As a core element of film language, camera language plays a crucial role on narrative explanation, character shaping, and theme development. The glamour of camera language lies in its movability. Unlike stationary filming, moving camera provides more varieties and spirituality. It can coherently perform the transition of time, space and optical center, and can show the frames of story more intergrally without any editing and cutting. In the following sections, I will discuss several basic types of camera movements that I summarized and are used in our animation project and compare the role of camera between 3D computer animation and traditional film making.

**Track-in**

Track-in means the camera moves towards an object. It can be achieved by either changing camera positions or changing focal distance. Changing camera positions will change the viewpoint of the camera, producing an experience of getting nearer to the object, which is very similar to the visual experience in real world. Track-in by changing focal distance (also known as zoom-in) will not change position and viewpoint of camera, the scene will not have a motion perspective feel and there is no similar visual experience in real world. During the track-in process, the object in the picture gets bigger and the space of environment gets smaller. In some character-based animation, the zoom-in of the character will make the facial expressions clearer so audience can get closer to the mental world of the character. In the famous cartoon movie “The Lion King”, when Simba saw the cattle coming down from the mountain, the camera rapidly moves towards his face from a long distance away, and produced a strong vision impact to the audience, making them aware of how scary Simba was and how emergent situation he was surrounded with (Figures 1).

![Figures 1 Track-in shot in “The Lion King”](image)

In our project, we also used some track-in camera moves, such as the scene that the caterpillar saw the scalpel, there was a zoom-in shot towards his face, showing and emphasizing his panic and nervous facial expressions (Figures 2).
Track-away
Track-in and track-away together can be summarized as “dolly”, which is a term frequently used in film making field. A dolly is physical camera movement toward or away from its subject \[^{[2]}\]. Contrary to track-in movement, track-away means the camera moves away from an object. It can also be achieved by changing either camera positions or focal distance (zoom-out). However, it has a totally opposite motion effect compared to track-in. The object becomes smaller and shows a trend of gradually integrating into the environment, and the surroundings become bigger. At the beginning of the movie “Godfather”, a man’s face gradually appears from the darkness, he faces the camera and narrates his bitter experiences, at the same time, the camera slowly pulls back and we see the corner of a room, the man’s shoulder, and his upper body in sequence (Figures 3).

Such camera movement increases the mystique of the character and the whole environment, and arouses the audience’s curiousness and imaginations. In our animation project, there is a scene that the caterpillar is hanging on the rope with face facing the floor and the camera is placed towards his face. When he sober up and begins to scream, the camera suddenly pulls back to the surface of the floor, revealing the long distance between the caterpillar and ground. In this way, the audience will understand what situation he is in and why he acts so exaggerated and looks so terrified (Figures 4).
Panning & Tilting

Panning is a camera movement technique that involves moving the camera horizontally while it is attached to a fixed stand. It provides a sense of looking to the right or the left. Tilting is an up and down type of camera movement where the frames change vertically as the camera stays still \(1\). Similarly, it provides a sense of looking to the top or the bottom. These two types of camera movement can both be used to present the viewpoint of the character, making audience more interacted with the story and feel like being immersed in the scene. Such camera movement has been used quite a lot in our animation project to show the scenes from the “eyes” of the caterpillar. For example, when the caterpillar is walking, the camera is animated up and down to simulate head movement of caterpillar, making people aware that everything they see are from caterpillar’s eyes (Figures 4).

Comparison Between 3D Animation and Traditional Film Making.

In 3D computer animation, camera can be placed anywhere unrestrictedly. In traditional film making process, the visual effect of final film heavily depends on position of the camera. Especially when filming in high altitude or filming high-speed scenes, it is quite difficult to find a place that is steady, easy to manipulate and with good viewing perspective. In contrast, for 3D animation software, such as blender and Maya, all the scenes, characters, lights and cameras are virtual and are simulated mathematically. The making of 3D animation is not restricted by time, space or any other natural conditions. The maker can place the camera wherever he wants in the scene and place as many cameras as he needs. Nowadays, there are a lot of movies, especially science fiction movies using advanced techniques to achieve filming that traditional camera cannot achieve, and many of them are realized by using 3D animation softwares.

Reference
