Introduction

Welcome to the third part of our **Outfit Creation Guide**. This time I'll present you my workflow for creating skirts. I won't be trying to be super physically accurate, I'll just give you some basics, for experimenting further on your own. Creating a skirt that you like with cloth modifier in 3dsMax often requires a **fair bit of trial and error**. So let's get to it.

Before you start

I usually start modelling the skirt shape with the **bottom edges of the bodice** (fig.2) to make these two elements meet at this point. It's also good to start with this particular edge to have the same amount of points in the same positions, both for the skirt and bodice, in case you wanted to **weld** them afterwards (frankly I don't recommend doing that, since it's easier to rig a model **part by part** than the whole thing at once).

*I'm talking about starting a skirt from the edge at **page 5.***
*If you don't know how to model a bodice and/or how to set up your bodytype and skeleton please revert to parts 1 and 2 of the **Outfit Creation Guide** - **The Setup** and **Modelling The Bodice**.*

Briefly about sewing skirts

There were many types of skirts accross the history of fashion but we can list few main ones:

1. A straight skirt (rectangle-based)

The pattern piece for this one is basicly a **rectangle**, the short edges are seamed together and the top part (usually around the waistline or hips) is **pleated** to adjust the top circumference to the desired waist/belt dimensions.

This type gives a **cylindrical form** with a rounded top - thanks to the pleats. So in the end it looks more like a **bell-like form**.
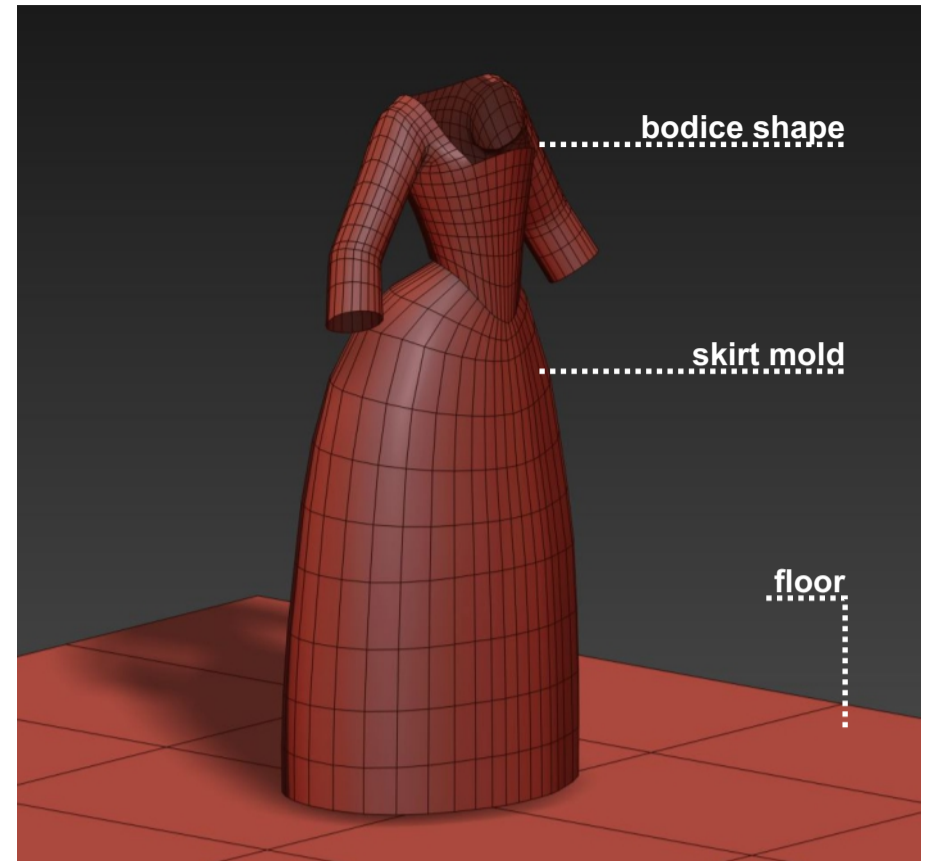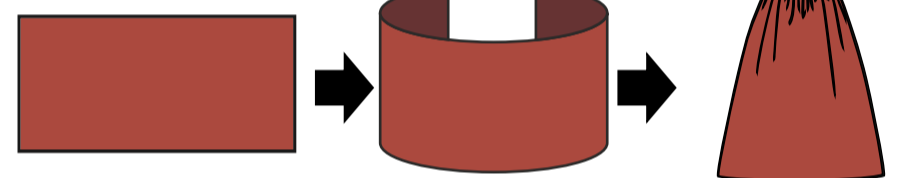
2. A circle skirt (circle/circle-fragment-based skirt)

The shape you need to cut out for this kind is in general a percentage of a **circle**. You can go from 1/4 of the whole circle up to 2x or 3x a circle. This type of skirt is usualy **fitted at the top** without any pleats (although you can add some extra circumference there to have some pleating in real life sewing) and it tends to create **multiple folds at the bottom** thanks to gravity. The more circles you cut, the more folds will happen.
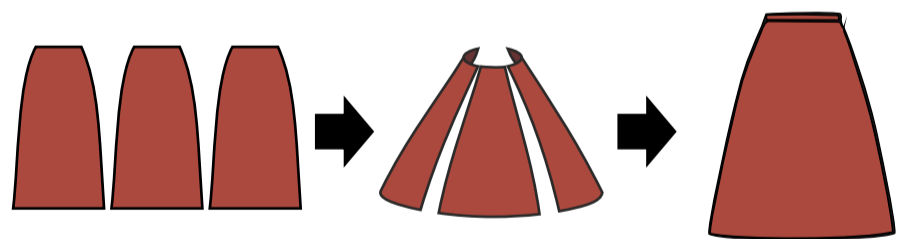
This type often gives you a **conical** or a so-called letter„**A"-line form**.
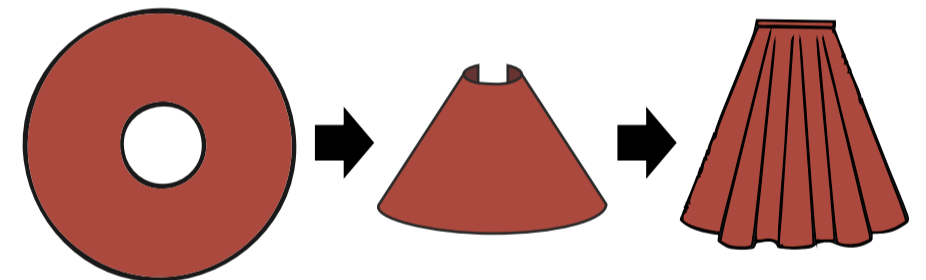
3. A gore skirt (gore-based skirt)

You have to cut out multiple shapes (**gores**) from the flat laying fabric and sew them together side by side.

This allows you to achieve **almost every desired shape**. This can be a way to construct both a **huge crinoline** skirt and a fitted **pencil skirt**.

Enough theory. I can tell you, from my own experience, that for 3d outfit mods you will need to model a general desired shape of the skirt/garment and for example add **pleats as a texture** (using normal map). Also **circle skirts** will come in handy if you wanted to get more volume and larger folds at the botom.

Let's move on to building the **simulating rig**.

Creating the simulation collision objects

A simple skirt interacts usually with two kinds of objects. Fist one is the wearers body (hips and legs area), which is often additionally shaped by various **underpinnings** like peticoats, cage and cord crinolines, bustles, paniers, bum rolls and pads. We'll be calling all these objects „**skirt mold**", this means a shape that we actually want the skirt to follow. Second object exists only for long skirts and it's the **floor**. These are the two main **collision objects** (fig.1) in our rig.

Tip: It's good to scale the **skirt mold** a little bit down. We don't want it to touch or intersect the bodice nor the skirt in their **initial state**.
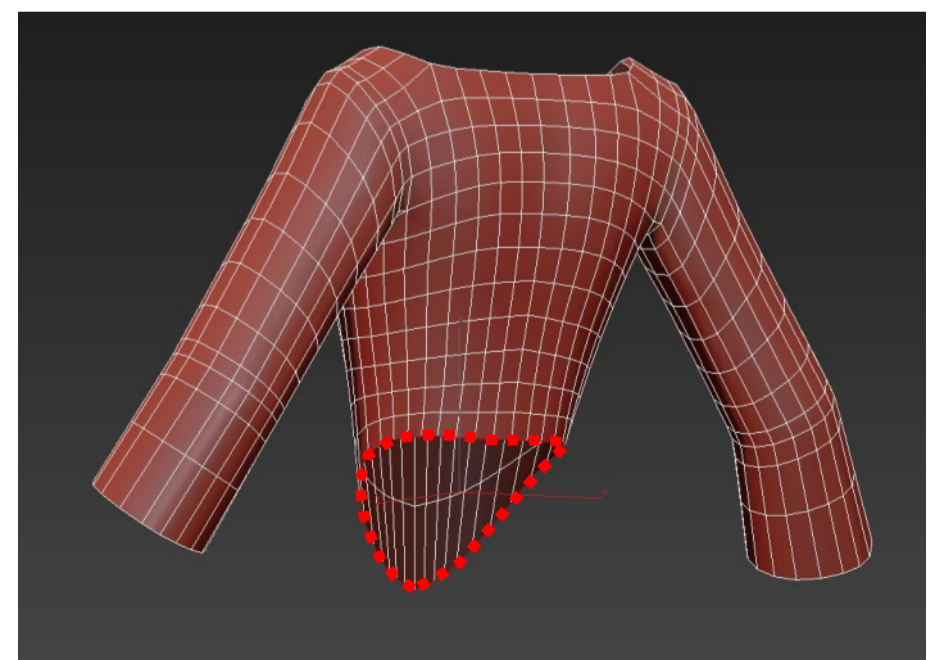

fig. 1 Underskirt simulation objects

pattern shape   basic form   final look

fig. 2 This is the right edge to start our underskirt

Modelling the initial shape

So, let's model the **initial skirt shape**.

In the case, of a baroque „**Mantua**" gown, it will be most probably a **straight skirt**. Why then am I modelling a **bell shape**? It's because I won't be modelling the accual pleats. I will only add them in texture using normals. So the bell shape is a cylinder with the pleats already applied (fig.3).

We need to leave somewhat ease between the **mold** and the **initial skirt shape** (fig.4) to get more folds during the simulation. I also finish the initial shape just above the floor since we want it partly laying on the floor surface in the end.

If the shape looks nice, let's add some **more resolution** to the mesh using **TurboSmooth** (fig.5) . the more vertices the more detailed the simulation, but also the slower. If the simulation takes too long it's probably because the **mesh is too dense**. You have to test what mesh resolution is best for you and your pc.

Object Properties Setup

Ok. We've got the **initial skirt shape** done, properly placed at the waist and there is some **ease between the skirt and the mold**. Let's add the **Cloth Modifier** to the top of the stack and set things up.

To enter the **Simulation Objects** properties click the „**Object Properties**" button (fig.6) and a separate window will appear.

First you have to add all the **Collision Objects** by name (that's why naming them in a clear way is important). Then you've got to click each object on the list to the left and select one of three options to the right for every one of them. In our case the skirt shall be defined as „**Cloth**" and both other objects as „**Collision Object**".

After this basic setup hit **ok** and exit the **Object Properties** window. Hit the **Object Properties** button again and check if the settings are stored. It's often that you have to do it twice - I don't know why but it's a bug of some kind.

If you are completely sure that the basic object definitions in the **Object Properties** window are good and stored, you can move on.

The second step of the config is selecting a fabric type **Preset** which you want to use for our simulation. This time I will use „**Burlap**" since I want the skirt to be more **rigid** but in most cases the **Default** preset will do. You can experiment with other presets but I remember that softer and more sophisticated materals are eager to **crash the simulation**. I'm using another parameter to control the scale of the wrinkles and folds - I'll mention it later on.

As you can see, there are lots of **fabric paramaters** you can fiddle with. In my view the only thing you may want to touch is the **Offset** parameter (fig.6,7), which defines the actual gap between the cloth and the collision object. You may want to minimise it to simulate the skirt very closely to the mold or increase it to avoid clipping. This parameter can be set both for the **Cloth** and the **Collision Object**.

The other set of parameters that may come in handy for you are the „**Frictions**" (fig. 6,7). They may be helpful if you want the cloth to stick to the mold or to itself, or be more slippery.

Initially I leave all frictions as default and only fiddle with the offset values.

Tip: I don't know what is the scale of your body model, but mine is somewhere around **120 units tall** - so these units are no centimeters nor inches. Remember that while setting the offsets.

You can hit **Ok** at the bottom of the **Object Properties** setup window.

Last but not least for the numeric setup is enabling **Self Collisions** and setting the **cm/unit** value (fig.8). I'll go with **1,5**. The more centimeters you type the more detailed the wrinkles and folds will get. For example if you want to get a cardboard-like behaviour - go below 1. If you want the skirt to flow - then go above 2.
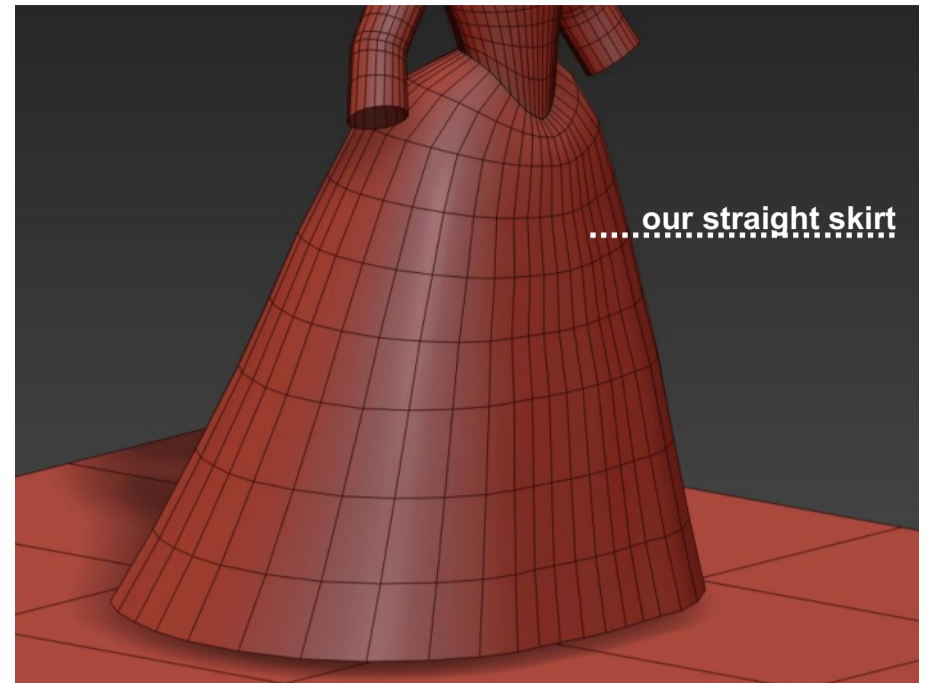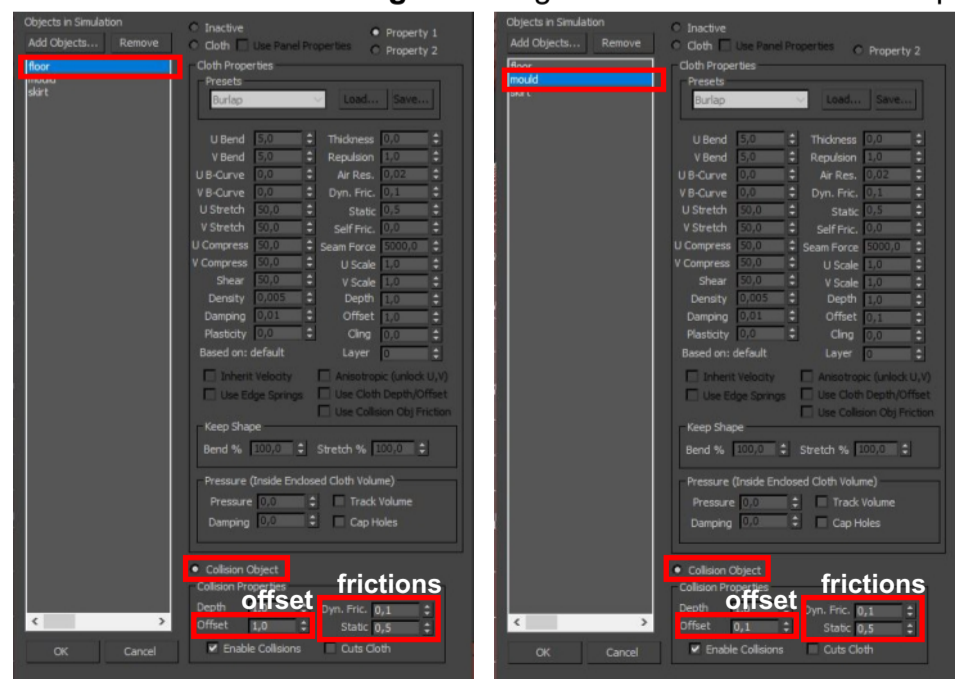
fig. 3 Underskirt initial form
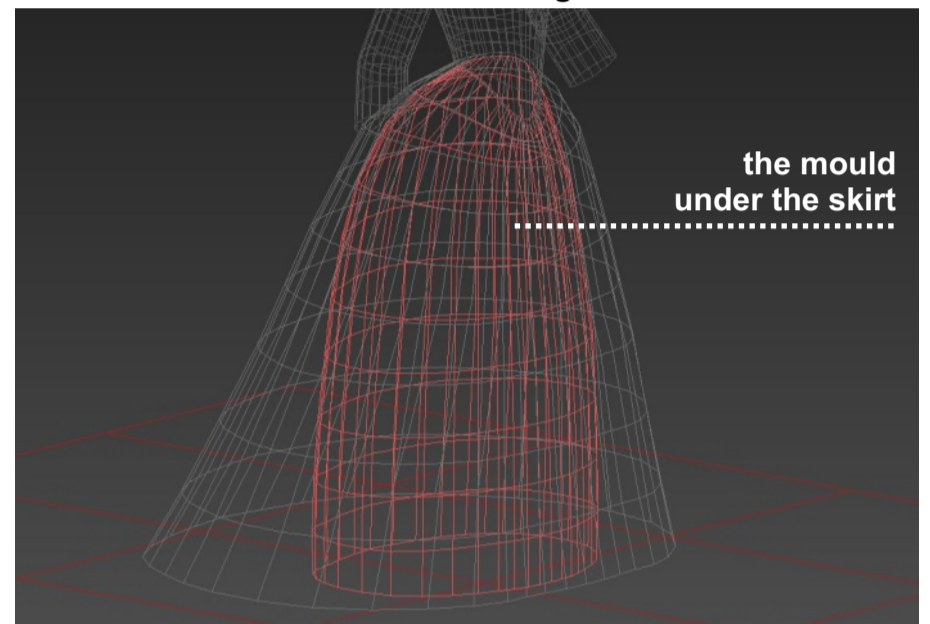
fig. 4 Underskirt initial form and the mould in wireframe
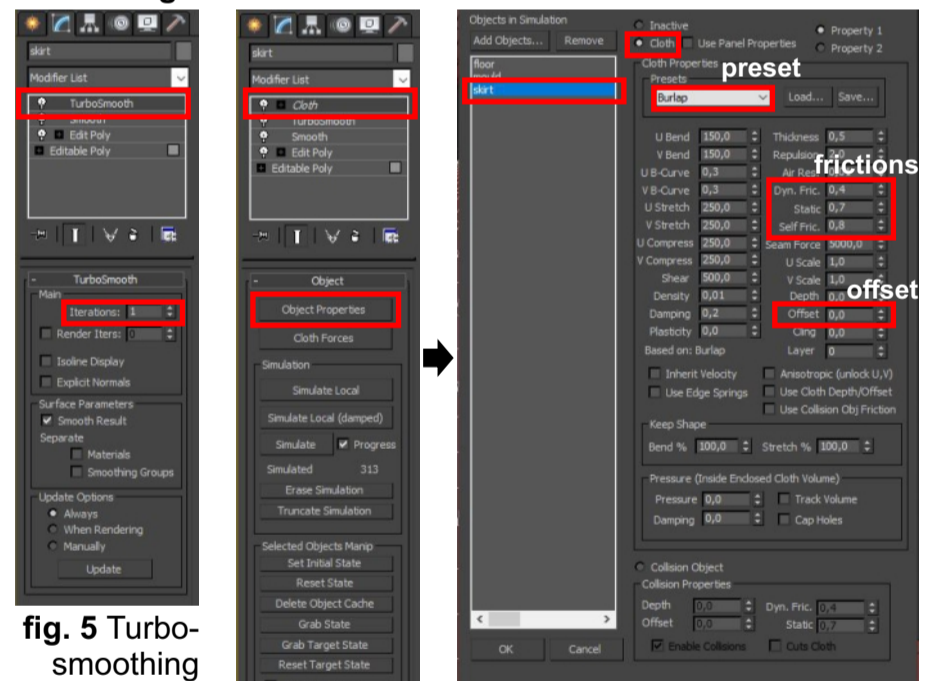
fig. 5 Turbo-smoothing

fig. 6 Adding the cloth modifier and setup

fig. 7 Further cloth modifier and setup

Creating the skirt belt

The final thing that we need to do before hitting the „**Simulate**" button is to make the „**belt" vertices** of the skirt initial form stay in one place. They have to be excluded from the simulation.

To do this we need to drop down the **Cloth** rollout in the **Modifier Stack** and select the „**Group**" edition level (fig.9). With this selected we need to pick the points that we want to preserve from moving (fig. 10).

You may want to switch the „**rectangle**" selection tool to „**spray**" selection tool and switch the viewport to **top view**.

With the desired points selected just hit the „**Make Group**" button and after it appears in the group list - select it and press „**Preserve**". This should add a „**(preserved)**" suffix to the group name.

That's the last thing we had to set up for this skirt.

You may check if you have some more than **100 frames** in your timeline (I usually go with **1000**) and we're ready to go. Open the time setup by clicking this button:
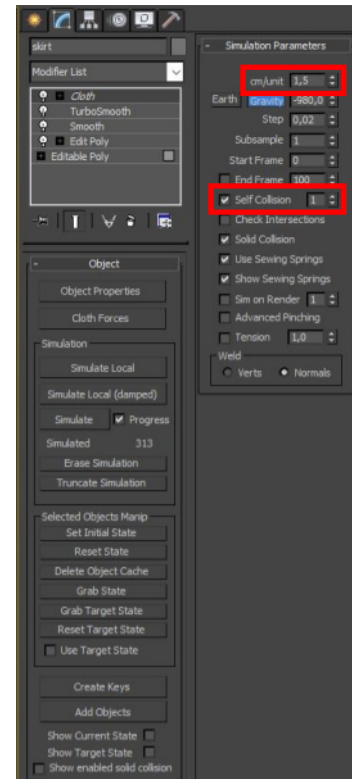
The simulation

Well. Just hit the „**Simulate**" button (fig.11) and watch.

The belt should stay in its initial position and the simulation should go on until the skirt gradually settles down and stops moving. If it will stop **rapidly** - this means that you probably have to change the fabric type preset and try again. If you want to restart a simulation with some frames already processed, you need to hit the „**Erase Simulation**" first. Also „**Delete Object Cache**" sometimes help to reset things properly.

If you want to change the **initial skirt shape** you may try actually editing it and pushing „**Set Initial State**", but from my experience it's best to delete the **Cloth Modifier** and place a new one and do the whole setup again. I tried many times to avoid redoind the whole cloth setup after the edit and it just made the cloth act a bit weird - just as if it wanted to get back to it's previous shape.
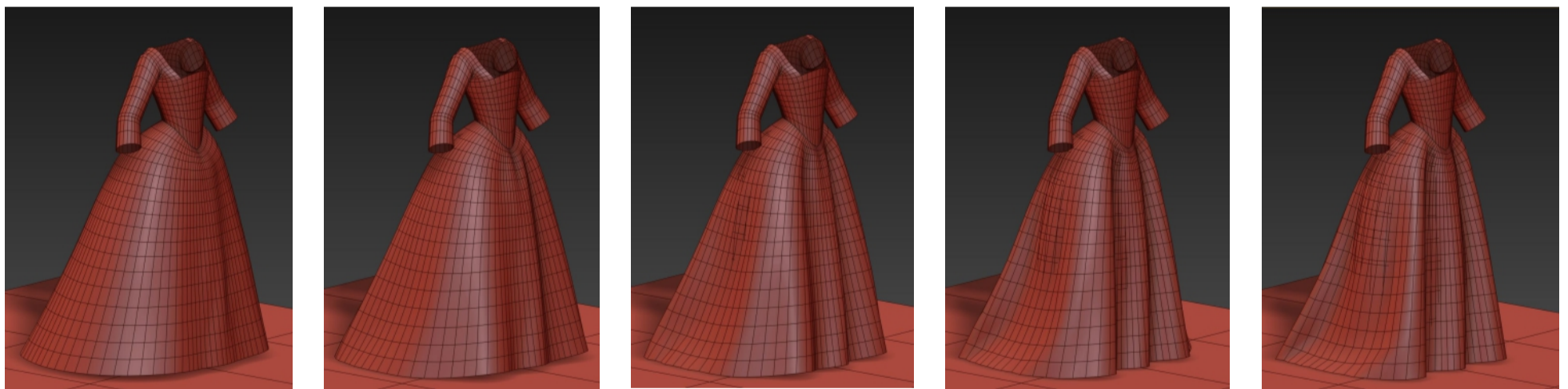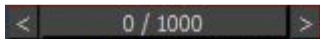
A few snapshots from my simulation:

fig. 8 Units and collisions   **fig. 9** Groups   **fig. 11** Simulate

fig. 10 Our selection for the group

fig. 11 Sit back and watch it simulate

After the simulation is done and satisfies you, we may use the **timeline slider**

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to pick the animation frame that you like the most and simply **collapse the shape to an editable poly** (fig.12).

Tip: You may want to keep the **animated version** as a backup before collapsing the skirt into a poly, since you may want to simply change your mind.
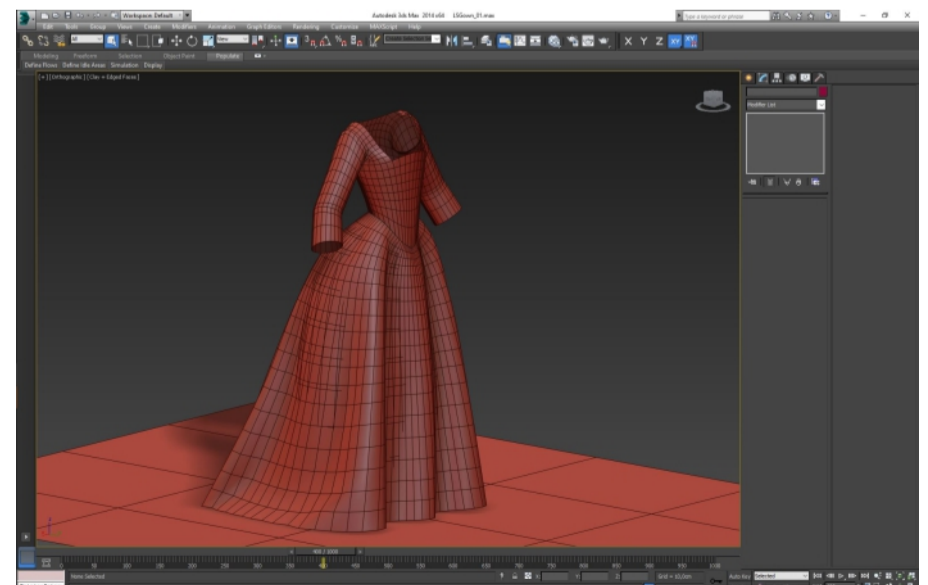

fig. 12 Choose the frame and collapse

Modelling the overskirt

If you've already picked your favourite form of the **underskirt**, let's move on to the **overskirt creation**.

We'll be starting the shape the same way as we did the overskirt, but this time we'll do more like a **circle skirt**.

So again you can (fig.13):

• Select the **bottom edges** of the bodice and create a spline out of these edges. Convert it later to **edit poly** and futher edit the shape into the overskirt.
• Scale the edges up while holding **shift button** - this way you'll create some **new polygons** that can be **detached** later on to a separate form and further edited into the overskirt.

No matter what method do you choose you need to end up with a **round nearly flat form** - circular on the outside and aligned with the bottom edge of the bodice on the inside (fig.14). That would give you a true **circle skirt** simulation.

Use **TurboSmooth** to increase the **mesh resolution** if needed.

In this moment you may notice, judging by the images, that my initial simulation overskirt shape is **different** (it's not merely flat) - it's something **between a flat circle and a bell shape** and it's a bit elongated in the back. Why? It's an effect of experiments.

First I did a simulation with a **flat circular shape** and I didn't like it. Then, I modified the form using **soft selection** and pulled the outer edge down, softly affecting the points towards the centre, to finally get a satisfactory simulation effect. **The trial and error process took some time**, but what you see in the next pictures is the already modified initial form. In case of all skirts - **you have to start with a simple form** - flat circle or a bell shape - simulate and **modify** them to get a satisfying end result.

Setting up the overskirt simulation rig

The **simulation rig** for the **overskirt** is similar to the one we did for the underskirt with two exceptions:

• **The underskirt now will be a collision object** - just as the underskirt mold in the first stage. I use to collapse the underskirt before setting up the cloth modifier for the overskirt.
• **We'll add some helpers** that will pull the certains points of the overskirt to get a characteristic „Mantua" gown look.

Ok. If our **overskirt initial shape** is ready and the **mesh resolution** seems dense enough but won't freeze our system, let's:

• Add the **Cloth Modifier** to the stack
• Add the **Collision Objects** to the list in **Object Properties** window and set which one is a **Cloth** and which one is a **Collision Object**.
• Enable **Self Collisions** and set up the **Units** in the **Modifier Panel**.
• Create a **Group** of belt points that will be **Preserved**.

If you don't know how to do any of the things above - revert to **page 3** of this tutorial.

After these setups are done, let's add the **helpers**. I'll create **boxes** in the points I want to pull (fig.15). You can also use **point helpers** or any other geometry. I did four boxes. Two of them will pull the front/sides of the skirt apart and back and then up under the bum area, and two other boxes will pull the skirt a bit up in the back to create a kind of bustle effect.

Next we need to go to **groups editing rollout** in the **Modifier Panel** select certain points and „**Make Group**" for each one of them (fig.16). But here instead of selecting a group and pressing „**Preserve**", we will click „**Node**" and select our box helper to make it pull the point.

You can also pull **many points at once** with one helper. I made the „bustle" helpers pull several points in a row to made them form a wider chunk of fabric in the top/back area.
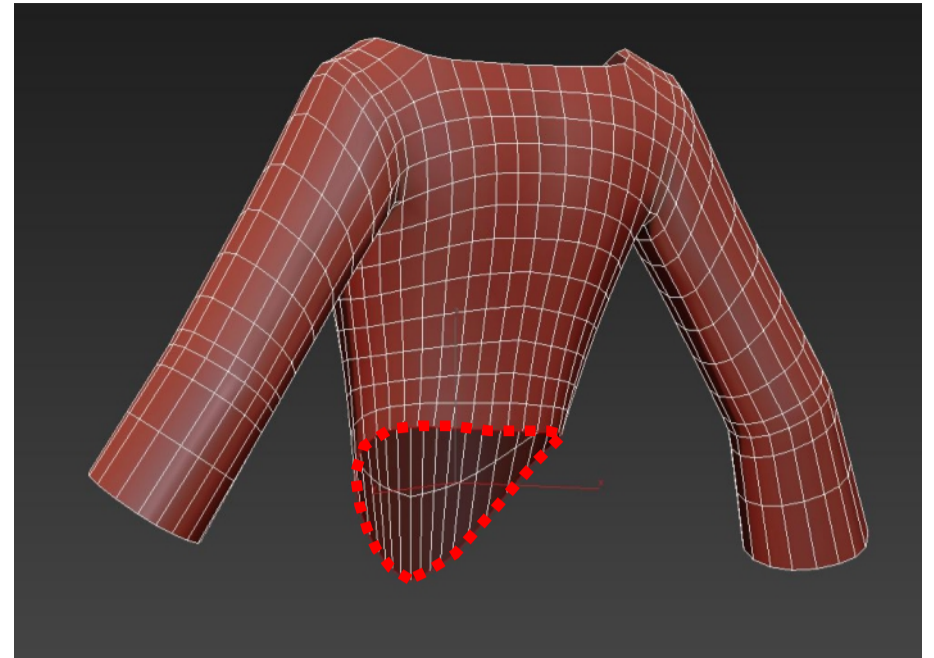

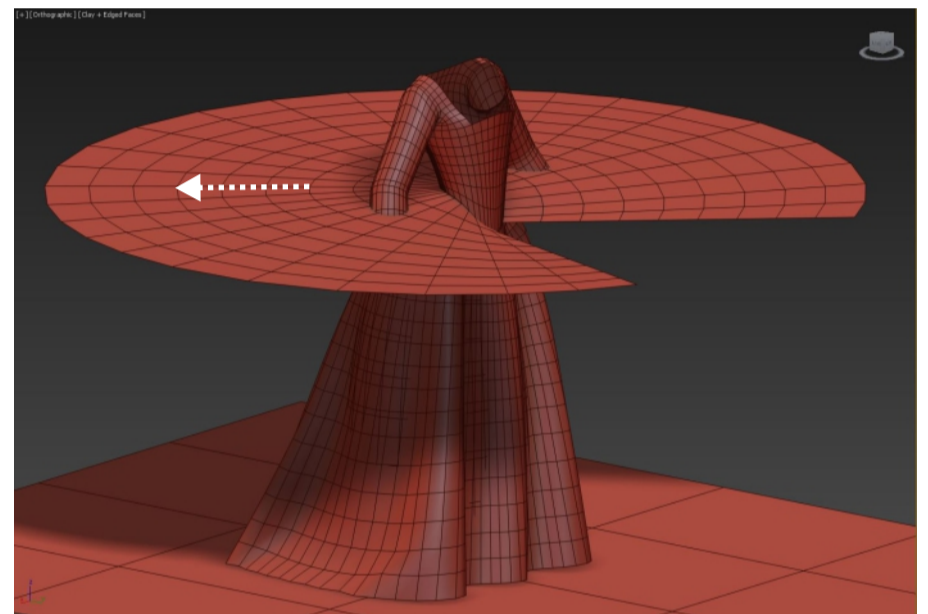**fig. 13** This is also the right edge to start our overskirt

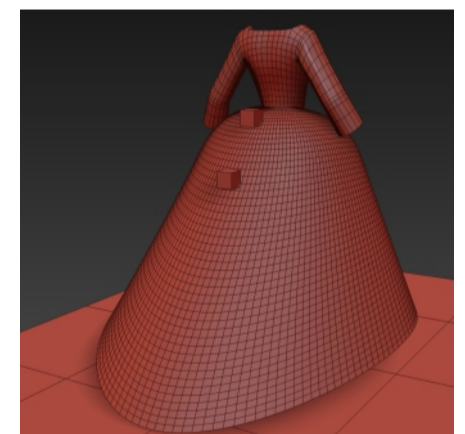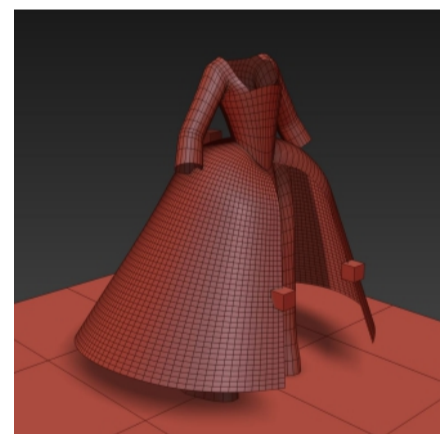
fig. 14 Let's start with a circle this time

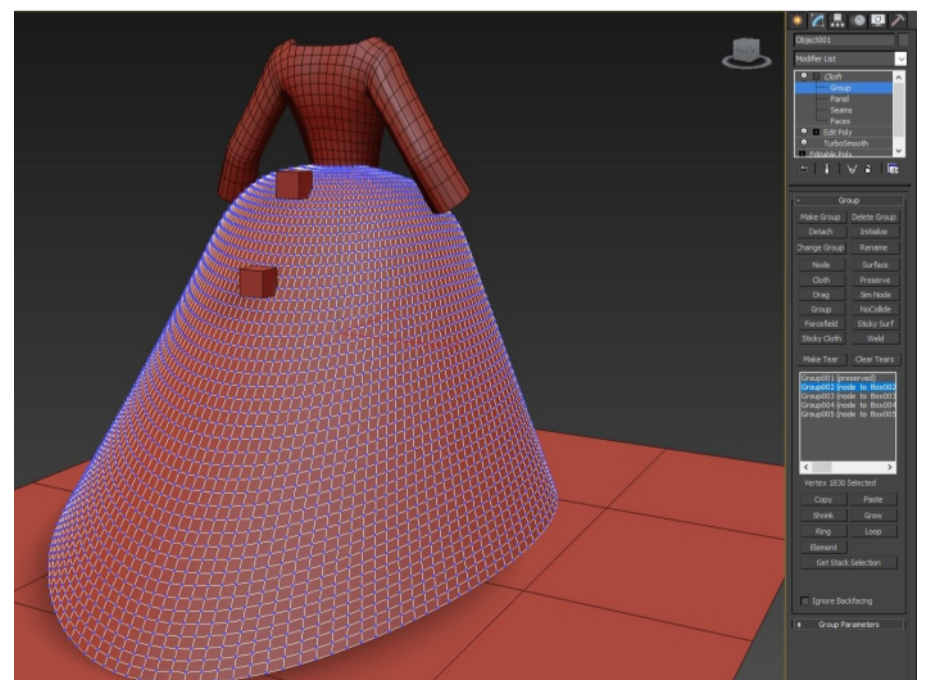**fig. 15** Adding the helper boxes

**fig. 16** Setting up the „Node" groups for the selected points

Animating the helpers

Before we hit „**Simulate**" for the overskirt, we have to **animate the helpers** to make them pull the parts of the skirt in certain directions.

First, again - make sure your **time setup** has something between **200-1000 frames**. The default **100 frames** may not be enough.

When you're ready to start moving the helpers around, to define their positions at various frames, hit:
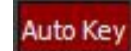
Auto Key

The viewport area should get a **red frame** when **Auto Key** is on (fig.17). Before you start moving to different frames and moving your helpers around you should set the **animation keys** for all helpers at **frame 0**. For this, select all helpers and hit:

Then we'll go somewhere around **frame 70** with the animation slider:

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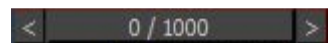
And, with **Auto Key still on** we'll move the helpers around setting their desired position for this frame. A key should **automatically appear** on the timeline at a certain frame when you move the object.
Then We'll go to **frame 100** and set the helpers' positions and consequently around **frame 160** to define the final positions.

You can see the **diagram** of moving these four points for a „Mantua" skirt (fig.18).

Of course you may create **as much helpers as you need** and define different positions for them all along the timeline. From my experience a typical simulation takes around **200-500 frames** but it all depends on the **Cloth Modifier settings**.

After we set up all the helpers' positions for the desired frames, we can turn the **Auto Key** off and **play** the helpers animation to check if it works well.

When this is done. We may check if all the **Cloth Modifier setup** is done and hit **Simulate**. You can sit back and watch it animate (fig.19).

Again, if anything **freezes or ends** in the middle of the animation - you have to check your **Cloth** setups. If the fabric is too stiff - increase the number of **cm/unit** in the **Modifier Panel**.

It's very likely you don't get a satisfying result at first, but editing the **helpers' movement** and the **initial form** of the skirt will bring you closer and closer.

For example I did almost 10 versions of **Helena Modrzejewska** skirt and all of this took a long time, but was worth the effort.

Last but not least. When you're satisfied with a certain frame - just **collapse the skirt into an edit poly** and save the scene to a new file ;)
I like to keep my wip scenes at different stages. You may do a Tutorial later on for example. ;)

That's all for now.

Hope you liked this part of our **Outfit Creation Guide**. Please ask me questions in the **comments section** or via **PM** if anything is unclear.

Many, many thanks for downoading the guide and supporting my **Patreon** page.
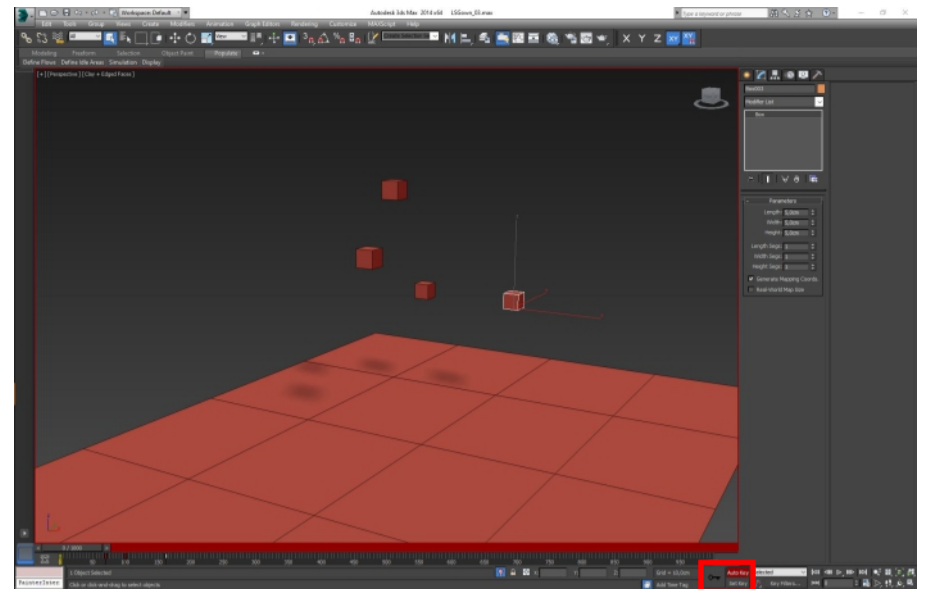
Good luck with your simulations guys! :)
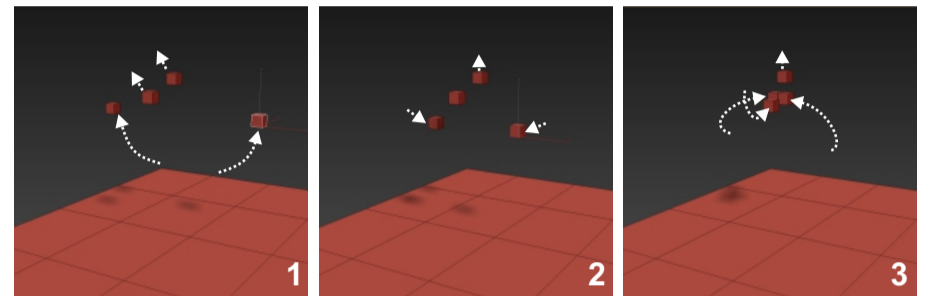
K.

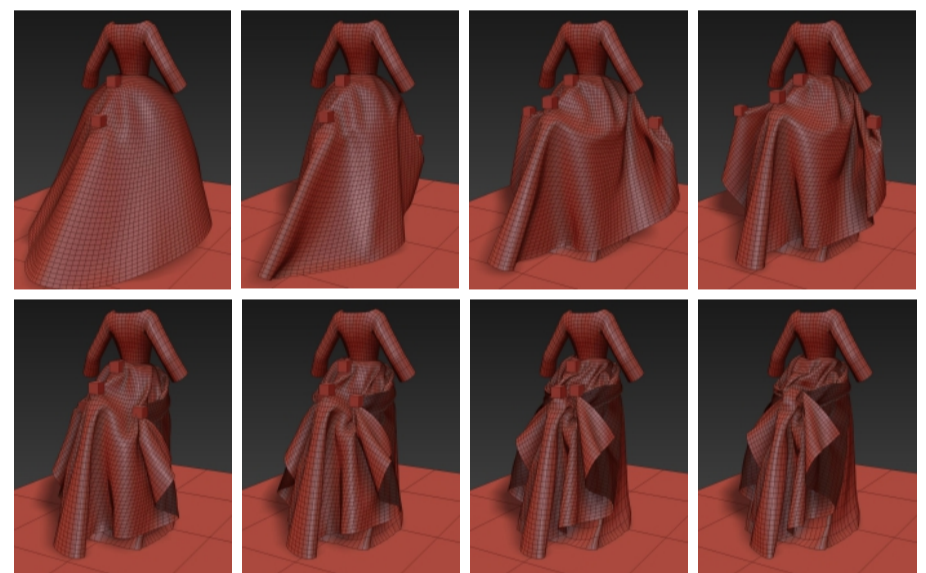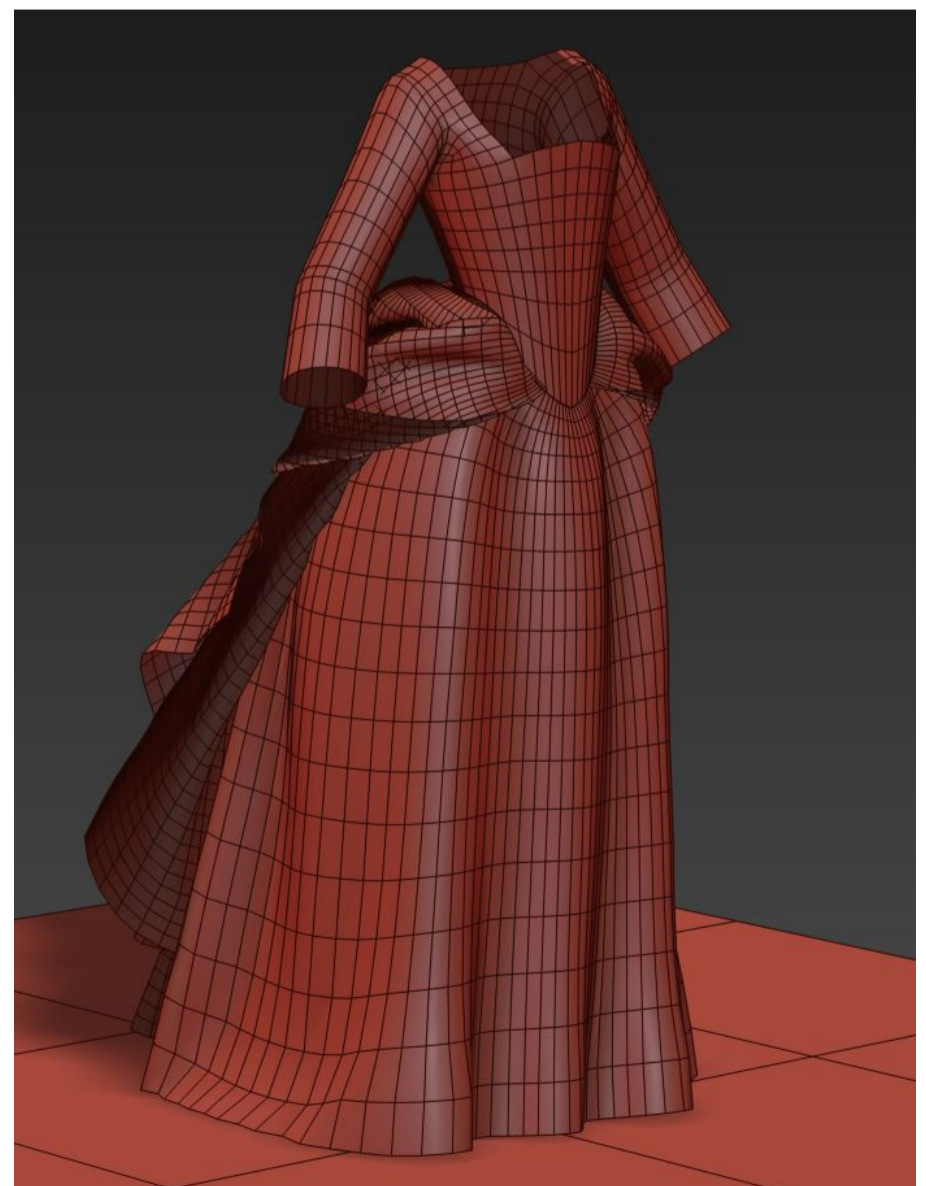**fig. 17** Animating the helpers

fig. 18 My helpers motion scheme

fig. 19 There she goes...

fig. 20 Collapse and Voila!