

**ProGammon**

**COLLABORATORS**

	<i>TITLE :</i> ProGammon		
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**REVISION HISTORY**

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# Chapter 1

# ProGammon

## 1.1 ProGammon Documentation

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ProGammon  
Version 2.82  
12 March 1999  
FREEWARE  
The Ultimate Amiga Backgammon Game

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Introduction

Requirements

What's New

The Basics

Game Play

Menus

Tool Types

Auto Mode

The Dice

Some Math

CPU vs ME

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Advanced Section

Acknowledgments

Author

## 1.2 introduction

Introduction:

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Have you tried playing computer backgammon before? Were you a little disappointed?

In the long run, most users will find that this program plays a pretty good game of backgammon. Anyone from beginner to expert will improve their game by playing and using ProGammon.

It's also possible to set the board up however you like which will allow you to practise up at certain situations like the "Back Game".

This program keeps track of your wins and losses as well as gammons and backgammons. The Statistics Page also tabulates each dice roll so you can examine the dice for randomness and fairness.

It's operating system friendly and is very cpu & memory efficient so even your 3-D rendering work will barely slow down while you play a game or 3.

## 1.3 requirements

Requirements:

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This program works on any Amiga with kickstart 2.04 or greater and even works on non-Amigas using UAE.

With an AGA Amiga, this game will use a 640 x 480 multiscan productivity screen, if available. It also works good in 640 x 256 PAL and 640 x 200 NTSC mode. Just use the appropriate

Tool Type  
if necessary.

One user also informed me that it works great on his Picasso II+ graphics board in his A1200T. Thanks Dirk!

## 1.4 What's New

## What's New:

-----

## Version 2.82:

- fixed a small bug that sometimes caused stones to be created just outside the main board when using Undo Move.
- fixed the stats screen text color so it should now be the same color as used elsewhere.
- changed the menu background color so it's easier to see.
- added a  
    NOBORDER  
    tool type.
- a couple of very minor changes in game play.
- changed the default palette. Thanks go to Tomas Amsrud for this combination of colors. Now it looks as good as it plays!

## Version 2.8:

- the way the dice are rolled has been changed. If you think this program cheats then read  
    The Dice  
    section.
  - lots and lots of new  
    Tool Types  
    . Also check the  
    Advanced  
    section for their use.
  - USERDICE makes it simple to use your own dice by entering in each roll from the keyboard.
  - SHOWMOVE displays the previous Amiga move.
  - JENA allows you to play the game the way Volkmar does in Jena, Germany. Players are limited to a maximum of 5 stones per point in Jena.
  - RANDOM enables random opening moves. Another Volkmar suggestion which results in a variety of opening moves, including some non-traditional ones.
  - CPU  
MAN  
These two allow you to set the board up however you like.
  - CPUFIRST  
MANFIRST  
These last two allow either player to have the first move regardless of the opening role.
-

- a new @{" Auto Play " LINK Auto} feature. One mouse click in the lower ↔ right corner of the board and the Amiga will move your stones for you. An Amiga vs Amiga match can be kind of interesting.
- also added a second set of dice to the board. Should be a little easier to understand and review previous moves.
- another 101 changes in the AI, some good some not so good! This version plays a little different style of backgammon compared to previous versions so try playing a few hundred games before passing judgement. It's a work in progress!
- a new [ Clear Stats ] button in the Color Window so you can reset your statistics without changing the board colors that you have saved in your gammon.prefs file.
- and finally, a slightly redesigned, recolored icon.

#### Version 2.7:

- added a tool type called TRAINER. This allows the user to ask ProGammon to suggest a move anytime during gameplay. A second opinion is useful, even if you don't agree with it!
- finally, a PAL tool type so the program will now work in 640 x 256 hi-res PAL mode if needed.
- the last release introduced a major change in game play. This version merely contains some minor adjustments.
- added a new section on interpreting the winning percentage.  
If you like  
    mathematics  
    then check it out.

#### Version 2.6:

- complete rewrite of the AI to encourage more blocking and maintaining of key positions.
- added a NAME tool type and a CHEAT tool type so you can use your own dice if you don't like the computer generated ones.
- also added a DONE tool type. See the Tool Type section.
- click on the dice after you complete a game and the Amiga winning percentage will now be displayed.

#### Version 2.5:

- improved the AI used during the late stages of the game. It should be much harder to gammon the Amiga.
  - added some code to encourage the Amiga to maintain a wall of 6 stones once it has established one.
-

-cleaned up various routines for speed and size.

Version 2.4:

-added an Undo function so you can start your move over again if you need to.

-fixed a bug in v2.3 where occasionally the program would prevent you from making a valid move.

-removed the debug\_hunks which significantly reduced the size of the program.

Thanks to Nils Goers for all of the above suggestions and improvements.

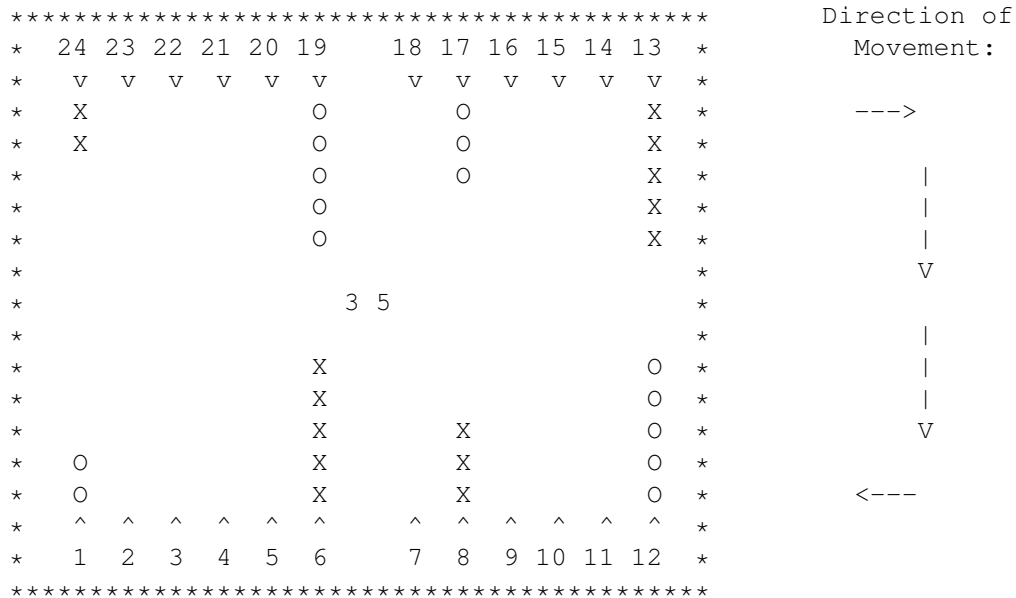
-finally got around to putting the documentation in AmigaGuide format.

## 1.5 The Basics

The Basics:

-----

The game begins with the following board setup:



^ ^ ^ ^ ^ ^  
 Your HOME area is positions 1 to 6.

There are 24 positions on the board and each player begins with 15 stones. 'X' represents your stones and the 'O' represents the Amiga's stones. In

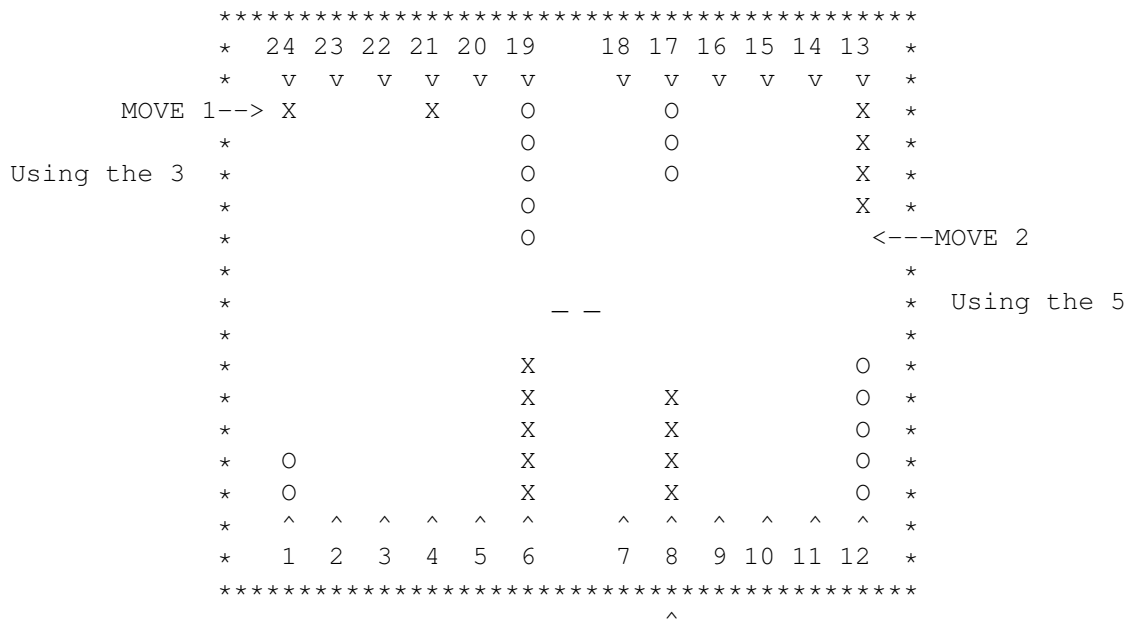


the diagram above you have 2 stones on position 24, 3 stones on position 8 and 5 stones each on positions 6 and 13. The 3 and the 5 in the center of the board represent the dice.

Each player takes turns rolling the dice and moving their stones an amount equal to whatever was rolled.

The object of the game is to move your stones in a clockwise direction into your home area. When all 15 stones are home you can remove them from the board depending on what you roll. The first player who removes all of their stones from the board wins the game.

The game starts with each player rolling one die to determine which player gets to go first. For example, if the Amiga rolled a 3 and you rolled a 5 then you would start by using this combination for your first move. Here is one possibility:



With the 3 I moved one stone from position 24 to position 21. For the second move I moved a stone from position 13 to position 8. After the opening move each player alternates rolling the dice.

Either player can move to any position as long as it is not blocked by 2 or more of the opposing players stones. In the above example I would not have been allowed to use the 5 to move a stone from position 24 to position 19 because the Amiga has position 19 blocked.

It is possible to move to a position that has only 1 Amiga stone on it. When this happens, your stone will take possession of that point and the Amiga stone will be knocked off onto the center bar. Any stone on the bar has to enter the board in the opposing players home area. You must get back on the board, on a point that is not blocked, before any further moves are allowed. If you cannot make a move just click once on the dice to give up your turn and resume play.

When all of your stones are home, you can start removing them from the board. This is called bearing off. If, for example, you rolled a 6 and a 2, you could remove one stone from position 6 and another one from position 2. If you rolled a 6 but didn't have any stones on position 6 to remove then you are allowed to take one stone off the next highest position. It is also legal to move stones within your home area rather than bearing them off. It might be an advantage to do this if the Amiga still has some stones in your home area and is trying to knock you off onto the bar.

The only other rule is that both players must use as much of what they rolled as possible. If you rolled a 5 and a 3 and it is possible to use both the 5 and the 3 then you must make both moves. If you can only use the 5 or the 3 but not both then you are required to use the higher amount (5). The Amiga plays by these rules and now, since version 2.3, you are forced to play by these rules also.

## 1.6 Game Play

Game Play:

-----

To move a stone just click once on the stone and then once on the spot where you want it to go. If you did it right then the stone should move to the new location or else a message will appear to help you out.

If you roll doubles ( i.e. two 3's ) then instead of getting two moves of 3 you get four moves of 3.

Anytime during a move you can get an update to how many moves you have left by clicking anywhere outside the main board area. In the message area will be displayed the dice values that have not yet been used.

You can also make multiple moves. If, for example, you roll a 3 and a 4 then you are allowed to make one move of 7 as long as both points between your present location and your destination are not blocked.

If you are unable to make a move then just click once on the dice to continue with the game. If you select a stone by mistake then just click on that same stone to start your move over again.

Once all your stones are in your home area, you can remove them from the board by double clicking on them.

A gammon will be declared if one player is able to get all his stones off before the other player has removed one. This is equivalent to winning 2 games.

A backgammon occurs when one player gammons the other player plus he traps at least one of the opposing players stones in his home area. This is worth 3 wins.

## 1.7 menus

Menus:

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Undo Move

You can restart your move from the beginning by selecting this from the menus. You could also accomplish the same thing by clicking on the stone and putting it back wherever it came from.

Stats

This menu item will display a table of what you have rolled so far as well as what your average roll has been. A long term average roll of about 8.144 is ideal. If you are interested in how I determined this number then send me some mail.

Statistics on wins/gammons/backgammons are now also displayed within this window.

Clicking on the left side of the stats window will show the statistics for the present series of games and clicking on the right side will show the overall statistics for all games that have been played, including previous games stored in the gammon.prefs file.

Colors

Selecting this will allow you to adjust both the board colors as well as the speed of the game.

If you select SAVE in the color adjustment window then your game preferences will be saved to a 266 byte file called gammon.prefs in the current directory. The program keeps track of the AMIGA's winning percentage in this file as well as statistics on the dice. If you want this feature then remember to click on SAVE before the end of the first game.

## 1.8 Tool Types

Tool Types:

-----

```
MAINFONT=topaz
FONTSIZE=8
```

These 2 tool types allow you to use any reasonably sized font for your menus, message display and window title in VGA mode. If the program is unable to find this font or if your size choice is too large then it will use topaz 8 as the default.

---

## REVERSE

I prefer setting up the board so that you move your stones from the upper left part of the screen to the lower left in a clockwise direction. If you would prefer that the board was set up so that your stones move from the upper right part of the board to the lower right in a counter-clockwise direction then use this tool type.

## NTSC

This tool will force the program to use a 640x200 NTSC screen or dblNTSC screen if available.

## PAL

As above except this one causes ProGammon to use a 640x256 PAL screen.

## NAME=Kevin

Replace Kevin with your name and then you won't have to be called Human anymore. Name lengths can now be as long as 19 characters including spaces. Wide fonts combined with a long name may cause part of your name to be printed off the screen so use some common sense. It's fine with topaz 11 but a 19 character name won't work if you use ruby 15!

## USERDICE

This tooltype simply lets you use your own dice and enter values in from the keyboard.

## DONE

With this tool type you will have to click on the dice after each move to signal to the Amiga that you are done. Some users like to be able to see how a move looks before having to commit themselves to it. Should be fewer accidental moves.

## TRAINER

Use this tool type to improve your game. Click anywhere on the lower part of the board and the Amiga will suggest a move for you. For example, if the opening roll was ( 2 - 3 ) then the Amiga might display this:

13/11 13/10

This means move one stone from your 13 point to your 11 point and move another stone from your 13 point to your 10 point. The points are numbered from 1 to 24 with 24 being the farthest point away from your home area. See

The Basics  
for further board numbering information.

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A display of Bar/23 means move a stone from the Bar to point 23 and 5/0 suggests that you should bear a stone off from the 5 point.

If you are having trouble winning, then learning to play like ProGammon does is a good first step. As you improve, you should start to see moves that are even better than the ones that PG suggests.

Winning should now be easy, or at least, easier!

#### JENA

In Jena, Germany players are limited to a maximum of 5 stones on each point at any one time. 6 or more stones on a point is not allowed. This will force you to play the game more intelligently so that you don't stack all your stones on the same point.

#### SHOWMOVE

This displays what the previous move for the Amiga was in the upper left portion of the screen.

#### NOBORDER

This will cause the border around the board to be the same color as the outside board color which will eliminate the border.

#### RANDOM

Starting with v2.8, the first/opening move is somewhat random. Of the 15 opening moves, 9 of them have 2 or 3 unique possibilities. For example, if the Amiga rolled a 6 and you rolled a 4 it might make one of the following moves:

- a) 1 / 7        7 / 11
- b) 1 / 7        12 / 16
- c) 1 / 5        1 / 7

You might not agree with the last one but in testing it has proven to be just as good as the other two more common moves. If you don't like random moves then get rid of the above tool-type.

CPU=

MAN=

These two tool types will allow you to set the board up anyway you wish.

Here's how it works:

CPU=20000000000050000305000000

MAN=0000050300005000000000020

---

Those 2 lines entered as tool types would allow you to set the board up in the traditional manner. The 24 positions on the board correspond to the first 24 digits after the equals sign. The 25th digit represents the number of stones on the bar for each player.

The board is numbered from 1 to 24. See

The Basics

. The first line

translates as follows. The CPU has 2 stones on the 1 point, 5 stones on the 12 point, 3 on the 17 point and 5 more on the 19 point. The final digit is a zero which means that no stones are on the bar.

There has to be exactly 25 digits/characters after the equals sign. Any more or less and the program will default to the traditional setup. Both tool types are not required. You can use either, neither or both.

The letters A through F are also available to place between 10 and 15 stones on any point.

Another example: if you wanted to set the board up so that the game starts with all 15 stones on the bar for both players then use the following:

```
CPU=0000000000000000000000000000F
MAN=0000000000000000000000000000F
```

The 24 zeros means there are no stones on the board and the last F means that both players will start with 15 stones on the bar.

```
CPUFIRST
MANFIRST
```

Either of these tool types can be used to force the program to let the Amiga or you start first regardless of who wins the opening role.

## 1.9 Advanced Section

Backgammon Simulations:  
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During a game of backgammon you often times get to a stage when you have to make a decision about whether to run home, make a hit, hold on to a key point or whatever.

One way to compare 2 moves is to write down what the board would look like after each move. Now, let the computer play against itself a few thousand times for each version. Compare the resulting 2 different winning percentage numbers and you will find out what ProGammon considers the best move to be.

You can also do this sort of testing on moves recommended by the experts. You will find that PG still has plenty of room for improvement!

Does that make sense? If so, then read on. In order to be able to do this kind of testing then you are going to need the following tools:

```
CPU=  
MAN=
```

These two tool types will allow you to set the board up anyway you wish.

```
CPUFIRST  
MANFIRST
```

In the above situation you would be using CPUFIRST because you just finished your turn and the Amiga will be rolling the dice next.

```
(RANDOM)
```

To make sure that your tests are consistent, you should eliminate the random opening moves by getting rid of the above tool-type.

```
TEST
```

This tool type turns off the majority of the graphics, sets the speed at 15 and automatically starts playing against itself. This greatly increases the number of games/hour that the Amiga can complete. The more games played, the more meaningful your results will be.

Remember to make sure that the boards being compared are set up properly before doing any long term testing.

NTSC seems quicker than multiscan productivity mode. Optimized versions of ProGammon are also available to speed things up.

The stats can be examined at any time and then you can continue on by resuming Auto Mode.

After 1000 games, the winning percentage will vary by +/- 0.050. It may take as many as 5000 games to get meaningful results. Give me access to a supercomputer and I'll give you a better backgammon algorithm!

## 1.10 Testing the Dice

The Dice:  
-----

The dice are generated using the SAS/C random number generating function called drand48(). I have done a 1001 tests and rolled these dice a million and one times and I am thoroughly convinced that the numbers returned by this function are 100% random.

Most computer backgammon players are very suspicious of the dice, never when they win but always when they lose! The dice are now pre-rolled

---

before the first game. There are enough pre-determined dice rolls for approximately 20 complete games. No program can predict what moves you are going to make so it is absolutely impossible to arrange the dice file to the advantage/disadvantage of either player.

If it happens to roll double 6's for it's last roll and wins it is because it got damn lucky!

You can now see exactly what dice rolls are coming up. At the start of a game when it says, `Click Mouse To Roll`, just click the mouse in the lower left corner of the board. This will create a file called `dice.PG` in your `RAM:` directory. This file contains what the dice are going to roll for the next, approximately, 20 games. Any statistical analysis on this file will prove to you the 100% randomness of the dice.

No more suspicious, surprise, miracle rolls for the Amiga!

Every roll of the dice is also kept track of in the `gammon.prefs` file after you select `Quit` in the menus or close the game screen.

During the game, you can select `Stats` in the menus to see the averages for the games that you are presently playing. By clicking on the right portion of the statistics screen you can also examine the stats saved in the `gammon.prefs` file.

Is there anyway now that the Amiga can cheat? Sure. The program could cheat by looking ahead in the dice file. It's obvious that the Amiga could make a risky move if it knew for sure that your next roll would not give you the opportunity to make contact. It could also avoid risky moves if it determined that your next roll would make contact.

Does it cheat like this? Certainly not, and I can prove it!

After the first roll, every move is predictable and repeatable. What this means is that if the board is set up in a certain way and a certain number shows up on the dice then it is always going to make the exact same move regardless of what's in the dice file.

If you witness a very suspicious looking move during game play then stop and do the following.

There are now

`Tool Types`

available for you to recreate the exact same situation. Once you have recreated the position of the stones on the board, you can then use the `USERDICE` tool type to enter in what the dice roll was. Turn off the `(RANDOM)` opening moves and the Amiga will now proceed to make the identical move to what it made during game play.

This proves that the dice file is not being used to gain an advantage over you. It would have made that exact same move anyhow.

I have done everything I can think of to prove that this program does not cheat. I really have nothing to gain by writing such a program.

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If you have any other "it cheats" theories then let me know and I will be happy to prove to you otherwise.

Remember, winning against this game is easy. Don't use "bad dice" as an excuse for playing a "bad game"!

## 1.11 Auto Mode

Auto Mode:

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Clicking the mouse in the lower right portion of the board will start automatic game play. The center portion of the bar will change colors while you're in Auto Mode. The Amiga now takes over rolling the dice and making moves for both players.

Basically, this turns the program into Amiga vs Amiga game play.

Let the computer play overnight and then you can check the Stats screen to see if the dice really are random. Also check for wins/gammons etc.

Novice players may learn a thing or two by watching the game play against itself.

Expert players can watch and tell me where my algorithms need improvement. They may notice areas where my program is weak and find ways to take advantage of it.

You could also set the board up in a back game situation and then run some tests. I've found that the 2,3 backgame returns the highest percentage of winning. What are your findings.

A single click of the mouse anywhere should return control to the user.

This feature is also handy when you are way ahead or behind in a game and the outcome is obvious. Put the program into Auto Mode and then sit back while the Amiga completes the game for you.

## 1.12 Interesting Stuff

Math Facts:

-----

This section is optional but if your background in mathematics is fairly strong then you may find what follows very interesting.

Let's say there are 2 computer backgammon players that are completely equal. They use the exact same algorithm. In the long run, they will both

win 50% of the games that they play against each other.

Now, you know from playing ProGammon that in a short set of games you can be either a hero or a bum! Recently, I went 1 Win and 9 Losses during a set of 10 games. At other times, I have gone 9 Wins and 1 Loss.

The point I'm trying to make is that you can't judge a player or a game over a small set of games. A 10 game set neither proves that a player or program is stupid or brilliant. There is a lot of luck involved in a game of backgammon. This is why you have to play a large number of games before the winning percentage starts to have some real meaning.

So, the question is, how many games is enough? Is 100 games enough, or 300, or 500, or perhaps even 900? I have played a couple of 300 game sets and by then the average dice rolls for both players were nearly even. I used to think that at this point the winning percentage would start to have some real meaning.

Guess what? Mathematically, or scientifically speaking, this number really doesn't mean as much as you might think.

Even after playing 500 games, 2 completely equal players can have their winning percentage vary between 0.400 and 0.600. Most of the time they are going to win about 250 games each because they are equally skilled. However, one player may get extremely lucky over a 500 game set and end up winning 300 games and the other player only 200. Believe it or not, this can happen even though they are completely equal.

I've included a computer generated chart to help explain this further.

The implications are kind of interesting.

The amount of variation quoted above is between 2 players that play consistent backgammon. They never get tired and they never learn from their mistakes. The moves they make never change or evolve.

People, on the other hand, as they learn are constantly changing how they play backgammon. They find a particular style of play that seems to work over 100 games and they stick to it. What doesn't work is abandoned.

There is so much variation in a game of backgammon, that coming to any conclusions concerning what works and what doesn't is often times wrong! The amount of variation increases when you add in the fact that people get tired and the decisions they make concerning when to run, when to hit, etc., etc. are constantly changing.

Have a look at the following chart:

W I N %	N U M B E R O F G A M E S P E R S E T			
	100	300	500	900
0.300 ->	1	0	0	0

0.310	->	0	0	0	0
0.320	->	1	0	0	0
0.330	->	6	0	0	0
0.340	->	5	0	0	0
0.350	->	10	0	0	0
0.360	->	12	0	0	0
0.370	->	26	0	0	0
0.380	->	40	1	0	0
0.390	->	68	0	0	0
0.400	->	107	2	0	0
0.410	->	138	18	1	0
0.420	->	243	25	3	0
0.430	->	293	83	11	0
0.440	->	399	162	51	8
0.450	->	463	302	141	35
0.460	->	555	515	355	149
0.470	->	704	811	751	482
0.480	->	738	1085	1184	1135
0.490	->	781	1331	1593	1999
0.500	->	824	1363	1809	2384
0.510	->	785	1261	1649	1926
0.520	->	735	1080	1132	1158
0.530	->	676	805	756	542
0.540	->	589	577	335	149
0.550	->	472	305	150	28
0.560	->	390	162	63	5
0.570	->	297	72	8	0
0.580	->	214	25	6	0
0.590	->	163	8	1	0
0.600	->	102	3	1	0
0.610	->	62	4	0	0
0.620	->	41	0	0	0
0.630	->	26	0	0	0
0.640	->	14	0	0	0
0.650	->	10	0	0	0
0.660	->	6	0	0	0
0.670	->	2	0	0	0
0.680	->	1	0	0	0
0.690	->	1	0	0	0
0.700	->	0	0	0	0

Ok now, what do all these numbers really mean??

I wrote a program to simulate 2 Amigas playing backgammon against each other. I've also subsequently used Amiga vs Amiga mode to confirm these numbers. They are both using the same algorithm and are both as equal as can be.

The first column is the winning percentage just like what is displayed in ProGammon.

The second through fifth columns represent sets of games that they played against each other. The two Amigas were always fighting about who was the better backgammon player so they started by playing sets of 100 games. At the end of each set of 100 games, Player A would see what his winning percentage was and then he would add 1 to the appropriate row.

---

The first time they got together to determine a champion they played 10,000 sets of 100 games each. (i.e.  $10,000 \times 100 = 1,000,000$  games) If you look at the table you will see that they played dead even at ( 0.500 ) 824 out of the 10,000 sets they played ( 8.24% of the time ).

If you look up at the 0.350 level you will see that on 10 occasions Amiga A had a winning percentage of only 0.350 after a 100 game set. These two players are totally equal but because of the luck of the dice, look how poorly Amiga A did on 10 different occasions.

There was also 13 other times when his winning percentage was worse. On those occasions Amiga A only won between 0.300 and 0.340 of the time.

What this proves is that if you play 100 games and you think the winning percentage is telling you whether you're a good player or ProGammon is a good program is nonsense. You can't come to any conclusions whatsoever.

On one occasion Player A won only 30 of 100 games and at the other extreme one time Player A won 69 out of 100 games. This large variation isn't because Player A or B were playing tremendously or lousy. They were always playing equally intelligently. The variation is due solely to the randomness of the dice.

If you look at the other columns you will see that there is still a lot of variation even when they sat down and played 300 game sets, 500 game sets and finally they played a 900 game set 10,000 times.

Even after playing a 900 game set of backgammon, the winning percentage varied between 0.440 and 0.560. If your winning percentage is 0.560 after playing 900 games, you have not proven that you are clearly superior.

Though unlikely, it is still possible that you were just lucky. It is possible that you could play another 900 game set and the Amiga could come out on top.

Give the above some thought after you win or lose 10 games in a row!

For some real world testing, check out  
CPU vs ME

.

## 1.13 CPU vs ME

The Results:

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How well do I do playing against this program?

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I usually play sets of games and then record the results whenever the sum of both players in the Total column is 100.

Kevin	45 Wins	+	12 Gammons	+	0 Backgammons	=	69 Total
Amiga	25 Wins	+	3 Gammons	+	0 Backgammons	=	31 Total
							---
Dice :	( K= 8.459		A=7.976 )				100

I absolutely killed the Amiga during the first set! To be honest, this is one of the best sets that I have ever completed. Most users will find it very difficult, in the long run, to maintain that average.

The average of the dice rolls confirm that I had been getting some very lucky dice.

I played on and at the 200 game mark the results were the following:

Kevin	79 Wins	+	21 Gammons	+	1 Backgammons	=	124 Total
Amiga	56 Wins	+	10 Gammons	+	0 Backgammons	=	76 Total
							---
Dice :	( K= 8.347		A=8.062 )				200

During that set the Amiga played at 0.450 to bring it's overall average up to 0.380. The overall dice were still in my favor. In the long run the dice averages are going to be nearly equal which means that the Amiga's winning percentage will likely improve.

The 300 game mark:

Kevin	124 Wins	+	25 Gammons	+	1 Backgammons	=	177 Total
Amiga	93 Wins	+	12 Gammons	+	2 Backgammons	=	124 Total
							---
Dice :	( K= 8.264		A=8.115 )				300

That time the Amiga played at 0.470 for an overall average of 0.413.

The 400 game mark:

Kevin	161 Wins	+	32 Gammons	+	1 Backgammons	=	228 Total
Amiga	129 Wins	+	17 Gammons	+	3 Backgammons	=	172 Total
							---
Dice :	( K= 8.268		A=8.076 )				400

That was a close set! The Amiga played at 0.490 which means that I could have easily lost it. The overall Amiga average has continued to climb and is now at 0.430. The dice continue to be in my favor.

Ignoring the first 100 games, the Amiga has been playing at 0.470 during the most recent 300 games. That's a pretty competitive game of back-gammon!

And finally the 500 game mark:

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Kevin	206 Wins	+	40 Gammons	+	2 Backgammons	=	292 Total
Amiga	153 Wins	+	23 Gammons	+	3 Backgammons	=	208 Total
							---
							500

Final Dice : ( K= 8.236 A=8.080 )

The Amiga's winning percentage for the last 100 games was only 0.360 for an overall total of 0.416. I guess that means that I'm a better backgammon player than programmer!

During that 500 game set I was constantly rolling at least as much and usually more than what the Amiga was rolling. The Amiga rolled 36 more double 1's and 2's but I rolled 145 more double 3's, 4's, 5's and double 6's. That's equivalent to almost 4 more doubles for me per game. If ProGammon cheats, then it isn't doing a very good job!

Many games are decided on the last roll of the dice. I'm pretty sure that if the Amiga rolled what I rolled, it would have ended up with a much higher winning percentage.

Lousy, crooked dice? No, just lucky dice for me. I probably won't be nearly as lucky during my next set of 500 games.

If you're a serious backgammon player then play some games and let me know how you do. I hope ProGammon plays as competitively against you as it does against me.

## 1.14 Acknowledgments

Acknowledgments:

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 Thanks very much to the people that took the time to become registered users. Registration is FREE, as always!

Nils Goers showed me the correct way to compile a program.

David Antczak gets credit for the [ CLEAR STATS ] button as well as a few other ideas.

Thanks Glenski and Claire Shannon for your contributions. It's nice to know that my efforts are appreciated.

The

PAL  
 version is the result of Glen's nagging and his ex wife Claire  
 helped with the  
 TRAINER  
 and  
 USERDICE  
 features.

This program is dedicated to my dad who died 10 years ago this month.

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Without the encouragement from all of the above, this program would not have reached it's current level.

## 1.15 author

Freeware:

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You will be hard pressed to find a significantly better playing, more configurable game of backgammon.

Your questions and comments are always welcome.

Long live the AMIGA!

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