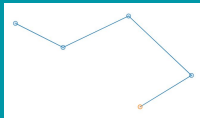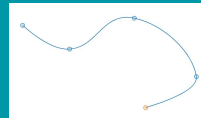# Overview

In mathematics, a spline is a line built from control points.
There are various ways to do this, for instance (points are identical in both cases):

Using straight lines:

Using curved lines:

- In Yag, you create and modify the control points, and Yag computes the complete line.

- Yag can then place pawns regularly along the computed line.

- IMPORTANT, watch out not to confuse:

  - Control points, which define the line.

  - Placement points, which set the pawns locations.

  - In particular, what determines the computing time of a spline is not the number of control points, but the number of pawns (placement points).
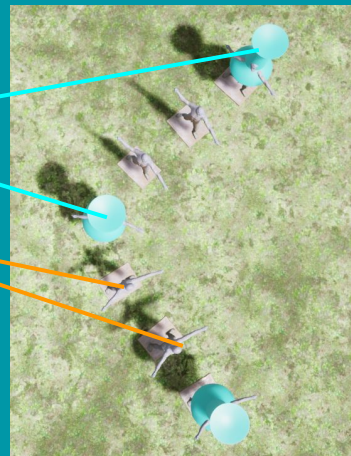
Splines in Yag

- In Yag, control points are visualized using blue pins

- And the spline is materialized when it is assigned a model.

- There are 2 types of splines in Yag:

"Point" type splines:
- Pawns are not distorted.

- Those splines are fast to compute.
- Useful for decoration (statues, foliage…)

"Line" type splines:
- Pawns are distorted to follow the line.

- Those splines are slow to compute.
- Useful for continuous objects (roads, rivers…)

The splines window

The splines management window is available in the <mark>main menu</mark>.

Tools
- Display selectors (more on that later)
- Control points (blue pins) size

Options
- Straight/curved lines
- Space between pawns
- Enable collisions
- Pawns offset
- Pawns scale
- Pawns rotation

Creation
- Choose the type
- Assign the pawn model
- Apply corrections
- Manage control points

Spline properties

TOOLS

1.00

BUILD

Type	Model	Tuning	Points

Type: ☑, ☐
Model: 🖼, 👁, 🗑
Tuning: 🔧 ☐, 90° ☑, 180° ☐
Points: ✏ ☐, − ☐, ✚ ☐, 🗑 ☐

CHANGE

☑, ☐

0.00, ☐

XYZ 0.00 0.00 0.00 ☑

1.00 1.00 1.00 = ☑

0.00 0.00 0.00

Creating a (empty) spline

We only create here the object used to select and manipulate the spline (the selector)
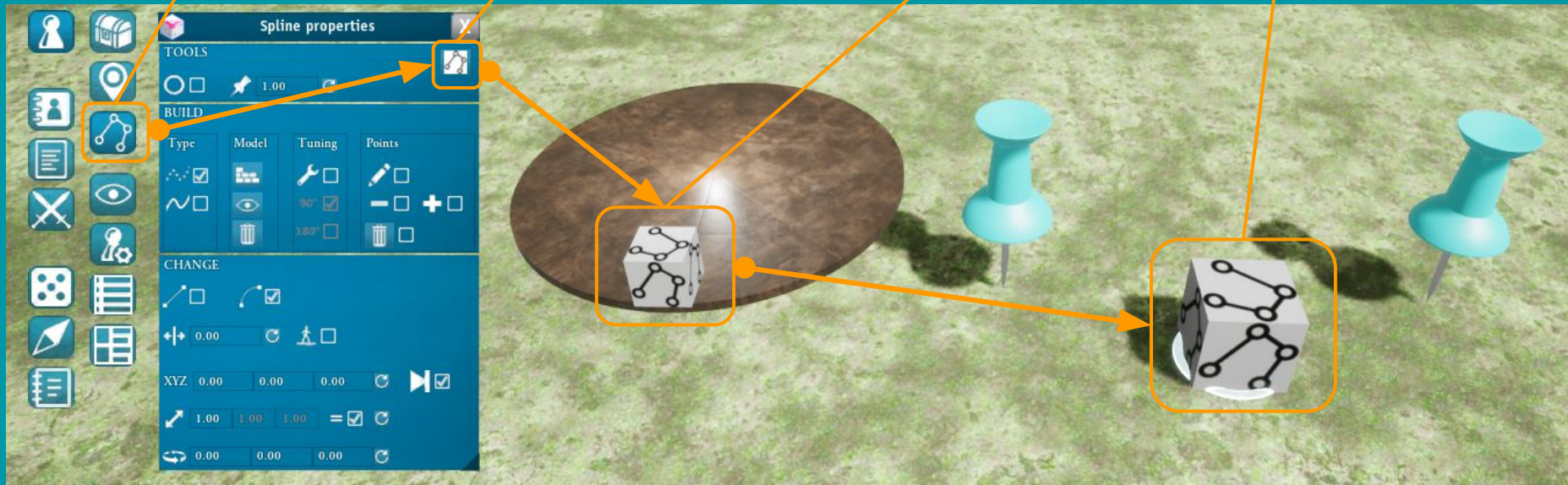It is created and used like a standard pawn
By default the spline is created with 2 control points and no model is assigned.

Open the spline window

Show the spline tray

Select the selector on the tray

Ctrl-C / Ctrl-V (copy-paste)

Assign a model

To visualize a spline we need to assign a pawn model to it.

- Only non animated (no humans and no creatures) and simple (no composite objects) objects will work.
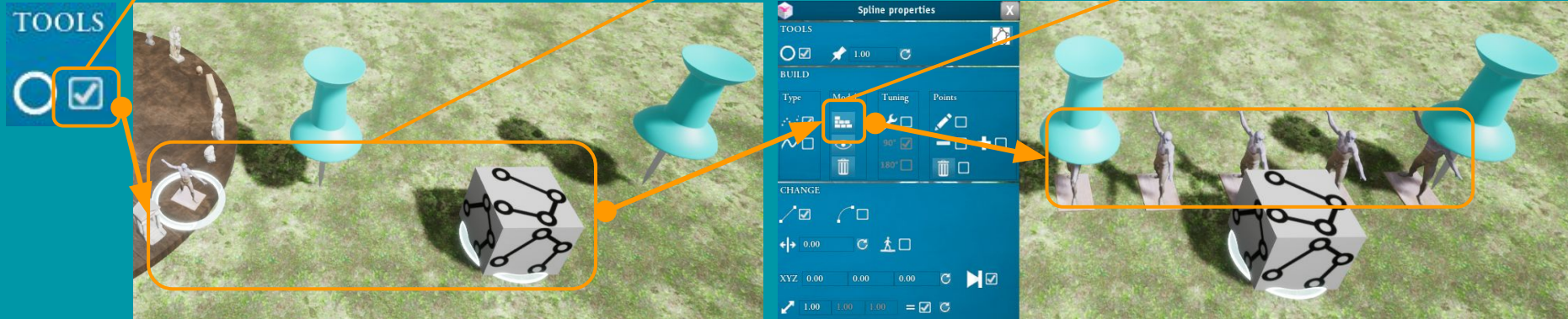- Yag displays a warning if the chosen object might not work properly.

Show selectors
- more on that later

Select simultaneously both the selector and the model
- The model can be on a tray or in game
- Use "Ctrl" key for multiple selection

**Click** the assign button
- "Model" tab
- Brick wall icon

Select and manipulate a spline: selectors

A spline is selected when its selector is.
But when the spline is done we don't need the selector any longer.
Hence we need a mechanism to show/hide selectors.

- This mechanism is the first option in the spline windows
    - Enable it when you need to work with splines to show all the existing selectors.
    - Disable it when you're finished with splines to hide all the existing selectors

- When selectors are visible, we can hover them with the mouse to identify the corresponding spline.

- When a spline is selected, its control points become visible.
    - The control points size can be modified.

- Each spline is a full object: it is not possible to select or manipulate each pawn separately.
    - The complete spline can be manipulated (displacements and rotations) with its selector.
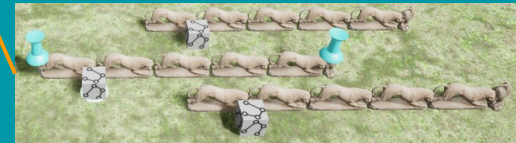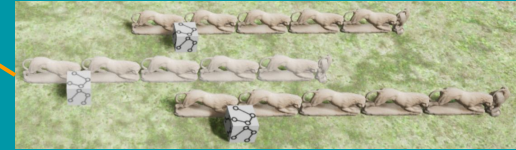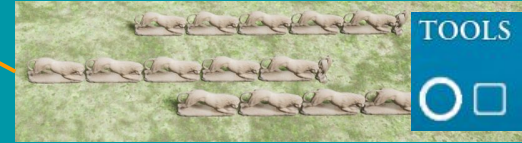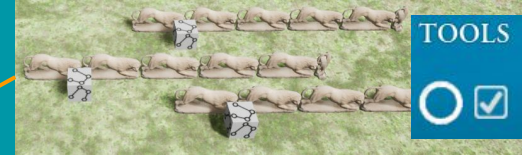
Modify the control points

It is possible to add/remove/move control points.

- A point is moved with a drag and drop:
    - Click on a point (held click): the point follows the mouse
    - We can then move it in space
    - Release the click to draw the modified spline.

- Multiple points can be added by enabling editing.
    - As long as the option is checked we can add points by clicking.
    - Disable the option to draw the modified spline

- Points can be added/removed one by one inside the spline with "+" and "-" options:
    - When an option is checked, click on a point to perform the corresponding action.

- All points can be removed with the bin button.
    - It resets the spline with its 2 default points
    - Warning: all points from the spline will be permanently removed.
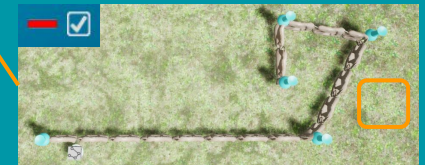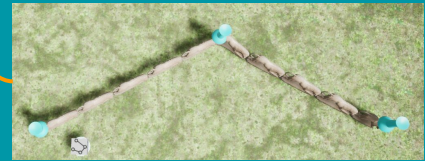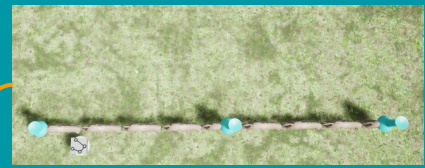
Model tuning 1/3 : generalities

Models are delivered by the authors of the 3D content bought for Yag.
- There is no standard for the model orientation and 4 cases are possible
- We will then need to manually tune the options depending on the chosen model.

Orientation of the length:
- Some models are oriented following their length, some others following their width.
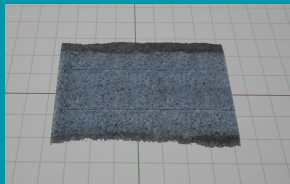
Length along X:

Length along Y:

Orientation of the alignment axis
- Sometimes the alignment axis is the length, sometimes it's the width.

Alignment along the length:

Alignment along the width:
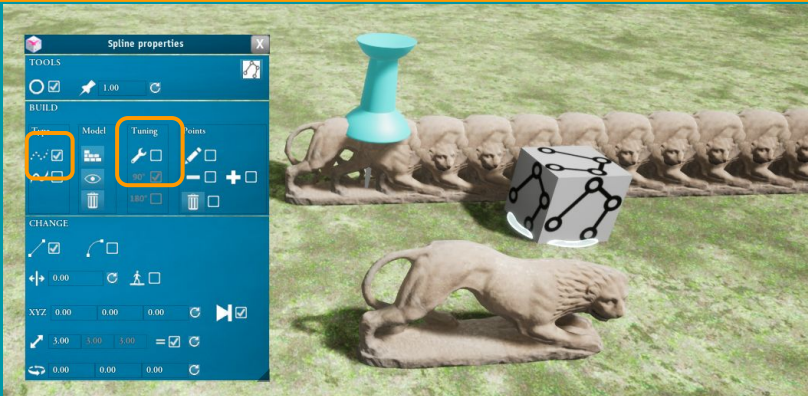
Model tuning 2/3 : "point" type splines

For point splines, only the "Wrench" option can be needed (others are grayed):

- It sets whether the distance between placement points should be the length or the width of the model.
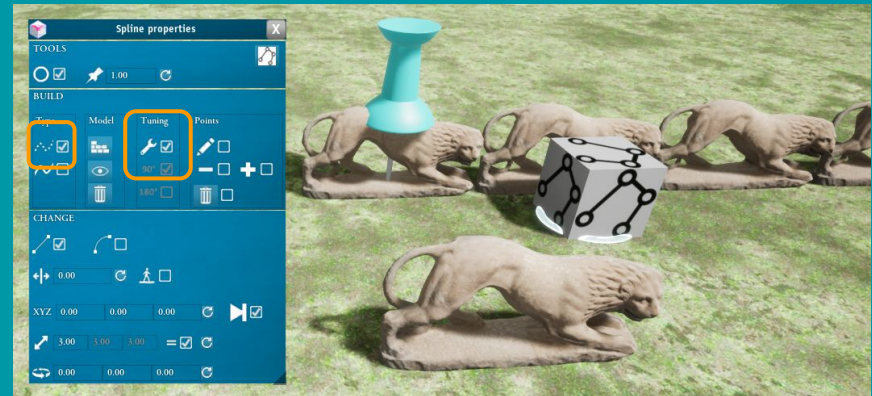
A poorly tuned spline:
- The model is aligned along its length
- Distance is taken along its width
- => there is some overlapping

A well tuned spline:
- The model is aligned along its length
- Distance is taken along its length
- => no overlapping

Model tuning 3/3 : "line" type splines

- The "Wrench" option sets the distance between placement points as previously.
  - Difference: on a "line" spline, pawns never overlap, they are distorted to follow and continuously align themselves along the curve.
- The "90°" option manages the model orientation.
  - It keeps the tuning (good or bad) of the "Wrench".
- **IN PRACTICE:**
  - If the object is wrongly distorted (stretched/shrunk), enable/disable the wrench
  - Then, choose the orientation with the "90°", and it will remain correct

Incorrect tunings
- Shrinking/stretching
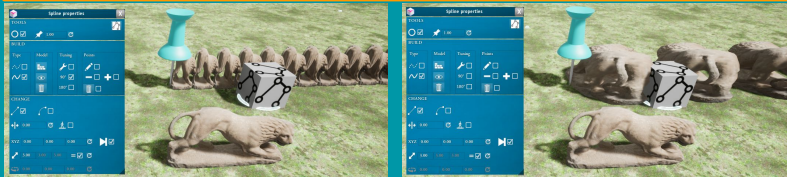
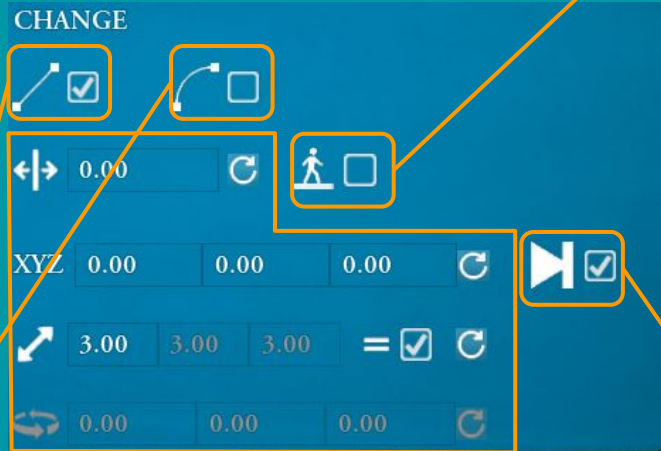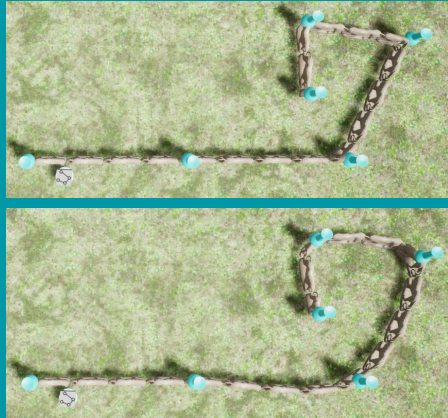Correct tunings
- Good proportions

- The "180°" option rotates models by 180 degrees.
  - It has the same effect as following the control points in a reverse order.
  - It can be necessary when combining splines with opposite orientations.

Options

The last part of the window contains options to modify the way the splines are rendered.

- Some options can be grayed depending on the type of the spline

- Checked: the objects of the spline behave like a floor: pawns and cursor can walk on them.
  - useful for roads and bridges
- Unchecked: the objects of the spline are invisible to pawns and cursor.
  - Useful for decorations and barriers.

- Work around an Unreal Engine bug.
- The last pawn of the spline can be very wrongly distorted
- Disable the option to forget it.

CHANGE

0.00

XYZ   0.00   0.00   0.00

3.00   3.00   3.00   =

0.00   0.00   0.00

- Space, offset, size and rotation of pawns
- Test and read the tooltips for details

Combine splines

Multiple splines can be combined.
- They then follow the same set of control points.

To combine multiple independent splines:

- Select simultaneously all target splines
  - Reminder: Ctrl-click for multiple selection
  - => Points of all splines are shown

- Move one point from a chosen spline
  - => All selected spline align on the master spline.

- It is then possible to offset the points of a spline aside to make them a decoration.