

GNU Backgammon

All About GNU

by Albert Silver

By now, it's fairly common knowledge that just about all the top players make use of the neural-net backgammon programs such as Snowie, or the older Jellyfish. The impact these programs have had on the way the game is understood and played cannot be overstated. Players of all levels have the option of purchasing these revolutionary 'bots' (short for robots) in order to not only have the pleasure of getting a drubbing by a world-class opponent as many times as they want, but also have it analyze their moves, games, and matches. The program will point out our mistakes, tell us how big a blunder our move was, and list the best moves. It is still up to us to understand why our move or cube action was wrong, however there is no question such a tool is priceless.

Perhaps 'priceless' is a poor choice of words as the price is by no means a given. Though the programs come with different options depending on how much one is willing to spend, a version with all the trimmings, such as importing one's matches, analyzing the games, grading your play, allowing rollouts, etc. will set you back no less than \$380 for Snowie or 'only' \$220 for the older, and less sophisticated Jellyfish. This would seem to indicate that a top-quality aide is only in reach of someone with deep pockets or a deep commitment. If not, one has to look at some of the free offerings available on the Internet.

That's where [GNU](#) comes in. Personally, when I first heard of GNU Backgammon, I immediately remembered with a grimace my first experience with an old version of GNU Chess several years earlier: an engine that barely played at an expert level, as opposed to other master-level programs, an absolute bare minimum in functions, and graphics that reminded me of my first Atari video game system.... from back in 1977. The surprise that awaited me couldn't have been greater.

GNU Backgammon is first of all a neural-net program of World-Class strength. It is based on the same technology from which Jellyfish and Snowie originated.

Neural Net technology

The concept of neural-net technology is what permitted the breakthrough in playing levels from 'interesting amateur' to 'world-class' playing literally on par with the best in the world. The person behind this [brilliant idea](#) is Gerald Tesauro, a researcher for IBM, who built the first neural-net program called TD-Gammon. The difference it brought was that instead of simply using weights and strategies of programmers and players, it created its own by playing against itself hundreds of *thousands* of times, with each version stronger than the previous one. By version 2.1, which had played 1.5 million games, two-time World Champion Bill Robertie declared it as good as a strong master and even wrote a book on the experience called "[Learning from the Machine](#)". In fact, because of its independent learning, its play and that of subsequent programs using neural-net technology have revealed revolutionary strategic knowledge of the game from which top modern practice is based. GNU Backgammon is among those neural-net giants, and is among the top programs in the world.

Features

How strong is GNU?

On [Gamesgrid](#), the famous online server where many of the world's best play, a bot called GGRaccoon, using the GNU 0.13 engine and playing on a weaker setting so that it plays instantly, has achieved a rating as high as 2083 and is a favorite sparring partner of the top players there.

A match was also done using Tony Lezard's [Dueller](#) software where GNU 0.13 played 100 7-point matches against Snowie 4 using their ideal settings. Although GNU won with a convincing 56-44, subsequent analysis, taking into account the luck factor, revealed that they were of exactly the same strength. The recently released GNU 0.14 is 1.18% stronger at 0-ply (the setting of GGRaccoon) than GNU 0.13 at 0-ply.

GNU is made of 3 neural nets: the contact net which is the main net for middlegame positions, the crashed net, and the race net which is so that GNU does not suffer from the common bane of backgammon programs: the non-contact bearin. For more information on how the neural nets were developed, see Joseph Heled's (the developer) site [The GNUbg Training Program](#). Be sure to select *full* instead of *concise* at the bottom left of the site if you do visit it.

Brief feature list

Aside from offering an analytical engine of the highest order, GNU's interface provides a very impressive number of features for users, many of which are not available in commercial programs. It's worth mentioning that GNU Backgammon is also available for MacOS, Solaris, Linux, and other operating systems. There are also programs using the GNU engine running on [Windows CE](#) and the [source](#) is available to be ported to PDAs.

- Import and export one's games and matches from other sources such as FIBS, Gamesgrid (it imports comments as well), and TrueMoneyGames.
- Analyze a game or entire match with a detailed report, including your rating and even the equivalent Snowie error rate.
- Keeps track of your results in the Player Record
- Rollouts galore with checker play according to score and extensive customizable options.
- Setting up of positions.
- Export to text documents (with diagrams) and PDF documents.
- Export to HTML customizing the information exported and the graphics used.
- Copy board and analysis to the Windows clipboard for easy pasting elsewhere.
- Numerous ready-made board designs plus the option to make one's own.
- Several skins available.
- Bearoff databases (both two-sided and one-sided), and tools to make ones own, however large (up to the 12-point, 13-point, etc.).

Advanced players will also find a wealth of options to help in their study of the game:

- Choose between any of seven Match Equity Tables such as Woolsey's, Trice and Jacobs, or even the Snowie table. You can also create your own to use instead.

- A new Temperature Map to visualize the dangers and jokers of a move as well as the volatility of cube decisions.
- Kleinman counts and Thorp counts.
- Gammon Values and a powerful Market Value viewer showing the values of take points, cash point, beavers, etc. including separate values for a dead cube or live cube.

What follows is a tutorial intended to present most of what GNU Backgammon has to offer, though not exhaustively so, and how to make the most of it. Therein you will find out about:

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Feel free to skip over parts that do not interest you or that you already know.

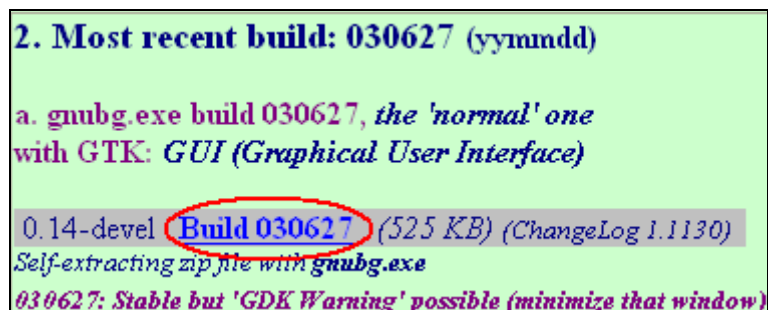
Where to get it

The official site of GNU Backgammon is either <http://www.gnu.org/software/gnubg/> or the new site at <http://www.gnubg.org> though you should be warned that this is not where you will want to get the program. To get the fully functional version you want to go to the site of one of the authors: [GNU Backgammon for Windows](#). Go there and download the *Installation Archive*, a self-installing 12 MB file, and run it.



Just so you know, there is a rather spooky warning below that says it is for people who “*can live with software that suddenly crashes with no sort of warning (...) and like reporting bugs*”. Frankly, it’s not nearly so dire, so don’t be put off by this. Of course if you do find a bug, or have a suggestion, do not hesitate to send it.

Once you have done this, you will want to bring it up-to-date with the latest version, released very regularly, to enjoy the new features and bug corrections. For this, go to Nardy Pillard’s site [This is not an 'official' GNU Backgammon page](#) (for all practical purposes it *is*). There, scroll down to the part that says *Latest Build* and download the most recent file. The numbers aren’t some mysterious serial number but merely the date of the release. So Build 030627 would just mean Build of 2003 June 27th.



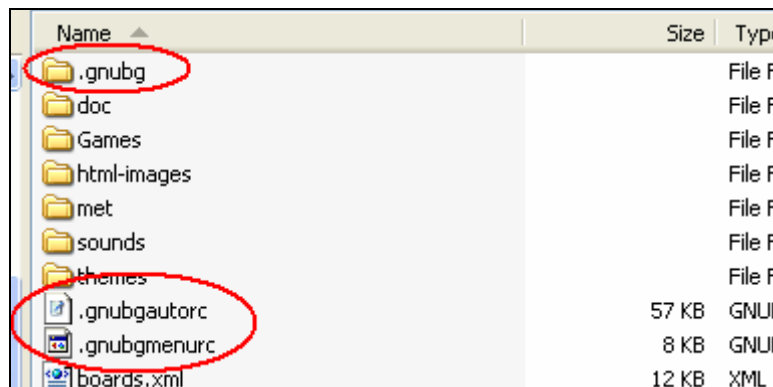
Click on the link circled in red and download the file. Then install it and it will replace the old build with the new one in a simple step.

If you are updating from an older build to the Installation Archive dated July 1st, 2003 or later, it is suggested you uninstall the previous version first. Read below on how to preserve your settings and Player Records.

Windows 95/98 users

If you are using Windows 95 or Windows 98, you may experience problems and see GNU crash right from the start. If this happens, you most likely have an older build that had some compatibility problems. Go to the official site [GNU Backgammon for Windows](#) and download the Installation Archive which has fixes to the problem. It is suggested you uninstall the previous version before doing so, which brings another concern: how can you preserve your settings and Player Records?

You'll need to do copy a few files first. In Windows Explorer, go to the `\gnubg` directory, and then copy the files `.gnubgautorc`, `.gnubgmenurc`, and the subdirectory `\.gnubg`, and place them in another directory temporarily.



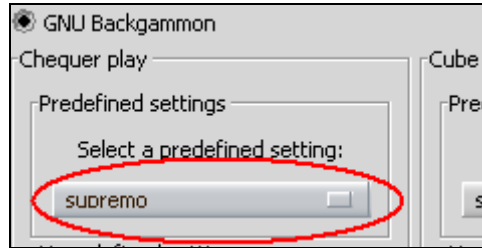
Now uninstall your older GNU Backgammon, and then install the new build. After it is installed, go to the `\gnubg` directory and copy to it the files you saved. If it asks you permission to overwrite the files say yes. Now when you open GNU it will use your previous settings.

Playing a game

The first and most basic feature is to simply set up a game and play, so let's start with that. Start the program and maximize the window. If the appearance isn't to your liking, you will find out how to customize it further below.

Players

First set the settings by clicking on the *Settings* menu at the top, then click on *Players*. This opens a window displaying the settings for GNU or allowing you to play against someone else (or even have GNU play against itself). At the top there is a tab where you can also set your name for the player. For the GNU engine, I prefer the pre-defined setting of *Supremo* for both checker play and cube decisions. At this setting it will take some time to play at given moments which may not be to the taste of everyone, so if you want a top-notch game, just a fraction worse, but almost instant, select *Expert* instead. You may also get tired of getting beat up by it (if you think it cheats, read the section [A Word about 'Cheating'](#)), in which case, you can select more modest playing levels.



If you are a Snowie user, or have seen Snowie's analysis, you may wonder why my recommended level of play (*Supremo*) is set at 2-ply when Snowie's strongest setting is at 3-ply. The reason is simply one of nomenclature, or naming. Snowie starts counting at 1-ply whereas GNU starts at 0-ply, so GNU's 2-ply is in fact the same search depth as Snowie's 3-ply.

Reduced Evaluation (speed)

This option is designed to increase the speed of play by taking a shortcut. Instead of averaging over all 21 possible dice rolls, it is possible to average over a reduced set, such as only 7 rolls which would be 1/3 or 33%. The 33% speed option should be approximately 3 times faster than the full search with no reduction. One point, it has been noted that this can badly hurt GNU's checker play so it is not advised to use it here. If you want it to play faster, and find *Supremo* too slow for example, set it at *World Class*, or try my *Move Filter* suggestion below.

Move Filter

The move filter allows you to control exactly how many moves GNU is examining at each ply. A ply is basically one move played by one side, thus if both sides played a move, it would be one whole move, but two plies, one for each side. To change the specific settings, press the *Modify...* button.

Although the level presets, such as *World Class*, *Supremo*, etc. are tested and good, you may want to know or control how GNU filters its moves to analyze and how many.



If you are playing *Expert* level (this is what GGRaccoon is set at) or another 0-ply setting, the *Move Filter* settings will not change a thing, as *Expert* level automatically examines all moves. At *Supremo* level, this changes though, as it takes a selection of the best moves from 0-ply and examines them at 2-ply. This means that for those selected moves it will calculate all the possibilities 2 plies ahead and evaluate them, allowing it to find better moves. Since *Supremo* is a 2-ply setting, we are only interested in the 2-ply settings of *Large* as in the figure above. 3-ply or 4-ply settings will have no effect here because *Supremo* doesn't examine at that depth.

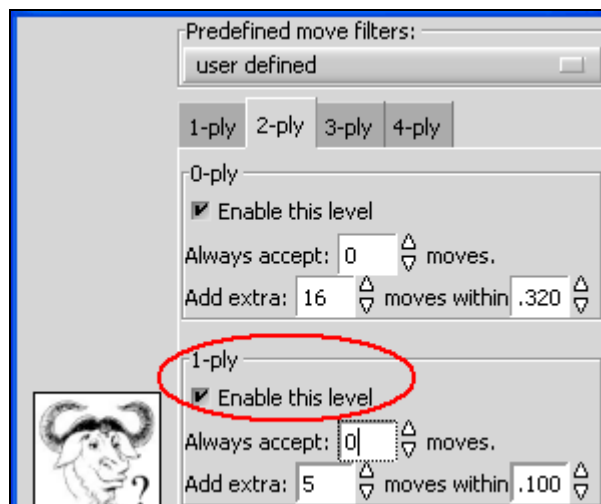
In the figure above, we can see it first will *Always accept 0 moves*. This first line means that it won't force any moves to be analyzed at 2-ply, it will only analyze moves according to the second line. If it had said it would always analyze 2 moves, this would mean that no matter how ridiculously bad the 2nd move was compared to the 1st, it would analyze both at 2-ply.

The second line says it will *Add extra 16 moves within 0.320*. This means that provided they aren't more than 0.320 equity worse than the top move, it will select a maximum of 16 moves to analyze at 2-ply. For example, in the diagram below

Rank	Type	Win	W g	W bg	Lose	L g	L bg	Equity	Diff.	Move
1	Cubeful 0-ply	50.6%	11.0%	0.2%	49.4%	16.4%	0.2%	0.131		8/5* 6/5
2	Cubeful 0-ply	36.8%	6.0%	0.1%	63.2%	23.9%	0.4%	-0.322	-0.453	20/16*
3	Cubeful 0-ply	34.6%	5.7%	0.1%	65.4%	28.5%	0.5%	-0.424	-0.555	13/9*

the 2nd best move is no less than 0.453 equity worse than the top choice, so it didn't bother analyzing them at 2-ply as it is unlikely to change its mind on what the best move is.

Take a look at the figure below now:



Here, the exact same settings were maintained, but the 1-ply filter was activated. This just means that those 16 moves selected from the 0-ply are sent instead to be analyzed at 1-ply, and then up to 5 moves from 1-ply will be sent to be analyzed at 2-ply. So this would actually be faster than the previous setting (and weaker), since a maximum of only 5 moves would be analyzed at 2-ply depth.



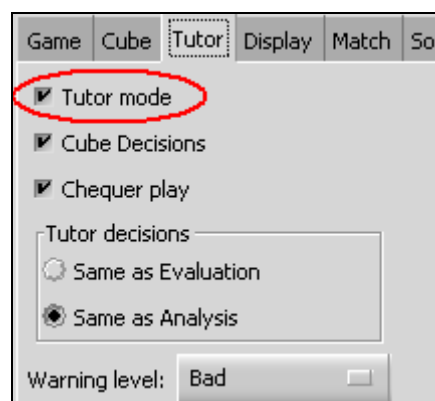
Tip - Feel free to experiment with the settings, as you can always reset them by simply choosing one of the level presets. In order to see if they are better, or as good but faster, I'd suggest comparing the results with *Supremo*. One setting I have that works quite well, is to take the basic *Supremo* setting and in the *Move filter* reduce the 16 to 12. It cuts down on the thinking time by 20-25% more or less, and I haven't seen more than one case in over 10,000 moves where it missed the best move.

Before going any further, do not forget to click on *Save settings* at the bottom of the *Settings* menu. You must do this every time you make changes you wish the program to remember the next time you load it.

Playing options and Tutor

In the *Settings* menu, select *Options*, and a small window opens. Here, you can activate automatic bear-off (it will automatically take off the most checkers if it can sparing you the effort of playing obvious moves), choose the equity table to be used (Woolsey's, Snowie's, etc.), select Nackgammon, choose to play with manual dice (you play with your own personal dice instead of the computer's) AND a great teaching tool: the **Tutor Mode**.

When activated, the Tutor mode has GNU analyzing your moves and/or cube decisions and comparing them with its choices. You set the threshold for its alerts, so if you set it for *bad*, it will only warn you when you make a bad mistake. It will then allow you to re-examine your choice, go right ahead with it, or provide a 'hint' essentially showing you its analysis.



My personal choices are to set the limit to *bad*, and to set the Tutor decisions as *Same as Analysis*.

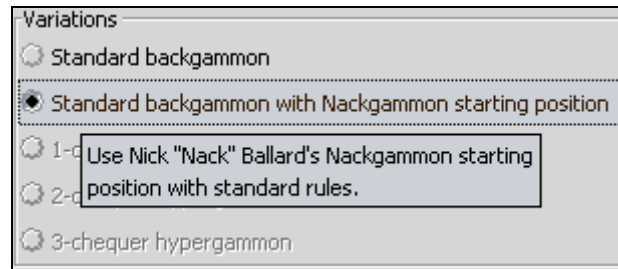


Tip - Before going any further, do not forget to click on *Save settings* at the bottom of the *Settings* menu. You must do this every time you make changes you wish the program to remember the next time you load it.

Backgammon variations

Backgammon has a number of variations, some of which are quite popular on the servers. The main ones are Nackgammon and Hypergammon, both of which are supported by GNU, as well as an Eastern variation of the rules not allowing more than 5 checkers on a single point. GNU is also capable of directly importing and recognizing Nackgammon and Hypergammon games played on the servers for analysis.

- **Nackgammon** – This variation of backgammon conceived by Nick “Nack” Ballard has two checkers removed from the 6 and 13 points and places them in the opponent’s board to form a second anchor. Play follows standard backgammon rules and games are naturally longer. It is considered a more strategic struggle, with luck influencing less, than normal backgammon. To play a game of Nackgammon against GNU, go to the *Settings* menu and then select *Options*.



Under the tab Game, select Standard backgammon with Nackgammon starting position. This way it will set up a game of Nackgammon instead of normal backgammon.

Hypergammon – Hypergammon is a very different game though it too follows the standard rules of backgammon. In it, each player starts with only 3 checkers in the opponent’s board and must of course cross the board and bear them off as in normal backgammon. To play Hypergammon in GNU you **must** first build the Hypergammon databases using the tool *makehyper.exe*. The tool can be found at Nardy Pillard’s site [This is not an 'official' GNU Backgammon page](#)

1b. Hypergammon databases

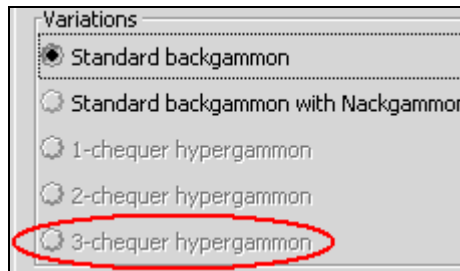
[2-checker database](#) (2.6 MB) (Apr 4th, 2003)
(Hypergammon however is played with 3 checkers. See below)

[makehyperZip.exe](#) (117 KB) version 1.2 (Apr 7th, 2003)
To create your own hypergammon databases.

"makehyper -f hyper1.bd -c 1" for the 1 checker db
"makehyper -f hyper2.bd -c 2" for the 2 checker db
"makehyper -f hyper3.bd -c 3" for the 3 checker db
! hyper3.bd needs 400 MB free RAM and can take days to build

The bad news is that building the ~400 MB file for the 3-chequer database requires no less than 400 MB of Ram (less causes disk swapping and considerable slow-down) and should take **days** to build. The good news is that with the databases it will play perfect Hypergammon, the same as the bot on Gamesgrid called MrHyperbot. To run the tool you need to open an MS-DOS Prompt window from Windows 95/98/ME (Start → Programs → MS-DOS prompt) or a Command Prompt window from Windows NT/2000/XP (Start → All Programs → Accessories → Command Prompt). There follow the instructions

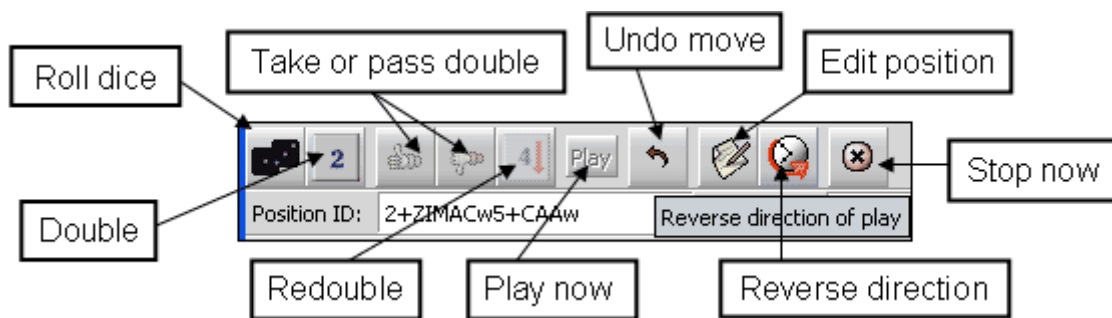
in the diagram (or at the site) to build the databases. To start a game of Hypergammon go to the *Settings* menu and select *Options*. In the window that opens select *3-chequer Hypergammon*, which will only be available if the databases are present.



Starting a game

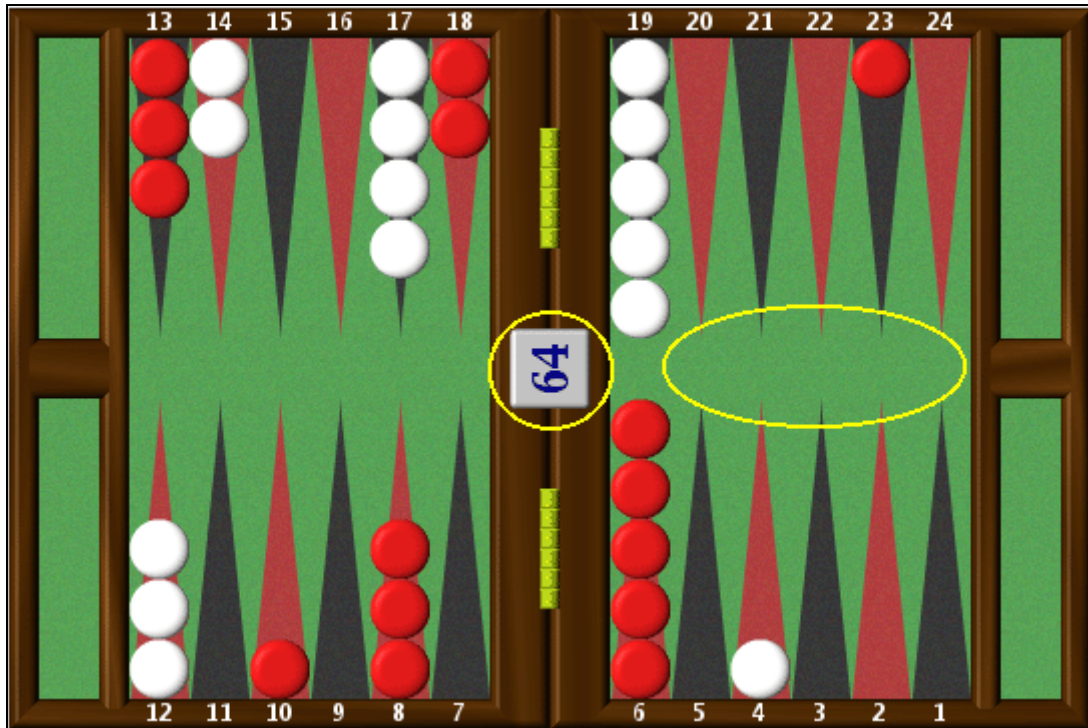
To start a game, just click on the *File* menu, and choose *New*, and then your choice of a game, match, or money game session. When you are playing, it will automatically show the pip count (and difference), though you can de-activate it by going to *Settings* menu and in *Appearance* uncheck the box *Show Pip count permanently*.

While playing, you can access the main functions through the toolbar at the top:

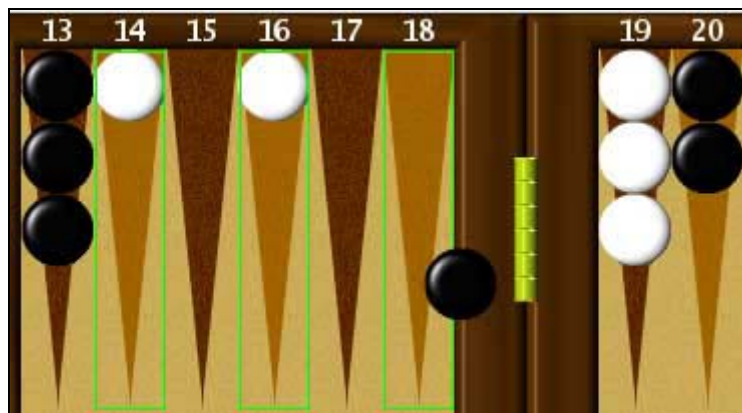


The functions from left to right are: Rolling the dice, doubling, taking or passing a double (thumbs up, thumbs down), redoubling (beavering), telling the computer to play (if you just set up a position for example), edit the position (plus names and score), change the direction of the play, and stop the program if it is analyzing or doing a rollout.

Mind you, you can roll the dice simply by clicking on the empty space of the board on the right side. Same goes for doubling, where you can just click on the cube on the board.



After you've rolled the dice, just clicking on a checker will have GNU play the highest number with it, and after with a second checker or the same one, it will play the lower number. GNU will also help you see where the pieces can go. Just click on a piece and start to drag it. You will see the possible landing squares highlight in green.

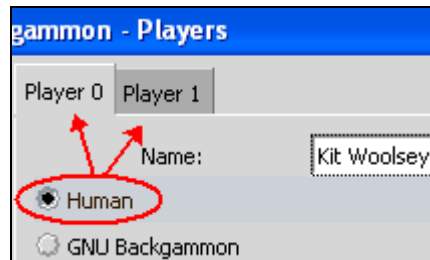


If you would like GNU's analysis of a move or cube decision while playing, go to the *Analyse* menu and select *Hint*, or press the keyboard shortcut Ctrl-H. For details on the *Hint/Annotation* window, see below.

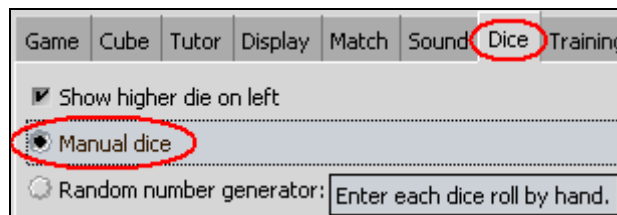
Human vs. human


You may wish to use GNU to keep track of a game or match against a friend, and play directly on GNU, or you may wish to enter a game from another source such as a book or a videotape for safekeeping and analysis. Here's how to do it.

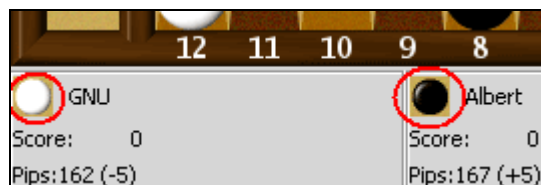
- 1) First you must set both players to human, so go to the *Settings* menu and select *Players...* In the window that opens, select 'Human' for both players. You can also select the names here, but even if you don't, you can change this later.



- 2) Now go to the Settings menu and select Options... In the window that opens, select the Dice tab at the top and then choose Manual dice. This allows you to enter your own dice rolls. However, if you only want to play against a friend on GNU (so you can save and analyze), letting GNU roll the dice, ignore this step.



- 3) Now go to the *File* menu, select *New* and start the game by selecting either *match*, or *session* (as in money game session).
- 4) If you want to change the direction of the play (ex: left to right), just click on the *Reverse Direction*  button.
- 5) You can set whose turn it is to play by clicking on the small chequer next to the player's name at the bottom.



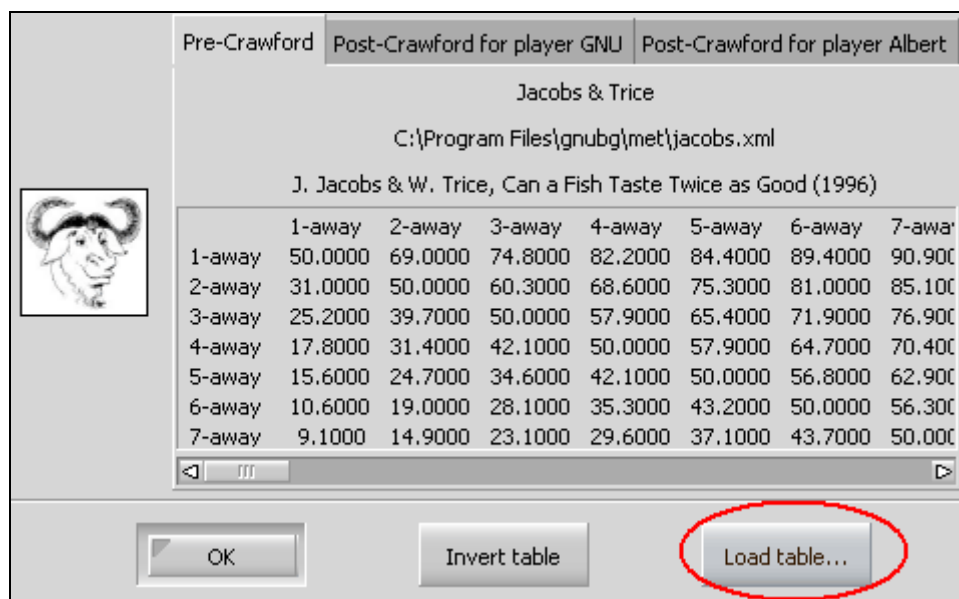
- You can also set the turn of the player to move in the *Game* menu and by selecting *Set turn* at the bottom.
- 6) To enter the moves, just play as you normally would against GNU: clicking on the board to roll the dice, selecting the dice rolled, and then playing the move. If you make a mistake in the dice rolled, just go to the Game menu again and select Set dice.
- 7) If you make a mistake in the move played, and want to correct this, go to the Windows menu, and select Game Record. Use the Game Record to go to the move you want to correct, and just start entering a new move or dice roll from there. GNU will automatically continue the game with your change and erase the moves that came after.
- 8) You can resign in the *Game* menu.
- 9) Don't forget to save your results regularly (*File* → *Save*) so you don't lose important information by accident.

Advanced Playing Information

For players seeking more advanced information on the position, GNU also provides information on the Match Equity Table (MET), race theory (Kleinman count, Thorp count), a powerful Market Window/Gammon value viewer, and a new tool called the Temperature Map courtesy of [Sho Sengoku](#).

Match Equity Table

The Match Equity Table can be viewed at any moment by entering the *Analyse* menu and selecting *Match Equity Table*. There you will see table values including Pre-Crawford and Post-Crawford scores. The table used by GNU is by no means imposed, and you can select any of a number of provided ones, including the Snowie MET, Woolsey's, Jacob and Trice's, etc. by selecting *Load Table*.



	Pre-Crawford	Post-Crawford for player GNU	Post-Crawford for player Albert				
Jacobs & Trice							
C:\Program Files\gnubg\met\jacobs.xml							
J. Jacobs & W. Trice, Can a Fish Taste Twice as Good (1996)							
	1-away	2-away	3-away	4-away	5-away	6-away	7-away
1-away	50.0000	69.0000	74.8000	82.2000	84.4000	89.4000	90.9000
2-away	31.0000	50.0000	60.3000	68.6000	75.3000	81.0000	85.1000
3-away	25.2000	39.7000	50.0000	57.9000	65.4000	71.9000	76.9000
4-away	17.8000	31.4000	42.1000	50.0000	57.9000	64.7000	70.4000
5-away	15.6000	24.7000	34.6000	42.1000	50.0000	56.8000	62.9000
6-away	10.6000	19.0000	28.1000	35.3000	43.2000	50.0000	56.3000
7-away	9.1000	14.9000	23.1000	29.6000	37.1000	43.7000	50.0000

In the window that opens, enter the `/met` directory on the left, and then on the right choose the table you want. The tables all end with the `.XML` extension, so to select the Jacobs and Trice table, choose `jacobs.xml`. Again, don't forget to save the settings (*Settings* menu → *Save Settings*) otherwise it won't remember your choice of table the next time you use GNU.

Kleinman and Thorp counts

If the game situation is a race, one can look up what the Kleinman count or Thorp count has to say about it.

Kleinman Count	One chequer bearoff	Thorp Count	One sided rollout
Player GNU	62 pips		
Player Albert	63 pips		
Difference:	-1		
Sum:	125		
<hr/>			
$K = (diff+4)/(2 \sqrt{sum-4}) = 0.136$			
Cubeless winning chance = $0.5 (1+erf(K)) = 57.65\%$			

Market Window/Gammon value

GNU offers a powerful Market Window/Gammon value tool to the advanced or aspiring player. This tool will answer all questions on a position's take point, its double point, etc. for both players at any match situation, including side-by-side dead-cube/live-cube scores. If you wish to see how other match scores would affect the figures, you can simply use the arrows, and you can change the cube value. And if it is a money game, then the respective double, beaver, raccoon, redouble values will be shown instead.

Match play
 Money game
Reset

Match score

GNU ▲
▼ -away

Albert ▲
▼ -away

Crawford game

Cube

1
 2
 4
 8
 16
 32
 64

Match equity table

Jacobs & Trice

C:\Program Files\gnubg\met\jacobs.xml

J. Jacobs & W. Trice, Can a Fish Taste Twice as Good (1996)

Gammon and backgammon percentages

	gammon rate(%)	bg rate(%)
GNU	<input type="text" value="2.64"/> ▲ ▼	<input type="text" value="0.05"/> ▲ ▼
Albert	<input type="text" value="1.99"/> ▲ ▼	<input type="text" value="0.05"/> ▲ ▼

0 ply
 1 ply
 2 ply
 3 ply

Market window
Window graph
Gammon values

Market window for player GNU

	Dead cube	Live cube
Take Point (TP)	26.608%	17.970%
Double point (DP)	52.458%	52.458%
Cash Point (CP)	75.767%	79.362%
Too good Point (TP)	98.797%	79.362%

Temperature Map

Sho Sengoku conceived and developed the idea of the [Temperature Map](#), which is now available to GNU users. Essentially what it does is allow you to see the possible consequences of a move or cube decision in a visual manner. It is available in the *Analyse* menu, but you'll most likely use it from the *Hint/Annotation* window. The best way to understand this is to give an example. Here is a move from a game against GNU where I made a mistake:

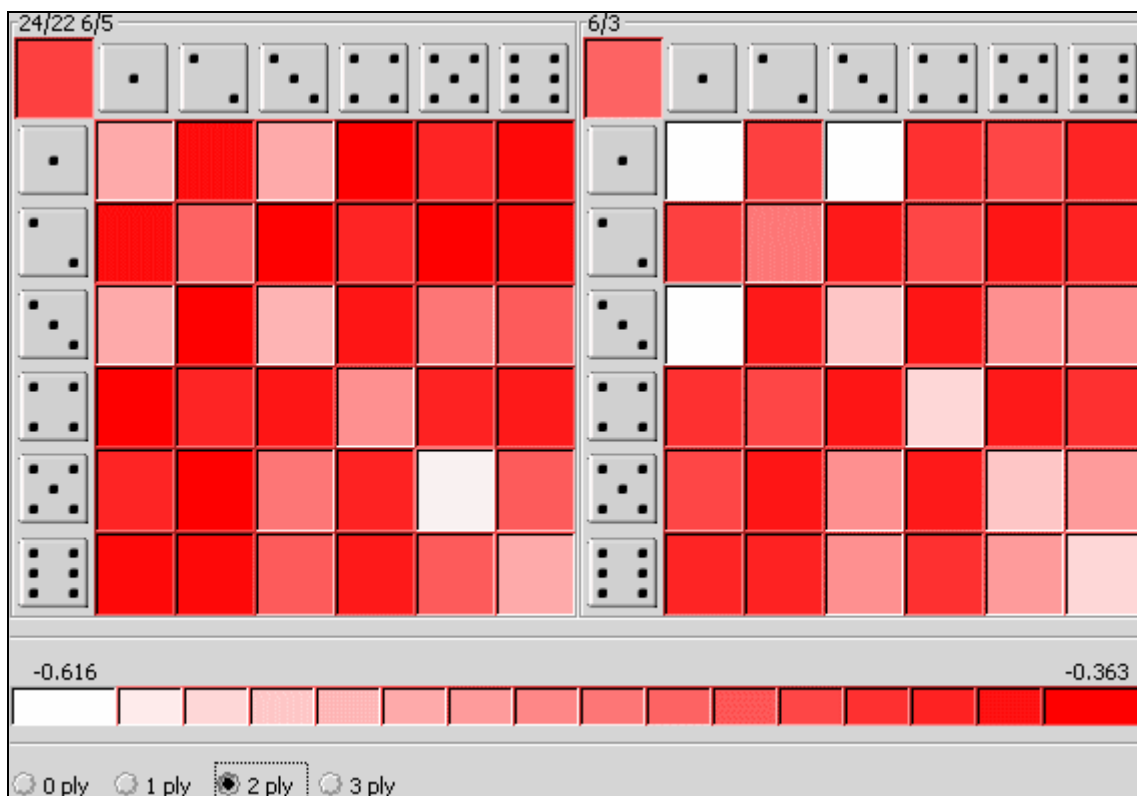


As can be seen in the Annotation window below, GNU says my choice 6/3 lost 0.040 equity and I should have played 24/22 6/5.

Rank	Type	Win	W g	W bg	Lose	L g	L bg	Equity	Diff.	Move
1	Cubeful 2-ply	29.9%	6.0%	0.1%	70.1%	17.4%	0.6%	-0.397		24/22 6/5
2	Cubeful 2-ply	29.6%	5.8%	0.1%	70.4%	18.6%	0.6%	-0.404	-0.007	24/23 24/22
3	Cubeful 2-ply	29.5%	5.9%	0.1%	70.5%	17.8%	0.8%	-0.405	-0.008	24/22 8/7
4	Cubeful 2-ply	29.0%	6.2%	0.1%	71.0%	19.8%	0.8%	-0.417	-0.019	24/23 6/4
5	Cubeful 2-ply	28.8%	5.7%	0.1%	71.2%	18.0%	0.6%	-0.421	-0.024	24/22 3/2
6	Cubeful 2-ply	28.0%	5.6%	0.1%	72.0%	16.3%	0.6%	-0.437	-0.040	6/3
7	Cubeful 2-ply	27.7%	6.6%	0.1%	72.3%	18.1%	1.3%	-0.440	-0.043	8/7 6/4
8	Cubeful 2-ply	27.7%	5.8%	0.1%	72.3%	24.1%	1.4%	-0.441	-0.043	24/22 5/4
9	Cubeful 2-ply	27.6%	6.3%	0.1%	72.4%	17.6%	1.0%	-0.444	-0.046	6/4 5/4
10	Cubeful 2-ply	27.5%	5.6%	0.1%	72.5%	20.2%	0.7%	-0.447	-0.050	24/23 5/3

Eval ...
 0 1 2 3 4
 Rollout ...
 MWC
 Copy
 Show
 Move
Temp. Map

I can of course conjecture the reasons or ask a master to explain this to me, but another choice is to see whether the Temperature Map can shed any light. To see it I highlight the moves I want to compare (it can be more than 2) and then press the *Temp. Map* button. Here is what it shows me:



The whiter the squares the worse the roll would be for me, and the darker the red, the better. I can see that after my play, a roll of 1 and 1, 3 and 1, or 4 and 4 for example, my equity would drop sharply, so it helps me see the dangers my play would allow. The Temperature Map is therefore ideal for “pay now, pay later” situations, and is also available for cube decisions. Why cube decisions you might ask? The reason is that it allows you to see the volatility of the position, and would thus allow you to see quickly and easily the potential market losers of a position. You can set the depth of the analysis as seen at the bottom of the figure above, but be warned that even a 2-ply analysis of all the possibilities can take some time.

Importing and Exporting games

GNU allows users to import matches from a variety of formats, including the Jellyfish formats, the FIBS oldmoves format, the Snowie GamesGrid format (.sgg), the TrueMoneyGames format (.tmg), and even Snowie’s *Standard Text Format* among others. It also allows you to export your games and positions into the Jellyfish format (.mat), HTML (including easily customizable graphics), a readable text format with diagrams (.txt), and even a PDF document. If you’d like to share a position and some analysis in text format, you can have GNU send this directly to the Windows clipboard for pasting.

Importing games

Since many players who play online will want to make use of this to analyze their matches, or at the very least see how they did, below are step-by-step instructions on how to do this whether you play at [FIBS](#), [GamesGrid](#), or [TrueMoneyGames](#). Essentially, you just want to save the games in a format that GNU can read and then import them.

To import a match or position, just go to the *File* menu and choose *Import*. Then select the type of file you wish to import, find the file, and that's that.



Tip - For those who take online classes, please note that it imports the commentary saved on a move-by-move basis at GamesGrid, so you can see comments in the annotation window when going over the moves. I tested this with an online class and it was all there, neatly saved at every move.

GNU Backgammon - Annotation

Cube analysis

Cubeless rollout equity: +0.523

1.	Double, pass	+1.000	
2.	Double, take	+1.029	+0.029
		0.760 0.003 0.000	- 0.240 0.000 0.000
3.	No double	+0.842	-0.158
		0.761 0.000 0.000	- 0.239 0.000 0.000

Proper cube action: Double, pass

Buttons: Eval ..., 0 1 2 3 4, Rollout!, ..., MWC, Copy, Copy

Double

Chat logs:

```
Suzanski: yes
franzinator: sure
Suzanski: and its a take
joolsef: he needs 25% cubeless to take ?
RedTop: and he needs 25% to take,
RedTop: compared to about 23% for money
Suzanski: lead is 10% of leader's count
RedTop: so it must be a double here, I'm close to losing my market
RedTop: for money he can take down 12%
RedTop: I think it's a razor-thin take, clearly a cube
```

FIBS - Importing and analyzing

These instructions are for use with [JavaFIBS](#), my preferred FIBS client.

- 1) After your match or game is finished, in the JavaFIBS client, go to the *Tools* menu and select *Match Converter*.
- 2) In the window that opens, click on the match you want to analyze, and press the *Convert* button. I'd recommend deleting the match after this (pressing the *Delete* button) so the list doesn't grow too big.

Matches

- MissBiggy.match
- You_vs_gunter_1056087037250.match
- You_vs_ysland_1056343221234.match**

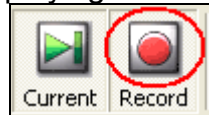
Buttons: Convert, Delete, Close

- 3) Open GNU, enter the *File* menu, select *Import*, and then choose *.mat match*.

- 4) Locate the match and import it. You'll find it in the main JavaFIBS directory, in the subdirectory *Match* and then *Jellyfish*. See the ***tip*** below to avoid having to do this everytime.
- 5) Go to the *Analyse* menu and select *Analyse match*. See [Analyzing matches](#) to learn how to change the analysis settings.

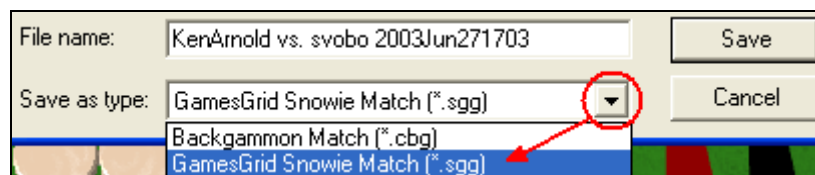
GameGrid – Importing and analyzing

- 1) When playing or watching a match at Gamesgrid, be certain to activate the Record



button so it will save the game when you are done.

- 2) In the save game window, change the format to be saved to Gamesgrid Snowie Match (.sgg) and then press *Save*.



- 3) Open GNU, enter the *File* menu, select *Import*, and then choose *Gamesgrid .sgg match*.
- 4) Locate the match and import it. You'll probably find it in the Gamesgrid directory in a subdirectory called *SaveGame*. See the ***tip*** below to avoid having to do this everytime.
- 5) Go to the *Analyse* menu and select *Analyse match*. See [Analyzing matches](#) to learn how to change the analysis settings.

TrueMoneyGames – Importing and Analyzing

- 1) I'd first suggest changing the option in the TrueMoneyGames client so that it always saves matches by default. Note that you cannot save a match that you are only watching. After opening the program, go to the *Tools* menu and select *Options*. In the window that opens, click on the *Table* tab at the top and then set the options as in the figure below.



- 2) After saving your game or match, open GNU, enter the *File* menu, select *Import*, and then choose *TrueMoneyGames .tmg match*.
- 3) Locate the match and import it. You'll probably find it in the TrueMoneyGames directory, called TMG, in a subdirectory called *SavedGames*. See the ***tip*** below to avoid having to do this everytime.
- 4) Go to the *Analyse* menu and select *Analyse match*. See [Analyzing matches](#) to learn how to change the analysis settings.



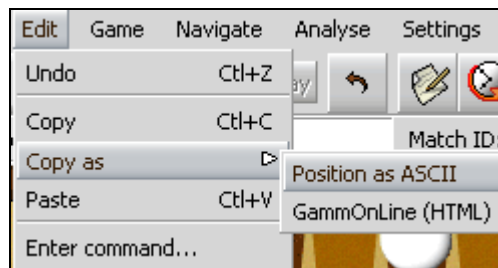
Tip - You can have GNU always remember where to get or save a specific file format. For example, to have it remember where to import your matches from Gamesgrid go to *File*, then *Import*, and then *Gamesgrid .sgg match*. In the window that opens, first go to the directory where the matches are saved, but before opening the file, press the *Set As Default* button at the top. After this, save your settings (*Settings* → *Save Settings*) and GNU will remember where to find your Gamesgrid matches. You can set GNU to remember different directories for each and every type of file format.

Exporting games/positions

GNU allows users to Export their games and matches into a variety of formats such as the Jellyfish formats, text format, not to mention PDF, LaTeX, PostScript, and even HTML. Note that when exporting to these formats you get the moves, diagrams at each move, the analysis, and even the game/match statistics. In text format you'll see the boards in ASCII art, and in PDF, you'll literally get an instant e-book of the match. It also can export board positions and Gammonline HTML to the Windows clipboard for easy pasting.

Windows Clipboard export

- **Text export** - If you want to share a position and analysis with someone via e-mail or a bulletin board, you can save it to a text file and then recopy the contents, but there is a simpler way. When the position is on the board, go to the *Edit* menu and select *Copy as* and the *Position as ASCII*.



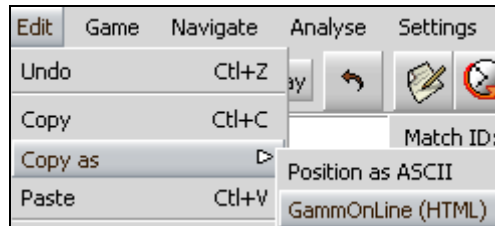
Now all you need to do is paste it wherever you like using the Paste command from the menu or the Windows shortcut Ctrl-V (or Shift-Ins) and get something like this:

```
GNU Backgammon Position ID: sGfwGQDg28EBBg
Match ID : cAlvATAAIAAA
+13-14-15-16-17-18-----19-20-21-22-23-24-+
| X          O   | | | O O X
| X          O   | | | O O X
| X          |   | | | O
|           |   | | | O
|           |   | | |
|           |   | | |
| O          |   | | X
| O          |   | | X
| O          X   | | | X
| O    O    X X | | | X
| O    O    X X | | | X
+12-11-10--9--8--7-----6--5--4--3--2--1-+
O: Kit Woolsey
3 points
11 point match (Cube: 1)
Rolled 63
4 points
X: Gammonline Readers
```

If the diagram comes out bad, it is probably because of the font. To fix it to look like the above, highlight the text of the diagram and change the font to *Courier New* and the size to 9 or 10.

To paste the analysis of the position, look at the analysis in either the Annotation window or the Hint window, highlight the moves, and press the Copy button. Then paste it just like the diagram.

- **Gammonline HTML export** – If you are a [GammonLine](#) subscriber, enjoy the GammonLine BBS, and would like to share an interesting position, you can also make use of the GammonLine board images as seen in pretty much every article available, AND publish the analysis in elegant HTML. To do this go to the Edit menu, select Copy as, and then GammonLine (HTML).



Now go to the text body in the forum and paste it with Ctrl-V (or Shift-Ins). This will work even if the analysis is only in the Hint window.

PNG Image export

You may also wish to simply save the board position as an image file that you can add to a Word document or HTML document for example. To do so, go to the *File* menu and select *Export*, then *Position*, and *PNG*. Be careful to add *.PNG* to the name when saving the image. The board image saved will use the color scheme currently being used. If you wish a different color scheme, change the design (for more info see ***Appearance|boards***). You can also change the size of the image that is created by entering the *Settings* menu, then *Export*, and at the bottom right of the window that opens, set the size you want.

HTML export

GNU is capable of creating elegant HTML files so that you can publish your games on the web. It will create them exactly according to your specifications, including the number of moves, what it analyzed, the board design of your choice, and even the match/game statistics. Here is a sample of what it looks like:

Move number 3: mamabear to play 31



Position ID: 0HPhATDg2+ABMA Match ID: MIH1AEAAAAAA
 Pip counts: mamabear 160, KitWoolsey 162

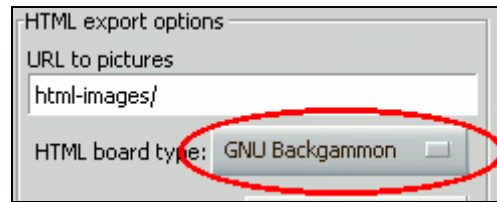
mamabear moves 24/20

#	Ply	Move	Equity
*	1	2	24/20*
			+0.206
			60.6% 21.1% 1.7% - 39.4% 8.9% 0.2%
	2	2	8/5 6/5
			-0.067 (-0.272)
			55.2% 18.1% 1.1% - 44.8% 13.8% 0.6%
	3	0	24/23 13/10
			-0.244 (-0.449)
			50.2% 15.1% 0.9% - 49.8% 15.1% 0.6%
	4	0	24/23 24/21
			-0.256 (-0.462)
			49.8% 13.6% 0.8% - 50.2% 14.8% 0.4%
	5	0	24/21 6/5
			-0.285 (-0.491)
			49.7% 14.4% 1.0% - 50.3% 16.5% 0.7%

To set all the settings as you'd like, you need to go to the *Settings* and then select *Export*. There you can choose, down to the smallest details, what it will display and how. The 'how' concerns the images used to produce board positions. This is chosen at the bottom of the window and you can choose between its own HTML images or two others, which are FIBS and BBS.

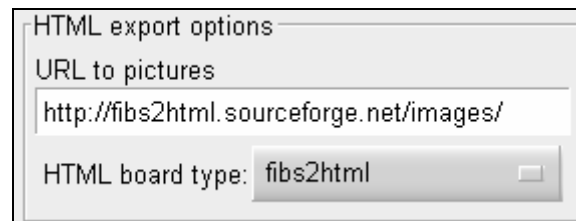
You can choose what the board in the HTML page will look like, and have it appear exactly as the board design (see [Boards](#) for more on this) you are using in GNU. To do so, you need to create a directory to place the images and then export them. First, go to the *File* menu, select *Export*, and then *HTML Images...* Find a directory to place them in, or create your own by pressing the *Create Directory* button at the top. I'd suggest using the default name *html-images*. Now enter the directory and press the *OK* button. Be careful to remember the name of the directory you placed the images in, including capital letters if you

used any. Now go to the *Settings* menu, select *Export* and then at the bottom select *GNU Backgammon* board images (circled in red below) and type the name of the directory.



Tip - If you want to post a position in an online forum that supports HTML you can do this regardless of whether the forum itself supports the necessary images. Here's how:

1) First be sure the image to be exported is currently on the board, and then in the *Export settings* set the HTML board type to *fibs2html*. In the space below *URL to pictures*, enter <http://fibs2html.sourceforge.net/images/> as shown below. Be sure to click *Ok*, and then *Save Settings*.



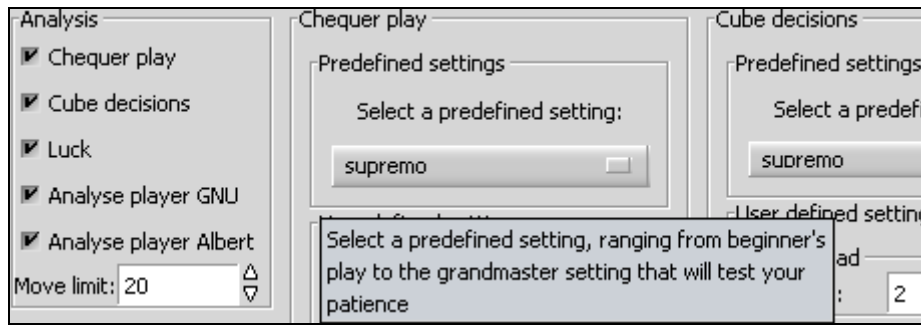
2) Go to the *File* menu, and select *Export*, then *Position*, and then *HTML..* Save the file and then open it in Internet Explorer. In case this already sounds a bit mysterious, inside IE just go to *File* → *Open* → and click on *Browse...* Locate the HTML file you saved and open it.

3) Once you see the board and image in front of you, still in IE, go to the *View* menu and select *Source...* This will open a small window with a lot of code. Copy the entire contents to the body of the post you are writing, and the board and analysis should appear in the forum without any problems.

Analyzing matches

GNU also comes with a set of functions that allow it to analyze a game or match, provide a detailed graded report, and allow you to navigate through the moves to quickly see the mistakes made.

Before starting, you'll want to configure the settings first, though this will only need to be done once. Go to *Settings* and select *Analysis*. A fairly large window will open, allowing you to play with as many settings as you could want. This is also where you set the thresholds for the Tutor mode (*dubious*, *bad*, etc.). Feel free to look around, but I simply set this to analyze checker play, cube decisions, and luck, and set the level of analysis at *Supremo* for both checker play and cube decisions. The Move limit setting is to set the maximum number of moves it will display in the *Hint/Annotation* window.



Tip - Once more, please do not forget to save (*Settings*|*Save settings*) after making changes in the settings, or you will be forced to change them again the next time you start the program.

If you just played a match at an online server, import it first, then go to the *Analyse* menu and select *Analyse match*, or *Analyse Session* (money game session). If you only want to analyze a specific game, open it and then select *Analyse game*. Once started, you will see a bar in the bottom right corner showing the progress made in both the number of moves and percentage completed.

Analysis Results and Grade

Once GNU has finished analyzing your games, you'll want to see the report and then go over the bloopers. In the *Analyse* menu, select *Match statistics*, and a window will open. Feel free to resize it (clicking and dragging the edges) to show more information. It will show you the results of both players side by side, allowing you to quickly compare notes.

Statistics for all games			
	Tami	KitWoolsey	
Moves marked bad	0	0	
Moves marked very bad	0	0	
Error rate (total)	-0.205 (-3.770%)	-0.147 (-2.810%)	
Error rate (pr. move)	-0.006 (-0.114%)	-0.004 (-0.074%)	
Checker play rating	World class	Supernatural	
Rolls marked very lucky	0	0	
Rolls marked lucky	1	7	
Rolls unmarked	40	34	
Rolls marked unlucky	0	0	
Rolls marked very unlucky	0	0	
Luck rate (total)	+0.420 (+7.317%)	+2.497 (+45.772%)	
Luck rate (pr. move)	+0.012 (+0.203%)	+0.061 (+1.116%)	
Luck rating	None	Go to Las Vegas immediately	
Cube decision statistics:			
Total cube decisions	19	20	
Actual or close cube decisions	5	5	

OK Copy

In the screenshot above you can see how it appears. It will detail bad moves (and good ones), not to mention rolls of varying luck, and attribute individual grades for your checker play, your cube decisions, your overall playing, and even your luck. It is very revealing when you see a very different evaluation of your checker play as opposed to your cube decisions. Another feature (in my opinion) is that GNU only grades your checker play according to non-forced moves, contrary to Snowie which grades while including moves that were spent on the bar or that were forced. In other words, if you played 50 moves but 10 of those were spent on the bar (you can hardly make a mistake if you can't play), then GNU will average your error rate according to the 40 unforced moves. You can save these results with the match (*File* → *Save* → *Match*), so that you can see the analysis at anytime without having to redo it. If you are used to Snowie's grade system, or would like to compare them, you will see the equivalent Snowie grade at the bottom.

GNU can be quite tough on the grades, much harder than Snowie 4, so an *Advanced* grade in GNU could easily be an *Expert* grade in Snowie 4. Below are the limits of each grade:

Snowie's thresholds (to understand the Snowie rating) are:

0.0 - 1.2	: Extra-terrestrial
1.2 - 4.4	: World class
4.4 - 5.9	: Expert
5.9 - 8.8	: Advanced
8.8 - 12.6	: Intermediate
12.6 - 18.5	: Beginner
18.5 - ??	: Novice

GNU's thresholds are:

0.0000 - 0.0017	Supernatural
0.0017 - 0.0062	World Class
0.0062 - 0.0083	Expert
0.0083 - 0.012	Advanced
0.012 - 0.018	Intermediate
0.018 - 0.026	Casual Player
0.026 - 0.035	Beginner
0.035 - oo	Awful!

GNU will also attribute an estimated Elo rating of your play based on the [FIBS rating system](#), but it will only do so for match play.

You can also copy the results of the report to another document. To do this, click on the lines you want to highlight using standard Windows functions (with the Ctrl and Shift keys), and then press the *Copy* button. Now open a document and paste (Ctrl-V) the contents of the clipboard.

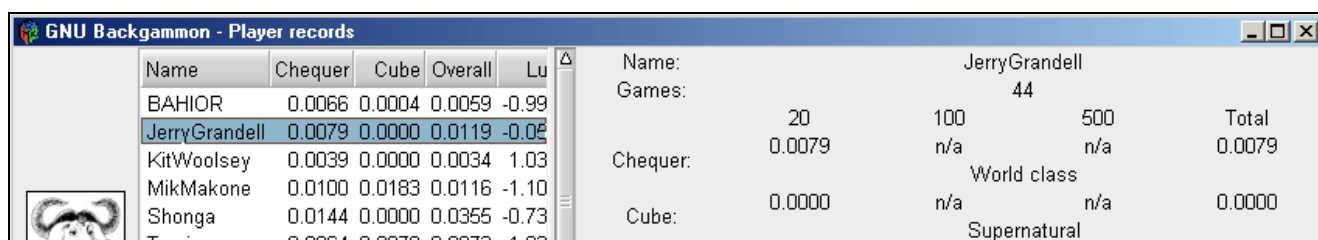


Tip - If you use a program such as Word or WordPad (avoid Notepad), the formatting will be lost when you paste it, but this is easily fixed: in the document, highlight the text, and change the font to Courier New and size to either 9 or 10. Ex:

Error rate (total)	Tami -0.205 (-3.770%)	KitWoolsey -0.147 (-2.810%)
Error rate (pr. move)	-0.006 (-0.114%)	-0.004 (-0.074%)
Checker play rating	World class	Supernatural
Rolls marked very lucky	0	0
Rolls marked lucky	1	7
Rolls unmarked	40	34
Rolls marked unlucky	0	0
Rolls marked very unlucky	0	0
Luck rate (total)	+0.420 (+7.317%)	+2.497 (+45.772%)
Luck rate (pr. move)	+0.012 (+0.203%)	+0.061 (+1.116%)
Luck rating	None	Go to Las Vegas immme

Player Records

You can keep track of the results obtained by yourself and your opponents using the *Player Records*. There you can store the statistics of your matches and keep records of the average results obtained such as checker play, cube decisions, and luck. It will also break down the results according to the last 20 games played, the last 100, etc.



Name	Chequer	Cube	Overall	Lu
BAHIOR	0.0066	0.0004	0.0059	-0.99
JerryGrandell	0.0079	0.0000	0.0119	-0.02
KitWoolsey	0.0039	0.0000	0.0034	1.03
MikMakone	0.0100	0.0183	0.0116	-1.10
Shonga	0.0144	0.0000	0.0355	-0.73
Tami	0.0064	0.0070	0.0072	1.03

Name:	JerryGrandell			
Games:	44			
	20	100	500	Total
Chequer:	0.0079	n/a	n/a	0.0079
	World class			
Cube:	0.0000	n/a	n/a	0.0000
	Supernatural			

To add results to an existing account, or simply create a new account in which to add the results (of course you must first have an analyzed match open), go to the *Analyse* menu, and select *Add to Player Records* and *Match statistics*. If the account doesn't already exist, GNU will create it automatically and add the results. If you wish to remove an account, then click on the name in the *Player Records*, and press the *Erase* button.

Reviewing moves and mistakes

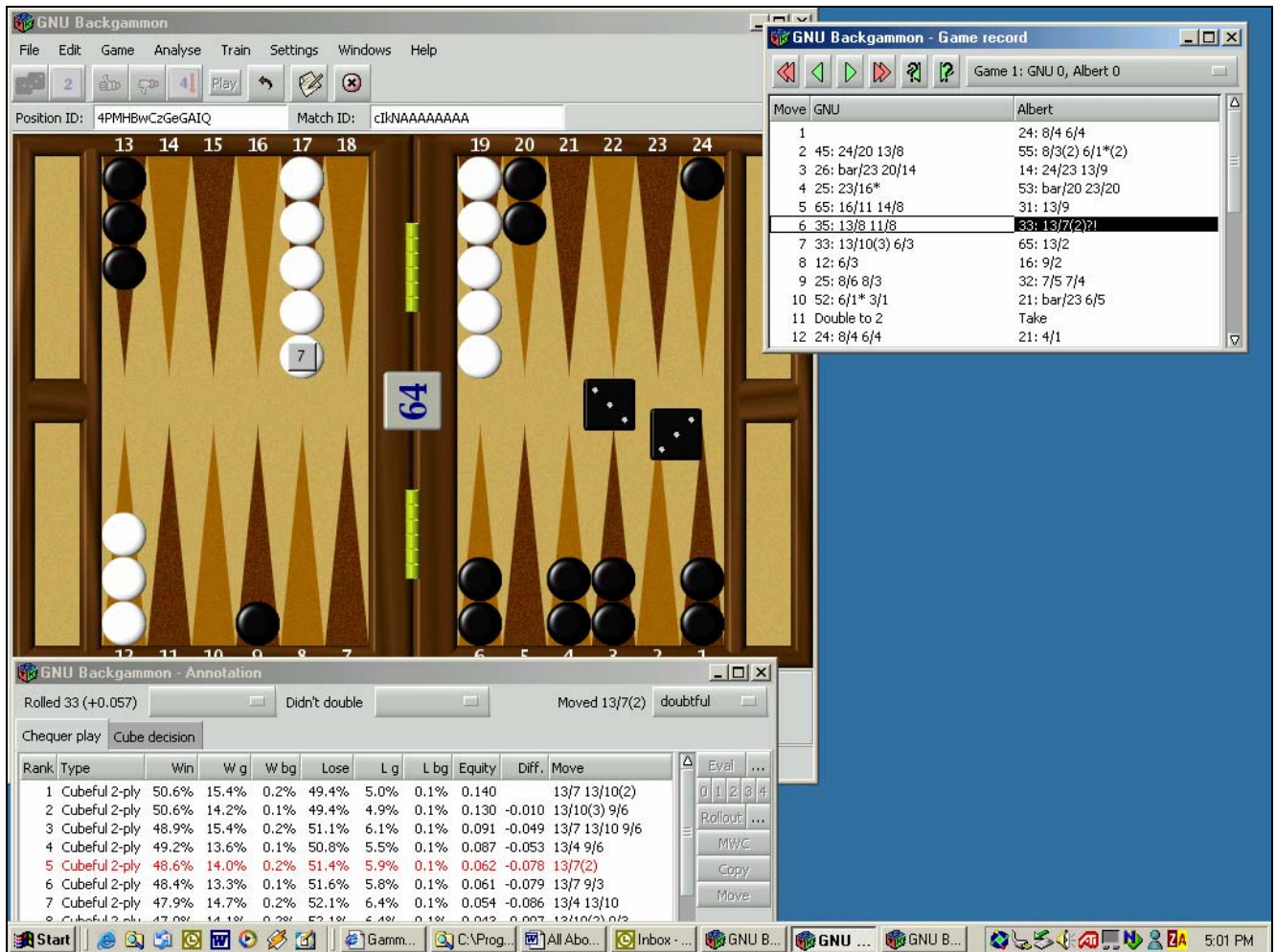
Once you have seen the results of the report, you will probably want to go over the mistakes you made. To do this, you'll need to open two more windows: Go to the *Windows* menu and select *Game Record*, and again to open the *Annotation* window. Two more windows appear, one showing the list of moves, and the other the analysis. However, the first issue that most likely needs to be resolved is one of organizing them so as to be a practical study tool.

Windows layout

When playing, it is normal to prefer the largest board display possible, however, when reviewing moves this is not possible. The following layout is what I recommend for screen resolutions of 1024 x 768, and 800 x 600. It is possible to shrink the board of course to easier fit the information windows but reviewing full matches then becomes tiresome in my experience. Feel free to create your own of course.

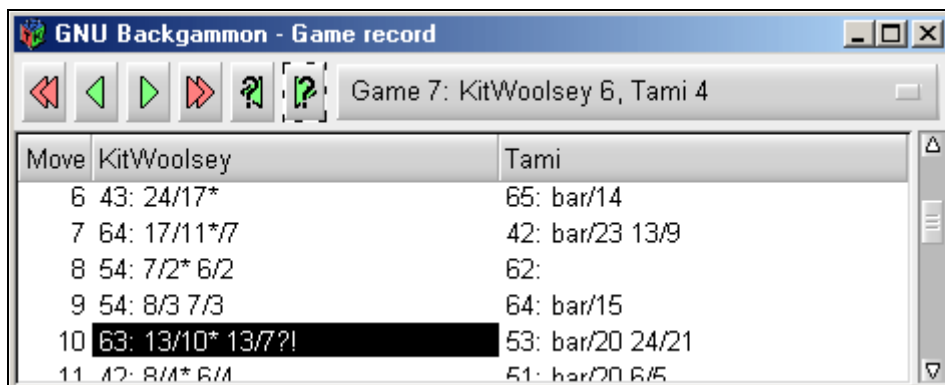
First size the board to about half the screen width and drag the ends down so as to get a compact fit. If you are using an 800x600 resolution then I recommend using the

smallest board size possible. Note that a bit of overlapping is inevitable. Here is an example of what it should look like:



Game Record

When opening the *Game Record* a small window will appear looking like this:



It always opens to the last move of the last game. You first have to click on a move in the notation before using the arrows. When you see a move highlighted, as seen above, you can navigate backwards and forwards move-by-move with the green arrows, and game-by-game with the red arrows. If you use the buttons with the question marks on the green

arrows, it will go from mistake-to-mistake. In the example used, GNU disagreed with one move by Kit Woolsey. The move in question wasn't considered a bad mistake, but it did get earmarked as dubious. GNU adds these punctuation marks (standard in chess commentary) in order to identify how it evaluates a move. For example, a '?' indicates a dubious move, a '?' indicates a bad move, and a '??' indicates a real blunder.

Hint/Annotation window

In order to see GNU's analysis, go to the *Windows* menu, and click on *Annotation*. This is essentially exactly the same as the *Hint* window, except that the latter won't include a space to add written notes. You will see a window open showing the best to worst moves from top to bottom. A first suggestion is to go to the *Settings* menu, then *Appearance*, and in it, to the right, make sure the box for *GWC as Percentage* is checked. Here is what it shows for the dubious move shown above:

Rank	Type	Win	W g	W bg	Lose	L g	L bg	Equity	Diff.	Move
1	Cubeful 2-ply	60.4%	40.8%	0.6%	39.6%	11.5%	0.6%	0.188		13/10* 7/1*
2	Cubeful 2-ply	59.8%	18.9%	0.4%	40.2%	9.2%	0.3%	0.184	-0.003	24/15
3	Cubeful 2-ply	57.3%	27.1%	0.8%	42.7%	8.1%	0.2%	0.137	-0.050	13/10* 13/7
4	Cubeful 2-ply	51.2%	25.4%	0.5%	48.8%	14.3%	0.5%	0.003	-0.184	24/21 7/1*
5	Cubeful 2-ply	49.9%	26.2%	0.8%	50.1%	13.2%	0.5%	-0.021	-0.208	13/10* 4
6	Cubeful 2-ply	49.0%	24.3%	0.8%	51.0%	14.0%	0.6%	-0.040	-0.227	13/10* 8/2
7	Cubeful 2-ply	48.8%	19.6%	0.7%	51.2%	14.2%	0.4%	-0.042	-0.229	24/21 8/2

One can add written notes here.

First of all, if you are new to backgammon software, and the above looks hopelessly complicated, relax, it isn't nearly that bad. Let's look at the 3rd line in red, the move that was played, and figure out what it all means:

- **Rank** – As it's ranked 3rd we know that GNU thinks it is only the 3rd best move.
- **Type** – It says *Cubeful* which means that it is taking into account the possibility that someone may double. This means that occasionally you may see several moves with an equity of -1.000 (see **Equity** below), despite significantly different winning percentiles, because it thinks that if they are played then the opponent will double, and you should pass. The *2-ply* is the depth GNU analyzed the move.
- **Win** - This number is the percentage the move has to win the game. Thus the side to play has a 57.3% chance to win (including gammons and backgammons).
- **W g** - This number is the percentage of wins that should end in gammons (including backgammons). Thus 27.1% of those 57.3% above will give you a gammon.
- **W bg** – This number is the percentage of wins that should end in backgammons. Thus 0.8% of those 57.3% above will give you a backgammon.

- **Lose** – This is the percentage of losses expected. Thus one has a 42.7% chance of losing the game (including gammons and backgammons).
- **L g** - This number is the percentage of losses that should end in gammons (including backgammons). Thus 8.1% of those 42.7% above will end in a gammon.
- **L bg** - This number is the percentage of losses that should end in backgammons. Thus 0.2% of those 42.7% above will end in a backgammon.
- **Equity** – This is the overall evaluation of the position by the program, after considering the different win/loss percentiles, the cube position, and the match score. A 1.000 would mean that you are expected to win a point, a 0.000 would mean that it is roughly equal, and a -1.000 that you are expected to lose a point. The score shows an edge for the side that played as it says 0.137
- **Diff.** – This is the size of the error (the difference in equity) perceived in comparison to the top move. As we can see, the top move's equity reads 0.187 and the move played only 0.137, thus equating to a -0.050 error. The thresholds of the degrees of errors are determined in the *Analysis* settings.
- **Move** – This is the move being evaluated. In the case of the red line, it is the move that was played.


As you can see, it shows the best moves considered, with the move actually played in red, plus the various equity scores for gammons, etc. Most players will focus on the last three, which are the total equity of the move, the difference in equity between the move played and GNU's top choice, and what move is being evaluated.


In the diagram above, we can see that at 2 plies GNU considers that 13/10* 7/1* was best, with 24/15 close behind. If you'd like to copy this information to a document, click on the moves that interest you in order to highlight them as above, and press *Copy*. Then paste it where you wish. Don't forget to change the font to Courier New size 9 or 10 if you wish to maintain the formatting.

If you'd like to see how the different moves it analyzed appear on the board, press the *Show* button.

3	Cubeful 2-ply	32.0%	3.9%	0.2%	68.0%	35.3%	0.9%	-0.360	-0.143	13/8 6/4	
4	Cubeful 2-ply	31.2%	6.7%	0.2%	68.8%	35.4%	0.9%	-0.375	-0.158	9/7 9/4	MWC
5	Cubeful 2-ply	29.7%	7.1%	0.2%	70.3%	41.3%	1.0%	-0.406	-0.189	9/4 6/4	Copy
6	Cubeful 2-ply	29.5%	6.3%	0.2%	70.5%	40.4%	0.9%	-0.409	-0.192	11/4	Show
7	Cubeful 2-ply	29.3%	5.5%	0.2%	70.7%	31.7%	0.5%	-0.414	-0.197	13/11 13/8	

Now just click on the move you want to see and the board will display it. To see another move, just click on it. To exit *Show* mode to be able to analyze the moves or run rollouts, click on the *Show* button again.

You'll also note a button called the Temp. Map . This is a powerful tool conceived and developed by Sho Sengoku. Please refer to the [Temperature Map](#) section for details.

You may also want to have GNU analyze a few select moves a bit deeper. To do this you can have it go a 3rd ply, or do a rollout. Let's have it do a 3-ply analysis of the three moves highlighted above. Just click on the number '3' and it will do a 3-ply analysis. Be a little patient as 3 plies is considerably slower than 2 plies, but it shouldn't be too long. If you want to customize the evaluator, click on the button indicated with a small red circle .

and change the parameters you want. Now just click on the *Eval* button, and let it compute its results. You may also prefer to see the Match Winning Chances of the moves instead of the equity. This shows the chances of winning the match as opposed to the evaluation according to a single game. To do so, press the MWC button:

Rank	Type	Win	W g	W bg	Lose	L g	L bg	MWC	Diff.	Move
1	Cubeful 3-ply	58.9%	19.1%	0.5%	41.1%	9.8%	0.3%	79.626%		24/15
2	Cubeful 3-ply	58.8%	40.6%	0.9%	41.2%	12.3%	1.0%	79.196%	-0.431%	13/10* 7/1*
3	Cubeful 3-ply	55.5%	27.4%	1.0%	44.5%	8.3%	0.3%	78.015%	-1.612%	13/10* 13/7
4	Cubeful 2-ply	51.2%	25.4%	0.5%	48.8%	14.3%	0.5%	75.633%	-3.993%	24/21 7/1*
5	Cubeful 2-ply	49.9%	26.2%	0.8%	50.1%	13.2%	0.5%	75.049%	-4.578%	13/10* 13/7

Here we see the results of the 3-ply analysis, displayed in percentiles. We can also see that GNU now clearly favors 24/15 after deeper analysis. How about a rollout?

Rollouts

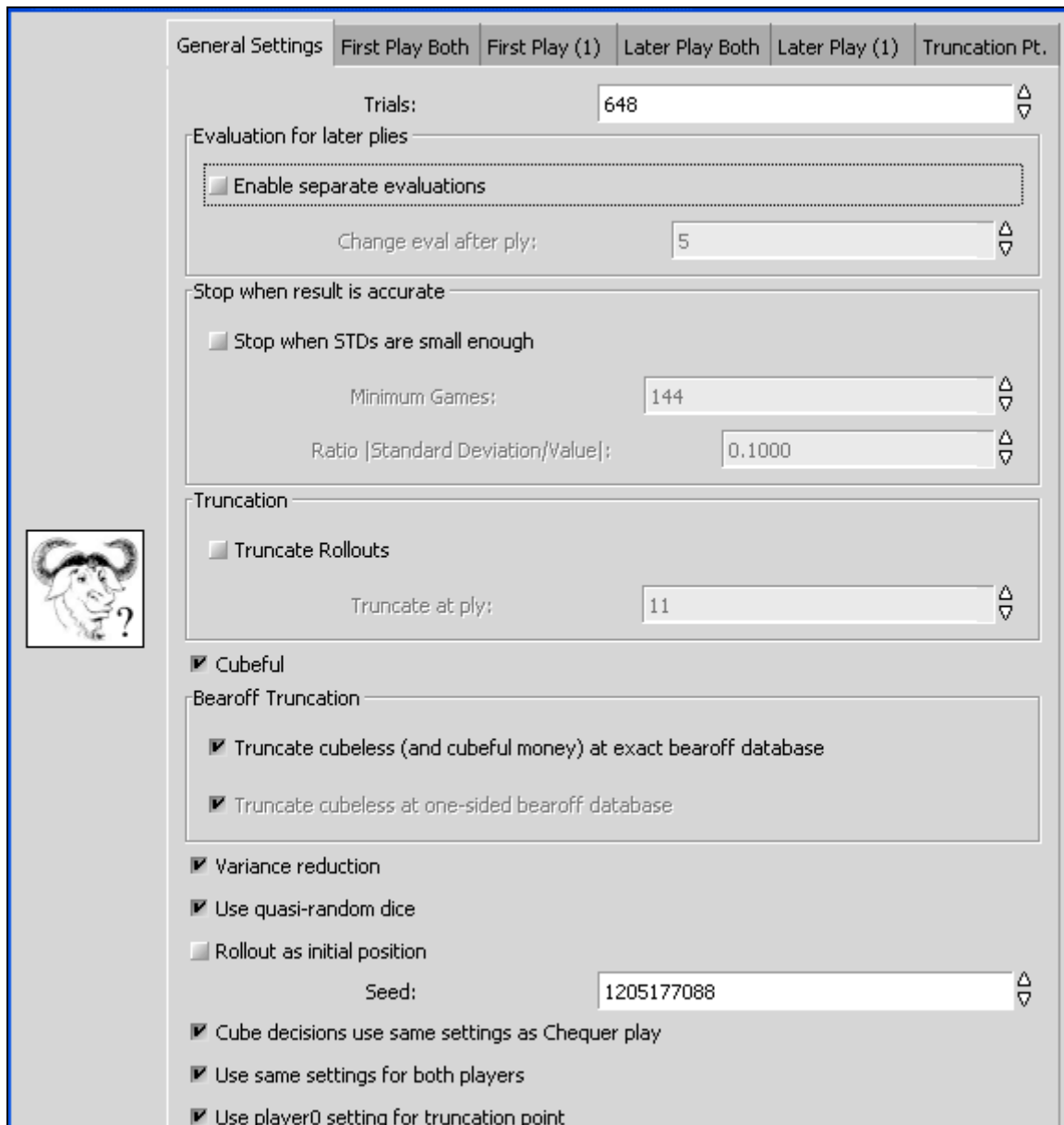
So what's a *rollout*? A rollout is when you have the program play against itself a set amount of times (number of trials) and then sum up all the results of wins, losses, gammons, etc. from those games to give a more precise evaluation of a move/position. The interest is that the program may easily be underestimating some features/dangers of a position, and not realize this by only looking a couple of plies ahead. By playing it out, things will happen, and the game will unfold, giving it more accurate information on the consequences of a move. One can do a **full** rollout, meaning it will play the position out until the last checker is born off, or it can be a **truncated** rollout, playing to a certain depth in plies, enough to evaluate the consequences.

Rollouts can be done at any time either directly from the *Analyse* menu with the *Rollout* option, or from the *Hint/Annotation* window. However, it is suggested you do it from the *Hint/Annotation* window as only there can you export the results to the clipboard using the *Copy* button. In both cases, the same options window is used as its reference. To use the rollout function you must first select the moves you want to rollout, otherwise the button will remain grayed out and inaccessible. You will want to set your preferred options the first time by clicking on the [...] button to the right of the *Rollout* button.

Rank	Type	Win	W g	W bg	Lose	L g	L bg	Equity	Diff.	Move
1	Cubeful 3-ply	58.9%	19.1%	0.5%	41.1%	9.8%	0.3%	0.167		24/15
2	Cubeful 3-ply	58.8%	40.6%	0.9%	41.2%	12.3%	1.0%	0.149	-0.018	13/10* 7/1*
3	Cubeful 3-ply	55.5%	27.4%	1.0%	44.5%	8.3%	0.3%	0.101	-0.066	13/10* 13/7
4	Cubeful 2-ply	51.2%	25.4%	0.5%	48.8%	14.3%	0.5%	0.003	-0.163	24/21 7/1*

GNU offers a vast number of ways to set the rollouts, allowing you as many possibilities for efficiency as possible. Its 0-ply play is incredibly strong and practically instant, so it can help give meaningful results very quickly. GNU also plays according to score in its rollouts (using the match equity table of your choice naturally), which Snowie 4 does not for example. I will explain the main options, share the results of some of the testing that has been done, and share my preferences.

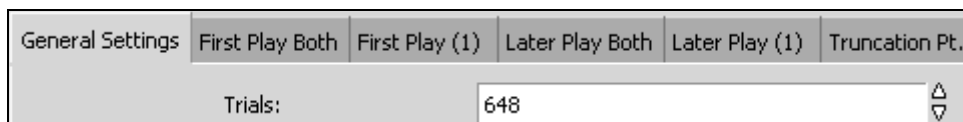
When one opens the rollout options window for the first time, it can look vastly intimidating and confusing.



However, it really isn't, so let's run through it from top to bottom and see what GNU can do for you.

Trials

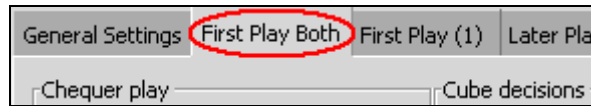
The topmost part under the tab General Settings is where you set the number of trials.



The number of trials is simply the number of games you want GNU to play out (or roll out) as it collects the results. The more trials the better as this reduces the error margin of the results. After all, if it won a certain position 2 times in 3, it could be a fluke, but after hundreds or thousands of trials with variance reduction (see below) the results become far more trustworthy.

Playing strength

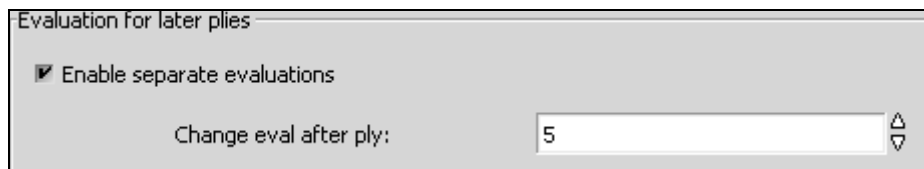
To set the primary playing strength used in the rollouts, click on the tab *First Play Both* at the top:



This is where you configure the primary strength of play. If you want to set a different playing strength for the cube decisions, you must go to the General Settings tab and at the bottom deactivate the option *Cube decisions use same settings as Chequer play*.

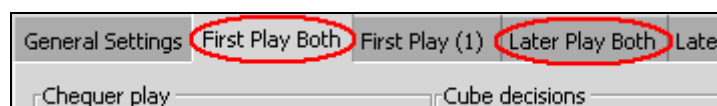
Evaluation for later plies

One can set GNU to use a different playing strength after a specified number of plies in the *Evaluation for later plies*.



For example, suppose you had a backgame situation to rollout. Although you wanted the game to be rolled out at 0-ply (1900-2000 Elo), you didn't trust the first plies to be the best. Enabling this as above, you could set the first 5 plies to be played at *Supremo* (2-ply) and the rest of the game at 0-ply, giving you a bit of both worlds. In fact this has been tested and shown to be very efficient for exactly that scenario.

So how does one set the playing strength of the first 5 plies (for example) and after? At the top, there are those mysterious tabs:

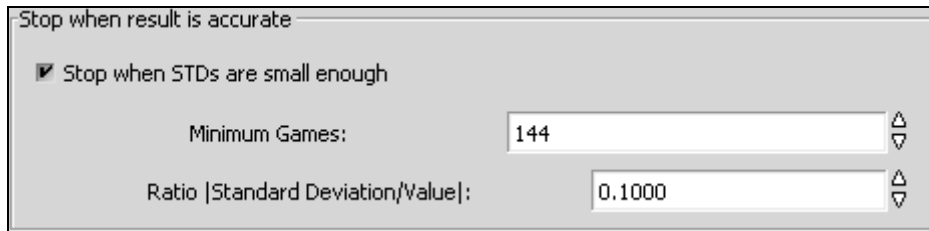


If you click on the tab *First Play Both*, you can set the strength of the first plies to be played. Naturally, if you haven't activated the *Evaluation for later plies* option this will be the default rollout playing strength. Now, once you have set this, click on the *Later Play Both*, and you will be able to set the playing strength for the subsequent plies. You can use this option in both full rollouts and truncated rollouts.

Stop at specific Standard Deviation

Obviously, a rollout with too few trials will not yield reliable results due to the large Standard Deviation, or in other words how much the result could be wrong by. The more trials the smaller the possible error, however how many trials are necessary? Unfortunately, this can vary a lot according to the position, so to get a Standard Deviation of 0.020 (meaning the equity given could be actually 0.020 more or 0.020 less) one position might

need 400 trials, and another might need 1400. This option is designed to address this problem.



Stop when result is accurate

Stop when STDs are small enough

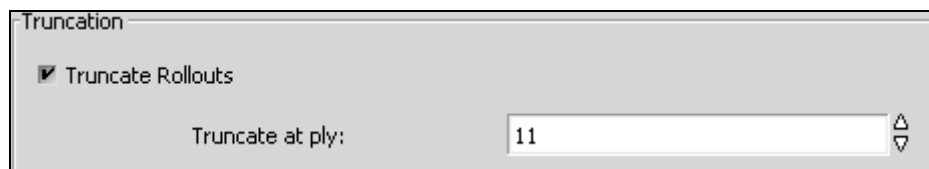
Minimum Games: 144

Ratio [Standard Deviation/Value]: 0.1000

In the figure above, the margin was set to 0.100 and a minimum of 144 games were requested.

Truncated rollouts

Truncated rollouts are rollouts played to a certain number of moves as opposed to full rollouts. You may feel that the program doesn't really need to play the game to the last move to know whether a move leads to good positions on average or bad ones.



Truncation

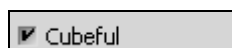
Truncate Rollouts

Truncate at ply: 11

In the above figure the setting is 11 plies, so GNU will play out 11 moves, stop and evaluate the resulting position, and then start the next trial. This is far faster of course, and is particularly desirable if you want to analyze using a 2-ply playing strength which might be too slow for a full rollout.

Cubeful

This option is designed to activate or not cubeful rollouts.

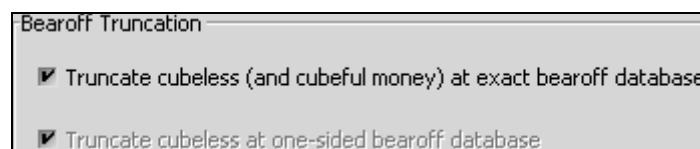


Cubeful

A cubeful rollout means that it is using the cube in the rollout and, just as in a normal game, might stop the rollout short due to a doubled cube that is passed.

Bearoff Truncation

Since GNU comes with bearoff databases allowing not only perfect play but perfect evaluations of a position as well, it makes sense to have the program stop a rollout when it reaches one of these databases.



Bearoff Truncation

Truncate cubeless (and cubeful money) at exact bearoff database

Truncate cubeless at one-sided bearoff database

Here one can activate or de-activate this option. It is on by default.

Variance Reduction

Whenever running a rollout, you will *always* want the Variance Reduction activated as it greatly increases the reliability of the results. The first time this ingenious [technique](#) was introduced to backgammon rollouts was by Fredrik Dahl, the author of Jellyfish. In a nutshell, it factors in luck when evaluating results, so that the program doesn't need 10,000 games to average out the luck of the dice and that way be sure luck wasn't a factor in the results obtained. With it, 100 rolled out games with Variance Reduction can be the equivalent of 5,000 games with no Variance Reduction.

Quasi-Random dice

Normally, GNU will roll the dice out completely randomly, but this may not be desirable in the rollouts. The reason is that luck may cause a number of flukes to happen, especially in the first roll. What if in your trials, the first roll it played never included some numbers which might lead to a slight change in its evaluation? The variance reduction will compensate for this, but so does the option to use *quasi-random dice*.

Use quasi-random dice

This option deliberately alternates the first roll for every trial so that every possible first roll will have been played after 36 trials, starting with 1 and 1, then 1 and 2, all the way to 6 and 6. The idea is to help negate the luck in the rollouts a bit more. However, this also means that if used, one must use a number of trials that is a multiple of 36. That is why 1296 trials (or 2592 or 3888) is a good number to run rollouts as it is 36 x 36.

Rollout as initial position

If you plan to do a rollout on one of the opening moves you will want to activate the option *Rollout as initial position*.

Rollout as initial position

The reason is that in the opening move one is not allowed to roll a double. This guarantees this will be respected if you roll from the opening position.

Seed

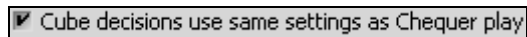
The seed is a random number that you can choose and that is linked to the random dice generator. It doesn't affect the randomness by any means, and its sole purpose is to allow you or others to exactly reproduce rollout results.

Seed:

If you see a posted rollout result with the played settings (strength and number of trials), the type of random dice generator chosen, and the seed, you should be able to exactly reproduce the results by using the same settings and the same seed.

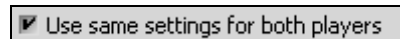
Same cube and checker settings

You may want to use different settings for the cube decisions than the checker play. If so, uncheck the option *Cube decisions use same settings as Chequer play*.

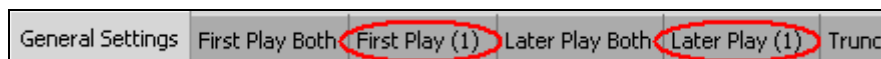


Same settings for both players

Although the obvious choice (and the default one) is to have both players use the same settings, you can also choose not to.



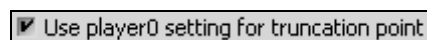
By deactivating the *Use same settings for both players* option, you can configure different checker and cube play settings for each side. Thus one side could be playing at *Expert* level, and the other at *Supremo*. To set the different playing strengths, you'll now make use of two other tabs at the top:



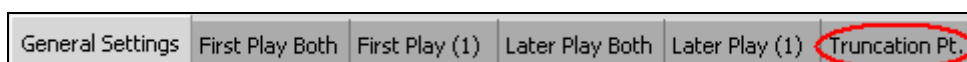
Once you have opted for individual settings for each side, you must set them. Without this option, the tabs *First Play Both* and *Later Play Both* establish the playing strength for both sides. With it, they only determine the playing strength of the first player. You must go to *First Play (1)* to set the level to be used for the other player. If you have activated [Evaluation for later plies](#) you must also set the *Later Play (1)*.

Final truncated evaluation

If you are using a truncated rollout, you may be concerned about the final and decisive evaluation. For example, you might be content to let it play 17 plies at 0-ply to evaluate the resulting position, but want a little more precision on the evaluation of the final position. You can change this by deactivating the *Use player0 setting for truncation point*.



When deactivated, you can set a different playing level for that final evaluation. It goes without saying that this is pointless for a full rollout. To set the level, you'll need to go to the top to the *Truncation Point* tab.



My suggested settings

A lot of testing has been done by a number of people seeking to find the most reliable settings under different circumstances, as well as spotting the unreliable ones. I'd like to especially thank Michael Depreli, Ian Shaw, Ian Dunstan and Neil Kazaross for their painstaking research and the huge amount of computer time spent gathering and processing the data. The results helped answer a number of questions that reflect in my choice settings.

The first is that the 0-ply checker play is indeed extremely strong (as any victim of GGRaccoon can attest to) and due to its speed is usually ideal for full rollouts. It is only less than ideal for backgame situations where it may fail to make the most of the possibilities. So for pretty much any other situation, it can be used confidently. There has been significant questioning of the odd-ply play as it has often been seen that 1-ply would produce erratic results. Tests have shown that this is true of cube decision, but 1-ply checker play is a bit stronger than 0-ply as one would expect.

The next issue is the one of speed. It is possible to significantly speed the play up of the higher 2-ply levels by enabling the reduced evaluations. The question therefore is how much this affects the results. Tests have shown that the checker play is seriously affected by this and the deeper the reduction the more errors tend to appear. Consequently it is highly suggested that no speed reduction be used for checker play. On the other hand, the quality of the cube decisions was affected very little, and very reliable results were shown using 25% speed (a 4x speed-up) for cube decisions.

The primary setting is what I use the most and covers 95% of my rollouts, giving excellent results within a few minutes.

- My primary setting:
 - Set the number of games to either 648 games or 1296 using the arrows on the right. The reason for these numbers is that there are 36 possible combinations of the dice, and 1296 is 36 times 36.
 - Uncheck *Truncate Rollouts*, meaning it is a full rollout.
 - Set the level to *Expert*
 - Leave the other defaults

- My secondary setting is when I feel the cube decisions at 0-ply may not be reliable:
 - Set the number of games to either 648 games or 1296 using the arrows on the right. The reason for these numbers is that there are 36 possible combinations of the dice, and 1296 is 36 times 36.
 - Uncheck *Truncate Rollouts*, meaning it is a full rollout.
 - Uncheck *Cube decisions use same settings as Chequer play*
 - Set the chequer play at *Expert*,
 - Set the Cube decisions at *World Class* with *reduced evaluations* at 33%
 - Leave the other defaults

- My third setting is when the first moves may be difficult (backgame, etc.)
 - Set the number of games to either 648 games or 1296 using the arrows on the right. The reason for these numbers is that there are 36 possible combinations of the dice, and 1296 is 36 times 36.
 - Activate *Enable separate evaluations* and set *Change eval after ply* to 6.

- Uncheck *Truncate Rollouts*, meaning it is a full rollout.
- Under the tab *First Play Both* set the chequer play at *World Class*
- Under the tab *Later Play Both* set the checker play to *Expert*.
- Set the Cube decisions at *World Class* with *reduced evaluations* at 33%
- Leave the other defaults

Copy and Paste results

Once you have set your choices, press *Ok*, and then the *Rollout* button. When you are done, you may wish to copy the results to a document or e-mail for example. To do so, just click on the moves that interest you, and then press the *Copy* button as shown.

Rank	Type	Win	W g	W bg	Lose	L g	L bg	Equity	Diff.	Move
1	Rollout	59.4%	18.0%	0.7%	40.6%	8.8%	0.4%	0.177		24/15
2	Rollout	53.6%	27.0%	1.4%	46.4%	8.8%	0.3%	0.062	-0.115	13/10* 13/7
3	Cubeful 3-ply	58.8%	40.6%	0.9%	41.2%	12.3%	1.0%	0.149	-0.027	13/10* 7/1*
4	Cubeful 2-ply	51.2%	25.4%	0.5%	48.8%	14.3%	0.5%	0.003	-0.173	24/21 7/1*
5	Cubeful 2-ply	49.9%	26.2%	0.8%	50.1%	13.2%	0.5%	-0.021	-0.197	13/10* 4
6	Cubeful 2-ply	49.0%	24.3%	0.8%	51.0%	14.0%	0.6%	-0.040	-0.216	13/10* 8/2

To see the results, just paste them on the document (Ctrl-V for Windows users).

```

1. Rollout                24/15                               Eq.: +0.177
59.4% 18.0% 0.7% - 40.6% 8.8% 0.4% CL +0.177 CF +0.177
[0.3% 0.4% 0.1% - 0.3% 0.2% 0.0% CL 0.006 CF +0.006]
Truncated cubeful rollout (depth 19) with var.redn.
648 games, seed 1193803392 using Mersenne Twister
Play and cube: 0-ply cubeful [expert]
2. Rollout                13/10* 13/7                               Eq.: +0.062 ( -0.115)
53.6% 27.0% 1.4% - 46.4% 8.8% 0.3% CL +0.062 CF +0.062
[0.3% 0.4% 0.1% - 0.3% 0.2% 0.0% CL 0.007 CF +0.007]
Truncated cubeful rollout (depth 19) with var.redn.
648 games, seed 1193803392 using Mersenne Twister
Play and cube: 0-ply cubeful [expert]

```

If you are using Word or Wordpad, it is suggested you set the pasted text to the font Courier New, and the size to 9 or 10, else the formatting will be lost, and it may be difficult to read.

Once more: Remember to save your settings before exiting the program or you will need to reconfigure your settings the next time you use GNU.

Setting up a position

Naturally, other than matches and games, you might just want to set up a position from a book or other source, and ask GNU's expert advice. First, you **must** start a new game or match, and then just press the *Edit* button, located at the top in the toolbar.



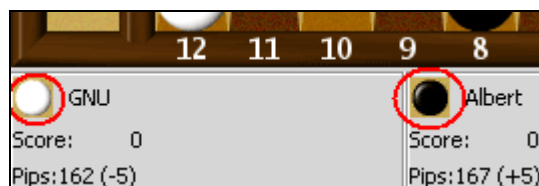
Names and score

At the bottom, you will see you have the option of setting the scores or the names of the players.

Side, cube, and dice

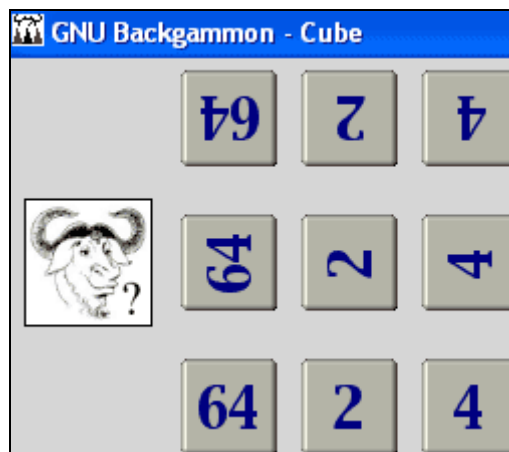
If you want to change the dice on the board, click on the side of the board where you would normally click to roll the dice. If you click on the left-side of the board it will propose the dice for the top player, and if you click on the right-side of the board it will present the dice for the bottom player.

You can set whose turn it is to play by clicking on the small chequer next to the player's name at the bottom.



You can also set the turn of the player to move in the *Game* menu and by selecting *Set turn* at the bottom.

To set the cube position and value click on the cube or enter the *Game* menu and select *Set cube*. A small window will appear with cubes set in all directions.



The cubes that are upside down are for the top player, the ones rightside up are for the bottom player, and if you wish to set the cube in the center, choose the ones facing sideward. If you want the cube at its initial value in the center, choose the 64 cube facing sideward.



Tip - If you want to setup the same position another GNU user posted, you don't need to set it all up manually. You can simply copy the Position ID and Match ID and instantly get the same position, cube, and score. Suppose you saw this:

```

GNU Backgammon Position ID: sGfwGQDg28EBBg
Match ID : cAlvATAAIAAA
+13-14-15-16-17-18-----19-20-21-22-23-24--+
| X          0  | | | O O X
| X          0  | | | O O X
| X          | | | O
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+12-11-10--9--8--7-----6--5--4--3--2--1--+

```

O: Kit Woolsey
3 points

11 point match (Cube: 1)

Rolled 63
4 points
X: Gammonline Readers

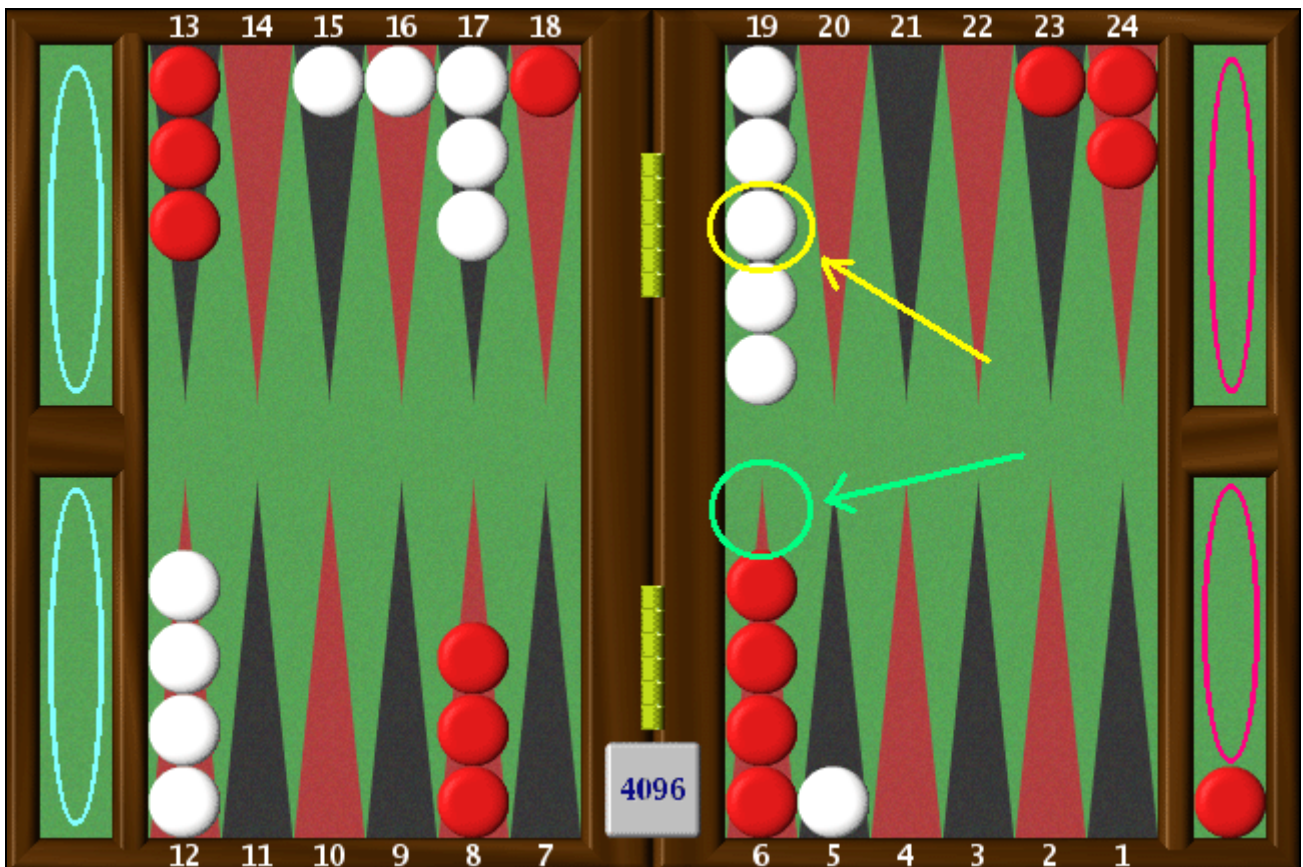
Just copy the code after the Position ID into your GNU's space (highlight it and press Ctrl-C) for the Position ID

Position ID: kf4ADjgc8wBIQ	Match ID: MAERAAAAAAAA
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Then press Enter. Now do the same for the Match ID, and that's all there is to it.

Checker setup

Moving and setting up the checkers is quite easy and Snowie users will feel at home as the method is identical. To remove or add white checkers to a point for example, use the right mouse button and click on the point. You determine the number of checkers to be added or removed by the height of the point you press. For example, in the following diagram



if you have 5 white checkers on the 19-point and only want to have 3, click with the right mouse button on the 3rd checker where the yellow arrow indicates and the top two will be removed. Adding checkers is the same, so if you wanted to add a red checker to the 6-point you would place the cursor where the green arrow indicates and left-click. If you want to quickly get the starting position, you can click on the area indicated by the blue ellipses on the left, and if you want to quickly clear the board of all checkers, click instead on the right side on the area indicated by the pink ellipses. Try it and experiment a little. It's much easier to do than to explain.

Once the position is set up, press the *Edit* button again to exit *Edit* mode. Now just go to the *Analyse* menu and select *Hint* (suggested even for rollouts). Attention, this isn't a suggestion, you must exit the *Edit* mode before asking for GNU to evaluate the position otherwise you will get odd results.

Appearance

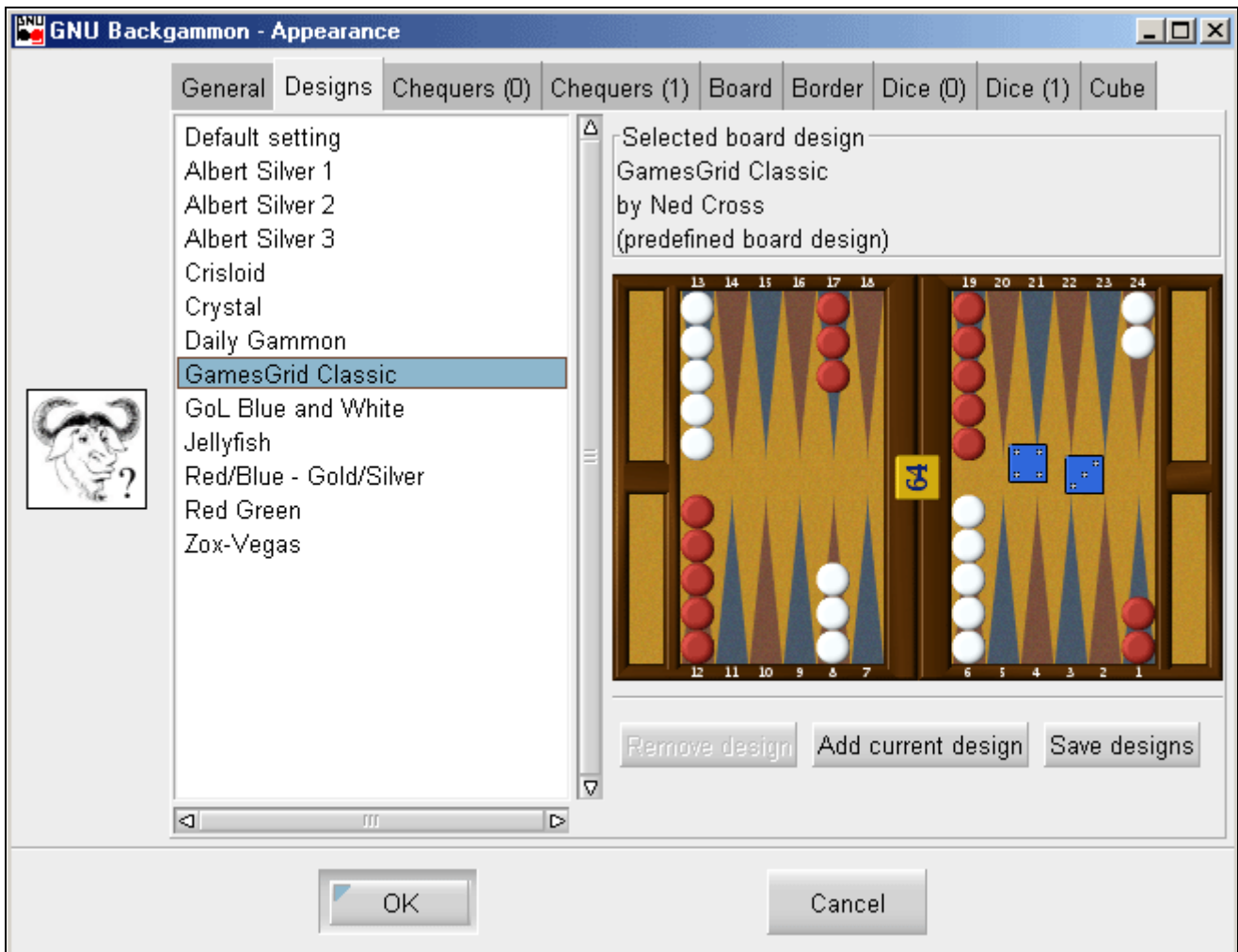
Skins

You can change the overall appearance of the menus through a number of skins included with the installation, however this cannot be done from within the program and must be done manually. The procedure is fairly painless if you aren't afraid of moving a couple of files in the Windows Explorer.

Open Windows Explorer, and enter the \Program Files\gnubg directory. In it there is a directory called \Themes, where the skins are located, and in that, you will see a number of directories with the names of the skins they contain. Enter the directory you want and copy the files in it to the main \gnubg directory. It will ask you if you want to overwrite the files in it. Say yes, and start GNU to see the changes. It is important to copy and not move the files, so if you're not Windows savvy, this means holding the Ctrl key on the keyboard down while dragging the files. Keep the Ctrl key pressed when you let go of the mouse button. My favorite is the one called '*mac*', and is what you see throughout this article.

Boards

The appearance of the boards can also be changed making use of a number of presets, or you can design your own. To make changes, go to the *Settings* menu and select *Appearance*. A window will appear, displaying a number of tabs at the top. Select *Designs* and you will see a list of the preset board designs, as well as thumbnails of what they look like. To choose one, just click on the name of the preset and press Ok. That's all there is to it.



You can also make your own designs and save them. Using the tabs at the top, you can change the appearance of the board and if you really like your new design, go back to the *Designs* tab and save it by pressing *Add current design* and then *Save designs*. Send the GNU team your best ones, and they may include them in the next release, which is just about everyday by the way. 😊

Conclusion

By now it should be clear that while a number of backgammon players have complained about the steep prices of top commercial software excluding them from the tools and type of progress available to more fortunate players, that complaint is now definitely without foundation.

It's true that it is ever a work in progress and has its rough edges, but with time they will undoubtedly be ironed out for the most part. It is also an engine that is stronger than its older top-of-the-line siblings in GamesGrid, and at its price (free), one would have to be crazy not to have it, even if one does own the legendary Snowie. After all, two heads are better than one.

I would like to effusively thank the authors of GNU Backgammon and its numerous contributors, and would also like to suggest that anyone enjoying their efforts make a contribution to the [Free Software Foundation](https://www.fsf.org/) (FSF), the principal organizational sponsor of the GNU Project, as a token of appreciation. The FSF survives mostly off the contributions,

however small, of private donations, and without it, those loud complaints mentioned above would be entirely justified.

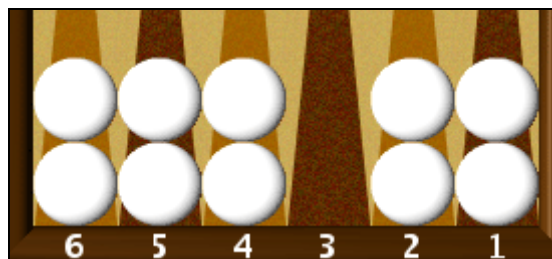
A Word about 'Cheating'

By far, the most common complaint seen about **all** backgammon software, weak or strong, is that it must be cheating to get so lucky. Most of these complaints stem from a lack of understanding of probabilities, and how skillful play will affect luck or the possibility of lucky rolls.

To begin with, let it be stated that there is no bias of any kind, and the source code of GNU is open to any doubting it. If you still cannot believe it, feel free to use your own dice by entering the *Settings* menu and selecting *Options*, and then in the right side *Manual dice*. If you are rigorously honest about your results, you will find no difference in the long run.

Probabilities are what rule supreme in backgammon. As there is indeed an uncontrollable luck factor, one cannot guarantee a victory or loss no matter how stacked up the chances are. So, good backgammon strategy is designed to maximize the good rolls for the playing side, and minimize the good rolls for the other side. In other words, after the best play, there will be less good rolls for the other side. If the other side doesn't realize what is happening, then it will seem like a never-ending streak of bad luck. It's not; it's the consequence of good playing. GNU is among the very best, so use it and learn with it. You can set it at a much weaker setting, and watch how its luck dries up.

The mathematics behind probabilities are also usually very poorly understood. Take for example the situation below. If your opponent had a checker on the bar, what is his chance of entering that single point?



If you said 11 chances in 36 or a little over 30%, good for you, but if you said 1 in 6 then you need a little brushing up. 1 in 6 would be correct if your opponent were only using one die, but with two, the chances add up to 11 in 36. So how come you never enter and GNU does? It may seem like that at times, but it's really not the case. It is natural to focus more on what causes us anguish making reality look quite distorted, but maybe you **were** very unlucky. Stories of hard luck abound. In a live game, I once played my opening move, and then lost to a backgammon without ever playing another move. My opponent hit me, and I danced for the rest of the game. I wasn't even able to avoid a backgammon. A top professional once told me of an instance where he was giving a gammon, got hit, and lost after dancing 7 straight times against a 3-point board. Does it seem to get more doubles? What about those doubles you rolled while on the bar? They don't count, you say? Sorry, but lady luck makes no case of guaranteeing the double will arrive at the right time. Good strategy will help you be able to use it when it does arrive.

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This tutorial is also available in Italian at [Tutto Su Gnu](#), courtesy of [Renzo Campagna](#) and [Giulio De Marco](#)

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