

# Formation of The Basis of Analytical Thinking of Children Through Chess Problems

Vladimir Karapetyan

Armenian Pedagogical University after Khachatur Abovyan  
Yerevan, Armenia  
e-mail: [vskarapetyan@mail.ru](mailto:vskarapetyan@mail.ru)

Samvel Misakyan

Armenian Pedagogical University after Khachatur Abovyan  
Yerevan, Armenia  
e-mail: [misakyan\\_samvel@mail.ru](mailto:misakyan_samvel@mail.ru)

## ABSTRACT

Chess tasks during general and professional chess educations contain lots of problems, because children learning chess are not able to solve exercises by themselves. In this paper we discuss some methods that can improve the performance of children learning chess and solving problems. Application of those methods can also impact on improvement of analytical thinking of children.

## Keywords

Chess, open attack, zugzwang, analysis, thinking, method

In the general educational system of the Republic of Armenia in the process of teaching of chess as a compulsory subject instructional difficulties are emerging while solving chess tasks. So that 2-4 year pupils perceive chess tasks in an adequate way and solve them on their own it is needed that the trainer chooses the most admissible way of presentation taking into consideration that in the class there is a small quantity of pupils with high level of visualization. Whereas when the pupil solves the task on its own, then his or her intellectual potential arises, that inspires the child's confidence upon his intellectual potential's growth. Later we will discuss several typical chess tasks during which solutions it is preferable to implement the following methods offered by us

- 1) exclusive
- 2) change of moves
- 3) selection of moves
- 4) simplification of the position (artificial)
- 5) removal of chess pieces from the board
- 6) sacrifice of the chess piece
- 7) mandatory move
- 8) fragmentation of the move

Of course the above mentioned include specific actions (moves), each of which has its own aim: analysis of position, strengthening of the position, protection of the king from checkmate, escape from defeat.

The sense of the **method of exclusion** is that for the simplification of the nominated position it is needed to



Board 1

consider in mind separately and analyze the role and meaning of each Chess piece. Excluding by turn the role of the chess piece, we find that very chess piece or the chess pieces, which have primary importance for that chess position due to which it is possible to

find the right way to solve the task.

In the given position (see the board 1) it is black's turn to move and they have to protect themselves from checkmate. Analyzing the position we one by one exclude the black's chess pieces "g8" board rook, queen, bishop role in protection of the king from checkmate. The only chess piece Yits "a4" board's rook, and if it is sacrificed the king can be saved .1 Ra4-Na4-h4 2. Qh6\*h4 h7-h5, so the king of black's is protected.

By the way while implementing these actions (methods) the teacher should lead the pupils with such kind of questions, that will gradually reveal the solution of the given task.

**Method of the change of chess pieces turn** is applicable in



Board 2

almost all cases when we are solving the task. Especially while teaching the theme "protection from checkmate" it is needed, that the pupils see, and imagine the threat of checkmate so that they can organize the protection in concrete and specific way.

In the given position (see the board 2) its

black's turn to move and they have to protect themselves from checkmate. Firstly, it is needed to uncover the white's threat. Naturally, when it is revealed with which chess piece on which board there is a threat of checkmate, then it will be easier to find the way how to be protected. It's obvious that white 1. Ne4- f6 move threatens with checkmate, therefore black should not allow the given move of knight.

Here it becomes obvious that there is need to play with another method, it is mandatory move method, ed est if the black make the first move 1...Rd8-a8+, then white 2. Ka1-b1 move will be followed by 2...Be6- f5, curbing the pawn , afterwards winning it the black will gain material advantage.

Naturally, when it reveals which chesspiece on which board threatens with checkmate, then it will be easier to find a way out of checkmate.

**Selection of moves** method is that if by exclusion method it is already revealed the chesspiece that has primary importance for that position, then it must be chosen the best possible move of that chesspiece.



Board 3

In the given position (see the board 3) it's turn of white to move, they win or they do a checkmate after 3 moves. If we give black the turn to move it means that we will have saltmate. So the white will give the chance to blacks to make a move. Here emerges a question: which move has to make white. Of course it will be more felicitous if we could decide which black chesspiece should be given the opportunity to make a move. If we imagine that white make two steps in a row, then they will reach a checkmate with moves 1 .Qb3-c2- c1, therefore the chance to move will be given to pawn. It's not difficult to see that king of white has 3 opportunities to move, they are 1. Kh3-g2 or 1. Kh3-h2 are not right as after black's 1...h4-h3 move, white again have to move with king. Therefore the best is 1. Kh3-g4 move which will be followed by black black's move 1..h4-h3, afterwards white will do a checkmate after 2 moves 2. Qb3-c2 h3-h2 3. Qc2-c1 # .

Due to this method^ the pupil's accounting and analytical skills start to develop.



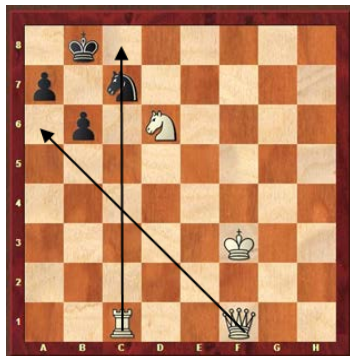
Board 4



Board 5

Therefore move that protects from chaeckmate is 1...Ra8-a4.

Of course, if exchanges are not possible, then the position may artificially be simplified, so that the pupils can understand it better.



Board 6

Position simplification method is applicable in those cases when it is possible to remove several chesspieces from the board through exchanges.

The given position (see the board 4) is complicated because there are a lot of chess pieces on the board, that's why through artificial

simplification of the position, after removing d5 and e4 knights, the move that will protect the black from checkmate becomes obvious.

After artificial simplification of the position the white can make a checkmate with the Ng4-f6 move.

Therefore move that

**The method of removal of the chesspiece from the board** is applicable in those cases when it is needed to have a checkmate situation through the removed chesspiece.

In the given task (see the board 6) it's white's turn to move, checkmate after two moves. If we imaginary remove <<

c7>> knight, then white will do a checkmate with 1R c1-c8 move. Using the threat of checkmate with <<b7>> Queen,

white will do a move 1Q f1-a6, creating a one move checkmate situation and if black make a move 1...Nc7xa6, that will be followed by 2. Rc1-c8 #.

**Chesspiece sacrifice method** essence is that: when in the given position as a savior move can be the sacrifice of the chesspiece.



Board 7

In the given position (see the board 7) the black have material advantage, but it's white's turn to move and they can escape the defeat due to the rook sacrifice. As suicide rook, white make the black so that they admit the rook sacrifice. 1Rg5-g1, if the black immediately take the

rook, then it will be a saltmate, that's why they make 1.. ..Rc1-c2 move, white continue to sacrifice the rook 2. Rg1-g2 Rc2-c3 3. Rg2-g3 Rc3-c4 4. Rg3-g4 Rc4-c5, after this move 5. Rg4-g5 , is not right as the black will exchange the rooks and will win.

Therefore the white have to continue 5. Rg4-g8+ , the black will have to admit the sacrifice: 5.. ..Kh8xg8 saltmate.

As the final goal of chess is make a checkmate to the competitor's king or protect your own king from chackmate in precarious position, that's why even the most powerful chesspiece's queen's sacrifice can be the only move.

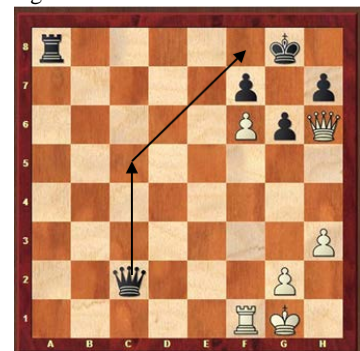
**Mandatory move choice method** is also very popular, because the check is the only move that will make the competitor to refrain from the move` for example from checkmate. Due to mandatory move the protection party can save some time and rearrange its chesspieces.

In the given position (see the board 8) it's black turn to move and they have to be organize protection from checkmate.

The white checkmate from the board <<g7>> , therefore the black's task is to watch <<g7>>

and its only possible if the queen is on the board <<f8>> . The black make a mandatory move 1...Kc2-c5+ 2. Kg1-h1 Kc5-f8, and the king of black is protected from checkmate.

In case of mandatory move, as well as in case of sacrifice the solution of the task becomes obvious.



Board 8

Position fragmentation method is applicable in those cases when ther are a lot of chesspieces on the board. In case of osition fragmentation the task becomes simpler.

In the given position (see the board 9) it's white's turn to move, check mate after 2 moves. In this position the right to move can be firstly transmitted to blacks , afterwards it can be fragmented and one by one black's each figure's move can be considered : 1...Ba8-b7 2Rc7-e7 #, 1...Ba8-c6 Rc7xc6 # , 1...Ra7xc7 2.Nb5xc7 # , 1...Ra8-a6(a5,a4,a3,a2,a1) 2. Rc7-e7 # , 1...Bh8-g7 2. Qf4xf7 # , 1...Bh8-f6 2. Qf4-g4 # , 1...Bh8-e5 2. Qf4xe5 # , 1...Bh8xd4 2. Nb5xd4 # , 1...Rh7-g7 2. Kf4-e5 # , 1...Rh7-h6(h1,h2,h3,h4,h5) 2. Qf4-f7 # , 1...f7-f6 2. Qf4-e4 # , 1...f7-f5 2. Qf4-d6.

We may conclude after the analysis that the white so that save the position "Zugzwang" have to move with bishop to boards << b3>> that will allow not to break the "Zugzwang". Fragmentation of the position is used when there are many figures (chesspieces) on the chessboard. In the case of fragmentation of the position the task becomes more affordable.



**Board 9**

In the given position (see the board 9) it's white's turn to move, and mate after two steps. Position allows to transfer the turn to the black, then fragment it, and then follow each figures of black:

1.. ..Ba8-b7  
2.Rc7-  
e7 #, 1..Ba8-c6  
Rc7xc6 #

1.. ..Ra7xc7 2.Kb5xc7 #  
1.. ..Ra8-a6(a5,a4,a3,a2,a1) 2. Rc7-e7 # , 1....Bh8-g7  
2.  
Qf4xf7 # , 1....Bh8-f6 2. Qf4-g4 # , 1....Bh8-e5 2. Qf4xe5 # ,  
1....Bh8xd4 2. Kb5xd4 # , 1....Rh7-g7 2. Qf4- e5 # , 1....Rh7-  
h6(h1,h2,h3,h4,h5) 2. Qf4-f7 # , 1....f7-f6 2. Qf4-e4 # , 1  
f7-f5 2. Qf4-d6 #:

After all we can conclude that in order to preserve Zugzwang position white Bishop should go b3 square, in order not to disturb (violate) the Zugzwang.

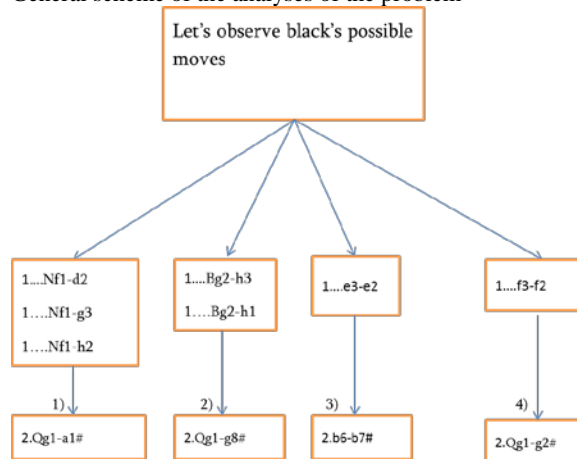
During the presentation of each material it's possible to choose more available method, which will help pupils to understand the task better and be able to solve it easily. The psychopedagogical studies of chess peculiarities mostly relate to strategic problems that become more concretized in frames of the psychological conception and cognitive activity of the learner/learner's cognitive activity. This study/research is based on a theory of A.N. Leontev's activity conception and P. Ya. Galperin(e)'s phasal formations of mental actions. As chess essentially includes various actions (analysis, synthesis, calculation, choice.) and operations, it was more suitable to apply the orienting base of the action and planning, as well as the thinking scheme as a realization mechanism in frames of this article. Let's try to prove/demonstrate the manifestations of scheme thinking peculiarities, as well as that of planning to find optimal variant to chess problem solutions in elementary school age due to "Zugzwang" two-step tasks. No matter what phenomenon or problem one studies, there are always two cognitive primary processes called analysis and synthesis that he uses both consciously and unconsciously. Analyzing a phenomenon or a problem means to divide it into parts, distinguish these parts and characteristic features and relationships with other objects too either mentally, or with the help of certain objective actions. While applying the "Zugzwang" method in problem solution, it's necessary to analyze the proposed position/location for both black and white sides. But it's more effective when we



**Board 10**

start our observation from the possible steps of blacks. While solving checkmate tasks by the two-step "Zugzwang", it is useful to apply the methods of step turn replacement /alteration and position simplification. Due to these methods we find out the consequences of the possible steps of blacks and deduce which one of the whites should make a step in order not to deviate/dislocate the "Zugzwang" construction. In the given position (see the board 10) it's white's turn to move, checkmate in 2 moves. Let's apply position simplification method and method of the change of chess pieces turn in order to solve the task.

General scheme of the analyses of the problem



1. We conclude, that the white knight which is on b3 square, shouldn't block it's own queen's path to a1 square. Therefore, 1.Nb3-a5, 1.Nb3-a1 and 1.Nb3-c1 should be excluded for white.

2. In case of 1...Bg2-h3 we can conclude that 2....Bh3-c8 could be the disturber for 2.Qg1-g8#, if the white knight which in the square e6, previously did a move. In this position we need to exclude e6 white knight's move 1.Ne6-d8, 1.Ne6-f8, 1.Ne6-g7, 1.Ne6-g5, in order to realize queen's checkmate. We also have to exclude 1.Kc7-c8 or 1.Kc7-d8, because of blocking of queen's path.

In this position we need to exclude white knights move to c5 and d4 from a7-g1 diagonal, in order not to close the diagonal, which is attacked by queen.

In case of last position it is necessary to exclude 1.Uc7-c6 by white king, that not to disturb to 2.Qg1g2#.

From the above we conclude that only 1.Nb3-d2 this move wasn't excluded by white, which means that is the key move for the given problem.

## CONCLUSION

Problems rise in the solving of chess tasks during general and professional chess educations. Most of children can't solve chess tasks by themselves because of lack of chess endowments. By the methods we suggested above children can easily solve chess tasks. The suggest methods application also forms schematic thinking fundamentals, improves analytical thinking of children.

## References

- [1] H. Toomanyan, "Chess 4 Teacher's Manual", pp. 63-70, Yerevan, 2013. (In Armenian)
- [2] H. Toomanyan, "Chess 4 Exercises' Copybook", pp. 21-22, Yerevan, 2014. (In Armenian)
- [3] S. Misakyan, "Chess 2-4 Methodical Guide", pp. 90-91, Yerevan, 2013. (In Armenian)
- [4] A. Tishkov, V. Chepizhny "Chess Tasks-Miniatures", pp 14-15, Moscow, 1987.
- [5] I. Mikhailova, "Strategy of Champions Thinking By Schemes", pp.6-9, 2008.
- [6] N. Zhuravlev "Chess Step By Step", p. 311, Moscow, 2012.