Blender Molecular Visualization Tutorial SS2013 I

Based on Christian Groves Blender Tutorial VizBi 2012,
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Actual Version of Blender:
http://www.blender.org

What is Blender?

Wikipedia

Blender was developed as an in-house application by the Dutch animation studio Neo Geo and *Not a Number Technologies (NaN)*. It was primarily authored by *Ton Roosendaal*, who had previously written a ray tracer called Traces for Amiga in 1989. The name "Blender" was inspired by a song by Yello, from the album Baby.

Roosendaal founded *NaN* in June 1998 to further develop and distribute the program. The program was initially distributed as shareware until NaN went bankrupt in 2002.

The creditors agreed to release Blender under the terms of the *GNU General Public License*, for a one-time payment of €100,000 (US$100,670 at the time). On July 18, 2002, a Blender funding campaign was started by Roosendaal in order to collect donations and on September 7, 2002 it was announced that enough funds had been collected and that the Blender source code would be released. Today, Blender is free, open-source software and is, apart from the two half-time employees and the two full-time employees of the Blender Institute, developed by the community.

The *Blender Foundation* initially reserved the right to use dual licensing, so that, in addition to GNU GPL, Blender would have been available also under the "Blender License", which did not require disclosing source code but required payments to the Blender Foundation. However, this option was never exercised and was suspended indefinitely in 2005.[5] Currently, Blender is solely available under GNU GPL

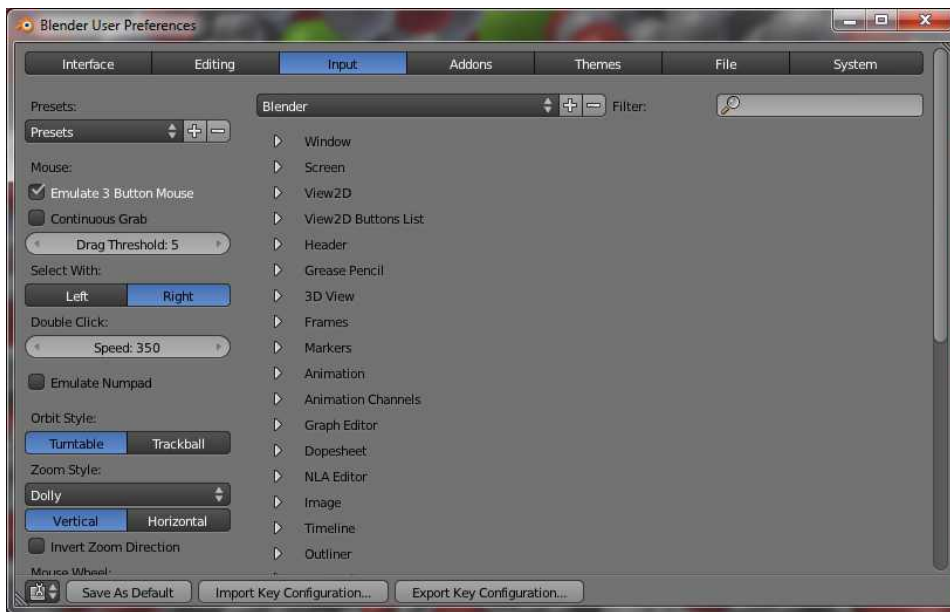## Preparations

Menu → File → User Preferences

→ Addons:

activate:
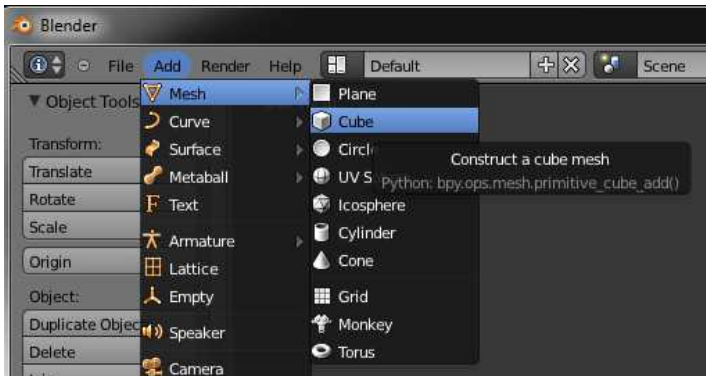Import-Export: Import Images as Planes

→ Input

activate "Emulate 3 Button Mouse" for using Blender with a Mobile PC

Press: "Save As Default/Save User Settings" to make sure, next time you start Blender, you do not have to redo these settings again

Object Mode

First, create a Cube:

Left Click: Select

Alt+Left-Click (Center Mouse Button): Emulate Center Mouse Button & Rotate
Center-Click+Shift: move horizontally/vertically
Center-Click+Ctrl: zoom in/out

Ctrl+Left-Click: Draw Shape and Select

Ctrl+Al+Left-Click: Zoom

ESC → Back to 3D View if e.g. in Render Mode

Num-Pad
1   : Front
3   : Side
7   : Top
5   : Orthographic/Perspective View
4,2,6,8 : Rotate in 45° steps
0   : Switch Camera View/Perspective View
Shift+f : Free Floating Mode for Camera/Perspective View, finish with left click
+/–   : Zoom in/out
Pos1   : Show all objects

Shift-C: The view is shifted to show all objects
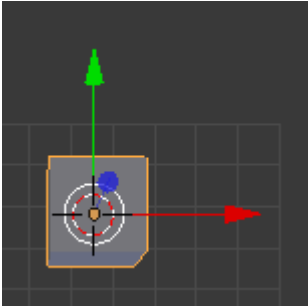
Choose Manipulation Mode

G: Grap
R: Rotate
S: Scale

G/R/S+Axis: Translation/Rotation/Scale along the chosen Axis (X,Y,Z)

Combined with Alt: UnDo ("Object Mode"; not in "Edit Mode")

Ctrl+Space: Show/Hide Manipulators

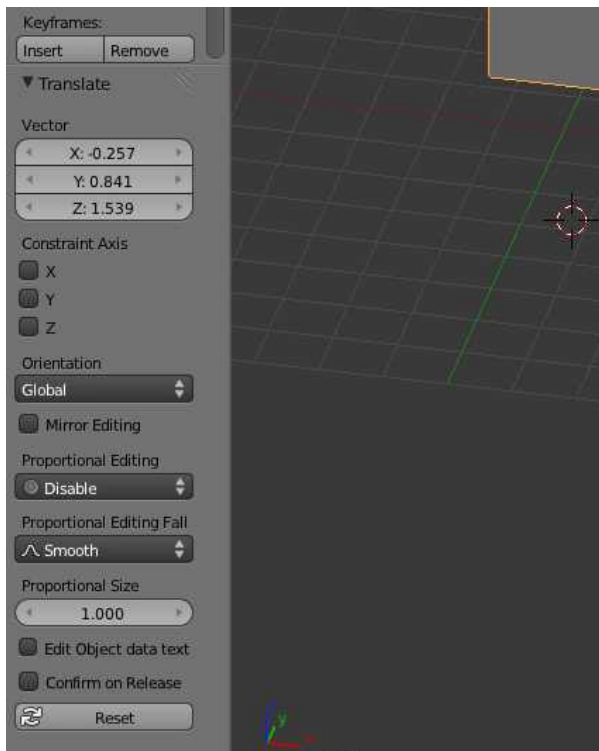Select here the manipulator needed (in this case the arrow):

Left-Click on Arrows of Object → Movement along the chosen axis
Ctrl+Movement: in full Blender steps
Ctrl+Shift: Movement in 1/10 Blender steps

Ctrl-Z: Undo (32 Undos, can be changed File → Preferences → „Editing" → Change Size of UnDo History)

Ctrl-Shift-Z: Redo

The Last Action/Transformation is shown here and can be manipulated

Origin → change the Gizmo of an object

Edit Mode

Tab: Edit Mode (toggle between Object and Edit Mode)

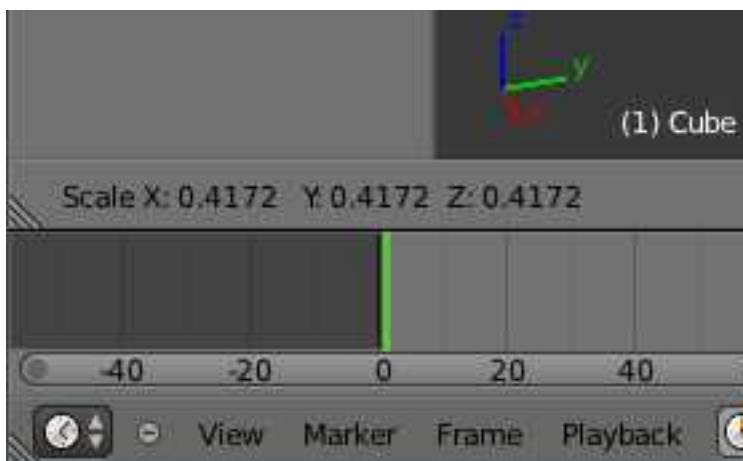select with Right Mouse Button single vertices

Shift: Multiple Selection, keep pressed by selecting 4 nodes

S + 0 + Enter → Place all selected nodes in one place
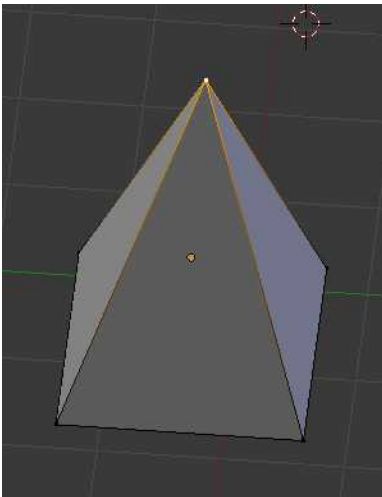(S for scale, 0 Scales the distances between all selected nodes to 0;
 pressing S + 10 would scale the distances between all selected nodes to the 10th of their length;
 this method can again be combined with X, Y and Z restraints, e.g. by selecting S + X + 0;
 watch the actual scale on the left bottom corner shown below)

W → "Specials" Pup-Up for Edit Mode appears, select:
- Remove Doubles: Removes all overlapping vertices in one position, e.g. after using S+0

Further ShortCuts:

X → Delete Objects

Shift+A: Add Objects to actual object (remember, we are in Edit Mode, these objects will be not single object, but they will be added to the actually edited object) or
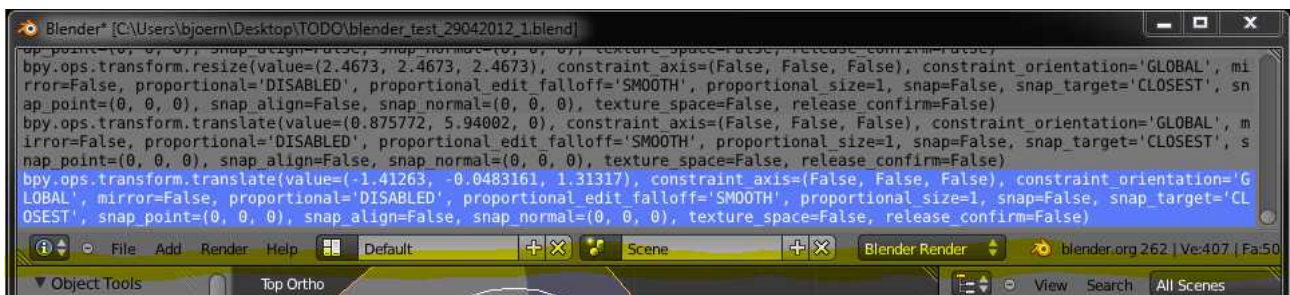

Ctrl+Left Click: Selection in Pencil Mode

C: Brush Mode (ESC to exit)

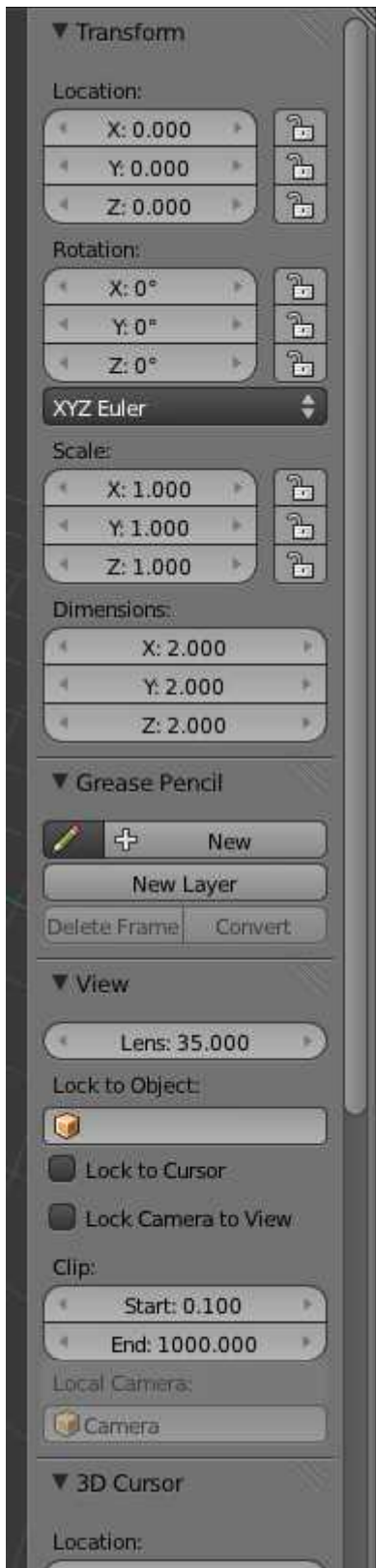Ctrl + Tab: Change Sub-Edit Mode: Vertex, Edge, or Face

API-Navigator

Help → Python API Reference

The Python-Scripts executed by Blender are always shown in the top section which is normally hidden. To open this section, the yellow marked line (see screen shot) has to be dragged down with the Mouse+LeftPress.
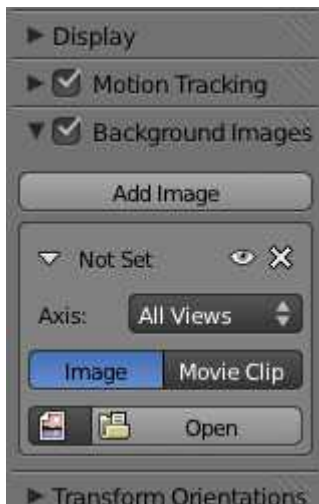
Properties Window

N → Properties of the selected object

Background Image

This image is only shown in view ports, e.g. in the camera perspectives:

(this is still the properties dialog)

This maybe useful if an image should be used as a base for a three-dimensional object, e.g. image segmentation. Important: If "All Views" is chosen, the images are only shown in orthographic perspective, which is toggled by "5" on the NumPad
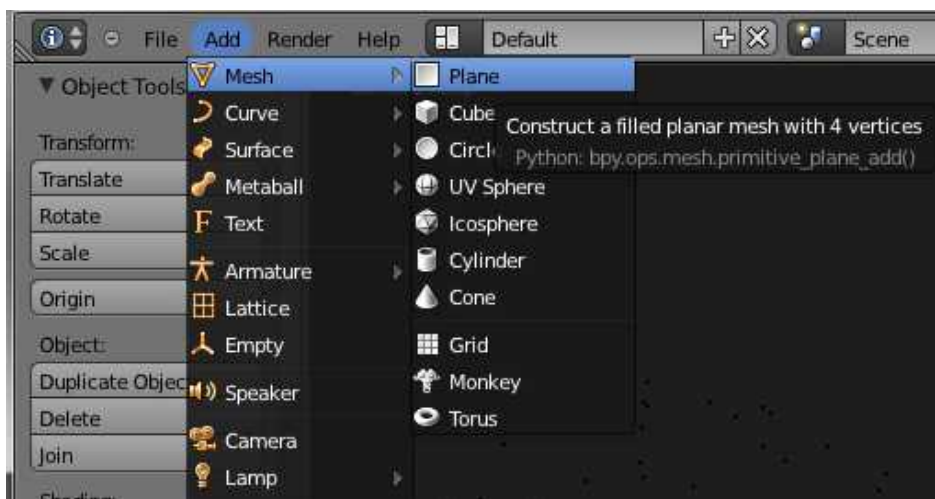
→ Therefore, usually it will be needed to correlate an image with a plane:

A Plane with an Image

The complex way

(Attention only for those who plaid around with the render settings: use the standard renderer: the Blender Renderer)

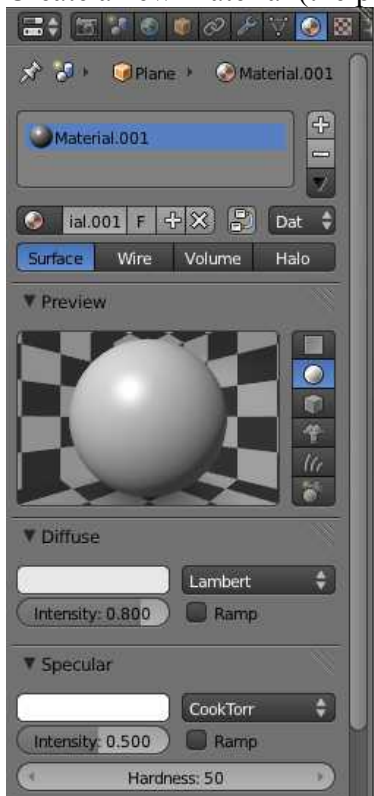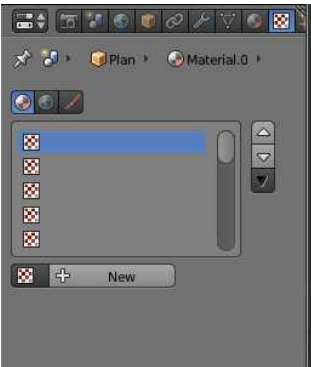Create the Plane:

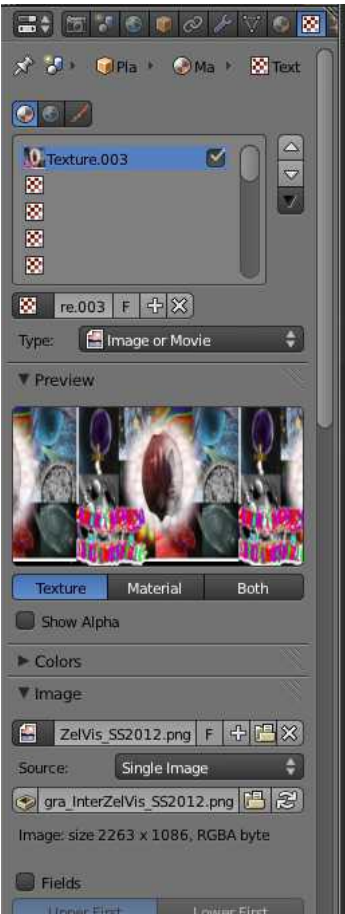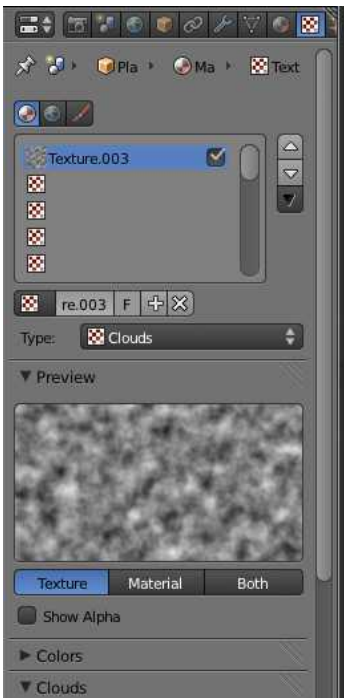Make sure, that "Textured Solid" is checked in the properties (Press N to toggle properties):
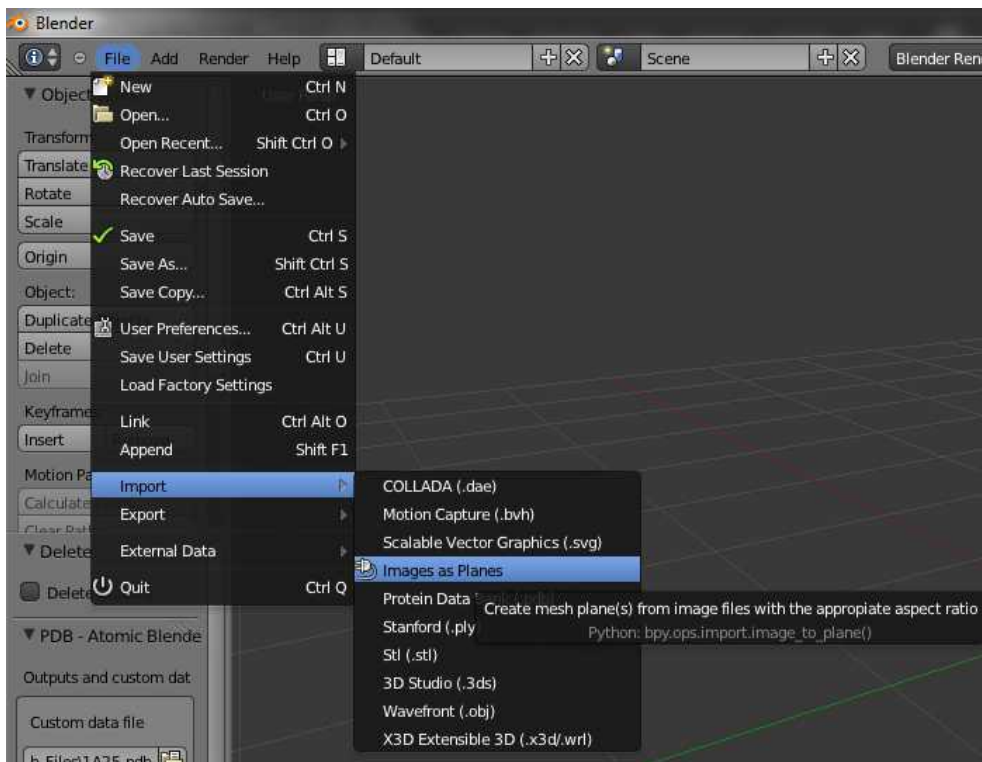

Create a new Material (the plane has to be selected):

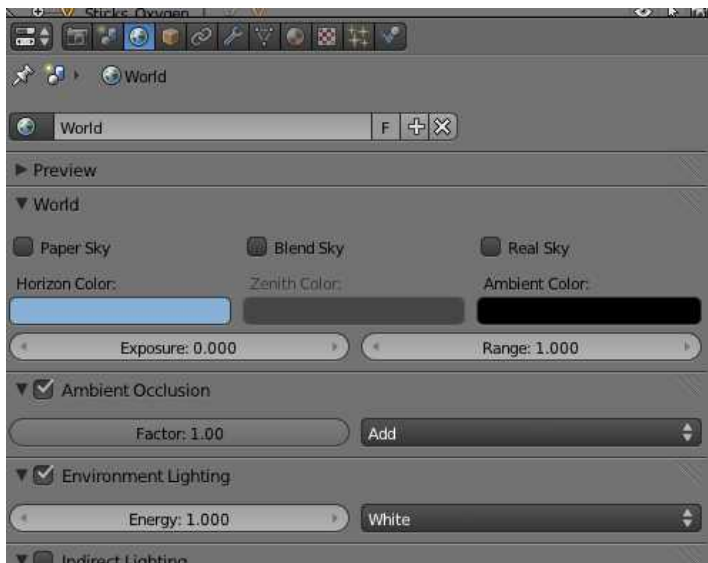Create a new Texture: →   →

The easy way

World Background Settings

Change the Light/Background Settings in the World Options:

Hide and Select Options

B → Border Select

H → Hide all selected

Shift+H → Hide all unselected

Alt+H → Unhide all

A → De-Select All

W → Specials: Subdivide line between selected vertices

Shift+D → Duplicate

Alt+M → Merge selected nodes (Edit Mode only)

E → Extrude selected nodes or shapes

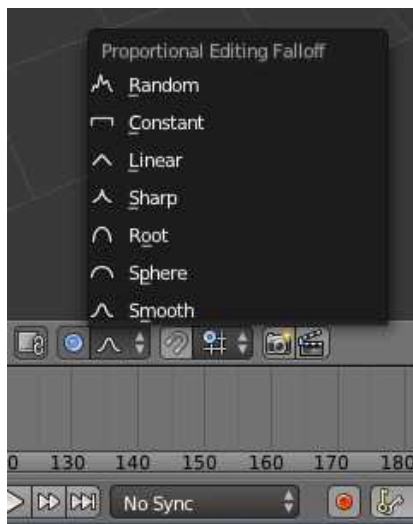F → create face between selected vertexes

Modifiers

Generate/Mirror Modifier
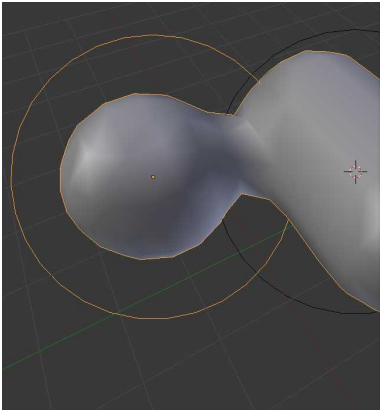
Generate/Subdivision Surface

Proportional Editing/Falloff
Smooth → Circle-like smooth fall-off
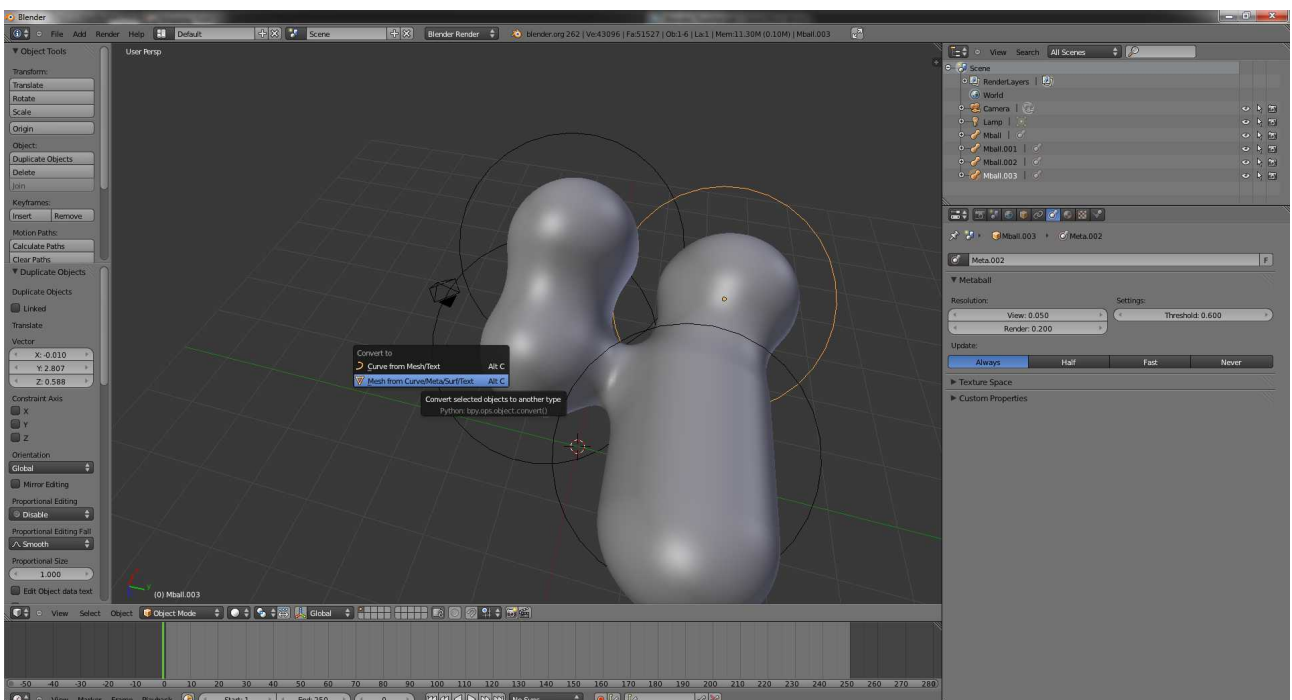Random → generates rough edges

Metaballs

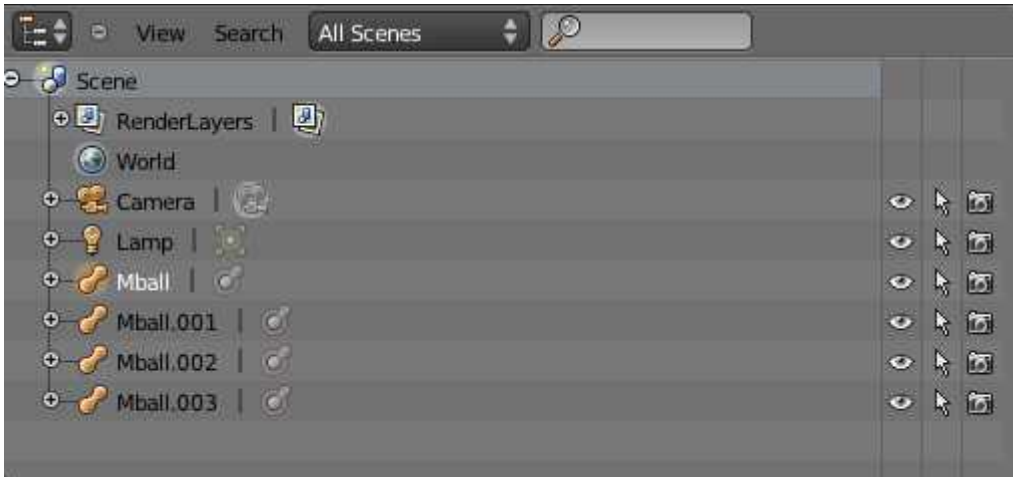Use Metaballs and extend the smoothness in ObjectD Data:
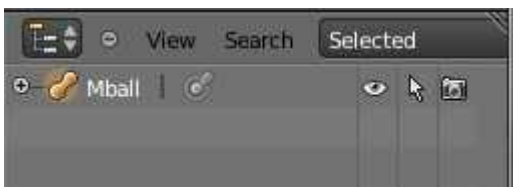

Shift+D → Duplicating objects

With Alt+C → Mesh from Curve/..., the Meta-Objects are changed to a mesh

The root name (in the "Outliner"-Window) – here Mball – defines the root object:

Select the option "Selected" to show only the actually selected objects in the Outliner Window

S, Shift+Axis → scale a selected object only along the other axis → Shift+Z → Scaling along X/Y-area

Make at the first position a KeyFrame with
I → Location

Move the Slider (yellow/green) in the Timeline to the new position, change the object (e.g. position) and again

I → Location

To view transparencies in the view port, it has to be selected in the properties like this (this does not work with all objects, e.g. it is not possible for Meta-Objects like the Mballs)

Mball.005

▼ Transform

Location:
X: -1.936
Y: -2.653
Z: -1.210

Rotation:
X: 0°
Y: 0°
Z: 0°

Scale:
X: 1.907
Y: 1.907
Z: 1.000

Rotation Mode: XYZ Euler

▶ Delta Transform
▶ Transform Locks
▼ Relations

Layers:

Parent:

Object

Pass Index: 0

▼ Groups

Add to Group

▼ Display

Type: Textured   ☐ Bounds   Box
☐ Name   ☐ Texture Space
☐ Axis   ☐ X-Ray
☐ Wire   ☑ Transparency

Object Color:

▼ Duplication

None | Frames | Verts | Faces | Group

▶ Relations Extras
▶ Motion Paths
▶ Custom Properties