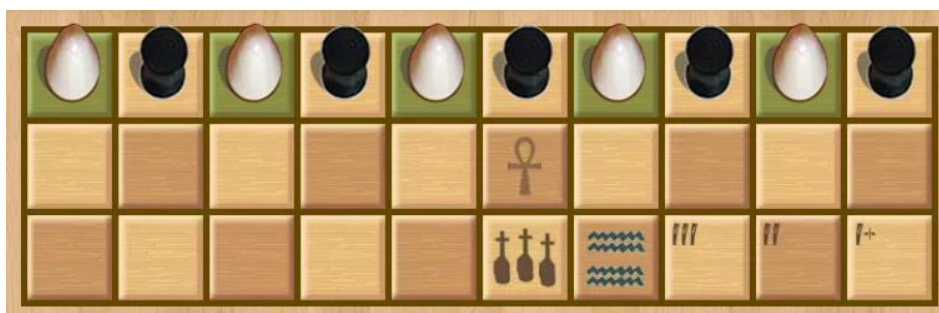


## Objetivos








Pretende-se com este trabalho desenvolver uma aplicação que permita ao utilizador jogar o jogo, a 2 jogadores, pelo menos um humano e um jogador virtual, BOT ou outro. O trabalho consiste em programar um jogo funcional na linguagem usada n UC. O IDE a usar será à escolha do utilizador.

## Enquadramento

O jogo de tabuleiro mais importante e popular do Egito Antigo era Senet, “The Game of Passing Through the Underworld”, às vezes conhecido como 'O Jogo dos Trinta Quadrados'. Foi jogado a partir de 3000 a.C. e é um dos jogos mais antigos conhecidos. Assumiu um tom religioso, tornando-se uma representação da jornada de partes da alma (os antigos egípcios acreditavam em várias almas, que se podem interpretar como partes da alma ou como diferentes aspetos do ser) através do submundo e eventual descanso no “campo de juncos” no oeste cósmico.



O jogo é composto por um tabuleiro de 3x10 espaços (casas). Algumas das casas têm um desenho pintado nelas, conforme ilustrado. As casas especiais são:

	a Casa da Segunda Vida
	a Casa da Beleza
	a Casa da Humilhação (ou a Casa das Águas),
	a Câmara dos Três Juízes (III),
	a Casa dos Dois Juízes (II) e
	a Casa de Heru (Hórus) (I).
	

Para jogar usam-se quatro varas de arremesso (Djebao, “Dedos”). As varas têm a forma de meio cilindro sendo que a superfície arredondada é pintada de preto (ou escuro) enquanto a superfície plana é pintada de branco (ou claro).



Lançam-se as varas e contam-se o número de brancos obtidos. Nenhum (zero) é contado como cinco (o zero foi inventado muito depois de Senet...). Se se obtiver dois ou três faz-se um movimento e passa-se a vez ao adversário. Obtendo outro qualquer valor, faz-se o movimento e joga-se de novo. Se não houver nenhum movimento legal para jogar, perde-se a vez.

As restantes regras podem ser lidas no ficheiro em anexo.

## Implementação

No arranque da aplicação deve ser apresentada uma primeira imagem onde se identifica o nome do jogo e os autores do trabalho. Ao clicar em qualquer tecla deve ser exibido um menu de jogo, onde o utilizador poderá seleccionar uma de 4 opções:

- A. Jogar uma Partida
- B. Carregar uma partida a partir de um ficheiro
- C. Apresentar uma descrição do jogo
- D. Sair da aplicação.

### A. Caso o utilizador selecione a opção A devem ser realizadas as seguintes operações:

1. Pedir o Nome do jogador.
2. Selecionar aleatoriamente quem é o primeiro jogador, humano ou BOT.
3. Construir a interface do jogo, ou seja, desenhar na consola todos os elementos necessários para visualizar o desenrolar da partida:
  - a. O tabuleiro de jogo.
  - b. Identificar cada jogador pela cor com que vai jogar.
4. Realizar o turno do primeiro jogador. Considera-se um turno de um jogador o conjunto das ações que esse jogador executa até passar a vez ao jogador seguinte ou até o jogo terminar. Só devem ser autorizadas as ações possíveis em cada fase.
  - a. Quando for o jogador humano a jogar seguir a sequência da jogada:
    - I. **Lançar as varas**
    - II. **Escolher o movimento**
    - III. **Voltar a I ou Passar a vez**
    - IV. **Sair** (além de interromper o jogo deve gravar o estado do mesmo).
  - b. Quando for o Jogador BOT a jogar, aplicar um algoritmo para o BOT mostrando as ações escolhidas pelo mesmo.
  - c. Tomada a decisão da ação escolhida (humano ou BOT), realizá-la e atualizar a consola com os novos dados.
  - d. Depois de uma ação de qualquer Jogador (Humano ou BOT) gravar SEMPRE o estado atual do jogo, de modo a ser possível dar a opção do jogador de interromper para continuar mais tarde.
  - e. Todas as ações dos jogadores devem ser mantidas em memória, apresentando na consola as ações do último turno dos dois jogadores.
5. Repetir alternadamente os turnos dos jogadores até que ocorra o final da partida.

6. Apresentar o vencedor do jogo.

**B. Ler os dados previamente guardados e retomar a partida gravada:**

- posições das peças de cada jogador no tabuleiro,
- jogador ativo (quem é que vai realizar a próxima ação,
- qual a próxima ação
- últimos lançamentos efetuados

**C. Apresentar na consola um resumo das regras do jogo.**

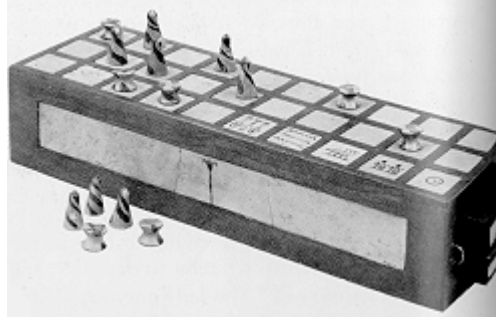
**D. Encerrar a aplicação.**

# SENET

## THE GAME OF PASSING THROUGH THE UNDERWORLD

### An Ancient Egyptian Two-Player Board Game

*By Daniel U. Thibault*



(Source: *Horizon Book of Daily Life in Egypt*, p. 48)

## INTRODUCTION

The most important and popular board game of Ancient Egypt was Senet, 'The Game of Passing [Through the Underworld]', sometimes known as 'The Game of Thirty Squares'. It was played from 3000 B.C. and is one of the oldest known games. It took on religious over-tones, becoming a representation of the journey of the parts of the soul (Ancient Egyptians believed in several souls, which you can interpret as parts of the soul or as different aspects of being) through the under-world and eventual rest in the 'field of reeds' in the cosmic west. This is an excellent game, enjoyable and interesting to play.

Senet appears in one of the creation stories: Djehuty (Thoth) invented Senet as a way to help the poor sky-goddess Nut. Nut had been cursed by her husband Ra-Atum because she had been unfaithful and was now pregnant with the earth-god Geb's children. Ra-Atum's curse stated "that Nut could not give birth to any children during the 360 days of the year". Djehuty challenged the gods to games of Senet, with time as the prize, and, winning, was able to add 5 extra days to the year (which were not so cursed). Nut was then able to have her children on each one of the 5 extra days: Ausare/Wesir (Osiris), Her-Wer (Haroeris), Setekh (Seth), Aset (Isis), and Nebet-Het (Nephthys).

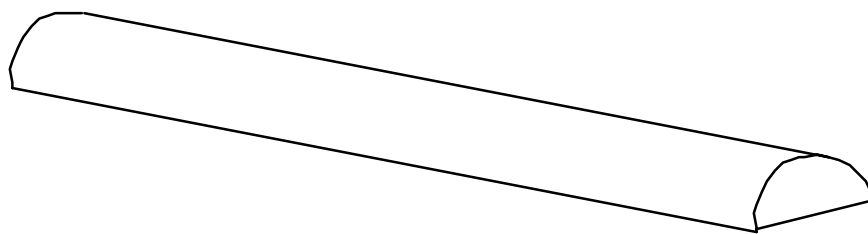
## COMPONENTS

### *Throwing Sticks (Djebao, "Fingers")*

There are four of these. They are shaped like half-cylinders and about the same size as an index finger. The tips may be rounded off or sculpted to look like fingertips. The rounded surface is painted black (or dark) whilst the flat surface is painted white (or light). Some sets contained knucklebones instead of throwing sticks.

*Note:* Whenever black/dark and white/light are mentioned, different colours may be substituted. One could use different woods or wood stains, for example.

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### *Cones and Spindles (Yebao, “Dancers”)*







There are five cones and five spindles, each about an inch tall. The cones are light coloured, whilst the spindles are dark or red (Setekh's (Seth's) colour). The very earliest Senet sets used ten of each piece; this later became nine, then seven and finally five. The more elaborate sets used carved lion's and Setekh-beast heads, Bes' heads, kneeling captives, etc.









### *Board*

A flat board was sometimes used, but the more luxurious models had a drawer built into the right end, wherein the pieces were dropped in as they were borne off during play. The drawer was also used to store the components between games.

The board is divided into thirty squares (*peru*, “houses”), in three rows of ten. Each square should be about an inch on the side. A few of the houses have a design painted onto them, as illustrated below. Later boards had every single house illustrated, but only some of the illustrations had some bearing on play.

Starting at the middle and working our way towards the lower right, the special houses are:

















-  the House of Second Life (or the House of Power and Life or the House of Repeating Life),
-  the House of Beauty (or the Good House or the Beautiful House),
-  the House of Humiliation (or the House of Waters),
-  the House of Three Judges (or the Hall of Two Truths),
-  the House of Two Judges (or the House of Ra-Atum) and
-  the House of Heru (Horus).

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Other squares sometimes appearing include: the House of Netting, appearing immediately after (to the left of) the House of Second Life; when you landed a piece on this house, you would lose a turn.

### SET-UP

The cones and spindles are put on alternating houses as shown below:

One player takes a cone and a spindle, puts his hands behind his back, shuffles the pieces between his hands and then holds his fists out. The other player designates a fist and the first player opens it to reveal which side the other player will be playing. The cones always go first.

An alternative way of determining who goes first is for a player to drop a single finger while the other calls out dark or light. If he called correctly, he throws the fingers first (see below). What each player is hoping for while throwing the fingers is a one: the first player to throw a one goes first, taking the cones. This method is more authentic but slower.

### THROWING THE FINGERS

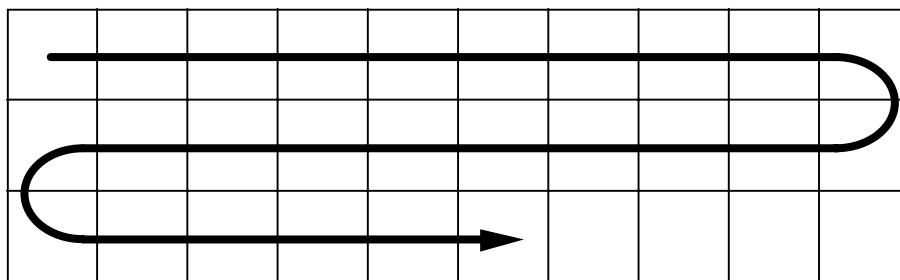
Gather the sticks in one hand and hold them in a vertical bundle, a few inches above the table. Drop them. Count the number of white faces. A zero is counted as a five (the zero was invented a *lot* later than Senet...). If you throw anything else than a two or three, take your turn and then throw again. On a two or three, take your turn and then pass the sticks to your adversary. Should there be no legal move for you, you lose your turn and pass the sticks to your opponent.

We know how to use these as they were still being used in Asia in the 17<sup>th</sup> century; some Amerindians also use the same principle with nutshell halves. Note that two is the most frequent throw (six in sixteen chance), one and three somewhat less frequent (four in sixteen chance each) and four and five the least frequent throws (one in sixteen chance each).

### HOW TO MOVE THE DANCERS

There can be, at any one time, only one dancer on any one house. A dancer advances as many squares as the player threw, in the following fashion, known as *boustrophedon* (from the Greek for "as the ox ploughs the field"):

## Four Ancient Egyptian board games



The player *must* move a dancer forward if he can. If there is no legal forward move possible, then he *must* move a dancer backward. If there is no legal backward move possible, the throw is forfeited.

A dancer must reach the House of Beauty by exact throw—it cannot move past it. Once on the House of Beauty, the dancer can:

- On a five, bear off;
- On a two, three or four, advance to one of the last three Houses; or
- On a one, if the player has no other choice, fall into the House of Humiliation.

A dancer cannot move backward or forward from the last four houses; it can only bear off (or go to the House of Second Life from the House of Humiliation—see below). It is "awaiting judgement".

### DANCING

Whenever the moving player's dancer lands on one of his opponent's, they "dance"—that is, they exchange places. Sometimes, the only legal move is a backward one which dances the opponent forward!

Dancers may protect each other, however: if two or more dancers of the same player follow each other, they are considered protected and cannot be attacked.

The last three Houses are an exception to this rule: dancers there are never protected and, if attacked, are dropped in the House of Humiliation instead of exchanging places with the attacking dancer.

### DROWNING

When a player has a dancer drowning in the House of Humiliation, it throws his other dancers into disarray—they no longer protect each other. Whilst he has a drowning dancer, a player may move no other piece. If the dancer starts drowning whilst the player has the sticks (which may happen on a throw of one if there is no other legal forward move), he may continue throwing, hoping for a four (on which the drowning dancer bears off). If he fails in this (by eventually throwing a two or three instead of a four), when his turn comes back he may either accept the sticks and hope again for a four or decide to forfeit his turn to save the drowning dancer—the rescued dancer is then moved to the House of Second Life (or, if that House is occupied, the first free House behind it) and the turn goes back to the opponent. Should a dancer be drowning when an opponent's dancer "attacks" it, it is rescued—they swap places! Likewise, if another of the player's dancers is knocked into the water by his opponent, the original drowning dancer is sent to the House of Second Life.

### NOTES ON PLAY

An aggressive player will try to dance his opponent's pieces back as often as possible; a defensive player, on the other hand, will concentrate on keeping his dancers mutually protected—the best formation is then a group of three and a group of two, each one caterpillaring forward on the corresponding throw (on a throw of two, he would move the rearmost dancer of the group of two).

## Four Ancient Egyptian board games

The movement options of a player decrease as dancers are borne off; the motion of the last dancer can be quite erratic indeed.

Keeping a protected group on the House of Beauty not only prevents the opponent from bearing off, but also prevents him from attacking the pieces that are awaiting judgement.

When a dancer is drowning, it is almost always preferable to send it to the House of Second Life —unless it is the last one and the opponent is also close to bearing off his last piece.

The game is fast-paced and of unpredictable outcome, the race to the finish being frequently very hotly disputed.

### ALTERNATIVE RULES

Senet was played for a long time over a wide geographical area; it is therefore not surprising that several sets of rules have existed in different places and times. Here's a brief list of known variants:

- The throwing sticks are read as 1, 2, 3, 4, 6 instead of 1, 2, 3, 4, 5.
- Each player has seven (or nine or ten) pieces instead of five.
- Each player throws the sticks until a 2 or 3 is thrown and only then resolve his moves, in whichever order he likes.
  - At the game's start, the second player must throw a one before he can move any piece.
  - At the game's start, all pieces are off board and must be entered by using up throws.
  - A player unable to use a throw forfeits the sticks to his opponent.
  - A group of three or better dancers blocks the passage of opposing pieces.
  - When a piece is forced to move backward, it may *not* attack an opposing piece.
  - The House of Second Life is considered a safe house (that is, a piece on that House may not be attacked).
    - The House of Second Life is considered a safe house *and* grants the player an extra turn.
    - The House of Beauty grants the player an extra turn.
    - While a piece is on the House of Humiliation, no other piece is allowed to enter it.
    - A piece that falls on the House of Humiliation is sent back to the very first (farthest) house.
    - A piece that falls on the House of Humiliation is removed from the game and must be re-entered at the very first (farthest) house.
  - Pieces on the last three Houses are allowed to move forward in addition to bearing off.
  - The last three Houses and the House of Beauty are considered safe houses.
  - If a throw allows the player to bear a piece off, he must do so.
  - A player may bear off his pieces only once they are all on the last row of the board.



## Four Ancient Egyptian board games

According to John Tait, an Egyptologist at University College London, the rules were as follows:

- Pieces move forward only.
- Legal moves must be made.
- The sticks are read as 1, 2, 3, 4, 6.
- Players alternate throws unless they throw a 6, in which case they move and throw again.
- Pieces that are hit are removed from the board and must be re-entered. The hitting player gets an extra throw as a result.
- Pieces re-enter on a throw of 4 or 6, unto Houses 4 or 6 (counting from the beginning).
- Re-entry is not mandatory if another legal move is possible.
- The House of Second Life is a safe house.
- A piece on the House of Beauty can bear off on a 6.
- A piece that lands on the House of Humiliation is removed from the board and must be re-entered. The player also forfeits any extra throws he may have pending at that time.
- Pieces on the last three Houses may bear off on the corresponding throws.
- Pieces may bear off or move forward.
- When a piece is borne off, the player gets to throw again.

R.-C. Bell proposed yet another set of rules, wherein Senet is played essentially *backward* from previously. It is presented here for completeness, being considered very unlikely to be correct:

- Players alternate throwing the sticks.
- The pieces start off of the board, entering it on the last five houses and travelling towards the first houses.
- On any throw, the player may either enter a piece onto the corresponding house (the House of Heru on a one, the House of Two Judges on a two, etc) or advance an already entered piece.
- An attacked piece is removed from the board and must start all over again.
- The special houses are all safe.
- The game is won by the first player to manoeuvre all of his pieces onto their ending positions.

## SYMBOLISM & HISTORY

Senet is the second oldest board game known for which we still have the rules. An older board game (simply known as the *Ur Game*) was found in the royal tombs of Ur, in Sumer, dating back to about 3000 B. C., and its rules were rediscovered in the 1990s. The Hyksos, which invaded Egypt around 1650 B. C., causing the demise of the Middle Kingdom, introduced a descendant of the Ur game to the Egyptians. This game was called *Aseb* or *The Game of Twenty Squares* or *The Game of Thieves/Robbers* and is described later on. New Kingdom Senet boards were often reversible, with an Aseb board on the other side (but sometimes an Ur board). Another descendant of the Royal Game of Ur was played into the 20<sup>th</sup> century by the Jewish community of Cochin in Southern India.

Called *Snt* by the ancient Egyptians (who didn't write down vowels), the word was pronounced *Zinat* in the early period of Egyptian history, evolving into *Senet* by the time of the Roman conquest (language drifts over several millennia...). Although no Senet rulebooks survived, there are numerous depictions of games in progress on tomb walls and even some running commentaries. This has allowed Egyptologists to piece together the rules, starting with the Swiss Gustave Jéquier and the German Edgar B. Pusch. A number of variants remain possible and it is likely they were played at various times throughout the game's 3000 year span—it was played from the very beginnings of Egyptian history until the Christian era, where its pagan connotations caused it to fade into disfavour. I have chosen here the variant set that gives, in my opinion, the best enjoyment.

## Four Ancient Egyptian board games

The five pieces (dancers) represent the five parts of the deceased's soul, which are wandering through the *Douat*, the Egyptian underworld, trying to be united with Ausare (Osiris), the god of the dead. The winner is the first one to bear all of his five dancers off of the board. He is then "justified".

The dancers' first objective is to reach the House of Beauty. This represents the end of the mummification period (seventy days). Once there, a dancer can cross the Nile (represented by the House of Water) to face its judgement. Once judged worthy, each part of the player's soul is allowed to unite with Ausare.

### ***Later Historical Development***

Senet became known as the *Game of Thirty Squares* (although it is possible the latter's rules may have been different, closer to the Arabic *Tab es Siga* game). The Romans adapted it into the game of *Ludus Duodecim Scriptorum*, played with cubic dice. In the first century AD, *Ludus Duodecim Scriptorum* became *Tabula*, a variant with only two rows of marked squares. During the Middle Ages, *Tabula* developed into *Tables*, from which *Backgammon* and its numerous variants, such as *Tric-Trac*, *Jacquet* and *Nard*, are derived.