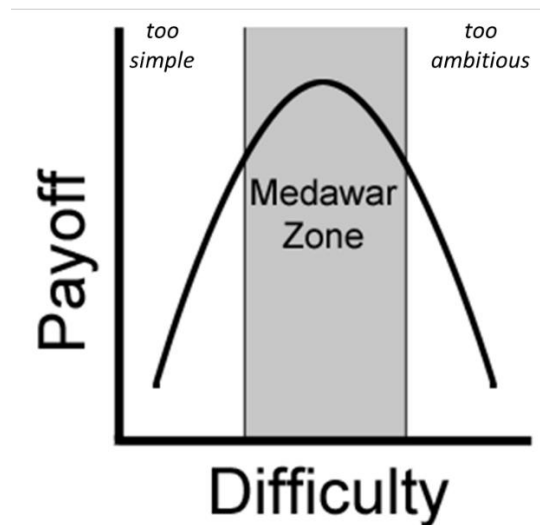


## CHAPTER X. General guide to animations using 3ds Max

### Overview

A brief protocol is provided for using 3ds Max to create animations. Before you begin, it is important to consider the Medawar Zone. This principle reminds us not to be too ambitious and not to be too simplistic when designing. In terms of animations, this principle should be your guiding light. In the words of Edward Tufte, “*whatever it takes, and nothing more*”.



**Figure 1.** The Medawar Zone is the area of actions which are most likely to produce fruitful results. Actions that are “too simple” are unlikely to produce novel or significant results. Actions that are “too ambitious” may not succeed at all, or may be rejected by the community at large



## Target audience

- 1) Students (upper level high school and higher ed)
- 2) Pre-collegiate teachers (grades 9-12)

## Learning Objectives

- 1) Students should be able to create a basic animation in 3ds Max, render, and export for viewing.

## Educational Methods

### Safety

1. N/A

### Materials (see sections below for prepping materials prior to activity)

1. Computer with decent video card (you will know quickly if this is not the case!)
2. Access to AutoDesk 3ds Max (available on UF Apps or in 153)

### Basic principles of 3ds max

1. The general window in 3ds Max has four working panes:
  - a. Work space (top default view, can be changed)
  - b. Work space (front default view, can be changed)
  - c. Work space (left default view, can be changed)
  - d. Perspective 3D view (can be changed)

The general window in 3ds Max has four working panes:

- a. Work space (top default view, can be changed)

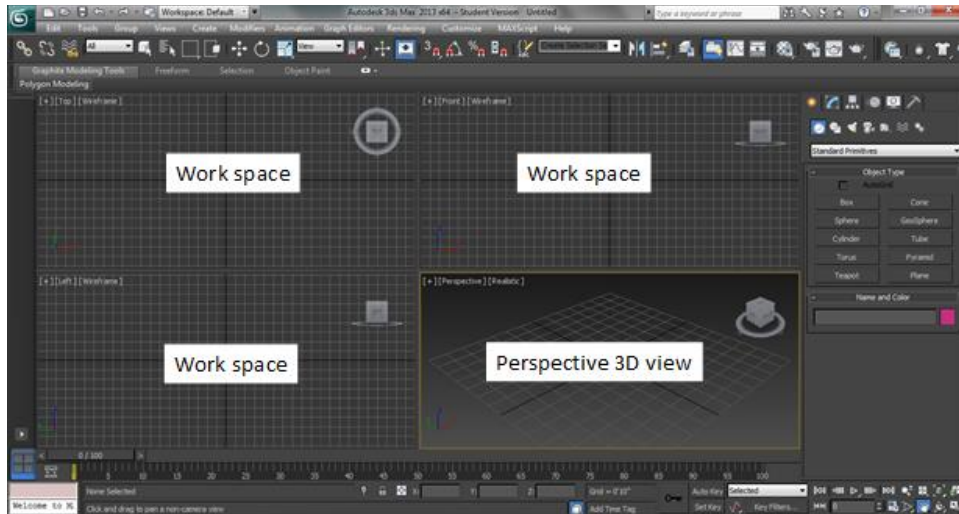


Figure 3. Overview of workspace in default mode

The commands at the top move **objects** in 3d space (think if an actor running around and moving when the camera is still). The commands in the bottom right move **your perspective** in 3d space, but the object does not move (think of a camera moving around an actor, and you are operating the camera).

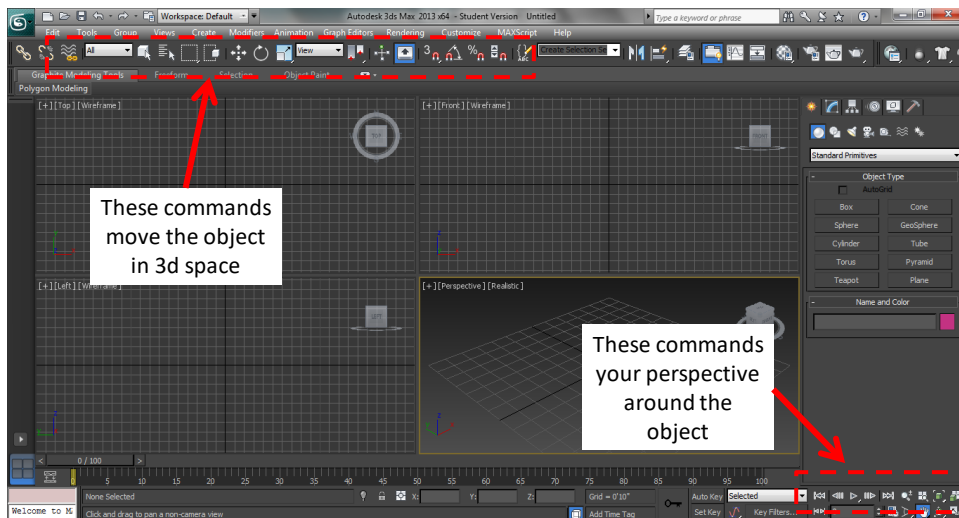


Figure 4. Default command setup in 3ds max for moving objects or “cameras”

## Creating objects:

To create an object, use the create tab on the right side

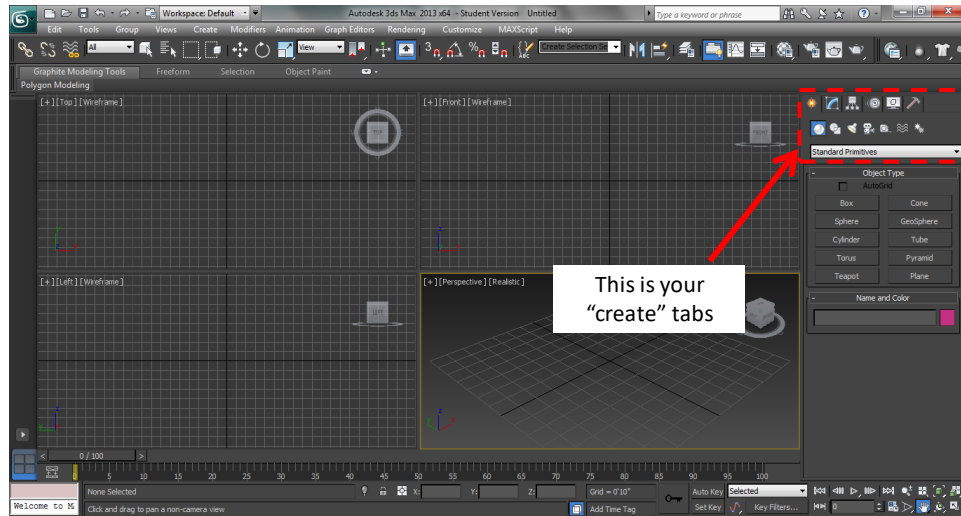


Figure 5. Create tab feature

For example, planes can be created in various orientations simply by clicking **Create-plane**. Next click on a workspace and draw . If specific dimensions are needed, they can be adjusted in the “parameters” pane in the bottom right part of the screen. Note that this screen will only appear once an object, such as a plane, is selected

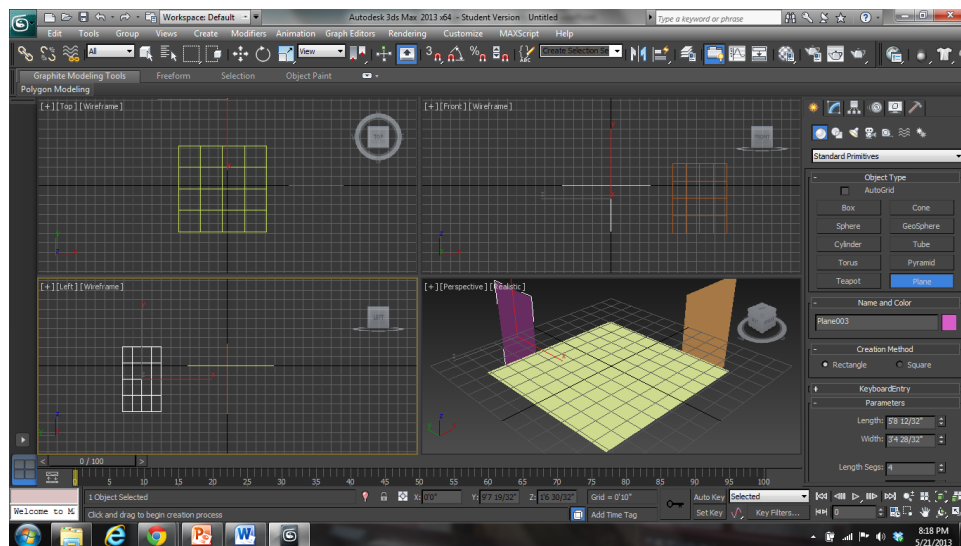


Figure 6. Drawing basic objects in the workspace

The key to using 3ds max is to learn about the “modifiers” that can be applied to any base object. The **modifying an object button** is found in the default tool box near the upper right side as shown below.

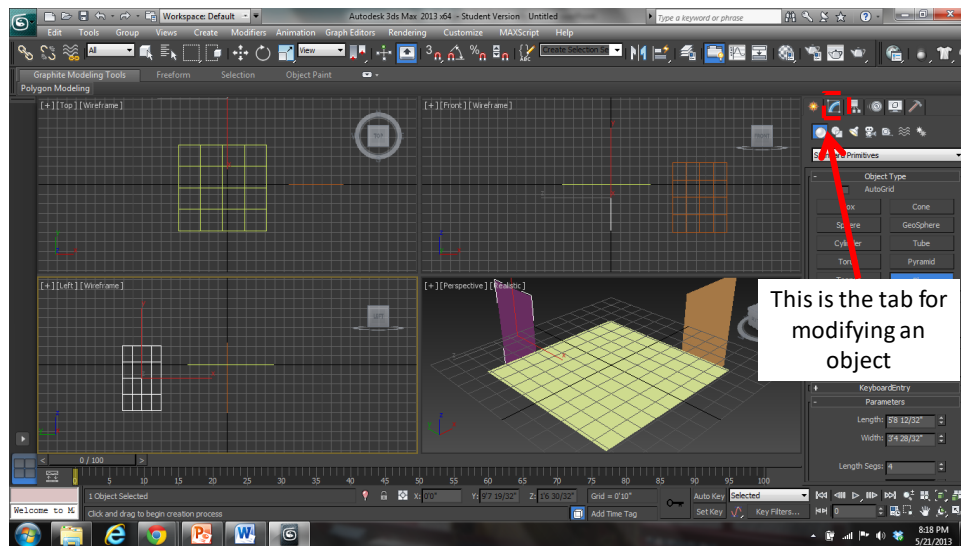


Figure 7. Modifying objects tool is key to 3ds Max

The best way to learn about these **object modifiers** is to use them as they are necessary. I use YouTube tutorials exclusively for training in 3ds Max. For example, for making grass I typed “3ds max grass tutorial” in the YouTube search engine. The modifier is called “Hair and Fur”

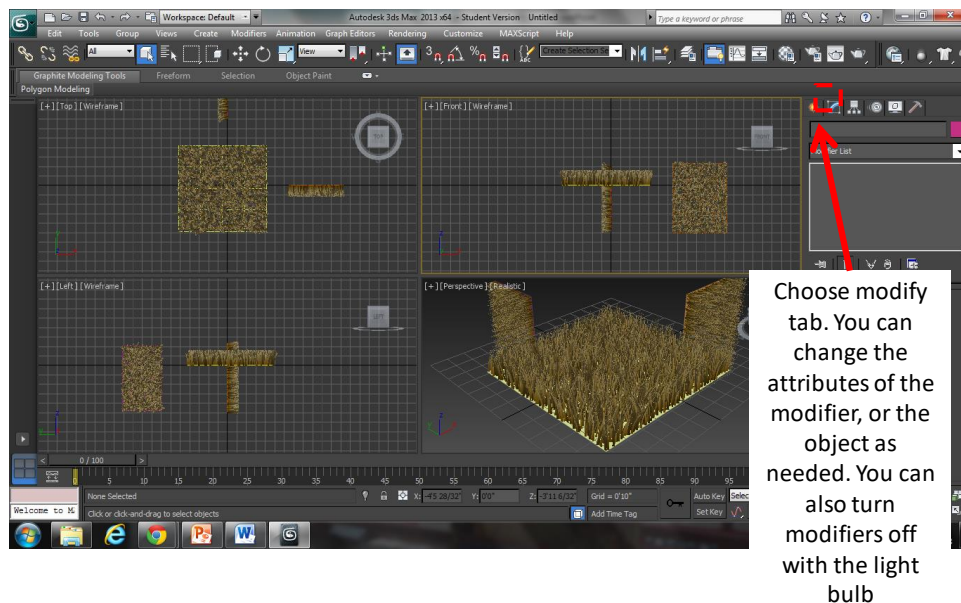


Figure 8. Example of making grass with the “hair and fur” modifier

A box will appear beneath the modifier that allows you to adjust the parameters. For example, I can adjust the thickness, length and other basic physical properties of the grass by changing these settings. The number of combinations is infinite. Play with these settings until you like the image in the Perspective 3D View workspace (bottom right window)

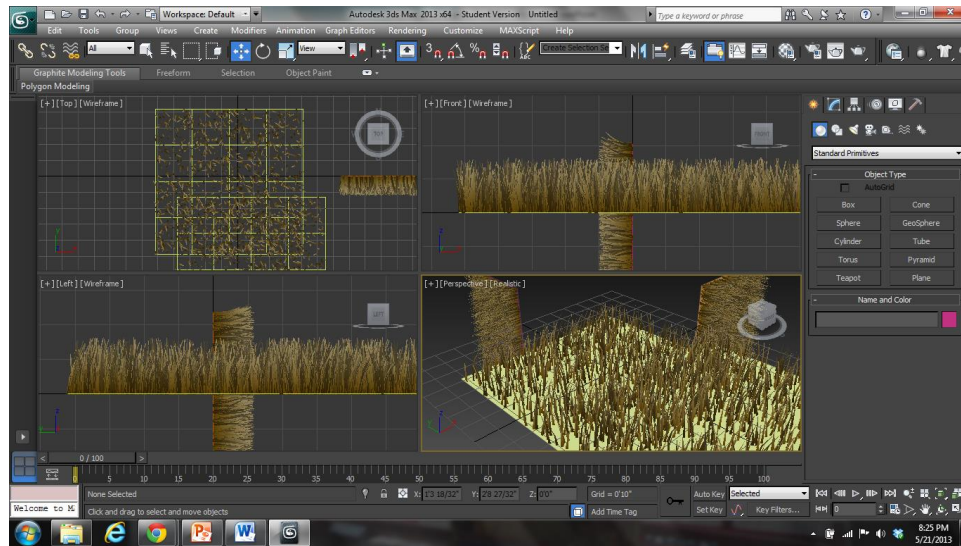


Figure 9. Changing parameters of the modifier

### Animation:

Now we will address the basic concept of creating animations, which depends on your ability to move objects in 3d space, and also tweak the settings of a modifier to change the physical appearance. If you feel comfortable with those two topics, continue to the animation section below. If not, revisit the instructions above or ask questions in google!! There is a large forum of designers who have answered most basic questions.

*Tip: Be sure to include “3Ds Max” in quotes when searching for help.*

The slider near the bottom of the screen is the “time” domain. There are ticks with number marks that indicate discrete time intervals. For advanced users, you may wish to set the length of one time interval (called a frame) in the “advanced time functions” tab under frame rate. For example, if one time interval equals one second you can plan the length of the video. Longer animations require longer rendering times, and this increases with the complexity of the objects/modifiers.



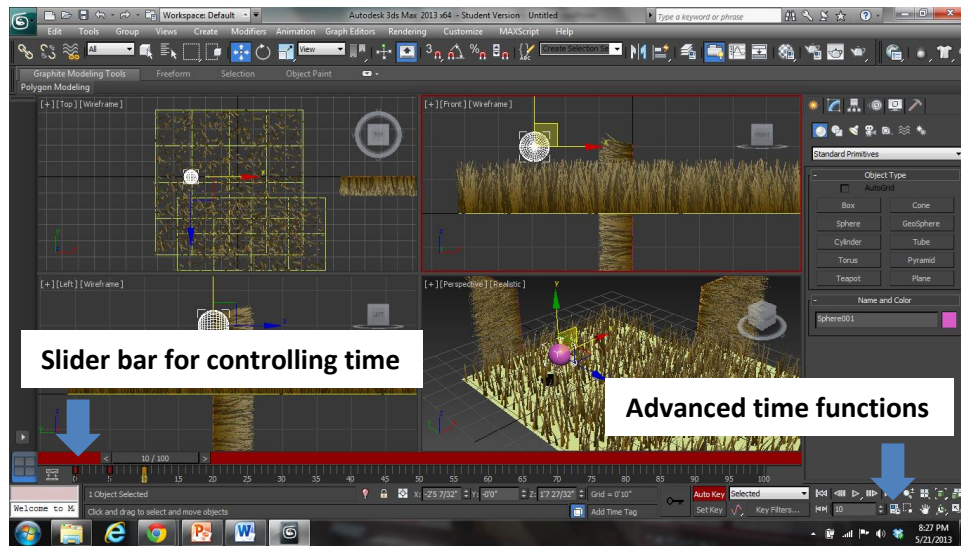


Figure 10. Slider bar controls time domain, and is connected to the spatial domain

The simplest example is to use the “AutoKey” function at the bottom (the manual “SetKey” function can alternatively be used). This key turns the animation sequence ON and any changes will be recorded and time stamped per your design. A simple example is below:

- 1) To start, move all of the objects and modifiers where you want them at  $t=0$ .
- 2) Push AutoKey to turn ON the animation sequence.
- 3) Now move the slider to a forward time, say  $t=10$  frames.
- 4) While the slider is in a future frame (in this case  $t=10$ ), move the objects where you would like them to be at  $t=10$ . For example you may wish to have the ball bounce on the grass.
- 5) You can also change a modifier, for example make the grass grow by changing the hair length.
- 6) Next, press “AutoKey” to turn OFF the time domain. You can move the time slider around to observe how the model interpolated your movement(s). You may wish to add more, or less movements to get a more realistic response.
- 7) Repeat this process until you have a working animation! Use the 3D perspective viewer to observe the movements

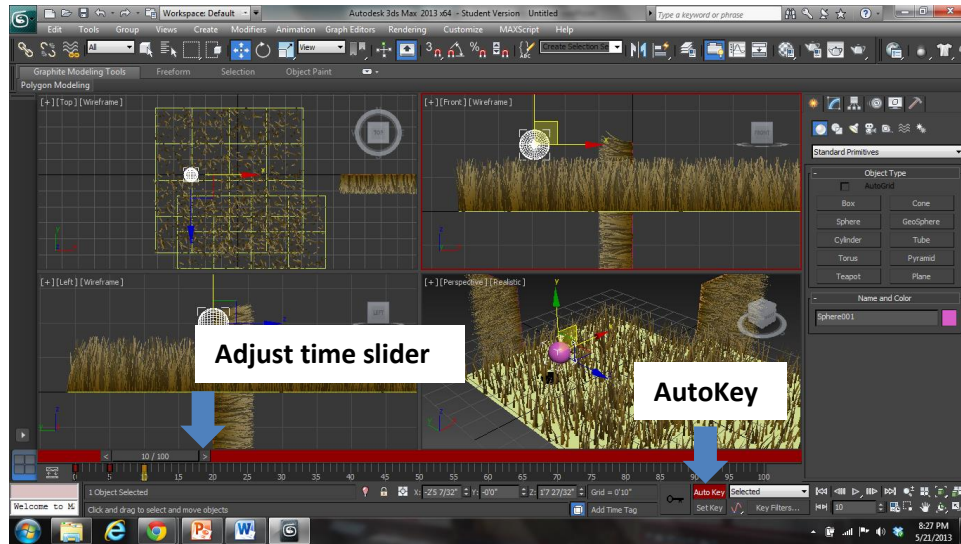


Figure 10. AutoKey is the ON/OFF switch for time stamping. The software uses algorithms to interpolate movements and behaviors between set time stamps at a specified frame.

If you wish to delete a particular time stamp, you may do so by clicking on an individual time stamp. In the example below, I used 3 time stamps that were spaced apart by 5 frames

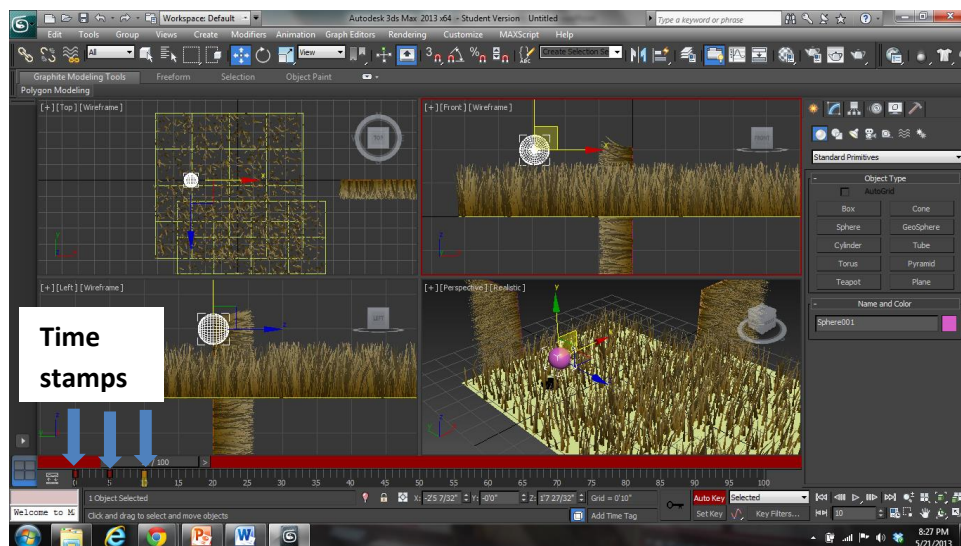


Figure 10. Time stamps mark the designated object movements and/or object modifiers during animation.

This is a very basic tutorial. There are millions of combinations that can be used. 3ds Max also has a Multiphysics modeler as well as thousands of custom plug ins for high quality animation. Tutorials for all of these advanced features are beyond the scope of this basic introduction.



## Rendering:

For rendering, first select “**Rendering-Render Setup**” at the top of the screen.

If you wish to change the background for your animation, select “**Rendering-Environment**” and choose your background.

You can render a still image (e.g., .jpeg file) by clicking “**Single**” in the Render Setup dialogue box. Follow the prompts and choose the file type that you prefer.

You can render an animation by (e.g., .mov file) by clicking “**Range**” in the Render Setup dialogue box and selecting the number of frames you wish to render. Frames are shown in the time slider at the bottom. Follow the prompts and choose the file type that you prefer.

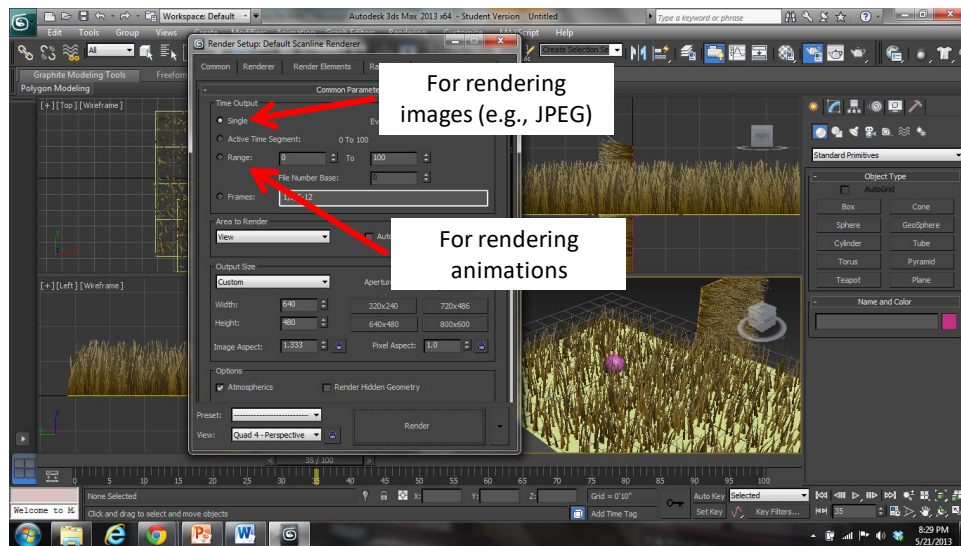


Figure 11. Rendering of images or animations.

1. The general window in 3ds Max has four working panes:
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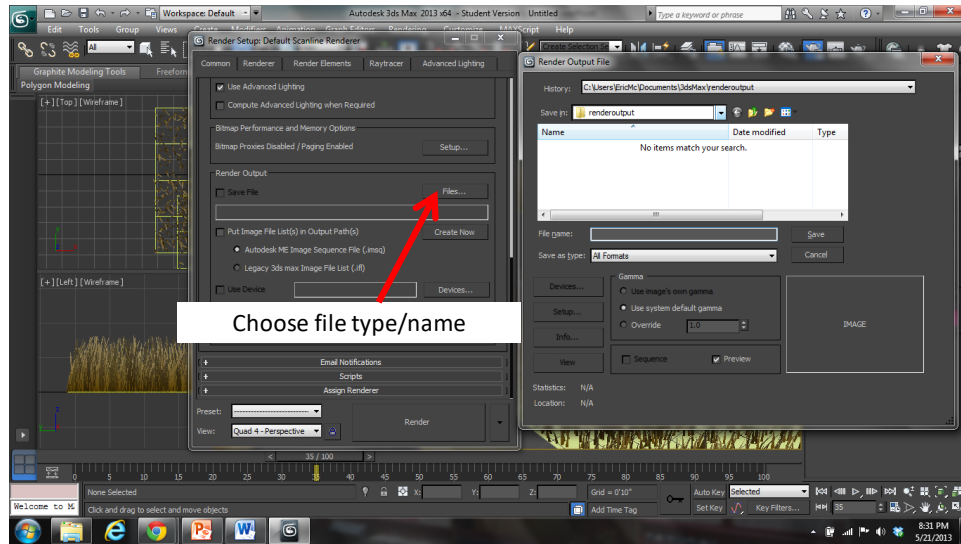


Figure 12. Choose file type for render by clicking on “Files...”

# 1. Example tutorials (to practice with general skills)

Simple way to make waves

<https://www.youtube.com/watch?v=dzkTY3kKyGM>

Vegetables

<http://www.youtube.com/watch?v=-0L8U3dMiEI>

River/creek flow

<http://www.youtube.com/watch?v=aXbuiXu8gY>

Bacteria/archaea

<http://www.youtube.com/watch?v=MRBdbKFisgl&list=PL573333DC6891238D>

Rock/microbialite

<https://www.youtube.com/watch?v=rHW949zf7iI>

Bouncing ball

[https://www.youtube.com/watch?v=ffv\\_WpluzpY](https://www.youtube.com/watch?v=ffv_WpluzpY)

Bowling ball/pins

<https://www.youtube.com/watch?v=qsApS4Kpu4Y>

General tutorial on materials

<https://www.youtube.com/watch?v=rOeMNE9OTes>

### **Supplemental material**

*General guidance of visualization of science*

Edward Tufte is a professor in statistics at Yale who pioneered the visualization of scientific data. For excerpts from “Beautiful Evidence”, see:

[https://www.youtube.com/watch?v=Th\\_1azZA2OY](https://www.youtube.com/watch?v=Th_1azZA2OY)

Tufte courses are open to anyone

<http://www.edwardtufte.com/tufte/courses>