

Character and Set Design

Interior Reconstruction

COMS31000 Coursework 1

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1 Introduction

This report details my virtual recreation of the upstairs seating area in Bakesmiths, a café and bakery located on Whiteladies Road, Bristol.

2 Pre-production and Planning

2.1 The Environment

After visiting a number of cafés, venues and public spaces, I decided on Bakesmiths because of the rich lighting and rustic decor.

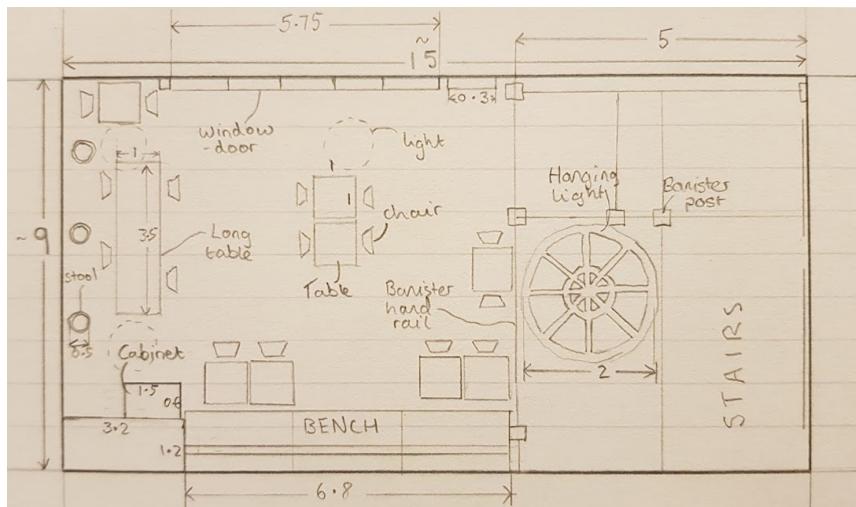


Figure 1: Photos of the upstairs seating area in Bakesmiths

As seen in Figure 1, Bakesmiths is well lit both with natural and artificial light, has a range of interesting textures and lots of unique geometry. The diverse selection of objects in the room allows for the exploration and employment of a variety of modelling tools and techniques.

2.2 Gathering Data

Before starting my model, I gathered information about the layout of Bakesmiths.



(a) Floor plan sketch dimensioned relative to table top width



(b) Profile of banister post top

Figure 2: Examples of photos and data gathered from interior

I took perspective photos of all major objects such as chairs and tables, as well as profile photos of objects which I planned to model with curves, such as the banister post top see in Figure 2b. I also took many general photos of the scene and drew an approximate floor plan of the interior, measuring dimensions relative to the width of a table (Figure 2a).

3 Techniques and Surfaces

The list below summarises the main selection of tools and techniques used when recreating my interior. I have also noted the main objects for which I used each technique using names as they appear in the Maya binary file, and have included a number of screenshots illustrating the use of these techniques alongside justification in subsection 4.3. Entries marked as experimental do not appear in the final model.

- Surface Revolves
 - Metal hanging light shades
 - Sign light shades
 - Banister pillar tops
 - Table number holding cans
 - (Experiment) Banister ribs
- Surface Lofts
 - Banister ribs
 - Chair base and back
- Surface Extrudes
 - Overhead light inner braces
 - Hanging light cables
 - Chair legs
 - Sign light cables
 - Sign hooks
- Surface Bevel
 - (Experiment) Bench
- Polygon Bevels
 - Most visible polygons
 - Bench cushioning
- Polygon Extrudes
 - Most visible polygons
 - Windowed door
 - Tables
 - Hanging light frame
- Poke
 - (Experiment) Bench cushioning
- Polygon Wedges
 - Windowed door handle
- Duplicate Special
 - Equally spacing banister ribs
 - Overhead light ring braces
 - Stool legs
 - (Experiment) Mirror instance for wooden spoon
- Polygon Sculpting
 - Banister hand rails
 - Skirting trim
 - (Experiment) Banister pillars
- Boolean Union
 - Rectangular table
- Boolean Difference
 - Banister pillars
- Circularise
 - Cabinet
 - Sign hook attachments
 - Door handle key form
- Edge Softening and Hardening
 - (Experiment) Banister pillars
- Object Mirror
 - (Experiment) Wooden spoon
- Offset Curve
 - Chair base and back

4 Modelling Process

4.1 Setup

Prior to building my scene, I familiarised myself with Maya by creating, duplicating and subsequently rendering a pint glass. Once comfortable, I created a new workspace for my scene and set up a GitHub repository such that I could save regular backups of my project as it developed.

4.2 Modelling Methodology

When modelling objects, I created a new Maya file which gave me a fresh space to work in. After completing the model, I then imported it into the Bakesmiths scene and positioned it as necessary. This methodology provided a tidy way to organise my project with an assets folder containing reusable components. I also frequently rendered the scene to observe for artefacts caused by non-manifold geometry. Figure 3 shows a selection of these progress renders.

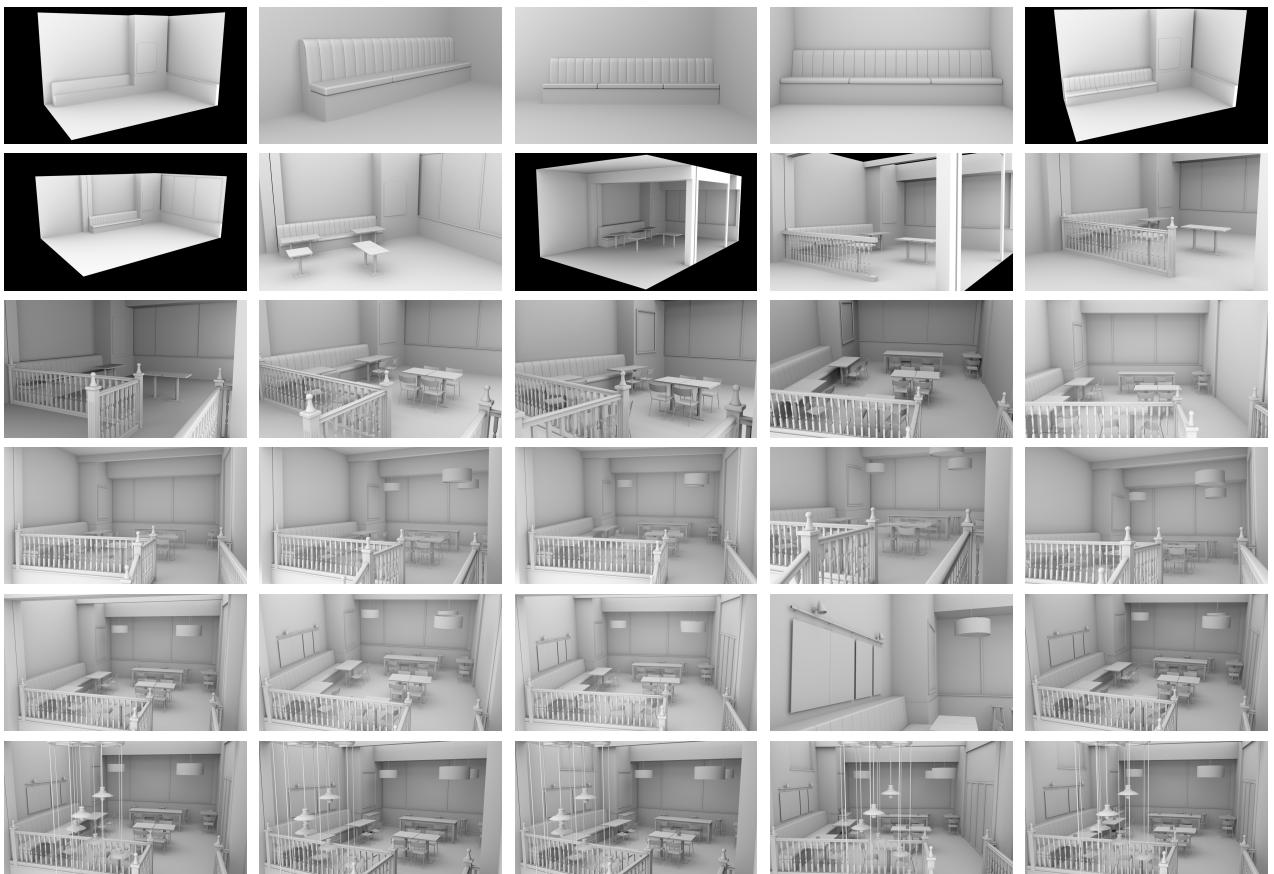


Figure 3: Renders showing progression of model

4.3 Process and Model Details

I started the reconstruction by positioning bounding planes which form the inner walls of the interior. After I had the space enclosed, I started blocking out the scene with placeholder polygon primitives which represented the position and approximate scale of objects. I also created the main structural elements in my scene such as ceiling braces, wall pillars and windows. It was important to do this stage before adding to the model as rescaling detailed objects is often not easy.

The first object which I attempted to create was the bench. Since we were strongly encouraged to work with curves and had not had many lectures on polygonal modelling, I created a cross section profile of the bench and used the surface bevel tool to create a single rib. I then duplicated this surface and capped each end with a surface plane. This method resulted in small gaps around the NURBs planes (as visible in Figure 4) which at the time I was unable to resolve. With the experience that I have now, I would have converted the surfaces to polygons and used the fill hole tool to create the caps.

I later returned to the bench and re-modelled it using the primitive-up technique as polygonal bevels were sufficient to create the minimal padded aesthetic. Though it looks simple, this was the object which I struggled with the most.

After creating the bench, I worked on the square tables, which I created using a series of simple linear polygon extrudes. I then started working on the banisters. I initially modelled the banister ribs using a surface revolve traced from an image plane (Figure 5b), however due to the perspective distortion in the photo I struggled to accurately draw the profile curve. As a result of this, using a loft seemed like a more flexible approach as the profile circles sit perpendicular to the image plane and are subsequently affected less by perspective distortion. The banister pillar top (Figure 5c) was better suited to a revolve as the profile image was minimally distorted. Figure 5 shows the revolve profile curves alongside the final lofted banister rib.

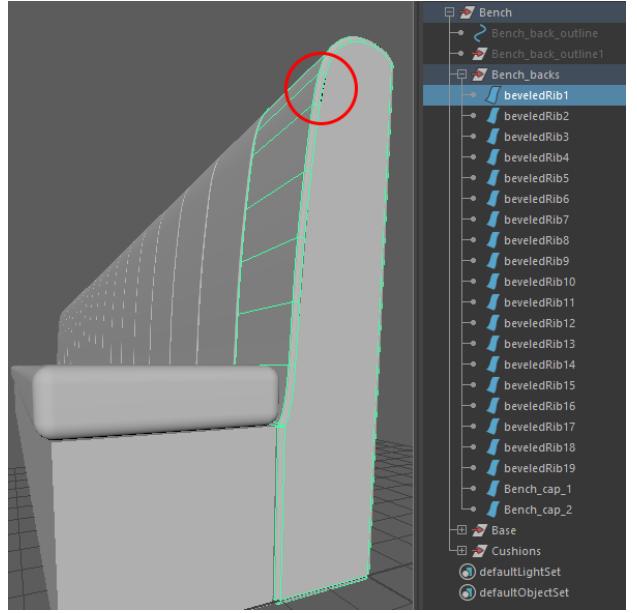


Figure 4: Bench created with surface bevels

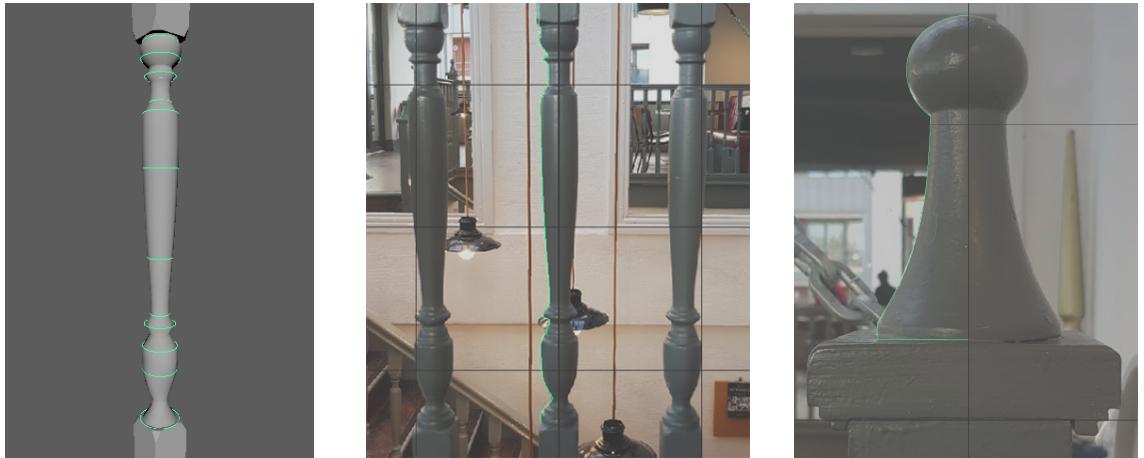


Figure 5: Modelling the banister pillar top and ribs

To create the banister pillar body, I initially added edge loops to a reshaped polygon cube and pushed vertices inwards, however this did not have crisp edges when rendered (Figure 6b). In an attempt to solve this, I tried hardening the edges but the topology did not have a high enough resolution to look smooth (Figure 6c). To create realistic grooves, I decided to use the boolean difference tool with bevelled and stretched cylinders. I equally spaced these cylinders and added a matching number of face subdivisions such that the topology remained clean. This produced the sharp edges that I was looking for and resulted in a banister which very closely resembles the reference photo.

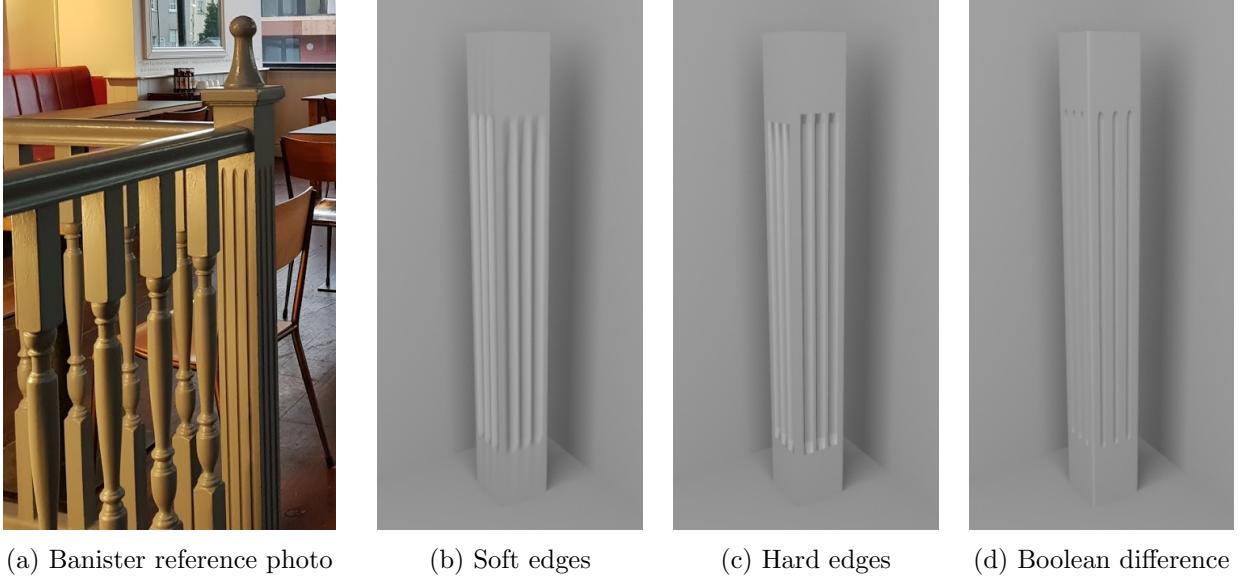


Figure 6: Banister pillar body comparison

After adding the completed banisters to my scene, I moved on to making the chairs. The organic shape of the chairs suggested that the use of NURBs would be appropriate. I created the legs using a surface extrude along a curve (with a slight taper), and formed the seat and back with a surface loft. I created the leg profile curves first, then used the offset tool to create matching curves for the surfaces. Using the offset tool resulted in the seat surfaces aligning perfectly with the chair legs. I then converted the seat surfaces to polygons and extruded. Figure 7 shows the profile curves used to construct the chair.

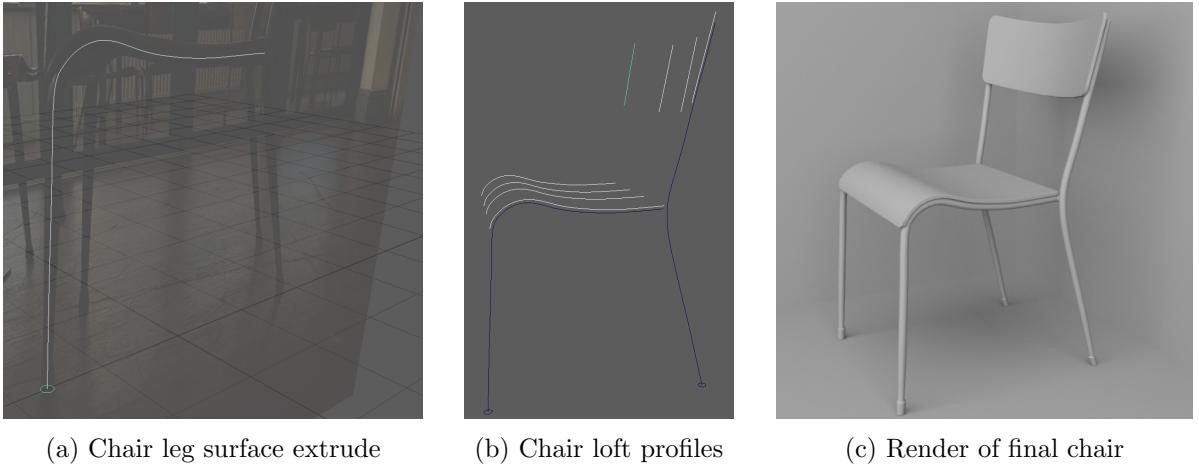
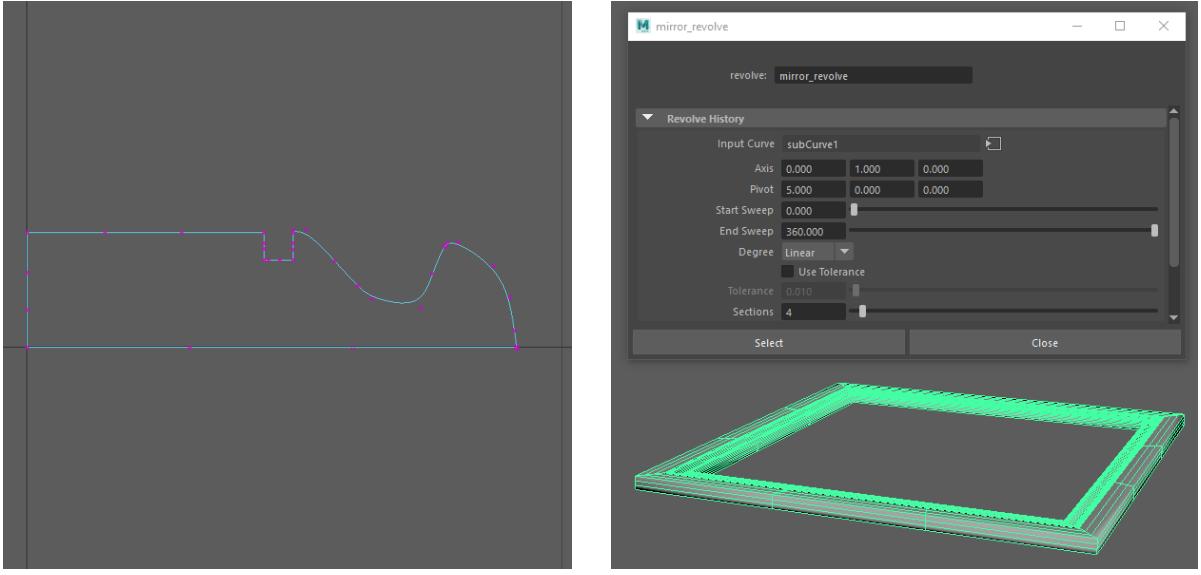


Figure 7: Modelling the chairs

With the chairs completed and positioned throughout the scene, I started working on the mirror frame. I first created a cross section profile using a combination of one point and three point EP curves. To create the frame from this profile, I initially tried a surface revolve with only 4 segments (as seen in Figure 8b), however this technique could only be used to create a square shape and as such was not suitable in this situation. Instead, I took the time consuming approach, creating and positioning four extrudes, rotating the end faces by 45° such that they join flush.

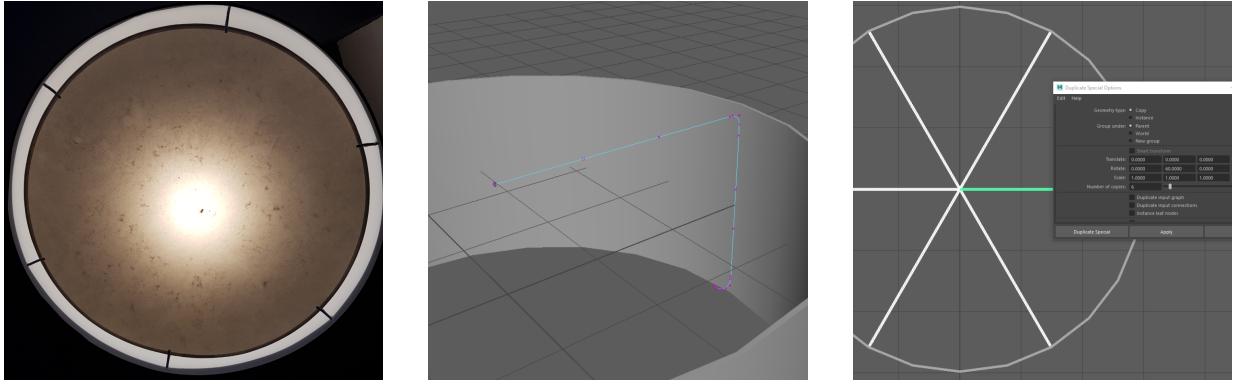


(a) Mirror frame cross section profile curve

(b) Creating a square mirror with a surface revolve

Figure 8: Modelling the mirror

The next objects that I created were the overhead lights. These consisted of an outer cylinder surrounding metal wires which suspend an inner light diffusing fabric disc, as can be seen in Figure 9a. I created the outer cylinder and inner disc using simple polygon extrudes, and created the suspending wires using a profile surface extrude followed by a rotary duplicate special. Using duplicate special is more time efficient than modelling the wires individually, and the use of a profile extrude was suitable considering the constant cross section of the wire.



(a) Photo of light underside

(b) Wire extrusion profile

(c) Rotary duplicate special

Figure 9: Modelling the overhead lights

I was very pleased with the outcome of the overhead lights, so I then created the stools using a similar technique and moved on to adding detail to the left wall. The hanging wall signs are resized cubes suspended from a cylindrical tube by hooks, which were created using a profile extrude, as demonstrated in Figure 10a. I created the hook mounts by sculpting a polygon cube, and used a number of vertex manipulation tools including the chamfer tool and the circularise tool to create the mounting screws. I chose this approach as it was easy to create screws on both sides without introducing and combining more primitives. I modelled the sign lights using a single revolve and then added profile extruded cables. Although these objects are quite far away from the camera, the extra detail has helped make the scene more realistic.

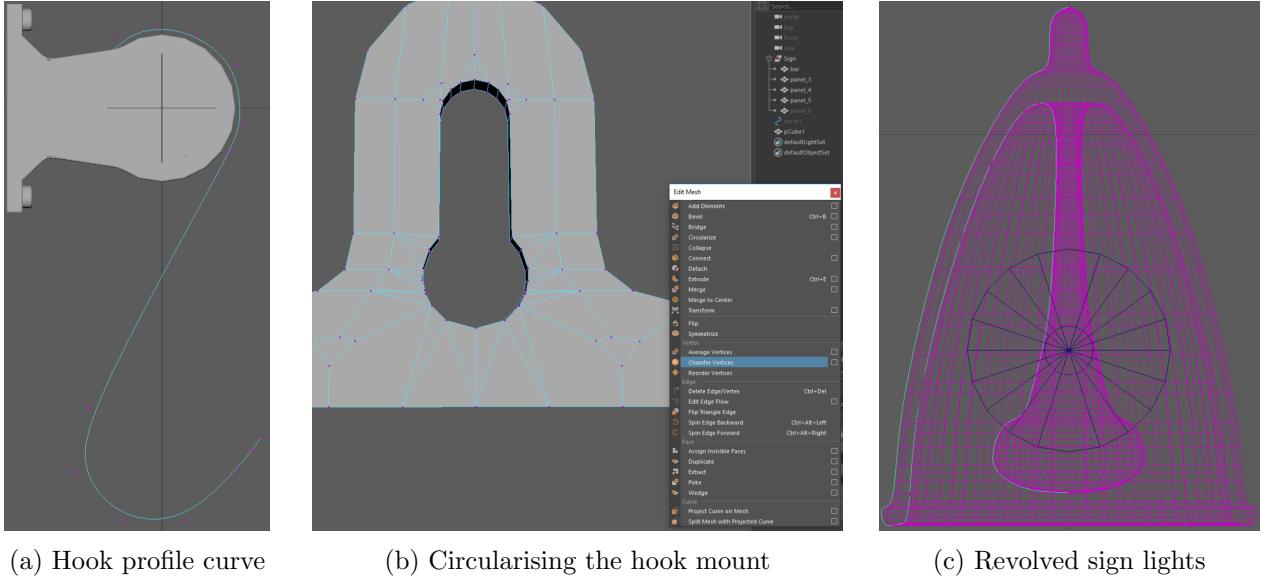


Figure 10: Modelling the hanging signs

At this stage, the scene was nearing completion, but there were still a few objects to create. I made the windowed door using a series of extrudes (the regular shape of the door suggested NURBs surfaces were unsuitable), and added a door handle which I initially made using a profile extrude. Since this extrude was self-intersecting (see highlighted areas in Figure 11a), I re-created it using linear extrudes in combination with the wedge tool for the rounded corners.

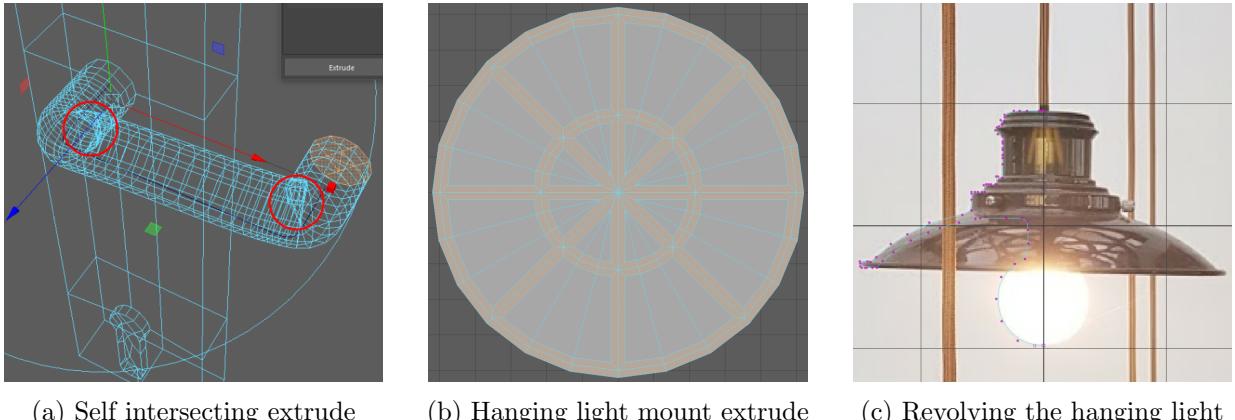


Figure 11: Modelling the door handle and hanging light

I then created the hanging light mount with a series of polygon extrudes (Figure 11b), and suspended revolved lights with cables made using surface profile extrudes. Using curves instead of plain cylinders here allowed me to add very small bends in the cables after extrusion to better match reality. The hanging light is the object of which I am proudest – I am very pleased with how well it matches the real counterpart.

I had now added all major objects to the scene, and focussed my efforts on adding further detail. I bevelled appropriate edges, added table number holding cans, added plug sockets and modelled the antique cabinet. I also noticed that a couple of the tables were very slightly taller than others, so I updated my model to reflect this. I then positioned my camera to the bookmarked render location and produced my final render, as seen in Figure 12.



Figure 12: The final render

5 Conclusion

This coursework proved very enjoyable and valuable. Given more time, I would have liked to add further detail to the model and perhaps also re-created the downstairs seating area. If I were to reconstruct an interior again, I would strive to take perspective photos of objects from a greater distance so as to minimise barrel distortion. Overall, I am very please with the end result and look forward to applying lighting and texture.