Animation principles and their relationship to enrich digital motion graphic designs

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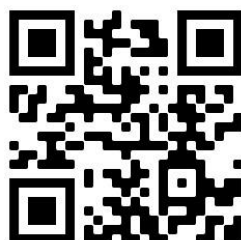
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Abstract

The aim of the research is to uncover the relationship between the application of animation principles and the enrichment of digital motion graphic designs by identifying and discussing these principles to determine the feasibility of their relationship in the field of digital motion graphic designs and their role in enriching the visual editing of them to contribute to meet the objectives of visual communication for these designs and increase its efficiency. The research followed the descriptive and analytical approach in dealing with the principles of animation and clarifying its relationship to enriching digital graphic designs. The results found that there is a wide range of animation principles commonly used that must be taken into account in the production of animation films, as it was found that there are (12) principles of animation that are applicable in most animation works, most of which can be applied in digital motion graphic designs to enrich them. In addition to the existence of a close relationship between the animation field and the field of digital motion graphic design, which is widely evident in the use of the same production programs and techniques, but of course there is a difference in the production objectives, time and cost of each of them.

Keyword: Animation Principles - Digital Motion Graphic Design.

1. INTRODUCTION

It's no secret that the (12) Principles of Animation are the fundamental building blocks for any animator. Getting the hang of these basic techniques will put any motion graphic designer on the way to understanding the language of animation. (Anahita Tabarsi, 2016)

The term motion graphic and its abbreviation (MG) in its simplest form expresses movement on static digital graphic elements. It

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defined as: "A communication process that takes place using animation and graphic design together. What does matter in in this definition is the concept of the word "communication". An animated graphic designer must export a well-defined message about the topic he is addressing to the audience using a combination of text, motion and image elements. Usually this communication is in the advertising service of a company or for a specific reason, or to inform the target audience of a product or idea." (Rob Garrott, 2015)

Amy Balliett (2015) described motion digital graphic as: "A key component of visual communication and often more successful than static designs. It is not specifically a traditional animation. For example, the designer who produces motion graphics does not draw every frame, but instead designs most graphics scene by scene through a drawing and design program such as Adobe Illustrator, and then animates them in An animation and visual effects program such as Adobe Effects, and some digital motion graphic designs can be simple and do not take time to implement, while others can take up to three hours only to move one second."

With the increasing appreciation of the power of visual communication supported by various digital multimedia, the motion graphic design grew out of the need to provide the consumer world with visual communication within all economic segments. As a result, graphic design evolved into a multifunctional role, whereby the designer plays a pivotal role in the production stages of work which required great ingenuity and the need to communicate effectively with the audience. This research tries to focus on an aspect that can enrich the visual processing of digital motion designs with the goal of increasing its effectiveness.

Research problem:

One of the main factors that can enrich visual processing in the field of digital motion graphic designs is animation principles, commonly used in animation field, whether traditional or digital, as many digital motion graphic designs today lack the application of such principles. Ignoring these principles may result weakness in many of

these designs and their inability to meet the goals of visual communication with the required efficiency. the researcher attributes the lack of application of these principles to several factors, including: the large gap between the specialty of animation and the specialty of graphics, especially for the field of digital motion graphic design, as well as not taking advantage of the great development that animation has occurred in both theoretical and technical aspects in the development of the field of digital motion graphic design, in addition to the lack of studies dealing with these principles and their relationship to the field of digital motion graphic design, and this is what current research tries to address.

Research objectives:

This research aimed to uncover the impact of the principles of animation on enriching digital motion graphic designs.

Research importance:

- Draw attention to the importance of animation principles in digital motion graphic designs.

- The contribution to the enrichment of digital motion graphic designs.

- The contribution to the enriching the graphics field in general.

Research Hypotheses:

- There are some animation principles to be considered when designing animation.

- There is a close relationship between most of animation principles and enriching digital motion graphic designs.

2. RESEARCH METHODOLOGY

The researcher in this study followed the descriptive analytical approach to describe the principles of animation and its relationship to enriching digital motion graphic designs.

The Theoretical Framework of Research:

Thirty-eight years ago, a book entitled "The Illusion of Life" was released. It was written by two pioneering animators at the Disney Foundation: Frank Thomas and Ole Johnston (1981) who worked in

Walt Disney studios Animation from (1978: 1934).This book included an explanation of a list of twelve basic principles of good animation that emerged during the golden age of animation, and which were discovered and refined by many studios of the time. (Chris Glick, 2012)

Although there are many animations that do not require the revitalization of characters because the design do not need it, the Twelve Principles of Animation are completely applicable to inanimate elements as well as they do to the characters. These principles help in animation in a realistic and aesthetic manner.

Most of these principles were covered in many studies and animation books later, including what was presented by the motion designer (Delano Athias, 2010) in the form of practical video explanations provided by Digital Tutors. Among them also is what (Richard Lapidus, 2012) presented in his book "Tradigital 3ds Max".

And also what (Stephen Brooks, 2017) presented in his book "The Tradigital Animate CC", In which he tried to fill the gap between the principles of traditional animation and the fundamentals and principles of digital animation through the Adobe Animation program, which is a development of the company's famous Flash program, as it tried to apply the animation principles of Frank Thomas and Ole Johnston in a digital way, in addition to rearranging these principles according to their importance. The following is the researcher summarizing of the most prominent things covered by these references in the principles of animation, taking into account the order of their importance according to Stephen Brooks's order, and clarification with various examples.

The Twelve Principles of Animation:

1- Timing: "It can be divided into three types:

1/1 - The Physical Timing: It is to impart a convincing sense of weight and mass to the moving elements. It does not have to be realistic always, but rather to be convincing.

1/2 - The Theatrical Timing: It is used in each of the action situations, whether dramatic or comedic. The abilities of a motion designer are developed in it through natural experiences, or it can be learned in theory by studying live action films.

1/3 - The Musical Timing: It helps animation professionals to enhance the feeling and mood of movement, which gives it a reasonable structure. (Tv Tropes, 2018) Timing is generally thought of as the heartbeat of a character or a moving element. Is it regular or irregular? accelerating? or slow? Just as the type of music played during a scene changes its mood, so will the timing. Timing enables you to adjust the rhythm of the movement, adding more Keyframes between Poses slows down and smooths movement, and in the case of fewer frames, the movement is more rapid and sharp, as timing preserves the appearance of the object by obeying the laws of physics. Timing is: Knowing where to place the animation frame on the timeline. It is best done with experienced and experimenting animated graphic designers by repeating the animation preview to get the correct timing. Studying the movement of surrounding objects, and looking for references to movement such as reference videos also helps in getting the correct timing. In Figure (1) an example of employing the principle of timing in designing a movement. (Stephen Brooks, 2017)

Figure (1): Shows the sense of rapid movement timing by blurring the shape of a tree and the group of trees in its center in the background of the scene, using the Blur Filter effect in conjunction with the character's rapid movement. (Stephen Brooks, 2017)

2- Slow in and Out:

At the start of the event, movement is slow, then speeds up, and slows down before the end of the movement. Meaning that the number of frames will be more and are close at the beginning of the first movement mode, then decrease in the middle and then increase again when approaching the end of the movement mode. Fewer frames make movement faster and more frames make movement slower, meaning that the body needs time to accelerate and slow down. Without applying this principle, the viewer feels mechanics in the movement Style. This principle can be applied in 3D animation and digital motion graphic designs by changing the motion line settings in the program instead of being straight to a curved path as shown in Figure (2).
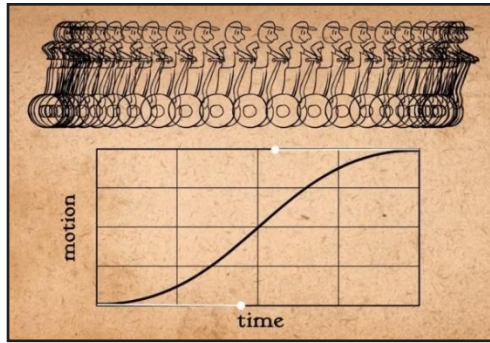
Figure (2) An illustration showing the method of applying the principle of slowing down at the beginning and end of the movement by increasing the number of frames of movement of the character at the beginning and end to impart a sense of slowness at the beginning and end of the movement. (Alan Becker, 2018)

In real life, it takes time for any object to move, whether to speed up or slow down. And the same principle applies to animation. When we have a moving object, we need time to accelerate its movement. This principle makes moving elements a lot more attractive. To achieve this principle in digital motion graphic designs, we will need to adjust the spacing for the movement of objects, because this spacing simply indicates where each individual frame is placed between two keyframes. This principle is employed in digital motion graphic designs in almost all designs, as in Figure 3:

Figure (3): Clarifying the concept of the principle of slowing down at the beginning and end of movement in a three-dimensional motion graphic design by increasing the number of frames in the car's movement at the beginning and end to impart a sense of slowness at the beginning and end of the movement. (Pluralsight, 2014)

3- Squash and Stretch:

This principle imparts an impression of mass and size to the character, or the elements in general, when moving, increasing the sense of mass and elasticity of objects. And in it, the length increases with decreasing the width or vice versa, and it is applied a lot in processing the characters' faces, giving the comic character to the cartoon character. The most prominent example of applying this principle is the clear rebound movement of the ball as in Figure (4).
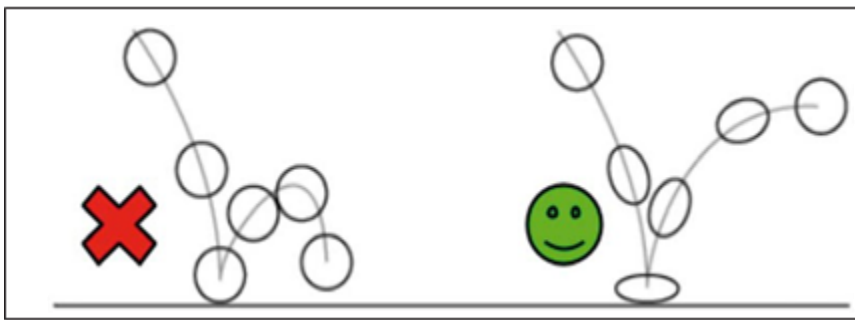

Figure (4): A sketch showing the correct concept of applying the principle of Squash and Stretch to bounce a ball. (Laura Moreno, 2015)

In Figure (5) an example of an application of this principle with different mass and shape, and in Figure (6) an example of the success of applying the principle of Squash and Stretch in giving life to the scenes of three-dimensional visual effects in the American film The Mask (1994), whose success was a major reason in movie success.
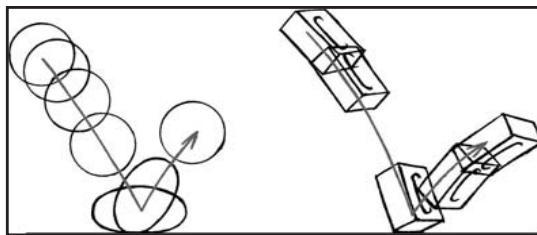

Figure (5): A sketch showing the effect of applying the principle of Squash and Stretch with different stiffness and shape of the object. (Steve Roberts, 30, 2004)
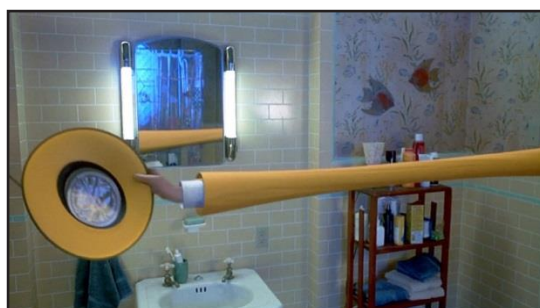
Figure (6): A frame illustrating the use of principle Squash and Stretch in the arm movement of the hero of the mask movie during his rapid movement, as in cartoon characters.

4- Anticipation:

The principle of anticipating movement is intended to prepare and alert the viewer to an important event that the character is about to perform before its start. Every important event is preceded by a custom movement that makes the viewer anticipate what will happen, and helps the credibility of the movement. (Steve Roberts, 2004) Such as preparation to start running, or jumping, which requires preparation by descending, and changing facial expressions that may pave the way for the entry of a character or target into the scene. In Figure (7) an illustration of the application of this principle in real life.

Figure (7) An illustration of the principle of anticipating movement, taken from real life through movement Baseball while throwing the ball (Wikimedia Commons, 2004)
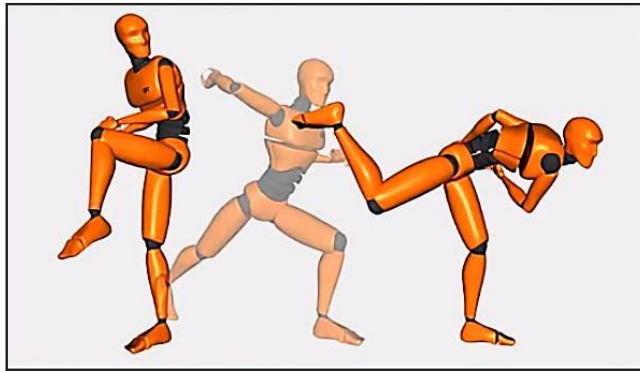
Figure (8): The main keys to sequence the movement of a Baseball player character with an animation program A three-dimensional concept demonstrating the principle of anticipation of movement before its start, as in real life. (Eskchat.com) Image link From: http://blog.digitaltutors.com/understanding-12-principles-animation/

In Figure (9) a comparison showing the ready-to-go position of a cartoon character, and the character Jim Carrey, adapted from American comics in the movie of The Mask in (1994), where the application of the principle of anticipation was made use of by the exaggeration in preparing the character's body position for fast running movement next.

Figure (9): A movement comparison showing the principle of anticipating movement of the hero in The Mask during his action like in cartoon characters.

5- Arcs:

All moving styles with few exceptions (such as mechanical machine move, straight front stroke) must follow arc paths or a semi-circular path. The principle of the arcs path is particularly applicable to the movements of the human body and the movements of animals, as the path of the arches gives the movement a flow and makes it more natural and streamlined, and also gives the scene more realism and supports the main event, for example: the movement of the pendulum, the movement of the arm, the head when it moves left or right, all of that must move in an arc path. In Figure (10), the movement of the ball appears mechanical sharp because the principle of movement is not applied through an arc-shaped path, but rather it is moved in a straight path. In figure (11) we note the smoothness of the ball's movement as a result of taking the arc path in motion. In digital motion graphic design and 3D software, this principle can be achieved by steadily continuing movement in the X axis while applying the principle of slow motion at the beginning and end of movement in the Y axis. (Alan Becker, 2018)
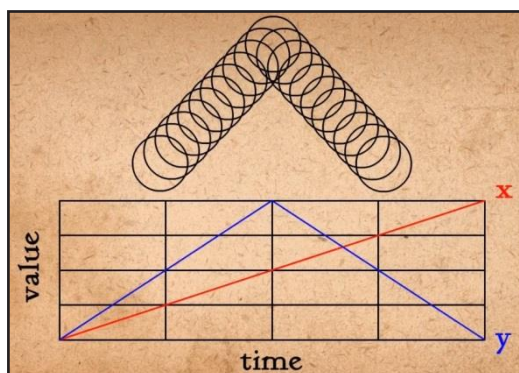

Figure (10): Shows the pattern of mechanical sharp movement in the event that the movement is completed in a straight-line path. (Alan Becker, 2018)
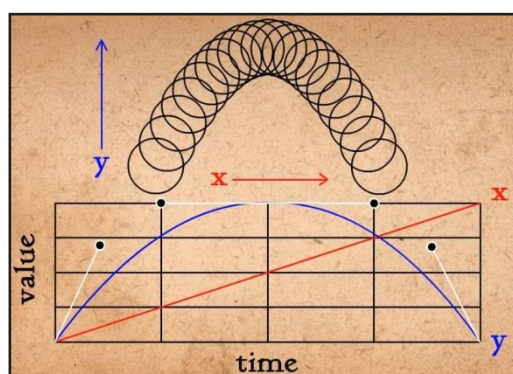
Figure (11): Shows the style of smooth flowing motion as a result of applying the principle of completion of movement in an arc path. (Alan Becker, 2018)

6- Staging:

There is a story often told to shed light on how this particular principle was reached, this story comes from the days when animation was shown in only black and white, when it was difficult to form a character like Mickey Mouse, with its solid black color, and for clarity because of this problem, Walt Disney told animators to draw all of their characters with clear silhouettes in which the character's body postures are always perceptible. For example, Figure (12) Mickey Mouse's ears were always drawn next to each other even when his head was turned to the side, they never overlapped, because if not, it would appear that Mickey only has one ear, and his iconic silhouette would be ruined.
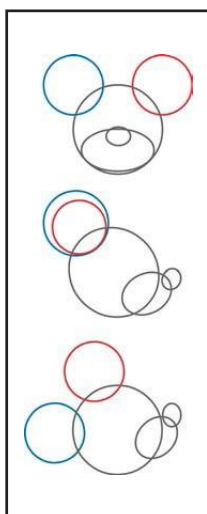
Figure (12): Linear drawings of the famous design modes to move the Mickey Mouse character from the front (top of the figure), and how the shape of the ear overlaps in the side view angle if it is moved in the three-dimensional space (center of a figure) so the character was drawn in order not to allow the design of the famous character to overlap the two ears after rotation (bottom figure) (Stephen Brooks, 2017) .

Staging is a method or style of presentation of an idea to be very clear, in other words, adjusting the settings for an event or pose position using all of the characters, camera angles and the rest of the scene elements in order to help tell the story and convey a specific situation, or an idea of a character in terms of Its relation to the story. What is the point of animating something well if no one can see or understand it? This principle is used effectively in long, medium, or close shots, in order to prevent the viewer from confusing two or more events at the same time, as it is used to express acting, timing, or camera angles and positions. For example, remote shots are used to show large movement, while close-up camera shots are suitable for showing facial expressions. In order for the scene to be properly directed, the designer must know the 'story objective' in relation to the scene. Finally, the influencing factor for the principle of staging, in

terms of success or failure, mostly comes from determining where and how to place objects on the screen. (Stephen Brooks, 137, 138)

In digital motion graphic designs, staging can be determined by objects focusing, camera placement, or even lighting. If the design isn't right in the scene, audience will have trouble focusing, or the wrong item might get focused. The viewer must be looking at a specific point of interest in digital motion graphic designs, making them unmistakably clear. In order to control the design well, one must think about the main point of design, and what should reach the viewer, as in Figure (13) following (Pluralsight, 2014).
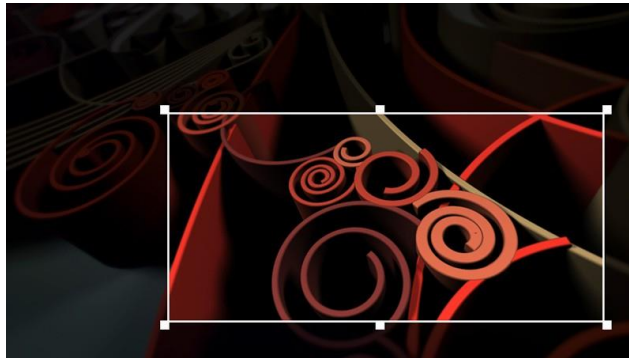

Figure (13): A frame of motion graphic design that illustrates the principle of staging in terms of focusing on the viewer's point of interest (Pluralsight).

7- Straight Ahead Action and Pose to Pose:
Straight Ahead: in which the motion designer begins drawing the frames of a particular action one by one, from the beginning of the animation to its end. This method is good for moving elements that have random movement, such as fire, scattered water particles, dust clouds, and explosions.

Pose to pose: in which the motion designer draws the main frames of the movement and then fills the frames that complete the movement

between them later. See in next figure (14) comparison between straight ahead action and pose to pose in 3D animation form.
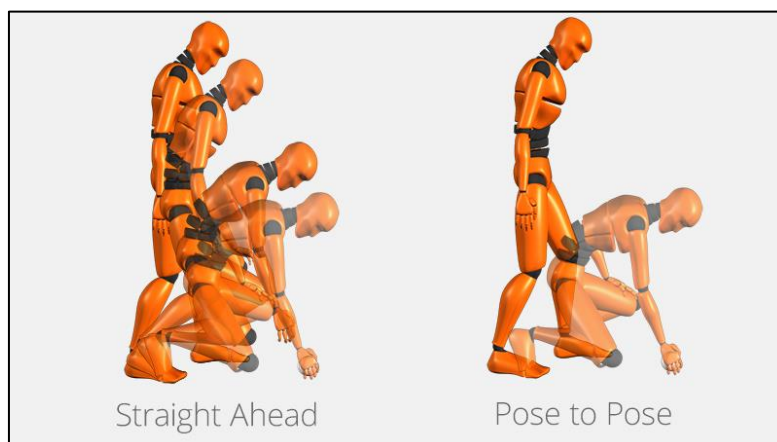

Figure (14): Comparison between straight ahead action and pose to pose
Image link: http://blog.digitaltutors.com/understanding-12-principles-animation/

In *pose-to-pose* animation, the animator plans his action, figuring out just what drawings will be needed to animate the scene. Pose-to-pose is used for animation that requires good acting, where poses and timing are important. (Lasseter, John, 1987) (Thomas, Frank., Ollie Johnston, 1981). In next Figure (15) animation below, applying pose to pose action to the brown bag as it jumps up on the screen by marking out 3 key frames in the Pose to Pose and get quite a dramatic transition.

Figure (15): Pose to pose (Anahita Tabarsi, 2016)

8- Follow Through and Overlapping Action:

This principle means the inertia resulting after the cessation of movement, when the main body of the character stops, all the other parts will continue to move a little before they stop, as nothing stops at the same moment. Interlacing also means the succession of moving elements of the scene after each other, that is, one after the other and not as a single block. Technically it's physics. To paraphrase Newton's Law of Motion: objects at rest want to stay at rest and objects in motion want to stay in motion (until acted upon by an outside force).

Overlapping actions give animation a natural feel. If we want our characters to move believably and feel like they live on earth with gravity, weight, and real-world mechanics the principles of overlapping action are vital. (Drew Adams, 2017)

9- Secondary Action:

It is an additional sub-event in the scene which is used as a complement to the main event to strengthen it and add other dimensions to it, as it gives the scene more life and supports the main event. The secondary action aims to add more realism to the character's movement and helps to support the basic movement as its presence helps to make the animation more realistic and the viewer feels that he is seeing a real scene, for example: Someone enters his room and closes the door behind him and after entering he discovers that the door has not closed properly Good, returns to close it, events continue. The secondary actions are not a result of the primary actions, but are purely present as support for them. (Rebecca Green, 2012)

10- Solid Drawing:

Taking into account the two-dimensional shapes when animating them in the three-dimensional space and giving them a sense of

volume, weight and balance. In other words, the ability to draw two-dimensional objects and characters from all angles as if they were occurring in a three-dimensional environment. The original designation of the principle came from the two-dimensional drawing and its corresponding in three-dimensional Solid Posing, which means how the position of the character pose is simple, clear and legible as possible when it is moving on the computer, where the position of the character must be strong and expressive of its feelings.

Animation is essentially a series of poses that when combined, form motion. If those poses aren't clear then it's hard for an audience to know exactly what's happening. By turning each pose into a silhouette, it makes it easier for the animator to see if the pose they have created, reads well (Peter Butler, 2015). Look at In Figure (16):
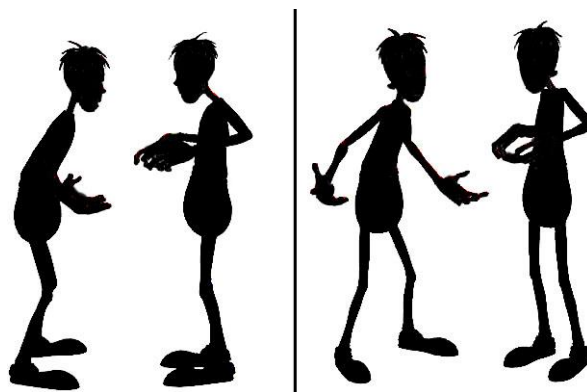

Figure (16): An example shows that the left image is harder to read than the right. Especially the left character. From: http://www.loneoakproductions.com/blog/2015/06/16/principles-of-animation-solid-drawing/

11-Exaggeration:

This principle is intended to agree with reality while presenting it in a more exaggerated manner. Exaggeration in walking, eye movement, or even head rotation is sometimes necessary. What is important is that exaggeration is done reasonably, and common sense is

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used in order not to move dramatically, and exaggerate it too much. In general, animation consists of a series of drawings in which the weight values of the elements are not clear, and their success on the screen depends on their quality in giving the impression of interaction in an exaggerated manner when the weight and physical forces of the elements are added in the scene. (Harold Whitaker, John Halas, 24, 2009)

In Figure (17) the researcher reviews an example in which he applied the principle of exaggeration through digital motion graphic that was done through 3D Max program by moving a metal ball inside a tube while exaggerating the reaction of the tube response to the movement of the ball inside it by the protrusion of the parts the ball goes through as it happens in most cartoonish artwork:
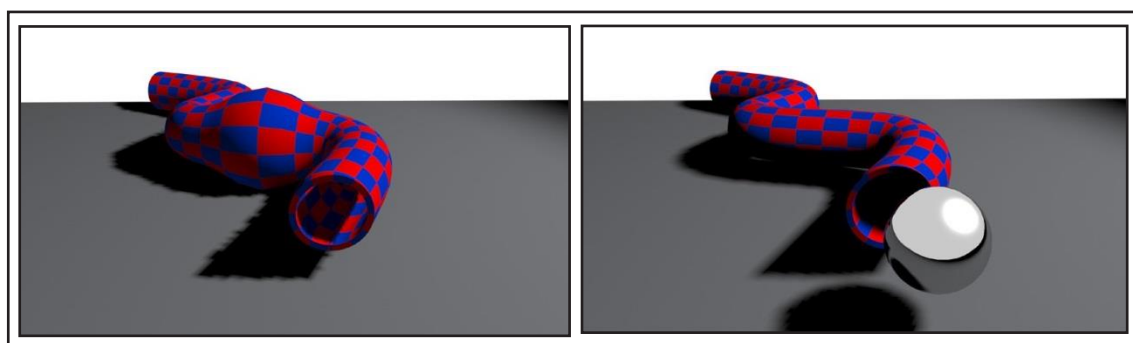

Figure (17): The researcher, two deferent frames showing the application of the principle of exaggeration in the movement of a ball that passes through a curved tube that is affected by the mass of the ball and protrudes it during its movement as it happens in cartoons.

12- Appeal:

It is an attribute that makes the movement charming, interesting, and satisfying to the eye of the viewer. It is the charisma of the event for the movement, and it is often mainly in the design of the character and in its posture, and it is not only required to be added to the good

characters, but it can also be added to evil characters (Frank Thomas, Ollie Johnston, 1981). But these bad characters of course need to look bad in a less attractive form, so that the audience does not like them more than the hero (Andy Beane, 104, 2012). Audiences like to see a quality of charm, pleasing design, simplicity, or magnetism. A weak drawing or design lacks appeal. A design that is complicated or hard to read lacks appeal. Clumsy shapes and awkward moves all have low appeal (Ralph A. De Stefano 2018). Look at In Figure (18):
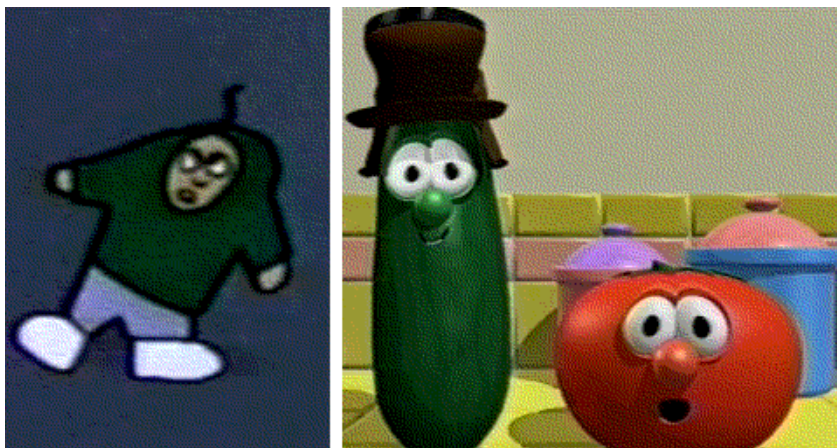
In Figure (18): The image on the left is not an appealing design, while the characters on the right is. From: https://www.evl.uic.edu/ralph/508S99/appeal.html

3. RESULTS

- There are many animation principles which we should put into consider when designing any type of animation.
- There is a close relationship between using most of animation principles in animation artworks and digital motion graphic designs.
- There is an urgent need to enrich digital motion graphic designs by applying animation principles to them starting with design stage.

Recommendations:

In light of previous findings, the researcher recommends:

- We should work to increase artistic awareness of animation principles in Arab culture and related issues of taste and aesthetic values by teaching those animation principles in many of Arab educational institutions, at their primary, secondary and university levels.
- We should pay attention to teach those animation principles widely in fine arts institutions, in particular for animation and graphic departments.

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