The LaTeX havannah package

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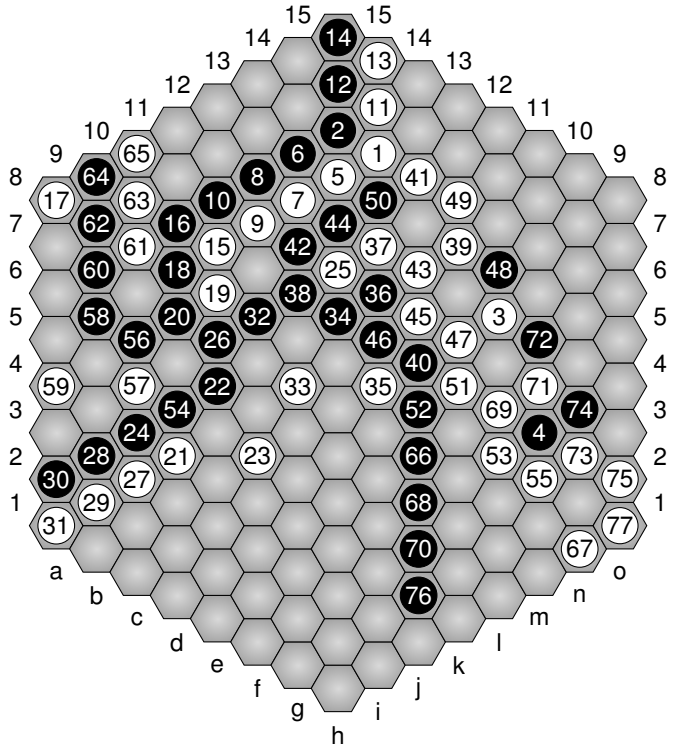
Abstract

The `havannah` package defines macros for typesetting diagrams of board positions in the games of Havannah and Hex.



A Havannah game between Maciej Celuch and Mirko Rahn
played on `http://www.littlegolem.net` from 2009-07-05 to 2009-07-29

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1 Usage

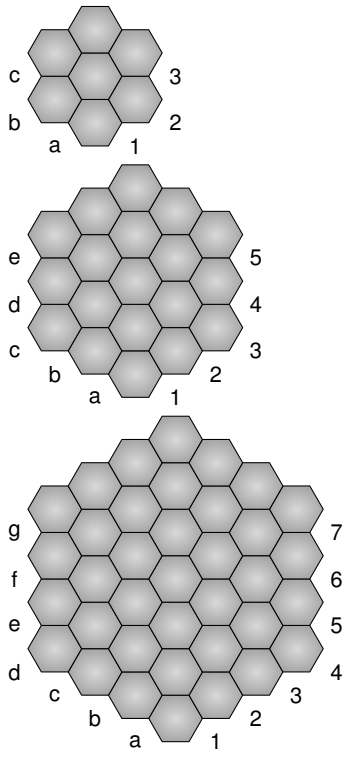
Put `\usepackage{havannah}` in the preamble of your document.

This package defines four environments, three commands, and several hooks that allow for the customization of its output.

`HavannahBoard` The `HavannahBoard` environment typesets a Havannah board. It accepts the following keys:

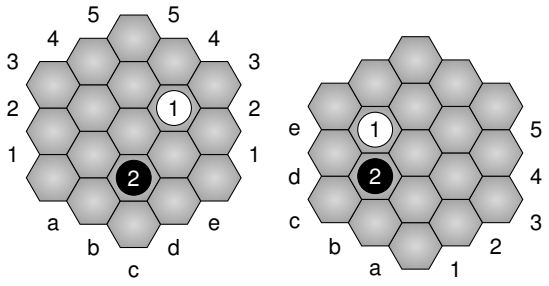
- `board size`: an integer from 1 to 13, default: `10`,
- `coordinate style`: `little golem` or `classical`, default: `classical`,
- `hex height`: a length, default: `17.5pt`,
- `show coordinates`: a Boolean, default: `true`,
- `show hexes`: a Boolean, default: `true`.

Sample effects of setting these keys are shown below.

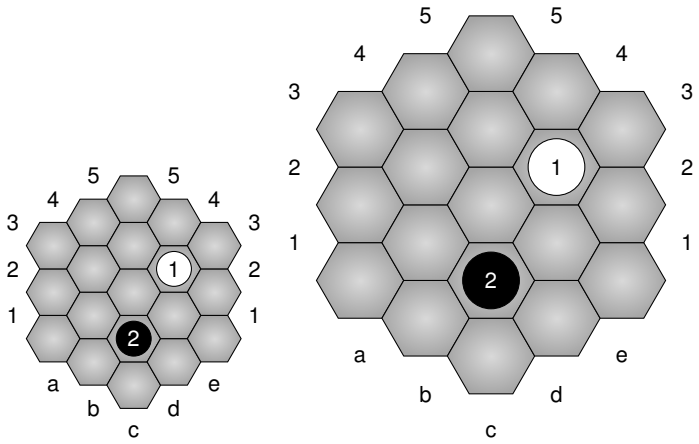



```
\begin{HavannahBoard}[board size=2]
\end{HavannahBoard}

\begin{HavannahBoard}[board size=3]
\end{HavannahBoard}

\begin{HavannahBoard}[board size=4]
\end{HavannahBoard}
```

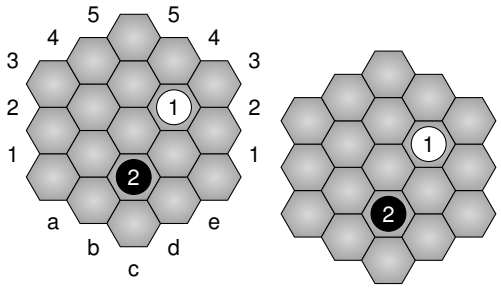
```
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
  \HGame{d3,c2}
\end{HavannahBoard}
\begin{HavannahBoard}[board size=3,coordinate style=classical]
  \HGame{d3,c2}
\end{HavannahBoard}
```



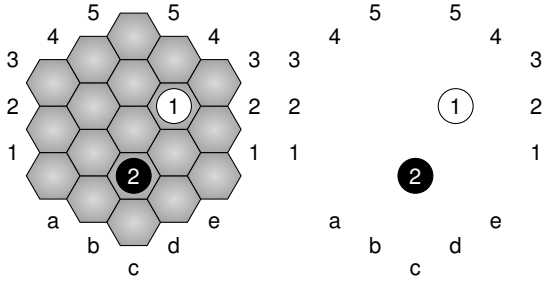
```
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
  \HGame{d3,c2}
\end{HavannahBoard}
\begin{HavannahBoard}[
    board size=3,coordinate style=little golem,hex height=1cm]
  \HGame{d3,c2}
\end{HavannahBoard}
```



```
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
  \HGame{d3,c2}
\end{HavannahBoard}
\begin{HavannahBoard}[
    board size=3,coordinate style=little golem,show coordinates=false]
  \HGame{d3,c2}
\end{HavannahBoard}
```



```
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
  \HGame{d3,c2}
\end{HavannahBoard}
\begin{HavannahBoard}[
    board size=3,coordinate style=little golem,show hexes=false]
  \HGame{d3,c2}
\end{HavannahBoard}
```

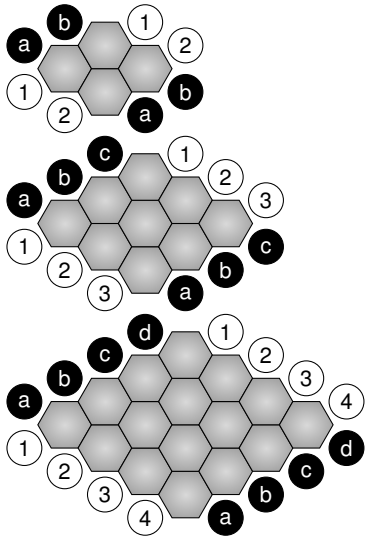


`HexBoard` The `HexBoard` environment typesets a Hex board. It accepts the following keys:

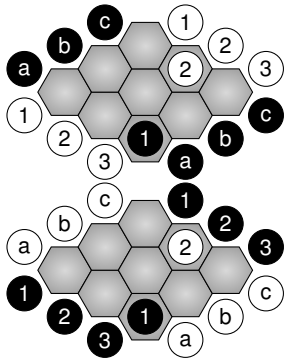
- `board size`: an integer from 1 to 26, default: 11,
- `top left color`: either `white` or `black`, default: `black`,
- `hex height`: a length, default: `17.5pt`,
- `show coordinates`: a Boolean, default: `true`,

- `show hexes`: a Boolean, default: `true`.

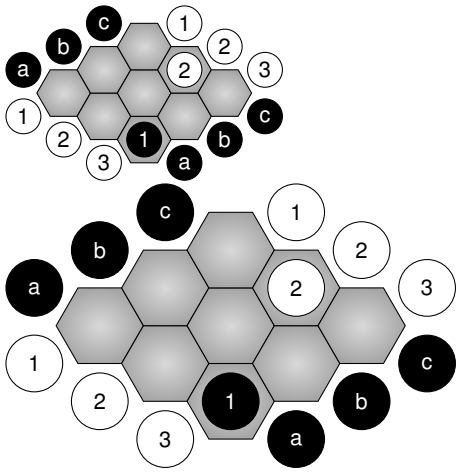
Sample effects of setting these keys are show below.



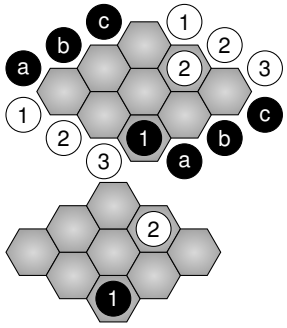
```
\begin{HexBoard}[board size=2]
\end{HexBoard}

\begin{HexBoard}[board size=3]
\end{HexBoard}

\begin{HexBoard}[board size=4]
\end{HexBoard}
```



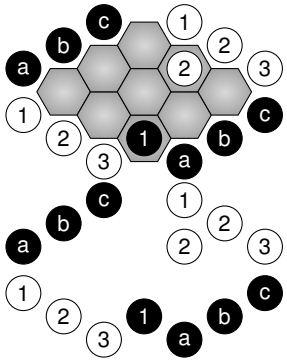
```
\begin{HexBoard}[board size=3]
  \HGame{a3,c2}
\end{HexBoard}

\begin{HexBoard}[board size=3,
    top left color=white]
  \HGame{a3,c2}
\end{HexBoard}
```



```
\begin{HexBoard}[board size=3]
  \HGame{a3,c2}
\end{HexBoard}

\begin{HexBoard}[board size=3,
    hex height=1cm]
  \HGame{a3,c2}
\end{HexBoard}
```



```
\begin{HexBoard}[board size=3]
  \HGame{a3,c2}
\end{HexBoard}

\begin{HexBoard}[board size=3,
    show coordinates=false]
  \HGame{a3,c2}
\end{HexBoard}
```



```
\begin{HexBoard}[board size=3]
  \HGame{a3,c2}
\end{HexBoard}

\begin{HexBoard}[board size=3,
    show hexes=false]
  \HGame{a3,c2}
\end{HexBoard}
```

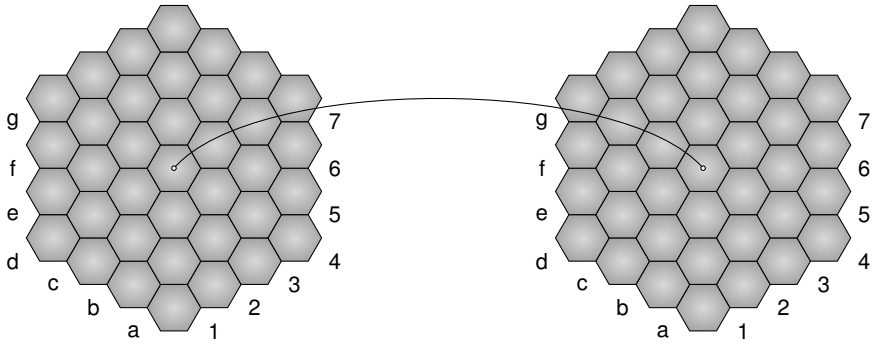
`InnerHavannahBoard` The `InnerHavannahBoard` environment typesets a Havannah board inside a

tikzpicture environment. It is useful for drawing multiple diagrams in one picture. In addition to the keys of HavannahBoard, it accepts the following keys:

- prefix: to be put before cell names.
- x: the x coordinate of the lower corner of the board.
- y: the y coordinate of the lower corner of the bowrd.

An example of its use is shown below.

```
\begin{tikzpicture}
  \begin{InnerHavannahBoard}[board size=4,prefix=A,x=0,y=0]
  \end{InnerHavannahBoard}
  \begin{InnerHavannahBoard}[board size=4,prefix=B,x=7cm,y=0]
  \end{InnerHavannahBoard}
  \draw (Ad4)..controls (Ae7) and (Bg5)..(Bd4);
  \HStoneGroup[color=white]{Ad4,Bd4}
\end{tikzpicture}
```



InnerHexBoard

The InnerHexBoard environment typesets a Hex board inside a tikzpicture environment. It accepts the same set of extra keys as InnerHavannahBoard: prefix, x, and y.

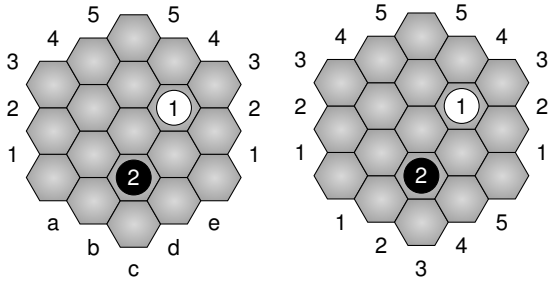
HLetterCordinates
HCoordinateStyle
HDrawHex

You can use \renewcommand to redefine three hooks that change the look and feel of HavannahBoard or HexBoard. They are:

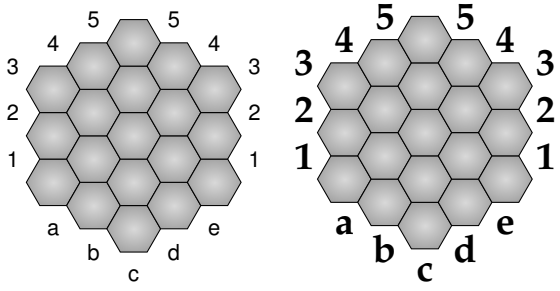
- \HLetterCoordinates: a comma-separated list, default: {a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w,x,y,z},
- \HCoordinateStyle: a one-argument macro, default: {\sffamily#1},
- \HDrawHex: a tikz command, default: {\shadedraw[shading=radial,inner color=gray!30, outer color=gray!70]}. Note that the default shading is a heavy task for some printers so you might want to use a simpler command instead, for instance \draw[fill=gray!35].

Sample results of redefining them are shown below.

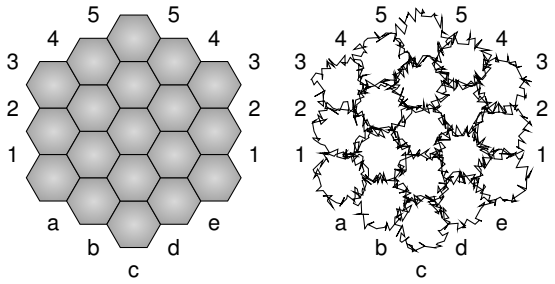
```
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
  \HGame{d3,c2}
\end{HavannahBoard}
\renewcommand\HLetterCoordinates{1 ,2 ,3 ,4 ,5 }
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
  \HGame{4 3,3 2}
\end{HavannahBoard}
```



```
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
\end{HavannahBoard}
\renewcommand\HCoordinateStyle[1]{\Large\bfseries#1}
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
\end{HavannahBoard}
```



```
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
\end{HavannahBoard}
\renewcommand\HDrawHex{\draw[
  decorate,decoration={random steps,segment length=1pt}]}
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
\end{HavannahBoard}
```

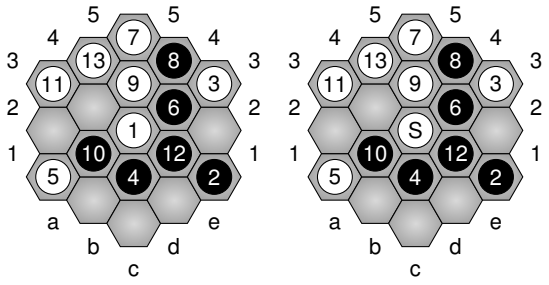


`HGame` The `\HGame` macro can only be used inside a `HavannahBoard` or `HexBoard` environment. It accepts the following keys:

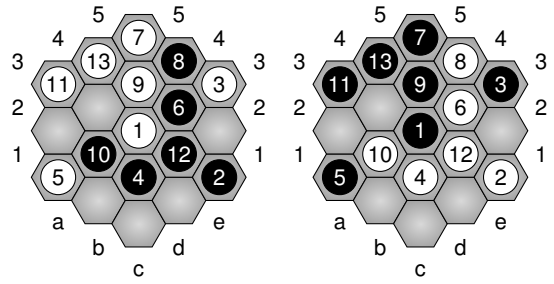
- `first move label`: a text, default: `1`,
- `first player`: either `white` or `black`, default: `white` inside `HavannahBoard` and `black` inside `HexBoard`.
- `numbered moves`: a Boolean, default: `true`,
- `relative stone size`: a number, default: `0.75`.

Their effects are shown below.

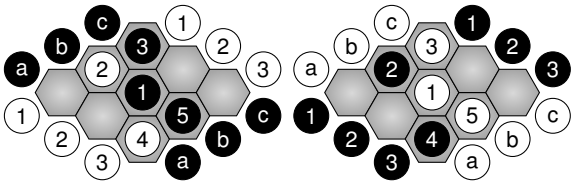
```
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
  \HGame{c3,e1,e3,c2,a1,d3,c5,d4,c4,b2,a3,d2,b4}
\end{HavannahBoard}
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
  \HGame[first move label=S]{
    c3,e1,e3,c2,a1,d3,c5,d4,c4,b2,a3,d2,b4}
\end{HavannahBoard}
```



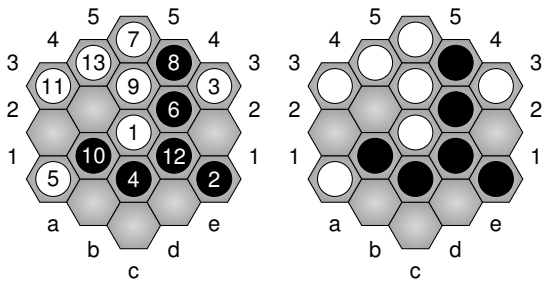
```
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
  \HGame{c3,e1,e3,c2,a1,d3,c5,d4,c4,b2,a3,d2,b4}
\end{HavannahBoard}
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
  \HGame[first player=black]{
    c3,e1,e3,c2,a1,d3,c5,d4,c4,b2,a3,d2,b4}
\end{HavannahBoard}
```



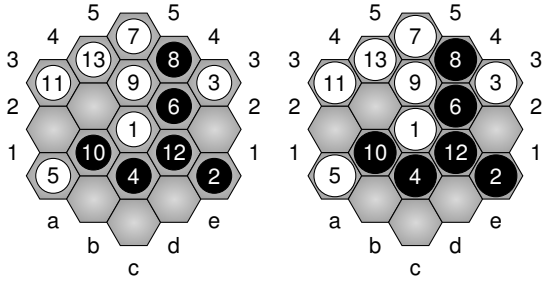
```
\begin{HexBoard}[board size=3]
  \HGame{b2,b1,c1,a3,b3}
\end{HexBoard}

\begin{HexBoard}[board size=3,top left color=white]
  \HGame[first player=white]{
    b2,b1,c1,a3,b3}
\end{HexBoard}
```



```
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
  \HGame{c3,e1,e3,c2,a1,d3,c5,d4,c4,b2,a3,d2,b4}
\end{HavannahBoard}
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
  \HGame[numbered moves=false]{
    c3,e1,e3,c2,a1,d3,c5,d4,c4,b2,a3,d2,b4}
\end{HavannahBoard}
```



```
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
  \HGame{c3,e1,e3,c2,a1,d3,c5,d4,c4,b2,a3,d2,b4}
\end{HavannahBoard}
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
  \HGame[relative stone size=0.9]{
    c3,e1,e3,c2,a1,d3,c5,d4,c4,b2,a3,d2,b4}
\end{HavannahBoard}
```

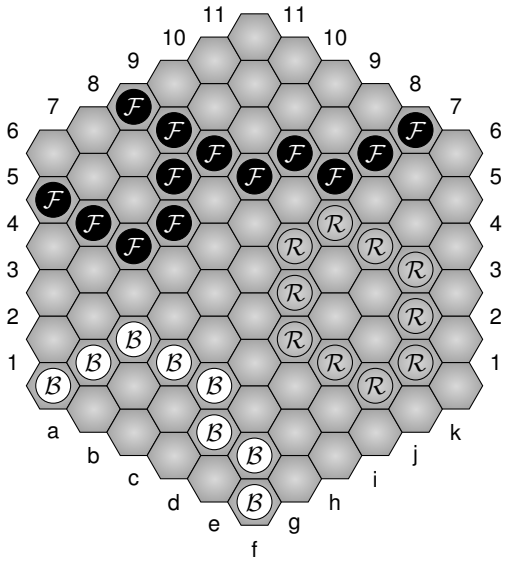


`HStoneGroup` The `\HStoneGroup` macro can only be used inside a `HavannahBoard` or `HexBoard` environment. It puts a group of stones of the same color on the board. It accepts the following keys:

- `color`: `white`, `black`, or `transparent`, there is no default – the value must be specified,
- `label`: a text, default: empty string,
- `relative stone size`: a number, default: `0.75`.

The effects of `color` and `label` are shown below. The effect of `relative stone size` is the same as for `\HGame` and will not be shown.

```
\begin{HavannahBoard}[board size=6,coordinate style=little golem]
  \HStoneGroup[color=black,label=$\mathcal F$]{
    a5,b5,c5,d6,d7,d8,c8,e8,f8,g8,h7,i7,j7}
  \HStoneGroup[color=white,label=$\mathcal B$]{
    a1,b2,c3,d3,e3,e2,f2,f1}
  \HStoneGroup[color=transparent,label=$\mathcal R$]{
    h6,g6,g5,g4,h3,i2,j2,j3,j4,i5}
\end{HavannahBoard}
```



`HMoveNumberStyle`
`HWhiteStone`
`HBlackStone`
`HTransparentStone`
`HBeforeOddMove`
`HBeforeEvenMove`
`HBeforeStone`

There are five hooks that can be redefined via `\renewcommand` to change the appearance of `\HGame` and `\HStoneGroup`. They are:

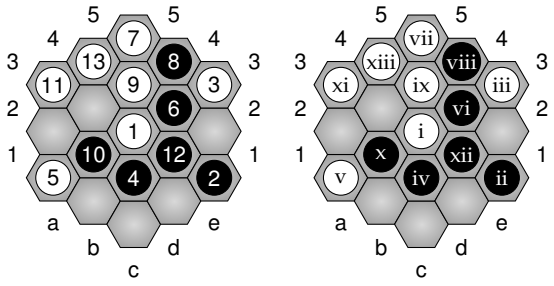
- `\HMoveNumberStyle`: a one-argument macro, influences `\HGame`, default: `{\sffamily#1}`,
- `\HWhiteStone`: a `tikz` command, influences `\HGame` and `\HStoneGroup`, default:
  `{\node[circle,draw,inner sep=0.6pt,fill=white,`
  `minimum size=\HStoneDiameter]}`,
- `\HBlackStone`: a `tikz` command, influences `\HGame` and `\HStoneGroup`, default:
  `{\node[circle,draw,inner sep=0.6pt,fill=black,text=white`
  `minimum size=\HStoneDiameter]}`,
- `\HTransparentStone`: a `tikz` command, influences `\HStoneGroup`, default:
  `{\node[circle,draw,inner sep=0.6pt,`

```
minimum size=\HStoneDiameter]},
```

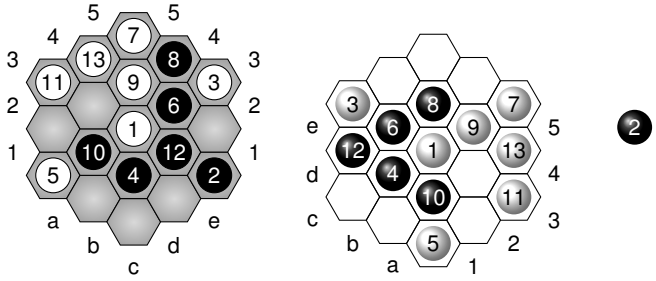
- `\HBeforeOddMove`, `\BeforeEvenMove`: macros expanded before placing stones, for example `\pause` when animating games in `beamer`, influence `\HGame`, default: `{}`,
- `\HBeforeStone`: a macro expanded before placing stones, influences `\HStoneGroup`, default: `{}`.

Sample effects of redefining some of them are shown below.

```
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
  \HGame{c3,e1,e3,c2,a1,d3,c5,d4,c4,b2,a3,d2,b4}
\end{HavannahBoard}
\renewcommand\HMoveNumberStyle[1]{\footnotesize\romannumeral#1}
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
  \HGame{c3,e1,e3,c2,a1,d3,c5,d4,c4,b2,a3,d2,b4}
\end{HavannahBoard}
```



```
\begin{HavannahBoard}[board size=3,coordinate style=little golem]
  \HGame{c3,e1,e3,c2,a1,d3,c5,d4,c4,b2,a3,d2,b4}
\end{HavannahBoard}
\renewcommand\HDrawHex{\draw}
\renewcommand\HWhiteStone{\node[
  circle,shading=ball,ball color=white,inner sep=0.6pt,
  minimum size=\HStoneDiameter]}
\renewcommand\HBlackStone{\node[
  circle,shading=ball,ball color=black,inner sep=0.6pt,text=white,
  minimum size=\HStoneDiameter]}
\begin{HavannahBoard}[board size=3]
  \HGame{c3,e1,e3,c2,a1,d3,c5,d4,c4,b2,a3,d2,b4}
\end{HavannahBoard}
```

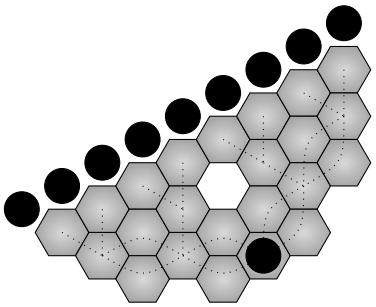


`HHexGroup` The `\HHexGroup` macro can only be used inside a `HavannahBoard` or `HexBoard` environment. It puts a group of hexes on the board, which presumably is typeset with `show hexes=false`. It is recommended to use it inside the `HexBoard` environment due to the simplicity of its coordinate system. It accepts the following keys:

- `label`: a text, default: empty string,

An example of its use is shown below.

```
\begin{HexBoard}[
    board size=9,show coordinates=false,show hexes=false]
  \HHexGroup
    {a1,b1,c1,d1,e1,f1,g1,h1,a2,b2,c2,e2,f2,g2,a3,b3,c3,d3,e3,f3,b4,c4,d4}
  \draw [dotted] (a1)--(a2); \draw [dotted] (b1)--(a2);
  \draw [dotted] (c1)--(c2); \draw [dotted] (d1)--(c2);
  \draw [dotted] (e1)--(e2); \draw [dotted] (f1)--(e2);
  \draw [dotted] (g1)--(g2); \draw [dotted] (h1)--(g2);
  \draw [dotted] (c2)--(b3); \draw [dotted] (e2)--(e3);
  \draw [dotted] (a2)..controls(a3)..(b3);
  \draw [dotted] (a2)..controls(b2)..(b3);
  \draw [dotted] (g2)..controls(f3)..(e3);
  \draw [dotted] (g2)..controls(f2)..(e3);
  \draw [dotted] (b3)..controls(b4)..(c4);
  \draw [dotted] (b3)..controls(c3)..(c4);
  \draw [dotted] (e3)..controls(d4)..(c4);
  \draw [dotted] (e3)..controls(d3)..(c4);
  \HStoneGroup[color=black]{a,b,c,d,e,f,g,h,i,c4}
\end{HexBoard}
```



2 Implementation

```
⟨*package⟩
\NeedsTeXFormat{LaTeX2e}
\ProvidesPackage{havannah}[2010/06/06 LaTeX havannah package]
\RequirePackage{tikz}
```

The naming schema used in the havannah package is \HFooBar for redefinable hooks, and \h@foo@bar for internal macros.

Start with defining default expansions for the hooks.

```
\newcommand\HLetterCoordinates{%
  a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w,x,y,z}
\newcommand\HCoordinateStyle[1]{\sffamily#1}
\newcommand\HMoveNumberStyle[1]{\sffamily#1}
\newcommand\HDrawHex{\shadedraw[
  shading=radial,inner color=gray!30,outer color=gray!70]}
```

```
\newcommand\HWhiteStone{\node[
  circle,draw=black,inner sep=0.6pt,fill=white,
  minimum size=\HStoneDiameter]}
\newcommand\HBlackStone{\node[
  circle,draw=black,inner sep=0.6pt,fill=black,text=white,
  minimum size=\HStoneDiameter]}
\newcommand\HTransparentStone{\node[
  circle,draw=black,inner sep=0.6pt,
  minimum size=\HStoneDiameter]}
\newcommand\HBeforeOddMove{}
\newcommand\HBeforeEvenMove{}
\newcommand\HBeforeStone{}
```

The `\h@draw@hex` macro draws a hexagonal cell. The cell is `3\h@one@third@hex@wd` wide and `2\h@half@hex@ht` high. It has two horizontal and four slanted edges. The `\h@draw@hex` macro takes one argument: the coordinates of the center of the cell. It uses the `\HDrawHex` hook to style the cell.

```
\newcommand{\h@draw@hex}[1]{%
  \HDrawHex (#1)
    ++(-2\h@one@third@hex@wd,0)--
    ++(\h@one@third@hex@wd,-\h@half@hex@ht)--
    ++(2\h@one@third@hex@wd,0)--
    ++(\h@one@third@hex@wd,\h@half@hex@ht)--
    ++(-\h@one@third@hex@wd,\h@half@hex@ht)--
    ++(-2\h@one@third@hex@wd,0)--
    cycle;
}
```

Define pgfkeys paths.

```
\newif\ifh@numbered@moves
\newif\ifh@show@coordinates
\newif\ifh@show@hexes
\pgfkeys{%
  /h@havannah@board/.cd,
  board size/.store in=\hv@board@size,
  coordinate style/.is choice,
  coordinate style/classical/.code={%
    \def\h@draw@board{\h@draw@classical@board}},
  coordinate style/little golem/.code={%
    \def\h@draw@board{\h@draw@little@golem@board}},
  hex height/.store in=\h@hex@height,
  prefix/.store in=\h@prefix,
  show coordinates/.is if=h@show@coordinates,
  show hexes/.is if=h@show@hexes,
  x/.store in=\h@xx,
  y/.store in=\h@yy,
  board size=10,
  coordinate style=classical,
  hex height=17.5pt,
  prefix=,
  show coordinates=true,
```

```
  show hexes=true,
  x=0,
  y=0,
%
  /h@hex@board/.cd,
  top left color/.is choice,
  top left color/white/.code={%
    \def\h@top@left@color{\HWhiteStone}%
    \def\h@bottom@left@color{\HBlackStone}%
  },
  top left color/black/.code={%
    \def\h@top@left@color{\HBlackStone}%
    \def\h@bottom@left@color{\HWhiteStone}%
  },
  board size/.store in=\hx@board@size,
  hex height/.store in=\h@hex@height,
  prefix/.store in=\h@prefix,
  relative stone size/.store in=\h@relative@stone@size,
  show coordinates/.is if=h@show@coordinates,
  show hexes/.is if=h@show@hexes,
  x/.store in=\h@xx,
  y/.store in=\h@yy,
  top left color=black,
  board size=11,
  hex height=17.5pt,
  relative stone size=0.75,
  show coordinates=true,
  show hexes=true,
%
  /h@game/.cd,
  first move label/.store in=\h@first@move@label,
  first player/.is choice,
  first player/white/.code={%
    \def\h@odd@player{\HWhiteStone}%
    \def\h@even@player{\HBlackStone}%
  },
  first player/black/.code={%
    \def\h@odd@player{\HBlackStone}%
    \def\h@even@player{\HWhiteStone}%
  },
  numbered moves/.is if=h@numbered@moves,
  relative stone size/.store in=\h@relative@stone@size,
  first move label=1,
  numbered moves=true,
  relative stone size=0.75,
%
  /h@stone@group/.cd,
  color/.is choice,
  color/white/.code={\def\h@player{\HWhiteStone}},
  color/black/.code={\def\h@player{\HBlackStone}},
```

```
  color/transparent/.code={\def\h@player{\HTransparentStone}},
  label/.store in=\h@label,
  relative stone size/.store in=\h@relative@stone@size,
  relative stone size=0.75,
%
  /h@hex@group/.cd,
  label/.store in=\h@label,
}
```

The InnerHavannahBoard environment first sets the values of \hv@board@size, \h@draw@board, \h@hex@height, and \h@show@coordinatestrue or \h@show@coordinatesfalse. Then it computes \h@half@hex@ht, \h@one@third@hex@wd, and \h@board@diagonal, and executes \h@draw@board.

```
\newcount\h@board@diagonal
\newdimen\h@half@hex@ht
\newdimen\h@one@third@hex@wd
\newenvironment{InnerHavannahBoard}[1][]{%
  \def\h@odd@player{\HWhiteStone}%
  \def\h@even@player{\HBlackStone}%
  \pgfqkeys{/h@havannah@board}{#1}%
  \setlength\h@half@hex@ht{\h@hex@height}%
  \divide\h@half@hex@ht by 2
  \setlength\h@one@third@hex@wd{0.577350269\h@half@hex@ht}%
  \h@board@diagonal=\hv@board@size
  \multiply\h@board@diagonal by 2
  \advance\h@board@diagonal by -1
  \h@draw@board
}
```

There is nothing to be done at the end of InnerHavannahBoard.

```
{}
```

The HavannahBoard environment just wraps InnerHavannahBoard inside a tikzpicture.

```
\newenvironment{HavannahBoard}[1][]{%
  \begin{tikzpicture}
  \begin{InnerHavannahBoard}[#1,prefix=,x=0,y=0]
}
```

Finally, HavannahBoard closes the InnerHavannahBoard and tikzpicture environments.

```
{ \end{InnerHavannahBoard}
  \end{tikzpicture}
}
```

The \h@draw@classical@board and \h@draw@little@golem@board macros differ enough that a common routine would be of little help. They both draw a rhombus of hexes with two corners cut. The edges of adjacent hexes are drawn twice.

The following counters are shared by both macros.

```
\newcount\h@l
\newcount\h@a@corner
```

```
\newcount\h@b@corner
```

The `\h@draw@classical@board` macro is a bit simpler than the other one.

```
\newcommand\h@draw@classical@board{%
  \h@l=0
  \h@b@corner=\hv@board@size
  \foreach \h@letter in \HLetterCoordinates {%
    \global\advance\h@l by 1
    \ifnum \h@l > \h@board@diagonal
      \breakforeach
    \else
      \global\advance\h@b@corner by 1
      \h@a@corner=\hv@board@size
      \foreach \h@n in {1,...,\h@board@diagonal} {%
        \global\advance\h@a@corner by 1
        \ifnum \h@l < \h@a@corner
        \ifnum \h@n < \h@b@corner
          \coordinate (\h@prefix\h@letter\h@n) at
            (\h@xx+3*\h@n\h@one@third@hex@wd-3*\h@l\h@one@third@hex@wd,
             \h@yy+\h@n\h@half@hex@ht+\h@l\h@half@hex@ht);
          \ifh@show@hexes
            \h@draw@hex{\h@prefix\h@letter\h@n}%
          \fi
        \fi
        \fi
      }%
      \ifh@show@coordinates
        \ifnum \h@l < \hv@board@size\relax
          \node at
            (\h@xx-3*\h@l\h@one@third@hex@wd,\h@yy+\h@l\h@half@hex@ht)
            {\HCoordinateStyle{\h@letter}};
        \else
          \node at
            (\h@xx-3*\hv@board@size\h@one@third@hex@wd,
             \h@yy+2*\h@l\h@half@hex@ht-\hv@board@size\h@half@hex@ht)
            {\HCoordinateStyle{\h@letter}};
        \fi
      \fi
    \fi
  }%
  \ifh@show@coordinates
    \foreach \h@n in {1,...,\h@board@diagonal} {%
      \ifnum \h@n < \hv@board@size
        \node at
          (\h@xx+3*\h@n\h@one@third@hex@wd,\h@yy+\h@n\h@half@hex@ht)
          {\HCoordinateStyle{\h@n}};
      \else
        \node at
          (\h@xx+3*\hv@board@size\h@one@third@hex@wd,
           \h@yy+2*\h@n\h@half@hex@ht-\hv@board@size\h@half@hex@ht)
```

```
          {\HCoordinateStyle{\h@n}};
      \fi
    }%
  \fi
}
```

The `\h@draw@little@golem@board` macro is more complicated since the numbered rows in Little Golem change direction in the middle.

```
\newcommand\h@draw@little@golem@board{%
  \h@a@corner=\hv@board@size
  \h@b@corner=\hv@board@size
  \multiply\h@b@corner by 3
  \h@l=0
  \foreach \h@letter in \HLetterCoordinates {%
    \global\advance\h@l by 1
    \ifnum \h@l > \h@board@diagonal
      \breakforeach
    \else
      \global\advance\h@a@corner by 1
      \global\advance\h@b@corner by -1
      \foreach \h@n in {1,...,\h@board@diagonal} {%
        \ifnum \h@n < \h@a@corner
        \ifnum \h@n < \h@b@corner
          \ifnum \h@l < \hv@board@size
            \coordinate (\h@prefix\h@letter\h@n) at
              (\h@xx+3*\h@l\h@one@third@hex@wd,
               \h@yy+2*\hv@board@size\h@half@hex@ht+
               2*\h@n\h@half@hex@ht-\h@l\h@half@hex@ht);
            \ifh@show@hexes
              \h@draw@hex{\h@prefix\h@letter\h@n}%
            \fi
          \else
            \coordinate (\h@prefix\h@letter\h@n) at
              (\h@xx+3*\h@l\h@one@third@hex@wd,
               \h@yy+2*\h@n\h@half@hex@ht+\h@l\h@half@hex@ht);
            \ifh@show@hexes
              \h@draw@hex{\h@prefix\h@letter\h@n}%
            \fi
          \fi
        \fi
        \fi
      }
      \ifh@show@coordinates
        \ifnum \h@l < \hv@board@size
          \node at
            (\h@xx+3*\h@l\h@one@third@hex@wd,
             \h@yy+2*\hv@board@size\h@half@hex@ht-\h@l\h@half@hex@ht)
            {\HCoordinateStyle{\h@letter}};
        \else
          \node at
```

```
            (\h@xx+3*\h@l\h@one@third@hex@wd,\h@yy+\h@l\h@half@hex@ht)
            {\HCoordinateStyle{\h@letter}};
        \fi
      \fi
    \fi
  }%
  \ifh@show@coordinates
    \foreach \h@n in {1,...,\h@board@diagonal} {%
      \ifnum \h@n < \hv@board@size
        \node at
          (\h@xx,
           \h@yy+2*\h@n\h@half@hex@ht+
           \h@board@diagonal\h@half@hex@ht+\h@half@hex@ht)
           {\HCoordinateStyle{\h@n}};
        \node at
          (\h@xx+3*\h@board@diagonal\h@one@third@hex@wd+
           3*\h@one@third@hex@wd,
           \h@yy+2*\h@n\h@half@hex@ht+
           \h@board@diagonal\h@half@hex@ht+\h@half@hex@ht)
           {\HCoordinateStyle{\h@n}};
      \else
        \node at
          (\h@xx+3*\h@n\h@one@third@hex@wd-
           3*\hv@board@size\h@one@third@hex@wd,
           \h@yy+\h@n\h@half@hex@ht+3*\hv@board@size\h@half@hex@ht)
           {\HCoordinateStyle{\h@n}};
        \node at
          (\h@xx-3*\h@n\h@one@third@hex@wd+
           9*\hv@board@size\h@one@third@hex@wd,
           \h@yy+\h@n\h@half@hex@ht+3*\hv@board@size\h@half@hex@ht)
           {\HCoordinateStyle{\h@n}};
      \fi
    }%
  \fi
}
```

The InnerHexBoard environment is similar to InnerHavannahBoard but simpler, as it typesets an entire cross-product of coordinates, without cutting the corners.

```
\newenvironment{InnerHexBoard}[1][]{%
  \def\h@odd@player{\HBlackStone}%
  \def\h@even@player{\HWhiteStone}%
  \pgfqkeys{/h@hex@board}{#1}%
  \tracingcommands=1
  \setlength\h@half@hex@ht{\h@hex@height}%
  \divide\h@half@hex@ht by 2
  \setlength\h@one@third@hex@wd{0.577350269\h@half@hex@ht}%
  \HStoneDiameter=\h@relative@stone@size\h@half@hex@ht
  \multiply\HStoneDiameter by 2
  \h@l=0
```

```
\foreach \h@letter in \HLetterCoordinates {%
  \global\advance\h@l by 1
  \ifnum \h@l > \hx@board@size
    \breakforeach
  \else
    \foreach \h@n in {1,...,\hx@board@size} {%
      \coordinate (\h@letter\h@n) at
        (3*\h@l\h@one@third@hex@wd+3*\h@n\h@one@third@hex@wd,
         \h@l\h@half@hex@ht-\h@n\h@half@hex@ht);
      \ifh@show@hexes
        \h@draw@hex{\h@letter\h@n}%
      \fi
    }%
    \coordinate (\h@letter) at
      (3*\h@l\h@one@third@hex@wd,
       2\h@half@hex@ht-2\h@half@hex@ht+\h@l\h@half@hex@ht);
    \coordinate (-\h@letter) at
      (3*\hx@board@size\h@one@third@hex@wd+
       3\h@one@third@hex@wd+3*\h@l\h@one@third@hex@wd,
       -\hx@board@size\h@half@hex@ht-
       \h@half@hex@ht+\h@l\h@half@hex@ht);
    \ifh@show@coordinates
      \h@top@left@color at (\h@letter)
        {\HCoordinateStyle{\h@letter}};
      \h@top@left@color at (-\h@letter)
        {\HCoordinateStyle{\h@letter}};
    \fi
  \fi
}%
\ifh@show@coordinates
  \foreach \h@n in {1,...,\hx@board@size} {%
    \coordinate (\h@n) at
      (3*\h@n\h@one@third@hex@wd,-1*\h@n\h@half@hex@ht);
    \coordinate (-\h@n) at
      (3*\hx@board@size\h@one@third@hex@wd+3\h@one@third@hex@wd+
       3*\h@n\h@one@third@hex@wd,
       \hx@board@size\h@half@hex@ht+\h@half@hex@ht-\h@n\h@half@hex@ht);
    \h@bottom@left@color at (\h@n)
      {\HCoordinateStyle{\h@n}};
    \h@bottom@left@color at (-\h@n)
      {\HCoordinateStyle{\h@n}};
  }%
\fi
}
{}
```

The HexBoard environment just wraps InnerHexBoard inside a tikzpicture.

```
\newenvironment{HexBoard}[1][]{%
  \begin{tikzpicture}
  \begin{InnerHexBoard}[#1,prefix=,x=0,y=0]
```

```
}
```

Finally, `HexBoard` closes the `InnerHexBoard` and `tikzpicture` environments.

```
{ \end{InnerHexBoard}
  \end{tikzpicture}
}
```

The \HGame macro

```
\newcount\h@move@number
\newdimen\HStoneDiameter
\newcommand\HGame[2][]{%
  \pgfqkeys{/h@game}{#1}%
  \HStoneDiameter=\h@relative@stone@size\h@half@hex@ht
  \multiply\HStoneDiameter by 2
  \h@move@number=0
  \ifh@numbered@moves
    \def\h@label{\HMoveNumberStyle{\h@first@move@label}%
      \global\def\h@label{\HMoveNumberStyle{\the\h@move@number}}}
  \else
    \def\h@label{}
  \fi
  \foreach \h@coord in {#2} {%
    \global\advance\h@move@number by 1
    \ifodd\h@move@number
      \HBeforeOddMove
      \h@odd@player at (\h@coord) {\h@label};
    \else
      \HBeforeEvenMove
      \h@even@player at (\h@coord) {\h@label};
    \fi
  }
}
```

The \HStoneGroup

```
\newcommand\HStoneGroup[2][]{%
  \let\h@player\empty
  \let\h@label\empty
  \pgfqkeys{/h@stone@group}{#1}%
  \ifx\h@player\empty
    \errmessage{No color specified for HStoneGroup}
  \fi
  \HStoneDiameter=\h@relative@stone@size\h@half@hex@ht
  \multiply\HStoneDiameter by 2
  \foreach \h@coord in {#2} {%
    \HBeforeStone
    \h@player at (\h@coord) {\h@label};
  }%
}
```

The \HHexGroup

```
\newcommand\HHexGroup[2][]{%
  \let\h@label\empty
```

```
  \pgfqkeys{/h@hex@group}{#1}%
  \foreach \h@coord in {#2} {%
    \node at (\h@coord) {\h@label};
    \h@draw@hex{\h@coord}%
  }%
}
```

That's all, folks.

```
⟨/package⟩
```