Proceedings of the 4th International Conference on Machine Learning and Automation
DOI: 10.54254/2755-2721/2026.37935

Improving Visual Clarity by Tweaking Animation Parameters and Production in 3D Scene

Zheng Wu

Shenzhen International College, Shenzhen, China
apollo_1018@qq.com

Abstract. Based on the theme of "Chinese-style cookie", a short three-dimensional animation is created in this study, and the effects of different production and animation parameters on the three-dimensional animation are analyzed. The process started with polygon modeling and putting on the physically based materials, such as color, normal and roughness data for the pastry appearance. Other pastry models of a plate, package, and more were then set around the object to create the scene. Translation and rotation were keyframed and the camera moved to offer up other views. Various pacing, movement and camera setups were tried since a poor pacing could create a sudden action or limit the visual power of the action. Comparing versions showed that better timing and perspective facilitated ease of reading the cookie and yielded a more natural sequence. This results in a well-controlled animation with a good visual hierarchy.

Keywords: 3D, animated scene, Chinese cookie

1. Introduction

With the evolution of digital media, the means through which products and cultural objects can be presented have increased significantly [1-4]. Movement, framing and length of time are all important components that can direct attention and show form and material over time in a three-dimensional animated scene. It's hard to convey these possibilities with a still image. Therefore, 3D modelling and animation are a helpful method in fields such as food visualization, cultural heritage digitization and advertising, where form can be melded with information and culture [5-7].

Typically, research and practice on digital food presentation focuses on baked goods, sweets and other traditional foods. Materials, light and small surface detail are often given a high priority because they play a significant role in the sense of realism. In contrast, the use of animation to make the presentation more entertaining or to tell a story is less emphasized, especially when the food itself has cultural references in the region. A good digital representation thus needs to supplement an accurate model. The tempo of movement, visual rhythm and camera framing may also be used to reinforce the character and significance of the object, and not just for 'moving for moving's sake' [2, 7].

The use of animation to present products is especially prevalent in current product visualisation, for manufactured products like machinery, electronic equipment and accessories. The focus of well considered animation (including animated Chinese pastries) is comparatively scarce in terms of

© 2026 The Authors. This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (https://creativecommons.org/licenses/by/4.0/).

DOI: 10.54254/2755-2721/2026.37935

traditional food objects. There are many existing examples of food-related animation that involve simply moving objects without paying due regard to composition, camera dance and pacing. These elements may end up being hard to follow or even visually not compelling if coordination is not done well. This is where the chance to explore how a pre-existing 3D resource can be made into an enhanced presentation by designing the scene, the motion using keyframes, and the camera movements—particularly when the subject is culturally charged [3, 5-7].

The Chinese-style cookie is therefore the primary theme and the entire process from a ready-made model to an animated presentation is explored. Surface development, scene composition, planning key frames for translation and rotation, designing camera-paths and the temporal refinement. This focuses on speed, rotation behaviour, viewpoint and timing, and is aimed at achieving a combination which is visually comprehensible, and has a sense of cultural character. A short animation is created and compared with the final product to identify any differences in production and how this impacts the viewer's experience [8-10]

2. Production of the Chinese cookie scene

2.1. Current model and project collaboration

The cookie model was created at the first production stage, and the geometry and the surface treatment were designed at the same time. The point was not just to achieve a realistic 3D shape, but to maintain the visual attributes of a traditional Chinese pastry. The development of polygonal construction and the materials was therefore the basis for the subsequent animation [1, 5].

The mesh was made from a cylindrical starting form which produced the circular volume of the cookie. It then underwent vertex repositioning, extrusion and bevel operations which gave it its silhouette with a less uniform edge and a gentle curvature on the upper surface. Tiny ripples were added to the top, giving the impression that it was handcrafted pastry, instead of a flawlessly made disc. Meanwhile, the topology was cleaned and redistributed evenly, for stable mesh when rotating and when animating movement [1].

A physically based shading workflow was used for the surface, with three main texture inputs: colour, normal and roughness. The overall color was a warm, yellow hue, with some darker patches along the edges indicating browning. Normal information provided smaller features such as grain and shallow cracking, that came to light when illuminated. Surface response was toned down by varying the roughness. The material controls, when used together, this added sense of depth and physicality to the completed model [2].

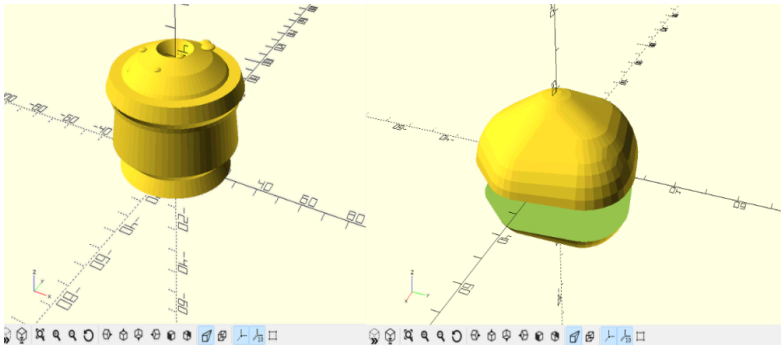


Figure 1. First polygon model of the cookie and beginning to create its round shape (picture credit: original)

DOI: 10.54254/2755-2721/2026.37935

Scale and pivot has been verified prior to moving the asset into final scene for predictable placement and rotation later in the scene (Figure 1 and figure 2). The mesh was also checked for consistency to make sure that the model could be used as the reliable base for composition and animation [1].

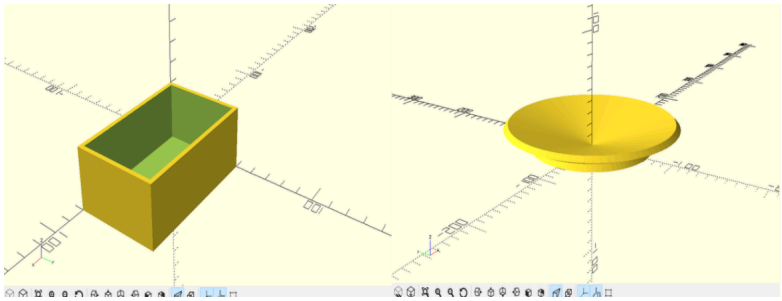


Figure 2. Supporting 3D components that were created for the cookie scene (picture credit: original)

2.2. Scene preparation

The first step in scene preparation was to collect the resources and organize them in the way they were intended to be displayed visually (Figure 3 and Figure 4). The information in the plate was used as a foundation for the cookie, and the information of the secondary pastry objects was used as a context. They were not designed as individual models, but as a composition.

Space between objects was refined prior to moving them. If they were close enough, they might overlap with the main action when it started moving, so the action would be more difficult to follow. For this reason the composition was several times analysed via the intended camera, instead of just standard viewport, giving the composition the chance to be judged as seen from the audience's point of view [7].

"Camera setup was considered as part of the composition." The point of view should be chosen so that the cookie remains the main subject of the picture and there is still some information left around to provide some context. Multiple camera elevations, angles and distances were tested as even subtle changes in framing resulted in a different 'scale' and visual priority for the objects [7].

Other opinions were considered prior to locking the animation. These checks revealed problems such as partially hidden objects, frame space not being used and views where the cookie was not recognisable. This was used to improve the camera and set up of the scene [7].

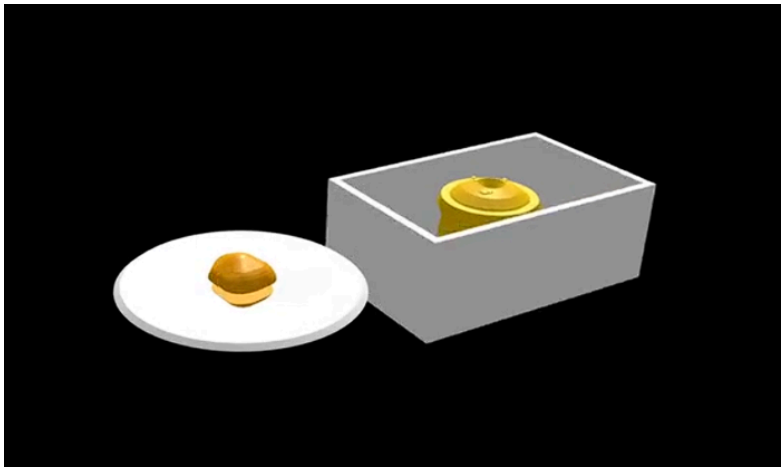


Figure 3. Initial placement of the cookie, plate and packaging (picture credit: original)

DOI: 10.54254/2755-2721/2026.37935

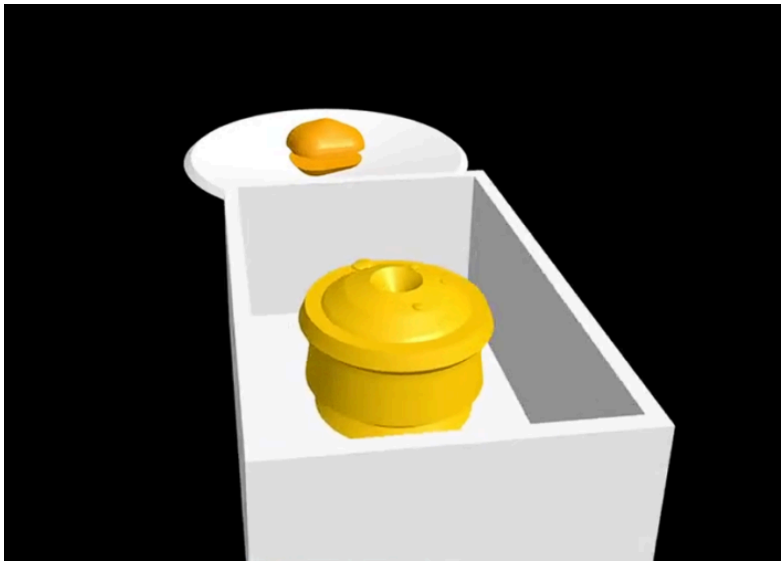


Figure 4. New scene set up with the cookie in the foreground (picture credit: original)

2.3. Animation development

Animation became the main production focus after the scene had been established. The keyframes were set at certain points in order to define the position and orientation of the objects and to ensure that the objects were properly positioned and oriented over time [3, 5].

A starting state was set up for the cookie and then the cookie was passed through successive key frame positions. The translation was complemented with rotational changes to make sure that the object is not visually static. When both these types of movement were used together it was more dynamic and still focussed on the cookie [3, 4].

There was a direct effect of temporal spacing on the perception of motion. Keyframes that were too close together resulted in too sudden of action, while keyframes that were too spaced out resulted in an unnecessarily slow sequence. The intervals were thus adjusted back and forth until the movement got a more stable rhythm and was still easy to see.

The camera was not completely stationary, it was moved in sync with the object. The movement along its course was deliberately limited so as to provide support to the subject instead of being the major visual event, and its course was planned to expose or duplicate the movement of the cookie at certain moments. The activations of the camera and the objects were timed together and referred to as one action [7].

Complete transitions were made between actions and assessed as connections. Individual instances of translation, rotation and camera movement may all sound fine by themselves, but they may sound odd together. The entire animation was thus previewed several times, paying special consideration to continuity and how each action led to the next [3, 5].

2.4. Iteration and adjustment

The first animation was a diagnostic version that was used to find issues in pacing, movement and framing. Several actions were a major issue of speed. The abruptness of the changes and the lack of time for the viewer to look at the cookie made it difficult to see the changes.

Certain keyframe intervals have been extended to vary the speed and promote continuity to the individual actions. The rotational portion was updated concurrently as some of the turns were not

DOI: 10.54254/2755-2721/2026.37935

conducive to the translation. Rotations were therefore adjusted both in rotation direction and speed to render the combined motion more coherent [3, 4].

Several iterations were needed for framing, as well. Some initial perspectives actually obscured too much of the cookie, some left too much empty space, or made the subject look less dominant. Camera was moved and sequence previewed after every move [7].

Several preview renders were created, aiding in the refinement process. Successive versions were not evaluated individually but as sequences. This helped to identify pacing and composition issues and to know if the change actually enhanced the presentation [5].

2.5. Final animation

The final result combines the updated translation, rotation, timing and camera choreography. While the earlier versions were more temporally unbalanced, the final version has a more balanced structure so that the viewer is less challenged in following the cookie's movements.

During the last sequence the cookie remains dominant, with the other objects merely providing a context. The changes in the camera have not been too extreme, allowing the environment to be visible, while not distracting from the main object.

The result demonstrates that the combination of movement, temporal control and framing can be created together to give an existing 3D asset a stronger communicative function. The outcome thus highlights the role of animation and camera design in the digital visual communication [5, 7].

3. Animation experimental evaluation

The evaluation was designed to get to understand the presentation quality of the different animation settings generated. Realism of the underlying cookie model was not the experimental aim, but rather alternative animated versions were compared to see what mix of choices best conveyed the subject.

Three major differences were taken into account: time of day, vantage point and the movement of the objects. The purpose was to find the effect of these on the readability and naturalness. Starting alternatives were created and individual settings were modified to allow the visual impact to be more apparent.

In order to analyse pacing, the time intervals between the keyframes were varied and the rest of the parameters were maintained as consistently as possible. The shorter intervals resulted in a quicker version, and the longer intervals resulted in a slower version, making it possible to compare the effect of tempo. Viewpoint was tested in a similar fashion, in which the camera was placed in a simple elevated position and a more frontal position, and the frame was evaluated based on the amount of cookie and other supporting elements that appeared in the frame.

Four criteria were used for assessment and they were all practical: smooth movement, good reveal of the main subject, good temporal balance and good coherence of the entire composition. Each version was viewed many times and observations made where the movement or perspective was unclear, sudden, or seemed visually inconsistent [3, 7].

3.1. Experimental setup

The evaluation aimed at analysing the presentation quality obtained from varying animation settings. Realism of the underlying cookie model was not the goal for the experiments, but rather different animated models were compared to see which set of choices conveyed the subject best.

DOI: 10.54254/2755-2721/2026.37935

Three main factors were investigated: temporal speed, viewpoint and motion of the object. The aim was to find out how such aspects affected the readability and naturalness. Preliminary alternatives were created and some of the settings were manipulated to better see the effects of the visuals.

Assuming that the other settings were as constant as possible, the interval between keyframes was the only one that varied, to investigate pacing. The shorter the interval, the faster the version; and the longer the interval, the slower the version, and the effect of tempo could be compared. Viewpoint was also studied in a similar manner, with camera placement ranging from a small elevated vantage point to a more frontal placement, and the criteria being based on the visibility of the cookie and other supportive elements.

Four criteria of practicality were assessed: smoothness of the movement, visibility of the main subject, time balance and unity of the entire composition. Each version was viewed multiple times, and observations were made when a movement or perspective seemed to be unclear, sudden or incongruous.

3.2. Experimental results

As demonstrated in the first test, speed was not necessarily a good thing. Actions were faster but it reduced the time of looking at the cookie and also caused sudden cuts. It was therefore more difficult to perceive fine surface information during the faster version (Table 1).

The slower trial allowed the action to be easier to track as the movement was on screen for longer. Meanwhile, there was a blanket slowdown in pace and this might be unnecessarily lengthening the sequence and reducing the sense of energy. The final result was therefore not uniform, but selective: only those movements which could be improved by increased viewing time were slowed and other movements could be performed at a more natural speed [3, 4].

Distinct changes in visual clarity were observed as well with changes in viewpoint. The best framing was of the cookie itself, but still showed other objects to set the scene. The distance from the camera was too close to reveal significant elements of its shape, or too far to place it in the foreground. The chosen camera angle provided a better balance between the information from the environment and the focus on the cookie [7].

Table 1. Comparing and contrasting animation versions and visual outcomes

Version	Animation speed	Camera/Movement	Result
Version 1	Faster	Original camera	Movement appeared too sudden
Version 2	Slower	Same camera	Movement was easier to observe
Version 3	Adjusted	Improved camera angle	Cookie was clearer and better presented
Final	Adjusted timing	Adjusted camera and movement	More natural overall presentation

DOI: 10.54254/2755-2721/2026.37935

3.3. Overall evaluation

Together, the tests indicate that it is not possible to isolate one setting as the cause of the quality of the animation (Figure 5 and Figure 6). The three elements—pacing, object movement, and framing—had a synergetic effect on each other, and when all three were adjusted together, improvements were greatest. This approach as opposed to trying to maximize any single parameter was the basis for the final version [3, 7].

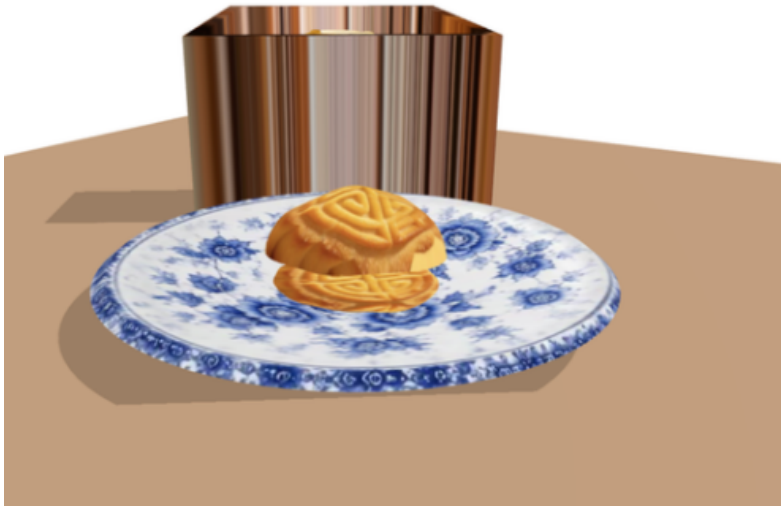


Figure 5. Experimental animation scene with cookie & supporting elements (picture credit: original)



Figure 6. Final rendered image with the cookie as the main element (picture credit: original)

There are a number of merits in the visual fabrications of the scene as indicated in the final renders. The golden-brown pastry is instantly recognizable in the frame compared to the cooler blue and white plate, creating a hierarchy in the frame. The surface embossing, darker baked edges and some irregularities throughout the material add to its more organic look and feel, something enhanced by its circular shape. In the meantime, the plate and package provide context without

DOI: 10.54254/2755-2721/2026.37935

being distracting. Colours, variations in materials, surface and relief, all contribute to a more cohesive and visually satisfying final presentation.

4. Conclusion

This project is an example of a process where a 3D asset is gradually built up to a final presentation with full animation. From the modelling and material construction, through to a scene set-up and motion design, testing and refinement. The findings suggest that even relatively simple actions will be more effective if they can be calculated in terms of duration and framing. Version comparison proved especially valuable in revealing defects which were prone to being overlooked during first manufacture. The minute differences in pacing and perspective finally resulted in a clearer and more natural scene.

Future versions could include further camera movements, more interaction between the objects and more movement from the environment. The animation may also be extended to make it a longer sequence to make it more explicit to communicate cultural background information of the cookie. There are more opportunities to enhance the storytelling dimension by using sound and simple narrative devices. Such add-ons may better enable technical production and cultural presentation to be more integrated.

References

[1] Vaughan, W. (2012). *Digital modeling*. New Riders, Berkeley, CA.
[2] Pharr, M., Jakob, W., & Humphreys, G. (2023). *Physically based rendering: From theory to implementation* (4th ed.). MIT Press.
[3] Williams, R. (2009). *The animator's survival kit*. Faber & Faber, New York.
[4] White, T. (2006). *Animation from pencils to pixels: Classical techniques for digital animators*. Focal Press, Burlington, MA.
[5] Beane, A. (2012). *3D animation essentials*. Sybex, Indianapolis, IN
[6] Kerlow, I. V. (2009). *The art of 3D computer animation and effects* (4th ed.). John Wiley & Sons.
[7] Block, B. A. (2008). *The visual story: Creating the visual structure of film, TV and digital media* (2nd ed.). Focal Press, Amsterdam.
[8] Pavlidis, G., Koutsoudis, A., Arnaoutoglou, F., Tsioukas, V., & Chamzas, C. (2007). Methods for 3D digitization of cultural heritage. *Journal of Cultural Heritage, 8*(1), 93–98. doi:10.1016/j.culher.2006.10.007
[9] Storeide, M. S. B., George, S., Sole, A., & Hardeberg, J. Y. (2023). Standardization of digitized heritage: A review of implementations of 3D in cultural heritage. *Heritage Science, 11*, 249. doi:10.1186/s40494-023-01079-z
[10] National Heritage Board Singapore. (2020). Traditional Chinese pastries. *Intangible Cultural Heritage*. National Heritage Board. Singapore, Retrieved from [https://www.roots.gov.sg/ich] (https://www.roots.gov.sg/ich)-landing/ich/traditional-chinese-pastries