays of action to the point of intersection).

For x-ray intersections on squares of the enemy king shelter the value might be double. Knights could also be included into the equation when interacting with a piece along its x-ray.

Complementarity (Optimal spread)

Complementarity is a very important factor in chess. The concept refers to control of free squares on the board by the pieces. For each free square on the board controlled by a piece a bonus of 3 millipawns (mps; this should mean one thousandth of a pawn) is given (and maybe even much higher). For a second piece controlling the same square the bonus should be only 2 mps; and for a third piece - 1 mp. Thus, it would be preferable for a square to be controlled by as few pieces as possible, which would guarantee even distribution of control of free squares on the board by the pieces (optimal spread). The higher complementarity is, the better the general welfare of a position.

For complementarity relating to the quadrant (a square shape of the board consisting of 4 board squares each side when evenly splitting the entire board to 4 such shapes) where the enemy king has found refuge values for optimal spread can be weighted by, say, 1/3 higher.

With other factors being equal, complementarity may very well make the big difference.

Split ratio for control of black and white squares

You can develop the idea further by introducing a split ratio for control of black and white squares. If control as measured above for one of the colours is represented by a ratio in the interval of 50-50 split to 55-45 split, then a bonus of 50 cps would be indicated. If the split is in the interval from 55-45 to 60-40, then the bonus would be lowered to 30 cps. If the split is in the interval from 60-40 to 70-30, then no bonus or penalty points are given. When the split exceeds the 70-30 ratio, variations are left out.

Complementarity in the defence of the king shelter

This might be very important. Complementarity will be calculated in the usual way (and taking into account the control exercised by own pawns), but not only for the free squares of the king shelter, but also for the squares occupied by own pawns or pieces. The value for complementarity might be multiplied by 2 or 3. The higher the value for complementarity of the king shelter, the more solid the defence of the shelter should be.

Additionally, one might also calculate the split ratio for control of black and white squares of the shelter and assign bonus points. Bonus points could be assigned in the usual way for split ratio in intervals (from 50-50 to 55-45; from 55-45 to 60-40 and from 60-40 to 70-30, while for values exceeding the 70-30 threshold variations might be left out), and then multiplied by 2.

Piece configurations in terms of complementarity

Piece configurations are meaningful because of the extent of control of complementary squares.

If we introduce the concept of piece capacities, this might be of help.

Pieces will have 4 capacities: diagonal pieces, linear pieces, knights for controlling squares not accessible to other pieces and 2 bishops for controlling squares of different colour.

Each capacity will score 15cps. A repetition of capacity will be penalised by 5cps. Queen and bishop might get half the points of a full capacity for controlling squares of different colour.

We have 7 pieces in all with 4 possible capacities.

The queen shares linear and diagonal capacities.

In this way 2 rooks will be penalised by 5 cps for a single repetition, while

2 rooks and a queen will get -10 for 2 repetitions.

QBB - we will have 3 capacities - linear, diagonal and 2bishops, with 3 repetitions, but the half-way capacity of queen and bishop might not be considered here, because the 2 bishops have sufficient control of complementary squares.

In the simplest case of QB vs QN, we will have 3 capacities for the QN with no repetitions, and 2.5 capacities for QB - linear and diagonal in the queen and half capacity for queen and bishop, 1 repetition. This will make QN better by some 12cps. That is roughly what I thought initially about it, judging by an eye-measure.

Please, note, that this rule could be applied only for assigning points in terms of control of complementary squares for different piece configurations and might be useful in distinguishing between finer elements of the configurations' overall power and influence on the board. It could be indicative of how a certain piece configuration fares in relation to other piece configurations in a very wide variety of cases, but not all. Different relevant factors should also be considered, like bonus for heavy pieces on an open file or the 7th rank, bonus for the knights with bigger fixed pawn structures, etc.

Using the above system, different configurations might get the following points:

Q - 30cps
QN - 45cps
QB - 32cps
QR - 25cps
RB - 30cps
RN - 30cps
RR - 10cps
NN - 10cps

BB - 25cps

BN - 30cps (it might look strange that BN gets higher value than BB, but this is true just in terms of complementarity and for the game in general; indeed, 2 bishops, when not in an open position, in many situations might not be an asset, a badly needed knight might just come in short)

QRR - 30cps
QRB - 27cps
QRN - 40cps

QBB - 27cps
QBN - 47cps
QNN - 40cps

RBN - 45cps
RNN - 25cps
RBB - 32cps
RRN - 25cps
RRB - 25cps

BBN - 32cps
BNN - 25cps

QRRB - 27cps
QRRN - 35cps
QRBN - 42cps
QRBB - 30cps
QRNN - 35cps
QBBN - 50cps
QBNN - 47cps

RBBN - 55cps
RBNN - 40cps
RRBN - 40cps
RRBB - 35cps
RRNN - 20cps

QRBBN - 40cps
QRRBN - 37cps
QRRBB - 25cps
QRRNN - 30cps
QBNN - 37cps

RBBNN - 50cps
RRBBN - 50cps
RRBNN - 35cps

QRBBNN - 35cps
QRRBBN - 35cps
QRRBNN - 32cps
QRRBBNN - 30cps

When we have the bonus points in terms of complementarity for the different piece configurations, we might measure the difference in performance in terms of complementarity and use it as an additional important factor to score positions.

Fanning quality of pieces

The fanning quality of pieces (i.e. when pieces fan out across the board) is similar to complementarity (optimal spread), but while optimal spread refers more or less to mobility, fanning has a direct bearing on the positioning of pieces and simultaneous control of central squares. The proposition is that the more wide apart pieces are from each other, the better for the general welfare of the position.

For the purpose we will measure the distance in squares between every two pieces on the board on files, ranks and diagonals. (Kings are excluded from this) Squares in between the pieces (squares on which the pieces are do not count in) will be counted empty if there are enemy ps and pieces or other own ps and pieces. Each square between the pieces will give 5mps. We will check this for every 2 pieces on the board. In the end, we will have some number, and the bigger the number, the better. This will mean that the overall placement of pieces to each other is reassuring. Placement of pieces in a way that they cover a wider area on the board will be stimulated. This might have a decisive effect for some types of positions.

Control of squares

Control of squares is of 2 main types: specific control of squares, when squares are controlled for different purposes, in front of backward, isolated ps, weak spots, etc., and general control of squares, which concerns mobility of pieces, intensity of interaction, etc.

General control of squares

The following system might apply:

For each square controlled pawns get 10mps.

Bishops and knights get +5mps, rooks get 3mps, and the queen just 1mps bonus.

The closeness of control will matter, because this will make intervention of enemy pieces more difficult.

no squares in between the linear piece and the square controlled 1/2 higher bonus is indicated

1 square in between the linear piece and the square controlled 1/3 higher bonus

2 squares in between the linear piece and the square controlled 1/4 higher bonus

3 squares in between 1/5 higher bonus

Knights will get a bonus for no squares in between.

Pawn structure

+ 25 for a passer

+ 50 for a protected passer

+ 25 each plus + 50 for the tandem for two connected passers

-25 for the root p – structures of the type wps b3, a4, c4, where one p protects 2 others as the root b3 pawn could fall easy prey to the enemy pieces (not sure all engines do that – 10 Elo)

Pawn structures of type c3-d4-e5 - -10 as there are some intrinsic mobility restrictions

Pawn structures of type f7-g6-h7-f5 when fixed - -20

With 2 isolated double ps 2 ranks apart (eg. f7 and f4) – no penalty for the ps if the more advanced one is well defended (eg. bd6), actually just a bonus for space advantage factors for the f4 p.

Structures with root pawn on the fourth rank -20, as the root pawn would be more vulnerable to attack (eg. wps e4,f5, bps e5,f6)

Connectedness of pawns

A group of pawns will be defined as a structure of pawns when each p of the structure has at least one own p on an adjacent square horizontally, vertically or diagonally. Thus a2, b2 or a2, b3 would be groups of 2 ps, but a2, b4 would not. The larger the group, the better - +3cps for each member of the group. A bonus of +5cps for a p being defended by another p is also indicated; thus structures of the type a2,b3,c4 are a positive development.

-1 for each rank a group of ps spans

Scoring of groups of pawns

For the number of groups of pawns on the board -3 for each group should be subtracted. In this case isolated pawns, be it vertically or horizontally, should be counted as a group.

Potential member of a group

When a p is just one square apart from fulfilling the conditions for being a member of a group, then it will be a potential member and will be assigned a negative value of -1. (eg. ps on b4, c5 and a2; the a2 p is just one square apart from a3 and it can span that distance; therefore, just -1). If, however, a p is just one square apart, but it can not span the distance itself, then -6 should be given. (eg. ps on b2,c2 and a4 - -6 for a4).

Fixing a double pawn

For fixing a double pawn +35 is given in middlegame and +50 in endgame. Eg. bps b7,b6,c6, the bonus would go for a white p on c4.

Potential of connectedness

This will apply to positions with double or isolated ps, but may also be applied to perfect structures as groups of ps can easily disconnect and reassemble again. The proposition is that the more centrally vertically and horizontally a p is placed, the better the chances for connecting with the help of own and enemy pawns and pieces. For the purpose we will use a rectangle shape of the board, consisting of the squares within the shape a2-a7-h7-h2.

For vertical placements on the 2nd and 7th ranks - a bonus of +3cps is given

If p is on the 3rd and 6th rank - bonus will be +6

4th or 5th rank - +9

For horizontal placements, the bonus points will be as follows:

d and e files - +8cps

c and f files - +6

b and g files - +4

a and h files - +2

Potential of bridging the gap of disconnectedness

Placements of ps more to the back of the board will carry a bigger bonus than those to the fore.

P on 2nd rank - +7.5 cps

P on 3rd rank - +6; 4th rank +4.5; 5th +3; and 6th rank +1.5

General positioning of pawns

A more central pawn would carry a higher value as its potential for growth and influence along its way forward spanning the left and right corners of the board is bigger than a less central pawn's. Thus an a p would be inferior to a b p by -7, a b p inferior to a c pawn by -7 and a c pawn inferior to a d pawn by the same value. It is irrelevant if the p is double, isolated, in the own or enemy half of the board. But please note that the ratio might be fully reversed in simple endgames when an a p could be preferable to a d p.

Positioning of pawns vertically

+2 cps for a p on the 3rd rank (a p on the second rank would carry no bonus)

+4 cps for a p on the fourth rank

But this would not apply to pawns of the pawn shelter, of course.

Piece-pawn positioning in relation to the enemy camp

It would be preferable to have pieces in front of ps pawns in relation to the enemy camp.

+20mps for own piece placed vertically in front of own p (files will be checked)

-10mps for own piece placed behind an own p

+20mps for own piece placed diagonally in front of own p (diagonals will be checked)

-10mps for own piece placed behind an own p

Optimal spread for pawns

The optimal spread of ps on the board might bode well for the general welfare of the position.

For the purpose, positions of pawns within the rectangle a2-a7-h7-h2 will be checked.

A penalty of -5cps is due for each p controlling an additional square (apart from the first) along the same file.

Same penalty of -5 for each p controlling an additional square along one and the same rank.

-7 would be due for each square within the rectangle controlled by a second p

Bonus for ps on squares of alternating colours

When placed on squares of alternating colour (black and white), ps will get some bonus points for a perfect 50-50 split, and penalties in all other cases. (When the number of ps is odd, a 3-2 or 4-3 split will count for a perfect split.)

+20 cps for a perfect split

Penalties will be as follows:

8 ps of same colour on the board - -30cps

7 ps of same colour - -25

6 ps of same colour or 7-1 split - -20

5 ps of same colour or 6-1 split - -15

4 ps of same colour or 5-1 split - -10

3 ps of same colour or 4-1 split - -5

Passers

Scoring passers in terms of rank placements

Passer on the 7th rank will score 1/4 higher than passer on 6th rank, which in turn will score 1/4 higher than passer on 5th, etc.

Passers on 4th, 3rd and 2nd ranks will score additionally 1/2 of those values.

3 passers when connected in a group

When connected in a group, 3 passers will score an additional +1.25 to already assigned bonus points for passed pawns.

Passers when part of bigger fixed chains

Those will be passers of the type wpsb4,c5,d6, bpsb5,c6, or wpsb4,c5,d6,e6, bpsb5,c6. When part of bigger fixed chains, passers deserve an additional bonus, because they could be destroyed only at the cost of further positional concessions. 1/3 higher bonus than that for a protected passer in the first case, and 1/3 higher bonus than that for a pair of connected passers in the second case. That might help a more precise evaluation of the position and, in the second case, try out an exchange sacrifice of a minor piece for 2 ps with considerable winning chances.

Useless surplus passers

Those are usually end-file a or h separate passers, or b or g protected passers, with large fixed structures on the board. Even if one of the sides has a surplus passer of this type, but it is not possible for its pieces to land on penetration points in the enemy position, then the game is drawn as an advance of the passer would lead to its demise.

2 protected passers defended by one and the same pawn

When 2 protected passers are supported by one and the same p, the bonus for protected passer status should be somewhat decreased, maybe by 1/3, as those passers are more vulnerable in one way or another.

Bonus points for distance between passers

With 2 or more separate passers on the board, or 2 groups of passers, bonus points will be assigned for the number of files in between the separate passers or the groups (or between a separate passer and a group, for that reason). The larger the number of files in between, the better for the side with the passers, as they are more difficult to contain that way.

6 files in between - bonus of +25cps

5 files in between - +20 cps

4 files - +15

3 files - +10

2 files - +5 cps

Just one file in between will carry no bonus.

Bonus for passers in terms of distance to the enemy ps

When considering this, we should check the number of files in between the passer and the enemy ps or groups of ps. Enemy ps could be just on one side of the passer, or on both sides. +3cps for each file separating the passer from the enemy ps. The less removed the passer is

from enemy ps, the more easily would it be to contain it, because enemy ps usually support pieces trying to stop its movement forward.

Protected passer defended by 2 ps

In the case that a protected passer is defended by 2 own ps (eg. wpsd4,e5,f4, bpsd5,f5), the bonus for a protected passer should be somewhat increased, by 1/4, as it is solid like a rock and will endure a long time.

Pieces obstructing the advance of an own passer

If a piece obstructs (stays in the way to promotion) the advance of an own passer, then it should be penalised minimally, by 2mps.

Blocking protected passers

Blocking protected passers deserves higher bonus than blocking a separate passer, simply because the passer is more valuable.

Blocking a simple protected passer

1/3 higher bonus than the standard (eg. wpsc4,d5, bpc5,bbd6)

Blocking a protected passer defended by 2 ps

2/5 higher bonus, not only because of the relatively bigger value of this passer, but mainly for the reason that the square in front of the passer is an excellent position for blocking, being part of larger fixed structures. (eg. wpsd4,e5,f4, bpsd5,f5,bne6)

Backward passer

This seems as a contradiction in terms, but actually is not. When 2 more own pieces control the square in front of an enemy passer, its bonus points could be halved, as practically it cannot advance without being lost.

But this should be considered only if the number of the own minor pieces controlling the square is not lower than the number of enemy minor pieces controlling it.

Connected backward passers

This could occur by opposite colour bishops. When the tandem of a queen and bishop control the squares in front of enemy connected passers, it is very difficult or impossible for the ps to advance. Bonus points for the passers could reasonably be halved. The number of connected passers could be 2, 3 or more.

Double pawns

Double pawns, be it isolated vertically, a group in itself or part of a group, shall be assigned a penalty of -20 for each p.

In the endgame, the value should be double.

Immobilised double pawns

Immobilised double ps is the case when 2 double ps are definitely stopped in their movement by an enemy pawn. (eg. wpe4, bps e5,e6) This is certainly a big disadvantage since it will be almost impossible for the ps to correct their deficient structure. Twice the value of a penalty for double ps is indicated. The penalty might be somewhat decreased if there is an own p on an adjacent file less advanced than the more advanced pawn of the 2 double ps. (by 10)

5 mps for each square separating a pair of double ps (thus wpsb2,b5 would be preferable to wpsb2,b4 or wpsb2,b3)

Double ps when part of a group and closing the ranks

When double ps are part of a group with the more advanced of the pair connecting diagonally to a even more advanced own p, a big penalty would be indicated for the double ps, because it is impossible for members of such a group to advance coherently. 1/3 higher value for the doubling. (eg. bpsb7,b6,c5) Such a structure is not only deficient, it is ugly.

Bonus points for double ps when part of a group in relation to the size of the group

When part of a group, double ps should be weighted in respect of the size of the group. The smaller the group, the better, because an advance of the ps will create less deficiencies.

+5 cps for a group of 3 in relation to a group of 4

+5 cps for a group of 4 in relation to a group of 5

Additional penalties for double ps in terms of advancement

When the double ps are part of a group, it is the less advanced p that will suffer more because it is less mobile. -5cps for it

When the double ps are horizontally isolated, it is the more advanced p that will suffer more, because the enemy pieces are closer to it.

Double ps in terms of rank placements

Double ps could not be done in terms of rank placements, because this is very cumbersome and possibly counterproductive.

Double ps in terms of file placements

In distinction to horizontally isolated ps, double ps are more difficult to do in terms of file placements. Still, some patterns could be discerned.

Double ps when horizontally isolated

These are very similar to horizontally isolated ps and central files should carry a bigger penalty, as it is easier for the enemy pieces to attack them there. 1/10 higher penalty for ps on d or e files in relation to ps on c or f files, which in turn will score 1/10 higher penalty than b and g files, and the same holds true for the end a and h files.

Double ps when part of a group

When double ps are part of a larger group, the logic will be reversed as it is not easy for enemy pieces to attack them, and what counts will be the intrinsically more valuable placements on central files. 1/10 higher penalty for ps on end a and h files in relation to ps on b and g files, which in turn will score 1/10 higher penalty than ps on semi-central c or f files. The same will be true for d and e files.

Isolated pawns

Isolated pawns represent the case when a pawn is severed from other ps by one or more files (horizontal isolation) or by one or more ranks (vertical isolation).

For isolated ps a penalty of -20 for each p should be given, both for a vertical isolation, as well as for horizontal one.

Degrees of isolation

Isolation might be measured by degrees.

2 cps for each rank or file separating the isolated p from other ps shall be given.

Values for isolation should be double in the endgame.

Fixed horizontally isolated pawn

If an isolated p is fixed (blocked in its movement) by an enemy p, then the penalty for the isolated p should be increased significantly, maybe 1.5 times, as it is restricted in its movement and may fall easy prey to the enemy pieces.

Horizontally isolated p in terms of rank placement

Horizontally isolated ps will score penalties in terms of the rank they are placed on.

The less advanced the rank, the more vulnerable the p is.

For a black p the 7th rank will score a penalty 1/8 higher than for a p on the 6th, which in turn will score 1/8 higher penalty than if the p was on the 5th rank.

When the p moves to the 4th rank (the last possible for this type of p), the penalty will decrease by 1/4 in relation to what it was for the 5th.

Horizontally isolated central p

This is a p on a central e or d file (usually on d). Such p should receive some additional penalty, -10, because its position right in the center of the board makes it much more vulnerable to enemy piece attacks.

Additional +15 for blocking such a p (apart from other blocking bonus points).

Horizontally isolated pair of ps

In the case of 2 ps connected horizontally, and isolated horizontally from other own ps (usually the ps are on the 3rd or 4th ranks, eg. wpsc3,d3, bpsb5,e5; or wpsc4,d4, bpsb6,e6), the scoring will depend on the ability of the ps to advance forward.

+15 for the pair if the ps are on the 4th rank

-15 for the pair if the ps are on the 3rd rank

Horizontally isolated ps in terms of file placements

Ps on central files will carry a bigger penalty, since they are more easily attacked. 1/8 bigger penalty for a p on d or e files in relation to a p on c or f files, which in turn carries 1/8 bigger penalty than b and g files, and the same holds true for the end files.

Horizontally isolated p when part of a fixed structure

Eg. wpsb4,c5, bpc6. When a horizontally isolated p is a part of a fixed structure, its isolation is further aggravated. 2/5 higher penalty for isolation is indicated.

Backwardness

Backwardness is a very important concept in chess. Backward pawns are extremely important because of different reasons. They could partially determine the passer status, if a p could

move forward or not, they could bode ill or well for the general welfare of a position and help in assessing other factors. Backward ps occur 2 or 3 times more frequently than double and isolated ps do as a whole. So if you are doing backward ps just for the 7th rank, and skip semi-backward ps, backward-fated ps and their varieties, not definitively backward ps, partially backward ps, potentially backward ps, backward ps when part of a fixed structure, and backward ps when connecting to a more advanced own p, and if you do not do backward ps across ranks, then most probably you are skipping half of the existing positional factors on the board and a big portion of what chess actually is all about.

A p could be not only backward, but also semi-backward and backward-fated.
A backward p is the case when on its way forward a p passes through a square where it can be captured by an enemy pawn and no other own p supports its movement forward. (eg. wpa5, bps b7,a6 - b7 is backward)

More precise definition of a backward pawn

A backward pawn is one that is not able to advance without being captured by an enemy p for nothing, and that could not be supported by another, less advanced own pawn, in its advance, either because there is not such a p, or, if there is such, it would be either fixed, or also backward.

A semi-backward p is the case when on its way forward a p passes through a square where it can be captured by an enemy p, but an own p supports its movement forward. (eg. wpa5, bps a6, b7,c7 - b7 is semi-backward as c7 supports the b6 square)

Doing semi-backward pawns

Semi-backward pawns are not straightforward to do, because with such ps everything will depend on the relatively better piece control of the square in front of the semi-backward pawn. But since usually the side making the enemy pawn semi-backward exercises better control over that square, assigning a decent penalty is not entirely devoid of reason.

Backward-fatedness is the concept when on its way forward a p passes through a square where it can be captured by 2 enemy ps with no own ps supporting its forward movement. (eg. wps a5,c5, bps b7, a6,c6 - b7 is backward-fated)

All three forms of backwardness can be measured according to the rank upon which the backward p is placed.

Backward p on the 7th rank - a penalty of -25 cps is given

Backward p on the 6th rank - 1/2 the penalty for a p on the 7th rank (eg. wpa4, bps a5,b6)

Backward p on the 5th rank - 1/2 the penalty for a p on the 6th rank (eg. wpa3, bps a4,b5 - a penalty for b5)

Backward p on the 4th rank - 1/2 the penalty for a p on the 5th rank (eg. wpa2, bps a3,b4 - a penalty for b4)

Semi-backward p on the 7th rank - a penalty of -15 cps is given

Semi-backward p on the 6th rank - 1/2 the penalty of a p on the 7th rank (eg. wpa4, bps a5,b6,c6 - a penalty for b6)

Semi-backward ps are not penalised when on the 5th or 4th ranks

Backward-fated p on the 7th rank - a penalty of -35 cps is given

Backward-fated p on the 6th rank - 2/3 the penalty of a p on the 7th rank (eg. wps a4,c4, bps a5,b6 - a penalty for b6)

Backward-fated p on the 5th rank - 2/3 the penalty of a p on the 6th rank (eg. wps a3,b2,c3, bps a4,b5 - the wp on b2 is, of course, backward, but bpb5 is penalised for backward-fatedness)

Backward-fated p on the 4th rank - 2/3 the penalty of a p on the 5th rank (eg. wpa2, bps a3,b4 - a penalty for b4 is indicated)

The values for all types of backward ps should be double in the endgame.

If a pawn makes 2 enemy ps backward simultaneously (eg. wpb5, bpsa6, c6), then the penalty for backwardness should be decreased, maybe one half the value. This applies also to not definitively backward ps.

A backward p whose only support for advancing forward is another backward p

A backward p whose only support for advancing forward is another backward p should be counted as a standard backward p. Eg. wpsg3,h4, bpsh5,g6,f5 - f5 is such a p.

Double backward-fated pawn

That would be the very rare case of a backward-fated p that is double (eg. wps a4,c4, bps b6,b7). As the backward-fated p restricts the forward movement of the b7 p, the penalty should be higher, say 1.5 times.

Semi-backward p with adjacent double ps

This type of semi-backward p deserves at least 1/4 higher penalty than standard semi-backward ps, because the adjacent double ps would render very difficult any coherent advance of the members of the group. (eg. wpsb2,b3,c2,d3, bpd4 - c2 is such a p)

Not definitively backward pawns

A not definitively backward pawn is one that has more than 1 free square until it reaches the square where it can be captured by an enemy p. (eg. wpe4, bpse5, d7 - the d6 square is free for other pieces to pass through so that backwardness is not that compulsive) Such a p might be penalised a bit lower, let's say 1/2 of standard penalty. For me semi-backward ps should not be penalised, but backward-fated should, and depending on the rank where the p is placed. (eg. wps c3,a3, bps c4,b6 - b6 is such type of p)

This concept might be developed for the number of squares the backward p is away from the enemy pawn's capturing square.

2 squares away - 1/2 of standard penalty

3 squares away - 1/4 of penalty (eg. wpb2, bpsb3, a6)

4 squares away - 1/8 of penalty (eg. wpb2, bpsb3, a7 - a7 is penalised very low)

Taking into consideration this type of ps would make it possible to recognize early enough detrimental pawn moves, for example wp b3, bps a6,b5,c5 - b5b4 would be a bad move from this viewpoint.

Not definitively semi-backward pawn

A not definitively semi-backward p is a semi-backward p more than one square away to where it would be captured by an enemy p. (wpb4, bpsb5,c7,d6 - c7 is such a type of pawn) In distinction to backward ps, the penalty is not decreased, but increased, as enemy pieces could potentially control the square in front of the p. The increase should be small, however, maybe by 1/3 the standard value for a semi-backward p on the 6th rank.

Partially semi-backward pawns

A partially semi-backward p is a semi-backward p that could become both fully backward, and semi-backward, and sometimes also backward-fated. (eg. wpsb4,d4, bpsb5,c6,d6 - if the d4 p falls, c6 becomes semi-backward, if the d6 p falls, c6 becomes backward-fated, and if both d4 and d6 were to fall, c6 becomes fully backward p) In that case this type of p should be assigned some penalty, maybe 1/3 the cumulative values for the three types of ps, as it might evolve into all of them.

The concept might be developed across ranks, with lower values when the partially semi-backward p advances forward.

Not definitively partially semi-backward pawn

This is a partially semi-backward p more than one square away from the square where it could be captured by an enemy p. (eg. wpsb4,d4, bpsb5,c7,d6 - c7 is such type of p) In this case the penalty for c7 should be increased somewhat in respect to a partially semi-backward p, as the enemy side could take control of the square in front of the p, including, if d5 square is not guarded by black, by advancing own d p.

The concept could be developed across ranks with decreasing penalties for the advancing semi-backward p.

Potentially backward pawns

A potentially backward pawn is one of a bigger pawn structure that could evolve into both a fully backward p, and a semi-backward one. (eg. wpd4, bpsd5,c6,b7 - c6 is a potentially backward p, if black moves b7b6, c6 will become semi-backward, if black moves b7b5, c6 will become fully backward) A penalty is indicated for these possibilities, but not big as the structure could endure for a long time, let's say 1/4 the cumulative penalties for both types of possible evolutions.

The concept could be developed across ranks with decreasing values when the p moves forward.

Mutually backward pawns

Eg. wpa4, bpb6 This is the archetype of a backward p, but it occurs extremely rarely in practice, because such ps are easy targets. Therefore, the standard backward p is of the type wpa4, bpsa5,b6. While the bpa5 stops wpa4, making it not backward, the same is true of wpa4 in respect of bpa5. But bpb6 remains backward.

Mutually backward ps could be done in terms of ranks. Because such ps are very volatile, their penalty should not be big, maybe 1/2 that of a fully backward p, or around 12cps.

Backward pawn connecting to a more advanced own p

Eg. wpc5, bps a6,b7,c6

The penalty for b7 should be somewhat increased, by 1/4, as if it moves forward the more advanced p it connects to would become isolated.

Backward p when part of a fixed chain

When a backward p is a part of a fixed chain (eg. wps d3,e4,f5, bps f6,e5), the penalty for backwardness should be increased steeply, by 2/3, as if it moves forward, it would not correct things, but instead another backward p on its place could appear (e4), if the enemy side decides to capture.

The concept could be developed for ranks with steeply decreasing penalties as the backward p moves forward, as soon a passer might appear.

Backward pawn when part of a pair of double ps

If a backward p is part of a pair of double ps (eg. wpc4, bpsc5,d6,d7), then the penalty for the backward p should be decreased by 2/3, as its forward movement will force the undoubling of the pawns.

+3cps for each piece controlling the square in front of the backward pawn as on this will depend if the ps are undoubled or stay as a weakness.

Backward p when part of a fixed structure with diagonally connected own ps and double

In this case (eg. wps d3,e4,f5,e2, bps d4,e5,f6), if the double p is behind a p that is not the least advanced (d3 in this case), the penalty for a backward p should be retained, and that for double p removed, because the forward movement of the less advanced double p will force the undoubling of the ps, while at the same time another backward p will appear in its place.

Pieces amplifying the backwardness of a pawn

Some bonus points should be assigned to own pieces controlling the square in front of an enemy backward p (only relating to fully backward ps, and not to not definitively backward ones). Let's say 1/5 the penalty for the backward p. The concept is very difficult to apply to semi-backward ps, and useless for backward-fated.

5mps for pieces controlling the square in front of a semi-backward pawn.

Own piece blocking a fully backward enemy p - +10mps

Semi-backward-fated p

A semi-backward-fated would be one of the type wpsb5,d5, bpsd6,c7,b7 - c7 is such a pawn. this type of p stays somewhere in between a backward-fated p and a backward p. If black moves b6b7, c7 becomes backward-fated, and if both b ps are removed, we have the case of a backward p. The distinction to a backward p is that 2 enemy ps could capture it if trying to advance, while only one own p supports it. That makes the possible advance more difficult, and in any case this would require some extensive preparation. Some penalty is indicated for the p, maybe 1/2 the cumulative penalties for a backward-fated and a backward p.

The concept could be developed for ranks, with decreasing penalties as the p moves forward. I think it is important to do this type of p, because it occurs quite often.

Backward ps in terms of file placements

Penalties for backward ps should be calculated in respect of the file they are on. The more central the file placement of the p, the bigger the penalty, simply because the p is more important, and its forward movement is thwarted. Placements on central e and d files will carry 1/8 higher penalty than for ps on semi-central c and f files, which in turn will carry 1/8 higher penalty than for ps on g and b files. The same will apply to a and b ps. The rule could be applied also to backward-fated and semi-backward ps.

Bonus points for backward ps when part of a group

When backward ps are part of a larger group of ps, their penalties should be somewhat decreased, by maybe just 1/10, because groups usually make weaknesses more difficult to attack. This concerns also semi-backward, backward-fated and other types of backward pawns.

Backward-fated ps that do not cancel each other

Usually backward-fated ps cancel each other, except in terms of ranks (eg. wpsb5,c4,d5, bpsb6,c7,d6). But when this is not the case, such ps are major weaknesses.

Backward-fated p when unopposed

Eg. wpsb5,d5, bps b6,c7,d6 A backward-fated p when unopposed is a major weakness. This is really the case not to be an unopposed pawn. Such a p fully deserves its big penalty as it can be attacked on the file where it is placed by the enemy heavy pieces.

Backward-fated p when being the less advanced double p

Eg. wps d3,c4,d5, bps c5,d6,e5 White has double ps part of a group and some space advantage. But the real difference is the backward-fated p on d3. A white p on e4 instead of d5 would be the much better choice, as now the backward-fated p is easily attacked. Besides, a p on e4 would leave black with the same backward-fated weakness. Therefore, the big penalty for the d3 p is fully deserved.

Unopposed pawns

That will be a pawn that does not have an enemy counterpart on the same file. This might not be a passer, it might not even be a potential passer (because double enemy ps on an adjacent file neutralise it), but the quality of being unopposed confers upon it a bigger influence on the board for the time being and good prospects for future development. That is why such ps are to be preferred and should receive a decent bonus. +8cps for any such a p

Connected unopposed ps

Those will be 2 unopposed ps on adjacent files. They will be neutralised by ps of different enemy groups. These ps deserve much bigger bonus, and they are really much more dangerous; +20

Double unopposed ps

That will be a double p with no enemy counterpart on the same file. Bonus points might be decreased minimally. +6cps for each of the ps.

Unopposed p on the 5th rank

When this type of p is on the 5th rank, it is much more dangerous, therefore its bonus should be increased, 1.5 times.

Blocking an unopposed pawn

If possible, that would make sense in almost any situation. But as the factor is relatively unimportant, millipawns are assigned. +5mps for such a move

Bonus for unopposed ps in smaller groups

Unopposed ps, when part of a smaller group, would deserve a bigger bonus than when part of a larger group. That is so because smaller groups advance more quickly than larger groups, and therefore the status of an unopposed pawn could be exploited more easily for gaining positional advantages.

Unopposed p in a group of 2 ps - +6cps

Unopposed p in a group of 3 ps - +4cps

Unopposed p in a group of 4 ps - +2cps

Pieces controlling the square in front of an enemy unopposed p

+3mps for such a piece

(That would take into account the squares for a possible move, i.e. if the p is on e7, e6 and e5 would be considered)

Distance in between unopposed ps

When one of the sides has more than one unopposed ps, the distance in files in between them would matter, as this could help in creating a passer.

1 file in between - bonus of 20mps

2 files in between - +15mps

3 files in between - +10mps

Unopposed ps in terms of ranks

The more advanced an unopposed p is, the better. Bonus points should be a bit bigger than for a normal p. +3cps for an unopposed p on the 3rd rank and +6cps if such a p is on the 4th rank.

Unopposed ps in terms of files

The logic would be reverse to the logic for a normal pawn. The more central an unopposed p is, the more difficult it would be to use it in an attempt to create a passer. End-file unopposed ps are best suited for this.

1/5 higher bonus for an end-file a and h unopposed p in relation to a b or g unopposed p, which in turn will score 1/5 higher than semi-central c and f ps, etc.

Unopposed ps when part of fixed structures

Eg. wpsd3,c4,b5, bpsb6,c5 An unopposed p being part of fixed structures should get some bonus points, +5cps, because of its capacity to constructively influence the structures.

Bonus for an unopposed p in terms of its ability to advance

If an unopposed p is able to advance, it will get +10cps additional bonus points, as usually this is one of its main features. But this will not concern unopposed backward-fated ps (precisely the case not to be an unopposed p).

Unopposed ps in terms of enemy ps stopping their advance

The standard unopposed p will be the case when 2 enemy ps stop its movement forward on adjacent files.

If just one enemy p does that, +5cps might be added to the unopposed pawn's bonus.

When there are 3 enemy ps stopping its advance, -2cps might be subtracted, and another -2 in the case of a fourth enemy pawn.

Differentiating between a potential passer and an unopposed pawn

For practical reasons, a potential passer could be considered if the side with the surplus pawn is able to create a passer within 4 own moves (3 consecutive null-moves might be applied).

Otherwise, the surplus p could be considered just as an unopposed p.

Unopposed pawns in terms of own ps helping their advance

Unopposed ps will receive some bonus for the number of own ps supporting their forward movement (i.e., controlling squares along the forward movement of the p).

+2cps for each own p controlling such squares

+3cps if the squares controlled are by double ps on the same file (as usually the p will be able to advance more forcefully in this way)

The diagonal connection

The diagonal connection will be a group of diagonally connected ps on the same diagonal.

The main features of the diagonal connection are, of course, the lead p and the root p.

Directions of diagonal connections

A direction of a diagonal connection will be the way the connection goes. Going towards the king side or going towards the queen side are 2 possibilities. If the lead p is closer to the h file than the root p, then the direction is towards the king side. If the lead p is closer to the a file than the root p, then the direction is towards the queen side.

Bonus for 2 diagonal connections going into the same direction

When 2 diagonal connections go into the same direction, they are due some bonus points, as the lead pawns of both groups are well-coordinated. +10cps might be a good measure. But groups consisting of just 2 ps on the 2nd and 3rd ranks might be excluded from this.

A diagonal connection with a direction towards the side where the enemy king has castled

+5cps additionally for such an arrangement might be justified, as this is an optimal way of building such structures. Again, groups of ps just on the 2nd and 3rd ranks might be excluded from this.

Lead pawns

The lead pawn will be the most advanced of a group of diagonally connected ps. Lead ps get their merit not so much because of being well-defended, but because in their capacity of lead ps they support the activity of own pieces while being a real bore for the enemy pieces. Lead ps are the exact opposite of root ps. Lead ps will be considered only for a single diagonal.

Lead ps will get the following bonus points:

Lead p of a group of 2 diagonally connected ps (leading just one p) +3cps

Lead p of a group of 3 diagonally connected ps (leading 2 ps) +6cps

Lead p of a group of 4 ps +9cps

Lead p of a group of 5 ps +12cps

If a lead p is leading ps along 2 diagonals, bonus points for both will be dispensed.

When doing lead ps, lead ps part of the own king shelter might not be considered, as this could only complicate things. Groups consisting of only 2 ps with both still into the own camp might score 1/2 the usual values.

Lead pawns in terms of files

The more central a lead p is, the higher its role as a leader is, and consequently bigger bonus points should be assigned. Ps on e and d files should get 1/5 higher bonus than ps on c and f files, which in turn will get 1/5 higher bonus than b and g ps, etc.

Lead pawns in terms of ranks

Lead ps are possible from the 3rd through the 6th rank. The more advanced a lead p is, the better, accentuating its role as a bore.

+2cps for a lead p on the 3rd rank

+4cps for a lead p on the 4th rank

+6cps for a p on the 5th rank

and +8cps for a lead p on the 6th rank

Lead pawns when part of fixed structures

When lead ps are part of fixed structures, their specific functions are only accentuated. Therefore, 1/3 higher bonus for such ps is well-indicated.

Blocking a lead pawn

Blocking a lead p is a positive development, as this could help in attacking the diagonal connection of ps as a whole.

+8cps for such a piece

Attacking a lead p

+5cps for attacking a lead p with an own p is indicated, as this will threaten the diagonal structure as a whole.

Fixing a lead p

Fixing an enemy lead p with an own p is always a positive development, as this will make attacking the lead p, and the diagonal connection as a whole, easier.

+3cps

Pieces controlling squares of the capturing capacity of a lead p

Own and enemy pieces controlling squares diagonally in front of a lead p would deserve some bonus points, as they could help in attacking the p or preventing an enemy attack on the p.

+2cps

Lead pawns in terms of closeness to the enemy king

One square in between the lead p and the enemy king (with the p going along the way of a king) will give you +15cps

2 squares in between the p and the king will score 10cps

3 squares will be worth 5cps

Making the difference with lead pawns

One of the most important indicators for the performance of lead ps would be the possible closeness (3 squares away or less) of a lead pawn to the enemy king. It is important to do that both in the case a diagonal connection is not fixed, and when the ps of the connection are part of bigger fixed structures (i.e. the enemy side will have a diagonal connection with fixed ps, too, often of the same size). In the first case what will matter will be the usefulness of the diagonal connection for successful development of the own pieces, and the closeness of the lead p to the enemy king will mean that own pieces are successfully developed in a close range to the enemy king, which will have some bearing on overall attacking chances, moreover that diagonal connections are usually associated with a degree of permanence of arrangements on the board. In the second case, the permanence of arrangements will only be strengthened by the fixed structures, and that is why closeness of the lead p to the enemy king will be particularly important. Both sides will have, supposedly, larger fixed structures consisting of diagonal connections with same number of ps, possibly similar values for ranks, and even files, but the real difference will be that one of the sides will have a lead p close to the enemy king, while the other side's lead p will look somewhere to the queen side (or the side opposite to where the king has castled), and practically be inefficient in terms of king attacks.

That could be used, of course, to determine well in advance if an attack on the enemy king could be successful, even if at the current point of time pieces for the side with a lead p close to the enemy king are still far away from the enemy king. The permanence of fixed structures will help those pieces to gradually develop for attack on the king, using the power of the lead p, while the other side could only patiently wait, as its attacking chances would not be helped by the own lead p. In this way, enemy lead ps close to the own king when part of fixed structures should be avoided at all costs, especially when the number of fixed ps is bigger. It seems that this is one of the biggest difficulties for engines, that often do not consider such ps and such structures important, maybe because they weight mobility and immediate attacks higher, but in the case of bigger fixed structures both mobility, as well as attacks, have different meaning, as fixed structures for the side with the lead p close to the enemy king could help that side to gradually, but forcefully, develop its pieces on appropriate attacking positions, while relatively good mobility and attacking values for the enemy side could basically come to nothing with time as the attacking potential for the other side develops. It might be wise to consider decreasing the values for mobility and attacks with similar arrangements.

Similar weak spots in engines' play are especially well taken advantage of by humans, who recognize such structures much better than engines. Resolving this issue in engines' behaviour could practically resolve the last big outstanding problem with positional understanding of top programs. Of course, there are also other deficiencies in the positional understanding of engines, but that is by far the most important one.

Penalties for root pawns

Root pawns are the last of a group of ps. This concerns only groups of ps connected diagonally. With the perishing of the root p of such a group, all other ps become more vulnerable. Penalties will increase with ranks increasing.

-5 for root p on 2nd rank

If a root p is the mainstay of a group of ps along 2 diagonals (eg. wps e3, d4, c5, f4), then the penalty should be somewhat increased, maybe double.

Double penalties are indicated if a root pawn is a part of a fixed or semi-fixed structure, since much more depends on its well-being than if the structure was not fixed.

Root pawns in terms of files

The more central a root p is, the more difficult its defence would be, because it could be attacked from all sides. But the difference could be really insignificant. 1/10 higher penalty for central e and d root ps in relation to c and f root ps, which in turn will score 1/10 higher penalty than b and g ps, etc.

Root pawns in terms of ranks

The situation is similar to horizontally isolated ps. Root ps are possible from the 2nd through the 6th ranks with penalties slightly increasing as the p advances, because being closer to the attacking potential of enemy pieces.

1/10 higher penalty for a root p on the 3rd rank in relation to a root p on the 2nd rank, a root p on the 4th rank will score 1/10 higher penalty than a root p on the 3rd rank, etc.

Root ps in terms of the size of the group

The bigger the diagonal connection of ps, the bigger the penalty for the root p, because more own ps will depend on its well-being.

1/10 higher penalty with each additional pawn in the group (a group of 2 could be the default).

Ps attacking enemy root ps

+2cps for a pawn attacking an enemy root p as this helps to dismantle the diagonal connection

Fixing an enemy root pawn

Fixing an enemy root p with an own p is a welcome development, as the root p becomes an easier target.

Apparent root pawn

An apparent root p would be one, that is actually not a root one, but the real root p behind it has an own piece placed immediately in front of it vertically, so that the square in front of the apparent root p remains undefended pawn-wise. Eg. wpsf2,e3,d4, wnf3 - e3 would be such a p.

+5cps for the enemy side for 2 enemy ps controlling the square in front of such a p (e4 in this case); some enemy pieces might land there forcefully

Apex pawns

An apex pawn will be the designation for a lead p defended by 2 pawns, i.e. a lead p of 2 diagonal connections at the same time. Apex pawns are due some bonus points, as they are a very stable feature of the position, and lead pawns are valuable.

+3cps for an apex p; double that, if fixed

Apex ps on the 3rd rank will not be considered.

Apex pawns in terms of ranks

Apex ps are possible from the 4th to the 6th ranks.

An apex p on the 4th rank might get the standard value, a p on the 5th rank 2cps more, and a p on the 6th rank still another +2cps.

Apex ps in terms of files

It would not make sense to consider apex ps in terms of files, as lead ps will sufficiently cover this.

Apex ps on the a and h files are impossible to occur.

Pieces attacking apex ps

Enemy pieces attacking apex ps is counterproductive and a waste of time.

-2cps for such pieces

Own knight behind an apex p

Own knight placed on the square immediately behind an apex p, if possible, would be an asset. The knight enjoys a quiet stay there.

+4cps for such a knight

Pieces defending an apex p

Pieces defending an apex p, even on an x-ray diagonally, deserve a bonus.

+1cp for such pieces, as this could make possible the further advance of a p defending the apex p.

2 apex ps on the same rank one square away

Eg. bpse6,d5,c6,b5,a6 - d5 and b5 are such ps Some bonus (+4cps) is indicated for such an arrangement, as a wide number of ps (e6,c6,a6) are able to advance while retaining the cohesion of the structure.

Medium pawns

Medium pawns are the pawns in between the root and the lead p along the diagonal connection. Medium pawns are relevant in terms of supporting the cohesion of the diagonal structure.

As the biggest diagonal connection would consist of 5 ps, from rank 2 through rank 6 (7th rank would be excluded, as this would be the case of a connected passer), the number of medium ps in a single structure is 3 at the most. They could be subdivided in three categories:

- medium ps in the first degree - immediately behind the lead p
- medium ps in the second degree - one square away from the lead p
- medium ps in the third degree - 2 squares away from the lead p

In terms of importance for the cohesion of the structure medium ps in the first degree are most valuable, since in the case of enemy ps attacking them, the structure as a whole would suffer most appreciably; and medium ps in the third degree are least valuable, since enemy ps attacking them would make the structure suffer least appreciably. The following bonus points might be dispensed:

ps in the first degree - 15mps

ps in the second degree - 10mps

ps in the third degree - 5mps

Medium ps will receive no bonus when all ps of the diagonal connection are fixed, as in this case enemy ps attacking them would be irrelevant.

Attacking a medium pawn when fixed

Attacking an enemy medium pawn, part of a diagonal connection, when it is fixed, with an own pawn, if possible, should score some bonus, because this will threaten the integrity of the connection.

+3cps in such a case

+6cps when the medium p is part of the enemy king shelter, as this will expose the king

Four-pawners

-20 for structures of type a3,b2,c3,d2 (too many holes)

-25 for structures of type h2,g3,f3,e2 with 2 root pawns on the second rank

-10 for structures of type h2,g3,f4,e4 (some mobility restrictions)

Five-pawners

For five-pawners derivative of four-pawner structures the rules for the latter will hold true.

Compositions of pawns

6 pawns chain and 1 separate pawn preferable to 2 chains consisting of 5 and 2 pawns (+20)

Chains consisting of 5 and 2 pawns preferable to chains of 4 and 3 pawns (+20)

When the chains are into the enemy camp, the estimates will be reverse as the probability of the smaller number of pawns to produce a passer would be higher

Pawn avalanche

Pawn avalanches consist of at least 4 connected passers on central and semi-central files, and maybe some other passers. The 4 passers striding together forward have a material value equivalent to 2 minors. 5 passers will even surpass that value. If the structure could be blocked, defence would be much more efficient.

Fixed pawn structures

Fixed pawn structures is the case when own and enemy ps are on adjacent squares vertically, i.e. they stop (block) their movement forward.

The simplest case is of a pair of fixed ps (eg. wpc4, bpc5).

Semi-fixed structures is the case when for one of the pairs of the fixed structure there are 2 free squares in between, but their movement forward is almost completely stopped as they are backward-fated ps. (eg. wps d3,c4,e4, bps d5,c5,e5)

Parts of a fixed structure is the case when one or more of the own or enemy ps do not have counterparts along the files they are placed on or when their counterpart is severed from the own pawn group. (eg. wpsd3,e4,f5,g4, bps e5,f6) Parts of a semi-fixed structure is the same, but with semi-fixed structures. Although parts of fixed and semi-fixed pawn structures seem more mobile than fully fixed and semi-fixed structures, the inherent mobility restrictions are retained because the surplus ps are backward in nature.

A chain usually refers to fixed and semi-fixed structures, but might also denote just a group of own ps.

Considering semi-fixed pawns with bigger fixed structures and for other purposes

When taking stock of the number of fixed pawns, semi-fixed pawns (eg. wpsc4,d3,e4, bpsc5,d6,e5 - d3 and d6 would be such ps) could be counted as fixed.

Closed and semi-closed structures

Closed pawn structures are when we have pawns for both sides on both central and semi-central files (eg. wps c4, d5, e4, f3, bps c5,d6,e5,f4).

Semi-closed pawn structures are when we have pawns for both sides on the central d and e files as well as one pawn each on a semi-central c or f file.

Closed pawn structures are of 2 types – fixed and semi-fixed. Fixed structures are when enemy pawns are attached to one another with no spaces in between (eg. wps c4, d5, e4, f3, bps c5,d6,e5,f4). Semi-fixed structures are when there are spaces between pawns on one of the files (eg. wps c4,d3,e4,f5, bps c5,d6,e5,f6).

For this type of structures special evaluation bonus points for space advantage are given. For central pawn on fifth rank - +30 instead of +10 (eg. d5 pawn); for central pawn on sixth rank (quite rare) the bonus will be +60 instead of +30.

For semi-central pawn on fifth rank the bonus will be +20 instead of +10; if such a pawn is on sixth rank, the bonus will be +40.

The need to assign higher bonus points for space advantage arises from the possibility to regroup forces more efficiently with this kind of space advantage, as well as from the fact that mobility for own pieces with space advantage of central ps will increase considerably.

Drawing possibilities with bigger fixed pawn chains on the board

When we have bigger fixed or semi-fixed (of the type wpsf4,g3,h4, bpsf5,g6,h5, with two backward-fated ps opposite each other) structures, the drawing possibilities of the weaker side would increase the bigger the chain gets. This is often misunderstood by engines.

If we have 8 ps each side on the board, then the game is automatically a draw, if the weaker side does not lag behind by more than 2 pawns in evaluation, when sacrifices would become possible.

If we have 7 ps each side on the board, then a bonus of +50 cps is indicated for the weaker side as possibilities for penetration are rather low.

If we have 6 ps each side, then the bonus should be decreased to 30.

With 5 ps, +10 could be assigned.

This rule could help avoid fixing more pairs of ps, even when this could mean gaining space advantage. So when you are up in evaluation and there are already 4 pairs of fixed or semi-fixed ps, it would be wise not to fix additional ps, especially when their number grows

significantly. For the purpose of measuring the number of ps of that type, a p one square away from becoming backward-fated would be counted as a backward-fated (wpg2 in the above example).

Additional indicators for considering a position drawish on the grounds of all ps being fixed

In some cases, when not all ps are fixed, the position could still be considered drawish. To conclude that such is the case, all remaining ps that are not fixed should be either backward-fated for one of the sides, or blocked by enemy pieces in a way that those pieces could not be expelled from their blocking position (with opposite colour bishops, for example).

Fixing an enemy pawn attacking the king shelter with an own p before it enters your own camp

Fixing such a p (eg. wpg4, bpg5), with larger fixed structures on the board, and another enemy p already into your own camp (bpf4, for example), should be a reasonable solution (+15cps for wpg4), as otherwise 2 attacking enemy ps already into your camp would be a very dangerous alternative. This might be a possible defensive technique against attacks with larger fixed structures. Having less own ps in the shelter might not be that bad, if fixing is successful.

Discriminate placements of ps with bigger fixed structures

With bigger fixed structures and when down in score, it would be wise to have own ps still not fixed on adjacent files horizontally connected (eg. bpsg5,h5), as this would help close the position further. Eg. - wps g3,h2 - white can do nothing to prevent further closing of files (if the f file is already with fixed ps) - actually this could be counted as a fixed structure for the weaker side.

+20cps for such an arrangement

Pieces fixing the pawn structure

Pieces being part of the fixed pawn structure (i.e. in diagonal connection with other own ps and fixed by enemy ps; eg. wnc3, wpd4, bpsc4,d5, or wnd4, wpc3, bpsc4,d5) is a paradoxical concept at first glance, but not all pieces are unsuited for such a function. Queen and rook should not be considered, but the minors should. The knight is a perfect fixer, because it retains good mobility and is usually well-placed, while the bishop not much so, because this would lower considerably its mobility, but still such a placement for the b might sometimes be useful.

+15cps for n fixing the pawn structure

-10 for b fixing the pawn structure

Bishop fixing the pawn structure to prevent penetration

Although the bishop is not the best fixer, when the b side is the weaker side and fixing the structure would prevent penetration of enemy pieces, this is the appropriate option to choose.
+20 for such a move

Fixed ps on the 7th rank

Endgame

Such ps are bad, of course, and should be avoided. Eg. wpa6, bpa7. And it would not matter much if the fixed p is horizontally isolated, or a part of a larger fixed structure. Soon the enemy p that fixes it could become a passer very close to promotion square. The closer the p to the center of the board, the smaller the penalty, as central ps of this type are easier to defend.

Fixed p on an end a or h file - penalty of -40cps

Fixed p on b or g files - -15cps

P on c or f files - -10cps

P on d or e files - -5cps

Parts of fixed structures

Parts of fixed structures would be the case with at least one pair of fixed ps, but when one of the sides has 1 or 2 ps more on the diagonal connection that are not fixed by enemy ps. Eg. wps e3,d4,c5, bpd5, or wps e3,d4,c5, bps c6,d5. In the case that one of the sides has 2 spare ps, they should be at both ends of the diagonal connection.

+15 mps for the spare ps of the part of a fixed structure, as their advance could precipitate structural changes in the part of a fixed structure.

Pieces controlling the squares in front of the spare ps of a part of a fixed structure

Both own and enemy pieces would deserve some bonus points, +5mps, as on this could depend if the spare ps advance and force changes in the structure.

Weighting of factors with fixed and semi-fixed closed structures

When we have fixed or semi-fixed closed structures (eg. wpsc4,d3,e4,f5, bpsc5,d4,e5,f6) placements for own pieces on squares on a more advanced rank behind the own ps would carry a certain bonus in relation to mobility, 15% higher values for minors and 5% higher for heavy pieces, as the possible disintegration of the closed structure could suddenly increase their mobility, while placing the pieces on a more backward rank behind the ps, even with higher mobility, would not help much as they could not easily penetrate the enemy position.

Bonus for space advantage of bigger fixed chains

With bigger fixed chains, consisting of 5 or 6 ps each side, but not more, the bonus for space advantage for the ps should be weighted higher by maybe 10%. This is because those are structures with most advanced ps not placed on central or semi-central squares, and while the increase is justified by higher mobility values for own pieces, this is not of such a vital importance because of the less central placements of the ps.

Counter-indicated closure of sides

Completely closing one of the sides (all 4 ps fixed or semi-fixed), even gaining space advantage, when the enemy has space advantage on the other side and it is still not completely closed, is counter-indicated and wrong, since the enemy could only increase his advantage on the side where he is better, even to a winning point, while you will be unable to seek out counterplay on the other side.

-50cps for such a development is a decent penalty

Vertically isolated pawn with enemy ps responsible for the isolation

That is a pawn amidst a cluster of enemy pawns. Eg., wpe5, bps e6, f5, e4 - -35 for the e5 pawn.

Restricting pawn

Eg. wp g5, bps g7,g6,f7. Usually the black pawn structure looks quite normal in middlegame, but when there is a g5 pawn it restricts the movement of the enemy g pawns forward and the structure becomes bad. At least +40 for the g5 pawn would be wise.

Passer status

An easy way to check the potentiality for creating a passer would be the following:

Neutrality

If for each own p on the board on a given file there is also an enemy p on the same file, the position will be passer-wise neutral, i.e. it is impossible to create a passer for one of the sides. If one of the sides has a p more on a given file, then we shall check if there is an enemy p on an adjacent file that could block the forward movement of the own p. If there is one, then the position is also neutral. The p on the adjacent file might well be a double one.

A candidate, prospective or a potential passer

When the above condition is not fulfilled and we have a p that does not have a counterpart on the same file, or whose forward movement can not be blocked by a p on an adjacent file, but which is still not a passer (the enemy groups of pawns are removed from one another), then we have a potential passer for one of the sides. Potential passers should be scored for something like 20 cps in the middlegame and 35 cps in the endgame. A rising bonus 1/2 the value for a fully-fledged passer might be given for the decreasing distance to a promotion square, in the way it is usually assigned to a passer.

Exotic pawns

Semi-passers

This is a p that goes behind an own passer and fulfills the conditions for being a passer (that is, there are no enemy ps that could capture it along its way forward) if it were not for the more advanced passer. A semi-passer should be assigned some bonus, for example 1/2 the value of a fully-fledged passer. Sometimes semi-passers in complex double-edged positions could be a valuable asset if the more advanced passer perishes.

Treble pawns

Treble ps occur when there are 3 own ps on the same file. Of course, a big penalty is indicated, maybe -60 cps.

Quadruple pawns

This will occur only extremely rarely. 4 own ps on the same file should be heavily penalised, at least 1.5 ps.

Potential of advancing forward

For each p on the board the number of own ps on adjacent files will be checked.

+10mps for each p on adjacent file

+5 mps if this p is placed behind the pawn we are measuring the potential for vertically

+3mps if this p is placed in front of the pawn vertically

+7mps if this p is on the same rank

This should be repeated for all pawns.

The style of Karpov

+10 for each own pawn on second or third ranks (better defended)

-5 for each square into the own camp (that would be the own half of the board, of course) not defended by a pawn or piece

-50 for active opp. piece into the own camp

Pawn structures consisting of 2 and 5 pawns preferable to pawn structures consisting of 3 and 4 pawns (+20)

Space advantage

Will be determined by the ps into the enemy camp

+10 for each p on the fifth rank, +30 for each p on the sixth rank

Special cases of b and n

+25 for a b or n on the fifth rank; + 50 for a bishop or n on the sixth rank, as the pression these pieces exert on the enemy position is bigger than usual (not sure how many engines do that – 20 Elo)

Eternal knight

This is knight on a central square – d5, e5, that has no opponent knight or bishop of the colour the square the knight is on to attack it - +75 for the knight (5 Elo, quite rare)

Space advantage for pawns in terms of fixed and unfixed ps

It makes sense to distinguish between space advantage for ps when the ps are fixed and when they are not fixed. The second case occurs only with ps on the 5th rank, so space advantage of fixed ps might be taken as the standard. For ps that are not fixed the bonus might be decreased by 1/3, because such ps will not perform exactly the same function for a long time, while fixed ps tend to last.

Control of squares into the enemy camp

Controlling squares into the enemy camp might be very important. Each square controlled by a piece might get +5mps additionally, but, of course, minor pieces might score relatively higher than rooks, which in turn could score higher than the queen. Pawns controlling squares into the enemy camp could get +10mps for each square. This might be an alternative way of measuring space advantage, but both ways - measuring space advantage in terms of ps into the enemy camp, and in terms of control of squares, might successfully complement each other and provide a more realistic assessment.

Control of squares into the enemy camp in terms of ranks

Controlling squares of the 7th and 8th rank could score double, as it is far more important in terms of the enemy pieces' chances to develop sufficiently.

Controlling squares into the enemy camp in terms of centralisation

Central e and d files could get 5mps additional bonus, semi-central c and f files +3mps additionally, and b and g files +1mp additionally.

King security

Position of the king

King position will be defined as the squares of the shelter zone, in relation to the square the king is placed on.

Placements of the king

K on h1, g1, a1, b1 – bonus of plus 1p

K on f1, c1 – penalty of -50

K on e1, d1 - -1p

K on second rank - -50; third rank – 1p; fourth rank – 3 ps; into the enemy camp - -5ps

Shelter zone

The shelter zone will comprise the squares, adjacent to where the king is placed, as well as the squares, 2 squares apart vertically, horizontally, diagonally or along a sinuous route (eg. wkg1, wph3 or e2, i.e. the move of a knight). The adjacent squares will build the immediate shelter zone (with squares behind the king excluded), while the squares 2 squares apart will build the wider shelter zone.

Pawn Shelter

The pawn shelter will consist of all pawns within the shelter zone.

Scores for ps of the pawn shelter

Ps of the pawn shelter will be scored in relation to which part of the shelter zone they belong to, as well as in relation to the route to the king, for the wider zone.

Each pawn of the immediate shelter zone will get a bonus of +50.

Each pawn of the wider shelter zone vertically, horizontally or diagonally removed from the king will get a bonus 1/2 of the above value.

Each pawn of the wider shelter removed along a sinuous route will get a bonus 1/3 of the bonus for the ps of the immediate shelter zone.

Pawns of the immediate king shelter when horizontally adjacent to the square where the king is and in front of it

Pawns of the immediate king shelter that are in front of the king are usually more valuable, because they bear the brunt of enemy attacks.

1/3 lower value for ps that are horizontally adjacent to the king, regardless of the placement of the king

Peculiarities of the pawn shelter

With short castling – no penalty or bonus for shelter of 3 ps (f2, g2, h2), a bonus of + 50 for a fourth p, protecting the king, eg. on f3.

Penalty of -50 for 2 ps and -1p for a single p

Placement of the ps of the shelter

Ps on the second rank – no penalty or bonus; p on g3 – same; p on h3 - -25, p on f3 - -50

Ps being on the fourth rank - -1p each

Flawed pawn shelters

Shattering

Shattering is when the pawn shelter is broken into 2 separate groups of ps. In this case -20 is given for the shattering itself, and further -70 for the f6 pawn in structures of type bps h7, f7, f6; or -90 for the h6 pawn if the shattering is f7,h7,h6.

Shelters with doubling

-50 is given if the flawed shelters are of type h7,g7,g6 or f7,g7,g6

Piece shelter

The piece shelter are own pieces within the shelter zone.

+30 for own b being part of the defensive structure (usually on g2,g7)

+25 for a knight

+15 for a rook

and +10 for a queen

In the case that one of the sides has very big space advantage so that the other side has almost no counterplay or very little counterplay – no penalty is given for pawn storms with pawns of the own shelter (eg. g2-g4, h2-h4, etc.).

In that very case a bonus is given for pieces defending own king: +30 for a r being able to defend own king if checked by an enemy piece; and +20 for knight or bishop with similar defence capabilities.

Forefront piece shelter

In the case of pieces on squares of the king position in front of the pawns of the pawn shelter a bonus is given - +10 for q, +20 for a r and +30 for a minor piece (eg. wbf3, wng3 with pawns along the second rank and kg1)

Additional free squares for the king

For each additional free square the king has access to - +15

Defending pieces

For each piece defending a square of the own king position attacked by an enemy piece a bonus is given - +10 for the q, +20 for the n and b and +15 for the r. That bonus might be halved in the case of defending any other square of the king position (shelter).

Enemy pawn sheltering king

In the case of a king attack, +50 is given for an enemy pawn sheltering the king, it would usually be an end pawn (eg. wps c2,b3, wka1, bpa2 or wps c2,b3, wka2, bpa3). It would be unwise to take the pawn as attacking chances would only increase.

Discriminate positioning of pawns of the shelter

With king attack, if two pawns are storming the k position and there are 2 sheltering ps along the same files, it would be indicated to keep the pawns positioned along the same rank as a pawn thrust could be met by closing the position (eg. wps g5,h5, bps g7,h7, g5-g6 would be met by h7-h6, deterring attacking chances). +30 for such arrangements is given

When the storming ps are 3 and along the same files there are 3 sheltering ps, +25 is given for fixing pawn chains as that would usually decrease attacking chances. Eg. wps f5,g5,h5, bps f7,g7,h7 – g7-g6 would be indicated, fixing the chains.

King shelter consisting of fixed pawns

King shelter consisting of fixed ps (usually this will not happen with castling on one of the sides, but in the center), when the p of the shelter on the file where the king is fixed, and at least one other own p of the shelter on an adjacent file is also fixed, is due some decent additional bonus, as fixed structures will make opening lines for attack on the king much more difficult, if possible at all.

+80cps for such an arrangement

Of course, the ideal situation would be that the number of fixed ps is bigger with bigger existing fixed structures.

King attack

Pawn storms - + 40 for a p on the fourth rank against the enemy king position, + 60 for a p on the fifth rank and + 80 on the sixth rank

Attacking the shelter zone

For attacking a square of the immediate shelter zone a certain value shall be assigned proportionate to the strength of the piece attacking it.

For attacking a square of the wider shelter zone that value shall constitute 2/3 of the former.

Attacking pieces

- + 50 cps for a q attacking a square defended by the enemy king
- + 15 for a bishop or n attacking such square or in the case of the n attacking a square from which it can check the enemy king
- +50 for a r on a semiopen file against the king
- +70 for a r on an open file against the king
- Double rooks on a semi-open file against the king - +80

With king attack, +10 for a piece attacking an enemy piece defending a square of the own king position – eg. Bg5 attacking Nf6 or Rf3 attacking same knight

+15 for a piece attacking the root p of the king shelter if there is such (eg. bps f7,g6,h7, +15 for wnd6 attacking f7 or +30 for wng5 attacking f7 and h7) Different combinations might arise.

Attacking squares of the king position (shelter) in terms of attacking pieces

Of course, it will all depend on a variety of factors, but still it pays to make a distinction between the attacking pieces, because of their specificities.

We will accept that a piece attacking the square the enemy king is placed at will get 1/10 of its value, so that the queen will get 90cps.

The following table might apply for a king on g1:

Piece	Queen	Rook	Bishop	Knight
g1	90	45	30	30
g2	70	40	28	28
h2	65	28	26	26
f2	60	26	24	24
h1	60	35	25	22
f1	55	30	22	20
g3	45	25	18	10
h3	35	20	14	12
f3	40	15	16	15

e3	42	10	20	8
e2	30	15	10	10
e1	45	20	12	5

Attacking pawns of the king shelter

Attacking ps of the king shelter will get 5 times higher value than attacking a usual pawn, as with the disappearance of such a p the shelter becomes much more vulnerable.

Attacking pieces of the king shelter

Attacking pieces, part of the enemy king shelter, will get 2 times higher value, as with the disappearance of such pieces the shelter becomes more vulnerable.

Intensity of interaction for the king shelter

Intensity of interaction for pieces having intersections on squares of the enemy king shelter could be done using the values for different pieces attacking the specific squares of the shelter. Calculations in this way would be much more precise.

Lines of squares opening access to the enemy king shelter

Such lines would be the 2 vertical and 2 horizontal lines of squares in front of the king shelter. For a king on g8, these lines would be squares along d8-d5 and d5-h5, and c8-c4 and c4-h4 for the more distant line.

Own pieces (white in this case) attacking the squares along these lines would be due some bonus points, as this could certainly have an influence on future attacking developments.

+5 cps for attacking squares along the lines immediately in front of the king shelter

+3 cps for attacking squares along the more distant lines

Pieces controlling squares linking to the king shelter

Pieces controlling squares from where they would attack the enemy king shelter are due some bonus points, as this could influence attacking developments.

+15mps for each square controlled

Pieces blocking pawns of the enemy king shelter

+15 cps for such pieces. This would concern mainly blocking ps of the shelter on initial positions. The bonus is due because such pieces could narrow defending possibilities for the shelter zone. It should be dispensed additionally to other bonus points for the attacking pieces. A rook in this function could get +20cps, while other pieces could get just +10cps.

Stepping-stones for attack

+5 for each square of intersection of an own pawn and own piece into the quadrant where the enemy king has found refuge

Stray Queen

If one queen is not within 2 moves of a square from which it can defend the own king position, and the opponent's queen is within a move from a square attacking the enemy king position, then +1.5 ps for the attacking q or -1.5 ps for the stray queen. The case might arise when the stray queen is indulging on pawns in the enemy camp, say w q on b7 or a7, and the pawn structure or available pieces prevent it from easily going back.

Attacking queen and bishop

In the case of qs and bs of different colours on the board, when one b is attacking the enemy k position and the other is just passively defending it, then +2ps for the attacking b – indeed the tandem should be dominating and the other b useless which will soon lead to some gains.

Hidden Attacking Rook

When we have the case of a r on a file against the enemy k position, with one own and one opponents p along the file, own p storming on 4,5 or 6th rank and opp. p part of the shelter, then +40 for the hidden r. Different attacking possibilities with sacrifices using the then open file might arise.

Pawns yielding pressure on the enemy k position. In the case of a p directly affecting the enemy k position - +40 for the p. The case might arise with a wp on e5, bps on e6, f7, g7 when f7-f6 or f7-f5 will weaken the p shelter. The e5 p is severely affecting the position and creating possibilities for a k attack. Some engines might not consider this.

Attacking possibilities

If a piece is within 1 move from a square from where it can go on a square attacking the enemy k position, then +half the value for the piece on an attacking position. The most frequent use will be with knights as they are slow-moving and need to support the attack. If we have a n on e2, it should get +15 for going on f4 from where it can go on h5, while wn on say b2 will get no boost. This might lead engines trying to concentrate their pieces for a k attack which is very important.

Sacrifices

Here we refer only to sound sacrifices. Unsound sacrifices are more like losing exchanges. For a sacrifice to be sound we should have a big plus for one side with a strong k attack (1 or 2 ps at least). If, for the next 10 plies the score does not go up or a winning continuation is not found, then the engine is at a loss of how to proceed and the solution may be in sacrificing. Do the following: lower for the next 4 plies the values of the attacking pieces by one fourth so that the q will be around 7ps, the r 3 something, n and b around 2.25. Then return the score to normal. In that way, in the course of those 4 plies the engine might consider to exchange q for a r, a r for a piece or a piece for one or 2 ps which might be the actual and only solution. If nothing is found then go back to normal proceedings.

Weakened pawn shelter in relation to enemy opposite colour bishop

When all the pawns of the pawn shelter are on squares of one colour with presence of opp. bishop of different colour – a penalty should be given for the shelter or a bonus for the attacking b.

B along the long diagonal

Fixed pawn structure for black – ps on h7, g6, f7, wp on g5, wb along the a1-h8 diagonal - +1.5ps for the b.

B on 6th rank among pawns of the shelter

Bps on h7, g6, f7, e6, wb on f6 - +2ps for the bishop. There is a big likelihood of mating king attack.

Q and n attacking a weakened king shelter

In the case of a weakened king shelter of the type – bps on h7, g6, f7, with white queen along the long a1-h8 diagonal and the knight placed on a square attacking the weakened f6 and h6 squares (eg. on e4, g4, d5) – the knight will be assigned value of 4.50.

Restricting attacked king mobility

With the assaulted king (usually with sacrificial attacks) having access to the center or the other side where it can take shelter, + 50 for a move with a minor piece or usually a rook cutting the access points of the enemy king.

Rook behind passed pawn - +50

+1p for a p directly pressuring the enemy king position – eg. wpf6, bps f7,g6,h7, bkg8; +1p for the f6 p.

The Tal dimension

Rook on 8th rank pinning a minor piece with king on the other end of the pin - +90

Annihilating activity

If there are at least 2 factors of permanent nature stimulating the attack (eg. open file, pressuring p on sixth rank etc.), then +2ps for the combined action of the 2 factors. If there are 3 factors - +3ps etc. This might compensate for the enemy queen capturing a rook or so.

A pawn on sixth rank with ongoing attack and bare king - +1p

With bare king, +50 for each p that has crossed the center line.

Bare king, destruction of the king shelter - +4ps.

2 bishops attacking the enemy king position - +70

2 knights attacking the king position - +50

With sacrificial attacks, if the attack continues after pawns and pieces have been swapped, +2ps for the ability to continue conducting the attack.

Passed p on seventh rank with king attack - +2ps.

+30 for a rook on a central fourth or fifth rank

+5 ps for battery of type b and q if the opp. pawn shelter can not prevent the penetration of the q

+90 for minor piece on sixth rank directly affecting the enemy king position (eg. wbh6 or wnh6, bkh8, bps h7,g6)

Founded disregard for less active pieces

With king attack going on, -50 for any own minor piece and -60 for own rook that are not directly involved in the attack (this could lead to sacrificing those pieces in order to gain some tempos for the attack)

Rook prevailing over 2 minors

With sacrificial exchanges of 2 minors for opp. rook and maybe pawn and king attack - +2ps for the r if one of the minor pieces can not defend the king position within 2 moves.

Other

How we patzers used to win against older engines on slower hardware (and still sometimes do against newer engines on faster hardware)

Closed center with king attack - +2ps

Closed center with pawns storming the enemy king position, at least one of which is on the fifth rank, especially if part of the structure of the pawn center - +3ps (eg. wps c4,d3,e4,f5, bps c5,d6,e5. g4 will follow and white attack will become crushing. Black should at all costs take ef4 when f4 is played)

Incapacitating pawns

With king attack, +20 for taking opposition with a heavy piece against the enemy k with pawn in between (eg. wkg1, wpg3, bqg6). In this way attacking moves like nh4 or rh4 become possible.

Diagonal pins of pawns with king on the other end of the pin

Usually with king in the center - +20 for the pin, eg. wkh5 or wqh5, bpf7, bke8.

With relatively open position, +20 for the king of the attacking side going to a square where it cannot be checked.

Pins

A pin is the case when a piece attacks an enemy piece with another enemy piece in between - the pinned piece (but it could also be a pawn), that is difficult or impossible to move, because the attacked piece will be destroyed. The attacking piece is also known as the pinner.

Pins are of 2 main types: a normal pin is when the attacker (always a linear piece) is of a different capacity than the attacked piece (i.e. diagonal linear piece attacking a non-diagonal linear piece or a non-linear piece), and a double-edged pin is when the pinner and the attacked piece share capacities (bishop attacking queen or queen attacking rook). The second case is of a very tactical nature and deserves 1/3 lower bonus, because it all depends on a variety of additional factors, how well pieces are defended, subtle tactical motives, etc.

Below is a tentative system that could apply to pins:

Bishop pinner will score 20cps.

Rook pinner will score 15cps.

Queen pinner will score 10cps.

Bonus points will be dispensed also in terms of the distance of the attacker to the pinned piece or pawn - the smaller the distance, the better for the pinning side, because this will make intervention of enemy pieces more difficult.

no squares in between 1/2 higher bonus

1 square in between 1/3 higher bonus

2 squares in between 1/4 higher bonus

and 3 squares in between 1/5 higher bonus

The distance of the attacked piece to the pinned piece will also matter, with bigger distance beneficial to the pinned side, as own pieces could intervene.

no squares in between 1/2 higher bonus for the pinning side

1 square in between 1/3 higher bonus for the pinning side

2 squares in between 1/4 higher bonus

3 squares in between 1/5 higher bonus

The pinned piece will also be of importance.

If the attacker and the pinned piece (the pinned piece is always of equal value or lower value than the attacker, or otherwise it could easily be captured without much ado) are of equal value, 1/10 additional higher bonus will be dispensed (bishop pinning a knight).

If the attacker is of somewhat bigger value than the pinned piece (rook pinning a knight or bishop), the additional higher bonus will be 1/15.

When the attacker is of much bigger value than the pinned piece (queen pinning a rook or a bishop pinning a pawn), the additional bonus points will be just 1/20.

Pins with king being the attacked piece will deserve twice higher bonus, as the pinned piece absolutely cannot move until the king leaves opposition with the attacker.

Equal pins

Equal pins will be the case when a bishop pins a knight with an enemy bishop at the other end of the pin, or a rook pins a knight or bishop with an enemy rook at the other end of the pin, or a queen pins a knight, bishop or rook with an enemy queen at the other end of the pin. Even when all pieces are defended and the risk of losing material is not big because the power of the pinning piece is the same as the power of the piece at the other end of the pin, the existence of such a pin is unfortunate because of tactical considerations.

+5 to +10cps for the pinning side depending on the power of the pinning piece

Why pins are so important

Pins are really important, because both the pinned piece and the other own piece at the other end of the pin lose mobility in such a situation, and mobility is, at the end of the day, strength. When a piece is pinned, it usually can not move without suffering material losses, and the same, to a varying extent, is usually true for the piece at the other end of the pin; many possible moves will lead to damaged pawn structure, for example. In this way both pieces for the pinned side are crippled in terms of mobility and you will need time to free yourself from the pin.

Therefore, pins are to be avoided whenever possible.

More or less the same logic is true of x-ray attacks.

King pins are even more forceful in this respect, because in this case the pinned piece can not move at all, i.e., it has zero mobility for the specific point of time, its strength being very low

or non-existent. To extricate from the pin without compromising on material or other issues will be very difficult, and you will need time for this.

The situation with the king at the other end of the pin having no free available mobile squares is even more dramatic, because one of the options for extrication from the pin, moving the king away from the pin, is not there. Time considerations will be even more important in this case.

2 king pins at the same time will be extremely forceful, because the pinned pieces can not move, have zero mobility, their actual strength being very low or non-existent at all, and the enemy will need a very small amount of additional strength to try and force a win; the enemy is in reality much superior in material.

One of the most forceful pins ever is queen pinning a piece with the enemy king at the other end of the pin and just one square in between the queen and the enemy king (eg. wqe6, bke8, bbe7). The queen is not only incapacitating the enemy piece, but it is also controlling 2 of the squares (f7 and d7 in the specific case) where the king could go to free itself from the pin.

Imminence of attack (piece reserve strength; overall distance from the enemy king)

For the purpose the distance in squares from where a piece is placed to where the enemy king is placed along the shortest route is measured. Both the square where the piece is placed, and the square where the enemy king is placed, are counted, and the measurement is done supposing there were not any other pieces on the board. For bishop opposite the colour of the square where the king is placed the reference square will be that immediately in front of the king vertically.

Naturally, rooks go by 2 consecutive moves along a file and a rank; bishops will use diagonals of different directions; while the queen will choose a route consisting of a diagonal movement and a movement along a file or rank (eg. wkg1, bqd6 - the q will go to d4 and then to g1, 7 squares in all, instead of going to d1 and then g1 - 9 squares in all). For the knight, the first move spans 4 squares, and the rest of the moves span 3 squares.

When we get a value for all pieces, we calculate the sum total, which number will be the overall distance in squares from the enemy king. The lower the number is, the better. The overall distance from the enemy king is useful in that it is often indicative of whether an attack could be completed successfully or not. By taking into consideration the distance for all pieces, we have an idea about how many pieces are well prepared to reinforce the attack once the pieces immediately attacking the king are not able to do the job. Besides, the sum total is often a number much less homogeneous in different variations than that for, say, mobility, and could be used for efficiently cutting the tree. Variations above a certain threshold could be discarded very early into the search.

Playing in a tactical and in a positional key

Most positions would not be identical what concerns tactical and positional patterns. Usually positions with available positional solutions would prevail, maybe some 80 to 20%, but of course, those 20% of cases where a tactical solution is required are very important, because they will have an impact on the game as a whole. Positional solutions would usually prevail, simply because most of possible moves are associated with positional elements, like good mobility, optimal positioning for all pieces, control of center, space advantage, weak pawns,

etc. In this way it makes sense to have a standard evaluation function for most positions featuring positional elements, and a modified one for the relatively lower number of positions featuring tactical elements.

A tactical position could be recognized by a number of salient factors: a large number of open and semi-open files for both sides, a large number of pins for both sides, a large number of attacks for both sides, a large number of attacks on enemy pieces along an x-ray (but only attacks of pieces on enemy pieces of different capacities - linear pieces attacking bishops and knights, and diagonal pieces attacking rooks and knights - would be considered), a large number of squares controlled by pieces along the ray of action of an enemy piece defending another enemy piece (deflection possibilities), unsafe kings (square where the king is placed and number of pawns on adjacent squares).

When such factors are present in abundant numbers, it would make sense to increase the values for those factors a bit, by 1/3, so that the engine will first consider variations with a tactical underpinning.

The following system of points for determining the tactical nature of a position might apply (please note, that those points will be relevant just in this respect and will have nothing in common with assigning bonus points in ps, cps, etc.):

each open file for one of the sides will get 10pts

each semi-open file for one of the sides will get 5pts

each pin for one of the sides will get 7pts

each attack on a piece for one of the sides will get 3pts

each attack on a pawn for one of the sides will get 1pt

each attack along an x-ray on an enemy piece for one of the sides will get 5pts

each square controlled along the ray of action of an enemy piece defending another enemy piece, for one of the sides, will get 2pts

enemy king not on g1/g8 square will get 15pts

less than 2 pawns on squares adjacent to the enemy king will get 10pts

battery of queen and bishop (queen in front of bishop) attacking the enemy king position, for one of the sides, will get 10pts

rook on the 7th file, for one of the sides, will get 10pts

queen and rook on an open file against the enemy king position, for one of the sides, will get 15pts

If the total number of points for the position exceeds 55, then it would be reasonable to evaluate the position in a tactical key, i.e. increasing by 1/3 the relevant tactical factors. That would certainly help to achieve a more balanced play overall.

Additional factors to consider playing in a tactical key

- number of enemy objects attacked twice or more times (double, treble attacks, etc.)
- intersections of pieces on squares of the enemy king shelter
- number of ps having gained space advantage that are not fixed (passers included)
- bigger number of pieces than pawns left on the board (3 more pieces could signal conditions of extreme tactics; in this case relevant tactical factors could have their values increased by more than 1/3)

Weighting of tactical factors in relation to specific game elements

Tactical factors (attacks, x-ray attacks, pins, open files, etc.) will be weighted in relation to specific conditions on the board.

Tactical factors will be weighted down in relation to the growing number of pairs of fixed ps. Tactical factors will be weighted up in relation to the decreasing number of ps on the board. They will be weighted down in relation to the decreasing numbers of pieces on the board (going by 2 pieces, for example). It makes more sense to weight in relation to the number of pieces and not material strength, because tactics is more closely linked to the interplay of different pieces than to the power of a piece.

Deflection

Deflection is a tactical shot, by force of which an existing connection between two enemy pieces (one defending the other or both defending each other) is severed, or the severing concerns an existing connection between an enemy piece and a specific square (an enemy piece defending a square of the king shelter). Usually this will involve a sacrifice of a temporary nature leading to advantageous gains in the long term.

There are 2 ways to deflect enemy pieces: either by luring them away by way of sacrificing to a square where they would defend no more the own piece or specific square, or by executing a sacrifice on a square along the ray of action of the enemy piece defending another enemy piece or a specific square of the king shelter, by way of which the communication between the enemy objects is severed (an enemy piece or pawn capturing on the square where the piece is sacrificed).

Indications for possible deflection moves would be piece and pawn control of squares along the ray of action of an enemy piece defending another piece or specific square, especially when there are intersections; and piece control of squares simultaneously controlled by the said enemy piece.

Bonus points could be dispensed as follows:

+5cps for intersections of own pawns and pieces or own pieces along the ray of action of the defending enemy piece

+3cps for piece control of each square simultaneously controlled by the defending enemy piece that is not along its ray of action to the defended piece or specific square

Of course, much bigger bonus points might be dispensed, but it is not very often that deflection possibilities will exist.

Blockade

Best blockers are obviously the knight and bishop, as it is difficult to remove them from their position. Rooks could be removed and forced to retreat by enemy ns and bs, while the queen is not suited for blocking at all, as it could be expelled from its position by all other enemy pieces. What concerns the king, blocking should not be considered at all, except in the late endgame.

Blocking a passed pawn

N or b blocking a passer - +30

Queen blocking a passer - - 50

For r irrelevant

(Not sure if all engines do that – 20 Elo)

Blocking a pawn that is not passed

This concerns a p that is not a passer but has no enemy ps on its file to promotion (a backward pawn) - eg. wpe4, bpse5,f6

+ 30 for a b or n taking the square in front of the p; + 20 for a rook (maybe most engines do not do that – 10 Elo)

Blocked pawns on initial position

+90 is given for ps blocked on the second rank, the blocker being n,b or r. Eg. wpe2, bne3 or bre3

If the blocker is a pawn, the bonus will be 1p (eg. wpd6, bpd7).

Blockade could be measured more precisely by referring to the rank on which the blocker is placed. Obviously, the earlier a passer is stopped in its movement forward, the better.

If blocker is on 3rd rank (wp on 2nd), then the bonus for a blocker should be increased by, say, 2/5.

Blocker on 4th rank - increase of 1/5 standard value

Blockers on 5th and 6th ranks - standard value

Blocker on 7th rank - decrease bonus by 1/5 standard value

Blocker on 8th rank - decrease bonus by 2/5 standard value

Blocking from afar

Blocking from afar would signify giving certain bonus points for pieces that are not immediately blocking the passer, but are nevertheless staying in its way one or more squares apart. The passer could move forward, but only to a certain point.

If blocker 1 square away - 1/2 the standard value

Blocker 2 squares away - 1/3 the standard value

Changing blockers

A bonus for own pieces controlling the square occupied by an own blocker is due, as those could take its place in the course of the game, depending on the requirements of the position.

1/2 the standard value for a blocker for a second (apart from the main blocker) piece controlling such square, and 1/3 the standard value for a third piece controlling it.

For 2 blockers blocking 2 separate passers the bonus for the second blocker should be decreased by 1/3 as the pressure is not easily handled.

If 2 blockers block 2 passers diagonally connected, then the bonus for the second blocker might be decreased by 2/3 as this type of blocking is usually inefficient.

Blocking a double p

+2mps as this stops the forward movement of the double ps

Blocking a horizontally isolated p

+3mps as when the p is blocked it is easier to prey on it

Blocking double horizontally isolated ps

At least +15mps, as this is an excellent position for the blockers, they cannot be attacked by ps

Blocking a double backward p

At least +5cps. Eg. bpd5, wpsd4,c3,c2 - the c4 square is a perfect square for transferring black's pieces.

Blocking a p that is not passed but has entered your own camp

If a p is not a passer, but has moved into your own camp (eg. wpf2, bpf4 - f4 is such a pawn), then blocking it would be useful as it stops its dangerous movement forward. +4cps for a piece blocking such a p (in the above example a piece on f3). However, rooks should not be considered because of some mobility limitations.

If the p is stopped in its movement forward by an enemy p that is not on the same file, but controls the square in front of the advanced p from an adjacent file (eg. bpf4, wpe2), then the bonus should be somewhat diminished, maybe by 1/2, because the p that has entered your camp cannot advance a square further without being captured by p. Still, the threat of advancing exists. +2cps would suit all white pieces on f3

Blocking double pawns when part of the king shelter

When double ps are part of the king shelter, blocking them would be quite useful.

+7 cps for a piece blocking such ps (eg. wps f2,g2,g3 - a black piece on g4). However, bishops are excluded from this.

+5 cps for enemy p fixing (blocking) them

Blocking the root p

Blocking the root pawn can be quite efficient, because of different reasons. On the one hand, its forward movement is stopped. On the other, even if such a p connects to only one own p diagonally, the blocking piece, because of its proximity, exerts some pressure on the ps of the chain. Besides, as the root p is a backward p, the blocking piece is placed on an ideal position, because it cannot be attacked by ps. (eg. wpsd4,e5, bpe6 - d5 would be an ideal square for all pieces) +25 if the blocker is a knight, +20 if bishop, +15 for the rook, and +10 for the queen. In distinction to the usual points for blocking, the q is not penalised, but gets a bonus instead.

Additional blockers

An additional blocker would be a piece placed behind an own blocker. (eg. wpb4, bnb5, bbb7 - bb7 would be such a blocker) +2mps for such a blocker. Obviously, the additional blocker does not exercise much influence in this respect for the time being, but its position could still have some repercussions on future developments if the main blocker is removed or perishes.

Differentiation of blockers

Main blockers are not equally suited for all roles of blocking. The knight would be the preferred choice when it comes to blocking horizontally isolated, double horizontally isolated, backward and backward-fated ps, as well as separate passers, but also when blocking a p that is part of a bigger fixed structure. The reason for this is that, as it is a slow-moving piece, the burden of blocking would not deprive it of much of its capabilities, while this would be true for the bishop and the other linear pieces.

The bishop would be an ideal blocker when it comes to blocking connected passers, because it would control the squares on which the ps advance.

The rook could be considered for blocking a horizontally isolated p (+10cps), or a separate passer (+5cps).

The only suitable blocking role for the queen would be blocking connected passers in tandem with the bishop (-20cps).

Blocking in terms of files

The more centralised a blocking piece is, the better, as it is more actively placed and usually its functionality is growing.

1/10 higher bonus for blocking on d and e files in relation to c and f files, which in turn will get 1/10 higher bonus than b and g files, etc.

Piece configurations

+ 30 for a r along an open file

Tandems

+70 for two rs on the seventh rank

+ 60 for two rs along an open file

+ 60 queen and r along an open file

+ 30 for q and b along a diagonal (10 Elo)

+ 75 for a diagonal battery b plus q when the battery is pointed at the enemy king position (25 Elo)

Triplets

+80 for q and 2 rs along an open file

Opposition of pieces

Rook on a file against the enemy queen with one or more own/enemy pawns/pieces in between - +20 for the r.

General activity

+20 for a r on semi-open file

Two rooks on central e and d files with ongoing activity in the center - +50

With only one open thoroughfare for rook activity (eg. d file), +60 for opp. minor piece controlling the square of access to the file (eg. wbb6 or wnc6 controlling the d8 square.) – valid also for endgame

Losing tempo

+15 for attacking enemy q with ps or pieces

+10 for minor piece attacking rook

+5 for pawn attacking minor piece

Initiative

The concept is a bit tricky but important

Center of activity, active, inactive flanks, sides

When black has huge space advantage on the queen side and other factors in its favour on that part of the board (like mobility etc) but the pawns structure is blocked (eg. wps a3,b2,c3,d4 ; bps a4,b3,c4,d5) we shall evaluate only the pieces on or exerting pressure on the other side

(where for example on the king side white has space advantage – p on e5, bps e6,f7; also greater mobility, attackers so on). In this way, although some engines might evaluate the position as about equal based on calculating the parameters for all pieces, the pieces present on the queen side are mere observers and it is useless to value them in any way. So that factually w should have huge, winning advantage.

(I think many strong engines do not know that – 30Elo)

Clash points

This is another concept for initiative I think most engines do not understand.

A clash point or a focal point is a point on the board around which the main and currently most important activity is centered. It might be a disputed pawn, fighting for a square or concentration on some spot attacked and defended. In this way this is the most important battle currently going on. Whoever wins it is likely to gain advantage, maybe decisive. In the fight for this clash point only a definite number of pieces are actively involved (in most cases 3 to 5 for both sides) so that factually they have much greater weight on the position and should be evaluated higher proportionally to other pieces on the board, say by a factor of 1.1. This will help the engine know where the focal points are and how it should strive for initiative.

For example, we have bp on d6, defended by b on f8, r on d8 and n on b7, while it is attacked by white r on d1, b on g3 and n on e4. We assume this will be the focal point. In that way we multiply the different parameters for each of the enemy pieces involved in the battle for the focal point by a factor of 1.1. This should give their real value in comparison to other pieces on the board.

(50 Elo if properly implemented)

Learning from Kasparov

+1p for one more piece developed and chances of king attack

+1p for activity on both sides

Sacrificing pawns

Endgame

+1.5 ps for gaining a permanent advantage consisting of one factor (eg. control of files or bishop pair)

+2.5 ps for gaining a permanent advantage consisting of 2 factors (eg. control of file and bishop pair)

Vectoral intersections

A bonus of +20 will be given for a square into the enemy camp occupied by enemy p on which diagonal or linear vectors of pieces meet. It would not matter if there is another enemy piece along the vector. Eg. wpb2, wnc3, brb8, bbg7 - +20 for the intersection of the r and b on b2. Or there might be a q on d4, or re2. If the point of intersection is a square of the enemy king position, the bonus will be +60.

Counterplay

In the case that an engine has a low, maybe a losing score, then it is useless trying to defend the weak spots or just shuffling around as this strategy will only increase the eval. for the opp. side with time with the presence of factors like space advantage, higher mobility, so on.

Instead the engine should try to seek counter chances on the other end of the board where its score should be decent. In that case measuring separately the scores for the k and q sides might be indicated. If w has lost position on the q side, then the game may not be lost and the fight continue if white decides to launch a k attack. Give a factor of 1.2 or 1.3 in case of a bigger negative score for all attacking pieces. In this way the engine will prefer to counterattack instead of just defending. Or, in the case of a low w score on the k side with black attacking, seek counter chances on the opposite side, launching pawn storming of the enemy q side to open files – give +20 for every wp on the 6 or 7th rank. Thus the engine might prefer not to simply defend.

Prevention of counterplay

If one of the sides is in firm control of the center and the other has to do a pawn thrust in order to try to destroy the enemy control, then +50 is given for an additional pawn control of the square the enemy pawn is thrust to; and +20 for an additional piece control of that square (eg. wps e4,d5,c4, bps c5,d6,e5; in order to prevent bpf5 wpg4 would be indicated or placing of a knight on e3 or bishop on d3)

Compensation

Compensation will refer to the ability to assess a position in one's favour when down in material and not able to compute a forced advantage based on a variety of subtle positional factors. Engines definitely have problems with compensation. The following rules might be useful for a game along the lines of compensation:

- 2 more backward pawns (only fully backward ps will be considered, and not semi-backward and backward-fated ones) the enemy has than you will give you +25cps additionally; a third surplus backward pawn with the enemy might add another 10cps to your advantage, etc.
- each blocking knight when part of bigger fixed structures that can not be attacked by enemy pieces of equal power will score +25cps additionally to other bonus points
- 3 more own pawns and pieces into the enemy camp than the enemy's pawns and pieces into your camp will give you 25cps additionally
- 2 more unopposed ps than the enemy has will score 15cps additionally to other bonus points for the ps.

Trapped pieces

In the case that a piece is into the enemy camp surrounded by pawns and pieces and has less than 3 free squares to go where it is not captured for the r or b, less than 4 free squares for the q and only 1 or no free squares for the n – then a penalty of one third the value of each piece is given. Thus the q will be valued by 6ps, the r by 3ps, the n and b by 2 ps. The eval. will look much more realistic.

Weak squares-bridge points/loss of squares-control of squares

In the case of central (e4,d4 for white), semi-central (e3,d3) or the squares c3, c4, f3, f4 into the own camp that are not controlled by own pawn and the number of enemy pieces controlling the square is greater than the number of own pieces, then – 50 for the central squares, -35 for the semi-central and -20 for the other squares, or a plus of same magnitude for the opp. side.

Weak spots

Weak spots are squares on the 3rd rank of the board (6th for the black pieces) not guarded by own pawns.

-10 for each such square

-20 for squares belonging to the shelter zone

Unguarded squares on the 4th rank

For squares on the 4th rank unguarded by own ps a penalty of -2 will be assigned, -4 in the case of existing immediately in front of the shelter zone.

Own pieces controlling weak spots

+5 for own piece controlling a weak spot

+2 for own piece controlling an unguarded square on the 4th rank

Double those values for squares of the shelter zone

Enemy pieces occupying weak spots

+5 for enemy piece occupying a weak spot

+2 for enemy piece occupying an unguarded square on the 4th rank

Own pawns controlling enemy weak spots

+10cps for such a p

Own ps controlling enemy unguarded (weak) squares on the 4th rank

+3cps for such a p

Penalties for weak spots in terms of centralisation

-7cps if the weak spot on the 3rd rank is on the d or e files (e3,d3), -5cps if the weak spot is on the c or f files (c3,f3), and -3cps for a weak spot on g3 or b3

Unreasonable retreats

Black knight or bishop on d8 or e8 - -40

Different types of opposing configurations

Bishop vs knight

+15 for the b as a general rule since the configuration can endure into the endgame

-5 for each fixed pawn on a square the colour of the bishop, -10 in the case of a pawn of the focal center (i.e. the squares e4,e5,d4,d5)

Same rules for bishop and knight vs 2 knights apply.

Same colour bishops

-5 for each fixed pawn on a square the colour of the bishop, -10 in the case of a pawn of the focal center

Opposite colour bishops

+50 is given to the weaker side so that the engine might eventually consider trading one of the bishops for a knight with escape chances.

Unhealthy mutual piece positioning

-25 for two knights defending each other unless they are fighting for access to a strategically important square

Positional peculiarities

Bad pieces

Pawn bishop

With fully reduced activity of a b by own ps, eg. bbd6, bps c5,e5,c7,e7 - -1.5ps for the b

End-file knight

A n on an end a or h file (usually on 4th or 5th rank) with no free squares to go because of enemy ps - -50

Useless attackers

-50 for a well-positioned piece that cannot influence the fight (eg. bnb3 with bps a4,c4,d5, wps a3,b2,c3,d4, wbe3) usually because on this part of the board the position is closed and the main battle is on the other end of the board. This could be recognized by where the pawn structure is fixed and where not. A bonus for transferring the n into the right direction.

Erroneous activity

-50 for attacking a p that is well defended. This just loses tempos.

Imprisoned queen

In the case that a q is restricted to some part of the board by own and enemy ps and pieces but has some free squares to go, -5ps if the material equivalent of the enemy pieces able to attack the q exceeds 9ps.

Fischer perfection

Bishop on a square where it can not be attacked by enemy minor pieces within 2 moves.
(+10cps)

Building a stonewall

With score advantage for the enemy side and big pawn chains, +1p for placing all one's ps on squares of the same colour with at least 2 of the ps being on squares of the focal and wider center (eg. f5 and d5 or e5 and c5). Thus enemy activity could be considerably restricted.

Bonus for relatively lower power of a piece defending own p

A bonus is indicated for the relatively lower power of a piece defending own p in relation to an enemy piece attacking the p. The bonus could be 50mps x the difference in power between the attacking and the defending piece. Thus, it would be preferable to defend the p with

minors when rooks or a queen attack it. This could free up some potential for developing activity at other vital points.

The heavy pieces

Heavy pieces on an open file

r on an open file +30cps

2rs on an open file +60cps

q and r on an open file with the r in front of the q in terms of the enemy camp +40cps

q and r on an open file with the q in front of the r in terms of the enemy camp +50cps

3 heavy pieces on an open file +70cps

3 heavy pieces on an open file with the q in between the rs +80cps

Heavy pieces on the 7th rank

r on the 7th rank +30cps

2rs on the 7th rank +60cps

q and r on the 7th file with the r in front of the q in terms of the enemy king position +40cps

q and r on the 7th rank with the q in front of the r in terms of the enemy king position +50cps

3 heavy pieces on the 7th rank +70cps

3 heavy pieces on the 7th rank with the q in between the rs +80cps

Heavy pieces on the 8th rank

r on the 8th rank +15cps

2rs on the 8th rank +30cps

q and r on the 8th file with r in front of the q in terms of the enemy king position +20cps

q and r on the 8th file with q in front of the r in terms of the enemy king position +25cps

3 heavy pieces on the 8th rank +35cps

3 heavy pieces on the 8th rank with the q in between the rs +40cps

Heavy pieces on an open file against the enemy king position

r on such a file +50cps

2rs on such a file +1p

q and r on such a file with the q in front of the r +1.25ps

3 heavy pieces on such a file with the q in front of the rs +1.40ps

3 heavy pieces on such a file with the q in between the rs +1.50ps

Heavy pieces on semi-open files

For heavy pieces on semi-open files the above values might be halved, lowered by 1/3, 2/3, etc.

Drawing chances with different pieces on the board

Some pieces are more exposed to drawing outcomes than others.

Queens on the board - 10% higher drawing chances (positive score might be reduced by 1/10)

Rooks on the board - 15% higher drawing chances (for a single rook or for 2 rooks)

Knights on the board - 10% lower drawing chances (positive score might be increased by 1/10; this will concern one or 2 knights on the board)

Same-colour bishops - 10% lower drawing chances

Opposite-colour bishops - 20% higher drawing chances
2 bishops each side on the board - 15% higher drawing chances

Prioritizing evaluation factors

If we had to prioritize evaluation factors, the following might be true:

1. position of the king (the square where it is placed)
2. king shelter (first and foremost pawn shelter, but also minor piece shelter)
3. king attacks (control of open files included)
4. attacking enemy objects
5. control of center
6. different types of weak ps, etc.

In chess, everything revolves around the king, so it is natural that the square where it is placed is the most important factor with direct bearing on other evaluation parameters. The way the king is protected and the way of attacking the enemy king would come in second and third. Only after that comes attacking enemy objects and control of center might slide to 5th rank. Considering weak ps seems to be even less important. But, of course, with relative equality for the first couple of parameters, weak ps might actually have a decisive say.

In the endgame, the picture might look as follows:

1. attacking enemy objects
2. considering passers
3. considering weak ps

Tuning the parameters

A good approach before starting to fine-tune the parameters (which is undoubtedly very important because of the tremendous amount of specific situations they will refer to) might be to try to mentally tune them to save yourself a lot of testing. Evaluation parameters are very logical in themselves, referring to some objective truth, and therefore a mental cross-check might be meaningful. It is important that all parameters correlate adequately. If you have 5 parameters, a sensible try would be to see the correlation of all of them in a single pool. Cross-checking parameter 1 to parameter 2, to parameter 3, to 4 and 5, then cross-checking parameter 2 to 3, 4 and 5, etc., might be well indicated. In this way it is possible to observe a broken link, some values that are too low or too high. When you have a pool of more or less meaningfully correlated parameters, fine-tuning might proceed.

Endgame

General Principles

Mobility

Same as in middlegame

King mobility

Mobility for the king will be considered only in the endgame.

The king will get +15cps for any adjacent square it has access to. Squares behind the king could get 10% lower value, squares in front of the king could get 10% higher value, and squares on the same rank where the king is could get the mean value.

Space advantage – same as in middlegame

Pawn Structure

Isolated p - -40; double isolated ps - -40 for each p

Double p when it is part of a group of 3 or more - -35

Structures of the type wp a5, bps a6, b7 - -35 for the b7 p

Passed pawn - +50

Passer to the seventh/second rank - +70

Protected passed pawn - + 75

Two connected passers - +50 each plus +75 for the tandem

Pair of bishops – pawn structure irrelevant, except passers

Doubling is not counted if one of the double ps is an advanced passer. (also middlegame)

Prospective passed pawns

In the event of existing pawn structures on one of the sides or in the center of the type 1 versus 2 ps, 2 versus 3 or 3 versus 4 ps, when the surplus p is a prospective passer - + 25 for the surplus p.

Doing prospective passers in terms of ranks

Prospective passers could be done for ranks, just as passers.

Blocking prospective passers

It would be wise to block a prospective passer, if possible. 1/2 the values for blocking a separate passer.

+25 for controlling the square in front of a passed pawn

Bishop guarding the square on which an advanced passer promotes - +40

Penalty for king being too far away from an enemy passer

A king being too far away from an enemy passer is due some penalty points, as this might have some repercussions on the course of the game. The distance in squares from where the king is to the promotion square of the enemy passer will be measured.

6 squares to go in between - -20cps

5 squares to go - -15cps

4 squares - -10cps

and just 3 squares away - -5cps

Position of the King

Wk on c3, d3, e3, f3 - +25

K on c4, d4, e4, f4 - +35; K on fifth rank - +50; K on sixth rank - +75

Other general principles and rules of thumb

If all pieces are on just one part of the board and the score for the side that is better is not bigger than +70, then – draw

If the play is on two sides and the score for the side that is better is more than +40, then – the better side is winning. Indicated is measuring the scores for both sides separately, especially the space advantage; +50 for a move on that part of the board where the score for the better side is lower (that concerns piece activity, but especially improving one's pawn structure, gaining space advantage, etc.). Same principle applies with activity in the center and one of the sides. Note: this is the famous two weaknesses principle.

Fixed/semi-fixed pawn chains

In the case of fixed or semi-fixed pawn chains (of the type wps g3,f4,h4, bps h5,f5,g4) the rule of thumb is attacking the root pawn of the chain – g3 for w, h5,f5 for b. +25 for such a move. The rule holds true for all types of endings.

Access to penetration points

With big fixed pawn chain, usually on both sides, +50 for a heavy piece landing on a square into the enemy camp that is not defended by the enemy pieces (the so called penetration points). Although the engine might not see at first a decisive advantage, it will come with time as the pressure increases

Quiet defence

-30 is given for any pawn moves on a side where the defending side has pawns in minority. This will only lead to creating new weak spots.

King attack

If there are pieces on the board materially equivalent to or surpassing 9ps (no queens), then +50 for a move attacking the position of the king. Often such attacks will be essential.

Symmetrical defences

In endgame, +35 for achieving a symmetrical pawn structure if being the weaker side (at least what concerns pawn placements on files).

Dead pins

In the case that a rook manages to pin a minor piece (n or b) with opp. rook on the other end of the pin (eg. wre8 pins bbc8, bra8) so that it is very difficult for the weaker side to free itself without some kind of losses - +75 for the pinning rook. Some engines seem to neglect such developments.

Negatively valued passed pawn

Only in the case of central d or e pawns – if the passer has already advanced into the enemy camp (eg. bpe4,e3 or bpd4,d3) and the enemy king is 2 squares closer to the p than the own k – then -70 for the passer is given as it is almost certainly going to fall. The rule holds true for all kinds of simple and composite endings, excluding queen where other factors influence the position too. Some engines seem to miss that as they do not see the p fall in 8 or 10 moves.

Blockade

The principles of middlegame will apply.

Blocking minors when part of pawn structure

With fixed pawn chains and minors being part of the pawn structure, +80 is given for n blocking enemy p, and +60 for b blocking enemy p, if it still retains good mobility (eg. wps a4,b3, d5, wnc4, bps a5,b4,c5,d6; or wps a4,b3, wbc4, bps a5,b4,c5). Usually the blocking position will ensure a passer on the other side of the board or in the center.

Different types of endings

Simple endings

Pawn endings

For this type of endings specific values for the pawn structure apply

Outside passer - +1p

Structures of the type wp a5, bps a6, b7 - +1 for the a5 pawn, when b7-b6 or b7-b5 is close to impossible

Double p in a group of 3 or more - -50

King supporting own passer - +50

Other endings

For those endings the general principles of endgame apply plus some specific parameters

Bishop endings

Same colour bishop endings

+15 for each p on a square of opposite colour of the bishop

+30 for k supporting own passer

+60 for outside passer (eg. bpb5, wpd4 - +50 for the b5 p)

Bad bishop

A bad bishop is when all or most of the pawns of the side with the b are placed on squares the colour of the b, with fixed p chains. Then the advantage of the stronger side is usually decisive.

Same colour bishops

-15 for each p on a square of the colour of own b and an additional penalty of -30 for play on both sides or on one side and in the center

Knight vs bishop

Same as the above rule shall apply.

Opposite colour bishop endings

Same principles apply, except that +60 for k supporting own passer is given

One surplus passer for one of the sides - +50 for that side

Two surplus passers for one of the sides that are connected – draw

Two surplus passers that are separate more than 2 files apart – stronger side wins; otherwise – draw; one exception is when one of the separate passers is on an end file promoting on a

square opposite of the colour of the own bishop – then draw, if the king of the weaker side keeps access to the square of promotion

Three connected surplus passers – stronger side usually wins; draw, if the passers are straddled, eg. bps f5, e6, d5, and the opp. king and bishop control the square in front of the root passer, or in the case of a e6, f5, g4 structure, the opp. king controls the square in front of the middle pawn of the chain

Drawing chances with opposite colour bishops in terms of different configurations

Opposite colour bishops tend to increase the drawing chances for the weaker side. When opposite colour bishops are the only pieces on the board, the weaker side might get +50cps in compensation. With 2 pieces on the board each side, weaker side might receive +30cps. With 3 pieces each side, the compensation might fall to 20cps, and with 4 pieces each side - to just 10cps.

Scoring mobility for opposite colour bishops when part of different configurations

Mobility for opposite colour bishops, when they are part of piece configurations, is an important feature, as it may have impact not just on both pieces, but on the performance of the configurations as a whole. Therefore it could be wise to score mobility for such bishops double.

Knight endings

Distant, outside passer - + 50

King supporting passer - +30

+50 for fixing a backward pawn – eg. wpg5, bps g6, h7, -50 for the h7 p

+2ps for composition of type wpa5, bnb7 with white move as the knight can not stop the passer after a6

+25 for a knight guarding the square of promotion of own advanced passer

Bishop versus Knight endings

+15 for each p on a square of opposite colour from that of the bishop

+30 for the b if the play is on both sides of the board

+30 for k supporting passer

With play on both sides and less than 3 ps each - +50 for the b side

Immobilized knight

Composition b vs n with the n having no free squares - +60 for the b (eg. wna1, bba4 or bna7, wbd7)

Rook endings

+30 for a rook on open file

+50 for k supporting own passer

+50 for r behind own passer

+30 for r behind enemy passer

R stuck with defence of own p - -85 for the opp. side (eg. wpa5, bpa6, wr sixth rank, br a8 - - 85 for the br)

Rook on seventh/second rank when there are 2 or more enemy pawns on it - +40

Cutting the access of the enemy king to the center with a move along a file or rank - +50; if the access of the king is denied already for the seventh/second rank or a file next to the end one of the board a bigger bonus would be indicated – say +70.

+2 ps for a passer 2 squares closer to promotion than enemy passer
Many engines severely underestimate passers

Shut-out rook

With all types of simple and composite endings with rooks a penalty of 1.25 ps is given if a rook cannot be transferred to the other side of the board within 3 moves because its movements are restricted by the existing structure of own and enemy pawns.

Endings of type k and 3 ps each on the k side, wk on second rank, wra8, bra1, bpa2, with the end a pawn being useless as the rook has no mobility at all and the bk cannot support the own passer as it will be permanently checked from behind by the wr – draw

3 pawns and r vs 2 pawns and r on one side of the board – draw

Invalidated rook

+60 for a unique composition of type brb8, wpb7, wbc8

Queen endings

+50 for pawn shelter of the k consisting of 3 ps

-20 for shelter of 2 ps; -50 for 1 p

+20 for k supporting own passer

Otherwise, -80 for king staying apart from own passer on the other end of the board where it can be perpetually checked.

Different types of opposing configurations

Queen versus rook

Only in the case of q vs r and p of the type wkg1, wpg2, wrf3, where black cannot penetrate into the f1-f3-h3 zone – draw. Other cases lost for the r side.

Queen vs two rooks

Q and passed p vs two rooks – draw

Q and 2 passers vs 2 rs – q side wins

Queen vs 3 minor pieces

If the minor pieces are badly coordinated - +2ps for the q side, almost certainly winning material

Q vs n and 2 bs – draw

Q vs bishop and 2 ns - +75 for the q side

Queen vs r, n and p - +50 for the q side

Queen vs r, bishop and p – draw

Rook vs two minor pieces

R and p vs 2 bishops – the b side wins except in special cases

R and advanced passer vs b and n – draw; in the case of distant advanced passer, say wp on a7 or b7 or a6/b6 – small plus for w - +35

R and advanced passer vs 2ns – draw or +50 for the r side if the passer is distant

R vs pawns

R vs 3 passed ps still into the own camp – r wins

R vs 3 central pawns – r wins

R vs 3 ps at the end of the board (f,g,h) when at least 2 of the passers have gone into the enemy camp with well placed k supporting them – draw

R vs 2 advanced passers on fifth and sixth rank with kings on the opposite side of the board – draw or win for the r side if the r is behind the more advanced p; the r side loses if the r does not stay behind the more advanced p.

Minor piece vs 3 pawns

Knight vs 3 connected passers - +50 for the p side

Knight vs 3 ps 2 of which are connected – p side wins

Knight vs 3 separate passers – p side wins

Bishop vs 3 pawns

3 connected passers - +25 p side

2 connected and one separate passer – p side wins

3 separate passers - +50 p side

Note that this is true only for simple endings. If there are more minor or other pieces on the board, then the proportion is reverse with the rest of the pieces being able to attack the ps and I would give a small plus for the side with a piece more, say +25. Other factors, like presence of 2 bishops should also be taken into account.

Some rules for some very basic endgames

I know that most engines are using nowadays tablebases, but it may be that the user does not have those, or does not want to install them. In order that the engine does not look extremely stupid, it must know at least some very basic examples.

Pawn endings

K and p vs k

K before own pawn - +50

K taking opposition - +50

Endings with end pawn are drawn if the enemy k has access to the promotion square

K and 2 connected passers vs k and 2 connected passers

Draw, except in very special occasions

K and protected passer vs k and 2 connected passers – draw; it would be wise to give an additional bonus of say +75 for the protected passer as some engines think the side with the 2 passers has big advantage.

K, bishop and end file pawn vs k

The game will be drawn if the pawn promotes on a square of opposite colour the colour of the bishop and the enemy king controls that square.

K, rook and p vs k and rook

If the king of the weaker side is in front of the enemy pawn – draw; otherwise, if it lags behind – stronger side wins

K, rook and 2 ps vs k and rook

If the passers are separate – stronger side wins; one exception – if the passers are f and h pawns - +50 for the stronger side, but the result may vary depending on different factors
If the passers are connected, stronger side usually wins; one exception is when the passers are end and next to end file ps, eg. g and h, still have not passed into the enemy camp or only one of them has done so and the enemy king has managed to straddle them – then draw

K and queen vs k and p

Stronger side wins except in special cases.

P on end file or c and f files advanced to the rank next to promotion with the king next to his p and the enemy k placed on a distant square – draw as self-mate comes to the rescue

K, rook and p vs k and minor piece

The stronger side wins except in one rare occasion

K, r and f file pawn vs k and bishop

If wp is already on f5, wkg4, r say on e2, with a dark-coloured bishop for black guarding the f6 square in front of the p and the bk also controlling that square – then draw as a kind of fortress is achieved

Minor piece and 2 connected passers vs rook

Usually the game will end in a draw.

+50 for the b side when the passers are already into the enemy camp and are central e and d pawns

+35 for the knight side under the same conditions

+35 for the b side when the passers are already into the enemy camp and consist of one central p and a p on a file next to it

+25 for the knight side under the same conditions

If the passers are still into the own camp, then +35 for the b side if the passers are central; otherwise draw.

2 ps and minor piece vs 1 p and minor piece on one side of the board or in the center –

draw, except when the proportion is knight and 2 ps vs bishop and p on a square the colour of the bishop in the center with active king for the stronger side (eg. wps d4,e5, wng4, bpe6, bbb3 with wk on f6 and bk on d7). In this case white must win.

K, bishop and rook vs k and r

+4ps for the stronger side

K and 2 knights vs k

Draw

K and 2 bishops vs k and n
+2 ps is given for the pair

K, bishop, knight and p vs k and r
+5ps for the stronger side

K, b and n vs k – mate possible only in that corner of the board with corner square the colour of the bishop

Composite endings

The general principles of endgame as well as the different types of simple endings specific parameters apply

Different types of composite endings

2 rook endings
+50 for doubling the rooks on the second/seventh rank

Queen and knight vs queen and bishop
I would give a small plus for the q and n tandem (in the range of +10), sometimes even not

Queen and rook vs queen and rook
No penalty for double pawns of whatever kind.
+35 for a move of the rook on a file next to the enemy king, if pawn sheltered – eg. wkg2, wps f2,g3 - +35 for brh8 or bra1

Rook and bishop vs rook and bishop of opposite colour
+75 for attacking a pawn with the r and b defended by the enemy k and r – eg. wkg2, wpf2, wrf1, bbd4, brd2 – the advantage will be decisive as the rook is stuck to passive defence and the bishop helpless.

Rook and other minor pieces each with pawn directly pressuring the enemy king position
+50 for the configuration with the pawn – eg. wpf6, bps f7,g6, bkg8

Passed pawn races

With 2 separate passers each, or 2 connected passers each, or one side having 2 connected and the other 2 separate passers - +70 if the more advanced passer of one side is 2 squares closer to promotion than the more advanced passer of the other side, and +30 with same conditions and just one square closer. +50 for the more advanced passer of the second pair if 2 squares closer to promotion than opp. more advanced passer of second pair, and +20 if just 1 square closer. The rule is valid for all types of endings.

Importance of central passers (valid also for middlegame)
+15 for a passer on a central d or e file
+10 for a passer on semi-central c or f files

The only exception would be pawn endgames.
It is interesting that most of the engines I know completely ignore this rule.

Special positional techniques

Fortress

Middlegame

Existence of a fortress

With big fixed pawn chains, one single consisting of 5 ps or more, or 2 separate consisting in all of 5 ps or more, when usually there are only one or two open files through which the enemy pieces can penetrate the opp. camp, if all the points of penetration are well defended by the weaker side – draw. The stronger side may have very big advantage in score based on spatial factors but the game is a draw. Many engines do not recognize this and think they are largely winning.

Endgame

Natural Fortress

A natural fortress is one when on of the sides has a considerable advantage based on activity of the king, space, etc. but with all the access points into the own camp being guarded by pawns or pieces. In this case it would be wise to give +75 for a construction of the own pieces guarding all access points – the game is a draw.

A good example for that is a b vs knight ending when for eg. black whose king will be less active, places his knight in a way to guard the central squares of one colour, and a pawn guarding the central squares of different colour so that the enemy king will not be able to penetrate (a n on e7 with a p on d6 will be a good construction).

Building a fortress

This is a special drawing technique when one of the sides has a considerable material advantage. If the weaker side manages to place its available pieces in a way establishing a zone, usually square, but sometimes also rectangular in shape, or with 2 bishops triangular, into which the enemy king cannot penetrate – then it would be advised, for simple endgames, to give a bonus of +3ps for the weaker side as the game is drawn.

Most often examples will include endings with q for the stronger side, eg. pawn and rook building a fortress, or 2 bishops building a fortress, or n and b shutting the enemy king out. Two knights building a fortress is close to impossible less for the pawn structure.

Another possibility would be to have 2 minor pieces and pawns building a fortress with the presence of 2 enemy rooks. The game will be drawn as sacrifices will lead to other drawn endings.

Perpetual check

Middlegame

When one of the sides has considerable advantage, + 80 for a move destroying the enemy king shelter and checking the king; the possibility for giving a perpetual would increase.

Endgame

Only in the case of queen and p endings, when one of the sides is with advantage, eg. trying to promote a pawn with the support of the own q, then +50 for a move with the q of the weaker side acceding to a square from where it can check the enemy king on the next move.

Passivity of pieces

Middlegame

Passivity restricted by own pawns

Often some pieces have more of an observer status. If all of the own ps are placed in way to restrict fully the play of a piece so that it does not have a move – then -2ps for that piece. (Most often it will be a knight or bishop; eg. bnb8, bps a6,c6,d7 fixed by wps; in this way the n will be fully useless until some major changes occur)

Passivity restricted by own king/shut-in rook

This will usually be the case of a k fully restricting the mobility of own r more or less permanently – eg. bkg8, brh8, bpsh7,g6,f7, wbh6 - +3ps for a move of the wb on h6, fully restricting the r, or -3ps for the r.

Passivity restricted by enemy pawns

This more or less results in the same consequences, but it is now the enemy ps that restrict the activity of the piece. Eg. bba8, bps c7, b6, wps c6,b5 - -2ps for the a8 bishop as it can come into the battle only if sacrificed for a p. Often some engines do not take this into account.

Endgame

More or less the same penalties should be assigned for full or almost full passivity.

Passivity restricted by own pawns

This is the more rare case, but sometimes engines do commit such mistakes – eg. wbh2, wps g3,f2, bps g4,f3 - -2.5 ps for the wb as it is fully useless and in endgame this counts even more.

Passivity restricted by enemy pawns

This occurs more often and even strong engines sometimes ignore it. Eg. bbh7, bps f6,e5, wps f5, e4, d5 – the bishop on h7 is useless for the moment - -2.5 ps for the b, because even if sacrificed for a pawn white advantage will be huge and bigger than 2 ps.

Optimal positioning of pieces

Endgame

If one of the sides has an advantage less than 0.50 ps and does not see a way of increasing it – then check the positioning of own pieces and if there is a way of placing some of them better - +20 for landing on such a square, even if it takes some time (in many endgames time is not that important, more important is to have all of the pieces actively positioned). This might open the eyes of some engines for an existing win.

Positional sacrifices

Endgame

Exchange sacrifice

If one of the sides has an advantage but does not see a way of increasing it – then +50 for an exchange sacrifice if with that the better side gains some other small assets – eg. wps d5,c4, bps d6,c5, bbd7. +50 for wre6. Then after bxe6, dxe6 instead of the exchange white will have 2 small assets – a passer on e6 and a penetration point into the enemy camp (the d5 square) through which the wk can pass. In endgame most often 2 small assets are worth more than a single bigger one as with time the 2 small ones are going to increase – therefore a bonus for such development is indicated. The assets gained could be an open thoroughfare, more active placement of the king or far bigger mobility.

Congestion of pieces

If 3 or more pieces of one side are placed on squares within a square shape of 3 squares length (eg. within h7-h5-f5-f7), then -50 for this constellation in the middlegame and -30 in the endgame. Usually those pieces will not only have far lower mobility, but will also have a very bad coordination and stand in the way of each other.

Linear congestions

More than 3 own pieces on a single file, or more than 3 own pieces along a single diagonal - some penalty is indicated for the congestion. -2mps for each piece after the third.

Control of thoroughfares

Only concerns heavy pieces fighting for control of an open file.

+5 for each own p controlling a square along the file into the own camp not controlled by enemy ps; +10 for the same conditions if the square controlled is in the enemy camp.

+35 for a knight on central square (eg. d5 or e5) protected by 2 own ps and with no enemy ps being able to attack it or placed in front of it. The exchange of that knight would result in a passer.

Powerful bishop

Bishop on a square of the focal center protected by 2 own ps and with no enemy ps being able to attack it or placed in front of it. +50 The exchange of that bishop would result in a protected passer.

Dominating knight

That would be a knight on a square of the focal center (usually with closed structures) protected by 2 own ps, with no enemy ps being able to attack it and no enemy minor pieces having the possibility to control the square the n is on within 2 moves. +50 Usually it would be wise to give a bonus for a second knight controlling the indicated square.

Beauty in chess

Gandalf cross

Pawn structures of type e3,d4,f4,e5. I have watched this in games of Gandalf. The structure is very sturdy, the root pawn cannot be attacked from ahead, and usually the doubling is compensated by open files, etc. Even if objectively a bonus should not be applied to this structure, I would give +20 for the sheer looks of it. (Envision placing a bishop on e4)

Serpentine

Pawn structure of type c2,b3,c4,d5 – I would give +10 even if the structure could be somewhat deficient in some respects

Checkers-type structure

Eg. bps e7,g7,f6,e5,g5. Of course, at least -50 is indicated for the double doubling, but it looks interesting.

Sturdy bastion

Pawn shelter consisting of 2 rows of 2 pawns each – eg. bps g7,f7,g6,f6. I would give +50 for a fourth pawn and -30 for the doubling, so that a bonus of +20 would result.

Mighty triplets

Triplets of heavy pieces along an open file in the exact order r,q,r (eg. brd8,bqd5,brd2). This is awe-inspiring. Apart from the triplets bonus a bonus of +20 for the exact ordering is given.

Alternating battery

2 bishops and q on diagonals next to each other pointed at the enemy king position (eg. bbb6, bbb7, bqc6). Big bonus is indicated.

Material imbalances

Material imbalances will be the case when one of the sides has superior material strength, but certain positional factors make up for the material inferiority of the other side, or even place it in a better situation. This is a very tricky concept, especially for engines, simply because usually they do not have the code for it.

Powerful central passers

Central passers (especially when they are into the enemy camp), when there are at least 2 of them and are connected (i.e. they are on adjacent squares of the board horizontally or diagonally), should get some bonus points apart from bonus points for passer status and for being connected passers (which is a huge advantage; +50 for the tandem and additional bonus for a third p). The third bonus is associated with their centralised position, paralysing the activity of enemy pieces. I would assign +30 for a p on an e or d file and +20 for a p on a c or f file. This is especially true for the middlegame and might compensate for the exchange or other disadvantageous material imbalances.

Endgame

Q and passer versus (vs) a r and minor piece, or q and passer vs 3 minor pieces: the position on the board is drawn (provided all other ps are on the same side and placed in a way not largely detrimental to the defending side) when the r and n or b control simultaneously a square along the way forward of the enemy passer; or when 2 of the minor pieces control the same type of square. Engines often do not understand this.

Piece communication between sides

Communication between pieces on both the queen and king side is definitely an important element.

+5mps for any square of intersection of 2 own pieces placed on different sides

+5mps for any own piece placed on one of the sides defending another own piece placed at the other side

If piece communication between sides is low, this could be an indication of upcoming problems.

Minors gaining space advantage separating the enemy sides

When the knight and bishop gaining space advantage on the 6th rank are placed on central d or e files, they fulfill also the important function of separating the enemy queen and king sides. Therefore, some special bonus for this is due.

30% higher value for such minors

Pawns separating the enemy sides

Central d and e ps on the 5th and 6th ranks should get a special bonus for separating the enemy king and queen sides. The bonus will be due if there is an enemy p fixing the own p, because communication between the sides becomes more difficult (eg. wpd5,bpd6).

+20cps for this case additionally to other bonus points for the p

The purpose of an object separating the enemy sides could be served also by an own passer on the 6th or 7th ranks, if it is on a central file.

+20cps for such passers additionally to other bonus points due

Weighting of different factors in middlegame and endgame

If the value of the q in my view is 9 ps, the value of a r - 4.5 ps, that of the n and b - 3 ps, then the total material on the board in the initial position will be 38 ps each side. For the purposes of this project a middlegame position will be one with a material exceeding 15 ps (i.e. half of the initial total material of pieces) each side and an endgame position one with a material less than 15 ps.

The following rules for middlegame and endgame would apply:

In middlegame the following evaluation factors should be weighted higher:

- mobility - by about 1/10 to 1/5 the usual value
- attacks and x-ray attacks - the same as above
- intensity of interaction - same
- space advantage - by about 1/8 higher than the usual value for pawns and pieces alike

In endgame the following evaluation factors should be weighted higher:

- passed pawns - by about 1/3 the usual value
- double pawns - by about 1/2 the usual value, if there is such when the pawn is part of a group; if not, then a penalty of at least 20 is indicated, steeply increasing with the decreasing material on the board.
- isolated pawns - by about 1/3 the usual value

Precision scaling

The above factors could be weighted more precisely by introducing additional intervals for available piece material: 30-25, 25-20 and 20-15 brackets for the middlegame; and 15-10, 10-5 and 5-0 brackets for the endgame. With decreasing material on the board for the middlegame the above mentioned factors would be scaled down, while with decreasing material on the board for the endgame the above mentioned factors would be scaled up.

Weighting of penalties for pawns in relation to enemy piece configurations

If queen on the board, weight enemy double and isolated ps by 1/3 lower

If rooks on the board, weight enemy double, isolated and backward (all types) ps by 1/5 higher for each rook

If bishop on the board, weight fully backward and fully backward-fated ps by 1/3 higher, but only if the ps are on a square the same colour as the bishop.

Suggestions on pruning

Cutting the tree

Harmonious (smart) mobility

Smart mobility means that the overall percentual differences in quantitative mobility between the pieces on the board are the lowest possible. The proposition is that a group of pieces with better smart mobility will be more harmoniously positioned than a group of pieces with a worse one. Thus, if we have a group of 2 pieces, one of which has a very low mobility, and the other one a very high mobility, and another one for which quantitative mobility numbers are more evenly split, the group with the more even split should be favoured. In the case of 5 pieces, a q, a r, 2 bs and a n, a variation with mobility numbers for the pieces of 12, 7, 6, 5 and 4 respectively should be chosen, and a variation with mobility numbers of 14, 7, 6, 5 and 2 respectively left out. The general rule shall be that a variation is chosen for which the sum of the percentual differences between the pieces in rising order of mobility scores is the lowest possible (the sum of the differences between the piece with highest mobility score and the piece with second highest; the second highest and the third highest, etc.). I would even go as far as to suggest that a group of pieces with 20 percent better smart mobility is to be favoured instead of a group of pieces that has 20 percent higher mobility measured in an ordinary way.

Cutting the tree (mobility)

In this way you can cut not only branches, but entire boughs from the search tree.

For the purpose the game is divided into different phases in respect of the available piece material on the board. For the middlegame those phases would be in intervals of 5 pawns difference: 30-25; 25-20 and 20-15.

30-25 interval: leave out, do not consider any variations where even a single piece has a mobility lower than:

- 4 free squares for the q
- 2 free squares for the n or b
- and 1 free square for the r

25-20 interval: leave out, do not consider any variations where even a single piece has a mobility lower than:

- 6 free squares for the q
- 3 free squares for the n or b
- and 2 free squares for the r

20-15 interval: leave out, do not consider any variations where even a single piece has a mobility lower than:

- 8 free squares for the q
- 4 free squares for the n or b
- and 3 free squares for the r

Do not consider positions with more than 1 fully backward pawn (i.e., just one square away from the capturing square of the enemy p) on the 7th rank. That would certainly compromise the position significantly.

Do not consider positions with more than 2 fully backward ps on the 6th rank.

Do not consider positions with more than 1 backward-fated p on the 7th rank.

Do not consider positions with more than two pairs of double ps. This could hardly be called a decent position anyway.

Do not consider positions for which the sum total of the mobility values for the two enemy pieces with highest scores exceeds by more than 50% the sum total of the mobility values for the two own pieces with highest scores.

Do not consider variations with enemy potential of connectedness exceeding own by more than 60%. (only middlegame)

Do not consider variations with enemy potential of bridging the gap of disconnectedness exceeding own more than 2 times. (middlegame)

Do not consider positions for which penalty for optimal spread of own ps is more than twice bigger than penalty for enemy ps.

Do not consider positions with more than 2 fixed isolated own ps.

Do not consider positions with overall fanning quality for own pieces more than 1.5 times lower than overall fanning quality for the enemy pieces.

The positional check for pieces

The idea would be to use 4 of the main factors of pieces' capabilities to heavily prune the search tree at a very early stage. As attacking, defending and intensity of interaction are strictly tactical in nature, they would not be suitable for the purpose, but one can use to good avail piece positioning, mobility, complementarity (optimal spread) and fanning-out. Piece positioning and mobility should be used in their collective format, i.e. for all pieces, and complementarity and fanning-out are collective factors by definition. In this way the margin of error would be much smaller than when checking a factor for a single piece.

It would be appropriate, starting from the 6th or 7th move onwards, when the pieces will have developed, not to consider any variation for which even one of the above factors is below a certain average value, or is considerably lower than the values for the enemy side (by more than 1.5 times). The risk of skipping any important variations would be very low, as it is highly improbable that any position with some of the above factors being improporionately low would deserve attention. And as those factors, although concerning pieces, are more or less of a positional nature, they are slower in changing values, and a factor of a certain value for all the pieces at move 7 will only slightly have changed at move 10.

In this way, as for each position you are checking not only 1 but 4 factors, it would be possible to cut at a very low risk huge portions of the tree.

Indeed, it would not be exaggerated to say that 90 % of all moves do not deserve any attention at all, because they are just losing something or being extremely bad positionally, and of the remaining 10% another 90% are too bad because of positional factors to be considered in earnest when the aim will be not to leave many losing continuations in your game. Thus, you will have to search deeper only about 1% of variations, and this could be achieved by using the positional check for pieces.

Stupid variations that could be aborted right away

- 3 pawns down in material and less than 3 own pieces attacking the enemy king position.
No mate and no material, what to play for

- Less than 2 pairs of own pawns that are either horizontally or diagonally adjacent to each other.

The pawn structure looks beyond repair in the foreseeable future. (but that would be considered only in the middlegame)

- Enemy has 3 more objects gaining space advantage (pawns and minor pieces on the 5th and 6th ranks) than you.

It is difficult to reverse the trend for a prolonged period of time.

- Not a single piece defending another own piece.

There must be something wrong with such a position, I do not know.

- Enemy has 2 more pieces positioned in the wider center than you.

Playing with a big number of decentralised pieces could not be justified.

- The overall mobility of the enemy exceeds yours by more than 4 mobile squares.

It is difficult to imagine that you can have a decent play when the enemy enjoys such a big advantage in mobility. And with time, the advantage is bound to only grow.

Some rules about specific positions (Specifications)

Specifications are rules of the type if and if, then, or even better if and if and if, then. Some of these rules might be essential, but others might not bring any real benefit. The good thing about specifications is that you do not need to tune much if at all, so they are easy to implement. But on the negative side, if you do 5 specifications, you might achieve 1 elo increase in strength, so you need to do many of those. There might be some 2 to 3 thousand specifications worthy of doing, and many more that would be pointless to do because of being too specific.

I suspect most of those are to be found throughout the text. Here just a bit more.

Queen on the board - score space advantage +20% higher

For the half of the board (divided vertically) where the enemy king is placed space advantage shall be scored by 30% higher.

A pair of bishops on the board, pawn structure irrelevant (especially endgame), but not if there are more than one intrinsic weaknesses (eg. 2 pairs of double ps or a pair of double ps and an isolated p). In that case, the second weakness might score a portion of its due penalty, the third much bigger portion, etc.

For a pair of connected passers, +10 if the passers are connected diagonally and not horizontally

To change or not change

With less pieces on the board, the advantage in score of the stronger side becomes relatively less significant. Therefore, some penalty for changing material if being the stronger side is indicated. For the purpose, both ps and pieces are considered. With the disappearance from the board of 1 pawn worth of material $1/50$ of the plus score for the stronger side is subtracted. Thus, if a pair of ps is changed, the plus score for the stronger side should be decreased by $1/25$. If 2 queens are changed, the decrease in score should be $18/50$. If 2 bishops are exchanged, then the decrease is $3/25$, etc.

Double p when root p

If a double p is a root p, a penalty of 2mps is indicated.

Blocking double root p

+2mps for a piece blocking an enemy double root p

Pieces defending a root p

+3mps for a piece defending own root p

double that if the root pawn is a part of a fixed or semi-fixed chain

-2mps for a second piece placed on the same file in front on an own p. Obviously, this thwarts somewhat the possible advance of the p.

Semi-connectedness of ps

For the purpose an own piece placed on a square where it would make a bunch of own ps a whole group if it were a p, is qualified for a full p. (eg. wpsa2,b2,c4, wnc3) When measuring the connectedness of a group, the piece will be scored 1/2 the standard value of a p. This could be useful in discerning certain patterns in advance. However, this will be applied only to ps disconnected vertically.

Pawn of the immediate king shelter when being a root p

When a p of the immediate king shelter is a root p at the same time, it should be penalised, by maybe 3cps, as this way of sheltering the king is usually awkward.

Pawns of the immediate king shelter connecting to a larger group of ps

A bonus is indicated, maybe +3cps, for each p of the larger group, connecting to the ps of the immediate shelter, as such ps restrict the activity of enemy pieces. (but maybe this should be done just for the first 2 ps)

Double ps with the more advanced p making an enemy p backward

The penalty for the enemy backward p should be somewhat, increased, by 1/5, because if the more advanced of the double ps perishes, its place could be taken by the second double p, maintaining the enemy p backward.

Controlling squares in front of enemy ps by own ps

For each square in front of an enemy p controlled by own p (for a possible move; i.e. the bpf5 controls the square in front of wpe2, but the opposite is not true) a bonus of 1mps is given. +5mps if the square in front of the enemy p controlled by the own p is not controlled by another enemy p.

Storming efficiency

For the purpose the distance in squares for each own p to the ps of the enemy pawn shelter is measured (for ps on the file on which the enemy king is placed and the 2 adjacent files). The distance will be measured to the point where the ps of both sides clash, either vertically, fixing each other, or diagonally, which case shall be weighted 3 times higher. Each square carries a penalty of 5cps. This will be repeated for all ps and we will sum the numbers. The bigger the overall number, the less efficient pawn storming is.

X-ray defence

Done in the same way as x-ray attacks, but for defence, and with the distinction that only own pieces in between the defending and the defended piece will be considered. For defending squares of the shelter zone values will be double.

Double backward-fated p

This p will score a bigger penalty than usual backward-fated ps, by 1/3, because it makes the doubling even more compulsive.

Backward p when part of a larger group with ps on squares of same colour

A smaller penalty for the backward p is indicated, by 1/4, because the group is a solid whole.

+1mp for any piece controlling a square in front of an enemy p (including by x-ray, i.e. when there are one or more own ps and pieces in between)

A bonus for 2 ps on adjacent files if they have no counterparts when considering neutrality

When considering neutrality for passer status a bonus is indicated (maybe +20cps) for 2 own ps that have no counterparts (i.e. enemy ps on the same file), if the ps are on adjacent files.

That would mean that the enemy neutralises those ps in terms of passer status with double ps of separate groups. Sooner or later a potential (prospective) passer might arise for one of the sides, which will lead to a potential passer for the other side too. Chances are that the side with 2 ps with no counterparts will create a potential passer that will be more advanced than the potential passer that will simultaneously appear for the other side. Hence the bonus.

One p controlling the square in front of double and horizontally isolated enemy ps

If one p controls the square in front of double (actually the square in front of the more advanced p) horizontally isolated ps, then a big penalty for the double ps is indicated. Cumulative value for the 2 double ps - 1.10cps, so the second p is worth some 10cps.

A horizontally isolated p when fixing an enemy p and making backward another p

When a horizontally isolated p fixes an enemy p and at the same time makes backward another enemy p (eg. wpa4, bpsa5,b6), the horizontal isolation of the p is felt less sharply, as usually it will be solidly defended. Therefore, the penalty for isolation might be reduced by 1/2.

A horizontally isolated p facing 2 double horizontally isolated enemy ps on the same file

If this type of p faces the 2 ps, but does not fix them, the cumulative value for the 2 double ps will be 1.25 ps.

If the p facing the 2 ps fixes them at the same time, then the penalty is bigger and the cumulative value for the 2 ps would be 1.15cps.

2 knights vs 2 bishops

+5 cps for the knights for each pair of fixed ps

Backward p with own knight on a more advanced rank on the same file

In that case, and if the knight is defended by 2 own ps and cannot be attacked by enemy ps, the penalty for the backward p should be decreased by 2/3 as it is very difficult to use the backwardness of the p.

Knight on 5th rank in relation to an enemy backward p

If we have a knight on the 5th rank, defended by 2 own ps, and the only enemy p being able to attack it being a backward p, then the n should receive an additional bonus of +15cps, as if changed for an enemy minor piece, the backward p would become backward-fated.

2 bishops and asymmetrical structures

When there are 2 bs on the board, asymmetrical structures would favour the bs. +5cps for each p that has no counterpart on the same file.

2 bishops and groups of ps

A larger number of groups of ps would favour the bs.

+4cps for each group of ps for either one of the sides (including isolated ps).

Penalty for vertically isolated passed p

When we have a vertically isolated passer, it should score 1/2 of the usual value as it is not exactly clear if the passer survives or not.

Bonus for neutralising enemy ps with ps on less advanced ranks

When checking passer status, and neutralising enemy ps with ps on adjacent ranks, the less advanced positioning of the p should be favoured. +6cps for own p on 2nd rank, and +3 for own p on 3rd rank.

A linear piece controlling more than one squares in front of enemy ps

If a linear piece (bishop, rook or queen) controls more than one square in front of enemy ps that are not controlled by enemy ps, some bonus is due; +7cps for each such square

Group of 4 ps with double ps in the middle

In the case of such a structure (eg. wpsc3,d3,e3,d4), when the double ps are in the middle with the 2 other ps on adjacent files on the same rank as the less advanced of the double ps, an additional penalty is due for the structure, -10cps, as it is very clumsy in moving forward.

Structure with knight fixing an enemy p

In the case of such a structure (eg. wnd4, wpe5, bpsd5,e6), when the knight is fixing an enemy p and is part of a larger fixed pawn chain with diagonally connected ps, a bonus is due for the knight, a decent +20.

Penalty for more than 3 own ps on the same rank

A penalty is indicated for more than 3 own ps positioned on one and the same rank (apart from the 2nd); -3cps for a fourth p, and the same for possible further ps

Backward p when part of the king shelter

If a backward p is part of the king shelter, the penalty should be increased by 1/3.

Backward-fated p when part of the king shelter

If a backward-fated p is part of the king shelter, the penalty should be increased by 1/4.

Weak spot controlled by 2 enemy ps

In that case the weak spot should carry much bigger penalty, -25cps, as there could land enemy pieces with tremendous effect.

Vertically isolated p more than 2 squares apart from closest own p

In that case a penalty of -7 might be well-deserved.

Control of square next to one of two fixed ps on 4th and 5th ranks

If there are 2 fixed ps on the 4th and 5th ranks, a bonus of 4mps for controlling the square next to the enemy p (i.e. the square horizontally adjacent to the enemy p), if it is not controlled by another enemy p as there can land advantageously an own piece.

Double horizontally isolated backward-fated p

That would be a double p that is horizontally isolated with the additional disadvantage that the square in front of the more advanced p is controlled by an enemy, and by more enemy pieces than own for the side with the double p. That would make the double ps backward-fated in practice, and therefore a decent penalty in addition to other due penalties for the double ps should be dispensed; -10cps

Rook on a file with one own and one enemy p

+5cps for each square separating the rook from the own p

Doubling heavy pieces on a semi-open file

For doubling 2 rooks on a semi-open file 1/2 the value for doubling 2 rs on an open file

For doubling q and r on a semi-open file 1/2 the value for doubling those on an open file

Doubling heavy pieces on an x-ray against the king

+10 for doubling 2 rs on an x-ray against the king

+15 for doubling q and r on an x-ray against the king

Penalty for doubling diagonal pieces with own p of same colour

-1 for doubling q and b on a diagonal, when there is an own p on it, fixed by an enemy p

A piece on a square in front of an enemy backward-fated p

This is an ideal square for the piece as it is solidly defended and cannot be attacked by enemy ps; +5mps for such placement

Intersections for the rooks

+15mps for a square of intersection for the 2 rooks, as they could double there

Low mobility rook

Endgame

-30cps for a zero mobility r

-20 for a r with just one free available square

Solid pawn control in front of an enemy pawn

+4mps for 2 ps controlling a square in front of an enemy p (for a possible move)

Continuous control of squares

Continuous control of squares by diagonal pieces

+3 for 2 bs on diagonals next to each other

+1 for q and b on diagonals next to each other

Continuous control of squares by heavy pieces

+10 for q and 2 rs positioned on files next to each other (eg. c,d and e)

+5 for q and 2 rs positioned on ranks next to each other (eg. 3rd, 4th and 5th ranks)

+6 for 2 rs on files next to each other

+4 for q and r on files next to each other

Rook on semi-open file in terms of distance to enemy p

For a r on semi-open file the distance to the enemy p will be measured.

+2cps for each square in between

Rule for different piece configurations

When different piece configurations arise on the board (eg. q vs 2rs, q vs 3 minors, 2 rs vs 3 minors, q and ps vs r and 2 minors, r and ps vs 2 minors, etc.), the most important factor to check is intensity of interaction. In that case it should be weighted 1.5 times higher, double that in endgame, because on it will depend the well-being of the one or the other side. The side with the more and less strong pieces will need good values for intensity of interaction, and that will mean that its pieces are well-coordinated, probably offering it the upper hand. If values for intensity of interaction are low for this side, the side with less, but stronger pieces might very well prevail. Therefore, it is necessary to check this factor in such positions.

Rook on 3rd rank against the enemy king position +20cps

Rook on a semi-open file with p attacked defended by another p

Some penalty should be assigned for the r when it is on a semi-open file and attacks an enemy p, that is defended by another p, as this is not a very wise placement; -2cps

Rook on a semi-open file against an enemy horizontally isolated p

+7cps for the r

Queen on a semi-open file against an enemy horizontally isolated p

+3cps for the q

Unwise attacks

It would be unwise to attack a piece of equal value (this concerns especially the minors), if capturing it would decrease your score. -2cps for such attacks

Own pawns making enemy ps weak when part of a larger group

When own ps that make enemy ps weak (fixing an enemy isolated p or making an enemy p backward) are part of a larger group, the penalty for the enemy pawns' weaknesses should be increased, by maybe 1/4, because the group only amplifies such weaknesses.

Double horizontally isolated ps on 7th and 6th ranks fixed by an enemy p

Eg. wpd5, bpsd6,d7. Such a structure is not only ugly, but it is very damaging for the side with the double ps, because it is conducive to the development of enemy pieces while

thwarting the development of own pieces. Penalties for double ps and fixing isolated ps might be increased significantly, even more so if the enemy p is part of a larger group.

Control of a single open file

Control of a single open file will carry a higher bonus than the bonus points for a r, 2rs, q and r and a triplet controlling an open file. +15 additionally

Control of open ranks

An open rank will be a rank on which there are no own or enemy ps. This will concern only rooks and the queen, and is important, because it might help the pieces transferring to an appropriate location.

+10 for r controlling an open rank

+15 for the queen

Controlling the square in front of an enemy horizontally isolated p

Controlling the square in front of an enemy horizontally isolated p when the p controlling it is part of a bigger group is a good decision. (eg. wpd5, bpse7,f7,g6) +5cps for a p on e7

Blocking the square in front of an enemy horizontally isolated p

Blocking the square in front of an enemy horizontally isolated p, when there is an own p controlling that square that is part of a larger group, is well advised. +15 for such a move

Minors on open files

+5 for a minor piece on an open file, if the piece is defended by a p (as this could prevent enemy heavy pieces from penetrating).

Funny knights

That would be knights on adjacent squares, either vertically, horizontally or diagonally. This is not an optimal positioning, because the knights control a rather small area, and besides they often stay in the way of other own pieces.

-3cps for such a positioning

Bishop on an open diagonal

That will more or less follow the pattern of rooks on open files, but while the rooks dominate 4 minors, and are therefore much more important, the bishops dominate nothing. That is why the bonus should be much smaller.

An open diagonal would be a diagonal with no own or enemy ps. For the purpose only diagonals, consisting of 5 squares or more, are taken into account. A placement on an open diagonal would be conducive to transferring to an appropriate location.

+7cps for a bishop on an open diagonal

Double pawn when part of the king shelter

1/2 higher penalty for doubling is indicated. However, when there is a fourth p in the king shelter, the additional penalty should not be considered, because just the doubling in terms of general positioning is felt, but not in terms of weakened shelter.

Unopposed p into the enemy camp against the enemy king position

+15 cps additionally to the bonus for an unopposed p

Prospective passer into the enemy camp against the enemy king position

+20 additionally to the bonus for a prospective passer (The difference between an unopposed p and a prospective passer is that an unopposed p is neutralised passer-wise by an enemy p, while a prospective passer is not, but enemy pieces and other factors prevent its becoming a full passer. In that sense, a prospective passer stays in between an unopposed p and a full passer.)

Rook defending own p

+2mps for each square in between

Distance of bishop to an own p along an x-ray

+3mps for each square in between

Proximity of linear pieces to the enemy king

When attacking the shelter zone, not only the squares attacked will be taken into consideration, but also the proximity of each piece to the king along a file, rank or diagonal. +15 cps if the piece is just 1 square away from the king; +10 cps if there are 2 squares in between, +5 if the squares in between are 3. Thus, it will be important not only to attack the king, but to attack it from close range. For attacking squares defended by the enemy king the rule will apply, but the bonus points will be half of the above.

Blocking an enemy p to prevent it gaining space advantage

Blocking an enemy p, if possible, to prevent it to gain space advantage by advancing further, would be indicated. Eg. A black piece on a5 with wpa4 would be a good choice. +1cps for such a move.

Mobility versus piece positioning

Do not consider variations where one of the factors for a given piece is extremely good, but the other might be unusually low. Such continuations would not be good. Usually this will be a centrally positioned piece with zero or minimum mobility, but it could also be a piece with relatively good mobility placed at the far end of the board. Interestingly, some engines are tricked by this.

Bonus for backward p on 7th rank because of first move

Fully backward and semi-backward ps on the 7th rank deserve a 1/15 lower penalty for backwardness because in a number of possible variations the p could go 2 moves ahead, forcing the enemy p, making it weak, not to capture it.

Pawns of the immediate king shelter on initial positions

A bonus is due if all 3 ps of the immediate king shelter are still on initial positions on the 2nd rank. +5cps

2 knights blocking passer and a semi-passer

Eg. bps c5,c3, wnc2, wnc4. This is just for the fun of it. It is not exactly clear which side has the upper hand.

Double pawn when part of symmetrical structures

When a double pawn is part of horizontal symmetrical structures (i.e. the black and white ps are on the same files), its penalty should be increased by $2/3$, as chances are the double ps will be blocked (fixed), making them useless.

Reinforcing the effect with further pins

A second pin will score $1/3$ higher, a third $1/2$ higher and a fourth one - $2/3$ higher.

Fixing the more advanced double p

+8cps for fixing the more advanced double p with an own p, as this would prevent definitively the undoubling of the pawns

A single piece into the enemy camp

A penalty of -15cps would be fine as there is a danger that the pawn will fall prey to the enemy forces

Intersections of pawns and bishop

+3cps for such an intersection, as the bishop could use the square to its benefit

Pawn support for the knight

+5cps for a single p supporting/defending the knight
+12cps when 2 own ps support/defend the knight

This is important, because the knight is a slower-moving piece than the linear pieces.

Unopposed p defended by another pawn

+5cps as this could help the pawn endure in its function for some time, if attacked by an enemy p

Unopposed p defended by 2 own ps

+12 cps as chances are great the pawn will endure in its function of an unopposed pawn for quite some time, if attacked by enemy ps

Temporary backward-fated p

Eg. wpsg4,e4, bpsf6, g5, h7 This would be a p that would cease being backward-fated, if an own p attacks one of the enemy ps making it backward and the latter could not be defended by another p. In the above case f6 is backward-fated, but the bph7 could attack g4, trying to undo its backwardness. $1/2$ lower penalty for such a backward-fated p.

Backward p leading to an isolated p

Eg. wph4, bpsf5,g6 This would be a p that, if it moves forward and is captured by an enemy p, would leave another own p isolated. $1/5$ higher penalty for such a p

Backward p leading to 2 isolated ps

Eg. wph4, bpsf5, g6, f5, no black p on the e file This would be a p that, if it moves forward and is captured by an enemy p, would leave 2 own ps isolated. $3/5$ higher penalty for such a p

Space advantage on both sides

20 cps additional bonus when space advantage is achieved by ps on both sides, as this would make defence more difficult.

Penalties for adjacency

2 rooks on adjacent squares horizontally -1cp
king and queen on adjacent squares (middlegame) -2cps

Weaknesses on both sides

Weaknesses on both sides (weaknesses would mean isolated and double ps, backward ps and weak spots) would be penalised additionally by -10cps as this would make defending them more difficult.

Blocking a protected passer when part of bigger fixed structures

Blocking a protected passer when the latter is part of bigger fixed structures (eg. wpsd6,e5,f4, bpse6,f5, bnd7) would deserve a much bigger bonus (by 2/3) as the fixed structure makes it more difficult to attack and remove the blocker. In this case, not only the knight and bishop, but also the rook and even the queen could be considered for blocking purposes.

Heavy pieces on open files in terms of centralisation and difficulty to open

Differentiation for files for the heavy pieces in terms of centralisation and difficulty to open would be an asset.

e and d files would score 1/8 higher than c and f files

c and f files would score as high as a and h files

b and g files would score 1/8 lower than c and f files (this is because those files are most difficult to open)

Heavy pieces on semi-open files in terms of centralisation

Could follow more or less the same pattern as that for open files.

Pawns of the king shelter fixing enemy pawns

+2cps for each p of the king shelter fixing an enemy p, as that would help avoid opening files for the enemy pieces to attack the king

2 connected passers against the enemy king position

+1p additionally to other bonus points for passers, because the passers not only threaten to queen, but also help greatly in attacking the king

A passer and an unopposed p against the enemy king position

Eg. wpf2, bpsf3,g4,h5 - h5 is a passer and g4 is an unopposed p. +50cps additionally to other bonus points for the 2 ps, because the ps threaten to become 2 connected passers, as well as help greatly in attacking the king.

Pieces in relation to the number of fixed ps

+5cps for each pair of fixed ps for the knight

+3cps for each pair of fixed ps for the rook

-5cps for each pair of fixed ps for the queen

-7cps for each pair of fixed ps for the bishop, as such structures usually deprive the piece of part of its capabilities as diagonals are blocked

Fixed horizontally isolated p on the 6th rank

A fixed horizontally isolated p on the 6th rank (for black) will get 2/3 lower penalty than the same pawn on the 7th rank.

In terms of file placements, values could follow the pattern of a p on the 7th rank.

Passer and semi-passer against the enemy king position

A passer and semi-passer against the enemy king position would deserve an increase of their bonus points by 1/2 each, because they not only threaten to promote, but also assist in attacking the king.

A piece in between 2 double horizontally isolated ps

An own piece placed in between 2 double horizontally isolated ps would deserve a bonus (maybe 15mps), because the ps shelter it from attacks of linear pieces on the file where they are.

Pieces covering access to the own king position

A piece covering the access of an enemy linear piece to the own king position (shelter) is due some bonus points, 10 to 20 cps. Best examples would be a bishop or knight covering the access of an enemy rook on an open or semi-open file, or a knight covering the access of enemy diagonal pieces.

Mighty attacking pawn

Pawn on a weak spot in the enemy king position (f6,h6), defended by another p. 2/3 higher bonus for the p, as it will last there for quite some time.

King on the 8th rank in between 2 rooks

This position of the king is unfortunate and a penalty of at least 30cps is indicated.

Diagonally connected group of ps spanning both sides

Eg. bpse6,d5,c4. In the case of a diagonally connected group of ps, spanning both sides (consisting of at least 3 ps on a single diagonal, and it could also be part of a larger group), a bonus of at least 20cps is indicated, as the space advantage obtained by the p into the enemy camp is about to last. Moreover, such structures support the activity of own pieces, while restricting the activity of enemy pieces.

+7cps additionally, if the most advanced p of such a structure fixes an enemy p, as in this case it will be more difficult to attack it.

Semi-weak spots

Semi-weak spots make sense to be defined only in relation to the king shelter. A semi-weak spot will be a square on the third rank (for white) of the king shelter, defended by only one own pawn and attacked by an enemy p. Possibilities for using this disposition for successful attacks exist, and therefore some penalty for the spot is indicated. -5cps would be fine.

2 horizontally adjacent ps on the 4th rank

Those ps are about to gain space advantage, and they could also support each other. +5cps

Firm pawn control of squares

2 ps controlling a square on the board that is not controlled by an enemy p deserve a bonus. +5cps

Of course, a square on the 3rd rank might be worth 3cps, while a square on the 7th rank could receive some 9cps.

Diagonally connected ps facing an enemy bishop

2 diagonally connected ps facing an enemy bishop on the same diagonal (eg. wpsb2,c3, bbf6) would deserve some bonus points. +7cps

Pieces controlling squares of penetration of enemy rooks

Pieces that control squares of penetration of enemy rooks on the 7th and 8th ranks are due some bonus points. +3cps

Penalties for decentralisation of pieces

Pieces that are too far off from central squares on the board in terms of moves needed to go there would definitely deserve penalty. For the purpose we check in how many moves a piece can go from the square upon which it is placed to any square of the focal center (e4,d4,e5,d5) without being captured on its way. If all squares of the focal center are occupied, we will use any square of the wider center (c3-f3-f6-c6) instead. The number of moves needed for this transfer would serve as an indication to penalise or not the piece.

If the piece needs more than 2 moves for the transfer, then the penalty will be 10cps.

If it needs more than 3 moves, the penalty will rise to 20cps.

In the case of more than 4 moves necessary, the penalty will be 30cps.

For more than 5 moves, -50cps would be well-deserved.

Mobility in terms of own and enemy camp

That would certainly be an important feature. Any square for which a piece is mobile into the enemy camp would score +5cps additionally.

Rook lacking in defence of king shelter

The rook is an important defender. If an own rook is not to be found in the defence of the king shelter, -2cps would be assigned.

Piece control of semi-weak spots

+2cps for each own or enemy piece controlling a semi-weak spot

Queen on a weak spot of the king shelter

A queen on a weak spot of the king shelter will be assigned +30cps, as this is a perfect attacking position.

+50cps, if there is a second weak spot in the king shelter

Connection between rooks on the 1st rank

+7cps, if the rooks on the 1st rank are connected

Space advantage gained by a root pawn

In the case of 2 diagonally connected ps into the enemy camp, when the less advanced p is a root p, some penalty is due as both ps are more vulnerable. -4cps Eg. wpsb2,c3, bpsb3,c4, with c4 being a root p

Semi-backward-fated p when part of the king shelter

When a semi-backward-fated p is part of the king shelter, it should be assigned much bigger penalty, by 3/5, because it seriously compromises the king position.

Temporary root pawn

A temporary root p would be one that could be defended in a single move by another own p. In that case its root quality is not felt that much and 1/3 of the penalty for a root p could be subtracted.

Lack of access to the 2nd rank for the king

In the case the king lacks access to the 2nd rank, because it is occupied by own ps and pieces, or because enemy ps and pieces control those squares, -10cps should be assigned. But the penalty will be valid only if there are enemy heavy pieces on the board.

Continuous attacking line

A continuous attacking line would be the case when all adjacent squares in front of the enemy king are controlled by ps and minor pieces. (eg. wpd5, wnc4, bkd7) +20cps for such a construction are well-deserved.

In the case the enemy king is further apart, +10cps would still be necessary.

Firm piece control in front of an enemy backward p

Firm piece control will be the case when 2 more own pieces are in control of the square in front of an enemy backward p (only fully backward ps will be considered). This situation makes of the p practically a backward-fated p, and therefore at least 10cps additional penalty is indicated.

Pawns attacking the enemy king position in a single group

In the case when 3 ps are attacking the enemy king position in a single group, a bonus of 10cps could be dispensed.

Control of squares on the 7th rank by a pawn

+10cps for each controlled square are indicated, as in this way own heavy pieces could penetrate the enemy camp, even if those squares are guarded by minors.

Control of squares on the 8th rank by a passer on the 7th rank

Squares on the 8th rank controlled by a passer are a precious commodity, because it is difficult to capture heavy pieces landing there, as the passer will queen. The bonus will be dispensed, however, only if there are heavy pieces on the board. Each such square will score:
+10cps, with only a pair of heavy pieces
+20cps, with 2 pairs of heavy pieces on the board
+30cps, if all heavy pieces are still active

Prone to a fork

Linear pieces positioned mutually in a way that they could be forked by an enemy knight, should get a penalty of -2cps for any pair of such mutually positioned pieces. But the penalty will be valid only if there is an enemy knight still active.

When one of the pieces is a king, the penalty should be double, because of its compulsiveness.

Minor piece gaining space advantage on the 6th rank with bigger fixed structures

When a bishop or a knight gain space advantage on the 6th rank, while being adjacent to bigger fixed structures, they would deserve much bigger bonus, by 1/2, because the larger fixed structures only accentuate this quality of theirs.

Backward-fated p when part of bigger fixed structures

When a backward-fated p is part of bigger fixed structures (eg. wpsd4,e5,f4,g5, bpsd5,e6,g6), it would deserve considerably bigger penalty, maybe double, because the enemy ps making it backward-fated are largely inaccessible, and the presence of the backward-fated p is almost not felt, if it moves forward, it will be lost.

King attack with bigger fixed structures on the board

When there are bigger fixed structures on the board, consisting of at least 3 pairs of ps, at least one of which is central, the side that is conducting the attack should get an additional bonus of +20cps, because even if nothing dangerous is observed at first glance, larger fixed structures are conducive to conducting a positional, long-term attack. Enemy weaknesses will only aggravate with time. That is why the defending side should avoid larger fixed structures, if possible. This is actually one of the weak spots of engines.

Piece defence is to prefer

If a square of the king shelter is attacked by enemy pieces, defending it with a piece is to prefer before moving a pawn, because this could create weak spots that are difficult to cover.
+10cps

Piece control in front of an unopposed pawn

Pieces controlling the square in front of an unopposed p should get some bonus points, maybe +3mps.

Double ps with the more advanced being part of fixed structures and the less advanced p able to attack an enemy p

Eg. wps e3,f4,e5, bps f5,e6 In this case attacking the enemy p part of the fixed structures would undouble the less advanced of the double ps, and therefore its penalty could be decreased by 1/2.

Closeness of ps to the enemy king

Pawns close to where the enemy king has found shelter might assist the pieces in attacking the king, although in subtler ways. Therefore, they should get some bonus points. Points will be dispensed in terms of the distance in squares in between the p and the enemy king. The p could span the distance going straight along a file, a diagonal, or taking one square aside and then using the straight line.

no squares in between (p and king adjacent) +20cps

1 square in between +15cps

2 squares in between +10cps

3 squares in between +5cps

Lack of access of king to a single free square because of enemy control

If enemy pieces control squares adjacent to where the king is placed, so that it does not have a single free square at its disposal, a big penalty is indicated. -50cps.

A lead p on a weak spot of the enemy king position

If a lead p is found on a weak spot of the enemy king position, a considerable bonus is due because the p will last there for quite some time. In the case that the lead p is leading 2 other ps, it could get at least 1/3 higher bonus than if it is leading just one p.

Defensive interference

Own piece controlling a square along the ray of action of an enemy linear piece attacking the own king position will get +2cps, as the possibility for intervention at some point exists.

The neuralgic square h3

With short castling, h3 is a neuralgic square (just as a3 would be in the case of long castling), because it could possibly be defended by just one own p (while f3, for example, could enjoy the defence of 2 ps, e2 included).

+5cps for pieces defending this square (this could also be an x-ray defence, eg. wpg2, wbf1)

Mobility in terms of piece positioning

Mobile squares might score points in terms of their values for general piece positioning. And this will make sense, because it is always better for a piece to land on a square with higher value for positioning, where its tentative mobility moves ahead could only increase.

Additional bonus points for attacking potential

The number of attacked objects (enemy pawns and pieces) will have an added value of its own, when one of the sides attacks improporionately larger number of objects.

3 more objects attacked (same object attacked more times by different pieces will count)

+20cps would be dispensed

4 more objects attacked +40cps would be dispensed

5 more objects attacked +60cps would be well-deserved

The king as a blocking piece

The king could be considered for blocking purposes in very limited situations.

King blocking when part of bigger fixed structures

The king could take on a blocking role in this case, because when it fixes the structure, it frees up other own pieces for different activities. +15cps But this should be considered only when the blocking king is on the defending side and there are not many other options to avoid opening the game.

King blocking a separate passer

In simple endgames, the king is also a good blocker, but only for separate passers. +10cps

Additional bonus for rook on the 7th rank

The rook will get +5cps for any free square on the 7th rank.

Defence before all

I would score defence-related factors (pawn shelter, pieces defending the shelter, etc.) 10% higher, because in chess you are supposed not to lose, but are not supposed to win at any cost.

Pawn of the king shelter on the 4th rank when part of bigger fixed structures

Eg. wps f2,g3,h4, bps h5, g4, f3 In this case the penalty for a p of the shelter on the 4th rank could be halved, as it is more difficult to open files.

Lasting space advantage

+5cps when a p gaining space advantage is defended by another p, +3cps if such a p could be defended by another own p in a single move.

2 root ps defending another own p

In that case the penalty for the root ps could be halved, as even if one of the ps perishes, the structure as a whole will survive.

Access of rook to both sides

+15cps in the case that a rook has access to squares of both the king and the queen side, or if it is placed on a square of one of the sides and has access to squares of the other side. This helps mobility and functionality of the piece greatly.

An artificially backward p

An artificially backward p would be the case when 2 more enemy pieces control the square in front of the p than pieces for the pawn side. In this way the pawn cannot move forward without being lost and it is practically a backward one.

+10cps in such case; But this will be considered only when the enemy minor pieces are at least an equal number to the pieces for the p side.

Piece positioning in terms of space advantage and the existence of a shelter

Bonus points for pieces in terms of space advantage should be dispensed only as long as pawn shelters exist on the board. Without shelters such bonus points are meaningless.

Attacking the king shelter from behind

Pieces attacking the king shelter from behind should get higher bonus points (+50%). This way of attacking the shelter is very efficient. The attacking piece could not only be on a more advanced rank than the enemy king itself, but could be on the same rank (7th for example).

But in this case the increase should be smaller, by 30%.

2 queens on the board

Two queens on the board have a combined quality that is not to be matched by other pieces. Therefore, 5% higher value for each queen is indicated. In the case that there are 3 queens on the board, their material strength values could be increased by 10% each.

Right to move with 2 queens on the board

In many situations, the right to move with 2 queens on the board each side is decisive. +1.5ps for the side that has the right to move.

Artificial piece shelter

When there are no more pawn shelters in later stages of the game, building an artificial shelter of pieces around the own king is essential with enough piece material on the board.

+15cps for a minor piece occupying a square immediately adjacent to the own king

+10cps for a rook occupying such a square

+5cps for a minor piece keeping control of a square immediately adjacent to the own king
+3cps for a rook keeping control of such a square

2 bishops on squares adjacent to the own king

This is an advantage. +3cps as the bishops are an excellent piece shelter, while possibly developing activity at longer range.

Rook having mobility just on the 1st rank

If a rook has free mobility squares just on the 1st rank, this could indicate some problem.
-2cps

Double rooks in terms of closeness to enemy king

If there are 2 pairs of double rooks on the board, the pair which is closer to the enemy king should get some bonus points as such closeness is a welcome attacking element.

+10cps for such a pair

But this will be considered only with castling on the same side.

Rook facing an enemy unopposed pawn

A rook placed on the same file and in front of an enemy unopposed p deserves some bonus points, as it controls not only the square immediately in front of the p, but also all squares along the path of the p forward.

+2cps

Pieces controlling squares from behind

Pieces controlling squares from behind (applicable just to specific control of squares, in front of backward, unopposed ps., etc.) should get higher bonus because it is more difficult for enemy pieces to intervene to make the piece abandon control.

10% higher value for such pieces (from behind means being on a more advanced rank than the square itself)

Queen attacking objects frontally, laterally and from behind

Queen attacking objects (pawns and pieces) from behind should get 5% higher value than when attacking frontally, because enemy pieces and ps have difficulty to intervene. At the same time it could get a bit displaced.

When attacking objects frontally (on a file or diagonal when placed on a less advanced rank than the object attacked), the queen could get the standard value.

And attacking laterally (from the side, meaning being placed on the same rank as the object attacked) should get 10% higher value, because it is difficult for enemy pieces and ps to intervene, while the queen is not displaced with this type of attacking.

Rook attacking objects frontally, laterally and from behind

Rook attacking objects from behind is the best choice, followed by lateral attacks and frontal attacks.

+10% for attacking objects from behind, if attacking frontally gets the standard value

+5% for attacking objects laterally

Serial piece defence

Serial piece defence is the case when an own piece defends another own piece that in turn defends a third own piece, etc.

There is an added value to such type of defence, because if a medium piece in the series (the second one in the case of 3 pieces) is attacked by an enemy piece, it is not compelled to flee or seek the defence of another own piece, while maintaining the defence of the next own piece in the series.

+15mps for each piece in the series

Mate is difficult to recognize

There is a special type of position that engines have difficulty with. Eg. wqh6, wng5, bkg8, bpsh7, g6, f7, bnf6. The queen is on a weak spot and a neuralgic square at the same time.

Black could easily be mated if it were not for the nf6. Mate could come on h7, f7 or h8.

+3.5ps for this position for the attacking side; +2ps additionally for a piece or p attacking the bnf6.

Although it might seem there is nothing to fear, the black king is in danger. Capturing enemy material for the defending side might prove suicidal, even if the capture is solid.

This might help find sacrificial combinations earlier.

Defending own ps attacking enemy ps

+5mps for an own p defending another own p attacking an enemy p, as this could have some implications on the outcome of the clash.

Cutting access of the enemy king to less advanced ranks

Controlling all squares the enemy king could have access to on a less advanced rank (from the point of view of the king) with pieces should get some solid bonus as this helps creating a mating net.

+75cps for such a development

Firm piece control in front of enemy passer and semi-passer

2 more own pieces controlling the square in front of an enemy passer than enemy pieces (in the case of a separate passer and at least an equal number of minors controlling the square) would mean that not only the passer, but also the semi-passer is stopped in its advance.

Therefore, both ps should get their values halved.

Space advantage for n and b on the 6th rank in terms of enemy objects

The knight and bishop on the 6th rank could have their bonus points graded in terms of the number of enemy objects (ps and pieces) placed on more advanced ranks (from the point of view of the minors).

10% higher value for each enemy object after the 5th fulfilling the above conditions

Queen and bishop on squares of different colour

+2cps for such an arrangement, as the pieces complement each other perfectly

Number of separate passers for both sides

One of the sides having 2 separate passers and the other 1 would be preferable to one of the sides having just 1 separate passer and the other none, because the 2 passers are more difficult to contain.

+10cps

Knight on a weak spot of the enemy king shelter, defended by a p that is not central

Eg. wnf6, wpg5 The knight and pawn complement each other perfectly and would deserve +15cps. A small force in strength creates serious attacking possibilities. Bringing in reinforcements might prove decisive.

Pawn attacking an enemy root p that is fixed

Pawn attacking an enemy root p that is fixed by another own p would deserve +2cps additionally as this type of attack is even more compulsive.

Pieces defending an own pawn gaining space advantage

+10mps for such pieces

Permanently backward pawn

Eg. wpa5, bpb7 B7 is a permanently backward p as it cannot move forward not only because it would be captured, but also because of the possibility for creating a far advanced passer (a6). Therefore, at least -30cps are indicated for this p. In the event of the p being captured, the passer will forcefully move forward. That is why the penalty is bigger in distinction to a usual backward p (wpa5, bpb7, bpa6).

Such ps could be done only for the 7th rank.

Rook neutralised by the tandem of a minor piece and a pawn

A rook on an open file will get some penalty in the case that an enemy minor piece, defended by a p, occupies a square on a more advanced rank than the rook. -15mps It is about time that the rook looks for a more appropriate location, as he cannot penetrate on this file. (eg. wrb1, bbb4, bpa5)

Pawn fixing an enemy p on the neuralgic square h3

A pawn fixing an enemy p on the neuralgic square h3 would deserve some bonus points, as this could only be useful in trying to open files for attack.

+2cps for such a p (bph4 in this instance)

Attacking ps fixing all 3 ps of the enemy king shelter with two of them on initial positions

Eg. wpsf6,g5,h6, bpsf7,g6,h7 This would not be a welcome development for the attacking side, as it is impossible to open files for attack on this side and the enemy king is pretty much safe. Bonus points for space advantage for the ps could be halved.

Specifying values for attacking squares of the immediate king shelter

Not all squares of the immediate shelter zone should get equal bonus points when enemy pieces attack them.

With king on g1, the square immediately in front of the king (g2) could get 10% higher value, squares diagonally in front of the king (h2 and f2) could get the mean value, and squares laterally adjacent (f1 and h1) could get 10% lower value.

With king on h1, the square diagonally in front of the king (g2) could get 10% higher value, the square immediately in front of the king (h2) could get the mean value, and the square laterally adjacent (g1) could get 10% lower value.

Scoring weaknesses with opposite colour bishops

With opposite colour bishops, double, isolated and root pawns could score 1/2 lower penalties. But that will not be considered if there are other pieces on the board, like knights and rooks.

Enemy pawns attacking any pawn of the diagonal connection

Enemy ps attacking any p of the diagonal connection (apart from the lead and root ps) is a welcome development, as this constitutes an attempt to at least shorten the connection.
+15mps

Fixing any pawn of the diagonal connection

Ps fixing any p of the diagonal connection (apart from the lead and root ps) is a positive sign, as ps of the connection become easier targets.
+10mps

Controlling squares in front of an own pawn

Pieces controlling squares in front of an own pawn will get +3mps, as this makes moving forward easier.

Possible moves will be considered, i.e. the e3 and e4 squares for a p on e2.

Permanently semi-backward-fated pawn

Eg. wps a5,c5, bps b7,c7 - b7 is such a p. In distinction to a semi-backward-fated p (eg. wps a5,c5, bps b7,c7,a6), this variety is more unwelcome, because the weak p cannot move forward not only because of the possibility of being captured, but also because a dangerous enemy passer could appear (a6). That is why the penalty should be bigger, by 1/5.

Fixing pawns that have gained space advantage

+2cps for fixing an enemy p that has gained space advantage with an own p. That would prevent the enemy p from advancing further. (That would concern ps on the 5th rank, of course.)

Pieces controlling the square in front of a p that has gained space advantage

+5mps for such pieces (both own and enemy). On such control could depend if the pawn (on the 5th rank) will advance further.

Pieces controlling the square in front of an enemy p

This would concern all ps. +2mps for such pieces, as this could prevent the p moving forward.

Pieces controlling the square in front of a p that could gain space advantage

+3mps for a piece controlling the square in front of a p that could gain space advantage on the next move, as on this could depend if the p advances on a cherished square. This would concern both own and enemy pieces.

Pieces attacking a square of the enemy king shelter which is empty, on which there is a piece and a pawn

Attacking squares of the enemy king shelter which are empty, occupied by pieces or pawns should score different bonus points as there are differences in the efficiency of attack. The most efficient way of attacking is attacking empty squares, followed by attacking squares occupied by pieces and squares occupied by pawns. This is because enemy objects get in the way of attacking pieces.

1/8 higher value for attacking an empty square than attacking a square occupied by a piece
1/8 higher value in turn for attacking a square occupied by a piece than a square occupied by a pawn

Linear pieces attacking more than one squares of the enemy king shelter along the same line (diagonal, rank or file)

Squares attacked by linear pieces along the same line should score differently. 1/10 higher value for the square closest to the piece in relation to the next closest square, which in turn will score 1/10 higher than the next closest square, etc. This is because the possibility of intervention of enemy pieces along the ray of action of the attacking linear piece.

Attacking passers

Pieces attacking passers will score double points than when attacking a normal pawn. I think this is self-explanatory.

Heavy pieces in terms of available squares on files and ranks

The ratio for available free squares on files and ranks for the heavy pieces will be measured.

+20cps for a split in the interval 50-50 to 55-45

+10cps for a split in the interval 55-45 to 60-40

When there are more than one heavy pieces on the board, the ratio will be measured for all pieces as a whole, so that one of the pieces may prevail on files, while other on ranks, but the overall ratio be good. However, a single piece may score 1/3 of those points, two pieces 2/3, and three pieces the full points.

This might help the tactical prowess of heavy pieces.

Defending objects with pieces on least advanced ranks

Defending objects with pieces on least advanced ranks (the 1st and 2nd for white) will score some additional bonus points, as the defenders there are more difficult to attack.

+30mps for a defender placed on the last rank

+15mps for a defender placed on the second last rank

Lead pawn of a group with root pawn connecting to a neighbourly diagonal connection, part of larger fixed structures, in terms of closeness to the enemy king

In this case (eg. wps c3,d4,e5,f6, b4,a5, with fixed black counterparts) the lead pawn on a6 is due bigger bonus points for closeness to the enemy king, 1/3 higher points for each own pawn of the neighbourly connection but the root p, because the larger closed structures will make seeking out counterplay more difficult.

Same piece defending more than one objects

If one and the same piece defends more than one pawns and pieces, the second defended object should get 1/5 lower value, the third still another 1/5 lower, etc., because this way of defending is prone to some tactical shots. But defended pawns and pieces might be considered separately.

The same rule could apply to pawns defending own objects.

Weak spots in terms of the existence of an own p behind the weak spot

Eg. weak spot on f6, bpf7 In this case the weak spot should be penalised higher because of space considerations. 1/5 higher penalty is indicated.

Pawn on the 4th rank horizontally adjacent to an enemy p that has gained space advantage on the 5th rank

Eg. wpd5, bpe5 Such a pawn (e5 in this case) will deserve some bonus points, as it can not be made backward by the adjacent p, besides, it controls some important squares (+7cps). In the case that such a p pertains to a file of the king shelter, the bonus might increase to 11 cps.

Rook behind own p able to attack enemy ps pertaining to a diagonal connection
+2cps. In this way files could be opened.

3 own pawns horizontally adjacent on the 4th rank

These ps are about to gain space advantage in different ways, and they could also support each other in different ways. +6cps

Pieces defending more than one square of the own king shelter

If a piece defends more than one square of the own king shelter, values for squares after the first should be somewhat decreased, by 1/7 for each subsequent square, as such way of defending is prone to tactical refutations.

Additional bonus points for lead ps in terms of closeness to the enemy king when the root p of the structure with the lead p is a common root p of another diagonal connection

In this case the lead p of the larger group, closest to the enemy king, should receive +3cps in terms of closeness to the enemy king for each p of the neighbourly connection but the root one, as larger diagonally connected structures, even with lead ps in different directions of the board, would definitely benefit development of own pieces while thwarting development of enemy pieces. In this way attacking chances would certainly increase, and that could be measured best by the bonus points assigned to the lead p.

2 pawns stopping the more advanced double p

When 2 ps stop the forward movement of the more advanced enemy double p (eg. wpse3,g3, bpsf7,f5), an additional penalty for the double p is indicated (-5cps), as undoubling is problematic.

Lasting space advantage in terms of minor pieces

When own minors into the enemy camp are defended by other minor pieces, they are due some additional points.

+3cps for a minor on the 5th rank defended by another minor pieces; double that if the defending pieces are 2

+5cps for a minor on the 6th rank defended by another minor piece; double that if the defending pieces are 2

Rook frontally attacking enemy ps on the 6th and 7th ranks

A rook frontally attacking enemy ps on the 6th and 7th ranks is due some additional bonus, as on capturing such ps the rook would land directly on an advantageous position.

+2cps for attacking ps on the 6th rank

+4cps for attacking ps on the 7th rank

Same pawn making one enemy p backward and another one backward-fated

1/4 lower penalties for the backward ps

Placement of pieces behind the lead pawn

Own pieces placed immediately behind a lead p (eg. wpsf4,e5, wne4) are due some bonus, as usually it is more difficult to attack them there.

+7cps for a knight behind a lead p

+5cps for a bishop

+3cps for a rook

and +1cp for a queen

Pieces attacking the lead pawn

Pieces attacking an enemy lead p are due some additional bonus, as this way of attacking usually prevents the p defending the lead pawn from advancing. 1/5 higher value might be indicated.

Tactically relevant pawn

A tactically relevant p would be one that is able to advance at least 1 square forward and which, if it were to advance, would attack a number of enemy objects (pawns or pieces).

+5cps if such a p is able to attack just one enemy object upon advancing

+15cps if it is able to attack 2 enemy objects upon advancing

Scoring weak pawns with a pair of bishops each side

When both sides have a pair of bishops, weak pawns (double and isolated) may be scored 1/2 the usual value, but not with non-existent penalties. Although bishop pairs tend to increase drawing chances, it is not easy to foresee for how long the pairs will remain on the board; at the same time it is not clear how long the weaknesses will endure, and therefore choosing a half-way solution might be indicated.

Drawing chances with single larger group of diagonally connected pawns

When being the weaker side, your drawing chances will increase, if you manage to build a larger structure of diagonally connected pawns, be it along different diagonals, and even when not fixed. This is so because such structures tend to stave off attackers and it will be difficult for the armies to come into direct clash. +5cps for each diagonally connected p might be well deserved.

2 pawns on the 5th rank making 2 enemy ps semi-backward on the same side

Eg. wpsa5,d5, bpsa6,b7,c7,d6 1/5 higher penalty for the semi-backward ps is due, as the semi-backward ps support each other's movement forward and that might have some implications for their status.

2 horizontally adjacent pawns on the 4th rank with one of them connecting diagonally to a less advanced p

+7cps for such ps, as soon a more extended diagonal connection might appear

2 horizontally adjacent lead pawns on the 5th rank

Eg. wpse4,f5,h4,g5 +8cps for such an arrangement, as the possibility for building a more extended diagonal connection with the lead p gaining substantial space advantage, is real.

A deficient majority pawn

Eg. wpsg3,h4, bpsg5,g6,f5 The black pawns on g6 and f5 are backward, while the white pawn on g3 is backward-fated. Black has also an unopposed p on f5, which is supposed to be an

advantage. Overall, the majority pawn is not felt, because in this particular situation it is far easier for the white pieces to attack the enemy ps than the other way.

Attacking the endmost enemy pawn part of a larger fixed structure

Attacking the endmost enemy pawn (in terms of files; i.e. ps at both ends of the structure) part of a bigger fixed structure, with an own pawn, is a good positional move, since this will either help opening files, or force the enemy search for possible ways of defending the attacked p, the alternative being collapse of the structure.

+5cps for such a move

Recaptures

When 2 pieces attack each other, a wider range of own pieces defending the attacked piece would only be to appreciate in the event of the enemy piece taking the own one.

+8mps for any defending piece

Pieces defending an own p with 2 ps attacking each other

When 2 ps attack each other, the number of pieces defending the own p would matter in the event the enemy p executes a capture, as this would suggest a wider range of recapturing possibilities.

+8mps for any such piece

Defending a lead p in terms of files placements of the defending pawn

A pawn defending an own lead p would receive some bonus in case it is a less central pawn than the lead, as in the event that the lead p is captured, it will reproduce itself with positive implications for the overall pawn structure in terms of centralisation.

+15mps in such a case (eg. bps c6,d5 would be preferable to bps e6,d5 and receive a bonus)

Defending a pawn that is attacking an enemy p with the enemy p being fixed

Eg. wp d4, bpsd5,c5,b6 This particular situation will favour the own attacking pawn (c5), as the enemy side will have to find a way of protecting the attacked own p, while capturing looks problematic.

A structure consisting of a single group of pawns representing a number of diagonal connections

In the case a number of diagonal connections make up a single whole (with one of the ps of the connection horizontally adjacent to a pawn, member of another connection), some bonus points would be indicated (+10cps), as such a structure is both flexible and solid, at least to a certain degree. But the points would be dispensed only if the single whole consists of at least 6 pawns.

A backward pawn with the backward-maker fixing another enemy p and both ps being endmost in terms of files

Eg. wpe5, bpse6,d7, no pawns on the f file In that case, when the backward-maker fixes another enemy p with both being endmost in terms of files (i.e. closing a group of pawns horizontally), the backward pawn is due some higher penalty (by 1/3), as an attempted advance of the backward p will result in a horizontally isolated p.

Number of pawns able to support an own pawn's advance

+15mps for any such p (possible moves will be considered)

Attacking a piece of same power, defended by a pawn placed on less central file

Attacking a piece of same power that is defended by a p placed on a less central file than the piece itself is due some penalty (-10mps), as in the event of a capture on the square defended by the pawn the enemy pawn structure will improve in terms of centralisation.

Quick-footed queen

+5cps for having access to both sides

+15cps for having access to the side where the enemy king has castled

+3cps for controlling a square along an x-ray on the side where the enemy king has castled

Space advantage in terms of pawns on squares of different colour

Gaining space advantage with pawns on squares of different colour should get some bonus points, as this way of gaining advantage is in line with control of complementary squares in an important area of the board.

+10cps if pawns gaining advantage are on black and white squares

Bonus for pieces defended by pawns

When pieces are defended by pawns, they would be due some additional bonus points, as such way of defending is useful from a tactical points of view. Pieces defended by ps can safely stay where they are in case of an attack by an enemy piece of equal power, while sometimes this would be problematic if the piece is defended by just another own piece.

+2cps for any such piece with one pawn defending it

+3cps for a piece with 2 ps defending it

Bonus for 2 knights with bigger single group of diagonally connected ps

With a bigger single group of diagonally connected ps 2 knights would be due some bonus, as the knights would not have big difficulties to find appropriate outposts and, generally, more compact structures favour knights.

+5cps with a structure of 5 ps

+7cps with 6 ps on the board

+9cps with 7 ps

and +11cps with 8 ps

Piece mobility restricted by enemy ps having gained space advantage

Pieces whose mobility is restricted by enemy ps that have gained space advantage are due some penalty points, as such a way of restricting mobility will have a more lasting impact.

-5cps for any square where a piece could be mobile controlled by such an enemy p

-7cps in the case that the ps are fixed

Superiority of pawns on the side where the enemy king has castled

A superiority in pawn numbers on the side where the enemy king has castled (with equal number of ps the enemy will have pawn majority on the other side) will have to receive some bonus points, as it is likely that will have some repercussions on attacking the enemy king.

+10cps for such an arrangement

Attacking squares from where the enemy king could be checked

Pieces attacking squares from where the enemy king could be checked are due some higher value (1/15 higher), as that could have repercussions in case of tactical complications.

If such pieces attack similar squares of the enemy king shelter, the increase in value could be by 1/8.

Doubling of rooks on ranks

Doubling of rooks on ranks (except the 1st and the 7th rank, which are normally scored) is due some well-deserved bonus (+15cps), as in this way rooks will be able to attack in a more synchronized way.

Distance of bishop to an own pawn

Usually it is not good for bishops to be on diagonals where there are own ps. Therefore, the distance in squares in between the bishop and the pawn could be of importance. Penalties could run as follows:

no squares in between - 25mps

1 square in between - 20mps

2 squares - 15mps

3 squares - 10mps

4 squares - 5mps

and 5 squares - just 3mps

Rook having mobility just on a file or on a rank

When a rook has mobility just on a file or on a rank, it is due some penalty, as this definitely influences its overall performance.

-7cps for such a rook

Knight on the 5th rank that could be attacked by just one enemy p with enemy piece in front of it

In that case, when an enemy piece prevents temporarily the possibility of pawn attack on the knight (eg. wne5, bpf7, bnf6), the knight is due a small additional bonus to other points (+3cps), as such an arrangement suits the knight, although this might not be the perfect outpost.

Trading a central pawn on the 4th rank for a similar enemy's

Trading a central e or d pawn on the 4th rank for a similar enemy's makes sense only if equality in the number of central ps with such a status is observed. It would be wrong to trade a central p for an enemy's when the enemy would still have a central p on the 4th rank, but you would not. This would be a major mistake, as you would not have sufficient control of squares into the enemy camp, while the enemy would have such. It would be preferable that the enemy gains space advantage with a number of fixed ps, as this would make converting the advantage more difficult.

-15cps for such a move

Eg. wpsd4,e4, bpsd5,e6 Capturing on e4 would be bad, as white would still have d4; allowing white to play e5 might be the better alternative.

Transferring the king to a safer haven

When the king side is attacked by enemy pawns, and there is no option to defend effectively, a wise decision would be for the king to leave its attacked shelter and try to find a safer place, either in the center, or on the other side.

+50cps for such a move

Piece control in front of storming pawns

Pieces controlling the square in front of pawns storming the enemy king shelter are due a bonus (+5cps), as this could have vital repercussions on whether the attack will be successful

or not. Both own and enemy pieces will be considered. Rooks and queen behind the attacking p will also count.

Pawns attacking the enemy p immediately in front of the root p in a diagonal connection

Pawns attacking the enemy p immediately in front of the root p in a diagonal connection are due a decent bonus (+4cps), as this will either open files, or move the root p one rank ahead, which is always a success for the attacking side.

+7mps for pieces (both own and enemy), controlling the square diagonally in front of such a p (eg. if the p is on c3, such a square would be b4), as on this would depend if the attack is successful or not. Control of the square along an x-ray will also be considered.

Rook on the 6th rank

The rook on the 6th rank will be due some bonus (+6cps), as there it could possibly attack root pawns, but also squares of the enemy king shelter.

2 pieces on the same rank one square away with an enemy p in front of them on the file in between

Eg. white pieces on f3 and d3, black p on e7 This situation is not favourable for the white pieces, as a possible advance of the enemy p could suddenly threaten both pieces.

-3cps for such an arrangement

The definitive stop

With the enemy heavy pieces attacking on a file objects into the own camp or squares of the own king shelter, an optimal way of defending would be having a minor piece on the 4th, or even 3rd, rank, on the file where the heavy pieces attack, defended by 2 ps and with enemy ps unable to attack it. This could make a powerful attack ebb away. Of course, a bishop on such a position could score lower, as bishops badly need mobility. The following points might be dispensed:

+7cps for a bishop; +12cps if it stops an attack on the own king shelter

+10cps for a knight; +15cps if it stops an attack on the own king shelter

A single group of pawns with one of the ps gaining space advantage on the side where the enemy king has castled

Such a scenario could get a bonus of 5cps, because of the group's flexibility in attacking the king.

What to develop first

In order to reasonably complete your development, you do not need to develop all pieces. Some pieces might be left for development at a later stage. But you should, of course, see to it that your king castles. It is necessary to develop the knight on the side where your king intends to castle (usually the king side), the bishop on the same side, of course, some central pawns, and castle. Developing the knight on the other side can reasonably wait, and the bishop on the other side only needs to have a central pawn advancing, so that it is sufficiently active even on its initial position.

Bonus for minor pieces gaining space advantage on the 5th and 6th ranks when not attacked by enemy pieces

Minor pieces gaining space advantage on the 5th and 6th ranks that are not attacked by enemy pieces are due some bonus, as this might have some implications tactically.

+3cps for such a piece

+5cps, if the piece gains space advantage on the side where the enemy king has castled

Bonus for knights in terms of outpost possibilities

Each square on the 4th and 5th ranks, that is not attacked by enemy ps, and that could not be attacked by enemy ps, could score a small bonus for each knight.

+2mps

double that, if the square is central or semi-central one (c to f files)

Attacking pawns in terms of ranks

Attacking pawns will make a difference when the enemy ps are placed on ranks from the 5th to the 7th (with white pieces attacking). Pawns are easier to attack when they are on more advanced ranks.

1/20 higher value for attacking a pawn on the 5th rank in relation to a p on the 6th rank

1/20 higher value for attacking a pawn on the 6th rank in relation to a p on the 7th rank

Rook behind own p on a file against the enemy king position

+4cps, as this might help open files in the future

Opening and taking control of the endmost file, part of the enemy king position

Opening and taking control of the endmost file, part of the enemy king position (with short castling, this will be the h file, while with long castling, the a file), will be due some higher bonus (by 1/3 the standard value), as attacking along this file is always more forceful, because enemy pieces have bigger difficulties to defend the squares of the king shelter along that file. It is simply more remote.

Attacking squares that could be part of the king shelter

Attacking squares that could be part of the enemy king shelter (i.e., the king is still in the center and not castled, but there are reasonable chances it will do so on that side of the board) is due some bonus in forestallment of developments.

1/2 the usual value for such attacks, supposing the king has already castled

Eg. If there are definite chances the enemy king will castle short, attacking h7,h6,g6 will score points, albeit the king is still in the center. Such attacks might also have the effect of preventing the king to castle at all, or compromise in advance the shelter.

King shelter with king still in the center

When the king is still in the center (on e1/e8), the shelter zone will consist of 15 squares: squares within the rectangle c1-c3-f3-f1. With the king on f1, the shelter zone will have the same number of squares, but centered around f1. It is always more difficult to defend a wider area of squares, besides, in such cases the number of enemy pieces able to attack the shelter zone increases considerably. That is why, no matter how solid a central shelter is, it is usually not a wise idea for the king to stay in the center.

King pin with the king having no free mobile squares

The case of a king pin with the enemy king having no free mobile squares is a very serious affair, because such a pin is more forceful than other pins.

+20cps additionally if such a pin occurs

Rook on a semi-open file for the enemy side

Rook on a semi-open file for the enemy side (i.e., behind an own p) is due some bonus, as this is a try to challenge control of the file.

+2cps for such a rook

Knight at an endmost square of the board

A knight at an endmost square of the board (a1,a8,h8,h1) is due some decent penalty (-20cps). This is actually the worse place for any piece on the board.

Pawns supporting an own pawn in its advance

Any pawn supporting an own p in its advance is due some bonus (+5cps for each such p), as possibility of advancing is always a good sign for a pawn.

Temporary backward-fated pawn

A temporary backward-fated p is one whose advance is stopped by 2 enemy ps, and could be supported by only one own p, but is not supported at the moment. Eg. wpsg2,f3,e4, bpse5,g5 - f3 is such a p The f4 square is a weakness in white's position and could be occupied by enemy pieces advantageously. Such a p is due some penalty, but not big, 1/3 of normal penalty points for a backward-fated p, or some 10 to 12 cps.

X-ray attacks with pieces of lower power

Pieces of lower power attacking more powerful enemy pieces along an x-ray are due some additional bonus because of tactical considerations.

+7cps additionally for bishop attacking enemy rook

+10cps for bishop attacking enemy queen

+12cps for rook attacking enemy queen

Space advantage in terms of small number of fixed ps in a single group

With small number of fixed ps in a single group space advantage is relatively more valuable, as own pieces are usually able to take more active positions.

just one pair of fixed ps - 20% higher value for space advantage might be a wise decision

2 pairs of fixed ps into a single group - 10% higher value for space advantage would be a good decision

Pieces defending an own p that has gained space advantage

+7mps for any such piece, as this might have some sense in the eventuality of the p being captured

Pieces defending an own fixed pawn that could be attacked by only one enemy p

+3mps for any such piece, as this could have implications for the pawn structure that will take shape

Pieces attacking an enemy blocker

Pieces attacking an enemy piece blocking an own separate or other passer are due some bonus points (+5cps), as this could help in forcing the blocker leave its position and open good chances for the passer to advance again.

Pawns keeping under control a square from where the own king could be checked

+8mps for any such square; it is always better that the king does not get checked at all

Pieces keeping under control a square from where the own king could be checked

+5mps, as this might have some tactical implications

Rook in front of knight on the same file

Rook in front of own knight on the same file is due some small bonus (+2cps), as this is an optimal way of coordinating the 2 pieces when occupying the same file.

Continuous pawn control of squares of the own king shelter

Pawns controlling all squares of the own king shelter on the 3rd and 4th ranks are due some decent bonus, because this is a good way of defending the king position.

+15cps for controlling all squares on the 3rd rank

+8cps for controlling all squares on the 4th rank

Fragmented storming pawns

Some penalty is indicated (-3cps) in the case that the most advanced pawn storming the enemy king position is not on an adjacent rank to the next most advanced storming pawn (i.e., there is at least one rank in between, eg. bpg4, bph6), as attacking in a fragmented fashion the enemy bastions is not the solution to prefer. Files will be more difficult to open, and the storming ps themselves are vulnerable to a certain extent.

Pawns defending minor pieces gaining space advantage on the 5th and 6th ranks

Own pawns defending minor pieces gaining space advantage on the 5th and 6th ranks are due some additional bonus points (but the points might also be assigned to the pieces), as this could have consequences both in terms of tactics, as well as of the length of time the minor piece will spend into the enemy camp.

+2cps for any such p defending a piece on the 5th rank

+4cps for any such p defending a piece on the 6th rank

Minors part of the own immediate king shelter on squares of opposite colour to the square of the king

Minor pieces that are part of the own immediate king shelter should score some additional bonus in case they are placed on squares opposite the colour of the square the king is placed on (eg. wkg1,wnf1, or wkh1,wbh2), because such an arrangement will gain in terms of complementary control of squares.

+5cps for any such piece

Bishop with more than one own pawns on the same diagonal

When a bishop occupies a diagonal with more than one own ps on it, each p after the first will get a penalty. The side with the bishop will need time to make this diagonal a more appropriate location for the bishop, or transfer it to another diagonal.

-3mps for any such p

Number of horizontally adjacent pawns on the same rank

Any number of ps horizontally adjacent on the same rank (eg. wpsg3,f3,e3) will get some small bonus because of flexibility.

+2cps for 2 such ps

+3cps for 3 such ps

+4cps for 4 such ps, etc.

The initial position might or might not be considered.

Attacking ps defended by own ps

Pieces attacking enemy pawns defended by other ps will score naturally lower.

1/2 the standard value, if the attacked p is defended by just one p

1/3 the standard value, if the attacked p is defended by 2 ps

Pieces defending an own p making an enemy p semi-backward

Such pieces are due some bonus, as this might have some implications in the case the semi-backward p advances.

+1cp for any such piece

Pieces attacking an enemy p making an own p semi-backward

Such pieces are due some bonus, as this might have implications in the case the semi-backward p tries to advance and comes into clash with the semi-backward-maker.

+5mps for any such piece

Number of own ps controlling squares on a semi-open file

The number of own ps controlling squares on a semi-open file will matter in terms of the extent of control over the file.

+2cps for any square along the file controlled by a p

double that, in case the same square is controlled by 2 own ps

Restricted mobility of pieces part of the immediate king shelter

Any piece that is part of the immediate king shelter with less than 2 mobile squares at its disposal will be due some penalty, as such pieces are not an optimal shield for the king, because of bad functionality and congestion considerations.

-5cps for any such piece

Pieces attacking enemy pieces attacking the own king shelter

Pieces attacking enemy pieces attacking the own king shelter will be due higher bonus than normal piece attacks (by 1/3 higher), because this could have some important implications for the security of the own king. Actually, such attacks are more efficient way of defending the own king than defending attacked shelter squares, because own pieces doing this will usually retain very good activity, while caring at the same time for the well-being of the king.

Bishop in front of knight on a diagonal

Bishop in front of own knight on a diagonal will score a very small bonus (+1cp), as this is an optimal way of coordination of the two pieces when they are on the same diagonal.

Piece immediately in front of own p vertically with an enemy minor piece gaining space advantage on the 5th rank that could be attacked only by the said pawn

Eg. wnc5, bpb7, bqb6 Staying in the way of the pawn to try and expel the intruder is not the wisest of strategies.

-1cp for such an arrangement

Doubling queen and rook on the 6th rank

Doubling queen and rook on the 6th rank, whenever possible, should score a decent bonus, as the enemy king shelter could be under severe threat.

+20cps for such an arrangement

The queen on files, ranks and diagonals

Considering values for the queen on open files, ranks and diagonals will be important not that much in terms of control of those lines, but in terms of ability to quickly transfer to an appropriate location.

An open rank will be a rank with no own or enemy pawns and pieces on it.

An open diagonal will be a diagonal with no own or enemy pawns and pieces on it. In the case of the queen, only diagonals consisting of at least 6 squares will be considered.

+15cps for a queen on an open file

+15cps for a queen on an open rank

+12cps for a queen on an open diagonal

+20cps for a queen on an open file against the enemy king position

+10cps for a queen on a semi-open file against the enemy king position

Magical shapes of pieces

4 own pieces placed at the 4 ends of a square shape of board squares, 4 squares each side, would deserve +20cps bonus, as no matter what the particular pieces at the 4 ends are, they seem to communicate in an uncannily coordinated way. Half of those points might be dispensed just for a beautiful setting.