



Harvard University
Graduate School of Design

INTRODUCTION TO 3D VISUALIZATION BASIC ANIMATION TUTORIALS

For urban, architecture and landscape architecture
Optimization, Animation, Rendering, and Post-production process



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Essential Shortcut



Controlling objects in a scene

Q, select

W, move

E, rotate

R, scale



View controlling

Zoom, mouse middle scrolling

Pan, click mouse middle button + drag

Arc-rotatative view, click mouse middle button + drag + Alt

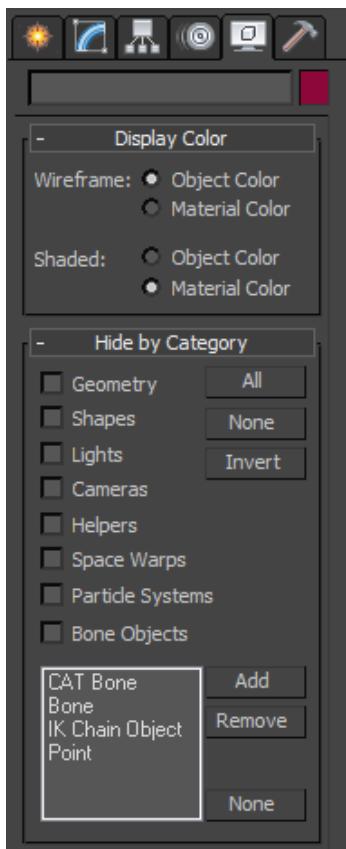
Alt + T, Toggle key for minimizing or maximizing a selected view

T, topview

Z, zoom all

V, pop up menu for selecting viewports

Space, Toggle key for locking or unlocking selected objects



Shift + G , Hide or Show all of geometries in a scene

Shift + S, Hide or Show all of splines in a scene

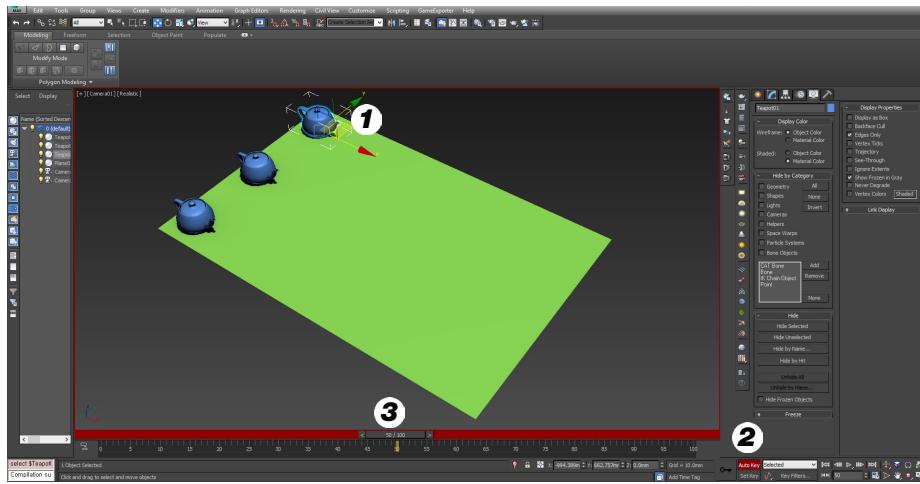
Shift + L, Hide or Show all of lights in a scene

Shift + C, Hide or Show all of cameras in a scene

Otherwise, you can see the Hide by Category control panel in the display panel.

Alt + Q, Toggle key for isolating selected objects in a scene

Understanding animation in 3ds max

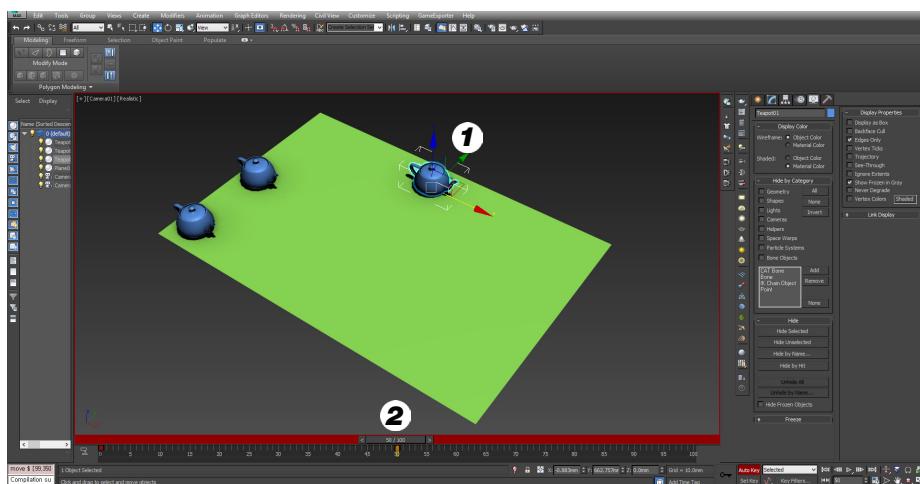


01 select(mouse left click) a teapot

02 click AutoKey

03 move(W) Timeslider to 50 frame

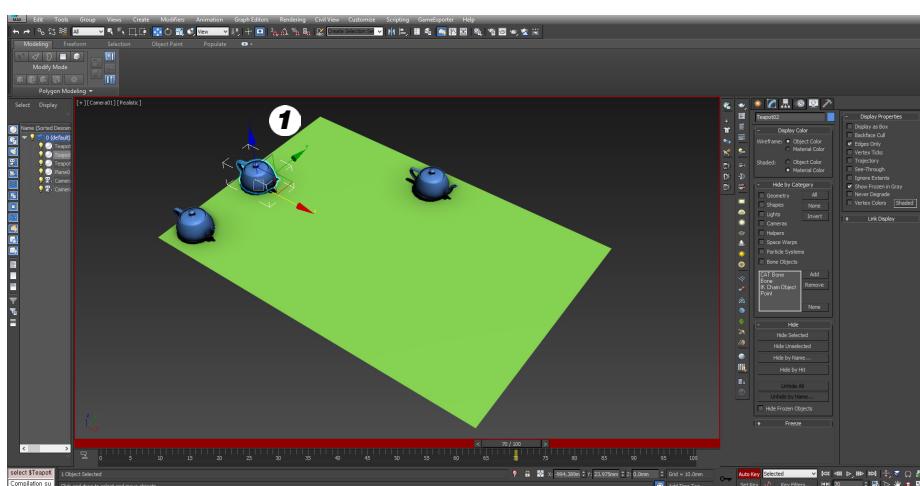
The AutoKey function will recode any kind of actions including position, rotation, or scale as long as the function is activated



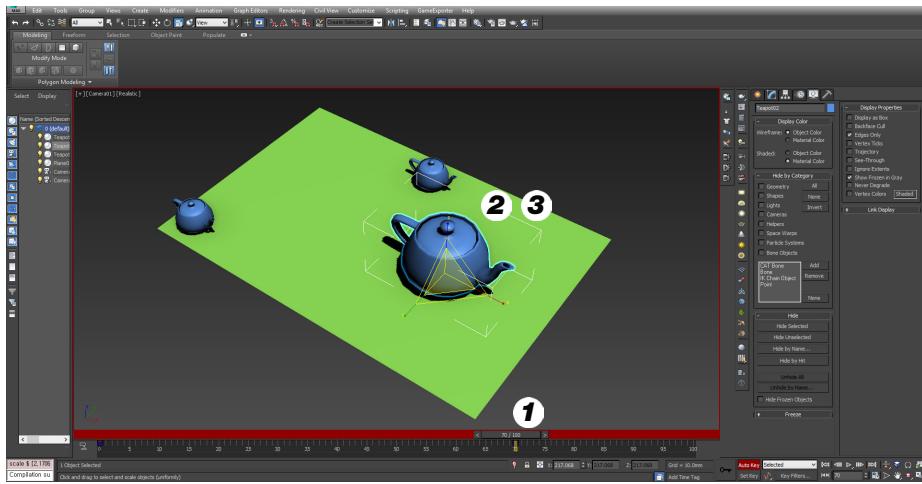
01 move the selected teapot

Then, you can see the red key in the Timeline at 0 and 50frame.

The red key means a position key.



01 select the second teapot

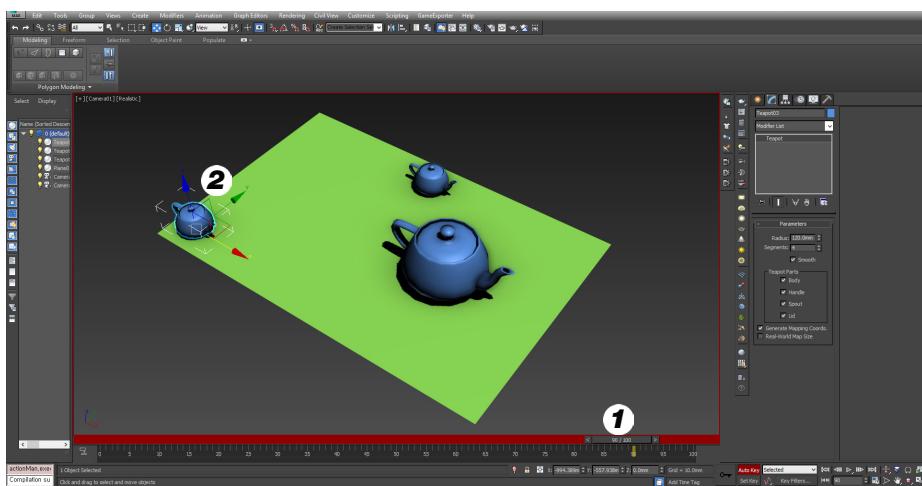


01 move Timeslider to 70 frame

02 move(W) the selected teapot

03 scale(R) up the teapot

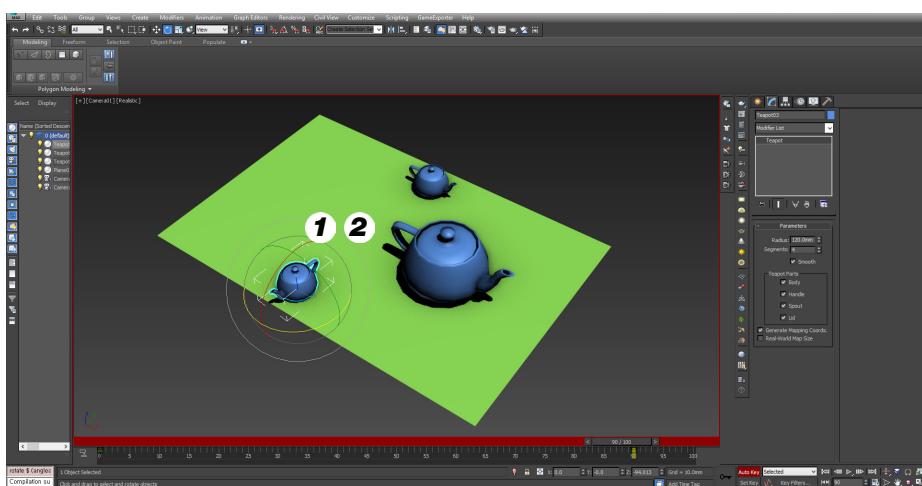
See the Timeline at the bottom of screen, you can see red and blue keys. Blue key means a scale key.



01 move Timeslider to 90 frame

02 select the last cute teapot

Keep in mind that your Autokey is still activated



01 move(W) the cute one to the place in the picture left

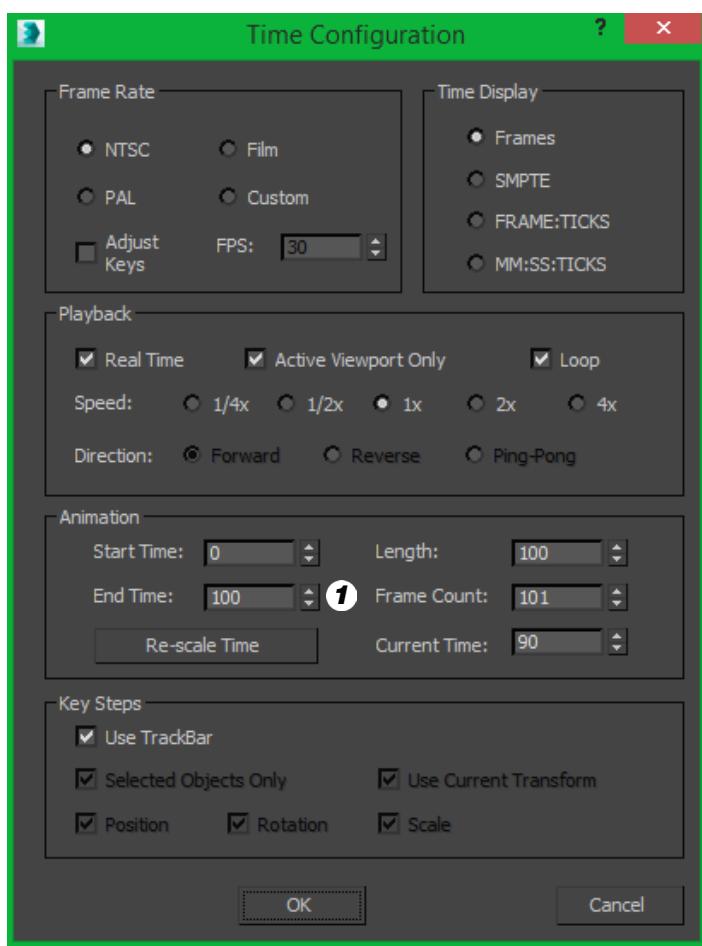
02 rotate(E) it

See the AutoKey function automatically generate when something is changed.

So you can see the Green key which is a rotation key!

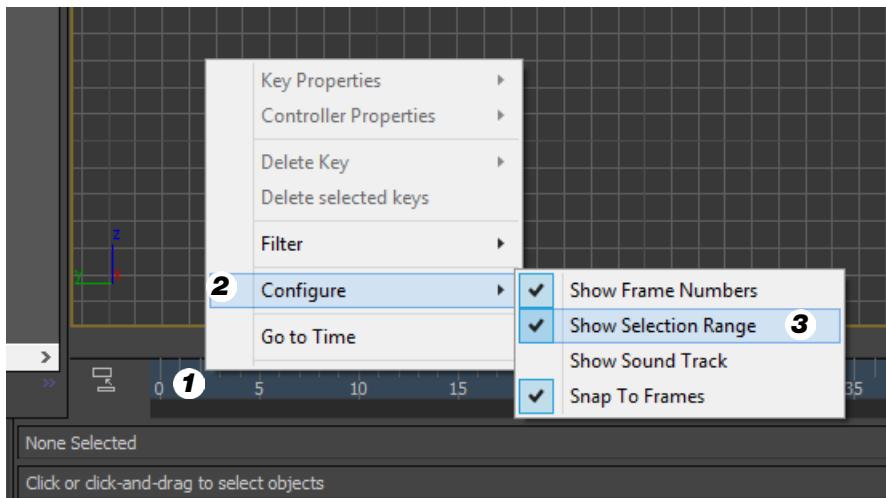
*Then, you **MUST** turn off the Autokey in order to deactivate.*

Well done!!! Actually, this is almost about how animation keys create in 3ds max. In Maya or AfterEffect, although the interfaces or the sequences of commands look like different, the core concept behind it is same!!

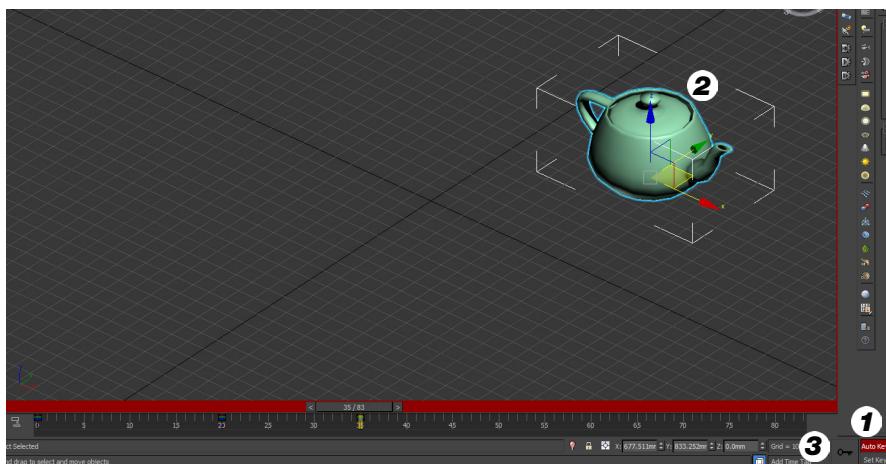


If you click the Time Configuration that is located on the right bottom of the screen, you can see the window left. You do not need to worry about knowing all of the options, but the End Time(1) could be important to change the Timeline range. For example, 300 means a 10 second -long range for animation.

Essential Key Control



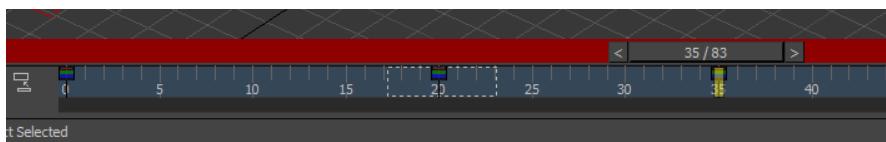
- 01 mouse-right click on the Timeline
- 02 click the Configure
- 03 make sure that Show Selection Range is activated.



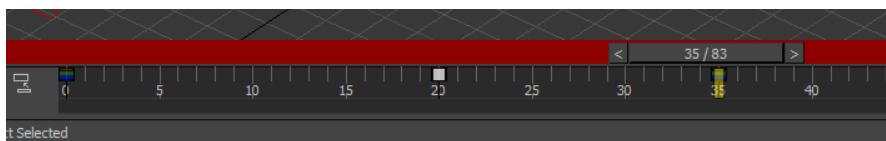
- 01 click the AutoKey button to activate Animation mode
- 02 select the teapot
- 03 click the Set Keys icon, , next to AutoKey Button.
See the Timeline, you can see the key which consist of RGB color.
Then, you can create three Keys with the teapot.



there are three keys on the Timeline.



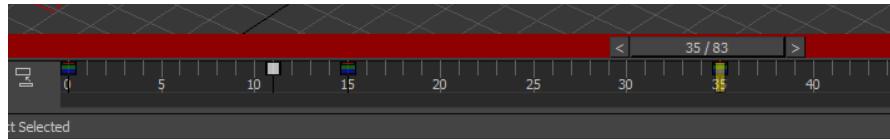
drag mouse to select one of the keys



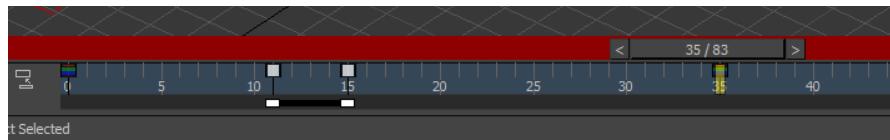
if you select the key correctly, you can see the withe key.



then, you can move the key by mouse-left click and drag.



or, with Shift key + drag, you can duplicate the key!!!



select two keys



you can see the small bar below the keys. Try to drag one of the white small square to re-scale the keys

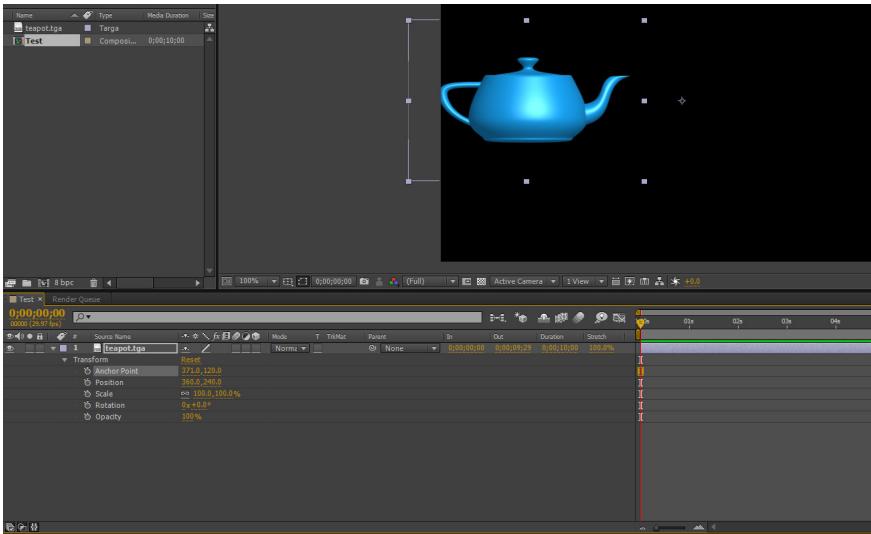
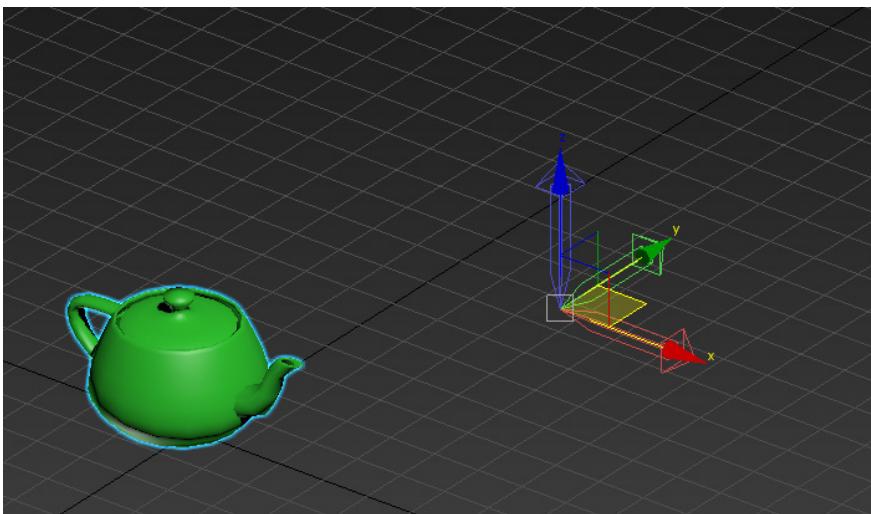
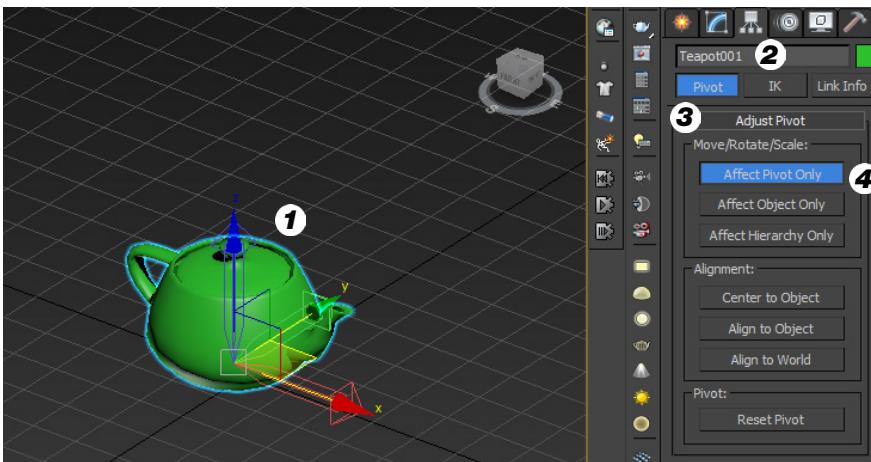
*GREAT!! You are not beginner now,
because you are able to control key/
moving, scaling, or copying keys)*

*let us think about what does it mean
“copy of key” for the movement*

*plus, think about what happen
when scale up between the keys?*

*Lastly, how can we delete all of key
of the teapot?*

Concept of Pivot



There are two ways to change pivot of a object, one is a shortcut (insert key on your keyboard), second one is ...

- 1 select the teapot
- 2 go to Hierarchy panel
- 3 click the Pivot button
- 4 click the Affect Pivot Only button

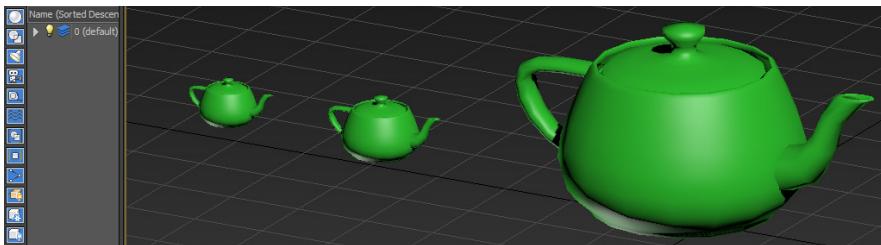
Once you move the pivot you **MUST** click the Affect Pivot Only button again to deactivate!!

Then, you can simple move the pivot of the teapot object, and I encourage you to make some transformation animations like rotation or scale!!

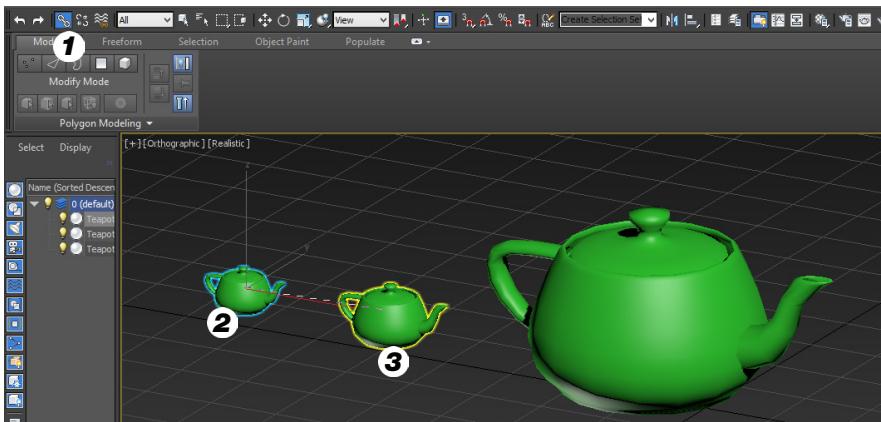
As I said, the concept is same in different CAD programs, but little bit different interface. In AfterEffect, you can achieve the same effect by controlling the Anchor Point!

How easy!!!

Concept of Link



There are a teapot family, a parent teapot and its children!!

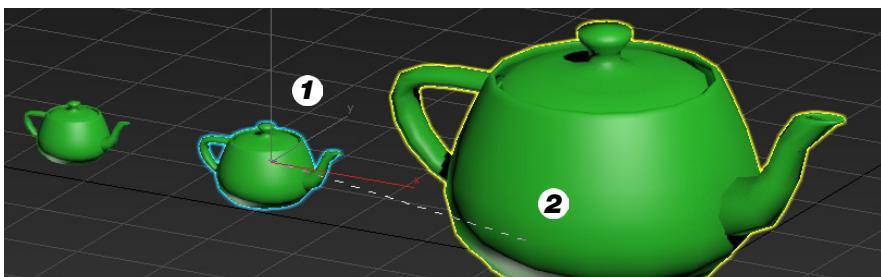


1 select the teapot

2 go to Hierarchy panel

1 click the Link button

2 click the last child and drag-and-drop on the the (3) child teapot!!



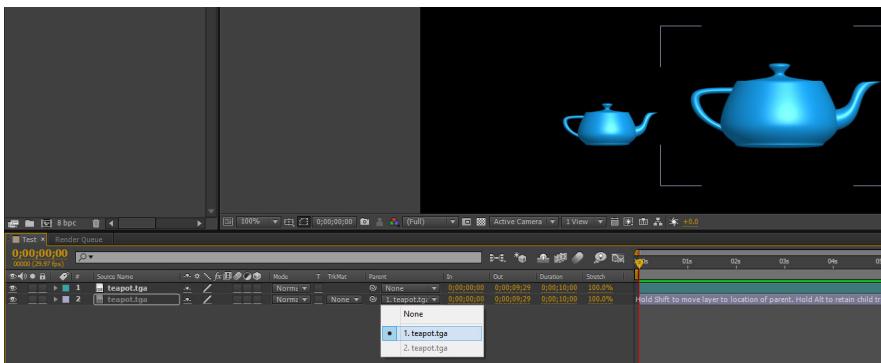
Again

1 click the last child and drag-and-drop on the the (2) child teapot!!

try move or rotate the parent teapot. What happen???

try move or rotate one of the children, then what happen???

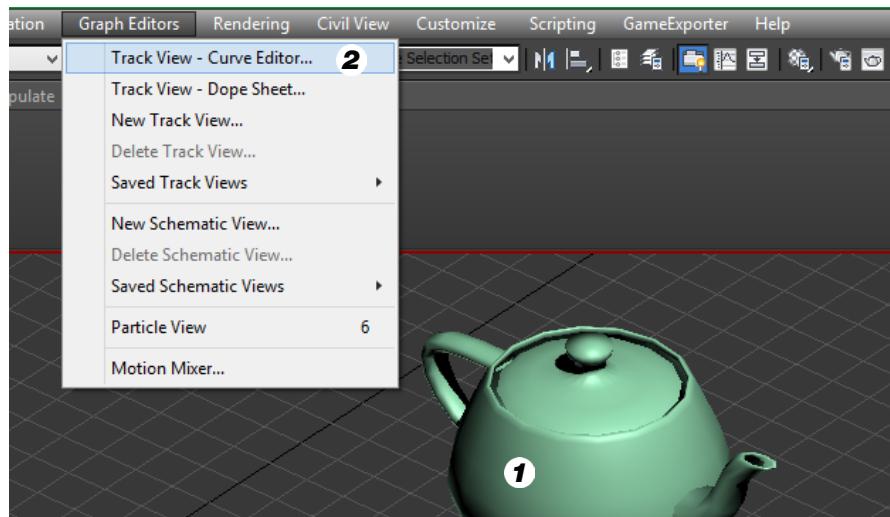
!!! In order to unlink the relationship, we can choose all of the related objects and simply click the Unlink button which is located next to the Link icon.



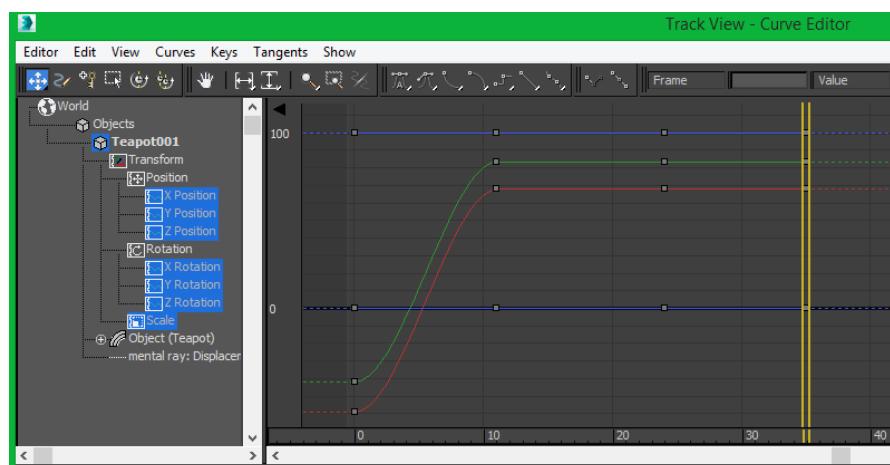
Again!!, We can expand the concept to Aftereffect. In Parent column, you can assign the relationship between parent and child.

Try move and scale the parent object, then what happen???

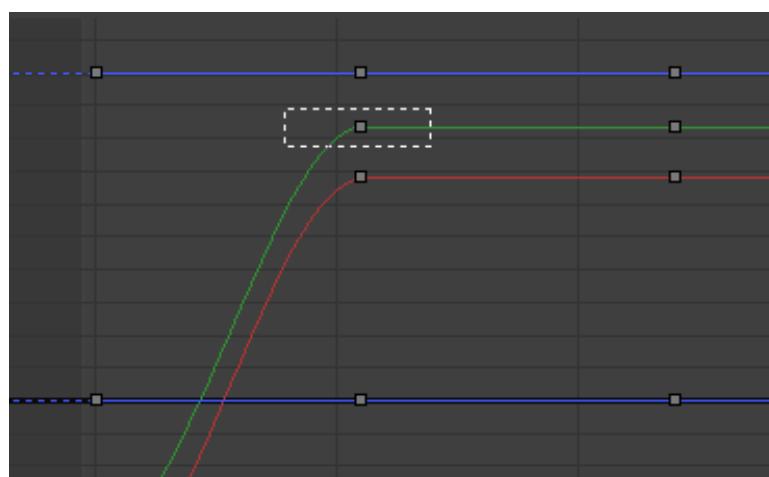
Key Decomposition



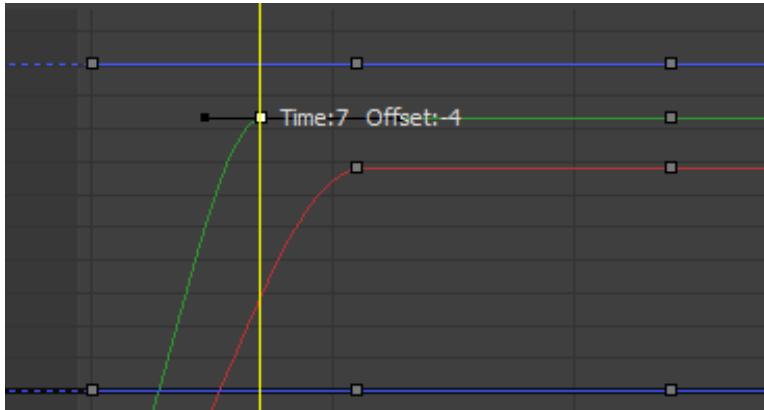
1 select the animated teapot
2 go to full-down menu, click Graph Editors, select Track View - Curve Editor



you can see the Curve Editor. Okay,
Let us read the curve in the window.
The blue straight curve means that
Z axis Key. Red-colored curve is X
axis, and green is Y axis.



1 select the key.



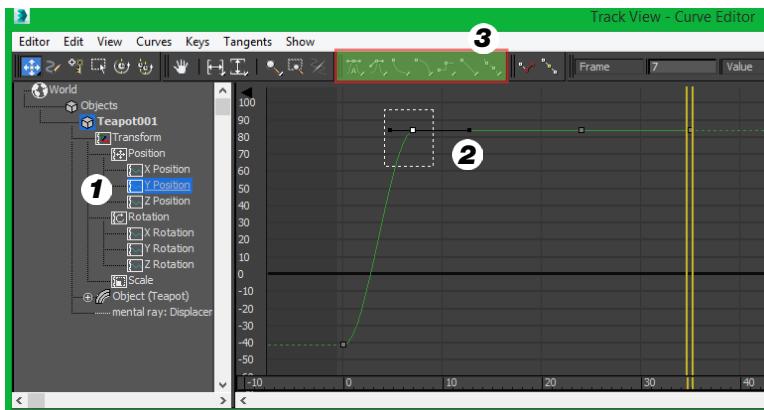
1 move the key to left little bit
(with Ctrl key, you can constrain the move)



before



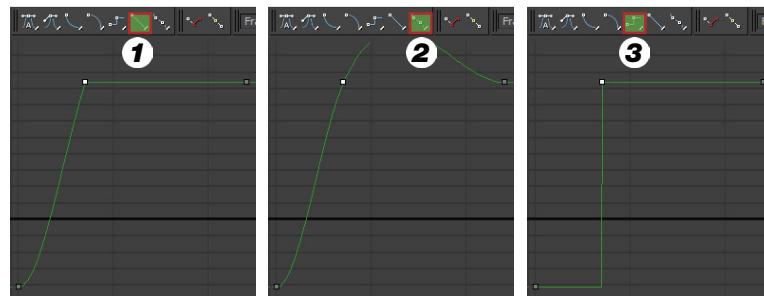
after



1 click the Y Position icon, then you can filter and see only the movement curve along Y Position of the teapot

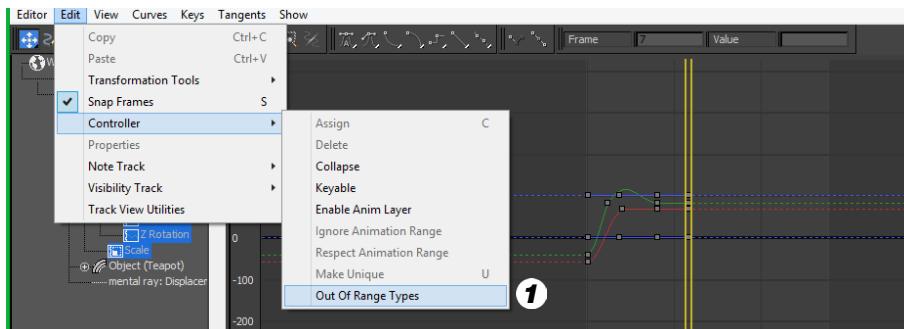
2 select the key

3 apply the easing options to the selected key

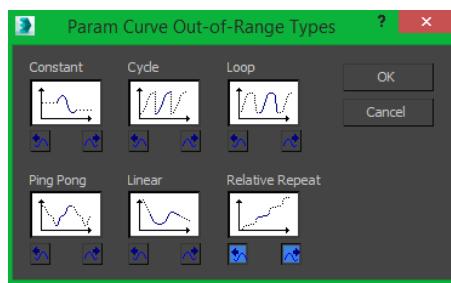


for instance, Set Tangents to Linear(1), Set Tangents to Smooth(2), Set Tangents to Stepped(3)

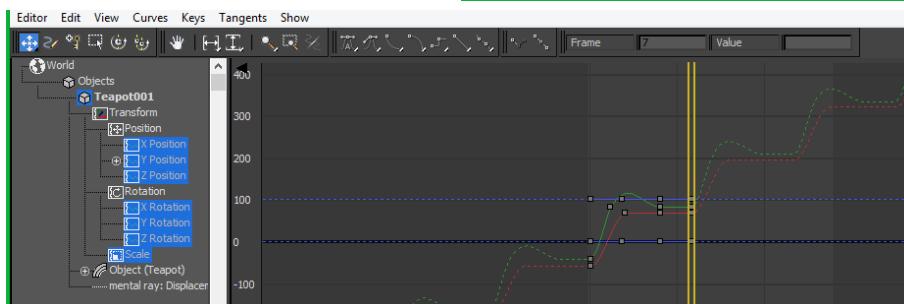
Out Of Range Types and Trajectory



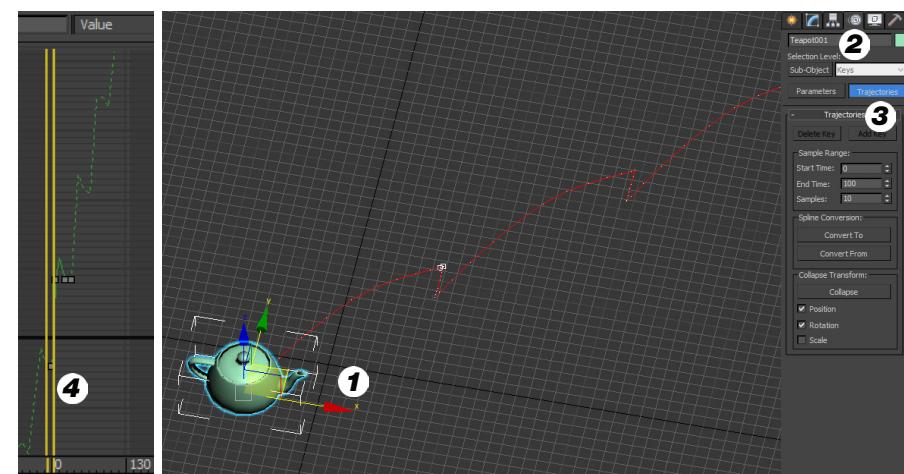
1 click the Out of Range Types in the Curve Editor



1 assign both side as Relative Repeat



you can see the repeated keys which is very useful for creating keys for the wheels of a car for example.



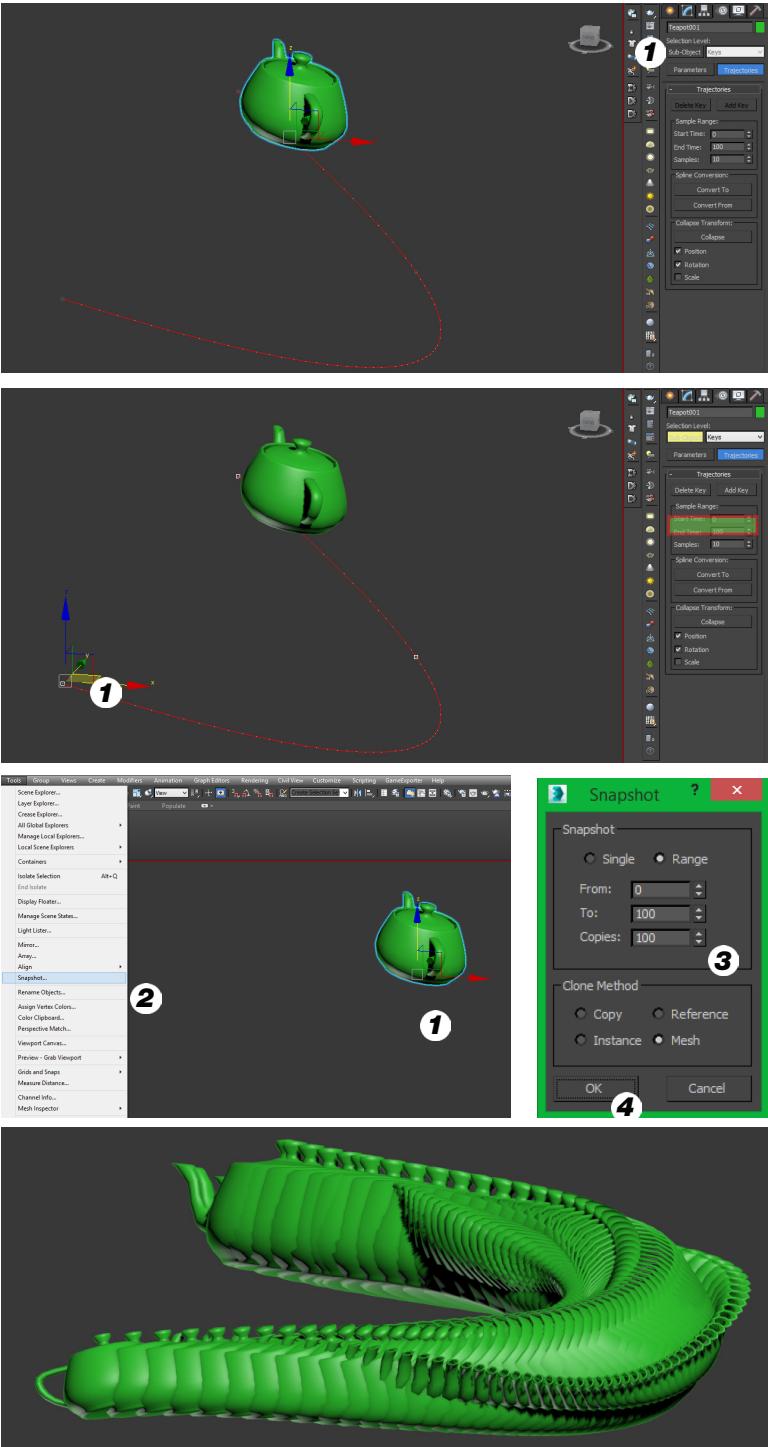
for the Trajectory

1 select the teapot

2 go to motion panel

3 click the Trajectories button

for the trajectory of the teapot matches the curve(4) in the Curve Editor. It makes sense!!!



In addition, you are able to control the key in the viewport directly
1 click Sub-Object button in the motion panel

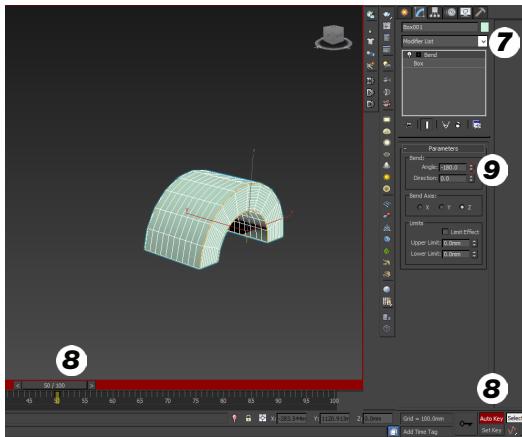
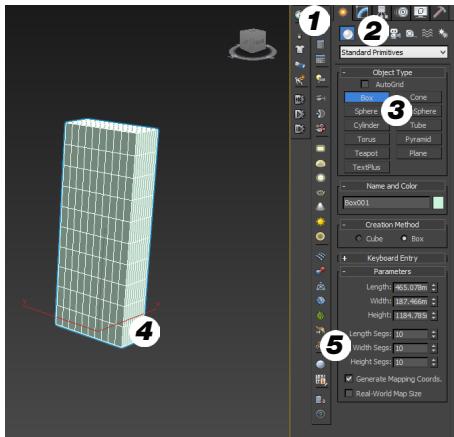
1 select a key and move it
Also, keys can be added or removed by using the Delete Key or Add Key buttons

1 select the teapot
2 go to Snapshot of the Tools on the Full-down menu
3 type 100 for the Copies option
4 click OK

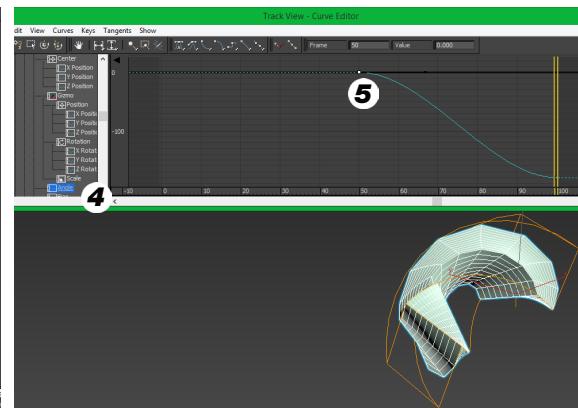
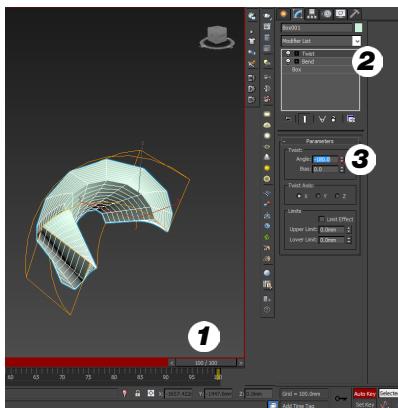
Great! We can visualize the transformation of the teapot such as position, rotation, and scale!!

Keep in mind, the fundamental concept of animation in digital environment is basically same, our next step is to expand and enrich the knowledge!!

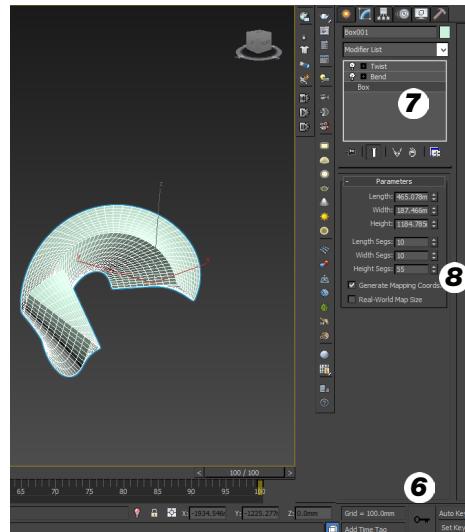
Concept of Modify-Driven Animation



- 1 click the Create panel
- 2 click the Geometry button
- 3 click the Box
- 4 drag in the viewport to create a box
- 5 change the box's parameters
Length Segs:10, Width Segs:10, Height Segs: 10
- 6 click the Modify panel
- 7 select Bend modify
- 8 move the Timeslider bar at 50 frame and click the Auto key button to record animation
- 9 change the Angle 0 to -180



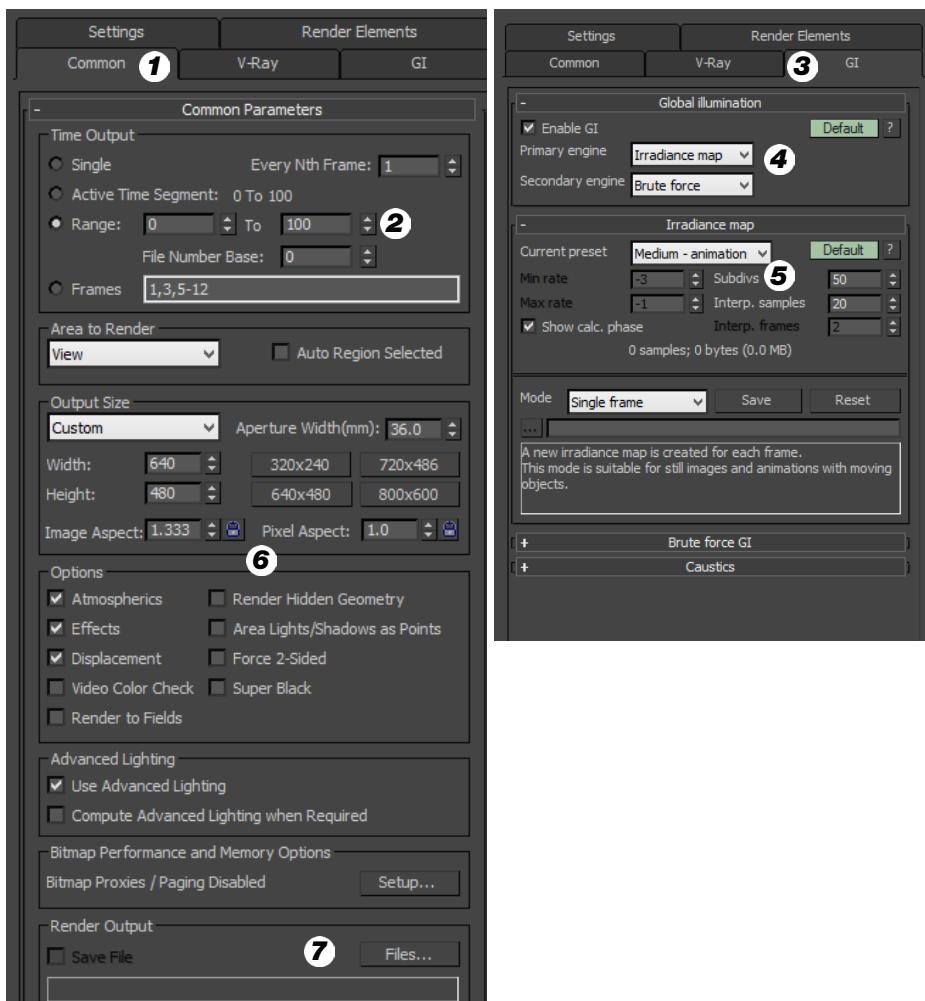
- 1 move the Timeslider bar at 100 frame
- 2 apply Twist modify to the box again
- 3 change the angle, -180
- The keys generated by Twist modify are at 0 frame and 100 frame. So we need to move the key at 0 frame to 50 frame
- 4 click the Curve Editor and find the Angle of the box
- 5 select the key and move it to 50 frame
- 6 click the AutoKey button to deactivate animation mode



- 7 go back to Box in the stack on the modify panel
- 8 increase the Height Segs : 55
Press the "/" on your keyboard then you can see the bending animation first and twisting animation will be happen.

Animation Rendering

There are different types of tricks and ways to render animations according to rendering engines, but we will learn a super simple way to do sequences rendering using VRay



Press F10 to open Render Setup Window

- 1 go to Common tab
- 2 you can assign the rendering frame (ex 0 frame to 100 frame)
- 3 goto GI tab
- 4 enable the EnableGI and select the Primary and Secondary engines like the picture
- 5 in the Irradiance map section, you select the preset as a Medium-animation.
- 6 go to Common tab, and you can define the size and ratio of the rendering images
- 7 you MUST assign the location where your output will be saved!!! As a File Format, I recommend TGA which does not compress your image and which contain Alpha Channel.

Memo
