Mario Held, IA

Mastering the Dutch

A tournament example developed with
C.04.3 FIDE (Dutch) Swiss Rules, version 2026

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CONTENTS

1 Foreword

This paper illustrates a step-by-step example of pairing procedure for a Swiss tournament developed by means of the FIDE (Dutch[1]) Swiss pairing system, with the hope to help those who wish to improve their knowledge of the system or to get more familiar with it.

During the FIDE Congress in Abu Dhabi 2015, the FIDE (Dutch) Swiss System Rules were partially modified to make them clearer and to correct some peculiar behaviours, thus giving better pairings in some cases.

In the following Congress in Baku 2016, the FIDE (Dutch) Swiss Rules were completely reworded, making them definitely easier but introducing no behavioural changes.

In year 2024, the Rules were modified again but, this time, some new behaviours were introduced. Among them, we should emphasise two important developments. First, those special cases that complicated the pairing rules requiring two special brackets (the "Penultimate Pairing Bracket", or PPB, and the "Collapsed Last Bracket", or CLB) were eliminated. Second, a new pairing constraint now forces the pairing allocated bye to be assigned to a player with the *minimum possible score*. Because of this, the new rules may (and do, at least sometimes) give different pairings than the previous ones.

A general knowledge of the system is required to follow the pairings, and the reader may want to keep a handy copy of the Rules. A natural companion to this paper is the *Annotated FIDE (Dutch) Swiss Rules 2026* (by the same author), which examines the rules in detail and explains some critical points.

Warm and heartfelt thanks go to IA Roberto Ricca for his valuable and patient work of technical review and the many useful suggestions.

Happy reading!

***Notice**: to help the reader, the text contains many references to relevant regulations. Such references are printed in italics in square brackets "[...]" - e.g., [C.04.2:2.1] refers to the FIDE Handbook, Book C: "General Rules and Recommendation for Tournaments", Regulations 04: "FIDE Swiss Rules", Section 2: "General Handling Rules", rule 2.1. Since a great deal of our references will be made to section C.04.3: "FIDE (Dutch) Swiss System", these will simply point to the concerned article or subsection (e.g., [3.2.1]). All relevant regulations can be downloaded from the FIDE website.*

[1] *The FIDE (Dutch) Swiss pairing system, so named with reference to its promoter and developer, Dutch IA Extraordinaire Geurt Gijssen, was adopted by FIDE in 1992. Its rules are codified in Section C.04 of the FIDE Handbook, available on www.fide.com.*

2 Initial Preparations

The preliminary stage of a tournament consists essentially of the preparation of the list of participants. To this end, we sort all players in descending order of score[2], FIDE rating and FIDE title[3] *[C.04.2:2]*. Homologous players (i.e., those players who have identical scores, ratings, and titles) will normally be sorted alphabetically, unless the regulations of the tournament or event explicitly provide a different sorting rule[4].

Here we face our first problem – the FIDE (Dutch) Swiss system belongs to the family of rating-controlled Swiss systems[5], in which the resulting pairings depend on the rating of the players. To get a proper pairing for the round, the players' ratings need to be right – i.e., they must correctly represent each player's strength[6]. Because of this, the Rules require us to carefully verify all the ratings and, when a player does not have one, to make an estimation for it as accurate as possible *[C.04.2:2.1]*. When a player has a national rating, but no FIDE rating, we can convert the first to an equivalent value – in some cases directly, in others by means of appropriate formulas. For players who have no rating at all, we usually need to estimate the playing strength according to current practices or national regulations.

After we prepared the list as indicated above, we can assign to each player a *Tournament Pairing Number (TPN)* (*see [C.04.2:2.3]*), which is only *provisional* at this stage. Additional players may be allowed to join the tournament in later rounds. In this case, we want to reorder the list, assigning new, and maybe different, TPNs[7] *[C.04.2:2.5]*.

TPN	Player	Title	Rating
1	Alice	GM	2509
2	Bruno	IM	2445
3	Carla	WGM	2421
4	David	FM	2402
5	Eloise	WIM	2309
6	Finn	FM	2307
7	Giorgia	FM	2286
8	Kevin	FM	2158
9	Louise	WIM	2132
10	Marco	CM	2123
11	Nancy	WFM	2116
12	Oskar	--	2113
13	Patricia	--	2105
14	Robert	--	1936
15	Stephanie	--	1900

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2 *Of course, at the beginning of the tournament all players have a null score, unless an accelerated pairing is used.*

3 *The descending order for FIDE titles is GM, IM, WGM, FM, WIM, CM, WFM and WCM - followed by all untitled players [C.04.2:2.2.2].*

4 *This is especially desirable when many players in the tournament are unrated, but they have nevertheless different playing strength and figurative ratings cannot be determined or used. However, ideally, players should always be sorted by rating (official or figurative), so this rule should be almost useless.*

5 *The "Rating-Controlled Swiss Systems" belong to a more general class of "Controlled (or Seeded) Swiss Systems", which sort the initial ranking list according to given rules rather than by drawing of lots (as was previously done).*

6 *In FIDE (Dutch) Swiss, players' strength is usually represented by their rating. However, the tournament rules may specify a different method for evaluating it (for further detail on the list preparation and sorting, see C.02:2.2).*

7 *Sometimes a player may be registered with wrong data that need to be corrected (both for pairing and rating purposes). TPNs may then be reassigned, but only for the first three rounds. From the fourth round on, they shall not be changed, even if players' data must be adjusted [C.04.2:2.3]. Please note that the above limitation only applies to such corrections. Late entrants, whatever the entry round, must get their correct place in the list, and the TPNs must be reassigned consequently – but this seldom happens in advanced rounds.*

Our tournament is comprised of 15 players. This number is small enough to make the tournament handy but, still, show most of the typical pairing difficulties. The players' list is properly sorted according to *[C.04.2:2]*.

The number of rounds is established by the tournament regulations and *cannot be changed after the tournament has started* (of course, unless some disaster occurs). This number should be (but, in fact, rarely is) in close relation with the number of players, because a Swiss tournament can reasonably identify the winner only if the number N of players is less than or at most equal to 2 raised to the number T of rounds: $N \leq 2^T$. As a rule of thumb, each additional round enables us to determine approximately one more position in the final standings. For example, with 7 rounds we can determine the strongest player (and, therefore, the player who deserves to win) among no more than 128 players at best – however, we can correctly select the second best among only no more than 64 players, and the third best only if there are 32 players at most[8]. Thus, it is generally advisable to carry out one or two rounds more than the theoretical minimum. For example, for a tournament with 50 players, 8 rounds are adequate, 7 are acceptable – while, strictly speaking, a 6 rounds tournament (which are the "bare minimum" with respect to the number of players) would not be advisable[9].

The preliminary stage ends with the possible preparation of "*pairing cards*", a very useful aid for the management of a manual pairing. They are sort of a personal card, the heading of which contains player's personal data (e.g., name, date and place of birth, ID, title, rating, and possibly additional useful data) and, of course, the TPN. The body of the card is comprised of a set of rows, one for each round to be played, in which all pairing data are recorded (opponent, colour, float status[10], game result or scored points, total score, and possibly additional data). The card may be made in any of several ways, as long as

(GM) GRECO Gioacchino 2650 **1**
ITA 251260 ID 123456/ FIDE 890123

T	Opp	Col	Flt	Res	Pnts
1					
2					
3					
4					
5					
6					
7					
8					
9					

8 *This is true only if the strongest player ends up as winner in every game. In practice, the occurrence of different results, such as draws, forfeits and so on, may change the situation, making the individuation of a definite winner (the so called "convergence") either slower or faster, according to specific, and usually unpredictable, circumstances.*

9 *Of course, this is just a theoretical point of view. Many tournaments are comprised of 5-6 rounds, because this is usually the best we can put together in a weekend. Thus, the determination of the players who end up in the winning positions of the final standings must be entrusted to tiebreak methods, which should be chosen with the utmost care.*

10 *See "Scoregroups and brackets", page 14.*

it is easy to read and to use. Here, we show a typical example.

The basic advantage of pairing cards is that we can arrange and move them on the desk, sorting them by rank, rearranging and pairing them in an easy and fast fashion. Nowadays, the use of pairing cards is pretty rare – in fact, personal computers made manual pairing obsolete. However, it's not unusual that an unhappy player asks for detailed explanations, so that the arbiter has to clarify or justify a pairing made by computer software. With a little practice, we can work out such an explanation right from the tournament board – which, in this case, needs to contain *all* the necessary data, just like a pairing card. Here, we will follow this method.

The last step in tournament preparations is the drawing-of-lots for the Initial-colour *[5.1]* (this decides the colour for each player for the first round, see *[1.7.4], [5.2.5]*), then, we can begin the pairing. Some arbiters, misinterpreting the drawing of lots, assign the Initial-colour at their own discretion. However, the Rules explicitly require a drawing-of-lots (which, by the way, may be at the centre of a nice opening ceremony). Let us then say that a nice little child, preferably not involved in the tournament, drew White as our Initial-colour.

Graphic conventions

Before getting into the heart of the matter, we need to establish some local conventions to represent the different objects with which we will be working.

- A player is always represented by the corresponding Tournament Pairing Number (TPN), with a "numeric" ("#") sign – e.g., **#4** indicates player number four. More information can be added as required[11].

- A pair of players is represented by the two corresponding TPNs connected by a hyphen (no "#" symbol is required) – e.g., **4-7** indicates the pair in which #4 plays as White, whereas #7 plays as Black. On occasions, we may add some useful information as mentioned above. Although until the final stage of the round-pairing (*see [1.9]*) colours are yet undefined, for the sake of simplicity we will try, whenever possible, to indicate the correct colour assignment as soon as possible.

- Round brackets "**(**…**)**" indicate a pairing, candidate pairing, or part thereof, which consists of pairs (see above) and downfloaters, indicated by a downright arrow "↓" – e.g., (4-7, 6-2, 3↓, 5↓) indicates a pairing comprised of the pairs 4-7 and 6-2 and of the downfloaters #3 and #5.

[11] *E.g., on expected colour (see Colour preferences, page 17), or on float status (see Crosstable markings, page 12).*

- Square brackets "**[**…**]**" indicate a <u>subgroup</u> (S1/S2) of a pairing bracket (*see [3.2]*).
- Curly brackets "**{**…**}**" indicate a <u>scoregroup, or pairing bracket</u> (*see [1.3]*), or a generic set of players, each indicated by their respective TPN[12].

***

[12] *On occasions, players may be represented instead by means of Bracket Sequence Numbers (BSN) – see <u>Looking for a better candidate: transpositions</u>, page 25.*

3 The Making of the First Round (The Fundamentals)

The rules to make the first round in different FIDE Swiss systems are slightly different, but *the resulting pairings are identical*. We have a number N of players, and we want to match them in pairs. So, if the number N of players is even, we can form a number P = N / 2 of pairs; but if the number of players is odd, one of them will remain unpaired and we will be able to form only P = (N – 1) / 2 pairs. To do that, the players list, ordered as described above, is divided into two *subgroups*, called S1 and S2. The former, S1, contains the first players, in the same number P as the pairs we are going to make – i.e., since this is the first round, the first half of them, rounded down to the nearest integer. The latter, S2, contains all the remaining players, i.e., the second half of the list, rounded up[13] *[3.2]*:

$$\begin{cases} \mathbf{S1 = [\ 1, 2, 3, 4, 5, 6, 7]} \\ \mathbf{S2 = [\ 8, 9, 10, 11, 12, 13, 14, 15]} \end{cases}$$ [14]

Now, we pair the first player from S1 with the first player from S2, the second one from S1 with the second one from S2, and so on, thus getting the "raw" (i.e., unordered) pairs (1-8, 2-9, 3-10, 4-11, 5-12, 6-13, 7-14). Since this is the first round, unless we have some special reason to do differently, there is nothing to stop these pairings.

Here, the number of players is odd. Hence, after all pairs have been made, one player is left unpaired. That player receives a *pairing-allocated bye* ("PAB"): one point[15], no opponent, no colour (*[1.5], [C.04.1:3]*). In the first round, this is always the last player of the list, i.e., in the present instance, player #15.

To complete the pairing process, now we need to assign to each player their appropriate colour. Since no player has a colour preference yet, all the colour allocation shall be regulated per *[5.2.5]*. Hence, in each pair, the higher ranked player (who comes from S1) gets the initial-colour, if the player's TPN is odd; or the opposite colour, if their TPN is even. Thus, players 1, 3, 5, and 7 receive the initial-colour, for which we drew White, while players 2, 4, 6 receive the opposite colour, which is Black. The opponent to each player from S1 shall receive the colour opposite to that player; therefore, the complete pairing will be as shown.

Board	**White**		**Black**
1	**1**	–	**8**
2	**9**	–	**2**
3	**3**	–	**10**
4	**11**	–	**4**
5	**5**	–	**12**
6	**13**	–	**6**
7	**7**	–	**14**
8	**15**	–	**PAB**

[13] *When the number of players is odd, S2 will contain one player more than S1. There are instances when we try to make less pair than the maximum, so that the second subgroup is larger than that. We will find such situations when discussing the following rounds.*

[14] *Since names are inessential, from now on we indicate players only by their own Tournament Pairing Numbers (TPN).*

[15] *The usual score for a player who gets the PAB is that of a win (usually, one point). However, the tournament regulations may provide for a different score.*

Before the pairings can be published, we must put them in order *[C.04.2:3.6]* according to the following criteria: (1) the score of the higher ranked player in the pair; (2) the sum of scores of both players; and (3) the lowest TPN of the higher ranked player. In most cases, the FIDE (Dutch) system generates pairings that are already in the right order (but this is not always true, especially in advanced rounds, so we want to check).

At last, we are almost ready to publish the pairing. Before that, we check it once again with the utmost care because, normally, *a published pairing should not be modified* *[C.04.2:4.4]*[16]. In case of an error (wrong result, game played with wrong colours, wrong ratings, and so on), the correction will affect only the pairings yet to be done[17] and only if the error is reported by the end of the next round. After that, it will be considered *only for purposes of rating calculation* *[C.04.2:4.3]*. In such cases, even the final standings will include the wrong result just as if it were correct!

Finally, we update the tournament board and crosstable, on which the pairing officer will post pairings and results for each player (this may be done while the games are in progress). When we renounce the use of pairing cards, as we do here, our copy of the board should also contain all relevant information required to compose the pairings for following rounds.

Crosstable markings

For each player's game, we should indicate at least the opponent, the assigned colours, the float status, and the result – and, possibly, additional useful information. The choice of symbols is free, as long as it is *clear, unambiguous, and uniform*. Here, we will show each pairing by means of a group of symbols comprised of the result ("+", "=" or "-", with obvious meaning), then a letter indicating the colour ("B" for Black, "W" for White, while we mark a forfeited game, i.e., a game that was scheduled but not played, and therefore has no colour, with an "F"), followed by the intended opponent's TPN[18], and finally we can have optional arrows "↑" and "↓" to indicate a previous upfloat or downfloat[19], if any (see

[16] *Article [C.04.2:4.4] of the General handling rules for Swiss tournaments states the special cases when a pairing can be changed even if it was already published. In this regard, see also FIDE Handbook C.05: "FIDE Competition Rules", item 7.4.*

[17] *Even in the event of an error, this rule does not allow the making of new pairings – which is a somewhat frequent request of players.*

[18] *In case of a game or match that was not disputed (e.g., a forfeit), the intended opponent is irrelevant (this pairing can be repeated, see C.04.2:3.5). However, this piece of information can be useful later if we need to check the pairings.*

[19] *Sometimes a player is paired to an opponent with a different score. To keep track of such events, we associate a flag to the player, marking the players' cards, or the tournament board, respectively with a downward arrow "↓" (often replaced for convenience by a lowercase "v") for downfloats; or with an upward arrow "↑" (often replaced by a "^") for upfloats. In this widespread convention, a single arrow indicates a float received in the last round. When there are two arrows, the first (from left to right) indicates the float marker for the last round, while the second indicates the float*

[1.4]). For example, "+B3" means that the player was paired against player #3, had Black pieces, and won the game; whereas "-F13" means that the player was paired against player #13, but forfeited (did not attend) the game.

Unplayed games are indicated in different ways, depending on their nature. Forfeited games are shown as indicated above. "PAB" indicates a Pairing-Allocated Bye, while "HPB" ("*Half Point Bye*") or "ZPB" ("*Zero Point Bye*") indicate an announced leave[20].

Since we do not make use of pairing cards, our crosstable or tournament board will also show each player's progressive score, to help us in the preparation of pairings and intermediate standings.

***

We should now collect the results of all the games and then proceed to update the crosstable and to make the pairings for the next round.

Board	Players	Result
1	**1 (0.0) - 8 (0.0)**	**1-0**
2	**9 (0.0) - 2 (0.0)**	**½-½**
3	**3 (0.0) - 10 (0.0)**	**1-0**
4	**11 (0.0) - 4 (0.0)**	**0-1**
5	**5 (0.0) - 12 (0.0)**	**½-½**
6	**13 (0.0) - 6 (0.0)**	**1-0**
7	**7 (0.0) - 14 (0.0)**	**0-1**
8	**15 (0.0) - PAB**	**1**

marker for the previous round (i.e., the last-but-one). When we must indicate a float in the last-but-one round but no float in the last round, we put a "-" sign before the arrow – e.g., "-↓" indicates a downfloat in the last-but-one round, and no float in the last round.

[20] *In exceptional cases, we could find an "FPB", which indicates a "Full-Point Bye" (a leave for which the player received the same score as for a win). This is sometimes assigned by the arbiter as a "last resort" to correct some unforeseen circumstance. This is a deprecated practice, to be used only out of sheer necessity.*

4 Second Round (HPB, Transpositions, and Exchanges)

Here is the tournament board after the first round.

Player	PN	1		2		3		4		5		6		7		8		9	
		Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts
Alice	1	+W8	1.0																
Bruno	2	=B9	0.5																
Carla	3	+W1	1.0																
David	4	+B11	1.0																
Eloise	5	=W1	0.5																
Finn	6	-B13	0.0	**HPB↓**	0.5														
Giorgia	7	-W14	0.0																
Kevin	8	-B1	0.0																
Louise	9	=W2	0.5																
Mark	10	-B3	0.0																
Nancy	11	-W4	0.0																
Oskar	12	=B5	0.5																
Patricia	13	+W6	1.0																
Robert	14	+B7	1.0																
Stephanie	15	**PAB↓**	1.0																

Before the start of the tournament, Player #6 (Finn) obtained a “Half Point Bye” (HPB) for the second round. Thus, *the player shall not be paired [C.04.2:3.3]* and shall score half point – that is why we already posted a “HPB” in the tournament board. Scoring more than zero, the player will also get a “downfloat” for the current round *[1.4.3]*. For the same reason, a downfloat was assigned for the previous round to player #15, who received a PAB.

Because of the HPB given to player #15, this round has an even number of players, so that no player will get the pairing allocated bye (PAB).

Scoregroups and brackets

Now, players have different scores, and a basic principle of all Swiss pairing systems states that, as far as possible, *paired players should have equal scores [C.04.1:5]*. To achieve this result, we sort players according to their scores. To this end, we define the scoregroup, which is a set of players who have identical scores at the beginning of the current round *[1.3.1]*.

A scoregroup is the main component of a (pairing) *bracket* *[1.3.2]*, which is a set of players to be paired among them. A bracket that contains just a scoregroup (i.e., all players in the bracket have the same score) is called homogeneous. The pairing process proceeds towards decreasing scores, one scoregroup at a time, from the upper one (i.e., the one corresponding to the maximum score) to the lower one (corresponding to the minimum score) – hence, the first task in pairing a round is to split players into scoregroups.

In practice, it happens rather frequently that one or more players in a bracket cannot be paired within their own bracket. Those players shall be moved down and join the players of the next scoregroup – in their own original bracket, they are called *downfloaters* *[1.4.1]*.

The next scoregroup, together with those displaced players, will form the next bracket. Since this bracket contains players with different scores, it is called *heterogeneous*. In such brackets, some players will meet opponents with different scores (they are called "floaters"), so such brackets must be treated somewhat differently than homogeneous ones. A player moved down from the previous bracket (and, thus, having a higher score) is called a *moved-down player* (MDP for short) *[1.4.1]*[21].

***

First, we divide and group players in *scoregroups* *[1.3]* according to their score. Then, as mentioned, those scoregroups are processed ("paired") one after the other, beginning with the topmost scoregroup, which contains the highest ranked players. In the current round, those are the players who scored one point. The next scoregroup contains the players who scored half a point. Last, we have the scoregroup of the players who scored zero points. So, we have:

1.0	{1, 3, 4, 13, 14, 15}
0.5	{2, 5, 9, 12}
0.0	{7, 8, 10, 11}[22]

Pairing parameters

It is now time to begin the pairing. Since this is our first time, we want to analyse the process in detail. Then, as we progress through the tournament, we will skip over the more mundane tasks, to focus only on the more interesting ones.

Let us start with the first bracket, consisting only of the first scoregroup (there can be no MDP there). In the first step, we determine some important parameters of the bracket (*see [3.1]*).

The first parameter is the number **M0** of moved-down players. This is the number of players who should have been paired in the previous brackets but in fact were not (this can happen for diverse reasons, which we will discuss later) – so it is well-known.

The second parameter is **MaxPairs**, or the number of pairs to be built in the bracket. There is no straightforward method to determine this number – actually, we must "divine" it – but

[21] *The opponent of a moved-down player is usually said to be an "upfloater". Please note that this is just a customary name. In fact, the Rules for the FIDE (Dutch) Swiss system contain no official definition for the upfloater.*

[22] *This scoregroup does not contain player #6, who is not going to be paired because of the announced absence (see [C.04.2:3.3]).*

an "educated guess" usually allows us to estimate it in a reasonably reliable manner. The number of pairs cannot be larger than half the number of players, which is therefore an "absolute theoretical maximum" to the pairs we can build. The number of pairs can be smaller, for several reasons:

– there may be players who, for whatever reason, can play with no other player in the bracket[23]. Such players are said to be *incompatibles*.

– sometimes, a bracket contains players who "compete" for the same opponent(s) in such a way that each of them can be paired, but we cannot pair all of them[24]. This situation is usually called "*semi–(in)compatibility*", or "*island-compatibility*".

– in some circumstances, the next bracket may require some floaters to be moved down into it, to make the pairing possible at all. We will come back to this problem later on.

Sometimes, not all the M0 moved-down players can be paired. Hence, we also define an additional parameter, **M1**, as the number of MDPs that are paired. Of course, M1 cannot be greater than M0. Any MDP who is incompatible in the bracket would detract from M1. This is the only certain information we have for this parameter. Again, we must guess its value based on sound reasoning and common sense.

***

This is the very first bracket, so there are no MDPs and, therefore, $M0 = 0$ and, thus, also $M1 = 0$. In this first bracket, our task is fairly easy: there are six players, and no incompatibles (it is too early in the tournament[25]), so we can safely guess that we will be able to build three pairs.

Colour preferences

Each player who played at least one game has a *colour preference* (sometimes also called *expected colour*). To determine it, we need first to define the *colour difference* $\boldsymbol{C_D}$. This is simply the difference between the number W of rounds that the participant *actually* played with White, and the number B of those *actually* played with Black: $\boldsymbol{C_D = W - B}$ (*see [1.6]*).

[23] *There is no way to pair such a player in the bracket. This player can't help but go look for an opponent somewhere else – which means, downfloat to the next bracket.*

[24] *For example, consider the bracket {1, 2, 3, 4} in which all players #1, #2, and #3 can play only with player #4. No player here is incompatible, as we can pair any one of them, but we cannot pair them all.*

[25] *In a second round, anyone may still play with almost everyone else. That is why, usually, we don't have incompatible players yet, unless special circumstances arise. For example, let's suppose that, in the first round, only two players drew against each other – in the second round, the half point scoregroup is going to contain only those two players, who have no possible opponent in the bracket and are, thus, incompatible.*

This difference is positive for a player who had White more often than Black, negative for a player who had Black more often than White, and zero if colours are balanced. Of course, the latter case is our ideal goal, and the pairing shall pursue it as far as possible.

The colour preference is determined as follows:

- A player has an *absolute colour preference* *[1.7.1]* when $C_D > 1$ or $C_D < -1$ – that is, when the player had a colour (at least) twice more than the other one; or when the player had the same colour for two games in a row[26]. The preference is towards the colour that was received fewer times or, respectively, the colour that the player did not receive in the last two games. In both cases, the player *must* receive the expected colour (in practice, we write it right away on the pairing card or in the tournament board). *The only exception may happen in the last round, for a player with more than half of the maximum possible score*[27] (this is called a "*topscorer*", see *[1.8]*) *or their opponent*. In this case, indeed, top ranking positions may be at stake; hence, pairing players of equal scores is especially important. In all other cases, the colour preference *shall* be honoured, period. This is an *absolute* criterion – in order to comply with it, we make players float as required.
- A player has a *strong colour preference* *[1.7.2]* when $C_D = \pm 1$ (i.e., when the player had a colour once more than the opposite). Needless to say, the preference goes to the colour that the player received fewer times *[C.04.1:8]*.
- If $C_D = 0$, the player has a *mild colour preference* *[1.7.3]* for the colour opposite to that of the previous game, so as to alternate colours in their *colour history*[28] *[C.04.1:8]*.
- Finally, a participant, who did not play any games yet (e.g., a "*late entry*"; or a player who received a PAB; or one whose game was forfeited), has no colour preference at all *[1.7.4]* and receives the colour opposite to that due to the opponent.

A player may have an absolute preference and a "lower grade" preference at the same time. For example, a player with a colour history BWWBB has an absolute colour preference because of the two Black colours in a row, together with a strong colour preference because of $C_D = -1$. It goes without saying that every time a player has multiple colour preferences, we only consider the stronger one, i.e., the one that comes first in the above hierarchy.

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26 *Again, we refer only to games that were actually played – the colour initially allocated for a game that was forfeited is irrelevant and shall be ignored.*

27 *For example, in a nine-round tournament the maximum score before the last round is eight points. So, a topscorer is a player who has 4.5 points or more.*

28 *The colour history of a player is the sequence of colours that the player received in the previous played rounds.*

Strong and mild colour preferences may be disregarded, when necessary, and, therefore, the player might also get the colour opposite to the expected one. In such cases, the player will have an *absolute* colour preference (that will tend to equalise the colour balance) in the next round.

During the pairing process, we need to keep a handy record of colour preferences for each player. To avoid the use of yet another table, we temporarily record all colour preferences in the tournament board, e.g., in the column bound to the pairing for the round (when the time comes to post the pairings, we will not need the colour preferences anymore).

Now, we need a code to indicate the various kinds of colour preferences[29]:

– a lower-case letter “w” or “b” indicates a *mild* colour preference, respectively for White or Black,
– a capital letter “W” or “B” indicates a *strong* colour preference,
– a capital “W^D” or “B^D” indicates an *absolute* colour preference because of a large colour difference (“D” for “[colour] difference"),
– a capital “W^S” or “B^S” indicates an *absolute* colour preference because of a colour repeated twice (“S” for “[colour] string”),
– a capital “A” indicates a player who has no colour preference at all.

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We should now proceed to determine the colour preference for each player. To do that, we examine the colour history in all the previous games of each player. (As already mentioned, we take into consideration only the games that were actually played, disregarding all others). We then mark the expected colour in the tournament board, thus obtaining the following.

Player	**PN**	**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**		**9**	
		Pair	**Pnts**	**Pair**	**Pnts**	**Pair**	**Pnts**	**Pair**	**Pnts**	**Pair**	**Pnts**	**Pair**	**Pnts**	**Pair**	**Pnts**	**Pair**	**Pnts**	**Pair**	**Pnts**
Alice	1	+W8	1.0	B															
Bruno	2	=B9	0.5	W															
Carla	3	+W10	1.0	B															
David	4	+B11	1.0	W															
Eloise	5	=W12	0.5	B															
Finn	6	-B13	0.0	**HPB↓**	0.5														
Giorgia	7	-W14	0.0	B															
Kevin	8	-B1	0.0	W															
Louise	9	=W2	0.5	B															
Mark	10	-B3	0.0	W															
Nancy	11	-W4	0.0	B															
Oskar	12	=B5	0.5	W															
Patricia	13	+W6	1.0	B															
Robert	14	+B7	1.0	W															
Stephanie	15	**PAB↓**	1.0	A															

[29] *Please note that this is a “local” convention, and it is far from universal – others may use completely different codes.*

The round we are going to pair is an even numbered one. Hence, a participant, who did not miss any previous games, played an *odd* number of them (in fact, one), thus obtaining a strong colour preference (this early in the tournament, we cannot have absolute colour preferences yet). We indicate such preferences in the bracket, using our "colour-preference-code" to add information right after the player's TPN: *{1B, 3B, 4W, 13B, 14W, 15A}*.

We already estimated that MaxPairs (or the number of pairs to be done, *see [3.1.2]*) for this bracket is three. Now, we want to check how many of these pairs cannot fully satisfy the colour preferences. Here, two players prefer White, three prefer Black, and one has no preference at all (for player #15, this will be the first round) – hence, it is theoretically[30] possible to make three pairs in which every player's colour preference is satisfied, i.e., no player should receive a colour other than the preferred one (if any).

*The "colour matching" parameters **x** and **z***

In real life, the distribution of colour preferences is not always so favourable that all players can have their colour preferences complied with[31]. The minimum number of pairs that must (unavoidably) contain a disregarded colour preference (of any kind) is usually called ***x***. In a perfect pairing, the number of disregarded colour preferences will be exactly ***x***. We can estimate this number by taking the integer part of half the difference between the number of players expecting White and the number of players who expect Black. Any number of players with no colour preference will be counted as having a preference that helps to equalise expected colours, which is (usually) the same preference of the minority[32] – we have just one such player here. From this point of view, any pairing that contains ***x*** pairs with disregarded colour preferences is *perfect* (out of necessity, since having less than that is impossible). However, we will not accept any pairing that contains more than that *(see [2.4.7], [C12])* except, of course, when we cannot avoid it.

Another parameter we want to know is the *minimum number **z** of pairs in which it will be necessary to disregard a strong colour preference*. This number will help us in the process of optimization, which requires that, if we have to disregard a colour preference, it should be

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[30] *This is only a very first evaluation. In general, other reasons could make it impossible to comply with a given colour preference – so that, sometimes, and particularly in later rounds, we will have to lower our expectations. For example, suppose that we have a bracket with four players, two of which have preference for Black and the other two for White. If one of the players due Black already met both players due White, we shall have to pair the two players due Black together (and, therefore, the two players due White will be paired together, too).*

[31] *For example, if we had four players expecting Black with only two expecting White, it would be readily apparent that at least one player with a preference for Black will have to get a White colour instead.*

[32] *A disregarded colour preference should (preferably) belong to the majority colour. Thus, considering a null preference as a preference for the minority colour helps us "satisfy" one more player.*

(as far as possible) a mild one rather than a strong one[33]. This number is given by the difference between ***x*** and the number of players that have a mild preference for the majority colour[34] (with a minimum of zero, of course). Of course, when ***x*** is null, ***z*** is null too, so we should disregard no strong preferences.

If a bracket contains only strong preferences, or only mild ones (ignoring for the moment all absolute preferences, which must be complied with, always), then parameter ***z*** is useless, just as criterion C13 *(see [2.4.8])* is, and we simply ignore them both.

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In the present instance, we have W=2, B=3, A=1 (not all players have a preference) – hence, ***x*** = (3-2-1)/2 = 0, which means that, as anticipated, no pair is bound to contain a disregarded colour preference.

<u>*Preparation of the candidate*</u>

Now we divide the players of the bracket between subsets S1 and S2 *(see [3.2])*. We put into S1 the first MaxPairs players of the bracket (in this case the first half of the players), while the rest (namely, the second half) ends up in S2: **{S1=[1B, 3B, 4W], S2=[13B, 14W, 15A]}.**

Then we sort each subgroup according to the usual rules *(see [1.2])*. This order normally coincides with the original one, so, usually, there is nothing we need to do, unless we got to this point after an exchange of players between S1 and S2.

So far, we only performed the necessary preliminary steps – now we are ready to prepare a <u>*candidate*</u> *(see [3.2])*, which is a *tentative pairing* built as explained in [3.3]. To build it, we associate the first player of S1 with the first player of S2, the second player of S1 with the second player of S2, and so on, just as we did for the first round, obtaining the following tentative pairs[35].

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[33] *Of course, absolute colour preferences can never be disregarded – the only possible exception being for topscorers or their opponents, during last round.*

[34] *For instance, let the number W_S of White seekers (players with White colour preference) be greater than the number B_S of Black seekers (we call White "the majority colour"). The x players should all be White seekers, and as many of them as possible should have mild colour preferences, while the rest will have strong ones (only during the last round, some absolute colour preferences might be disregarded too, so our line of reasoning should be suitably adapted). Hence, we can estimate z simply as the difference between x and the number W_M of White seekers (or, respectively, the number B_M of Black seekers) who have a mild colour preference, with the obvious condition that z cannot be less than zero:*

$z = max(0, x - W_M)$ if $W_S \geq B_S$ *(White majority)*

$z = max(0, x - B_M)$ if $W_S < B_S$ *(Black majority)*

For several reasons, the number of players who cannot get their strong preference may be greater than that.

[35] *The pairs in this candidate are to be read vertically, as (1, 13), (3, 14), (4, 15). For now, colours do not matter – we will attend to their assignment at the end of the round-pairing.*

S1	1B	3B	4W
S2	13B	14W	15A

Evaluation of the candidate

Now, having built a candidate, we proceed to evaluate it (*see [3.4]*). First, we must check it for compliance with the absolute criteria [C1] (players who already met, *see [2.1.1]*) and [C3] (clashing absolute colour preferences, *see [2.1.3]*). Criterion [C2] *(see [2.1.2])* does not apply to this bracket, because it is not the last one, so we do not have to allocate a PAB here. The Completion Criterion [C4] *(see [2.2.1])* is in a class of its own, being more of an "operative instruction" than a "selector". It states that a bracket pairing is not acceptable if it does not allow us to successfully complete the round-pairing – which is, *per se*, something rather obvious, although its introduction as a pairing criterion was a major revolution in pairings. We will go back to that criterion presently – for now, suffice it to say that completing the pairing for a second round is virtually always possible, so there is no need to worry about that now. Criterion [C5] *(see [2.3.1])* states that the PAB should be allocated to a player whose score is as little as possible – since we have no PAB in this round, we ignore it.

A candidate that complies with all the (relevant) absolute criteria, as this one, is said to be *legal* and can be evaluated for quality. A candidate that is not legal can only be immediately discarded.

Now that we made sure that the absolute criteria are complied with, we must evaluate the compliance of the candidate with the quality criteria [C6]–[C21]. This compliance is measured by means of *failure values*. Those are numerical values that describe "how good" the pairing is – the lower the failure value, the better the candidate. As we will realise presently, not all criteria need to be considered always – in several instances, some of them are irrelevant[36] and we can limit our attention to the significant ones only. However, since we are pairing a non-trivial bracket for the very first time, let us briefly examine them all, one by one. To summarise the overall quality of the candidate, we can build a simple table in which we accommodate the failure values of the bracket with respect to each one of the quality criteria. By doing so, we obtain a sort of "report card" for the candidate.

C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21

Now, we fill our report card with all the failure values; let us then examine the candidate with reference to each criterion and determine the respective failure values.

[36] *For example, criteria C10 and C11 concern only topscorers and their opponents – hence, they apply only in the last round of the tournament, and only to some brackets, thus being completely irrelevant in most situations.*

C6 minimises the number of downfloaters, thus maximising the number of paired players. The simplest failure value we can define for this criterion is the ***number of players that we cannot pair***[37]. In our bracket, we need to build three pairs, and we are going to make all of them – since we are making all the possible pairs, the failure value of the candidate for C6 is zero.

C7 minimises the scores of the downfloaters. Of course, this criterion is useless in homogeneous brackets, where all players have, by definition, the same score – it only applies in heterogeneous brackets, where the MDPs' score is higher than that of residents. Minimising the downfloaters' score implies that they should be chosen from among residents as far as possible; and, if we cannot avoid making an MDP float, that MDP ought to have the lowest possible score – i.e., we privilege the pairing of the highest-scoring MDPs.

Please note that in this process we proceed by steps – first, we minimise the score of the highest-ranked downfloater, then the second highest, then the third highest, and so on. It may happen that pairing the highest ranked MDP makes it impossible to pair two (or even more) subsequent ones in the current bracket. This criterion directs us to sooner pair the MDP that has the highest score than to pair a larger number of MDPs (however, the total number of downfloaters was already set by Criterion [C6] and cannot change now).

The most natural failure value for this criterion is not a single number but a list of the scores of the downfloaters, sorted in descending order. Such lists are compared lexicographically (as usual), i.e., first we compare the first element of one list with the first of the other list, then the second ones, and so on. The result of the comparison is decided as soon as we find different elements.

The current bracket is homogeneous, so, for the time being, we can let the matter rest – we will come back to this later.

[37] *The choice of the failure value for a criterion is largely arbitrary, in that it may be any of a (infinite) number of functions (in the mathematical sense of the word) – the simplest choice is the number of failures (unpaired players, disregarded colour preferences, and so on).*

C8 chooses the "best" downfloaters, i.e., those that best pair the next bracket, thus minimising first the number and then the score of downfloaters to be created[38] (in addition to enforce compliance with the "compulsory" criteria [C1]-[C5]). This optimisation is extended *only to the next bracket* because looking several brackets ahead would be too difficult.

This criterion has multiple effects, so its "natural" failure value is not a single number as usual, but complex information. First, we have the number of pairs that cannot be built in the next bracket (of course, ideally none). Then, we have a list of the scores of the players that will float down from the next bracket. Those lists are compared lexicographically.

In the present instance, as often happens, the number and score of downfloaters are not an issue in the next bracket. In such cases, there is nothing to optimise, so this criterion is not used.

C9 we already mentioned that, when a PAB is required, it must be allocated to a player with the lowest possible score (subject to the conditions established by the absolute criteria [C1]—[C3] and the completion criterion [C4]). Sometimes, we may have several players with the same minimum score, and it may well be that some among them played fewer games than the others. Criterion [C9] ensures that one such player, who already had fewer games than the rest of the field, does not receive a PAB if there is an alternative.

This criterion can be used only when the bracket downfloats just one player, and this player is then bound to receive the PAB (this is because its general application could even involve *all* the brackets, and this would be impractical).

C10, C11 minimise the numbers of topscorers, or topscorers' opponents, who get a colour difference with an absolute value higher than 2 ([C10]); or who get the same colour three times in a row ([C11]). These criteria only apply when pairing the last round, and only in processing those brackets that contain topscorers. The failure values would then be the numbers of involved topscorers or topscorers' opponents. As this is not the last round, there can be no topscorers, so both those

[38] *Please note again that the number of downfloaters from the current bracket was already set by C6. Therefore, we choose the best possible downfloaters, but <u>we do not increment their number</u> in order to maximise the pairs in the next bracket. For example, if the following bracket contains two incompatible players, we try to choose such downfloaters that allow their paring, but we never generate additional downfloaters!*

numbers are zero in the present bracket.

C12 minimises the number of players whose colour preference is disregarded. The natural failure value for this criterion is the number of players who do not get their colour preference. The minimum number of colour preferences that will unavoidably be disregarded in a bracket is ***x***[39], and we know that this number is not always zero. To determine if the candidate under scrutiny is perfect *[2.4]*, we compare the actual number of colour preferences disregarded in the candidate against the number ***x***, for which we found a value ***x*** *= 0*. A direct inspection of the candidate shows that one of the three pairs contains a disregarded colour preference; hence the failure value for this criterion is 1 and, since the reference value is 0, *the current candidate is not perfect*.

C13 minimises the number of players whose *strong* colour preference is disregarded. The failure value for this criterion is the number of players who do not get their strong colour preference, and the minimum for this number is ***z***[40]. All the considerations just made about [C12] also apply with respect to this criterion[41].

C14 … C17 minimise the number of residents who, having floated up or down in the last two rounds, float again in the same direction in this round. The failure value for each one of these four criteria is the number of floaters of the two kinds that float again. Since this bracket contains no floaters, all the relevant failure values are zero. For the time being, we shall not consider those criteria further; we shall return to this matter at a later stage.

C18 … C21 Minimise the score difference of MDPs who receive a float of the same type as they already got in the last two rounds. For these criteria, we will use as failure values the differences in score of the involved players. As mentioned, in the current bracket there are no floaters, hence, all these failure values are zero.

Now we can summarise the global quality of the candidate, filling in the failure values of the bracket for each one of the criteria into our report card.

C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21
0	0	0/0	0	0	0	**1**	**1**	0	0	0	0	0	0	0	0

[39] *See The "colour matching" parameters **x** and **z**, page 19.*

[40] *See The "colour matching" parameters **x** and **z**, page 19.*

[41] *Please note that, in the current bracket, the colour preferences are all strong, so that criterion [C13] is useless and may be ignored. However, since this is our first example, we will consider it all the same.*

<u>*Looking for a better candidate: transpositions*</u>

As mentioned, *this candidate is not perfect*, because the number of disregarded colour preferences is larger than the bare minimum (***x***). Hence, we must take some action to obtain, if possible, a better candidate. The first step in this quest is simple: we alter the subgroup S2, and possibly S1 also, looking for a perfect, or at least better, candidate (*see [3.5]*). After each alteration, we build and evaluate a new candidate, in the same way as we did above.

Since this is a homogeneous bracket, we are directed to rule *[3.6]*, which instructs us to first apply a *transposition* of S2, i.e., a change in the order of that subgroup. We want to try all the possible transpositions, one by one, until we find the first one that gives a perfect pairing. As soon as we find a perfect candidate, we end our quest and promote that candidate to pairing. If this procedure fails to yield an acceptable result, we apply one or more *exchanges* between S1 and S2 – and, for each exchange, we look again for the first successful transposition in the same way as described above.

So, first, to pursue our goal, we alter S2 with a transposition, which changes the order of the players, starting with the lowest ranked ones and then gradually moving towards higher ranks until an acceptable solution is found[42]. The method to do that is explained in *section [4]*, which gives the rules for the sequential generation of candidates.

Before applying any transposition or exchange, each player is *temporarily* labelled with a number, representing the player's ranking order *in that bracket*. This number is called "In-Bracket Sequence Number", BSN for short. BSNs form an ordered sequence of contiguous numbers[43] that never change when we transpose or exchange players, so they will help us to keep track of the transformations we are going to apply to the subgroups. Thus, we label the players in our bracket with numbers from 1 to 6:

player	1B	3B	4W	13B	14W	15A
BSN	1	2	3	4	5	6

We are now going to apply a transposition, which involves only players in S2, viz. {4, 5, 6}. The possible transpositions of the bracket are represented by all the dispositions of those

[42] *It is worth noting that, since we start moving players at the bottom of the subgroup, and choose the first useful transposition, it is possible (and even statistically likely) that, when x is not zero, the pairs in which we find disregarded colour preferences are located at the top of the bracket. Please note that this may be different from what happens with other Swiss systems.*

[43] *In a bracket, TPNs are not necessarily in strict ascending order. This is the first reason why we use BSNs, which, on the contrary, are, by definition, ordered. Furthermore, they must be contiguous because we use the exact player's position in the bracket to sort exchanges – we will discuss this further in <u>Resident exchanges</u>, page 29.*

three numbers, sorted in lexicographic order. This is equivalent to arrange all numbers that can be constructed with these figures in ascending order (in our case: 456, 465, 546, 564, 645, 654) *[4.2.2]*. The first transposition represents the basic order of the subgroup, which we already used in the first pairing attempt. Now, we start trying from the second transposition on, i.e., 465, or [13B, 15A, 14W]:

S1	1B	3B	4W
S2	13B	15A	14W

In this candidate, only the pair 3-15 meets both the colour preferences, so, it is even worse than the previous one – now, the failure values for [C10] and [C11] are both 2. Thus, we discard this candidate, keeping the previous one as provisional-best, and proceed to the next transposition, which is 546.

S1	1B	3B	4W
S2	14W	13B	15A

This new candidate still contains one disregarded colour preference. Since it is not better than the current provisional-best, we discard it too. The next transposition is 564.

S1	1B	3B	4W
S2	14W	15A	13B

Now, this candidate complies with all colour preferences; therefore, it is *perfect*, and we accept it[44]. The yielded pairs are 1-14, 3-15, 4-13. The colour to be assigned to each player remains yet to be defined; we will do that only after the pairing of all players, or *round-pairing* (*see [1.9]*), is complete.

Comparing Failure Values

This candidate is the first perfect one that we found. It is therefore immediately accepted because there can be no better and earlier candidate. Hence, there would be no need to compare it with the previous ones. We will do that anyway, just as an exercise, to show how candidate evaluation is performed.

First, we prepare the report card, and put it side-to-side with that of the previous candidate.

[44] *We could have observed that, to avoid disregarded colour preferences, we had to reach a transposition in which player #13 (BSN 4) is dislocated, skipping the useless previous pass, and thus reaching the required transposition at once. Such shortcuts are most useful in manual pairing, but they must be used with the utmost caution.*

	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21
old	0	0	0/0	0	0	0	**1**	**1**	0	0	0	0	0	0	0	0
new	0	0	0/0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0

Now, to compare the two candidates, we begin comparing the first failure values (C6). If one of the two is smaller than the other one, that one marks the better candidate, and the comparison process stops there. As long as failure values are identical, the candidates are still "equivalent" and we proceed downwards to the next failure value [C7], then to [C8] and so forth, always operating in the same way, possibly until the last one ([C21]). If, in the end, we found no difference, the candidates are indeed equivalent (from the point of view of the quality of pairing) and we choose the one that comes first in the sequence of generation.

This kind of complete comparison (we call it "lexicographic") is of great theoretical value. However, when pairing manually, we almost never need to resort to this formal procedure – usually, we just compare the (usually few) relevant failure values in hierarchical order.

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The "Requirement Zero"

In the new rules, Criterion [C4] (see [2.2.1]) dictates that a complete round-pairing must exist *at any stage* of the bracket pairing. This is informally called the "*Requirement zero*". For the round-pairing *[1.9]* to be successfully completed, a valid pairing must exist not only for the current bracket, but also for the all the still unplayed ones – we usually call it the "*Rest*"[45]). Thus, to enforce this criterion, we must prove that *at least one legal pairing exists* for all the remaining players. Quality is no concern of ours in this test (we are not interested in finding the "right" pairing now). In fact, we are only looking for *a legal pairing whatsoever* – and finding it is an easy task[46]. This check is called a "Completion test". In the early rounds of a tournament, this test is *essentially useless* because so very few players have already met that it is virtually impossible that the pairing does not come to fruition. However, it becomes more and more important as the tournament progresses, especially if there are few players.

We should first perform this test before the beginning of the round-pairing, in order to verify that a legal round-pairing is possible. Should this test fail, we ought to devise some trick to

[45] *Please note that this Rest has nothing to do with the Remainder, which is the remnant of a heterogeneous bracket resulting from the MDP-Pairing (see [3.3.3]).*

[46] *For a simple method to perform this task, see Appendix 1. However, we need no special method to find this "test pairing" – as long as it is legal, the first ugly mesh-up we can think of will be just fine!*

get around the impasse (see [1.9.3]); if the test is successful, we can be sure that the pairing will come to fruition.

During the bracket pairing, we should perform this test again and again, to check that the pairs we are building are not going to prevent the completion of the round-pairing. However, the pairing of the subsequent brackets only depends on the players that will have to be paired *there*, and not on any operation whose results remain confined within the current bracket. This means that we can affect subsequent brackets only at the time when we choose the players to be paired there. Therefore, *we must choose downfloaters with an eye to the Completion criterion*, so that, when the bracket pairing is completed, we will already be sure about its compliance to [C4]. The Completion test should then be performed only when we choose downfloaters. During the bracket pairing, this happens in several different situation:

- when we choose the MDP set (see [4.4]), and so, implicitly, we also choose the downfloaters who belong in the Limbo (see [3.2.4]),
- when we choose the PAB-assignee (if any),
- when we have an odd bracket and, therefore, must downfloat (at least) one player,
- when we choose additional downfloaters to make the round-pairing possible.

When a bracket produces no downfloaters, the Completion test made at the beginning of its pairing is sufficient. Sometimes, however, when the pairing is easy, we will save some time by performing the Completion test at the end of the bracket pairing instead of when choosing downfloaters, so it also serves for the next bracket (of course, this is somewhat risky, since a possible test failure means that we wasted time and effort).

By the way, we could even think that, when the bracket produces no downfloaters, the Completion test made for the previous bracket still holds. This is not so because, in the Completion test, we may well pair players with different scores – i.e., we could have made downfloaters, possibly even unnecessary ones.

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First, we need to define the set of players yet to be paired. Looking into the crosstable, we readily find that the Rest is {2, 5, 9, 12, 7, 8, 10, 11}. We immediately find a legal pairing, e.g. (2-5, 9-12, 7-8, 10-11). Of course, this pairing is “almost random” and, most likely, will not be the correct one – but this is irrelevant, because we are just making sure that (at least) one legal pairing exists. Since we just found one, we are now certain that, indeed, this round-pairing can be somehow completed.

Now, let us move to the next bracket, which contains the players who have scored 0.5 points, namely **{2W, 5B, 9B, 12W}**. Since two players expect Black, and two expect White, we should be able to accommodate all colour preferences, i.e., $\boldsymbol{x} = 0$. First, we perform the completion test, which is successful (in fact, the test pairing can be essentially identical to the previous one). Now, we divide the bracket in subgroups, obtaining the following.

S1	2W	5B
S2	9B	12W

We know that, in the first round, player #2 already played with #9 and player #5 played with #12. Thus, the "natural" pairing (2-9, 12-5) is *illegal* (it does not comply with [C1]), so this candidate is discarded at once. We need to apply a transposition – in fact, there is only one available – thus obtaining the following.

S1	2W	5B
S2	12W	9B

Now, this candidate is legal, but it disregards two colour preferences. We should be able to comply with all preferences, so this candidate *is not perfect*. Since it is legal, we save it as a *provisional-best* (or "*Champion*"), however we proceed to look for a better one. If we find no better candidate, this one will still be usable.

As we build more candidates, we will evaluate them against the current provisional-best, keeping the best of the two as the new provisional-best. If at any time we find a perfect candidate, we promote it at once, discarding any possible provisional-best. If, on the contrary, we find no perfect candidate (even after all the possible candidates are used up), the surviving provisional-best is the best possible candidate and, therefore, the one to be used.

Resident exchanges

Since this was the only possible transposition, and the bracket is homogeneous, we must try a *resident exchange*, which is a swap of resident players between S1 and S2 *(see [3.6], [4.3])*. We take a player from S2 and swap it for a player from S1, thus attempting to obtain an acceptable pairing. If the exchange of one player is not enough, we can swap two, three, and so on[47] - until we find a solution (or use up all the possible exchanges).

[47] *Let us consider the example of a six players bracket {[1,2,3][4,5,6]}. In this bracket, let us exchange players 3 and 4 between S1 and S2, thus obtaining the new subgroups composition {[1,2,4][3,5,6]}. This exchange is "useful" because it yields candidates that were not previously found (e.g., 1-3, ...). Now, let us exchange players (3,5), then (2,4), then (2,5), and so on. Each new exchange gives some new candidates, so all these exchanges are useful (at least until we try to exchange player #1: in fact, this player was already paired with all possible opponents during the previous exchanges, so this exchange is useless). However, candidates containing pairs formed by the exchanged players are*

A single exchange (i.e., one player for one player) is usually rather easy to manage – the matter may become tricky when more players are involved. To avoid errors, we follow some general rules:

- First, we shall exchange as few players as possible – this item needs no explanation...
- Then, we exchange the smallest possible difference between the sum of BSNs of the moved players. To clarify this rule, let us consider the example of an exchange between players P1a and P1b from S1 and players P2a and P2b from S2 – all represented by their BSNs. The principle that exchanged players must be as near in ranking as possible implies that the differences between the BSNs of exchanged couples must be, on the whole, as little as possible. To comply with this principle, the rules choose to minimise the difference of the sums, which is equal to the sum of those differences[48].
- Then again, when we have two possible exchanges with the same difference, we must decide which one of the two is to be tried first. The first criterion it to choose the lowest possible exchanged player(s) in S1 (and, therefore, the greatest different BSN[49]). For example, exchanging players {3, 4} from S1 is better than exchanging players {2, 4} – *but exchanging players {1, 5} is even better*, because, *in S1, exchanging #5 is (always) better than exchanging #4, whoever the higher ranked players in the exchange may be.*

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always useless, because they were already checked – e.g., exchanging (3,4) we obtain among the others, also the candidates (1-5, 2-6, 4-3) and (1-6, 2-5, 4-3) that were already examined as (1-5, 2-6, 3-4) and (1-6, 2-5, 3-4) – and this is easily extended to brackets containing any number of players. Now, let us consider the exchange of two players per subgroup, e.g. {[1,4,5][2,3,6]}. Here, every candidate contains at least one pair formed by exchanged players and is therefore useless. We may see that this situation happens in any bracket, each time the number of exchanged players is greater than half the number of players in S2 (which is the largest subgroup). We conclude that there is a theoretical maximum to the number of players that can be usefully exchanged in the bracket, which is half the number of players in S2 (rounded down if needed). For a deeper explanation on this matter, see Appendix II – How many players can we exchange?, page 70.

48 *In general, this sum is S = (P2a-P1a) + (P2b-P1b) + (P2c-P1c) + (P2d-P1d) + ... or, readjusting the terms, S = (P2a+P2b+P2c+P2d+...) – (P1a+P1b+P1c+P1d+...). In fact, the sum of the differences would be simpler to understand as a rule. However, the Rules choose to use the difference of the sums because, from a practical point of view, computing it is a bit simpler than computing the sum of differences. We ought to note that exchanging (2,3) for (4,5) is the same as exchanging (2,3) for (5,4), because the subgroups S1 and S2 must be sorted after each exchange. Also, we could note that this rule is also equivalent to minimising the sum of BSNs in subgroup S1 after the exchange, which depends on the values of both the outgoing and the incoming BSNs. For example, let us consider the bracket {[1, 2, 3],[4, 5, 6]}. The best exchange is 3↔4, which leaves a sum of the BSNs in S1 equal to 7. If we exchanged, say, 2↔4, this sum would be 8, and the same holds for the exchange 3↔5 – and so forth.*

49 *To compare the two exchanges and find which one comes first, we begin with the lowest-ranked players (highest BSNs), comparing the corresponding BSNs; if they are different, we choose the exchange with the higher BSN. If, on the contrary, they are equal, we proceed to the next lowest players, and repeat the comparison until we find the first difference or we use up all the players to exchange. This is still a lexicographic comparison, analogous to that used for the evaluation of Failure values (see Comparing Failure Values, page 26) and in several other instances; but a fairly unusual one because, unlike the other cases, the list is sorted in descending order and, moreover, the lower number takes precedence over the higher.*

- Finally, when two exchanges have not only the same differences, but also the same exchanged players from S1, we choose the exchange with the higher players(s) of S2 (and therefore the one with the lowest different BSN). Just as in the previous case, this may sometimes lead to seemingly peculiar choices. For example, exchanging players {7, 10} is better than exchanging players {8, 9} – but it is worse than exchanging {6, 11} because, *in S2, exchanging #7 is better than exchanging #8, and exchanging #6 is even better*, whoever the lower ranked players in the exchange may be.

After the exchange, the subgroups S1 and S2 must be put in order in the usual way *[1.2]* (we need to do that only seldom, because, usually, players are already in the right order).

***

The first possible exchange is between players #5 and #9 (BSNs 2 and 3) and yields the following candidate:

S1	2W	9B
S2	5B	12W

This candidate is perfect, so we can now discard the provisional-best previously stored and accept the pairs (2-5, 9-12). We can proceed to the next, and last, bracket.

<u>The last bracket</u>

Having completed the half point bracket, we finally go to the lowest bracket, namely the one with zero points, **{7B, 8W, 10W, 11B}**.

S1	7B	8W
S2	10W	11B

This is again a homogeneous bracket, and a very simple one. In fact, the very first candidate, which is (7-10, 8-11), is perfect!

<u>Colour allocation</u>

To complete the preparation of the round, now we must assign colours. We need to examine all pairs, one by one, according to colour allocation criteria (see *Section [5]* of the Rules):

- If possible, we satisfy the colour preferences of *<u>both players</u>* *[5.2.1]*.
- If we can’t satisfy both players, we satisfy the *<u>strongest colour preference</u>*. First come absolute preferences, then strong ones, mild ones come last *[5.2.2]*.

- All above being equal, we *alternate colours* with respect to the last time they played with different colours *[5.2.3]*. It may happen that in the sequence of colours ("*Colour History*") there are "holes" in correspondence with unplayed games (due to a bye or forfeit). We move such "holes" to the beginning of the sequence – basically, this means that we look at the colour of the previous *played* game.
- All above being still equal, we comply with the colour preference of the higher ranked player *[5.2.4]* – i.e., the player with higher score, or with lower TPN if scores are tied.

***

The "raw" pairs we built are the following (colour preferences are indicated too). Player #6 is not included because of their HPB leave.

(1B-14W, 3B-15A, 4W-13B, 2W-5B, 9B-12W, 7B-10W, 8W-11B)

In early rounds, we can usually comply with most colour preferences. Sometimes, as here, we are very lucky and can satisfy both players in all pairs – and we do just that.

The second round is now almost ready, so we check the boards order (see [C.04.2:3.6]) and publish the pairing (indeed, to cut a long story short, we post the results too).

Board	Players	Result
1	14 (1.0) - 1 (1.0)	0-1
2	15 (1.0) - 3 (1.0)	0-1
3	4 (1.0) - 13 (1.0)	1-0
4	2 (0.5) - 5 (0.5)	1-0
5	12 (0.5) - 9 (0.5)	½-½
6	10 (0.0) - 7 (0.0)	0-1
7	8 (0.0) - 11 (0.0)	1-0
8	6 (0.0) - HPB	½

We can now proceed to the next round.

5 Third Round (Downfloaters & Moved-Down Players)

We must now pair the third round. We already had a little practice, so we can go a bit faster – without neglecting any of the necessary checks and cautions!

As usual, our first task is the determination of colour preferences. For our convenience, from now on, we will report the colour preferences and the possible last two floats for each player. The hyphen ("-") indicates that the player did not float in the last round but did in the previous one. By the way, at this point, a warning is in order: as we proceed in the tournament, collected data increase steadily, and overlooking something important becomes easier and easier... We want to pay utmost attention while posting data on the board and check everything at least twice – it is really easy to make a mistake here!

No player has an absolute colour preference (such preferences can happen in round three but are still rather rare). Players #6 and #15 played one game less than the other players, so their colour preference is strong, while all other players have mild preferences. Thus, the colour preferences of the former two players shall take priority in the choice of expected colour.

Player #7 obtained an HPB in this round, so the number of players is even and, therefore, there will be no PAB. We updated the tournament board (see below) with the relevant data (opponents, colours, results, scores, floats, and colour preferences for the next round).

Player	PN	1		2		3		4		5		6		7		8		9	
		Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts
Alice	1	+W8	1.0	+B14	2.0	w													
Bruno	2	=B9	0.5	+W5	1.5	b													
Carla	3	+W10	1.0	+B15	2.0	w													
David	4	+B11	1.0	+W13	2.0	b													
Eloise	5	=W12	0.5	-B2	0.5	w													
Finn	6	-B13	0.0	**HPB**↓	0.5	W↓													
Giorgia	7	-W14	0.0	+B10	1.0	**HPB**↓	1.5												
Kevin	8	-B1	0.0	+W11	1.0	b													
Louise	9	=W2	0.5	=B12	1.0	w													
Mark	10	-B3	0.0	-W7	0.0	b													
Nancy	11	-W4	0.0	-B8	0.0	w													
Oskar	12	=B5	0.5	=W9	1.0	b													
Patricia	13	+W6	1.0	-B4	1.0	w													
Robert	14	+B7	1.0	-W1	1.0	b													
Stephanie	15	**PAB**↓	1.0	-W3	1.0	B-↓													

We must build five scoregroups. As mentioned, we indicate the colour preference and float markers, if any, for the last and previous rounds[50]. In a complete round, the number of

[50] *For the graphic conventions used, see Floaters below.*

upfloats can only be less than or equal to the number of downfloats. In this round, indeed, we have more downfloats than upfloats (this happens every time there are byes or unplayed games). Player #7, who got an HPB, is not paired and, thus, belongs to no scoregroup.

Before starting the pairing, we check that all the players can be paired (the by now usual "Requirement Zero"). This is easy. For example, looking at the crosstable we see that (1-3, 4-2, 8-9, 12-13, 14-15, 5-6, 10-11) is a legal pairing[51], so we can proceed.

Here are the scoregroups[52]:

2.0	{1w, 3w, 4b}
1.5	{2b}
1.0	{8b, 9w, 12b, 13w, 14b, 15B-↓}
0.5	{5w, 6W↓}
0.0	{10b, 11w}

As usual, we process scoregroups one by one, from top to bottom, building and pairing the brackets as we proceed.

The first bracket, whose players scored 2 points, is **{1w, 3w, 4b}** (*MaxPairs=1, M1=M0=0, x=0*, while ***z*** is ignored because there are only mild colour preferences in the scoregroup)[53].

Floaters

This bracket is odd. We must form one pair, while the remaining player cannot help but downfloat to the next bracket. Such players, who are downfloaters in this bracket, will be called *moved-down players* (MDPs) in the next bracket, where they are going to play against opponents with lower scores. Likewise, their opponents, the so-called "upfloaters"[54], will play against higher scoring opponents.

The pairing of two players with different scores, although sometimes unavoidable, is a violation of the basic principle of Swiss systems that players are paired to opponents with the same score *[C.04.1:5]*. Therefore, in order to avoid making players float too often, every player who is going to play with a lower-scored opponent receives a special flag, called a *downfloat*. In the same way, every player who is going to play with a higher-scored

51 Let us remember once again that we do not care in the least how bad this pairing may be (and, by the way, it is) – it is a legal one, and this is all we need to be certain that at least one legal pairing exists.

52 In passing, let us observe that the central scoregroup is more numerous than the top and bottom ones. This is because of the very nature of all Swiss systems, which reduce the number of players in top and bottom groups at every round, so players gradually pile up in the central scoregroups.

53 From now on, we will make explicit reference to the computation of the bracket parameters only when necessary; their values are always found as previously discussed (see Pairing parameters, page 15).

54 See note 21, page 15.

opponent receives a special flag, called an *upfloat*. The pairing system protects players from repetitions of a same kind of floating, limiting such repetitions for the next round and for the following one *(see criteria [C14]—[C17], Articles [2.4.9]—[2.4.12])*.

***

Now, we divide the bracket in subgroups.

S1	1w	
S2	3w	4b

The "natural" pairing (i.e., the first candidate pairing) is (1w-3w, 4b↓). This candidate does not comply with the colour preference of one player, and we know that the only one pair that we can form in this bracket should have no disregarded preference (*x* = *0*). So, this candidate is not perfect. As usual, we store it as provisional-best for (possible) future use (we have no other legal candidate yet) and continue searching for a better one. The first alteration is a transposition in S2, and there is only one possible, which yields:

S1	1w	
S2	4b	3w

This gives the candidate (1w-4b, 3w↓), which is perfect and is accepted as soon as the Completion test proves that the round-pairing can come to a successful conclusion. This check is straightforward (it can be descended straight from the previous one with only minor changes) and is successful, so we may proceed.

To complete the pairing for the bracket, we want to allocate colours[55]. This is thoroughly straightforward also, and the resulting pairing is (1-4, 3w↓).

The next bracket, with 1.5 points, is **{[3w↓][2b]}** (*MaxPairs=1, M0=M1=1, x=0*). This is the first time we find a heterogeneous bracket, so we should spend a few words on that. However, this bracket is so simple that there is not much to say, so we postpone that discussion to the next time. In fact, in this bracket there are only two players, and they are not incompatible – therefore, the pairing is straightforward (even colour preferences are well matched!) and we get the pair 3-2.

The next bracket is **{8b, 9w, 12b, 13w, 14b, 15B-↓}**. It is homogeneous and contains the players who scored one point.

[55] *In the previous rounds, we (correctly) left the allocation of colours as a final phase of the pairing, in order to focus on the problems of pairing itself. However, after the pairing of the bracket is complete, we will never have to change it, so we have no strong reason to delay the colour allocation (except, of course, for downfloaters!).*

Before we get into the pairing, let us take a look at the bracket and collect such information as might save time and efforts in the proceedings – for example, we note that the game 12-9 already happened. The bracket contains four players with a preference for Black, and only two with a preference for White. Therefore, a colour preference is going to be unavoidably disregarded (*x = 1*). Since *x* is not null, we should mind about *z* too. We have *x = 1* and three mild preferences for the majority colour and, since the difference is negative, *z = 0*[56]. In practice, this means that player #15 *must* receive Black. We will have to take this into account when assigning colours.

We might also note that player #15 had a downfloat in the second-to-last round. However, we don't expect this bracket to generate downfloaters; so, it is not likely that this information will be used. And now, to business! The bracket is:

S1	8b	9w	12b
S2	13w	14b	15B-↓

Here, the natural candidate is (13-8, 9-14, 12-15). This candidate is legal, it contains only one disregarded colour preference, and the Completion test is successful (e.g., 5-6, 10-11); so, the candidate is perfect, and we immediately accept it. The colour allocation is immediate for the first two pairs *[5.2.1]*. In the last pair, in which both players have a colour preference for Black, we observe that the preference of player #15 is strong, whereas that of player #12 is mild. Therefore, rule *[5.2.2]* applies, and the stronger colour preference is granted.

We then move on to the half-point bracket: **{5w, 6W↓}**[57] (*MaxPairs=1, x=1, z=0*). Here, players #5 and #6 are not incompatible (they did not play with each other yet), and there is only one possible pairing, which is then perfect by definition[58] – provided, of course, that the pairing leaves a pairable Rest (Completion test), which is readily proven. The colour preference of

*56 See <u>The "colour matching" parameters **x** and **z**</u>, page 19. We could also note that, when there is only one strong preference in a bracket, there is always a way to comply with it, so we have z = 0 always.*

57 We register the presence of float markers as a matter of completeness; however, please note that previous upfloats are irrelevant in homogeneous brackets, while downfloats are irrelevant if the bracket does not produce downfloaters.

58 When, as in this bracket, all the colour preferences are for the same colour, x is useless, and we may simply omit its calculation. The same applies when only one player in a bracket expects a different colour than all the other players, and the bracket does not produce floaters (because, in that case, the player's colour preference will be unavoidably complied with). In such cases, we may ignore the corresponding criterion [C12]. Please note that, even if x is useless, the same is not necessarily true for z. If, for example, all the preferences are for Black, and half of them are strong and the other half are mild, there is no way to change the number of total disregarded preferences (hence x is useless). However, there is a way to minimise the number of disregarded <u>strong</u> preferences and, therefore, we want to use z as a guideline for this optimisation.

player #6 is stronger than the opponent's and is therefore fulfilled, hence, the pairing is 6-5.

The last bracket to be paired is the lowest one, with zero points. This is **{10b, 11w}** (*MaxPairs=1, x=0*). Again, we have only one possible pairing, which is legal; there is no need for a completion test because this is the last bracket, we simply accept the pair 11-10.

We are done! After checking everything as usual, we may publish the pairing and let the round begin.

Board	Players	Result
1	**1 (2.0) - 4 (2.0)**	**½-½**
2	**3 (2.0) - 2 (1.5)**	**½-½**
3	**13 (1.0) - 8 (1.0)**	**0F-1F**
4	**9 (1.0) - 14 (1.0)**	**1-0**
5	**12 (1.0) - 15 (1.0)**	**1-0**
6	**6 (0.5) - 5 (0.5)**	**½-½**
7	**11 (0.0) - 10 (0.0)**	**1-0**
8	**7 (1.0) - HPB**	**½**

Twist! Player #13 does not show in time to play, thus forfeiting the game: *we need to fix the pairing cards (if used) and the tournament board* to reflect this mishap, especially in the light of the fact that the pairing between #8 and #13, not having actually come true, may be repeated in a future round. Moreover, player #8, who scored one point without playing, gets a downfloat *[1.4.3]*.

We can now proceed to the next round.

6 Fourth Round (Allocating the PAB – Choosing the Best Candidate)

After the third round, our tournament board, completed with information on forfeits, colour preferences and past floats, is as follows.

Player	PN	1		2		3		4		5		6		7		8		9	
		Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts
Alice	1	+W8	1.0	+B14	2.0	=W4	2.5	B											
Bruno	2	=B9	0.5	+W5	1.5	=B3↑	2.0	W↑											
Carla	3	+W10	1.0	+B15	2.0	=W2↓	2.5	B↓											
David	4	+B11	1.0	+W13	2.0	=B1	2.5	W											
Eloise	5	=W12	0.5	-B2	0.5	=B6	1.0	W^D											
Finn	6	-B13	0.0	**HPB**↓	0.5	=W5	1.0	b-↓											
Giorgia	7	-W14	0.0	+B10	1.0	**HPB**↓	1.5	w↓											
Kevin	8	-B1	0.0	+W11	1.0	**+F13**↓	2.0	b↓											
Louise	9	=W2	0.5	=B12	1.0	+W14	2.0	B											
Mark	10	-B3	0.0	-W7	0.0	-B11	0.0	W											
Nancy	11	-W4	0.0	-B8	0.0	+W10	1.0	B											
Oskar	12	=B5	0.5	=W9	1.0	+W15	2.0	B^D											
Patricia	13	+W6	1.0	-B4	1.0	**-F8**	1.0	W											
Robert	14	+B7	1.0	-W1	1.0	-B9	1.0	W											
Stephanie	15	**PAB**↓	1.0	-W3	1.0	-B12	1.0	w											

The scoregroups now are:

2.5 {1B, 3B↓, 4W}
2.0 {2W↑, 8b↓, 9B, 12B^D}
1.5 {7w↓}
1.0 {5W^D, 6b-↓, 11B, 13w, 14W, 15w}
0.0 {10W}

Before we begin the pairing, we check that the Requirement Zero is satisfied by performing the usual Completion test – we must verify that at least one legal pairing exists for all the players. For example, we may have the pairing (1-3, 2-4, 8-9, 7-12, 5-11, 6-14, 13-15, 10-PAB). Usually, this pairing is rather different than the one we are looking for – still, we just proved that at least one legal pairing exists, so we may proceed.

Allocating the PAB

Now, like in round one, we have an odd number of players, one of which must get the PAB. In the first round, players were still "all alike" – they all had zero points and there were no incompatibilities, so we simply assigned the PAB to the last player of the ranking. Now, players have different scores, and not every player can play anyone else. Therefore, we must apply some restrictions to the choice of the player who is going to receive the PAB. Namely, we must choose a player who:

1) did not receive a previous PAB, a forfeit win, or a Full-Point Bye[59] ([C2], *see [2.1.2]*)[60];
2) has a score as low as possible[61] ([C5], *see [2.3.1]*); and
3) has the minimum number of unplayed games[62] ([C9], *see [2.4.4]*).

Last, but not at all least, the allocation of the PAB to a player must allow the completion of the round-pairing ([C4], *see [2.2.1]*).

***

Inspecting the crosstable, we observe that only player #10 has the minimum score. Also, from the Completion Test we know that this choice leaves the round pairable – thus, we are fairly certain straight from the start that the PAB will go to that player, even if it will actually only be allocated after the pairing of the last bracket.

Now we can begin the pairing proper. The first bracket is **{1B, 3B↓, 4W}** (*x=0*).

S1	1B	
S2	3B↓	4W

The natural candidate is (1-3, 4↓). This violates criteria [C12] and [C13] on the compliance with colour preferences (*[2.4.7], [2.4.8]*). Still, it is legal, so we store it as provisional-best and continue searching. The first alteration to try is a transposition (there is only one possible), which yields the following.

S1	1B	
S2	4W	3B↓

Here, players #1 and #4 already played with each other ([C1]) so this candidate is not even legal – we discard it at once and proceed. Since there are no more transpositions available, the following alteration is an exchange (*see [3.6.1], [4.3]*). Here, we have only very few players, so we can enjoy some shortcuts. In principle, we should exchange the smallest possible number of players (easily accomplished – we can exchange but one!) and the smallest difference between exchanged BSN(s) – i.e., we swap a player from S1, ranked as low as possible (supposedly, the weakest one), which is player #1, with a player from S2 ranked as high as possible (thus, presumably the strongest one), which is player #3

59 *See note 20, page 12.*

60 *A requested bye, like a half-point bye ("HPB") or an announced absence ("Zero-Point Bye", or "ZPB"), does not prevent the allocation of a PAB in a subsequent round.*

61 *This is to prevent, if possible, that the PAB ends up to a leading player, as could sometimes happen with previous editions of the rules. In fact, most people would expect the PAB to go to low positions of the ranking.*

62 *The underlying idea is that a player, who already had less games than the others, should not, if possible, get another unplayed round.*

(technically speaking, we exchange the highest possible BSN of S1 with the lowest possible BSN of S2). This exchange leaves us with the following candidate:

S1	3B↓	
S2	1B	4W

The resulting candidate is (1-3, 4↓), which we already examined, so we can discard it. This is no coincidence – every time we exchange the player whose BSN is #1, every possible candidate in which this player is paired was already examined[63] – therefore, whenever we exchange BSN #1, this player is unavoidably going to float.

A transposition lends us a new candidate:

S1	3B↓	
S2	4W	1B

The candidate (4-3, 1↓) is perfect, so we can finalise it with the Completion test. The Rest is {1B, 2W↑, 8b↓, 9B, 12B^{D}, 7w↓, 5W^{D}, 6b-↓, 11B, 13w, 14W, 15w, 10W}, and we can successfully pair it as (1-2, 8-9, 7-12, 5-11, 6-14, 13-15, 10-PAB).

The next bracket contains one MDP (“Moved-Down Player”) with 2.5 points, downfloating from the previous bracket *(M0=1)*, together with *resident* players with 2.0 points; therefore, it is <u>*heterogeneous*</u> *[1.3.3]*. For clarity, we keep the MDP(s) separated from resident players[64]: **{[1B][2W↑, 8b↓, 9B, 12B^{D}]}**.

Let us begin by observing that the bracket contains an odd number of players, so one of them will have to downfloat. We have no reason to think that the remaining players of the bracket cannot be paired – therefore, at least for the moment, we can safely assume *MaxPairs=2*. Also, we can safely suppose that the MDP can be paired[65], hence, *M1=1*.

Only one player is expecting White, whereas four players have a colour preference for Black; so, at least one colour preference will be unavoidably disregarded *(x=1)*. However, this bracket contains a mix of players with strong and mild colour preferences, so we must focus on the number of disregarded strong colour preferences also (*see [C13], [2.4.8]*). The minimum number ***z*** of players who are not getting their strong colour preference is part of

[63] *See Appendix II – How many players can we exchange?, page 70.*

[64] *In fact, MDPs will populate the subgroup S1, whereas the rest of players, who are resident, go into S2, so this division is more than merely aesthetic.*

[65] *The parameter M1 must be “divined” in much the same way as MaxPairs. An educated guess usually allows us to estimate its value, but sometimes we may find that our estimate is wrong, so we must correct it. Nonetheless, we should remember that this parameter is not a variable but <u>a constant of the bracket</u>.*

the total number ***x*** of disregarded colour preferences[66] – i.e., ***z*** is at most equal to ***x***. Here, we can comply with one Black colour preference out of two, and there is a mild preference that can be "sacrificed" to a strong one – thus, ***z** = 0*.

The MDP-Pairing

In a heterogeneous bracket, we must give special attention to the MDPs. Therefore, the procedure is a little different *[3.3.3]*, and requires several steps:

1. prepare all the valid sets of pairable MDPs. A set is valid if it allows the minimisation of the score of downfloaters (i.e., compliance with [C7]).
2. sort the sets so prepared. The comparison rule between two sets requires that we compare the lowest BSN in the first set with the lowest BSN in the second set. The lower of the two, which corresponds with the higher ranked player, comes first – e.g., the set (1, 4) comes before (2, 3). If the lowest elements are equal, we compare the second lowest in the same way, then the third, and so forth – e.g., the set (1, 4, 9) comes before (1, 5, 6).
3. choose the first available set to populate S1.

(Of course, we need to do all that only when there are MDPs and not all of them can be paired. Often enough, however, all MDPs can be paired, so we need not choose them.)

Now, we put the first MDP set in S1, and, with that, we build an MDP-Pairing, obtaining some pairs and a <u>*remainder*</u> (*see [1.3.4]*). The remainder is then paired in the very same way as for a homogeneous bracket (*[3.3.2]*), giving some more pairs and, possibly, some downfloaters. Finally, we put together all the remaining MDP(s) (i.e., those that could not be paired and, thus, went to the Limbo, see *[3.2.4]*), the pairs, and the downfloaters, to form the candidate, which we then proceed to evaluate <u>*as a whole*</u>.

***

Here, we have only one MDP, which can be paired, so we can simplify the procedure. We put this MDP in S1, all alone, while all other players (residents) go to S2:

S1	1B			
S2	2W↑	8b↓	9B	$12B^{D}$

The resulting MDP-Pairing *[3.3.3]* is 1-2. We should then proceed to build the remainder, which is {8b↓, 9B, $12B^{D}$}. Then, we can proceed to the pairing of the remainder, building

[66] *See <u>The "colour matching" parameters **x** and **z**</u>, page 19*

the subgroups S1R and S2R. The pairing scheme is as follows.

S1R	8b↓	
S2R	9B	$12B^D$

The pairing is trivial and now we can build the complete candidate, which is (2-1, 8-9, 12↓).

Now, we proceed to the *candidate evaluation*. The absolute criteria are satisfied, as well as the completion criterion [C4] (e.g., 7-12, 5-11, 6-14, 13-15, 10-PAB) and the PAB criterion [C5]. The number of downfloaters is minimum ([C6]) and the same holds for the maximum score of the downfloaters ([C7]) because, in fact, we paired all the MDPs. It is also easy to prove that the chosen downfloater also complies with all the above criteria in the following bracket ([C8]), which would then be {[$12B^D$][7w↓]}.

We need not worry about the number of played games of the PAB-assignee now ([C9]), because the PAB will be assigned only in brackets lower than the current one. Also, criteria [C10] and [C11] are irrelevant – they only apply to topscorers in the last round.

The number of players who don't get their colour preference is minimum, so [C12] is complied with, and the only one disregarded preference will be mild, so also [C13] is complied with.

The only violated criterion is [C15] because player #2 is going to upfloat again, so we have a failure value[67] for it $F_V(C15) = 1$. Therefore, we save the candidate as provisional-best but continue our quest for the perfect pairing.

We must then look for a better candidate. The first attempt should be to apply transpositions and exchanges in the remainder, to try to make the pairing better; but, of course, *no alteration in the order of the remainder can possibly change the MDP-Pairing*. Therefore, we boldly jump straight to the next step, applying a transposition to the S2 subgroup *of the complete bracket* with the aim to modify the MDP-Pairing (this could perhaps change the remainder too, but we do not care about this now).

Again, we need rule [4.2], which gives instructions as to how to generate all the transpositions in the correct order. For heterogeneous brackets, this rule gives us a most practical hint, specifying that we are interested in the lexicographical order of the first N_1 elements of S2 only, where N_1 is the number of elements in S1 – i.e., the number of MDPs to be paired, which is *M1=1*. After we assigned BSNs to the players of the bracket in the usual way {[1][2, 3, 4, 5]}, we need to focus on the first element of S2 only. We want to change the pairing for

[67] *See Evaluation of the candidate, page 21.*

player #1, and the first transposition that meets this need is [3, 2, 4, 5] – any other useful transposition come later in the lexicographical order[68]. Thus, the next candidate to try is:

S1	1B			
S2	8b↓	2W↑	9B	12B^{D}

The MDP-Pairing here would be 8-1 – we do not need to proceed to the remainder because this encounter was already played in a previous round, so, no candidate containing it would be legal. Thus, we discard this attempt and go to the next transposition.

S1	1B			
S2	9B	2W↑	8b↓	12B^{D}

Now, the MDP-Pairing puts together 1-9. We do not proceed further because this pair raises a failure value for criterion [C13] (compliance with strong colour preference) – this means that *any* possible candidate containing this pair is bound to be worse than our current provisional-best and, therefore, should be discarded. It is readily apparent that the very same is true also for the next transposition group that pairs 1-12. Since we have no more transpositions left, now we accept the provisional-best candidate (2-1, 8-9, 12↓).

Before going to the next bracket, we may want to do some thinking about the procedure we just used. In fact, we might reason that, although we cannot be sure yet, we may well suspect that any MDP-Pairing with unsatisfactory failure values will likely bring us nowhere. Sometimes, a brief inspection of the whole bracket shows that at least one perfect pairing exists, and we would not really want to waste precious time in analysing imperfect candidates. This is of course sound reasoning, but skipping steps and jumping ahead is always a potential risk, so we want always be very careful and beware of shortcuts.

The next bracket, which is heterogeneous again, is **{[12B^{D}][7w↓]}**. Since the players are compatible, we can accept the (perfect) pairing 7-12 at once, and, by the way, the Completion test made for the previous bracket is still valid (e.g., 5-11, 6-14, 13-15, 10-PAB).

The next bracket is **{5W^{D}, 6b-↓, 11B, 13w, 14W, 15w}** (*x=1, z=0*). It is homogeneous and fairly simple – in fact, every player can meet anyone else.

S1	5W^{D}	6b-↓	11B	
S2	13w	14W	15w	

[68] *A simple way, although not a rigorous one, to see the procedure is as follows: take the first player of S1, then scroll S2 until a match is found, keeping in mind that we have to make x pairs containing a disregarded colour preference. Then repeat this procedure with the second element of S1, the third, and so on, until S1 is used up.*

The natural candidate is (5-13, 14-6, 15-11). It is perfect[69] and Completion test is successful, so we accept it immediately.

The last bracket is **{10W}**. It contains just one player, who ends up unpaired and receives the PAB *[1.5]*. This player also receives a downfloat *[1.4.3]*, which is annotated on the player's card – or, in our case, on the tournament board. Of course, there is no need for a completion test in the last bracket.

After the usual double check of pairings, board order, and so on, we have the round.

Board	Players	Result
1	4 (2.5) - 3 (2.5)	0F-1F
2	2 (2.0) - 1 (2.5)	0-1
3	8 (2.0) - 9 (2.0)	0-1
4	7 (1.5) - 12 (2.0)	1-0
5	5 (1.0) - 13 (1.0)	1-0
6	14 (1.0) - 6 (1.0)	0-1
7	15 (1.0) - 11 (1.0)	0-1
8	10 (0.0) - PAB	1

[69] *One might argue that this pairing is not perfect because players #5 and #13 both have a colour preference for White. This objection is unfounded, because we consider not so much the mere number of disregarded colour preferences, but rather the fact that this number is as small as possible - and, in our case, it is.*

7 Fifth Round (The Sieve Pairing Method – Choosing the PAB)

After the fourth round is played out, the tournament board is as follows. We want to note the forfeit win of player #3, who gets a downfloat for it (*[1.4.3]*).

Player	PN	1		2		3		4		5		6		7		8		9	
		Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts
Alice	1	+W8	1.0	+B14	2.0	=W4	2.5	+B2↓	3.5	w↓									
Bruno	2	=B9	0.5	+W5	1.5	=B3↑	2.0	-W1↑	2.0	b↑↑									
Carla	3	+W10	1.0	+B15	2.0	=W2↓	2.5	**+F4**↓	3.5	B↓↓									
David	4	+B11	1.0	+W13	2.0	=B1	2.5	**-F3**	2.5	W									
Eloise	5	=W12	0.5	-B2	0.5	=B6	1.0	+W13	2.0	B									
Finn	6	-B13	0.0	**HPB**↓	0.5	=W5	1.0	+B14	2.0	W									
Giorgia	7	-W14	0.0	+B10	1.0	**HPB**↓	1.5	+W12↑	2.5	B↑↓									
Kevin	8	-B1	0.0	+W11	1.0	**+F13**↓	2.0	-W9	2.0	B^{D}-↓									
Louise	9	=W2	0.5	=B12	1.0	+W14	2.0	+B8	3.0	W									
Mark	10	-B3	0.0	-W7	0.0	-B11	0.0	**PAB**↓	1.0	W↓									
Nancy	11	-W4	0.0	-B8	0.0	+W10	1.0	+B15	2.0	W									
Oskar	12	=B5	0.5	=W9	1.0	+W15	2.0	-B7↓	2.0	w↓									
Patricia	13	+W6	1.0	-B4	1.0	**-F8**	1.0	-B5	1.0	W^{D}									
Robert	14	+B7	1.0	-W1	1.0	-B9	1.0	-W6	1.0	b									
Stephanie	15	**PAB**↓	1.0	-W3	1.0	-B12	1.0	-W11	1.0	B									

The number of players is odd, so there will be a PAB. As usual, we first check that at least one legal pairing exists[70] (e.g., 1-3, 9-7, 4-5, 2-12, 6-8, 10-14, 11-15, 13-PAB), then we sort the players into scoregroups:

3.5 {1w↓, 3B↓↓}
3.0 {9w}
2.5 {4W, 7B↑↓}
2.0 {2b↑↑, 5b, 6W, 8B^{D}-↓, 11w, 12w↓}
1.0 {10W↓, 13W^{D}, 14b, 15B}

Before proceeding, let us consider our options for the PAB. Criterion [C5] states that it shall be assigned to a player with the lowest possible score. Thus, if possible, it will go to a player with one point (i.e., in the last scoregroup). Players #10 and #15 already got a PAB, so the choice will be between #13 and #14 – provided that at least one of them complies with the Completion criterion [C4] (which is readily proved by our test pairing). We can even foresee that the PAB-assignee will probably be #14 because #13 played one game less.

The first bracket, **{1w↓, 3B↓↓}**, with 3.5 points, contains only two players, who are not incompatible (they did not play with each other and have no colliding absolute colour

[70] *As we know, any legal pairing would do – but this test is performed several times during a round-pairing, thus wasting our precious time. While pairing the previous round, we found that a "smart test pairing" can be used repeatedly, minimising the nuisance. It is usually worth our while to devote some time (but not too much!) to build such a "smart pairing" in the first place.*

preferences). Hence, the pairing is trivial (1-3) and complies with Requirement Zero – i.e., the Completion test is successful.

The second bracket, with 3.0 points, is **{9w}** (*MaxPairs=0*). Here, we have a lonely player and there is not much to do... the player can't help but float down to the next bracket, which is the one with 2.5 points: **{[9w][4W, 7B↑↓]}** (*MaxPairs=1, M0=M1=1, x=0*). In this bracket, no players already met each other.

The Sieve Pairing method

The standard pairing procedure is always correct, but it is not always the easier one. Instead of that, we will now introduce the *Sieve pairing*, a most simple alternative method that is fairly convenient for brackets with only a few players[71]. First, we generate all the possible candidate pairings, in due order[72]. Then, starting with criterion [C1] and proceeding through all the pairing criteria, one by one, we check the failure values of each candidate, and keep only those candidates *whose failure value is not worse than the best found for that criterion*, discarding all others. In this way, we gradually reduce the number of acceptable candidates, until we are left with only one of them, which is thus immediately approved, or with a small group, in which case we select the one that comes first in the generation order.

***

For this bracket, which is very simple, the possible candidates are just four:

Pairs	Downfloat	Failure values	Comment
9w-4W,	7B↑↓	[C12]:1, [C16]:1	dropped at [C12]
9w-7B↑↓,	4W	[C15]:1	temporary-best
4W-7B↑↓,	9w	[C7]:1	dropped at [C7]
(none)	9w, 4W,7B↑↓	[C6]:1	dropped at [C6][73]

The Sieve pairing method is very convenient also when there is no perfect candidate, as is the case now, because it always allows us to choose the right candidate easily and safely. Here, we have no perfect candidate, so we select the "last survivor", i.e., (9-7, 4↓). Since the Completion test is now an integral part of the selection process, a candidate that does not comply with C4 is discarded immediately (along with the illegal ones), even before reaching the quality criteria.

71 *The Sieve method can always be used, whatever the number of players. However, although undoubtedly useful for "small but complicated" brackets, it can be rather tedious, and not at all convenient, for large ones.*

72 *Generating all candidates in the correct order can be a waste of time. We usually prefer to generate them in any order and then, should this prove necessary, only sort the (few) last survivors.*

73 *Although surely not a very good one, a candidate with no pairs (i.e., all players floating down) is still legal and must be considered among the possible pairings (sometimes, it is the only possible one).*

The next bracket is again heterogeneous: **{[4W][2b↑↑, 5b, 6W, 8B^{D}-↓, 11w, 12w↓]}**, with *MaxPairs=3, M0=M1=1, x=0*. The bracket contains an odd number of players, so it is going to send a downfloater into the following bracket. This player ought to have a colour preference for White (in order not to make *x* worse) and should not have downfloated recently. We cannot be sure yet, but we could expect that the downfloater will be #11.

The first step is the MDP-Pairing, which must generate one pair.

S1	4W					
S2	2b↑↑	5b	6W	8B^{D}-↓	11w	12w↓

The first attempt yields the pair 4-2, which has failures for [C15] and [C17] because player #2 upfloated in both last two rounds. This leaves the following remainder.

S1R	5b	6W	
S2R	8B^{D}-↓	11w	12w↓

The natural pairing yields the pairs 5-8 and 6-11, with player #12 to downfloat. The resulting candidate is (4-2, 5-8, 6-11, 12↓). Beyond the mentioned failures in the MDP-Pairing, this candidate has a double failure for C12 (colour preference) on players #5 and #11 and one failure for C14 (downfloat in the previous round) on player #12. This is unsatisfactory, but we have no temporary-best yet; so, we store the candidate for future use – or, more likely, for future rejection – and proceed to the next attempt.

With a transposition, we obtain (4-2, 5-8, 6-12, 11↓). This candidate is a little better than the previous one because it has no violation for [C14] (although it still has all other failures), so it becomes our new temporary-best.

The next transposition yields the candidate (4-2, 5-11, 6-8, 12↓). This is better than the previous one, because the two failures for [C12] (colour matching) disappeared, and therefore it becomes our new temporary-best, but still it is not perfect (it fails on floaters on [C14], [C15], [C17]), so we are not finished yet. The next transpositions give:

- (4-2, 5-11, 6-12, 8↓) (failures: [C12], [C14], [C15], [C17] – discarded)
- (4-2, 5-12, 6-8, 11↓) (not legal: [C1] failure on pair 5-12 - discarded)
- (4-2, 5-12, 6-11, 8↓) (not legal, as above - discarded)

The next step is applying an exchange to the remainder, namely we swap players #6 and #8:

S1R	5b	8B^{D}-↓	
S2R	6W	11w	12w↓

The pairs 5-6 and 8-11 are both illegal (they already played), so we can skip this candidate and the next too, and go straight to the transposition:

S1R	5b	8B^D-↓	
S2R	11w	6W	12w↓

We should be aware that *every time a candidate contains a pair in which the player from S1 has a higher BSN than the player from S2, this candidate has already been evaluated*[74] – hence, we ignore it and go to the next useful transposition, which makes player #6 float.

S1R	5b	8B^D-↓	
S2R	11w	12w↓	6W

This yields the candidate (4-2, 11-5, 12-8, 6W↓), which fails only for [C15] and [C17] because of the MDP-pair, while the pairing of resident players is perfect. Therefore, this is the best we can do with the current MDP-Pairing. Still, it is not perfect. To find a perfect candidate, we must change the MDP-Pairing itself.

To change the MDP-Pairing, we need to apply a transposition to the original S2 subgroup. The first useful transposition is the one that displaces the current first member of S2 replacing it with the next element – so, we get the following:

S1	4W					
S2	5b	2b↑↑	6W	8B^D-↓	11w	12w↓

It is apparent at once that this transposition can potentially lead to a better pairing, because the new MDP-Pairing 4-5 is perfect. Let us then proceed to the remainder.

S1R	2b↑↑	6W	
S2R	8B^D-↓	11w	12w↓

Now that we master the procedure a little more, let us not waste time on useless attempts. We know that a viable candidate must have no failures on colour matching and should have as few failures on floaters as possible. We realise easily that the first transposition that complies with all those requirements, thus yielding a perfect candidate, is:

S1R	2b↑↑	6W	
S2R	12w↓	8B^D-↓	11w

[74] *See Appendix II – How many players can we exchange?, page 70.*

So, we have a perfect candidate (4-5, 12-2, 6-8, 11w↓), and #11 is indeed the downfloater, as we predicted. Since this complies with the Requirement Zero too (e.g., 13-11, 10-15, 14-PAB), we accept it and proceed to the next, and last, bracket, which is:

{[11w][10W↓, 13W^D, 14b, 15B]} (*MaxPairs=2, M0=M1=1, x=0*).

This is the last bracket, so we are now going to assign the PAB and it is possible that the value of ***x*** be accordingly increased. This would force us to disregard one colour preference. However, even in this case, we must remember that ***z*** = *0*, and pair the players accordingly.

<u>*Choosing the PAB*</u>

This is the last bracket, so we must allocate the PAB to the player who remains unpaired. We already did it in the first round. However, this is the first time in which we can *choose* the PAB-assignee. The criteria that regulate the choice of the PAB-assignee are the following:

- [C2]: exclude players who earned full points without playing[75] – i.e., PAB, forfeits, FPBs[76]. In compliance with this criterion, we exclude players #10 and #15 from the pool of candidates (in principle, we should also exclude players #3 and #8. However, those players are not interested in the PAB allocation, so their exclusion is of no consequence).
- [C5] (PAB Criterion): minimise the score of the assignee. In compliance with this criterion, we exclude player #11.
- [C9]: minimise the number of unplayed games of the PAB-assignee (however, contrary to the previous criteria, this is a quality criterion that can be broken if needed). Of the two surviving PAB-candidates, player #13 played only three games (i.e., they had one unplayed game) whereas player #14 played all their rounds (no unplayed games). Therefore, this criterion will make us favour #14 as PAB-assignee, *if possible*.

***

Since the bracket is heterogeneous, the first step in the process is the MDP-Pairing.

S1	11w			
S2	10W↓	13W^D	14b	15B

The pair 10-11 is illegal (*[C1]*). We proceed to the first useful transposition that displaces player #10 from its current position in S2.

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75 *See note 60, page 39.*

76 *See note 20, page 12.*

S1	11w			
S2	13W^D	10W↓	14b	15B

Every pairing originating from this MDP-Pairing 13-11 will have at least one violation of [C12] (colour preference). With this in mind, let us examine the candidates that derive from this pairing. The remainder is the following.

S1R	10W↓	
S2R	14b	15B

The natural candidates would allocate the PAB to player #15 and this is illegal (*[C2]*), but the first and only transposition gives us the pair 10-15, with the PAB to player #14, which is acceptable. All in all, the complete candidate, which is (13-11, 10-15, 14-PAB), has a single failure on [C12]. Since this is the first legal candidate we find, we store it as temporary-best.

The next transposition in the MDP-Pairing (original S2) complies with colour preferences.

S1	11w			
S2	14b	10W↓	13W^D	15B

This gives the MDP-Pairing 11-14 and leaves the following remainder.

S1R	10W↓	
S2R	13W^D	15B

The natural pairing (13-10, 15-PAB) is not legal (as before, it violates [C2]). The first and only transposition yields (10-15, 13-PAB). The latter candidate is legal, but it has a failure for [C9]. Since this criterion has higher priority than [C12], we discard this candidate and keep the previous temporary-best.

We should now try exchanges in the remainder. The only available one yields the candidate (13-15, 10-PAB), which is illegal.

The next, and last, transposition for the MDP-Pairing yields a candidate that violates [C1] on 11-15 and, again, is not legal.

S1	11w			
S2	15B	10W↓	13W^D	14b

We now exhausted all the possible candidates. Thus, we must choose our temporary-best as final pairing, (13-11, 10-15, 14-PAB).

Now we put together all the bracket pairings and allocate colours.

(1w-3B, 9w-7B, 4W-5b, 12w-2b, 6W-8B^{D}, 11w-13W^{D}, 10W-15B, 14-PAB)

The only disregarded colour preference will be that of player #11, who will receive Black because the opponent, #13, has an absolute colour preference. The complete pairing is:

Board	Players			Result
1	1 (3.5)	-	3 (3.5)	½-½
2	9 (3.0)	-	7 (2.5)	0-1
3	4 (2.5)	-	5 (2.0)	1-0
4	12 (2.0)	-	2 (2.0)	½-½
5	6 (2.0)	-	8 (2.0)	0-1
6	13 (1.0)	-	11 (2.0)	1-0
7	10 (1.0)	-	15 (1.0)	1-0
8	14 (1.0)	-	PAB	1

It is interesting to note that the pairing obtained with the previous rules would have been a little different – namely, the last boards would have been 11-14, 10-15, 13-PAB. In fact, in pairing the last bracket, we rejected this candidate because it violates criterion [C9] – player #13, having lost a game by forfeit, had one game less than the other residents.

We can now proceed to the next round.

8 Sixth Round (The PAB-Candidates Pool – Choosing the Downfloaters)

After the fifth round is played out, the tournament board is as follows:

Player	PN	1		2		3		4		5		6		7		8		9	
		Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts
Alice	1	+W8	1.0	+B14	2.0	=W4	2.5	+B2↓	3.5	=W3	4.0	B-↓							
Bruno	2	=B9	0.5	+W5	1.5	=B3↑	2.0	-W1↑	2.0	=B12	2.5	W-↑							
Carla	3	+W10	1.0	+B15	2.0	=W2↓	2.5	**+F4**↓	3.5	=B1	4.0	w-↓							
David	4	+B11	1.0	+W13	2.0	=B1	2.5	**-F3**	2.5	+W5↓	3.5	b↓							
Eloise	5	=W12	0.5	-B2	0.5	=B6	1.0	+W13	2.0	-B4↑	2.0	W↑							
Finn	6	-B13	0.0	**HPB**↓	0.5	=W5	1.0	+B14	2.0	-W8	2.0	b							
Giorgia	7	-W14	0.0	+B10	1.0	**HPB**↓	1.5	+W12↑	2.5	+B9↑	3.5	w↑↓							
Kevin	8	-B1	0.0	+W11	1.0	**+F13**↓	2.0	-W9	2.0	+B6	3.0	w							
Louise	9	=W2	0.5	=B12	1.0	+W14	2.0	+B8	3.0	-W7↓	3.0	B↓							
Mark	10	-B3	0.0	-W7	0.0	-B11	0.0	**PAB**↓	1.0	+W15	2.0	b-↓							
Nancy	11	-W4	0.0	-B8	0.0	+W10	1.0	+B15	2.0	-B13↓	2.0	W^{D}↓							
Oskar	12	=B5	0.5	=W9	1.0	+W15	2.0	-B7↓	2.0	=W2	2.5	B-↓							
Patricia	13	+W6	1.0	-B4	1.0	**-F8**	1.0	-B5	1.0	+W11↑	2.0	b↑							
Robert	14	+B7	1.0	-W1	1.0	-B9	1.0	-W6	1.0	**PAB**↓	2.0	b↓							
Stephanie	15	**PAB**↓	1.0	-W3	1.0	-B12	1.0	-W11	1.0	-B10	1.0	w							

As usual, we perform the Completion test (e.g., 3-4[77], 1-7, 8-2, 9-5, 12-6, 10-13, 14-15, 11-PAB), then we separate the scoregroups:

4.0 {1B-↓, 3w-↓}
3.5 {4b↓, 7w↑↓}
3.0 {8w, 9B↓}
2.5 {2W-↑, 12B-↓}
2.0 {5W↑, 6b, 10b-↓, 11W^{D}↓, 13b↑, 14b↓}
1.0 {15w}

<u>*The PAB-candidates pool*</u>

Once again, the round has an odd number of players and will therefore need the allocation of a PAB. In the previous rounds this was very easy but now, as the tournament progresses, we have more constraints to take care of. Having to comply with the new criteria concerning PAB allocation[78], the selection of the PAB-assignee is somewhat more complex than with the old rules. A good strategy is to create a pool of all possible PAB-candidates right from the beginning of the pairing.

First, we want to identify the scoregroup in which the PAB can be assigned. Starting from the lowest scoregroup, and gradually moving towards higher scores, we look for the first

[77] *We have a peculiar situation here, that happens now and then. The pair 4-3 was included in the pairing for the fourth round! However, that game was not actually played (it ended with a forfeit win for player #3), so the pairing is legal.*

[78] *See <u>Allocating the PAB</u>, page 38.*

scoregroup in which there is at least one player who can receive the PAB while leaving a Rest[79] compliant with the Requirement Zero.

Inspecting the crosstable, we observe that the lowest scoregroup (1.0 points) contains only player #15, who already received a PAB. So, because of the PAB-criterion [C5] (*see [3.3.1]*), the PAB-assignee should be appointed, if possible, in the next lowest scoregroup (2.0 points). We then move to that scoregroup, which contains players {5, 6, 10, 11, 13, 14}. Players #10 and #14 already received the PAB, so the pool of PAB-candidates shrinks down to players {5, 6, 11, 13}. Therefore, we run Completion tests to check if we can give the PAB to (at least) one of those players. For example, allocating the PAB to player #5, the Rest can be legally paired as (1-7, 3-9, 4-2, 8-12, 6-11, 10-13, 14-15). This is all we need! Since this choice would leave the round pairable, the PAB shall go to a player in this scoregroup. Thus, the 2-points bracket shall give *two* downfloaters[80], to pair player #15 in the last bracket and yet leave a PAB-candidate available there. However, the PAB will be allocated during the pairing of the last bracket, so we will go back to this in due time.

We could even test the allocation of the PAB for all the PAB-candidates, thus possibly excluding one or more from the pool of candidates, but this would be overkill. In fact, the pairings in upper brackets may need some among those candidates, making them unavailable for PAB and, thus, making the prior check a waste of time. However, we should note that, when we finally get to the bracket where the PAB-candidates come from, we must take care that at least one of the downfloaters is indeed a PAB-candidate[81], so that the allocation of the PAB be possible when we reach the last bracket. This is especially clear when the pool of PAB-candidates contains only one player – then, that PAB-candidate will necessarily be the PAB-assignee and, therefore, is bound to downfloat.

***

Now we start the pairing, beginning from the first bracket, **{1B-↓, 3w-↓}**. The players in this bracket are incompatible, so the only possible candidate contains two floaters for the next bracket: **{[1B-↓, 3w-↓][4b↓, 7w↑↓]}** (heterogeneous).

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[79] *See The "Requirement Zero", page 27.*

[80] *This is because the bracket is even. Please note that, since the bracket must produce (at least) two downfloaters, criterion [C9] cannot be used. Were the bracket odd, a single downfloater would suffice, and [C9] would apply.*

[81] *Were it not so, the pairing of the bracket would fail because of C4.*

Only one pairing is possible in this bracket, (7-1, 3-4[82]). The Completion test is successful (e.g., 8-2, 9-5, 12-6, 10-13, 14-15, 11-PAB), so we immediately accept this candidate.

The next bracket is **{8w, 9B↓}**, and no pairing is possible. Again, both players must downfloat to the next bracket, which is **{[8w, 9B↓][2W-↑, 12B-↓]}**.

Here, player #9 already met players #2, #8, and #12. This player must therefore be parked in the *Limbo* (*see [3.2.4]*), and will get out from there only to downfloat again (*MaxPairs=1*, *M0=2*, *M1=1*, *x=0*).

Limbo	9B↓			
S1	8w			
S2	2W-↑	12B-↓		

The best MDP-pairing for the bracket is 8-12 (by the way, 2-12 is a forbidden pair). With this pair, we proceed to the remainder. The latter gives no pair, only one downfloater that will keep company to the one coming from the Limbo, so the candidate is (8-12, 2↓, 9↓). Since the Completion test is successful (e.g., 5-9, 2-6, 10-14, 13-15, 11-PAB), we go to the next bracket, **{[9B↓, 2W-↑][5W↑, 6b, 10b-↓, 11W^{D}↓, 13b↑, 14b↓]}**.

When a bracket contains many players, it is often advisable to list either the forbidden pairings for each player, or their possible opponents (whichever is more convenient). Here, the forbidden pairings are 2-5, 2-9, 5-6, 5-13, 6-13, 6-14, 9-14, 10-11, 10-PAB, 11-13, 14-PAB. For future convenience, we also note that 10-15 and 11-15 are forbidden too.

This bracket contains the PAB-candidates pool. Also, as mentioned, it must downfloat two players into the last bracket, which contains only one player and must downfloat the PAB-assignee. Therefore, we have *MaxPairs=3*, *M0=2*, *M1=2* (i.e., we want to pair both MDPs), while *x=0* because the bracket must give only three pairs and, therefore, it is possible, at least in principle, to comply with all colour preferences[83].

Also, we want to remember that the PAB-candidate pool is {5, 6, 11, 13}.

<u>*Choosing the downfloaters*</u>

The set of players to choose as downfloaters must of course comply with [C4]. As far as possible, those players should have the resident score (i.e., the nominal score of the bracket,

[82] *See note 77, page 52.*

[83] *When we decrease the number of pairs, the parameter **x** is also decremented accordingly, because it is reasonable to try to downfloat those players that cannot be paired according to their colour preferences. However, in the proceedings of the pairing, we could come to conclude that this strategy indeed cannot be applied, so we need to restore **x** – or even increase it.*

which is that of the basic scoregroup), in compliance with criterion [C7] (*[2.4.2]*). To put it in a nutshell, we can violate this rule of thumb only when we have no other choice (e.g., when we have an incompatible MDP parked in the Limbo). Thus, players #9 and #2 should not downfloat again – we want them paired in the current bracket.

Then, criterion [C8] (*[2.4.3]*) tells us to choose downfloaters such that criteria [C1]-[C7] are all complied with *in the following bracket*[84]. Therefore, we must take a look to the following scoregroup, which will become the backbone of the next bracket. This scoregroup contains only player #15, who already met players #10 and #11. Therefore, the set of downfloaters must contain at least one player different from those two, so they can be paired with the only resident; and a player from the PAB-candidates pool, who will get the PAB. Please note that our choice must consider the matching of colour preferences in the bracket of origin, but not that in the bracket of destination.

Considering only residents (i.e., excluding the MDPs #9 and #2 that must be paired in the current bracket), we have six players in the bracket. There are several (fifteen, to be precise) possible ways of choosing a couple of them as downfloaters, and the above observations help us but little (we can only exclude two couples out of the fifteen).

Then we have criterion [C9] (*[2.4.4]*), which tries to minimise the number of unplayed games of the prospective PAB-assignee. This criterion is active when we have to actually assign the PAB, but we must consider it also when we are pairing the bracket that contains the PAB-candidates pool – which is the current one. If this bracket had to give *only one* downfloater, we should choose this downfloater in the light of the criterion C9 – however, this bracket must give *two* downfloaters and, therefore, we cannot do that.

So, the question is – how we choose the set of downfloaters. In practice, *we simply follow the order of generation of candidates*, looking for a perfect one (as far as possible).

***

Now we have all the required information, so we can begin the pairing. The first step is the MDP-Pairing, for which we have the following subgroups.

S1	9B↓	2W-↑				
S2	5W↑	6b	10b-↓	11W^{D}↓	13b↑	14b↓

[84] *We should emphasise that this is required only in the following bracket. In fact, it would be nice to optimise the pairings for the whole round, but this task would be definitely too burdensome, so we settle for this limited optimisation.*

Player #9 already met player #14, and player #2 already met players #5 and #10. The first attempt for the MDP-Pairing yields (5-9, 2-6) and the remainder {10b-↓, 11W^{D}↓, 13b↑, 14b↓}.

In forming the subgroups S1R, S2R for the remainder, *we put in S1R only one player* because we already have two pairs from the MDP-Pairing, and we need a total of three. Thus, we have:

S1R	10b-↓		
S2R	11W^{D}↓	13b↑	14b↓

This yields the natural pairing 10-11, which is forbidden for [C1] (they already played), so the candidate is not legal and is immediately rejected. The first (useful) transposition gives 10-13, so the candidate is (5-9, 2-6, 10-13, 11↓, 14↓). In fact, this candidate is legal, and #11 can get the PAB while #14 can be paired to #15 – but it is far from perfect. In fact, we have failures for [C15] (on 9-5), [C12] (on 10-13), and [C14] (on 11↓, 14↓). We can do better than that!

Tips & tricks

We can sense that this pairing process threatens to be quite lengthy – but, luckily, nothing forces us to be as dumb as a computer. It may be worth trying some smart tricks in search for a *perfect* pairing. It goes without saying that if we don't find this perfect pairing, we will have to start all over again – and, this time, take the high road.

Let us then make a "smart attempt", trying to pair every player within all the constraints of the pairing criteria. First, since we are looking for a *perfect* pairing, the MDP-Pairing should avoid 9-5, which fails for [C15]. So, we try with the next possible pairing that complies with colour preferences (*[C12]*), which is 11-9, 2-6. This leaves us with the remainder **{5W↑, 10b-↓, 13b↑, 14b↓}**. Player #5 must be paired here, to maximise compliance with colour preferences. To minimise violations of [C14], we want to downfloat player #13. Thus, we should pair #5 with #10 or with #14, while the remaining player will float. Now, downfloating #14 violates [C14], whereas downfloating #10 violates [C16] (which has a lower priority). The pair 5-13 is forbidden (they met before). Therefore, we tentatively pair 5-14, and downfloat #10 and #13. However, #10 can neither be paired to #15 nor get the PAB, so this candidate must be rejected. Finally, 5-10, the best we can do with this MDP-Pairing, violates [C14], so, the candidate is possible – but it is not the perfect pairing we are looking for!

Therefore, we realise that our MDP-Pairing is not a particularly good one.

Before giving up, let us try one more "smart attempt". The pair 11-9 is in fact required for a perfect pairing, but we have alternate pairings for player #2 – so, let us try the pair 2-10, which leaves us with the remainder **{5W↑, 6b, 13b↑, 14b↓}**. Once again, player #5 must be paired in the remainder, in order to comply with [C12]. The pairs 5-6 and 5-13 are not legal (*[C1]*), thus, we go straight to 5-14, which leaves players #6 and #13 to float. Now, in the subsequent bracket, both #6 and #13 can get the PAB, and both can be paired to player #15. Got it! This is a perfect pairing at last. Now, the final question is – is this the *first* perfect pairing, or maybe there is one that is generated earlier in the sequence. In fact, it is easy enough to convince ourselves that this is indeed the first because all candidates that precede it have some failures. In the end, the pairing of this bracket is (11-9, 2-10, 5-14, 6↓, 13↓).

Thanks to our "smart tricks", we were able to obtain the pairing with only a moderate effort. However, we should never forget that *skipping steps is always dangerous* and requires the utmost caution. For exercise, the reader is encouraged to try to pair this bracket by following all the formal rules.

***

The next bracket is heterogeneous. It contains more MDPs than residents, so it has a Limbo. This bracket downfloats only one player, who is going to get the PAB, so criterion [C9] should apply. However, both the two possible candidates to PAB (players #6 and #13 – player #15 already got one in a previous round) have the same number of unplayed games (one each), so this criterion has no effect on the choice of the PAB-assignee.

Limbo	13b↑
S1	6b
S2	15w

Now the pairing is straightforward. The natural candidate is 15-6, while player #13 downfloats and, since this is the last bracket, finally gets the PAB.

Finally, we put together all the pairs and allocate colours. We have (7w-1B, 3w-4b, 8w-12B, 11W-9B, 2W-10b, 5W-14b, 15w-6b, 13-PAB), which yields the following round-pairing.

Board	**Players**	**Result**
1	**7 (3.5) - 1 (4.0)**	**0-1**
2	**3 (4.0) - 4 (3.5)**	**1-0**
3	**8 (3.0) - 12 (2.5)**	**1-0**
4	**11 (2.0) - 9 (3.0)**	**½-½**
5	**2 (2.5) - 10 (2.0)**	**1-0**
6	**5 (2.0) - 14 (2.0)**	**0F-1F**
7	**15 (1.0) - 6 (2.0)**	**0-1**
8	**13 (2.0) - PAB**	**1**

9 Seventh Round (Colour Histories)

In the sixth round, player #5 was late for the game and lost by forfeit. The crosstable is therefore updated as follows.

Player	PN	1		2		3		4		5		6		7		8		9	
		Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts
Alice	1	+W8	1.0	+B14	2.0	=W4	2.5	+B2↓	3.5	=W3	4.0	+B7↓	5.0	w↓					
Bruno	2	=B9	0.5	+W5	1.5	=B3↑	2.0	-W1↑	2.0	=B12	2.5	+W10↓	3.5	b↓					
Carla	3	+W10	1.0	+B15	2.0	=W2↓	2.5	**+F4↓**	3.5	=B1	4.0	+W4↓	5.0	B↓					
David	4	+B11	1.0	+W13	2.0	=B1	2.5	**-F3**	2.5	+W5↓	3.5	-B3↑	3.5	W↑↓					
Eloise	5	=W12	0.5	-B2	0.5	=B6	1.0	+W13	2.0	-B4↑	2.0	**-F14**	2.0	W-↑					
Finn	6	-B13	0.0	**HPB↓**	0.5	=W5	1.0	+B14	2.0	-W8	2.0	+B15↓	3.0	W↓					
Giorgia	7	-W14	0.0	+B10	1.0	**HPB↓**	1.5	+W12↑	2.5	+B9↑	3.5	-W1↑	3.5	B↑↑					
Kevin	8	-B1	0.0	+W11	1.0	**+F13↓**	2.0	-W9	2.0	+B6	3.0	+W12↓	4.0	B↓					
Louise	9	=W2	0.5	=B12	1.0	+W14	2.0	+B8	3.0	-W7↓	3.0	=B11↓	3.5	w↓↓					
Mark	10	-B3	0.0	-W7	0.0	-B11	0.0	**PAB↓**	1.0	+W15	2.0	-B2↑	2.0	W↑					
Nancy	11	-W4	0.0	-B8	0.0	+W10	1.0	+B15	2.0	-B13↓	2.0	=W9↑	2.5	b↑↓					
Oskar	12	=B5	0.5	=W9	1.0	+W15	2.0	-B7↓	2.0	=W2	2.5	-B8↑	2.5	w↑					
Patricia	13	+W6	1.0	-B4	1.0	**-F8**	1.0	-B5	1.0	+W11↑	2.0	**PAB↓**	3.0	b↓↑					
Robert	14	+B7	1.0	-W1	1.0	-B9	1.0	-W6	1.0	**PAB↓**	2.0	**+F5↓**	3.0	b↓↓					
Stephanie	15	**PAB↓**	1.0	-W3	1.0	-B12	1.0	-W11	1.0	-B10	1.0	-W6↑	1.0	**HPB↓**	1.5				

Player #15 will be absent for an HPB leave for this round, so the number of players is even and there will be no PAB. The Completion test is successful (e.g., 1-9, 3-8, 2-4, 7-6, 13-14, 11-12, 5-10), so we can proceed to the pairing. The scoregroups are the following. (Please note that almost all players floated up or down in the previous round. This is quite normal, and almost unavoidable, in any tournament with many rounds and only a few players.)

5.0	{1w↓, 3B↓}
4.0	{8B↓}
3.5	{2b↓, 4W↑, 7B↑, 9w↓}
3.0	{6W↓, 13b, 14b↓}
2.5	{11b↑, 12w↑}
2.0	{5W, 10W↑}

The first bracket **{1w↓, 3B↓}** only contains two incompatible players, who are thus bound to float. The next bracket **{[1w↓, 3B↓][8B↓]}** contains only one resident, so, it must have a non-empty Limbo.

Limbo	3B↓
S1	1w↓
S2	8B↓

Player #1 already met #8, so there is no legal pairing for this S1/S2. We must use a different set of pairable MDPs (*see [3.7.3]*), which, in fact, is tantamount to swap players #1 and #3 between S1 and the Limbo. Thus, we obtain the candidate pairing (3-8, 1↓). Its evaluation gives us the opportunity for an interesting observation. This pairing seems to violate both [C12] and [C13], in addition to [C14]. In fact, as this is the only legal candidate, it is also necessarily *perfect*. This is an important idea – the pairing criteria do not say that we must comply, e.g., with *all* the colour preferences, but that we must comply with *as many colour preferences as possible*. Since *no* preference can be complied with in this bracket, the pairing *is* perfect.

The next bracket is **{[1w↓][2b↓, 4W↑, 7B↑, 9w↓]}**, and it is heterogeneous. Player #1 can meet only #9. The MDP-Pairing is thus the forced pair 1-9, which leaves the remainder:

S1R	2b↓	
S2R	4W↑	7B↑

The natural pairing is perfect and the prospective downfloater complies with [C8] and, therefore, with all criteria from [C1] to [C7] (in the next bracket!) – including, of course, the completion criterion (e.g., 7-6, 13-14, 11-12, 5-10).

The next bracket, **{[7B↑][6W↓, 13b, 14b↓]}**, is also heterogeneous, and it is even, so it will give no downfloaters. The pairing, very easy, is (6-7, 13-14). (By the way, this is also the only legal full pairing for the bracket because #6 already played with both #13 and #14.)

The next bracket is a homogeneous one, **{11b↑, 12w↑}**, and the pairing is trivial, 12-11. The same holds for the last bracket, **{5W, 10W↑}**, which yields 5-10.

Now we can put all the pairs together:

(3B-8B, 1w-9w, 4W-2b, 6W-7B, 13b-14b, 12w-11b, 5W-10W)

<u>Colour allocation</u>

Finally, we must assign to each player their proper colour. In this round, there are several clashing colour preferences[85], which we must examine in the light of colour allocation rules[86]. Let us see the critical pairs.

3B-8B we cannot comply with both preferences, and there is not a stronger one. Then, we must compare the colour histories of the players: #3: uW**B**WBW; #8: uB**W**WBW (*see [5.2.3]*). Please note that we skipped the unplayed rounds (the fourth for player #3, the third for player #8) by moving them at the beginning of the colour

[85] *Because of this, we will have to manage several absolute colour preferences in the next round.*
[86] *See <u>Colour allocation</u>, page 31.*

histories, as indicated by *[C.04.2:3.4]*. Comparing the histories from the last played game backwards, we find a difference in the third place, where player #8 had White whereas player #3 had Black. We must therefore allocate White to player #3 and Black to player #8, obtaining 3-8.

1w-9w again, we compare the colour histories: #1: WBWBWB; #9: WBWBWB. Now, however, the histories are identical, so we must proceed to the next rule and grant the colour preference of the higher-ranked player (*see [5.2.4]*). This is player #1, whose score is higher than that of player #9. Therefore, the pairing is 1-9.

13b-14b Colour histories are: #13: uuW**B**BW; #14: uuB**W**BW. Thus, the pairing is 13-14.

5W-10W Colour histories are: #5: uW**B**BWB; #10: uB**W**BWB. Thus, the pairing is 5-10.

The pairs are then (3-8, 1-9, 4-2, 6-7, 13-14, 12-11, 5-10).

***

Incidentally, we could note that this pairing is essentially identical to the one we produced for the Completion test. This is unusual (even with a “smart” test pairing) but not unheard of, especially in tournaments with few players and many rounds, and becomes more probable as the tournament progresses through the rounds.

Board	Players	Result
1	**3 (5.0) - 8 (4.0)**	**1-0**
2	**1 (5.0) - 9 (3.5)**	**½-½**
3	**4 (3.5) - 2 (3.5)**	**1-0**
4	**6 (3.0) - 7 (3.5)**	**0-1**
5	**13 (3.0) - 14 (3.0)**	**1-0**
6	**12 (2.5) - 11 (2.5)**	**1-0**
7	**5 (2.0) - 10 (2.0)**	**0-1**
8	**15 (1.0) - HPB**	**½**

We can now proceed to the next round.

10 Eighth Round (A Different PAB-Assignee)

After the seventh round, the crosstable is updated as follows.

Player	PN	1		2		3		4		5		6		7		8		9	
		Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts
Alice	1	+W8	1.0	+B14	2.0	=W4	2.5	+B2↓	3.5	=W3	4.0	+B7↓	5.0	=W9↓	5.5	B↓↓			
Bruno	2	=B9	0.5	+W5	1.5	=B3↑	2.0	-W1↑	2.0	=B12	2.5	+W10↓	3.5	-B4	3.5	W-↓			
Carla	3	+W10	1.0	+B15	2.0	=W2↓	2.5	**+F4**↓	3.5	=B1	4.0	+W4↓	5.0	+W8↓	6.0	B^{D}↓↓			
David	4	+B11	1.0	+W13	2.0	=B1	2.5	**-F3**	2.5	+W5↓	3.5	-B3↑	3.5	+W2	4.5	b-↑			
Eloise	5	=W12	0.5	-B2	0.5	=B6	1.0	+W13	2.0	-B4↑	2.0	**-F14**	2.0	-W10	2.0	B			
Finn	6	-B13	0.0	**HPB**↓	0.5	=W5	1.0	+B14	2.0	-W8	2.0	+B15↓	3.0	-W7↑	3.0	b↑↓			
Giorgia	7	-W14	0.0	+B10	1.0	**HPB**↓	1.5	+W12↑	2.5	+B9↑	3.5	-W1↑	3.5	+B6↓	4.5	w↓↑			
Kevin	8	-B1	0.0	+W11	1.0	**+F13**↓	2.0	-W9	2.0	+B6	3.0	+W12↓	4.0	-B3↑	4.0	w↑↓			
Louise	9	=W2	0.5	=B12	1.0	+W14	2.0	+B8	3.0	-W7↓	3.0	=B11↓	3.5	=B1↑	4.0	W^{D}↑			
Mark	10	-B3	0.0	-W7	0.0	-B11	0.0	**PAB**↓	1.0	+W15	2.0	-B2↑	2.0	+B5	3.0	W^{D}-↑			
Nancy	11	-W4	0.0	-B8	0.0	+W10	1.0	+B15	2.0	-B13↓	2.0	=W9↑	2.5	-B12	2.5	W-↑			
Oskar	12	=B5	0.5	=W9	1.0	+W15	2.0	-B7↓	2.0	=W2	2.5	-B8↑	2.5	+W11	3.5	B-↑			
Patricia	13	+W6	1.0	-B4	1.0	**-F8**	1.0	-B5	1.0	+W11↑	2.0	**PAB**↓	3.0	+W14	4.0	B^{D}-↓			
Robert	14	+B7	1.0	-W1	1.0	-B9	1.0	-W6	1.0	**PAB**↓	2.0	**+F5**↓	3.0	-B13	3.0	W-↓			
Stephanie	15	**PAB**↓	1.0	-W3	1.0	-B12	1.0	-W11	1.0	-B10	1.0	-W6↑	1.0	**HPB**↓	1.5	B↓↑			

No player announced their absence, so there will be a PAB. As usual, the first thing to do is the Completion test, which is successful (e.g., 7-3, 1-13, 9-4, 2-8, 10-12, 11-6, 14-15, 5-PAB); then, we proceed to the round-pairing. The scoregroups are:

6.0 {3B^{D}↓↓}
5.5 {1B↓↓}
4.5 {4b-↑, 7w↓↑}
4.0 {8w↑↓, 9W^{D}↑↓, 13B^{D}-↓}
3.5 {2W-↓, 12B-↑}
3.0 {6b↑↓, 10W^{D}-↑, 14W-↓}
2.5 {11W-↑}
2.0 {5B}
1.5 {15B↓↑}

Players #10, #13, #14, and #15 already had a PAB; players #3 and #8 had a forfeit win. All those players cannot receive a PAB. The PAB-candidates pool cannot reside in the lowest bracket, which contains only player #15 (who already had a PAB). It will then be located in the penultimate bracket (which also contains only one player), provided the completion test is successful. In fact, it is – so, we can take a note that the PAB will go to player #5, then we proceed to the pairing proper.

The first bracket contains a single player, who downfloats into the next bracket. There, the players are, alas, incompatible, so, both float into the next bracket **{[3B^{D}, 1B][4b, 7w]}**. Again, player #1 is incompatible and will therefore populate the Limbo, whereas player #3 is paired with player #7 in 7-3. This is the only possible pairing in this bracket, so players #1 and #4 downfloat to the next bracket {**[1B↓↓, 4b-↑][8w↑↓, 9W^D↑↓, 13B^D-↓]}**.

S1	1B↓↓	4b-↑	
S2	8w↑↓	9W^D↑↓	13B^D-↓

Here, player #1 can only be paired to #13, notwithstanding the badly matched colour preferences (and player #1, being an MDP, *must* be paired, if only possible). On the other hand, player #4 can be paired with either #8 or #9. The first useful S2 transposition in the sequence is [13, 8, 9]. Thus, taking into consideration that the remainder gives no pairs, we have the candidate (1-13, 8-4, 9↓). In the next scoregroup, which is {2W-↓, 12B-↑}, player #9 is incompatible because they already met with all the residents there, and criterion [C8] fails for this candidate. Still, the candidate is legal – we store it as temporary-best and look for something better. The next alternative is (1-13, 9-4, 8↓), which is acceptable because player #8 can be paired to player #2. This candidate satisfies the Completion test (e.g., 2-8, 10-12, 11-6, 14-15, 5-PAB) and all other criteria, so it is perfect, and we accept it.

The next bracket is **{[8w↑↓][2W-↓, 12B-↑]}**. The pair 8-12 violates [C1], while 2-12 violates [C7]. Hence, the only viable candidate is (2-8, 12↓), which also satisfies the Completion test.

The next bracket is **{[12B-↑][6b↑↓, 10W^D-↑, 14W-↓]}**. This bracket could be fully paired, but a quick glance to the Rest[87] shows that the Completion test would not be successful (because the game 11-15 already happened in a previous round) unless we break criterion [C5] on the minimal score of PAB-assignee. Of course, we'd sooner renounce criterion [C6] on the minimisation of the number of downfloaters. Hence, this bracket must give a couple of downfloaters – i.e., *MaxPairs=1, M0=1, M1=1, x=0*. We must pair only the MDP, leaving two (adequate) downfloaters available for the next bracket.

Player #12 can play with anyone else in the bracket, but 14-12 offers the best failure values in the bracket. However, this pairing leaves players #6 and #10 to downfloat, and #10 causes a failure for criterion [C8] because we cannot pair that player in the next bracket. In fact, that player cannot be paired in all the subsequent scoregroups except to the given PAB-assignee, so we would have a [C5] failure too. Since both players #12 and #6 have a colour preference for Black, we'd better try the MDP-pair 10-12, which yields the candidate[88] (10-12, 6↓, 14↓). Now, this candidate only fails on [C16] (the Completion test is successful,

[87] *See <u>The "Requirement Zero"</u>, page 27*

[88] *In passing, we should mention also that players #6 and #14 cannot be paired to one another – this means that, if we had to form two pairs (i.e., not just one), pairing 10-12 would not have been possible.*

e.g., 11-6, 14-15, 5-PAB) and we can easily convince ourselves that this is the best possible pairing.

The next bracket is **{[6b↑↓, 14W-↓][11W-↑]}**. In this bracket, two MDPs compete for one possible (resident) opponent only. One MDP must then go to the Limbo and will finally downfloat again. The natural choice is the candidate (11-6, 14↓), which, once again, fails on [C16] – and that is the best we can do.

The next bracket is **{[14W-↓][5B]}**. This bracket must have *MaxPairs=0*, because it must give the floater(s) needed to pair the subsequent, and last, bracket, **{[14W-↓, 5B][15B↓↑]}**. Here we finally have the candidate (14-15, 5↓), which, in its turn, gives 5-PAB as required.

Putting all pairs together, we obtain the complete pairing.

Board	Players	Result
1	**7 (4.5) - 3 (6.0)**	**½-½**
2	**1 (5.5) - 13 (4.0)**	**1-0**
3	**9 (4.0) - 4 (4.5)**	**0-1**
4	**2 (3.5) - 8 (4.0)**	**1-0**
5	**10 (3.0) - 12 (3.5)**	**1-0**
6	**11 (2.5) - 6 (3.0)**	**1-0**
7	**14 (3.0) - 15 (1.5)**	**0-1**
8	**5 (2.0) - PAB**	**1**

Note: The previous version of these Rules would yield a different pairing, namely, (7-3, 1-13, 9-4, 2-8, 14-12, 10-6, 5-15, 11-PAB). The difference shows in the scoregroups with 3.0 points or less, and the reader is encouraged to find the reason for the difference and to compare the failure values for the pairings obtained respectively by means of the old and new rules. (*Hint: disapplying C5 to player #11, the pairing of the bracket with 3 points is different.*)

We can now proceed to the next, and last, round.

11 Ninth Round (The final round – Sorting boards)

At last, we reached the final round. The news is that, now, an absolute colour preference might be ignored, even if only when this is really important and only for “topscorers” (*see [1.7]*) and their opponents[89]. Indeed, this happens quite rarely. Nevertheless, we should be aware of this possibility and be careful when pairing topscorers, i.e., players with four and half points or more. A quick glance to the crosstable tells us that there are five such players, namely, {1, 3, 4, 7, 2}. In pairing those players, we want to be alert that a possible absolute colour preference is not an insuperable obstacle.

Player	PN	1		2		3		4		5		6		7		8		9	
		Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts
Alice	1	+W8	1.0	+B14	2.0	=W4	2.5	+B2↓	3.5	=W3	4.0	+B7↓	5.0	=W9↓	5.5	+W13↓	6.5	B^{D}↓	
Bruno	2	=B9	0.5	+W5	1.5	=B3↑	2.0	-W1↑	2.0	=B12	2.5	+W10↓	3.5	-B4	3.5	+W8↑	4.5	b↑	
Carla	3	+W10	1.0	+B15	2.0	=W2↓	2.5	**+F4**↓	3.5	=B1	4.0	+W4↓	5.0	+W8↓	6.0	=B7↓	6.5	B↓↓	
David	4	+B11	1.0	+W13	2.0	=B1	2.5	**-F3**	2.5	+W5↓	3.5	-B3↑	3.5	+W2	4.5	+B9↓	5.5	W↓	
Eloise	5	=W12	0.5	-B2	0.5	=B6	1.0	+W13	2.0	-B4↑	2.0	**-F14**	2.0	-W10	2.0	**PAB**↓	3.0	b↓	
Finn	6	-B13	0.0	**HPB**↓	0.5	=W5	1.0	+B14	2.0	-W8	2.0	+B15↓	3.0	-W7↑	3.0	-B11↓	3.0	W↓↑	
Giorgia	7	-W14	0.0	+B10	1.0	**HPB**↓	1.5	+W12↑	2.5	+B9↑	3.5	-W1↑	3.5	+B6↓	4.5	=W3↑	5.0	B↑↓	
Kevin	8	-B1	0.0	+W11	1.0	**+F13**↓	2.0	-W9	2.0	+B6	3.0	+W12↓	4.0	-B3↑	4.0	-B2↓	4.0	W^{D}↓↑	
Louise	9	=W2	0.5	=B12	1.0	+W14	2.0	+B8	3.0	-W7↓	3.0	=B11↓	3.5	=B1↑	4.0	-W4↑	4.0	b↑↓	
Mark	10	-B3	0.0	-W7	0.0	-B11	0.0	**PAB**↓	1.0	+W15	2.0	-B2↑	2.0	+B5	3.0	+W12↑	4.0	W↑	
Nancy	11	-W4	0.0	-B8	0.0	+W10	1.0	+B15	2.0	-B13↓	2.0	=W9↑	2.5	-B12	2.5	+W6↑	3.5	b↑	
Oskar	12	=B5	0.5	=W9	1.0	+W15	2.0	-B7↓	2.0	=W2	2.5	-B8↑	2.5	+W11	3.5	-B10↓	3.5	w↓	
Patricia	13	+W6	1.0	-B4	1.0	**-F8**	1.0	-B5	1.0	+W11↑	2.0	**PAB**↓	3.0	+W14	4.0	-B1↑	4.0	w↑	
Robert	14	+B7	1.0	-W1	1.0	-B9	1.0	-W6	1.0	**PAB**↓	2.0	**+F5**↓	3.0	-B13	3.0	-W15↓	3.0	b↓	
Stephanie	15	**PAB**↓	1.0	-W3	1.0	-B12	1.0	-W11	1.0	-B10	1.0	-W6↑	1.0	**HPB**↓	1.5	+B14↑	2.5	w↑↓	

No player announced their absence, so, there will be a PAB in this round too. As usual, we first perform the Completion test, which is successful (e.g., 10-1, 9-3, 4-7, 13-2, 8-15, 5-11, 12-14, 6-PAB), then we proceed with the round-pairing. The scoregroups are:

6.5   1B^{D}↓↓, 3B↓↓
5.5   4W↓
5.0   7B↑↓
4.5   2b↑
4.0   8W^{D}↓↑, 9b↑↑, 10W↑, 13w↑
3.5   11b↑, 12w↓
3.0   5b↓, 6W↓↑, 14b↓
2.5   15w↑↓

Players {3, 5, 8, 10, 13, 14, 15} already had a PAB or forfeit win. Hence, they must be excluded from the PAB-candidates pool, which cannot reside in the lowest bracket (which,

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89 *The fundament for this is in the Basic Rules for Swiss Systems, C.04.1, Article 6, which is the basis for criteria [C10] ([2.4.5]) and [C11] [2.4.6] of the Swiss FIDE (Dutch) System.*

once again, only contains player #15). Then, the PAB will be allocated in the penultimate bracket, which contains players #5, #6, and #14, provided the completion test is successful. Players #5 and #14 already got a PAB, so the prospective PAB-assignee should be player #6. We want to check that the Completion test is successful even without this player – and, as it happens, it is. So, we take note that the PAB *must*[90] go to player #6 and then proceed.

The players in the first bracket, **{[1B$^{\mathbf{D}}$↓↓, 3B↓↓]}**, are incompatible – therefore, they both float in the second bracket, **{[1B$^{\mathbf{D}}$↓↓, 3B↓↓][4W↓]}**. Also, this bracket contains no compatible players, so we proceed to the following one, which is **{[1B$^{\mathbf{D}}$↓↓, 3B↓↓, 4W↓][7B↑↓]}**. Here, there is (only) one possible pair, so the resulting candidate is (4-7, 1↓, 3↓).

The next bracket is **{[1B$^{\mathbf{D}}$↓↓, 3B↓↓][2b↑]}**. Once again, no pairs are possible, and we must proceed to the next bracket, **{[1B$^{\mathbf{D}}$↓↓, 3B↓↓, 2b↑][8W$^{\mathbf{D}}$↓↑, 9b↑↑, 10W↑, 13w↑]}**. This is a rather complex bracket, and we could use some "smart information" on the players.

S1	**1B$^{\mathbf{D}}$↓↓**	**3B↓↓**	**2b↑**	
S2	**8W$^{\mathbf{D}}$↓↑**	**9b↑↑**	**10W↑**	**13w↑**

First, player #1 can be paired only to #10, whereas player #2 can only play with #13. Player #3 already met #8; thus, the only possible pairing with three pairs is (10-1, 9-3, 13-2, 8↓). This pairing complies with the Completion test (e.g., 8-15, 5-11, 12-14, 6-PAB).

The next bracket is **{[8W$^{\mathbf{D}}$↓↑][11b↑, 12w↓]}**, and no pairs are possible here, too.

The next bracket is **{[8W$^{\mathbf{D}}$↓↑, 11b↑, 12w↓][5b↓, 6W↓↑, 14b↓]}**. Just as it happened in the eighth round, this bracket must yield a couple of downfloaters, in order to pair the subsequent, and last, bracket. Of all these players, only #5 or #8 can be paired to player #15 – who is the only resident of the last bracket – so, one of those two will necessarily have to float. Together with this player, we need to make player #6 float too, because this player is the "predestined recipient" of the PAB. In the light of this information, *MaxPairs=2, M0=3*, whereas *M1=2* because we cannot pair three MDPs with only two available residents. Hence, one MDP must go to the Limbo – and this will unavoidably be #8, because this is the only one who can be paired to #15 and, therefore, the only one that, as a downfloater, avoids

[90] *In case we have only one PAB-candidate, the allocation of the bye is sure right from the beginning, because it is enforced by criterion [C5]. Having made ourselves sure that the Completion test is successful (and, therefore, also all previous criteria are complied with), there are no other criteria that can forbid this PAB allocation. Of course, when there are several PAB-candidates, it is a completely different matter. In this case, we must wait (at least) until we reach the bracket in which the PAB-candidates pool resides.*

the failure of the Completion test C4. With the remaining players, there is only one possible candidate[91], which is (5-11, 12-14, 8↓, 6↓).

Now we can go to the last bracket **{[8W^{D}↓↑, 6W↓↑][15w↑↓]}**, whose pairing is clear by now, (8-15, 6-PAB).

Putting all pairs together, we obtain the complete pairing.

(4W-7B, 10W-1B^{D}, 9b-3B, 13w-2b, 5b-11b, 12w-14b, 8W^{D}-15w, 6W-PAB)

The colour allocation is straightforward for most players. In the case of pairs 9-3 and 8-15, we grant the stronger colour preference (*see [5.2.2]*). The case of pair 5-11 is more interesting. The preferences are equally mild, the colour histories are #5: uuWBBWBW, #11: WBWBBWBW. Now, the histories are of different length, but we can compare only the "common portion" – as it happens, that part is identical, so we must go to the following (and final) rule, granting the colour preference of the higher-ranked player (*see [5.2.4]*), which is #11 because of their higher score.

We already mentioned that the FIDE (Dutch) Swiss system yields pairs in the right board order *almost* always. Well, with all those floating players, this might be one of those rare occasions in which this did not happen – and, in fact, this round-pairing was strange enough, in the sense that several players downfloated repeatedly and were paired well below the scoregroup they belonged to. So, before publishing the round, we had better check that the boards are listed in the correct order[92]. The sorting rules are (*see [C.04.2:3.6]*):

1. the score of the higher ranked player
2. the sum of the scores of both players
3. the TPN (i.e., initial ranking) of the higher ranked player

Let us check these parameters board by board.

Pair	**4-7**	**10-1**	**9-3**	**13-2**	**5-11**	**12-14**	**8-15**
Score of the higher ranked player	5.5	6.5	6.5	4.5	3.5	3.5	4.0
Sum of the scores of both players	10.5	10.5	10.5	8.5	6.5	6.5	6.5
TPN of the higher ranked player	4	1	3	2	11	12	8

91 *It is worth noting that, from a more formal point of view, we should try a "normal" pairing of the bracket (e.g., 6-12, 8-5, 11-14) and realise that no such pairing can comply with the Requirement Zero. Then, we decide to reduce the number of pairs (i.e., MaxPairs) and, thus, generate a couple of downfloaters. Now, we should realise that floating two residents would confine two MDPs in the Limbo, so creating a total of four downfloaters – too many! Hence, we must downfloat one resident only, and put an MDP into the Limbo, choosing it in compliance with all relevant criteria. This procedure requires many trial-and-error attempts and is definitely tedious.*

92 *This check should be made on a regular basis, i.e., at every round. However, it is rather unusual that the pairs be generated in a different order than the desired one, unless, as it happened in this example, there are players who downfloat repeatedly. In these last cases, a check is in order.*

Several pairs are out-of-place, so, we must sort the round before publishing it.

Pair	**10-1**	**9-3**	**4-7**	**13-2**	**8-15**	**5-11**	**12-14**
Score of the higher ranked player	6.5	6.5	5.5	4.5	4.0	3.5	3.5
Sum of the scores of both players	10.5	10.5	10.5	8.5	6.5	6.5	6.5
TPN of the higher ranked player	1	3	4	2	8	11	12

Now, at last, we can publish the round.

Board	Players	Result
1	**10 (4.0) - 1 (6.5)**	**0-1**
2	**9 (4.0) - 3 (6.5)**	**½-½**
3	**4 (5.5) - 7 (5.0)**	**1-0**
4	**13 (4.0) - 2 (4.5)**	**0F-1F**
5	**8 (4.0) - 15 (2.5)**	**1-0**
6	**5 (3.0) - 11 (3.5)**	**1-0**
7	**12 (3.5) - 14 (3.0)**	**0-1**
8	**6 (3.0) - PAB**	**1**

As in the previous round, the old rules would yield a different pairing, namely, (10-1, 9-3, 4-7, 13-2, 8-14, 6-12, 15-5, 11-PAB). The difference shows in the penultimate bracket, and the reader is encouraged to find the reason for the difference and to compare the failure values for the pairings made by old and new rules (*Hint: the set of downfloaters must allow the completion of the pairing; and a player must float, who can get the PAB. Hence, the only viable sets are {11, 5}, {11, 8}, {6, 5}, and {6, 8} – choose the best available set and compare the compliance with colour preferences*).

And now, ladies and gentlemen, please start clocks for the final round!

12 Final Steps

Now, the tournament is over. The final operations, with regard to pairing, consist of the harvesting of results and final compilation of the tournament board.

Player	PN	1		2		3		4		5		6		7		8		9	
		Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts	Pair	Pnts
Alice	1	+W8	1.0	+B14	2.0	=W4	2.5	+B2↓	3.5	=W3	4.0	+B7↓	5.0	=W9↓	5.5	+W13↓	6.5	+B10	7.5
Bruno	2	=B9	0.5	+W5	1.5	=B3↑	2.0	-W1↑	2.0	=B12	2.5	+W10↓	3.5	-B4	3.5	+W8↑	4.5	**+F13↓**	5.5
Carla	3	+W10	1.0	+B15	2.0	=W2↓	2.5	**+F4↓**	3.5	=B1	4.0	+W4↓	5.0	+W8↓	6.0	=B7↓	6.5	=B9	7.0
David	4	+B11	1.0	+W13	2.0	=B1	2.5	**-F3**	2.5	+W5↓	3.5	-B3↑	3.5	+W2	4.5	+B9↓	5.5	+W7	6.5
Eloise	5	=W12	0.5	-B2	0.5	=B6	1.0	+W13	2.0	-B4↑	2.0	**-F14**	2.0	-W10	2.0	**PAB↓**	3.0	+W11	4.0
Finn	6	-B13	0.0	**HPB↓**	0.5	=W5	1.0	+B14	2.0	-W8	2.0	+B15↓	3.0	-W7↑	3.0	-B11↓	3.0	**PAB↓**	4.0
Giorgia	7	-W14	0.0	+B10	1.0	**HPB↓**	1.5	+W12↑	2.5	+B9↑	3.5	-W1↑	3.5	+B6↓	4.5	=W3↑	5.0	-B4	5.0
Kevin	8	-B1	0.0	+W11	1.0	**+F13↓**	2.0	-W9	2.0	+B6	3.0	+W12↓	4.0	-B3↑	4.0	-B2↓	4.0	+W15	5.0
Louise	9	=W2	0.5	=B12	1.0	+W14	2.0	+B8	3.0	-W7↓	3.0	=B11↓	3.5	=B1↑	4.0	-W4↑	4.0	=W3	4.5
Mark	10	-B3	0.0	-W7	0.0	-B11	0.0	**PAB↓**	1.0	+W15	2.0	-B2↑	2.0	+B5	3.0	+W12↑	4.0	-W1	4.0
Nancy	11	-W4	0.0	-B8	0.0	+W10	1.0	+B15	2.0	-B13↓	2.0	=W9↑	2.5	-B12	2.5	+W6↑	3.5	-B5	3.5
Oskar	12	=B5	0.5	=W9	1.0	+W15	2.0	-B7↓	2.0	=W2	2.5	-B8↑	2.5	+W11	3.5	-B10↓	3.5	-W14	3.5
Patricia	13	+W6	1.0	-B4	1.0	**-F8**	1.0	-B5	1.0	+W11↑	2.0	**PAB↓**	3.0	+W14	4.0	-B1↑	4.0	**-F2**	4.0
Robert	14	+B7	1.0	-W1	1.0	-B9	1.0	-W6	1.0	**PAB↓**	2.0	**+F5↓**	3.0	-B13	3.0	-W15↓	3.0	+B12	4.0
Stephanie	15	**PAB↓**	1.0	-W3	1.0	-B12	1.0	-W11	1.0	-B10	1.0	-W6↑	1.0	**HPB↓**	1.5	+B14↑	2.5	-B8	2.5

That's all!

13 Appendix I – Performing the Completion test

With the new FIDE (Dutch) Swiss rules, we must check the compliance to the Requirement Zero repeatedly, i.e., during several phases of the pairing. Therefore, it is of essence that the Completion test be performed in a manner as simple and efficient as possible. The rules do not define a special procedure, so we are free to adopt whichever method that best suits us – with only the (obvious) constraint that it must yield a legal pairing. Here, we are going to suggest a simple method that derives from the old-style "clock" Swiss systems widely used in the second half of the last century. One advantage of this method, besides its simplicity, is that, often enough, parts of the pairing thus found can be used again and again for subsequent tests.

The first step is sorting the crosstable by score (descending) and TPN (ascending). Then, we pair the first player to the first possible opponent in the list with whom they can be lawfully paired (i.e., they did not play before, and they don't have colliding <u>*absolute*</u> *colour preferences). We proceed to do the same with the first free player, and then again and again, until all players have been paired. If, at some point in the proceedings, a player has no possible opponent, then we go back to one (whichever one!) previous pair in which there is a possible opponent for that player and change that pairing. Let's see a practical example (from a real tournament) in which we perform a Completion check before the start of the fifth (and last) round. As mentioned, we first sort the crosstable, which is as follows.*

#	Pts	R1	R2	R3	R4	R5
12	5.0	+W6	+B1	+B3	+W4	*+B5*
1	4.0	+B8	-W12	+B10	+W2	*+B9*
5	3.5	=W11	+B7	+B2	+W3	*-W12*
8	3.0	-W1	+B9	-W4	+W11	*+B3*
2	2.5	=BYE	+B11	-W5	-B1	*+W6*
11	2.5	=B5	-W2	+W7	-B8	*+B4*
3	2.0	+W9	+B4	-W12	-B5	*-W8*
4	2.0	+B10	-W3	+B8	-B12	*-W11*
9	2.0	-B3	-W8	+W6	+B10	*-W1*
10	2.0	-W4	+B6	-W1	-W9	*+B7*
7	1.5	=BYE	-W5	-B11	+B6	*-W10*
6	0.0	-B12	-W10	-B9	-W7	*-B2*

Then we take player #12 and look for a possible opponent; #1 already played with #12, so we take #5 instead, forming 12-5. Now, the first "free" player is #1, for which the first possible opponent is player #11, so we get 1-11. Now, the first free player is #8, that can be paired to #2, yielding 8-2; then #3, who can be paired to #10; then #4 is paired to #9. Now it's the turn of #7, but this cannot be paired with #6, who is the only remaining player. So, we retrace our steps, looking for a pal for #7. The last pair we made was 4-9; we "dismount" this couple, and pair #7 with #9, and #6 with #4 (the reverse, i.e., 7-4, 6-9, would not be possible, because #7 can play #4, but #6 and #9 were already paired in a previous round).

In the end, we have the pairing 12-5, 1-11, 8-2, 3-10, 9-7, 4-6. Comparing the result with the correct pairing, we appreciate that this method yields a "bad pairing" – nevertheless, it provides a legal one, and <u>*that*</u> *is all we want. If we so desire, we can be a bit "smarter" than that and avoid pairs that are apparently bad, so the result will better suit the round – but this is an "optimisation" that, although possibly useful, is not required for the Completion test.*

14 Appendix II – How many players can we exchange?

For simplicity, let us consider a homogeneous bracket, and suppose we exchanged player A from S1 with player B from S2. After the exchange, player B, now in S1, has a higher BSN (i.e., a lower rank) than that of player A, now in S2. As transpositions proceed, we will get to a point in which the candidate puts together players B and A (and then some other pairs of players). Now, before the exchange, we tried all the possible transpositions in S2 – hence, we also tried, evaluated, and discarded, all the candidates that contain the pair A-B. It follows that every time a candidate contains a pair in which the player from S1 has a higher BSN than the player from S2, this candidate has already been evaluated (so, we can discard it right away).

Now, suppose that we exchanged two couples of players between S1 and S2. Reasoning as above, we can see that, when a candidate contains two pairs in which the player from S1 has a higher BSN than the player from S2, this candidate has already been evaluated – but we can do better than that. Let's remember that, before exchanging two couples of players, we tried all the single exchanges. This means that every time the candidate contains one pair in which the player from S1 has a higher BSN than the player from S2, this candidate was examined along with the single exchanges. We deduce that the exchanged player cannot be paired with a lower-ranked opponent, because all such candidates have already been examined. (For example, in a bracket with six players, before exchanging #2, we tried to exchange #3, so all the candidates containing the pair (2,3) have already been checked.) Reasoning along the same lines, we reach the conclusion that the same holds true also for exchanges involving more players. We can thus conclude that:

- ***Every time a pair contains a player from S1 with a higher BSN than their opponent from S2, this pair belongs to a candidate that has already been evaluated.***

Please note that exchanging player #1 is always useless when no downfloaters are expected from S2, because 1 is of course the lowest possible BSN in the bracket. However, if S2 must give downfloaters, even exchanging player #1 can yield useful new candidates (namely, those in which player #1 downfloats).

Let's now try to reason out how many players we can usefully exchange. If we exchanged all players, we would obtain no new candidates at all. But let us suppose that we exchanged all players but one – for example, let us consider a bracket containing 8 players and a triple exchange yielding (after sorting) the new subgroups S1 = {1, 5, 6, 7}, S2 = {2, 3, 4, 8}. Now, those subgroups give the same candidates as the single exchange 1↔8, which produces the subgroups S1 = {2, 3, 4, 8}, S2 = {1, 5, 6, 7} – and, therefore, it is useless. We can easily extend the reasoning to all possible triple exchanges and conclude that every exchange of all-players-but-one gives the same results of a single exchange. In just the same way we conclude that every exchange of all players but two gives the same results of a double exchange; and so on. Now, if we also remember that S1 can never contain more players than S2 (any possible excess players shall simply join the Limbo!), and that the possible downfloaters, apart *from those in the Limbo, must come from S2, which can therefore be actually larger than S1, the conclusion is that:*

- ***Exchanging more than half of the original S2 players is useless***.

These two observations allow us to immediately discard a great many candidates.

Example

Let us considers a bracket containing seven players: S1 = {1, 2, 3}, S2 = {4, 5, 6, 7}. Now, the possible single exchanges yield many new candidates. For example, the exchanges involving #3 give all the possible candidates containing the pairs 1-3 and 2-3, while the exchanges involving #2 give only the new candidates containing the pair 1-2. Exchanging #1 yields no new candidates at all, except for those in which #1 floats.

We should also note that there is a peculiar symmetry in all this – e.g., exchanges involving #7 are all useless (just as those involving #1), because no BSN is greater than seven in this bracket. Exchanging #6 yields only the new candidates containing the pair 6-7, because all other (i.e., those containing the pairs 6-5, 6-4, 6-3, 6-2, or 6-1) were already tried in precedent exchanges – and so forth.

Now, let us consider double exchanges, starting with those involving #3 and #2. The only new candidates now are those that contain the pair 1-2 with #3 to float, and those that contain the pair 1-3 with #2 to float. The next possible group of exchanges involves players #1 and #3 together, and the only new candidates are those that contain the pair 2-3 and #1 to float. Finally, it is easy to prove that the exchanges involving players #1 and #2 yield only candidates that were already examined in the previous attempts and are therefore useless.

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Mastering the Dutch

A tournament example developed with

C.04.3 FIDE (Dutch) Swiss Rules, version 2026

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