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THE SYMBIOSIS OF ART AND SCIENCE IN FILM ANIMATION CREATION

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Abstract
The current global emphasis on technological development for societal advancement in the face of disciplinary dichotomization between art and science leaves one wondering where art as a discipline fits in. Today, technology is fast becoming another synonym for science or the scientific. Inventions and technological apparatuses, such as computers, chips and all such gadgetries and inventions that enhance productivity and advance society, fall under the purview of the science. This view seems to relegate the arts to the background, in technology and development discourse. Surprisingly, the advancement of technology as researches reveal, is not a single disciplinary effort. The assumption that art and science have no meeting point falls like a pack of cards when considering disciplinary inputs in the area of film animation. This paper examines the potentials of the arts in technology-induced developmental strides and argues that the field of arts has always added and will continue to add to the milestones achieved by science. This is because art and science converge and are inextricably linked in several areas of human endeavour. These areas, one can say, make both disciplines of equal importance in the scheme of the development curriculum. This work x-rays the disciplinary inputs in film animation creation, to show the interrelationship between art and science.
Key Words: Arts, Science, Animation, Film, Societal Development

Introduction

The perceived dichotomy between the arts and the sciences have for long been promoted by many, resulting in the preference for one over and above the other where societal development is concerned (Kola, A. J. 2013, Nakkazi, 2014). The ideology that science profits society more is advanced to the point that art as a discipline seems to be relegated to the background or, at most, seen as a discipline with peripheral contribution to the advancement of society (Ajakeye 1982:2). It is for this reason that, in Nigeria and some West African countries, preference is given to science and technology (Enamhe 2013). Taking into consideration the artistic nature of some core vocations, many science-based students may find it hard to believe that viable economic or vocational opportunities lie in the area of art. A synergy between art and science in production is hardly seen as feasible because of the differentials between science and arts. Consequently, science-based students may miss

out on opportunities where they can interactively work with the artist and earn very decent income.

Several science-based students will find it a hard pill to swallow when told that hidden in almost every scientific endeavour lies the propelling and motivational force of art. And, research has proven the veracity of the claim. At Harvard Art Museums "In-Sight Evenings" lecture, Dackerman (2012) highlighted how art helped advance the frontiers of science using the works of Albrecht Dürer who greatly influenced 16th-century science with his cartographic and anatomical work. His profound influence on the astronomy of the day, Dackerman further posited, helped visualize changing conceptions of the universe." The invention of the movie camera may be a scientific exercise; but it was an artistic experiment with photography that motivated scientific inquisition and the subsequent invention of the movie camera (Encyclopaedia Britannica, 2009).

The shape of houses, bridges, cars and many scientific inventions, have been motivated by aesthetic considerations, which is a premise for arts, as much as their functionality or utilitarian qualities. Packaging and marketing which are aspects of the visual and communicative arts have aided the sustenance of most inventions by helping to gain and maintain the patronage of the public. In recent times, scientists have made incursions into the film arts and are contributing and benefiting immensely because it is an area that requires interactive work between the two disparate discipline. The justification of this claim will require an examination of the art of filmmaking.

The Art of Filmmaking

Filmmaking has for long been seen as the domain of the arts; but, in recent times, it has become a region where the arts and science cohere (Eldred, 2016). While the talents in films are populated by performing artists, the same cannot be said of the population of the production crew whose responsibility it is to ensure that the work of the artist is true to life. Many of the roles of the production crew fall squarely in the area of the sciences. One of such is the area of animation, special effects, set design and simulation of reality which is the focus of this paper. This work will examine the areas where art and science converge in filmmaking such as animation, simulation, set design, etc. and go on to prove that the advances made in these areas are the brainchild of a synergy between the arts and the sciences. This will make a case for synergizing between the two disciplines. An examination of the term film animation will now be required here.

Film Animation and Simulation of Reality

Film animation can best be understood with the compartmentalization and independent description of the words "film" and "animation". Film is motion picture. (Usai, 1996). It comprises telling story using images and sound. It is the fictional recreation of reality or the creation of perceived reality using the audio-visual medium. To the layman, images in film may be decoded as human talents acting out or performing roles in a film. Needless to say, images transcend the simple assumption that they are the recording of live actors playing roles. They include several inanimate objects mechanically imbued with life, which compete with the living in films. For instance, trees, rocks, robots, alien configurations and computer-generated characters proliferate the film world today. Animation, on the other hand, has severally been defined depending on the type of animation being described.

The Oxford English Dictionary (1989) defines animation as "the manipulation of electronic images by means of a computer in order to create moving images". It goes further to describe it as the "the technique of photographing successive drawings or positions of puppets or models to create an illusion of movement when the film is shown as a sequence". Film animation, therefore, is the manipulation of inanimate images, graphics or objects to create the illusion of movement in films or a film sequence. On the other hand, simulation, which is sometimes seen as virtual reality, is the recreation/imitation of reality or real world processes involving the development of models that are representations of key characteristics, behaviours and functions of the of the selected physical or abstract systems or processes (Banks, Carson, Nelson and Nicole, 2001).

Nature and Types of Film Animations

The ways films and film animations are made tell more of the synergy between sciences and art. Different types of animation exist and they pervade the entire film space from commercials to musicals and even home video films. We have, as Roberts (2004) observes, the hand-drawn traditional 2D where each of numerous frames is drawn by hand and filmed. This is evident in the films: "Snow White", "Peter Pan" and "The Sleeping Beauty". And there are the digital 2D and 3D animations comprising the use of computer-drawn images. The stop motion animation is one where physical static objects are animated and imbued with fluid movements in post production.

There is also the mechanical animation going beyond robotics where machines with human resemblance carry out mechanical routine tasks on demand. Film animation also entails the creation of prototypes of original machines that can be animated same using mechanical animation techniques. We also have the audio-animatronics and "autonomatronics" sensor-driven machines that is programmed to have a sense of perception and smell and can converse

with humans as well as puppetry animation involving the use of puppets as seen in the film: *King Kong,* produced in 1933. There are many more but the ones listed above are clear indications of animation where science held sway. (Lasseter 1989, Kerlow, 2000).

Areas of Multidisciplinary Convergence in Film Production

To assume that the place of the scientist is situated in laboratories, construction sites, mechanical workshops, research institutes or the oil and gas industry as is the case in Nigeria, where the banner of science flies high with little or no vestige of art or the artist is, to say the least, anachronistic. It is on record that many rocket scientists have found their way into the film industry, the domain of the arts, to ply their scientific skills or trade with joy, excitement and plenty of financial gratification plus a sense of job satisfaction (Varier 2017). In fact, rocket scientists, particle physicists, computer scientists, engineers and others have found employment helping to solve animation problems on the big screen, with film companies like DreamWorks Animation. One of such listed by Varier (2017) include Ron Henderson, a high-level physicist, who together with engineers and other scientists including NASA employees, shifted from their careers in aerospace and academia to work in the movie business.

Henderson and others help to create complex algorithms to simulate realistic-looking water, fire, dust and other elements used in action- packed movies with special effects in several Hollywood blockbuster films. These scientists provide tools for the artist and are needed to explain things like the mathematics behind the fluid-simulation technology that goes into the creation of bubbles animated by a race of diminutive aliens as seen in the film: "Home". Who else can do that if not a pure scientist? A look at today's movies will gratify Paul Debevec's assertion as captured by Varier, that: "The physics behind what's happening in these movies is incredibly complicated," and only scientists can unravel them. Henderson is an aeronautical engineering graduate and a doctorate degree holder in mechanical and aerospace engineering from Princeton, and is working in the film industry.

Other interesting cases are those of Drew Berry and others, whose works seem to merge the disciplinary divide between science and art, by using the film medium to expand the frontiers of science in unique ways that seem to awe the world. It will be pertinent to examine some of these works. Drew Berry, according to Mia (2009), is a biomedical animator, a cell biologist by profession, who specializes in revealing the drama behind the incredibly miniscule, yet operatic, lives of cells, molecules, and viruses. His works, which are focused on everything from the lifecycle of malaria to an up-close look at a mouse's brain, include Body Code, Catalogued Sickle Cell Anaemia and Haemoglobin, and DNA Translation. It is noteworthy that in several parts of the world, crucial inroads are being made in the area of

disciplinary convergence between art and science. In Olsen's article in The New York Times (15 Nov., 2010) entitled: "Where Cinema and Biology Meet", the works of animators, Gael McGill, Janet Iwusa and Drew Berry were featured. They included: animated images depicting how cells internalize molecules on the cell surface and a series of images from an animation depicting how proteins move across the endoplasmic reticulum membrane done by Iwusa. Geoffrey Cheung's "Metastatic Bone Pain" is a beautiful animation describing the cellular and molecular mechanisms underlying peripheral pain resulting from metastatic bone cancer. His work is a testimony of the fruitful marriage between science and art (Olsen, 2010).

The works of a scientist in the field of arts, Harvard biologist, Wilson, declares: "significantly enhance education and could change how students learn biology". Web resources that present an organized directory of cell and molecular animations, as well as a collection of original tutorials for life science professionals learning 3D visualization have sprung up. The goal is to provide an efficient way for scientists and educators to browse and access existing animations for teaching and communication purposes and fostering of a culture of collaboration among workers from disparate backgrounds. The interactivity between biology and film has helped in bringing visual representations of some of life's deepest secrets to the public, which is a major advancement in knowledge dissemination. There are other areas to consider, like architecture, where science and art fully integrate vocationally.

Film and Architecture

The synergy between art and science is also evident in the architectural field. Here, architects employ the media in the promotion of their profession. One of such is the combination of video with 3D modelling by Bjarke Ingels to show the full design process and concept from the context study, to the creative use of air rights above the highway (Berkowitz, 1980). The setting where a film is shot, which is of immense importance to the filmmaker, has been greatly enhanced by architects plying their trade in the film industry. Often times, spaces will have to be recreated to suit a particular scene. Bedrooms can be recreated in the living room to create space for the camera to record. In fact, in the Mnet comedy series: "Do good", the whole restaurant, including the kitchen, dining section and the bar, were all situated in one space without any demarcating wall. This design which makes for economy of space and fluidity in the recording process is indeed an architectural input to scene design.

In several action movies, streets, buildings, and several other locations have been constructed to suit particular scenes. The Japanese animator, Shinki Kimura's, perfect depictions of urban landscapes, including his native Tokyo have graced many anime TV series and film productions he has directed. The works of architects-turned-filmmakers are evident in many

sci-fi inspired design fiction films which transport the viewer to exclusive out-of-the-world locales, with seemingly realistic settings that the viewer can visually explore and inhabit. Architectural inputs have, to a great extent, enhanced the look of many films in the film industry. They use 3D software to originate designs and make plans for engineers and builders to follow for the construction of film sets.

The Viability and Need for Multidisciplinary Convergence in Filmmaking

From the foregoing, it is obvious that the film industry is a fertile field with latent opportunities that can be harnessed by bridging the gulf between science and arts. The rising profile of the Nigerian film industry in the global film market calls for the uplifting of professional standards in the practice of filmmaking and the quality of its output, which can greatly be enhanced with the convergence of science and art in filmmaking. Despite Nigeria's global ranking as one of the first three largest film producers in the world, there is a clear draught of sci-fi films, action-packed films, documentaries and children's cartoon films which have high multidisciplinary interactivity and a huge income-generating potential running into billions of dollars.

It should be noted that Walt Disney company, an American film company, producers of popular animated films: Peter Pan, 1953; Cinderella, 1950; the Jungle Book, 1967; Iron Man 2 and Toy Man 3, 2010; *Star Wars: (The Force Awaken, 2015*) is worth a whopping 186 billion dollars, with about 195,000 employees comprising experts in both art and science. In 2016 alone, the media networks division which is its largest segment, reported about 23.69 billion U.S. dollars as revenue (Kvrgic, D., 2015). DreamWorks Studios in California, USA, established about twenty-two years ago, is another successful film company working with scientists and artists in animated film creation. The company has a workforce of about 2,100 and over thirty-five animated films to its credit. The list of productions by DreamWorks alone includes the 3D animation film "Kung Fu Panda, 2008", "How to Train Your Dragon, 2010", "How to Train Your Dragon 2, 2014", "Shrek, 2001", "Shrek 2, released in 2004", "Madagasca: Escape to Africa, 2008", among others. The company, in the list of Forbes best small companies in the world, is worth about 1.5 billion dollars (DreamWorks' Annual Report, 2011).

It is logical to state that the marriage between science and arts in the entertainment industry will, to a great extent, create positive impacts in the economy of the nation by way of income generation and the provision of jobs for our teeming unemployed graduates. The analysis above shows that the convergence of science and art in film production has so many ancillary benefits waiting to be tapped. It is pertinent to look at the benefits that could accrue from the disciplinary convergence between art and science in film and animation creation.

The Benefits of the Convergence of Science and Art are many

When science is set to art, the benefits that accrue are many. It ranges from job creation, with huge financial rewards, job satisfaction, to enhanced creativity. The convergence can enhance productivity as is the case in filmmaking where science now provides tools that are beyond and outside the capabilities of the art profession. Below are other benefits:

1. The convergence has the capability of opening a new economic horizon for the scientist and artist who now have added fields to ply their trade and earn decent income.
2. It will also create mutual respect for the professions of disparate disciplines working together.
3. It will direct the attention of the scientist toward discovering new areas to pour their creativity into.
4. The collaborative work has the potential of breaking new grounds in several areas as there would be better interactivity and understanding of the needs of the different fields.
5. There are multi-disciplinary opportunities for the teeming unemployed in the society.
6. It will create a diversion from a monolithic economy to other viable areas where national income can accrue.
7. The science/art convergence can benefit the nation as new areas for income generation will sprout.
8. It will, in no small measure, elevate professional standards in filmmaking and provide new avenues for scientific research in the different aspects of the media.

The foregoing showed that the multidisciplinary convergence between art and science will be advantageous to both disciplines and should be encouraged.

Summary and Conclusion

This paper sets out to show that societal development is not predicated on a solo discipline but one that can emerge from a multidisciplinary convergence such as that between the arts and the sciences. The concept of film animation and simulation was examined to show that the movie industry is a field where scientist can ply their trade and one where they have already been making inroads. The paper succeeded in proving, using the works of molecular animators, physicists, and architects, that a synergy between art and science is a very feasible one, with far-reaching benefits.

In conclusion, this paper advocates the promotion of interdisciplinary interactions in the production work flow, especially in the area of filmmaking.

Recommendations

Taking into consideration the relevance of multidisciplinary interactivity, it is recommended that emphasis be placed on encouraging collaborative works between science and arts. The dichotomy between both disciplines should be downplayed and an atmosphere for cohesion between art and science created. Institutions of learning should develop a curriculum for the disciplinary intermingling so that students will, from the onset, get a fair understanding of the advantages of working with those on the other side of the disciplinary divide.

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