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MASTER'S THESIS

USE OF SLOW MOTION IN FICTION FILMS

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ABSTRACT

Cinematography is a visual medium, which conveys emotions through visuals. It involves many methods to achieve this, and one of the techniques is known as slow motion. It has played important role in the journey of filmmaking. This thesis about understanding how does slow motion works, its methods and use in fiction films. This thesis will first examine the origin and history of slow motion. Next, the thesis looks at how slow motion is achieved and considerations for shooting slow motion. Followed by comprehensive comparison of slow motion scenes from three different genres mainly in Action, Romance and Comedy films. Also how these techniques have changed over time. It includes an in-depth analysis of importance of high-speed sequences of those films and why does it work. Concluding the thesis will discuss about its importance and how effectively this technique helps in storytelling.

ABSTRAKT

Kinematografie je vizuální médium, které přenáší emoce přes obraz. Zahrnuje mnoho způsobů, jak toho dosáhnout, a jedna z technik je známá jako zpomalený “slow motion”. Hrál důležitou roli v cestě filmu. Tato teze je o pochopení jakým způsobem zpomalení filmu funguje, jeho metody a použití v hraných filmech. Tato práce bude nejprve zkoumat původ a historii zpomaleného filmu. Dále, se práce zabývá tím, jak je pomalý pohyb dosažen a úvahami a přípravami, které musíme podstoupit před zpomaleným natáčením. Následuje komplexní srovnání zpomalených scén ze tří různých žánrů (hlavně v akci, romantice a komedii filmů). I to, jak se tyto techniky měnily v průběhu času. Zahrnuje hlubokou analýzu důležitosti vysokorychlostních sekvencí z exemplárních filmů a vysvětlení funkčnosti. Na závěr práce budu diskutovat o jeho významu a o způsobu, kterým může tato technika efektivně pomáhat při vyprávě.

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INTRODUCTION

Everything looks great in slow motion; from the heroes walking in slow motion from a blast scene to famous Matrix bullet time scene. Films, television and commercials have been using this technique since a very long time. It is one of the most visually powerful tools, used widely in different genres of films. This technique increases drama and builds tension in storytelling. Our brains have limited processing power for visual images. We are used to watching things at regular speed. Slowing things down grabs our attention and allows us to focus on much more details in the images. Even before film, it has been used in theater for having dramatic impact on the audience. The slow motion method was used in physical gestures of the actors. In the Japanese culture a dance theatre style called Butoh also uses slow hyper controlled motion. Players in white body makeup, showcasing stories about taboo and absurd environments, traditionally perform it. It was used to convey a key element of the story. There is a famous example of slow motion used in theatre during Peter Brook's performance of *The Mahabharata*, staged in Paris in 1985. Arjuna launches an arrow, but Krishna intervenes to carry the arrow across the stage to its target in slow motion, giving the audience time to notice the expressions of all of the characters involved.

Slow motion stands out as an important method of narrative storytelling. It focuses on details, which are not visible to human eye. During a slow motion sequence, the images appear to move slower than usual despite the fact that the film is moving at the constant speed. In this effect the footage is recorded at a higher frame rate and played back slower in postproduction. The director uses slow motion to stretch out important moments in a film and generate range of effects. It also used in point of view shots, which can cause effects of empathy, weariness, sickness and a sense of the surreal. This technique is not only used in action films but in comedy, romance, horror and drama as well. For example, in a basketball scene in John Hamburg's *Along come Polly*, Reuben Feffer, who is obsessed with hygiene, has his face

pressed up against the hairy and sweaty chest of another basketball player. The scene is significantly slowed down to comically capture the look of horror and revulsion on Reuben's face. If a film shows that a bomb is about to explode in a building, then to depict the dramatic tension, the hero would come out in slow motion. This time stretch would increase the tension in the film, which affects the urgency of the hero's escape. Slow motion is an effect for dramatic impact, but that does not mean overusing it. Too many slow motion shots in a film would lose the interest of the audience. The meaning of its impact in the scene has to be understood. What emotion does the director wants the audience to feel? Is it used to convey love between two characters or show someone's superpower or last moment of his life? In the thesis we will explore the different meanings and uses of slow motion in different genres of films. Each genre will be supported by examples from three different eras of films. All the slow motion examples are mentioned in the references with their YouTube links. These films are good learning examples for understanding the use of slow motion

CHAPTER 1

HISTORY

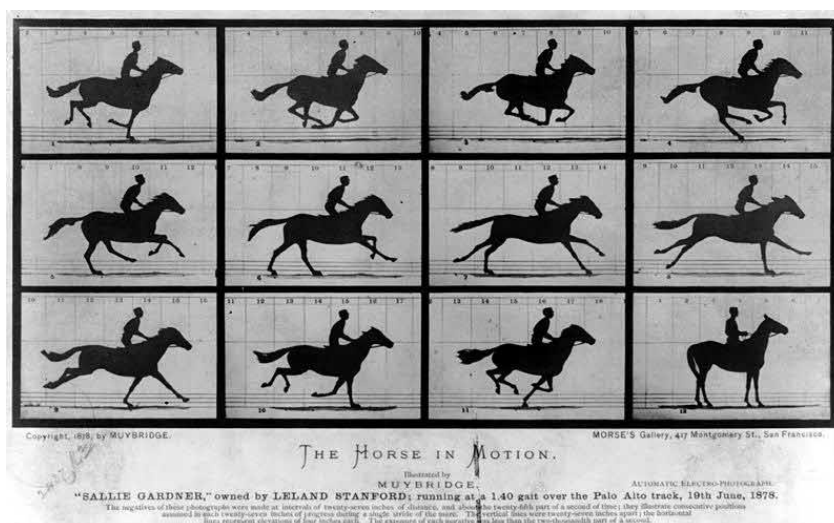


Fig. 1

(Horse in Motion)

In 1879, Eadweard Muybridge invented the zoopraxiscope, which allowed him to project his 1870s photographic motion studies as animations (Fig 1). It was observed immediately that repeating the photos 2:1 (double-printing), or spinning the zoopraxiscope slowly, would slow the motion down. An aside: In conducting his motion studies, Muybridge lined up multiple cameras that were activated by tripwires. (The motion picture camera wouldn't be invented until 1890.) This same technique would later be resurrected as "Time-Slice" or "Bullet-Time," popularized by the Wachowskis in *The Matrix*¹.

It was an Austrian physicist August Musger who developed this technique in the early 20th century. He used a mirrored drum as a synchronizing mechanism. This new device was patented in 1904 and was presented in Graz on July 7, 1907 for the first time, using a projector made by K. Löffler, owner of a cinema. In 1914, the Erneman Company introduced a slow-motion device in Dresden, Germany without mentioning Musger. In 1916, another canotrically synchronized slow motion device using mirrored rings was patented [1].

¹ Brevity, part 7: Slow Motion | BIG OTHER. 2015. Brevity, part 7: Slow Motion | BIG OTHER. [ONLINE] Available at: <http://bigother.com/2010/03/09/brevity-part-7-slow-motion/>.

It was in the early 1920s, when French impressionist cinema became keen on manipulating the camera for expressive camera effects like slow motion, super-imposition to represent physiological confusion, desire and suspense. An example of such technique is *Entr'acte* (1924) a short film directed by René Clair. This film premiered as an entr'acte for the Ballets Suédois production *Relâche* at the Théâtre des Champs-Élysées in Paris. *Relâche* is based on a book and with settings by Francis Picabia, produced by Rolf de Maré, and with choreography by Jean Börlin. The complete film duration is 20 minutes using such techniques as watching people run in slow motion, watching things happen in reverse, looking at a ballet dancer from underneath etc.². These kinds of techniques were quite new at that time and had an emotional impact on the audience. Another example is the famous film *Man with Movie Camera* (1929) directed by Dziga Vertov. The soviet director implemented various cinematic methods in his documentary like fast motion, slow motion, stop motion, double exposure, close-ups, jump cuts, dissolve, backward playback and so on. One of the most memorable sequences is in a park, where a woman is practicing during athletics' competition.



Fig 1.1

A woman spins around in majestic slow motion before hurling a discuss. Vertov highlighted the experience of this moment of impressive physical skill. (Fig1.1) Today, with so much high definition sports

² "Film Editing: History, Theory and Practice." *Google Books*. N.p., n.d. Web. 14 Aug. 2016

broadcasting, this shot might seem very common but in the 1920s, it was a very new and revolutionary effect. Later in 1930, Alfred Wiess presented a short film named *Marvels of Motion*. He experimented with similar camera techniques like Dziga Vertov. The film was narrated by Allan McDonald, which makes the silent film more interesting. He describes how with the help of the slow motion camera, the audience can watch the rhythmic motion of animals. In this film Wiess shot dogs, horses and cows in high speed and also made a reverse playback effects³. The dogs and horses are performing different kinds of stunts that look very impressive (fig 1.2 (a) & (b) below).



Fig 1.2 (a) Dogs running and jumping in Slow motion



Fig 1.2 (b) Horses running in Slow motion

Directors started implemented these effects in their film. During this period the genre of films was mainly based on drama, but some directors like Rouben Mamoulian also used it in comedy film, for example in *Love me Tonight* (1932). One of the most effective and memorable uses can be found in Jean

³ Marvels of Motion (1930): <https://www.youtube.com/watch?v=HcWIZjAJ-b8>

Vigo's *Zero de Conduite* (1933). Vigo's film is a satire on authority and rebellion set in a boy's boarding school where the students are regularly given zeroes when they fail to measure up the standards of behavior imposed by their teachers. The night before the commemoration day, the boys unite and stand against the authority by ripping up and throwing the trappings of the school dormitory. This chaotic scene is transformed by being shot in slow motion as feathers from the pillow fly and the boys leap and tumble in an elegant ballet.

Slow motion is used to stress the emotional significance of a moment in time. Martin Scorsese uses this effect very effectively in *Raging Bull* (1980). In the opening credits of the film, we see the wide shot of Jake Lamotta (Robert De Niro) shadow boxing in slow motion. This clarifies the subject of the film and shows the character isolated only in the place where he can achieve recognition.

With the advancement in technology, motion picture film cameras became more capable of shooting slow motion at extreme high frame rates. But shooting slow motion on film cameras was expensive, as it requires double the amount of film and time for processing. With the invention of camcorder cameras in 1960s, cinematographers could record on tape instead of film. Companies like Panasonic Varicam and Viper Filmstream introduced cameras, which could record at 60fps⁴. It also required external tape recorder and postproduction equipment for slow motion effect. But still they could not shoot more than 60fps. Later, Phototron manufacturers introduced a high-speed video system, which could shoot upto 3000 frames. But they were adequate only for industrial or military applications. Also the data bandwidth was limited on cables, so the camera can be only few feet away from computer. With the evolution of CMOS sensor technology, Band Pro & Film & Digital of Burbank known as Cine SpeedCam offered a much better solution. This camera can capture 1000 fps at HD resolution and 4000fps at SD. It can use true PL mount 35mm lenses and even accommodate matte boxes, follow focus and viewfinder In 1992, Vision Research, a U.S. based company,

⁴ Fall. 2006 FOCUSING ON SLOW MOTION EFFECTS (n.d.): n. pag. Web.

developed a high-speed camera named Phantom, which made a breakthrough in the filmmaking business. This camera has various series and the current cinematographer version PhantomFlex 4K can shoot up to 1000fps in 4K and 3000fps in 720p. It has become much easier to shoot slow motion in today's time, making it much easier for the filmmakers to shoot at extreme high frame rates. Although shooting digitally requires a massive amount of data storage. Another consideration while shooting high speed was that the camera movement was limited. This problem was solved by MR Moco rentals that made a robotic motion control arm known as BOLT. This rig has the ability to get up to full speed almost instantly so that the camera can go from standstill to high-speed motion and back to standstill in fractions of seconds, literally following falling objects and capturing images that would be or any other method.

CHAPTER 2

TYPES OF SLOW MOTION

It is very important to understand the basics concepts of slow motion. Slow motion is also known as overcranking because in early films the camera operators use to crank their films faster so when they are projected at normal frame rate we would see slow motion. There are two basic methods of achieving slow motion shot: over-cranking and time stretching or interpolation.

2.1 OVERCRANKING

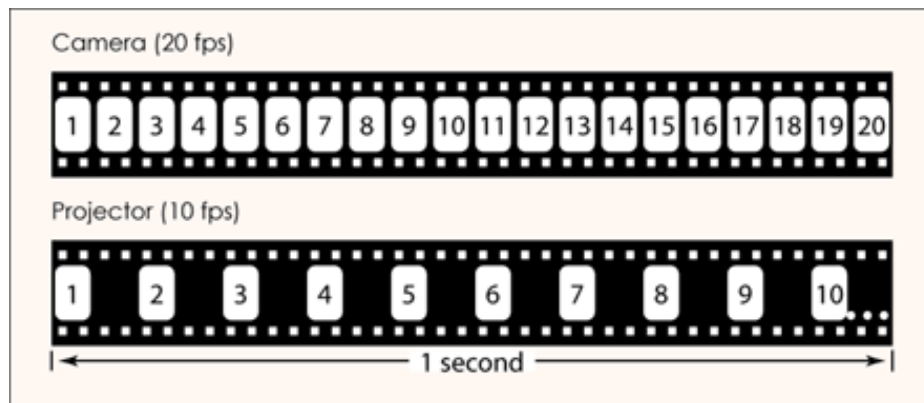


Fig 2.1

Overcranking comes from the old film technique where cameramen used to manually over crank the film to capture more frames. In the Fig 2.1 a projection speed of 10 frames per second has been selected. In fact film is usually projected at 24 frame/s making the equivalent slow overcranking rare, but available on professional equipment⁵. It is evident that with **DIGITAL** or **FILM**, over cranking the camera is actually capturing more frames in one second. This is the exact principle the **SUPER** high-speed cameras like Weiss Cam and Phantom use as well. These cameras are capable of capturing up to 1000 or even 4000 frames in one second. Film works in exactly the same way. It captures more information in the same time base. One second is always one second, you are just telling the camera to capture MORE FRAMES in that one second, and so in film and digital you are simply capturing more information.

⁵ Slow Motion." Wikipedia. Wikimedia Foundation, http://en.wikipedia.org/wiki/Slow_motion>.

2.2 TIME STRETCHING OR INTERPOLATION

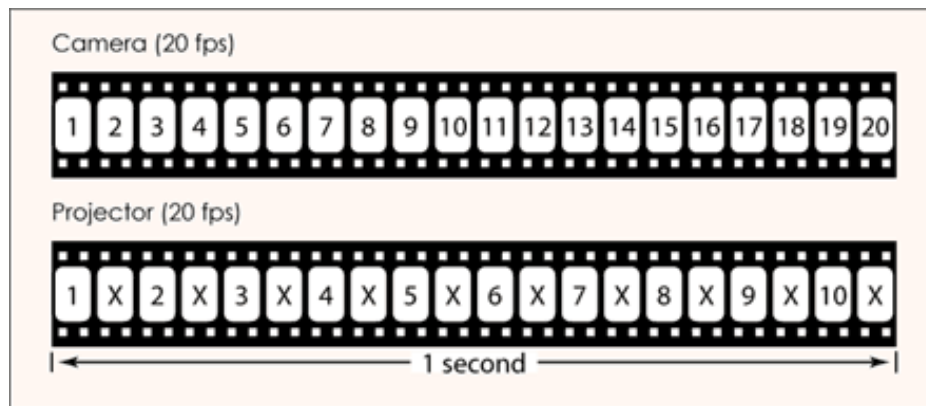


Fig 2.2

Another method is known as Time stretching or Interpolation where slow motion is done in postproduction. With the advancements of technology, it has been possible to add new frames in between the captured frame. In fig 2.2 above, X is the new frame, which is added in between 1 and 2. Sometimes the new frames are simply repeats of the preceding frames but more often they are created by interpolating between frames. Interpolation is the process of letting the computer draw in extra frames to smooth out video footage. It has uses other than slow motion; these include Matrix Bullet Time, animations and can help remove drop frames.

When preparing to interpolate footage, it is helpful to remove motion blur by using higher shutter speeds and provide contrast between the background and subject. This means to film against plain backgrounds rather than complex patterns.

Even though we might follow all of these steps, warping may still appear, which using the applications below can solve. Software that supports Interpolation.

- Twixtor (Plugin)
- After Effects (Frame blending).

The major difference between both methods is that overcranking is actually capturing more frames in one second and time stretching is simply adding more interpolated frames. Some directors, like Quentin Tarantino, used even a different method. Opening title sequence of the film *Réservoir Dogs* (1992) shows characters walking in slow motion. Unlike regular slow motion when capturing more frames in this sequence they captured less frames. I believe that they shot on 12fps and duplicated twice the frames using optical printer. A typical optical printer is a equipment which has a projector at one end and camera on another. By running film through the projector, and re-photographing it with the camera, we can create a near-perfect duplicate of the original. Since the frames are duplicated twice and projected at normal 24fps the images appears to be jerky. They might also use 180-degrees shutter to less motion blur. This effect makes the character look cool and calm, which in contrast later with hectic and violent feature of the film.

The cheapest way to achieve slow motion is to fake it. Actors can perform their actions slowly. Although this method cannot be used when there are natural fast moving objects in the background like fans, trees or road. Regardless of the technique used, we need to convert the footage to watch it into slow motion. Projection frame rate is generally 24fps, 30fps or 25fps. Slow motion footage can be from 60fps to 1000fps or more. But to watch actually the slow motion, we need to calculate the playback speed. The Playback speed in postproduction will give desired smooth slow motion. We can change the playback speed depending on the dramatic impact in the story, whether we want smooth or jarring effect ⁶

⁶ Kerrycgarrison. "Slow Motion Tests with Sony NEX 5n." *YouTube*. YouTube, 07 Aug. 2012. Web. 23 Aug. 2016.

CHAPTER 3

CONSIDERATIONS FOR FILMING SLOW MOTION

We have talked about different methods in shooting slow motion. Before we get into the use of slow motion in film genres it is vital to understand a few aspects about shooting high speed. With digital cameras it has become easier to shoot but some basic aspects of filming slow motion still remain the same. Slow motion effect depends on numerous aspects like the shutter angle, frame rate, type of audio used etc. Following are some guidelines that will help in better understanding the shooting of slow motion.

3.1 SHUTTER

The camera shutter is a device, which controls the time period over which light can pass. The longer the shutter stays open, the more light passes onto the film or sensor.

3.1.1 Mechanical Shutter

In film camera, shutter is a semicircular mirror portion of the disc that rotates in front of the gate. As the mirror spins, it reflects the image onto the ground glass so that it can be viewed by the camera operator part of the time. The other part of the time the mirror allows the light to pass onto the film. The RPM (Revolutions per minute) of the shutter is mechanically fixed and determined by the frame rate, exposure time determined by shutter angle.

3.1.2 Electronic Shutter

The electronic shutter reads the pixel of the sensor line by line or all at once. There are two kinds of electronic shutters Rolling and Global. **Rolling Shutter** reads all the pixels linearly from top left to bottom right while the shutter is open. It does not store the electric charge. It reads the light hitting on the pixel at that exact moment and converting into electric signal. The name is rolling since it is always active and rolling through pixels from top to bottom. But pixels are read one at a time causing a lag in final frame, which gives a “jello” or skew effect (Fig 3.1(a)). The horizontal lines appear to be

slanted. This unwanted motion artifacts' warping the whole image appears if the sensor reads out is slow. Most rolling shutters are incredibly fast, minimizing the potential problems. Red and ARRI also employ rolling shutter, the result appears to be more cinematic. Extreme High speed cameras such as Phantom also employ rolling shutter, but the read out time is only for 1 millisecond.



Fig 3.1 (a)

Global shutters work in different fashion. When the shutter is open the sensor is collecting light and after the shutter is closed it reads pixel one by one, dumps any excess charge and gets ready for next frame. The main difference between rolling shutter and global shutter is that global shutter captures the image at same time and reads all the information after the shutter is closed rather than reading from top to bottom. Hence the name is global, as it captures everything at once. In Fig 3.1(a) the table fan when frozen appears to be distorted using rolling shutter compared to global shutter which sharp and clear⁷. This does not state that Rolling shutters are bad compared to Global Shutter technology. It depends on the choice of the filmmaker whether he/she wants filmic look or not. For example The Sony F55 camera has CMOS sensor with global shutter.

⁷ Lackey, Richard. "Global vs Rolling Shutter and High Frame Rates." *Cinema5D*. N.p., 2015. Web. 03 Sept. 2016.

3.1.3 Shutter Angle

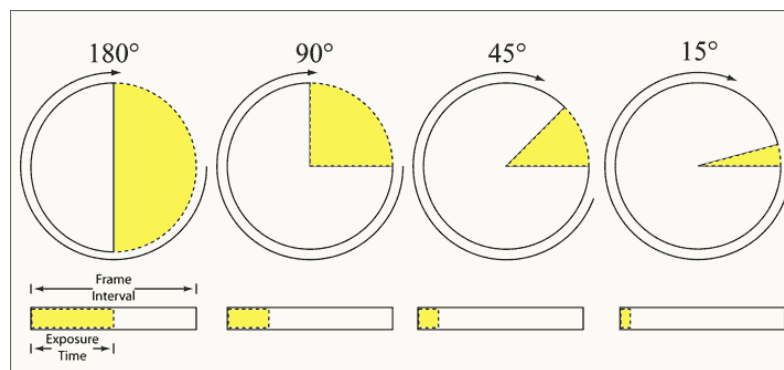


Fig 3.1(b)

While shooting slow motion it is very essential to understand which shutter angle should be used. The standard shutter is 180° which is a semi-circle in Fig 3.1(b). The shutter angle decides the amount of motion blur you want in the film. A larger shutter angle, for example, 360 degrees, will have more motion blur, compared to 45 degrees.



Fig 3.3

In Fig 3.2 above, watch the same image shot at different shutter angles. While shooting slow motion it's a creative decision of the director how much amount of motion blur should be considered. Shooting high speed at lower shutter angle produces a crystal clear image. But this type of shooting requires more light. For example, if shooting 500fps at 45°, then it will require huge amount of light sources. *Saving Private Ryan* (1998) provides the best example of lower shutter angle where its D-day effect creates a hyper real effect of the battle. The battle scene was shot 45-degree shutter angle that

gave a realistic effect showing details of debris, dirt and various particles flying into the air during explosions. Motion blur can be used to portray dreamy, fatigue or drugged like state⁸.

3.2 FLICKER FREE LIGHTING

Another important consideration while shooting high speed is Light. For example, when shooting at 180° shutter, the shutter speed will be 1/48 for regular 24fps shooting in 60hz NTSC. If we double the frame rate to 48fps, with the same shutter angle we halve the exposure time to 1/96th sec. We have just lost a full stop of light and are only at 48fps. Correspondingly the light increases by increase in the frame rate.

- 24fps = 1/48 (Basic Setting)
- 48fps = 1/96 (1 stop Down)
- 300fps = 1/600 (4 stops down)
- 1,536fps = 1/3072 (6 stops down)

Simply adding more light will not help but rather generate flickering effect. Both daylight and tungsten lights are powered by alternating current which means that the bulb will light up and down 50 times a second. While recording with speeds exceeding 1000 frames per second, this phenomenon becomes clearly visible and results in flickering of all surfaces that the light reflects off.

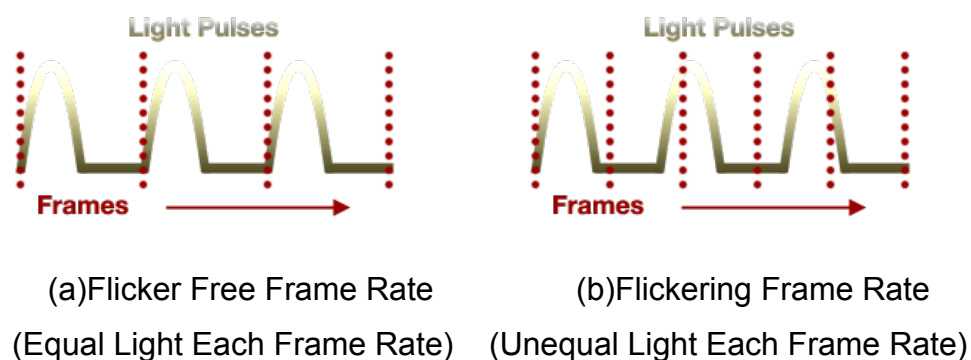


Fig 3.3⁹

⁸ "Rotary Disc Shutter." *Wikipedia*. Wikimedia Foundation, n.d. Web. 16 Aug. 2016.

⁹ RED. "Flicker-Free Video Tutorial." *Flicker-Free Video Tutorial*. N.p., n.d. Web. 16 Aug. 2016.

According to article by Steve Gladstone, the most electrically generated lights flicker, but what matters is how perceivable the flicker is while shooting¹⁰. For example shooting with tungsten bulbs in 60hz, the filament is heating upto 60times a second and cooling down 60 times a second. This effect is not distinguishable for human eye. While shooting normal frames (30fps in this case), the camera is capturing same number of light pulses on each frame, so the flicker isn't noticeable. When the frame rates are increased, they don't have constant number of light pulses per frames and these frames causes flicker [Fig 3.3]. To avoid this problem tungsten bulb can be connected to DC voltage to avoid the on/off cycle. When shooting fluorescent bulb with 60hz(NTSC) will not generate flicker as the bulb completely turns on 120times, 60 on and 60 off. The same bulb will cause flickering when shooting in Europe with 50hz, the 10hz disparity will generate flicker. When shooting at variable frame rates that don't divide into 60 (NTSC) we will likely encounter flicker. To avoid this, we can use Kino Flo's which flicker upto 25000 times per second (250,000Hz) or HMI light source, which uses 1000Hz High Speed Ballast, which allows capturing more than 5001000 fps without flicker. Alternately, it is possible to use LED lamps. Due to limited power they are not suitable for large sets, but perform ideally on pack shots and close-ups. Moreover they generate considerably less heat than traditional lighting. However when powering LED using AC/DC supply, AC voltage may pass through LED causing pulse to flicker. Using Battery source would solve the flicker in LED, as it is a constant DC source.

For shooting high speed, it would be better using large lighting units, where the wolfram doesn't have enough time to cool down and thus the light it emits is visible as constant. Sun is best light source for shooting higher frame, as it is a constant source of light on earth. Since daylight lamps work differently from tungsten even the largest units in flicker-free mode can create a slight pulsating effect, yet it is often very easy to remove in postproduction

¹⁰ Gladstone, Steven. "Flicker-Free Lights, and Why They Are Important to You." *Explora*. N.p., n.d. Web. 03 Sept. 2016.

by applying special plugins like Frame blending and Deflicker. For good slow motion footage, it would ideal to use flicker free lighting.

3.3 FRAME RATE

Frame rate or frequency is the rate at which camera records images in one second measured as fps (Frames per Second). Choosing the right frame rate is vital as it changes method of storytelling. For example, if we capture a horse running in 100fps it will give smooth slow shot about running. But if we shoot the same shot in more than 5000fps, then we could see immense amount detailing in the horse running which is not possible to see by human eye. The director should understand the impact of this technique and plan it accordingly with the cinematographer. Following are some examples of frame rates and their effect.

- **120fps**: The default slow-mo speed for sports and other fast action.
- **300fps**: Used for common visual narrative such as walking or other ordinary action.
- **600fps**: This speed starts to look a bit surreal, mechanical, and less realistic.
- **1000-1200fps**: Generally used for explosions.
- **5,000-10,000fps**: This effect would depict footage like a bullet or shattering glass.

Slow motion really doesn't work very well on camera systems not designed for it in the first place. If the frame rate is set higher than necessary, the high-speed video systems limited storage may not be able to store all the necessary frames. In other instances, too high of a frame rate sacrifices the area of coverage. This happens when an imager's frame rate is set higher than it's ability to provide a full-frame coverage. In most of the new generation of camera system, the imagers have an option that provide "partial frames per second." At this rate, the height of the image is sacrificed but in return, the frame rate can be as much as twelve times the imager's full-frames-per-second rate. When considering the performance some of the lower frame rate camera systems, specifically will increase their frame rate by recording partialrecording partial frames, but use line doubling during display. Line

doubling is a technique for restoring the partial frame image to a full frame image¹¹.

3.4 RESOLUTION

The processing power of the camera, and recording speed of the hard drive- are limiting the amount of information we can record. Resolution is how much data we can fit into a single frame or in two fields (in the form of pixels per inch).

The more pixels in a frame, the higher the resolution. The higher the resolution, the higher the data rate/the bigger the files. Frame rate mentioned before is amount of frames the camera can capture per second. For example the default is 23.97, 24, 25, 30 or 29.97 frames per second (FPS). If we double the frame rate (to say 60FPS), we are basically doubling the amount of frames, thus doubling the data required to store or play that video in the base we choose 24, 25 or 25. Data rate is a measurement of how much data exists within one second of video. In an uncompressed video, we can determine the data rate by dividing the size of the file by the amount of seconds in the file. Both larger resolution and larger frame rates increase your data rate and the overall size of your video files.

According to the author Covert¹², digital video camera is limited as to how much data it can write per second. We can build a camera with a sensor sensitive enough to record a 20k x 20k pixels image, but recording all of that data requires time. We can also build a camera fast enough to capture 120fps of video, but recording high resolution at high FPS requires a camera that can not only capture a high resolution, and not only has a really fast shutter speed, but also has the ability to store that data really quick. In such cases, the limitation of the camera isn't its sensors or its shutter speed, but its camera's write speed. Each camera has their own bandwidth limitations as they can transfer only fixed amount of data to memory. When choosing the

¹¹ Balch, Krish. "High Frame Rate Electronic Imaging." *Motion Video Products*. N.p., n.d. Web.

¹² Covert, Mackenzie. "Relationship between Resolution and Fps." *Quora*. N.p., n.d. Web.

right camera for the purpose, it is vital to check the throughput speed measured in Gigapixel per second (gpx/sec). The throughput can be determined by multiplying the resolution of the image with the number of frames it takes to capture the image. For example, the throughput speed of Phantom Flex 4k is 8 Gpx/sec and Phantom v341 is 3 gpx/sec.

With the advancement in technology today, there are many camera options available, which can shoot high speed at high resolution. It is important to consider what is the end result of slow motion output is it for TV, online media or Theater. Accordingly, the selection of the camera would be easier. All camera companies mention their technical specifications on their websites. For example, Alexa XT plus can shoot 120FPS in ARRI RAW and 1k, Red Weapon 6K Carbon Fiber shoots 120fps in 4K Full frame and Phantom Flex 4K can capture 940fps at 4K. Consideration of the resolution in pre production can save production cost.

3.5 DATA STORAGE

Shooting high speed on film requires more film stock, processing and developing, which is expensive and not practical in terms of production. For example, in cinema projection frame rate is 24 fps event time is 10 seconds and data storage is 2Gb, but when we shoot high speed (48fps) then the event time will be 20 seconds and data storage will be 4Gb. The size of the storage will increase with the increase in frame rates. Hence we end up with huge data that requires more storage space. The storage size depends on the camera's processing power, compression and data write speeds. All digital cameras have a certain amount of fixed memory known as DRAM (Dynamic Random Access Memory) in them to facilitate image processing before the finished picture is stored to the memory card. For example, In Phantom cameras 1000fps at HD RESOLUTION will record 4 seconds to 16GB RAM memory. To save that 4 seconds on storage device can take upto 15minutes, which can be used for capturing next shot.

To solve this issue, Vision Research has introduced CineMag storage device. It's a non-volatile flash memory for High-speed raw footage, which eliminates the downtime between shots. CineMag II has a throughput of

800Mpx/sec and CineMag IV upto 1Gpx/sec. They also come with Phantom CineStation, which is downloading station connected to computer via Ethernet. This keeps the camera free from capturing seamlessly high-speed video. Depending on the frame rate, the cinematographer should choose a high-speed system that uses image compression technology to gain longer record time with limited DRAM memory¹³. For example, if we are shooting in Red Dragon with 5K resolution 2:1 compression ratio and the frame rate is 100 fps using REDCODE at 12:1, then 1 minute of footage will be around 10gb storage. Each camera has a different recording format based on the data rate and processing power. Storage and backup options should be planned in advance before shooting slow motion because of limited storage space and transfer speeds.

3.6 AUDIO

Sounds become unrealistic if not played back at real time. We cannot record sound at higher frame rate. So the effect is supported with music, song or any theme to support the scene. The sound becomes most crucial while shooting slow motion. In action movies non-diegetic sound or heart popping music is used. Sometimes the director uses a dramatic background score or voice over to attract audience attention. The disadvantage of not using sync sound gives an opportunity for filmmakers to experiment with the scene using music, or any other sounds. Before shooting slow motion, the sound should be considered, as how it will support the visual and impact the audience.

¹³ "Phantom CineMag IV & CineStation IV." *The Phantom CineMag & CineStation for Vision Research's Digital High-Speed Camera*. N.p., n.d. Web. 03 Sept. 2016.

CHAPTER 4

APPLICATIONS OF SLOW MOTION

4.1. SPEED RAMPING

Implementation of slow motion effect by altering the speed in post is known as speed ramping. It is mainly an editing technique, which switches between normal frame rates to high speed. A shot that is speed ramped has generally three parts: a beginning and ending, which are of same speed, and the middle of a different speed. Often the middle part is slower, stopping on key action, then returning back to normal speed. The main purpose of speed ramping is to guide the audience's attention to a specific moment in the film. This effect became very popular after the film release of *The Matrix* (1999).

Film cameras such as Bolex and Arriflex 16mm can manipulate the shutter angle while the camera was running. When we film someone at 24 frames per second, and then slow the frame rate down to 12 frames per second while the camera is running, two things happen. 1) The person appears to speed up (fewer frames to cover the same action means that at a constant frame playback rate of 24 fps the action appears faster); and 2) unless the aperture of the camera is altered to keep the exposure consistent with the frame rate, the film gets overexposed, as more light is allowed to land on the slowed down film¹⁴.

With modern day computer based non-linear editing system, we can easily manipulate high-speed shots and also add other special effects. Speed Ramping and slow motion more generally also have the power to provide a snapshot of the power relations in a particular scene, important in action movies where forms of physical mastery are constantly being desired.

Speed ramping has been extensively used in many films for example *X-men: The Last Stand* (2006). The face off between two mutants with telekinetic powers the kind hearted wheelchair bound Professor Xavier

¹⁴ CTheory.net." CTheory.net. N.p., n.d. <http://www.ctheory.net/articles.aspx?id=340>

(Patrick Stewart) and the increasingly powerful of control Jean Grey (Famke Janssen) is a battle of will (Fig 4.1.1)¹⁵.



Fig 4.1.1

Xavier has taken the metamorphic higher ground by trying to convince Jean not to use her powers of destruction, but she uses her powers to lift him up against the wall out of his wheelchair. The placement of characters is quite reversed here as Xavier hangs helplessly in the air while Jean watches him from below. She stretches out her arms to signal that she is escalating her attack and attempting to master the space. At the instant Xavier's powers fail him and the speed of motion slows right down in order to freeze for a moment the power relations between them in a three dimensional tableau. Here the digital compositing and speed ramping enable the confrontation to be dramatized in a nuanced communicative way, by allowing the audience access to the detail of the gestural and facial performance. If speed ramping were not used, then Xavier's death would appear very dull to the audience¹⁶.

Another example, which uses this technique effectively, is the opening fight scene in *Sherlock Holmes* (2009). The slow motion in the scene was put there to emphasize the violence and pain of the other fighter's feeling. It also makes it much more realistic. The action makes more sense because we can see the jaw and ribs being cracked.

¹⁵ Movieclips. "X-Men: The Last Stand (1/5) Movie CLIP - Phoenix Shatters Xavier (2006) HD." *YouTube*. YouTube, 2015. Web. 04 Sept. 2016
<https://www.youtube.com/watch?v=XeU6SJorcvw>

¹⁶ Purse, Lisa. "Contemporary Action Cinema." N.p., n.d. Web. Page 68

4.3 BULLET TIME

Bullet time effect or time slicing effect is where the event is paused and the camera moves around the subject. It is different from slow motion, since in this effect, a set of still cameras are rigged around the subject and fired sequentially or at the same time. While in filming slow motion video cameras capture more frames per second and when they appear slow when played back at 24,25 or 30fps. Bullet time allows the camera to move around the subject at normal speed while the events appear to be slowed down. It's a visual effect technique that combines compositing and interpolation software. This technique is used to stop the action at dramatic point so that the audience can see a panoramic view around the actor or events.

The first use of bullet time effect was used in film *Zotz* (1962) where the professor Jones uses a magical amulet and shouts the word Zotz to slow down speeding bullet. It was also used in opening title sequence of Japanese anime series *Speed Racer* (1966). The racer jumps out of the car and freezes in mid jump and then the camera does an arc shot from sideways. The first music video to implement this technique was Midnight Mover-Accept in 1985. Later director Michael Gondry and the visual effects company BUF Compagnie used it in the music video for The Rolling Stones-"Like a Rolling stone." In 1998, it was used in the films *Lost in Space*, *Buffalo 66* and *Blade*.



Fig 4.1.1

A good example of this effect is from the film *The Matrix* (1999). John Gaeta and Manex Visual Effects created this effect and they were inspired by the artistic style of the Japanese animation film *Akira* (1980). The scene is as follows; Neo confronts an Agent on a rooftop during Trinity and is trying to

rescue Morpheus. When the agent shoots his gun at Neo, the slowing down of time is filmed to emphasize the uncertainty of whether or not Neo will actually succeed [4.1.1]. As the bullets fly toward Neo, the camera travels a full circle around him, simultaneously zooming closer and closer. The constant near misses as the image slows down prolong the tension almost unbearably. The speed ramps back to normal as two bullets graze Neo and he falls to the ground



Fig 4.2.2

The camera path was pre-designed using computer-generated visualizations as a guide. Cameras were arranged, behind a green or blue screen, on a track and aligned through a laser targeting system, forming a complex curve through space [Fig 4.2.2]. The cameras were then triggered at extremely close intervals, so the action continued to unfold, in extreme slow motion, while the viewpoint moved. Additionally, the individual frames were scanned for computer processing¹⁷. Using sophisticated interpolation software, extra frames could be inserted to slow down the action further and improve the fluidity of the movement (especially the frame rate of the images); frames could also be dropped to speed up the action. This approach provides greater flexibility than a purely photographic one. The same effect can also be simulated using pure CGI, motion capture and

¹⁷ "Bullet Time - TV Tropes." *TV Tropes*. N.p., n.d. Web. 03 Sept. 2016.

other approaches. Filming this scene is expensive and requires great planning and precision¹⁸.

One of the most striking things about bullet time that it slows down or stops diegetic time and allows the audience to see the details of the event. It allows us to watch Neo's super reflexes skills in virtual world. These sequences enhance the dramatic effect of slow motion in narrative filmmaking. But overusing this effect will lose its impact, as it should serve the purpose of the story: do we need to need feel what protagonist super human skills are capable or not. Bullet time intensifies our experience, and they also transport us out of our everyday experience into an amplified state of excitation. This implementation of slow motion induces a series of special sensations in the spectator that makes it benchmark invention in the journey of filmmaking.

4.3 ROBOTIC ARM.

To capture a very fast event lasting 2 seconds, the camera movement would have to move at similar or faster rate to see the slow motion. This is practically impossible with using traditional camera movement like dolly, crane or jib. Today's films demand dynamic shooting and a specific need to provide the camera motion relative to a moving object. Considering the requirements of repeatability for different takes, for such tasks like combining with computer graphics, shooting along a path with moving camera controlled manually is an almost impossible task even at the standard frame rate of 25-30 fps. This problem was solved by MrMoco rental's industrial robotic arm known as BOLT. (Refer to fig 4.3.1 below.) With the help of this high-speed robotic arm technology, the camera can move at ultra high speed. The German based company The Marmalade also made similar high-speed robot named SPIKE Fig 4.3.1(b). Bolt, also known as Cinebot, can make a 1-meter move (vertical

¹⁸ "Bullet Time." *Wikipedia*. Wikimedia Foundation, n.d. Web. 03 Sept. 2016.

or horizontal) in just half a second. That's roughly 6.5 feet in one second, which is not bad for a 950lbs machine.¹⁹



Fig 4.3.1

The system makes camera moves that are exactly repeatable, allowing them to be slightly tweaked until the shot is just right. The robot can literally follow falling objects and capture objects that would be impossible to achieve with any other method. These machines are controlled through software (Bolt uses Flair interface) and allow addition of new moves from Maya or any other 3D software. They can be mounted on the floor or on tracks to have high-speed dolly shots. When paired with a slow motion camera such as the Phantom Flex 4K, which can shoot 1,000 fps at full 4K resolutions, the BOLT transforms into one of the most jaw-dropping creative image capture tools. The system is also compatible with major digital cameras like Alexa XT, RED Dragon.

High Speed Robotic arms are extensively used in commercials like tabletop, fashion, sports etc. They have revolutionized slow motion cinematography. These machines were used in Marvel's latest production *Ant-man* (2015). High-speed motion control photography was needed to shoot some exciting explosions and fires at high speed but down at the scale of an Ant! Using small lenses to get the camera close to the model sets, the Bolt High Speed Cinebot was the ideal tool for these shots – combining its high speed with accuracy, precision and synchronized triggers for firing miniature explosions and fires.

¹⁹ "BOLT." Mr Moco Rentals. N.p., n.d. Web. 16 Aug. 2016.



Fig 4.3.2

In the film there is a shot tracking alongside an architectural model where a CG Antman would be running while triggering numerous explosions to simulate bullets being fired at Antman (Fig 4.3.2). Multiple passes of the same move were done to maximize the number of explosions and craters created for Antman to dodge, and to pepper the buildings with pockmarks and fire. Multiple passes with different focuses on some of the sets also allowed CG artists to build up an infinite depth of field to blend in with the explosion passes²⁰.

²⁰ "MRMC." Mrmoco.com. N.p., n.d. Web.

CHAPTER 5

SLOW MOTION IN FILM GENRES

In film theory, film genre is a category or classification, which involves similar content, subjective matter, mood, plot, themes or structures. Most common genres are Action, Adventure, Comedy, Romance, Drama, Horror Western and Science Fiction etc. Some films also have sub genres, which have their own style and formula. The impact of a high-speed shot in an action film is quite different compared to that from a comedy film. For example, in action films the effect is used to raise the tension or see the details, but in comedy films it's used to get laughs, to make a scene funny. Filmmakers understood the different effects of slow motion on the audience in different genres of film. This chapter will be focusing specifically on Action, Romance and Comedy genres. The analysis of the use of slow motion in each of the genres will be supported by three examples from three different eras of film history.

5.1 ACTION

The action film genre is the most popular genre, which utilizes the slow motion method extensively in almost all of its films. In the present time, every other action film has a scene shot in high speed, for example, a bomb explosion, car crash, an actor fighting etc. In modern films, slow motion scenes are usually combined with computer graphics and can be shot digitally. But back in the old days, shooting at high speed was always expensive since it required a lot of film and large magazines to stock it. Today, the largest camera magazine available is 370m for 35mm motion picture.

5.1.1 *Bonnie and Clyde* (1967)

(Director: Arthur Penn, Cinematographer: Burnett Guffey)

The documentary style film *Bonnie and Clyde* revolves around two partners and their adventures in traveling around central U.S. robbing banks in the hope of becoming rich and famous. The couple is driving outside the countryside. In the final scene of the film, they stop on the side of the road to help Mr. Malcom fix his flat tire. Clyde goes out of the car towards Mr. Malcom. Suddenly birds fly away, and Bonnie and Clyde look at them surprised. Malcom looks back over at the bush. He jumps under his truck and both Bonnie and Clyde look at Malcom, and Clyde laughs then they both look at the bush and notice that something is wrong.



Fig 5.1

Clyde jumps and turns around looking in Bonnie's direction; they make eye contact (Fig 5.1). Clyde tries to run over to Bonnie but gunshots begin to be fired from the bush and strike both Bonnie and Clyde.



Fig 5.2

Their bodies shake as the bullets strike them, Clyde falls to the floor and Bonnie screams while falling back in her seat. There is non-stop gunfire as Clyde rolls around on the ground while being hit with bullets and Bonnie falls out of the car but her legs are still inside (Fig 5.2)²¹.



Fig 5.3

The gunfire stops and Clyde rolls over so the audience can see his face, Bonnie's hand falls to the floor and the camera tracks out, you see the pair lying there lifeless (Fig 4.3) ²².

Director Arthur Penn not only used slow motion in this scene, but also used great editing techniques, which make the death of the protagonists look like a lyrical bloodbath. The final death scene of the film is shot with multiple cameras and at different speeds. The cinematographer rigged three high-speed cameras together at exactly the same vantage point but at different frame rates with different lenses, to slow down the action. Then there was a basic camera running at normal speed and one of the camera speeds was

²¹ Escalamar. "Bonnie and Clyde (1967). Final Scene." *YouTube*. YouTube, 29 Sept. 2009. Web. 20 Aug. 2016. https://www.youtube.com/watch?v=NrmUpso_xT8

²² Kevin Prunty » Film Analysis- Bonnie and Clyde (1967). N.p., n.d. Web. 16 Aug. 2016.

more than 100 frames per second²³. The differing speeds at which this scene is shot reveal the complex elements surrounding Bonnie and Clyde's downfall.

The editing switches from normal speed to high speed and alternating the speeds makes the violent death scene more dramatic and poetic. The slowing down of the action here definitely adds an artistic element to Bonnie and Clyde's deaths, especially Clyde's. Due to the effects of the camera, his fall is portrayed as somewhat graceful, like a perfectly choreographed dance.

However, just when the audience gets used to the slow shots, the movie kicks back into gear, and Clyde's death doesn't seem so beautiful anymore as he is showered in bullets. With this approach the audience feels the tension and it makes the scene look much more realistic.

5.1.2 *The Untouchables* (1987)

(Director: Brian De Palma, Cinematographer: Stephen H. Burrum)

Another great example set in the era of the 1930s was from the film *The Untouchables*. The film follows a government agent's, Eliot Ness's, autobiographical account of his Untouchables team bringing Al Capone (Gangster) to justice during the Prohibition. One of the most memorable sequences in the films is the Union Station gunfight scene. It is around a 9 and a half minute long scene but the slow motion part is only 3 minutes long²⁴. Below is a sketch of the scene. An idealistic cop Elliott Ness (Kevin Costner) along with his sharp-shooting partner George Stone (Andy Garcia) have arrived at the city's Union Station in order to apprehend Mob accountant Walter Payne (Jack Kehoe), who holds evidence that could put the crime boss Al Capone in prison. Screenwriting critics often look down upon the part where a baby is put in danger. It is easy to see why: it is an absurdly obvious way to gain audience investment.

²³ ABELE, ROBERT. "Dance of Death - Bonnie and Clyde." Dance of Death. N.p., n.d. Web. 16 Aug. 2016.

²⁴ Menick TV. "The Untouchables - Union Station Scene." *YouTube*. YouTube, 29 May 2014. Web. 20 Aug. 2016. <https://www.youtube.com/watch?v=eRJ539f5Ugc>

But this sequence works for many reasons aside from suspense created by the pram rolling down the steps with a baby in it. It works because it is so meticulously set up: when ambushing Al Capone's accountant en route, Elliot Ness (Kevin Costner) finds himself in the Union Station stairway with a bunch of gangsters, civilians, and the aforementioned baby pram. Violence inevitably ensues, but rendered mostly in stylized slow motion.



Fig 5.4

The figure movement and expressions in this scene are normally paced, excluding the woman desperately struggling to get her baby pram up the stairs, until the gunfire starts. The scene turns into slow motion and panic arises as the shooting begins and the pram is released and slowly starts descending down the stairs (Fig 5.4).



Fig 5.5

At this point, it is helpful to point out that the falling pram was inspired by and references the infamous Odessa Steps scene in Sergei Eisenstein's 1925 film, *Battleship Potemkin* (Fig 5.5). The reference creates a parallel around the theme of the suffering of the innocent people amidst violence, which is dramatised so well in both scenes, yet they end differently as the cops in America are able to save the child unlike the crowd in *Potemkin*.



Fig 5.6

The mother's face is panicked and you can see her mouthing the words "My Baby". Then you see the innocent face of the baby and then the pram plummeting to the bottom of the stairs. The expressions on Capone's men are uncaring and crazy looking whereas the expressions of the cops were determined looking. The movement and expressions of the bystanders are panicked with sailors trying to grab the baby and getting shot (Fig 5.6). Towards the end of the scene Ness's partner throws him the gun and stops the baby carriage (Fig 5.6).

The effect of the slow motion in this scene is to maximize suspense. When you have so many aspects to keep track of in one scene (five gangsters, two lawmen, many civilians, one baby) it is easy for the audience to get lost if the scene plays in real time. However, Brian De Palma's choice to shoot it in slow motion allows the audience to anticipate the actions from the protagonists to be that much more impressive when successful. On top of that, the gradual rolling of the baby carriage toward the bottom of the stairs works as something of a timer, measuring how much time Ness & George Stone have to accomplish their objective, and still save the baby. This scene works well with the use of slow motion and montage cutting that grabs audience attention throughout the scene.

5.1.3 *X-Men Days of the Future Past* (2014)

(Director: Bryan Singer, Cinematographer: Newton Thomas Sigel)

The use of slow motion technology changed regarding time. In the earlier examples of the films, shooting slow motion was expensive since it was shot on film. By the new age, digital technology shooting high speed became much easier. High speed cameras like Phantom Flex 4K have the capacity of shooting more than 900fps at 4K and 1492fps at 2K. This gives filmmakers an immense ability to film high speed at extreme high data rates much more easily compared to film. So nowadays, the majority of the summer blockbuster action movies are packed with slow motion shots, sometimes including 3D effects as well. But this use of slow motion is completely undesired, since it does not support the story. These effects were added just for the sake of visuals. But there are some films, which have utilized the advantages of modern technology, and one of the best examples is the Kitchen Scene from the film *X-men Days of the Future Past* (2014).

The films plotline is that the X-Men have sent Wolverine into the past in a desperate effort to change history and prevent an event that results in doom for both humans and mutants. Quicksilver (Evan Peter) is an X-men who has abilities to travel at super high speeds far beyond an average human. While staging a prison break from the highest-security holding cell in the country, mutants Wolverine (Hugh Jackman) and Charles Xavier (James McAvoy) get a little assistance from the mutant Quicksilver (Evan Peters), who prevents a group of security guards from catching them – often using their own feet, fists, clothes or surrounding objects like kitchen utensils.





Fig 5.7

Quicksilver runs about the room at lightning speed in order to hamper a group of security guards²⁵. As he does so, the camera enters his world so that everything around him comes to a virtual standstill. Guards and mutants appear frozen. Cooking gear, cutlery and vegetables hang in midair. Sprays of water droplets from an overhead sprinkler system fall in surreal slow motion. Bullets inch across the room toward Xavier and Wolverine (Fig 5.7). Capering gleefully along walls and over cooking stations, Quicksilver alters the scene, repositioning and disarming guards and plucking bullets out of the air²⁶. The sequence is actually a mixture of live-action stunts, computer generated objects and impressive visual effects crafted by Rising Sun Vfx studio.



[a]

[b]



²⁵ "X Men Days Of the Future Past QuickSilver Scene HD." *YouTube*. YouTube, 24 Dec. 2014. Web. 20 Aug. 2016. <https://www.youtube.com/watch?v=1NnyVc8r2SM>

²⁶ Rising Sun. *Quicksilver VFX BREAKDOWN*. N.p., n.d. Web. 16 Aug. 2016.

[c]

Fig 5.8

According to Rick Marshall's article in Digital Trend, in order to capture various elements of the room, the visual effects supervisor Richard Stammers and the VFX team decided to shoot portions of the scene at 3600 frames per second using 3D Phantom photography – a speed that would allow time to appear just shy of frozen, but also retain the necessary 2K resolution. Rain dropping from sprinklers, pots, and newspapers were all shot in ultra slow motion (Refer Fig 5.8 [a & b]). In order to shoot these scenes, a lot of lighting was used which made it difficult for the crew and actors to keep their eyes open for long time. To create the illusion of Quicksilver moving faster than everything around him, Peter was filmed on a treadmill and using a variety of wire work stunts (in order to simulate running on the walls) at a more manageable 120 frames-per-second while other segments were filmed using a stunt double on a rigged-up version of the set that allowed his character to run up one wall and hop from the wall to floor without missing a step.²⁷ (Refer to Fig 4.8 [c]). The 120fps high speed filming allowed the VFX team to manipulate the certain portions of the sequence, creating the effect that QuickSilver is causally accelerating and slowing down. Once all the 3600fps and 120fps scenes were shot they were combined together into a single sequence. Computer generated elements were added where necessary and Peter's pace was altered according to the action. This scene is actually a combination of multiple sequences filmed at different speeds on different sets, blended together through the magic visual effects technology.

The sequence was shot during the last shooting days, as it was not planned to be included in the film. But apparently this scene was the most

²⁷ Marshall, Rick. "This Scene Might Win X-Men: Days of Future Past a VFX Oscar. Here's How They Did It." *Digital Trends*. N.p., 20 Feb. 2015. Web. 16 Aug. 2016.

talked about and appreciated by the critics and audience. The scene is funny and technically extraordinary. With modern day technology, slow motion boundaries can be pushed much further. But what matters is the content. All of this works because it serves the purpose of the story. As an audience we immerse into the character's super human abilities to freeze time in ultra slow motion and in how they affect the development of the story.

In terms of technology and use of this technique there are some honorable mentions. One of them is the fight scene from the film *Sherlock Holmes* (2009). Mr. Holmes (Robert Downey Jr.) fights his opponent in extreme slow motion and explains the impact of his each attack. The film slows down to indulge his enormous intellect and to show how fast his brain works to the audience. Another great action example is from the film *Watchmen* (2006). Director Zack Snyder is known for his visual style of dark tones, slow motion and epic images. Although sometimes he goes way too far of using slow motion without even realizing the impact of it turning into a cliché. But in this film the opening credits are shot in beautifully mocking the famous iconic moments of History. The scene is a montage of shots, which is filmed like moving photographs with elements of guns firing, camera flashing and camera moving in slow motion. This stylish title sequence saves a time in back story narration and sets the structure for the twisted world of Watchmen. Another recent example is the Times Square attack scene from *The Amazing Spider Man 2* (2014). Electro (Jamie Foxx) sends a high voltage electricity pulse across Times Square to kill whole crowd of people, Spiderman (Andrew Garfield) with use of his spider sense and web shooters saves several innocent people. This action sequence in slow motion shows how fast Spiderman's reaction skills are and the camera zooming around to show the threats that needs to be neutralized. This scene is a combination of visual effects, computer graphics and dynamic camera movement. Adding 3D to it makes this scene a complete package of entertainment.

5.2. ROMANCE

In the previous genre discussed, slow motion was used to heighten the tension using action sequences and very high frame rate. The use of high

speed in romantic genre is completely different. Here it is used to convey emotions of the character, place or an event. In this genre the stories are generally more focused on two or more individuals. The slow motion is subtle to keep the story moving and build the romantic tension. Too much slow motion can make the romance cheesy and unrealistic. There are good noticeable films, which have used this technique at his best.

5.2.1 Every man for Himself: Slow Motion [*Sauve qui peut (la vie)*] (1980)

(Director: Jean Luc Godard Cinematographers: Renato Berta, William Lubtchansky, Jean- Bernard Menoud)

This French film is quite different from the regular Hollywood romantic films since it comes from the visionary director Jean Luc Godard. It is divided into four chapters: The 'Imaginary', 'Fear', 'Commerce' and 'Music' each focusing on three main characters Isabelle (Isabelle Huppert), Paul (Jacques Dutronc) and Denise (Nathalie Baye). The plot has Jacques Dutronc as unsympathetic filmmaker named Godard; Denise as the girlfriend who is trying to leave him; and Isabelle Huppert as a woman from the country working as a prostitute in the city. The British title of the film was released as *Every Man for Himself: Slow motion*. The film has many scenes, which are shot at different speeds. It is used to convey the emotional confusion of the three characters.



Fig 5.8

Paul and Denise have their apartment, which Denise plans to sell it. While Isabelle is looking for an apartment and she is interested in renting Paul and Denise's place²⁸. She comes to sign the lease and we see Paul and Denise sitting on the table talking. Paul is annoyed about their relationship status. He reads the magazine kept on the table that says 'A Hundred Do-It yourself ideas' and he suggests to her that he has a better idea. Paul launches himself at her, flying across the air towards her shoulders and knocking her down (Fig 5.8). The camera slows down and as they roll around on the floor, the violence appears to transition to romance²⁹.

Instead of shooting at higher frame, Godard decided to shoot at lower frame rate and duplicate the frames using optical printer to have the staggering effect. I believe either they shot on 6fps and duplicated the frames 4 times using optical printer. The shutter angle was 270 degrees or they shot on 24fps and duplicated 2 times to have 48fps keeping the same shutter angle 270 degrees to give more motion blur. Regardless of the frame rate the projection speed was 24fps. The frames freeze for a number of times giving them an effect of staggered stop motion rather than continuous slow motion. This jerky effect works in this narrative, as we cannot tell if they are fighting or engaging in an act of love, which sums up the ambiguous character relationship.

Godard called this effect as the 'real slow motion' as it does the pointed examination of expressions, postures, attitudes and physical relationships that might otherwise have been missed³⁰. Godard believed that different speeds convey different emotions of the characters in the film. When the actions of the characters slow down the diegetic sounds are placed at normal pace. For example, the sound of glass breaking when they are fighting. By using this method, the sound jumps ahead of the image. It is never particularly revealing, but it is clever and creative and makes many of the slow motion shots much more interesting than others. As mentioned before, this technique is not exactly how an audience is used to watching a slow motion sequence.

²⁸ . "Scene from 'Slow Motion' - YouTube." YouTube. YouTube, 31 Dec. 1969. Web. 20 Aug. 2016. <https://www.youtube.com/watch?v=xfJc-WOnReY>

²⁹ "Every Man for Himself, Jean-Luc Godard, 1980." Criterion Blues. N.p., 04 Apr. ienu2015. Web. 16 Aug. 2016.

³⁰ "Scott." Scott. N.p., n.d. Web. 16 Aug. 2016.

The jarring effect is experimental and unsettling to watch, as the director wants us to feel uncomfortable about the characters' relationship. Had it been shot in smooth slow motion, the scene would have looked sensual or erotic. This scene does not fracture the narrative of the film but rather enhances it.

5.2.2. *In the Mood For Love* [*Faa yeung nin wa*] (2000)

(Director: Wong Kar Wai Cinematographer: Christopher Doyle)

Romance is a very delicate and emotional subject to deal with. But there are few visionary directors who can convey this emotion to the audience very well. One of them is the famous director Wong Kar Wai along with his frequent collaborator Christopher Doyle. The story is about two neighbors: a man (Tony Leung) and a woman (Maggie Cheung) who form a strong bond after they realize that their respective spouses are having an affair. However they agree to keep their bond pure so as not to commit similar wrongs. The film comprises of some of the most beautifully shot slow motion scenes with moody music and rhythmic editing.



Fig 5.9

Both of their spouses often leave for work at different shifts leaving them alone at home. The characters continue to intersect each other in

everyday life situations. One of the major recurring motifs is eating alone. The film includes chance encounters when they often walk towards the street noodle stall. This corridor scene is two and half minutes long. We see Mrs. Chan (Maggie Cheung) walking towards the noodle shop in high speed and then when she leaves Mr. Cho Mo-wan (Tony Leung) enters the frame (Fig 5.9)³¹. This scene is wonderfully crafted by a sad violin track composed by Shigeru Umebayashi. Also to emphasize the characters' loneliness, rhythmic editing is used.



Fig 6

This scene is shot at not more than 60 frames per second, unlike action movies where the frame rates are much more higher. The effect here is to elongate the connection between Cheung and Leung. In the first part, they never appear in the frame together in slow mo; the camera actually stops making a point of stopping to deliberately miss the instant they are in close proximity (Fig 6)³². Christopher Doyle's approach of low-key lighting and use of colors support the vision of the director.

The shots here are longer, therefore reducing the need for editing. By this approach audiences is not interrupted by cuts in between shots but rather slowly sink into the story world. The director not only uses slow motion but also uses repetition and doubling effect to communicate a mood or feeling of the character's isolation. If this scene were shot like the previous example of *Every man for Himself* (1980) the impact would have been completely different. The staggered stop motion effect would convey a disconnection between Mrs. Chan and Mr. Cho affair. The smooth melancholic motion heightens the drama by manipulating space and time in the film.

³¹ "In the Mood for Love (2000): Yumeji's Theme." YouTube. YouTube, 19 May 2009. Web. 20 Aug. 2016. <https://www.youtube.com/watch?v=23oBMOvt85o>

³² D'Angelo, Mike. "In The Mood For Love." In *The Mood For Love* · Scenic Routes · The A.V. Club. N.p., n.d. Web. 16 Aug. 2016.

5.2.3. *Drive* (2011)

(Director: Nicolas Winding Refn Cinematographer: Newton Thomas Sigel)

Drive is included as an example of a romance film, even though it may be closer to a neo noir thriller film with mixed genres of romance and drama. It is definitely not like the typical romantic films. The film is about a Hollywood stunt Driver (Ryan Gosling) who also work as a getaway driver. Things start to get dangerous after he becomes attracted to his female neighbor Irene (Carey Mulligan) whose husband (Isaac) owes money to local gangsters³³. The remarkable use of slow motion is used in the elevator scene towards the climax of the film. The elevator in the film holds a significance importance for both of the characters, as it's the first time the two characters meet. They both commute in the same building elevator everyday.

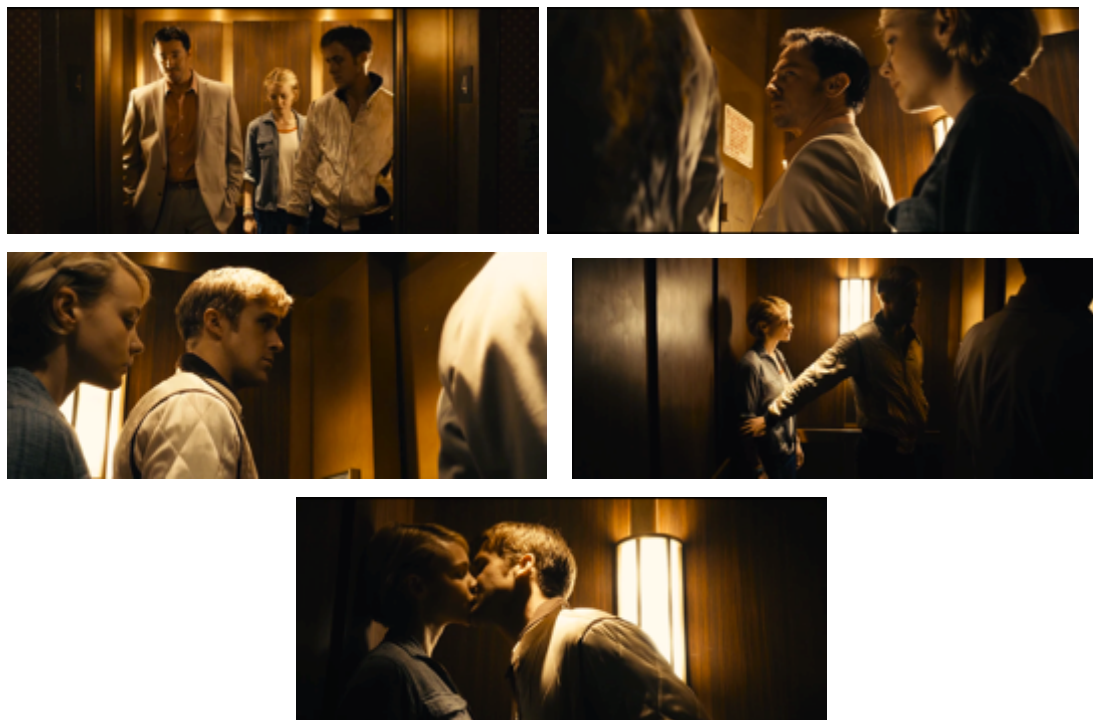


Fig 6.1

The scene starts with the driver and Irene entering the elevator as third man waiting for them. The elevator doors closes and we see shot reverse shot of the driver and hitman. The driver notices the gun in hitman's vest.

³³ Powerful Scenes. "Drive - Elevator Scene." *YouTube*. YouTube, 2013. Web. 04 Sept. 2016.
<https://www.youtube.com/watch?v=i5ufgkJ-uVE>

Refn cuts to side view shot where we see the hitman in the foreground and driver puts Irene on the corner of the lift. This corner also represents their world of comfort. The slow motion begins from this moment where the lights start to dim down and music starts. The driver comes closer to Irene holds her from the waist and kisses her passionately. The director holds this frame for a while as if the time has stopped for them to enjoy this private moment³⁴ (Fig 6.1). The viewer is whisked away with the pair into a surreal, dreamlike world. Shifting light is used to convey the emotions of the couple. The viewer is whisked away with the pair into a surreal, dreamlike world. Shifting light is used to convey the emotions of the couple.



Fig 6.2

As soon the audience is immersed in the couple's romance, the lights turn back on and the scene is moved to normal frame rate where the driver is hitting the hitman. He slams his head to the wall and then also to the opposite wall. Irene shifts back and notice the scorpion on his jacket. Here the romantic turns into something much more gruesome, where the driver starts to stomp

³⁴Drummond, Seonaid. "Drive: Elevator Scene." Its Pronounced Shona. N.p., n.d. Web. 16 Aug. 2016.

the head of the hitman and the blood splatters on his jacket. The elevator door opens behind her and she backs out. Refn cuts to midshot of the Driver, as he slowly turns around splattered with blood to confront his women. We watch Irene waiting in the parking lot looking horrified by the man she loves (Fig 6.2).

Refn does something quite unique with this scene as he builds a romantic moment between the leads and then shifts to an act of violence. In most romantic films, dialogues are used to convey character's feelings. But while shooting slow motion, we cannot use dialogue; we have to depend on music. The scene lasts for 3 minutes but the pacing and acting is astonishing. The first two minutes are slow and romantic and the remaining turns into a gruesome crime scene. This makes the scene unique from other films because the slow motion allows the audience to get immersed in their romance. Filming this scene at two different speeds works best since at one scene the Driver is breaking out of his emotionless persona to show his true passion towards Irene and another one his brutality towards the hitman. There are also other slow motion scenes in the film but this scene has major impact compared to them. The cinematographer Simon also shot the Quicksilver Kitchen scene later in 2014. In the previous section, I discussed about how the slow motion works in an action scene. In that scene, they were shooting at very high speed to depict the super human strength, but the same cinematographer also shot *Drive* (2011) in which the high speed had completely different purpose. In most of the cases, it's the director's vision of how he/she wants to use this technique in the film narrative.

5.3. COMEDY

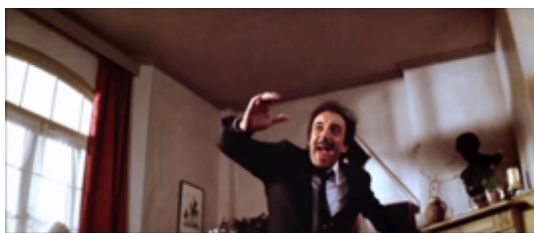
Using High speed in the comedy genre has a completely different impact on audiences compared to action and romance genres. This effect can get a lot of laughs if used correctly. The audience does not care in quality of the effect as long as it is funny. There are various applications of this technique in comedy. Slow motion is so overused in action and romantic films that it has become cliché. So, some comedy films exactly do what famous memorable scenes did and they make a parody out of it. Sometimes slow

motion is also used to amplify the details to call attention, for example a fat man running and falling down on the beach in slow motion. Another use is to exaggerate a particular moment or gag in the film by shooting at extreme high frame rates. The audience can relate to it even if it's ridiculous³⁵.

5.3.1 *Return of the Pink Panther* (1975)

(Director: Blake Edwards Cinematographer: Geoffrey Unsworth)

Return of the Pink Panther is a crime comedy film. It is the fourth film in the Pink Panther series written and directed by Blake Edwards. The story is about an Inspector Clouseau (Peter Sellers) who is put on the case, when the Pink Panther diamond gets stolen, with the Phantom's trademark glove left only as the clue. Clouseau hires manservant Cato Fong (Burt Kwouk) to keep him on toes, by giving him surprise attacks. They share a unique bond of love and hate relationship. Cato is always hiding and tries to attack the inspector but they always end up in hilarious fight sequences. There are quite a few noticeable ones but one of them is the kitchen scene. It is a 3-minute long scene but the slow motion begins from 2:00³⁶. Inspector has come home and he is suspicious that the servant is hiding inside the house. He puts them in the fridge, but suddenly Cato jumps out of the fridge to attack him. All this time he was waiting inside the fridge to attack inspector makes the scene even more comical.



³⁵ "Four Tips for Using Slow Motion in Comedies." - Steve's Digicams. N.p., n.d. Web. 16 Aug. 2016.

³⁶ YoureGonerWakeUpDead. "Cato Keeping Inspector Clouseau Vigilant." YouTube. YouTube, 18 May 2010. Web. 20 Aug. 2016. <https://www.youtube.com/watch?v=S2l5Yt6LBfo>



Fig 6.3

They both fight and miss each other, hitting the wall, home objects... The inspector pushes Cato on the floor and walks a few steps back to take a jump and attack him. He starts running and jumps in the air in slow motion crossing the doorway to attack Cato. But he misses him completely, breaking into the kitchen (Fig 6.3). We watch him in slow motion crashing on to the table. The entire kitchen wardrobe falls on him as well as the utensils drops on by one. The shot is intercut with his neighbor who is watching T.V. and is unaffected by the chaos happening next door. We still see kitchen stuff falling on him and the slow motion ends when the telephone bell rings.

Watching the Inspector miss his kick and crash into the kitchen is hilarious. One of the main components of the scene is sound. The director Blake did not use any music in the slow motion but rather used the sound of the Inspector screaming. When we hear the stretched sound of his voice screaming in high speed, it makes the audience laugh. In terms of camera work, this scene is a long shot until Cato attacks. We follow Inspector around his house with steady camera movement. It was ED Parker's (an American Martial artist) idea, which suggested Blake to employ slow motion with regular speed to get greater audience reaction. The slow motion gave the audience time to observe and relate to the particular movements. Switching back to regular speed would make a change in the audience's pulse³⁷. It's an action scene but here the high-speed effect works in different manner. Rather than creating suspense, shooting the scene in slow motion is used to show the foolishness of the Inspector. Tragedy in comedy is quite a common in comedy films. Shooting high speed shows the audience those funny details, which makes this the most memorable one.

5.3.2. *Zombieland* (2009)

³⁷ Parker, Ed. "Black Belt." Google Books. N.p., n.d. Web. 16 Aug. 2016.

(Director: Ruben Fleischer Cinematographer: Michael Bonvillain)

Zombieland is an American horror comedy film written by Rhett Reese and Paul Wernick. The film is set in zombie Apocalypse world where a student named Columbus (Jesse Eisenberg) is trying to reach his family in Ohio. On his journey he meets a tough guy Tallahassee (Woody Harrelson) and pair of sisters Wichita (Emma Stone) and Little rock (Abigail Breslin) who are trying to get to an amusement park. What makes this film stand out is not the film itself, but its opening credits. The opening titles of humans being attacked by zombies running in slow motion sets the mood and character for the audience.

The film begins with a voice over of the lead character explaining to us that zombies infect the world and to survive you must follow by the rules. The next shot fades to black and a montage of 15 clips begins³⁸. As mentioned before, the film also mocks the irony of the situation for example; we see a human holding signboard of 'The end is near' and are being attacked by zombies (Fig 5.3 [a]). This establishes the comedy genre of the film.

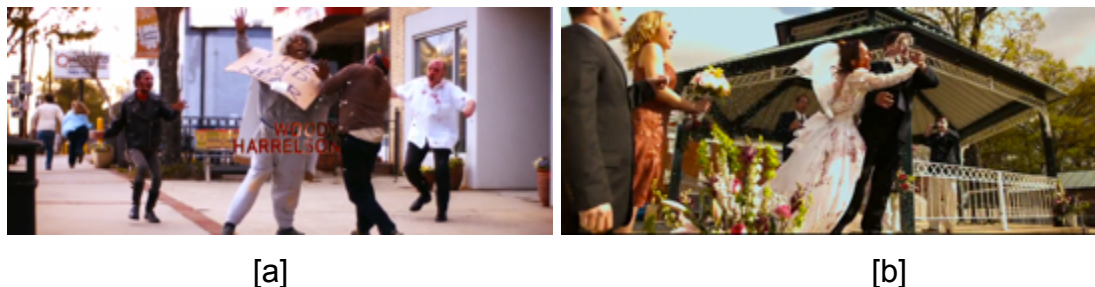


Fig 6.4

In another clip, we watch wedding ceremony where bride trying to attack her husband. (Refer to 6.4 [b].) This shot in extreme high frame rate has a dark humorous side to it as it depicts how zombies have spread the infection to such an extent that even the ceremony is ruined. Imagine going to a strip club and finding out the stripper is a zombie, this sounds scary but the director makes it funny by shooting this in slow motion. We watch a stripper covered in blood running in high speed towards her customers to attack them (Fig 6.5 [a]).

³⁸ "Full Zombieland Intro [HD]." YouTube. YouTube, 15 July 2010. Web. 20 Aug. 2016. <https://www.youtube.com/watch?v=1uUHamXmUAI>



[a]



[b]



[c]

Fig 6.5

Making it slow makes the time stop and allows the viewer to immerse in the joke. The opening credits are also exciting because the people interact with the credits for example, the first clip shows a man falling and his hand hits a letter causing it move (Fig 6.4 [c]). Another example is when a person breaks the glass in slow motion cutting through the main title of the film (Fig 6.5[b]). This makes it feel as if the credits are part of the actual scenes, adding realism to the scene. These montage clips are supported with over the top metal music by Metallica-‘From whom the bell tolls’. This gives edginess to the film’s theme. Even the lyrics of the song are about death, which is very relevant to the living dead³⁹. The editing of slow motion scenes emphasizes the scenarios of each clip and the reactions, which increase the comedy. The effect of this creates tension between comedy and horror as each shot seamlessly fades into each other. These scenes were shot on Phantom HD camera with more than 1000 frames. The director Ruben specifically used elements such as blood, fire explosion, glass and any other liquids, which looks visually great in extreme slow motion. The production had a large enough budget to shoot these scenes. The director also shot gunshots in extreme slow motion so that the blood splatter was looking fake. If the montage was not shot in normal speed, the impact would have been not comical but rather more like horror. With the high speeds shots, the narrative

³⁹ Amelia. "Reel Witty: Zombieland (2009) Opening Scene Analysis." N.p., n.d. Web. 16 Aug. 2016

and also the genre of the film was supported.

5.3.3. *Anchorman 2: The Legend Continues* (2013)

(Director: Adam McKay Cinematographer: Oliver Wood)

All the films discussed above are not only great films in terms use of slow motion but are also great as in terms of story itself. *Anchorman 2* however is an average film compared to the other comedy films. One of its scenes is interesting for slow motion analysis. It is the RV car crash scene. Set in the 70's, San Diego's top rated newsman, Ron Burgundy (Will Ferrell), returns to New York for the first after a 24-hour news channel. Ron reunites with his team of newsmen and takes them for a ride in his RV that is running on a cruise control⁴⁰. They talk about their good old memories, and Ron offers his teammates some chimichanga (Deep fried burrito) from his deep fried dryer in the RV. Among his teammates Champ Kind (David Koechner) asks him the reason of keeping the bowling balls and the scorpion in the car. Ron explains to Champ that it's a long story, while Brian Fantana (Paul Rudd) tells him that cruise control does not steer by itself. The shot cuts to scene where steering wheel starts to lose control and car flips crashing into the road.



Fig 6.6

The RV is upside down and everyone is flying into the car in slow motion. The background track by Muskrat Love - Captain & Tennille oddly sets the mood. All the characters are hit by the elements from the van. Hot oil spills on Champ's face and the dog bites his arm in extreme high speed. The bowling ball hits Brian on his head and Brick (Steve Carell) gets smashed on the roof of the car. While Ron's scorpion pet bites his mouth (refer fig 6.6).

⁴⁰ "Anchorman 2- Hilarious RV Scene." YouTube. YouTube, 07 Apr. 2014. Web. 20 Aug. 2016.
<https://www.youtube.com/watch?v=LUEDVMOMY24>

All of these actions look extremely hilarious in slow motion. High Speed shots are generally combined with music but in this scene, they also included the sound of objects hitting the reporters, like the sound of fried oil falling on the face, sound of bowling ball hitting on the head. Also we hear the sound of the characters shouting in pain, which adds realism to the scene and makes it funny.



Fig 6.7

These scenes were shot using green screen in studio with the Phantom HD camera. Each of the actions was shot separately, for example, bowling ball hitting the face, individual objects like cans along with car itself (Fig 6.7). Later they were composited together in postproduction. The director added elements such hot oil, scorpions and bowling ball, because it looks funny in slow motion. This is a great example of technique and its use. It is not just about adding elements, which would look great in, slow motion, but it's also about the importance of their use in the scene. When the audience watches the characters interact with these elements in high speed, it makes them laugh as they see the details of the car crash, which they cannot see in real life.

CONCLUSION

Slow motion method has come a long way, since the time of its analog use in theater to recent methods of using it with digital cameras and robotic arms. The change in technology has changed the way we perceive slow motion. We have many different options available for implementing this method. But it's not always the technique rather its significance in the film. The audience does not care about the frame rate, shutter angle or which camera was used, but rather about how this effect works for them in the narrative.

It is important to understand the uses and also the disadvantages of slow motion. We have examined the technical considerations while shooting slow motion and how to use them for creative purpose. With modern technology, it has become easy to shoot high speed but that need not lead to overdoing it. It will make the film cliché and boring to watch.

This thesis has some few great examples of how this technique works in Action, Romance and Comedy films in order to illustrate how slow motion is differently perceived in different genres. While in an action film, we want to see the detail (for example explosions or bullets); in comedy we care about the joke rather than that of detail (for example fat man falling down in slow motion). Slow motion can also be used in Animation, Musical, Horror, Drama, Sport or even Thriller genres. In filmmaking, there are no rules, but guidelines. This effect has a huge dramatic impact on the audience's emotions. If it is used in the right manner, it can help to create a rich filmic experience and deliver meaning related to the film's story.

It's always good to know what are the extreme possibilities of this effect. With the rise in virtual reality (VR) technology, we might be able to experience slow motion in real time, but the basics of storytelling will still remain the same.

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