ARTICLE

LANGUAGE OF THE INANIMATE—A REDUCTIONIST APPROACH TO REALISM BY ADAPTING MARIONETTE MOVEMENT THROUGH A PHYSIOLOGICAL STUDY OF ANIMAL MOTION

Owen Seda
https://orcid.org/0000-0001-9056-2979
Tshwane University of Technology, Pretoria
owenseda@mindbuzz.net

Mienke Fouché
https://orcid.org/0000-0001-5135-3648
Tshwane University of Technology, Pretoria
vanzylm1@tut.ac.za

ABSTRACT

This paper is based on a practical project involving an in-depth study of animal physiology and locomotion with a view to constructing five animal marionettes in which the focus was on their movement. The purpose was to make them come across to an audience realistically and convincingly solely based on their movement. The researchers attempted to reject the emphasis placed on visual accuracy in modern realism and naturalism, arguing that, in the case of inanimate objects such as puppets, realistic and convincing approximations of reality did not need to rely on visual accuracy but could rely on movement. To prove this, the marionettes were not given the physical attributes of the animals in their natural state. To test the effectiveness of reliance on movement, the marionettes performed for an adult audience consisting of thirty respondents whose ages ranged from 18 to over 60. In analysing the data, the respondents were divided into three age groups: 18–39, 40–59, and 60+. Each respondent was ascribed a number to ensure confidentiality. The performance was deliberately devoid of the usual attributes of the theatre such as storyline, character roles, sound and lighting. The respondents evaluated the effectiveness of the animal marionettes and completed an open-ended questionnaire. The findings indicated that the realistic movement of the marionettes was so effective that it persuaded the respondents to view the marionettes as convincing and realistic.

Keywords: marionette; realistic; anatomy; locomotion; movement; puppetry; skeleton

UNISA university of south africa PRESS

Commonwealth Youth and Development
https://upjournals.co.za/index.php/CYD
Volume 15 | Number 1 | 2017 | #3297 | 20 pages

http://doi.org/10.25159/1727-7140/3297
Print ISSN 1727-7140

INTRODUCTION

During the Italian Renaissance, roughly between the 15th and 16th centuries, artistic representation strove to approximate (or deliberately deviate from) the illusion of reality (Brockett and Ball 2000; Wilson and Goldfarb 2002).

Visual accuracy in artistic representation gained ground around 1850 as a result of the groundbreaking ideas of the British biologist, Charles Darwin, and the Swedish psychologist, Sigmund Freud, who identified heredity and environment as the primary bases of perception, social action and representation. Freud and Darwin advanced the view that social action was best understood against the background in which that social action took place. In other words, truth and believability were relative to the material circumstances in which the action unfolded. As time wore on, truth in representation achieved its full realisation in the theatre through the twin movements of realism and naturalism, such that by the turn of the 19th century, realism and naturalism had become the most dominant forms of artistic expression. Realism and naturalism sought to achieve objective and scientific explanations of lived reality through representation.

It is said that realism was first recognised as a movement during the 1850s, whereas naturalism (a more extreme form of realism) came about during the 1870s (Brockett and Ball 2000). To the extent that realism and naturalism placed emphasis on accurate reflections of the natural world through art, realism and naturalism seemed to be in sync with the emphasis on visual accuracy of scenery and spectacle, which had already come about during the European Renaissance. As Cohen (2000) rightly observes, realism came to have the most pervasive and long-lasting influence on modern forms of theatre. Likeness to life through representation became the primary goal of the realist movement in art. Instead of regarding actors and objects as merely presenting characters and objects on stage, the realists argued for the very existence of such characters and objects on stage. At its every stage of development, visual accuracy was complemented by realistic dialogue in order to consummate the act of effective communication in the theatre. As Carlson (1996) rightly observes, modern world drama came to be produced by dramatists working with a specific target audience in mind where the dramatists and their audience shared a common language that was uniquely attuned to theatrical communication. Dramatists and their audience not only shared a spoken language, which is key to the communicative act, but also a range of other "languages of the stage," which included theatre conventions, acting styles and theatre structures. In realism and naturalism, language and visual accuracy complemented one another in order to communicate with and convince theatre audiences of the veracity of that which was depicted on stage.

In this paper we attempt to do more (or, in another sense, less). We proffer a different approach to realism: we negate the historical emphasis on the functional complementarity between language and visual accuracy. We put forward the view that for inanimate objects, such as puppets, realistic and convincing approximations of

reality as we perceive them through sensory experience can be fully realised through movement that is not necessarily accompanied by spoken language. We argue that the language of the inanimate is to be found solely in convincing movement that is based on the physiological study of animal locomotion.

PUPPETRY AND MARIONETTES—A GENERAL OVERVIEW

In this paper we use the terms "marionette" and "puppet" interchangeably because they are related in meaning. Tillis (1992, 65) provides the following comprehensive definition of puppetry:

> The puppet is a theatrical figure, perceived by an audience to be an object that is given design, movement and *frequently speech, so that it fulfils the audience's desire to imagine it as having life*; by creating a double-vision of perception and imagination, the puppet pleasurably challenges the audience's understanding of the relationship between objects and life. [emphasis added]

From Tillis's definition, it is clear that puppets are physical figures that communicate with audiences through "design, movement and sound." In puppetry, an effort is also made to convince the viewer through speech and/or sound.

A marionette refers to a specific type of puppet that is controlled from above using strings. In this paper we opt to use marionette and puppet interchangeably because puppetry is a generic term that encompasses marionettes as a form of puppetry.

Tillis's definition (1992, 65) indicates puppetry as a form of bodily extension to which life is ascribed through a combination of human manipulation and the imagination of the viewer. Flower and Fortney (1983) are of the view that a marionette is more than just a work of art: every person who creates (or manipulates) a marionette puts a bit of themselves into it. In this paper we argue that, like a real human being, a marionette can develop a style and a look unique to its creator even without the accompaniment of speech or sound.

Compared to other forms of representation, puppets and marionettes do not always adhere strictly to requirements of visual accuracy. In other words, visual accuracy has not always been the raison d'etre of representation in puppetry. This is because, being inanimate objects, puppets and marionettes try to achieve their greatest effect through movement. It can be said then that in puppetry, movement takes precedence over visual accuracy and spoken dialogue, so much so that movement is the primary language of communication in puppetry. It can be argued that in marionette construction, convincing movement is the language of communication of the inanimate. However, this does not discount the fact that there is considerable evidence of puppet constructions in which modern puppeteers make an effort to create puppets that try to approximate visual accuracy. For example, Currell (1992) and Flower and Fortney (1983) recommend that

the joints and limbs of puppets ought to be dressed up and covered in other materials in order to mask the inner workings of the puppets. Such measures are taken in a quest to achieve visual accuracy and create the illusion of reality.

However, an opposite approach can be followed as illustrated in Figure 1, which depicts two images: a chimpanzee and a hyena. These are examples of puppets that are basically made from wood and gauze with the bodies constructed out of interlocking plates of plywood and bendable rods that are covered with nylon gauze in order to create a realistic sense of bulk of body as would be found in the natural world, without masking the joints and inner workings of the puppets (Taylor 2009). The limbs are also constructed from layers of plywood that are spaced in order to create that sense of bulk.

Figure 1: Chimpanzee and hyena

Source: Taylor (2009, 25, 77)

Using the approach described above as a springboard, in this paper we adopt a reductionist approach to realism arguing that in puppetry the modernist quest towards visual accuracy and realistic representation lies in convincing movement and locomotion, and the language of communication of the puppet is to be found in convincing movement rather than in fidelity to visual accuracy.

Animal Motion and Anatomy

In order to test the validity of our basic argument we constructed five animal marionettes with the purpose of having them move realistically and convincingly. To achieve that, we did an in-depth study of animal physiology and locomotion.

Based on this study, we designed and constructed the five marionettes, each one to mimic a different type of movement in the animal kingdom, namely: aerial locomotion (the common barn owl), scansorial locomotion (the two-toed sloth), cursorial locomotion (the crocodile), saltatorial locomotion (the large bullfrog), and natatorial locomotion (the hammerhead shark). The five classes of animal and the type of locomotion of each are summarised in Table 1.

Table 1: Animal classes and forms of locomotion

CLASS	ANIMAL	LOCOMOTION
Mammal	Sloth	Scansorial (locomotion in an arboreal environment, i.e. in trees)
Bird	Owl	Aerial (flying in the air)
Reptile	Crocodile	Cursorial (locomotion in a terrestrial environment on all fours)
Amphibian	Frog	Saltatorial (bipedal locomotion, i.e. hopping on two legs in a terrestrial environment)
Fish	Shark	Natatorial (swimming in an aquatic environment, i.e. in water)

In this paper, for reasons of limited space, we focus on describing the anatomy and locomotion of only two of the five animals (the common barn owl and the frog) and the design and construction of their marionettes. We used the same process to design and construct the other three marionettes.

The Common Barn Owl—Anatomy, Locomotion and Construction Process

To demonstrate aerial locomotion, we constructed a common barn owl. The common barn owl is a bird that employs aerial locomotion and is thus capable of flight. Unlike other large birds of prey, owls hunt at night. There are no upward drafts or thermals at night for the owl to take advantage of, therefore owls have a more engaged mode of flight. Our study and analysis of owl structure revealed that the owl has a complicated axial skeleton in which the sternum is a stretched bony blade that is positioned ventrally to the ribcage. According to De Panafieu and Gries (2011), this forms the breastbone, which is the main area of attachment for the bird's flight muscles. The paired coracoids (extensions of the shoulder blades), the shoulder blades, and the wishbone form the

pectoral girdle. The pelvic girdle is slim and fused to the lumbar vertebrae to create a rigid structure. The spine, the pectoral girdle, the ribs, and the pelvic girdle all come together to form a rigid structure that provides stability to the frame as a further adaptation for flight (see Figure 2).

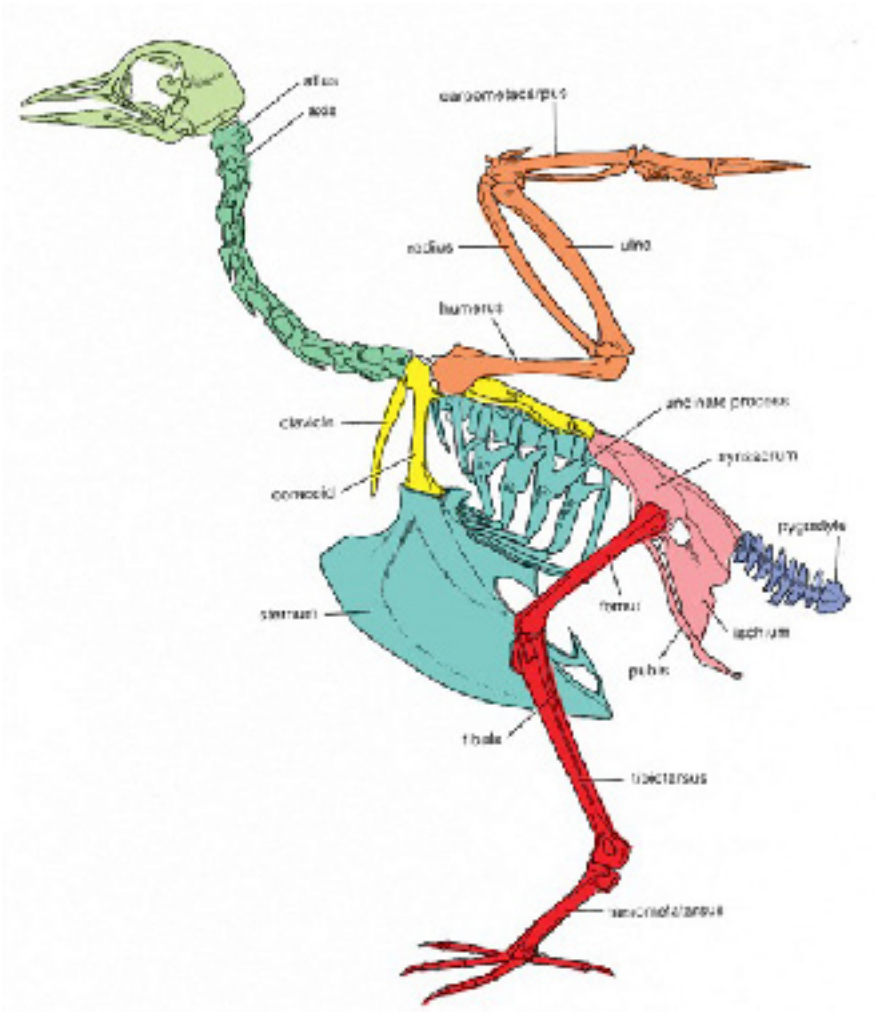

Figure 2: General bird skeleton

Source: Polly (2011, 6)

The owl's wing consists of three segments of relatively equal length (the "arm," the "forearm," and the "hand"). Together they are restricted to movement in only one plane by hinge joints (Attenborough 1998). Like other birds of prey, owls have three forward-

pointing toes with the fourth toe pointing backwards. The foot joints function in a manner similar to the wing movement. In Figure 3, the flapping mechanics of a bird's wings are illustrated.

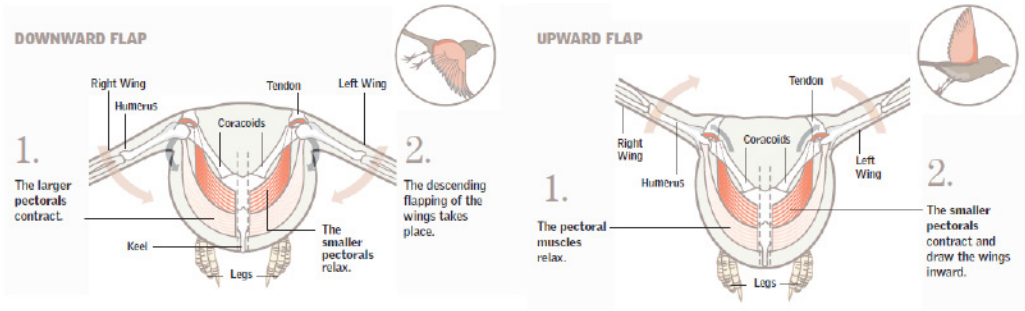

Figure 3: Flapping mechanics of a bird's wings

Source: Britannica Illustrated Science Library (2008, 13)

When in flight, owls use aerial locomotion, which is an appendicular form of motion. This means that the limbs create forward propulsion and are also responsible for directional control. Airflow is also important for flight. Birds create their own flow of air across the wings by flapping. Forward thrust is created by flapping lateral appendages—the right and left wings are simultaneously rotated either to simulate a figure of eight or a circular motion (Encyclopaedia Britannica 2013). The common barn owl hunts using sustained flight in open areas where its prey often hides on the ground. Its wings are adapted for low-level flight rather than for soaring. The owl hovers in the air above its target before it swoops down for the catch. The owl's wings have a large surface area to give the animal plenty of lift at slow speeds (Attenborough 1998). It flies along a straight path with steady flapping of the wings, gliding upwards to reduce speed just before perching (Encyclopaedia Britannica 2013).

The African Bullfrog—Anatomy, Locomotion and Construction Process

Our second example is that of the African bullfrog. The African bullfrog is a large fossorial amphibian that employs saltatorial locomotion. The frog is generally well known for its impressive leaping. It also has a most peculiar skeleton, especially in respect of its pelvic and pectoral girdle.

The frog has a specially designed skeleton to absorb the shock created by landing on the ground after leaping (Bonnan 2016, 210). Its skull and vertebral column are connected to the pectoral girdle by means of an elastic muscular suspension. The tailbone is a stiff rod comprising fused vertebrae of the lower backbone and it is horizontally flanked by the pelvic girdle. The pelvic girdle remains in the same plane as the axial skeleton when the animal jumps (Encyclopaedia Britannica 2013).

In terms of its appendicular skeleton, the front limbs consist of three parts connected by a hinge joint in the elbow and plane joints in the wrist. The hind limbs have the same limb plan as the front limbs but are almost twice as long (Encyclopaedia Britannica 2013). The skeleton of a bullfrog is illustrated in Figure 4.

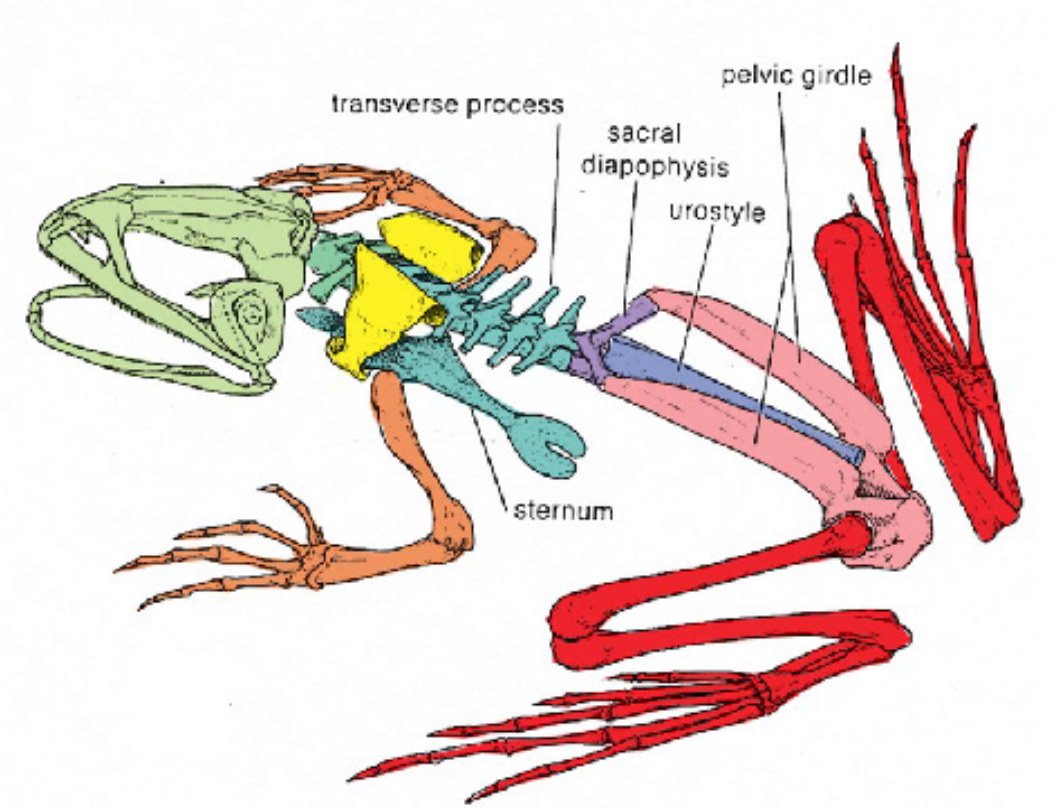

Figure 4: Bullfrog skeleton

Source: Polly (2011, 5)

Saltation (hopping) in frogs is possible because their hind legs are almost twice as long as their anterior (front) legs. Saltation is created by retraction and then extension of the hind limbs to create an aerial phase of movement.

To prepare for jumping, the frog flexes its forelegs and arches its back in order to tilt its body upwards. This moves the lower part of the legs into a vertical position. As soon as the femur is perpendicular to the body, the knee joint releases, snapping open and sending the frog forward at an angle of 30° to 45° (Bonnan 2016). The frog lands by extending its forelegs in front of its chest to act as shock absobers. As the forelegs make contact with the ground, the hind legs are protracted to return to a jumping position in readiness for the next jump.

Materials and Techniques for Constructing the Marionettes

The design and construction of the various animal marionettes were closely informed by a study and mastery of the physiology of the animals in question. The specific construction techniques were in turn determined by the types of movement that animal marionettes were intended to recreate as realistically as possible.

It is in this regard that identifying and understanding the structure of joints and ligaments were particularly important in this project. As Kisia (2011) rightly observes, in order to determine the types of movement that a vertebrate animal is capable of executing, one must understand its joints and the ligaments that function together with those joints. In all vertebrate animals, joints are located where two bones meet, and these joints are necessary to create movement and maintain stability.

Star, Evers, and Star (2015) identify three types of joint that are found in human beings and also in animals (although the skeletons of animals differ from those of human beings due to the diversity of animal habitats), namely the immobile fibrous joint (between the bones of the skull), moveable cartilaginous joints (between vertebrae), and highly moveable synovial joints (e.g. in the shoulders, the elbows, and the knees). Using the joints of humans as a standard makes it easier to understand what joints are located in which part of the body since both animals and humans share the same general body plan.

A pivot joint allows one bone to rotate in or against another bone. A typical example of this type of joint is the one between the head and neck of a mammal. A ball-and-socket joint allows movement in many directions and is usually located where the shoulder and the arm meet as well as where the hip and the leg meet. A hinge joint can only bend and straighten in one direction and it is usually located in the elbows, knees, ankles, fingers, and toes. A saddle joint allows forward, backward, and left-to-right movement and is usually located at the base of the thumb. This type of joint is common in arboreal animals as it aids in climbing. A plane joint allows gliding movement and is located in the wrist (Walker 1995). The types of animal joint are illustrated in Figure 5.

Figure 5: Types of animal joint

Source: Walker (1995, 43)

All the information relating to animal physiology, locomotion and joint types was used to design and construct the animals chosen for the study.

A close analysis of the large barn owl revealed that it has ball-and-socket joints in the shoulder and hip. It also has a pivot joint where the head and neck meet, with hinge joints in its elbows, knees, wrists, and ankles. The large bullfrog has ball-and-socket joints in the shoulder and hip. It has a pivot joint where the head and neck meet as well as hinge joints in its elbows, knees, fingers, and toes. The wrist and ankle are made up of plane joints.

Since animal locomotion is created by forward progress and directional control, decent quality joints are required in the construction of the marionettes in order to properly restrict movement in the correct plane. The three-part tongue-and-groove joint described by Currell (1992) is a good example of such a controlled joint that performs a simple bending action exactly like a hinge joint. The layered construction of this kind of joint is illustrated in Figure 6.

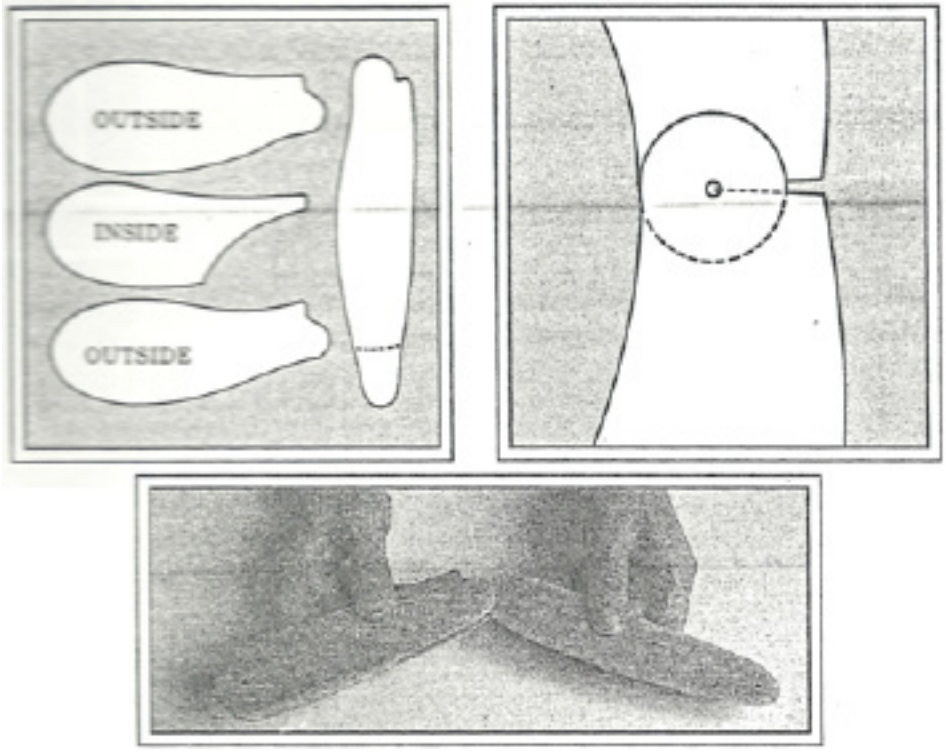

Figure 6: Three-part tongue-and-groove joint

Source: Currell (1992, 67)

One joint type that was used extensively in this study in order to create realistic movement of the marionette limbs was a form of double-action joint that allowed two connected limbs to bend simultaneously (e.g. the elbow and the wrist, or the knee and the ankle).

The data gathered on animal anatomy and locomotion indicated that the movement of animals might not be very easy to replicate in a puppet. An understanding of the types of joint present in the animal's body, where in the body the joints are located, and what movements they are capable of executing is imperative to fully understand the range of motion that a given animal can execute.

In executing the design methodology, we created a skeletal drawing of the animal, rendered a motion study drawing of the animal and then created a construction drawing noting the types of movement necessary as well as the relevant joints.

In executing the construction methodology we made paper patterns from the construction drawing, transferred the patterns onto wood, cut out the wood patterns, glued the wood patterns to form the puppet parts, carved the puppet parts, fashioned out the joints, and assembled the marionette.

Figures 7 and 8 depict these twin processes as outlined above.

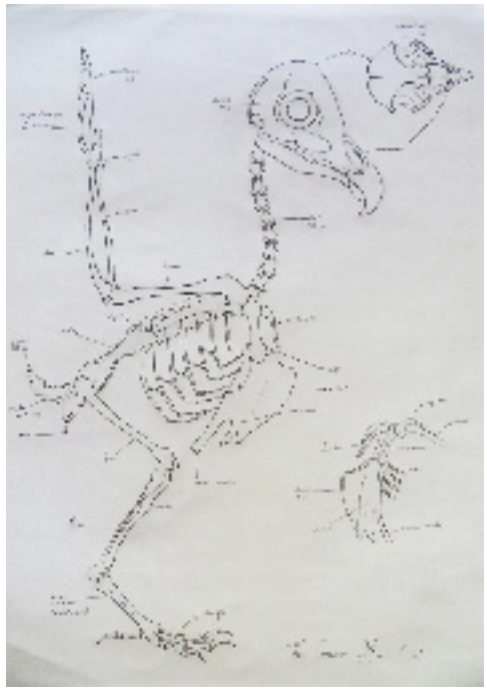

Figure 7: Common barn owl skeletal drawing

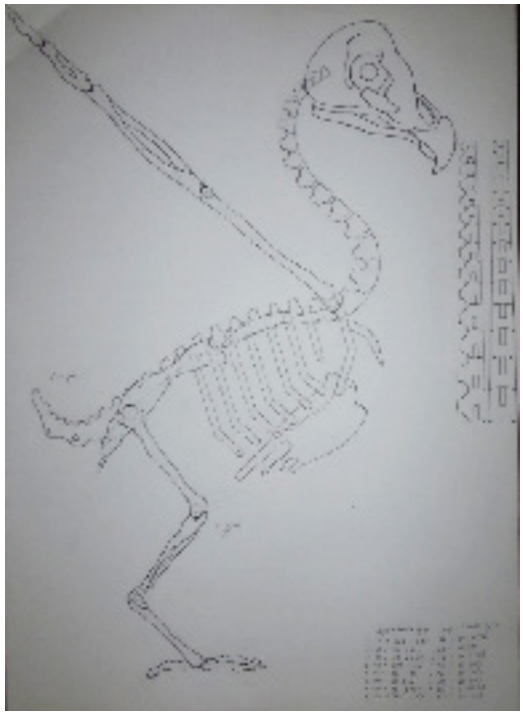

Figure 8: Common barn owl construction drawing

Brief Description of the Construction Process and Joint Structure Used for the Common Barn Owl

As already outlined above, the construction drawing of each animal marionette was based on its skeletal drawing and motion study.

In the case of the common barn owl, the shoulder and pelvis joints were designed to have rotational movement. The elbow, knee, and ankle joints were designed with hinge joints. The toes and wrists were designed as plane joints. While the spine was rigid, the neck was designed to consist of 14 individual pieces to allow for flexible neck movement. The different vertebrae were linked with shallow ball-and-socket joints. Because the limbs, bones, and vertebrae of an owl are delicate and thin to ensure that it is light enough for flight, the head was carved from jelutong wood whereas the rest of the body was constructed from 6 mm and 4 mm plywood. The principle of lightness of body is often used in puppetry in order to ensure that the puppet is not too heavy for the puppeteer to handle.

The owl's ribcage was made by cutting indents into the spine and slotting the ribs into the indents. The ribs were then strengthened by gluing the distal ends of the ribs to the sternum to provide support. The pelvis was glued to the lower part of the spine with the shoulder blades glued to the top of the first four ribs. The 14 neck pieces were

threaded onto a piece of string, which was then attached to the main spine in order to allow for free movement of the owl's neck. The ball-and-socket joint for the shoulder was constructed by making a rounded indent in the front part of the shoulder blade and then drilling a small hole through it. Another small hole was drilled through the top of the upper arm, and one end of a piece of string was glued into this hole, leaving the other end free. The entire rounded top of the upper arm was covered with a layer of glue and left to dry. The layer of glue was meant to simulate the fluid synovial joint of a living creature, allowing for smoother rotational movement. Once dry, the end of the string sticking out of the top of the upper arm was threaded through the small hole in the shoulder blade and tied between the ribs. The same method was used to create the ball-and-socket joint of the pelvis.

Simple tongue-and-groove joints were constructed to create hinge joints for the knee and elbow joints, and the finger and toe joints. The digits of the owl's fingers consisted of two pieces threaded onto a piece of string, similar to the technique that was used for the construction of the owl's neck to simulate plane-joint movement. The owl's toes were threaded through the distal ends of the legs while the front toes were glued together and to the string. The purpose behind this was to use gravity to slacken the toes while the owl was airborne and to simulate a plane joint. It was also meant to simulate the movement of the bird's feet during flight.

Figure 9 depicts a photograph of the common barn owl marionette after completion.

Figure 9: Completed owl marionette

Photo: Courtesy M. Fouché (co-author)

Marionette Performance and Analysis of Effectiveness of Movement

As indicated earlier, the main research aim was to adapt animal marionette movement based on a study of animal physiology with a view to achieving convincing and more realistic marionette movement. The intention was to determine how movement alone could act as a form of effective communication that would enable the marionettes to connect with audiences in the absence of spoken language. We also wanted to make the point that for inanimate objects such as marionettes, a reductionist approach to realism that is based on movement and movement alone is sufficient to communicate in the absence of language.

In order to test the effectiveness of the marionettes' movement achieved through their construction and assembly, the five animal marionettes performed for an adult audience consisting of 30 respondents whose ages ranged from 18 to over 60. The respondents completed an open-ended questionnaire in which they evaluated the realism and effectiveness of the animal marionettes' movement as well as their ability to communicate.

Because the project was meant to focus on movement and movement alone as a form of communication, several restrictions were placed on the performance. The first was to create five skeletal animal marionettes with their limbs and joints fully exposed, leaving out all the other natural attributes that are characteristic of these animals in terms of visual accuracy as we normally find in realistic representation. This was meant to deflect the perception of the audiences from the notion of realistic representation and draw their attention to the mechanics of the movement and the effectiveness (or lack thereof) of the movement without undue obstruction or influences.

Secondly, the marionette performances were presented to an adult audience ranging in age from 18 to over 60. The reason for focusing on this demographic group was that, unlike a child audience watching a marionette performance, they would not so easily willingly suspend their disbelief.

The third restriction was to deliberately avoid ascribing any character or persona to the five marionettes by way of performing to a set storyline with spoken dialogue. This could have potentially persuaded the adult audience to become attached to the marionettes emotionally through empathy. Therefore, all that the marionettes were supposed to do was to go through a series of motions executing their various natural movements without necessarily performing to the dictates of a pre-determined plot, storyline or dialogic accompaniment.

Fourthly, the marionette performance was devoid of the usual attributes of theatre performance such as separate staging, elaborate theatre stage lighting and sound effects as one would normally find in realistic theatres of illusion. Instead, the marionettes moved in, around, and among the audience without the accompaniment of sound, lighting, and spoken dialogue in order to de-emphasise or to detract from the ambience of a realistic theatre performance as one would normally find in illusionistic theatre

practices. Having the marionettes move around and among the audience was also meant to allow the respondents to discuss among themselves what they were observing and also to view the marionette mechanics and movements up close.

In line with the desire to steer clear from the ambience of illusory realistic performance conventions, the marionette performances were not presented in a conventional theatre but rather in a public art gallery in Waterkloof, Pretoria. There were two performances: the first performance took place on 17 June 2015 and the second performance was presented on 18 June 2015. Both performances were interactive, with the puppeteers and the marionettes moving in and among the audience. When not performing, the marionettes were laid out on a table to allow respondents to examine the inner workings and construction of the marionettes more closely.

In order to determine the effectiveness of the marionettes as well as their ability to communicate, we grouped the questions and the responses to the questions in the questionnaires in three main sections for analysis: "Realistic movement," "Emotional connection," and the "Willing suspension of disbelief."

Realistic Movement

From our analysis of the answers, it was clear that the movement of the marionettes was overwhelmingly convincing.

The audiences were asked to score the degree of realism that they found in the movement of the marionettes and for this they scored a summative total of 252.5 points out of 300 (i.e. a score of 84% for realistic movement). Respondents across the three age groups stated that the movements were "very realistic and detailed," "seamless," "complex and lifelike," while some stated that the "movement was incredible and with poise."

Over and above this impressive score for realistic movement, some respondents made reference to the "atmospheric" movements of the marionettes. Although "atmospheric" movement is not a widely recognised term, it is used in animal locomotion to refer to or to describe small subtle movements carried out by different animal species, movements which help to mark out and characterise those specific animals in terms of their identity. "Atmospheric" movements are generally recognised in the aesthetics of puppetry. These movements help to make puppets and marionettes seem lifelike and natural.

In terms of specific responses, Respondent No. 6 (age group 18–39) liked the owl's neck movement while Respondent No. 5 (age group 60+) mentioned that the movement of the owl's neck and head "affected" her. Respondent No. 8 (age group 18–39) was entirely captivated by the "lifelike and interesting movements of the marionettes," mentioning that "all the movements from the variety of small twitches to the big limbs moving" captured her attention "as a subject on its own."

All these comments indicated that the respondents were simultaneously captivated by the general movement and the more subtle atmospheric movements of the marionettes.

These responses demonstrate the importance of convincing movement and atmospheric movement in creating a connection between puppets and their viewers.

Emotional Connection

All but two respondents felt some form of emotional connection to one or more of the five marionettes.

In this research project we interpret emotional connection to mean that the respondents must have found the movement of the marionettes to be so graceful and realistic as to convince them (i.e. the respondents) that they were viewing something more substantial than just a skeletal frame that revealed joints and the inner workings of the marionettes.

Of all five marionettes, the owl, whose wing movements were structured along the lines of a real bird's wings, was adjudged to be the second most convincing marionette. Some respondents specifically mentioned that they were impressed by the owl marionette's head movements, some of which were atmospheric movements. The frog marionette was adjudged to be the third most impressive. Respondents consistently referred to its graceful and natural movement. Some also pointed out that they particularly liked the idea of the frog marionette hopping around them. It would appear then as if the combination of effective and convincing movement and the interactive nature of the performance achieved the effect of persuading the respondents that they were watching a real frog and not a mere skeletal structure performing in their midst.

A survey of most of the answers from the respondents indicated that the respondents were able to develop an emotional connection with the marionettes primarily on the basis of their effective movement alone, which was in the main "realistic" and "lifelike." Out of a total of 30 respondents, 16 indicated that it was movement that had connected them emotionally to one or more of the animal marionettes.

One interesting response that was connected to emotional attachments with the marionettes indicated that some respondents were able to ascribe some kind of "persona" to the marionettes. As stated earlier, the marionettes had been designed and meant to perform in a non-theatrical setting, and the specific purpose was to avoid giving them a persona as would be the case in realistic and naturalist forms of representation. Sanchez (1997) indicates that "persona" has several meanings. It can be understood as referring to "how one appears to others (but not really as one is) … the part someone plays in life or the assemblage of personal qualities that fit a man for his work" (1997, 35). We would argue then that when respondents referred to the "persona" of the various marionettes, they were in fact referring to the marionettes having successfully acquired some form of character or persona on the basis of convincing and effective movement. We argue that the marionettes' personas were their ability to become the objects that they represented on stage in spite of our reductionist approach to their construction. Persona here therefore refers to the ability of the puppets (which were no more than

bare and lifeless objects) to come to life and become themselves through convincing and effective movement.

Respondent No. 5 (age group 18–39) felt a connection with the crocodile for its ability to "scurry" in between and among the respondents. Respondent No. 7 (age group 18–39) stated that several marionettes were "very lifelike and full of character." She was particularly impressed by the crocodile's "attitude," something which in our view can be read as "character." Respondent No. 7 (age group 40–59) stated that the marionettes had "wonderful movements and character." Respondent No. 8 (age group 60+) stated that he felt an emotional connection with all the marionettes because of "their convincing movement and character." Respondent No. 10 (age group 60+) stated that the shark and the crocodile marionettes were "full [of] character," which was emphasised and amplified in equal measure by their movement and their stillness.

From all the above, we would argue that the movement of the five marionettes was so real and convincing that respondents found themselves caught up in the marionettes' lifelike qualities in spite of the reductionist approach used in their construction. Experiencing the marionettes as real creatures persuaded the respondents to imagine and perceive them as having character and personality.

Apart from attributing persona to the marionettes, some respondents also made reference to the ambience of the performance. As already indicated earlier, this was in spite of our deliberate effort not to create a theatrical ambience at the performance, which could easily have lulled our respondents into an aura of make-believe as is normally the case with representational theatres of illusion. Malpas (2015, 37) asserts that "the art form of theatre relies heavily on atmosphere, which supports the integrity, continuity and sense of reality of story regardless of the often abstracted and vaguely hinted scenographic features or spaces … and immaterial ambience creates the experience of a material place through emotive suggestion."

Theatrical ambience can be understood as the mood or tone suggestive of reality that is created in the theatre. It is often achieved through the use of sound, lighting and set design, and construction. Ambience is central to immersing the audience in a sense of the illusion of reality. Audiences are far better entertained when they get immersed in a storyline to a point where they invest emotionally in the events.

In the case of the project under analysis, we deliberately made an effort not to create theatrical ambience by eliminating sound, sound effects, and music. Secondly the marionettes performed under the house lights of the art gallery venue, that is, the same white light that is used by the gallery to illuminate and showcase its art works. Thirdly, the marionettes performed not on a separate stage but in and among the respondents who were able to interact with them and view them up close. When the marionettes were not in movement, they were laid out on a display table in the middle of the gallery to allow the respondents to take a closer look at their design and construction as works of art. Yet in spite of all these measures to eliminate ambience as outlined above, a number of respondents were still able to ascribe ambience to the marionette presentation.

Respondent No. 2 (age group 18–39) felt a connection with the hammerhead shark marionette because of its "graceful movement," which instilled "a sense of peace and elegance." Respondent No. 9 (age group 40–59) also made reference to ambience when he stated that he felt an emotional connection with the shark because of "its slow methodical movement" which "built tension."

It is therefore reasonable to deduce that the marionettes were able to create ambience and atmosphere as a result of their convincing and realistic movement in spite of their rugged and skeletal construction. Respondents were able to feel and place these animals in their natural habitats as a result of their convincing and graceful movement.

Wilful Suspension of Disbelief

In theatre criticism, "wilful suspension of disbelief" relates to theatre audiences' ability to set aside notions about everyday reality and to accept that the events which unfold on stage during a performance are in fact a form of staged reality though fictional and a case of make-believe. The 19th-century poet and critic, Samuel Taylor Coleridge (quoted in Greenwald, Schultz, and Pomo 2002), wrote eloquently about the willing suspension of disbelief, defining it as the audience's ability to accept the lie or the illusion of reality that is central to the act of theatre.

In the case of the project under analysis, the audience was able to see beyond the bare skeletal structures of the five marionettes and become convinced that they were viewing real animals on the basis of convincing and realistic movement. The majority of respondents made the point that it was the movement of the marionettes that persuaded them to suspend disbelief due to its "lifelike" and "realistic" quality. Respondent No. 2 (age group 18–39) stated that the "movements imitated real life, but that the physical design of the object remained" and that "it felt like it was a lifeless object that became alive through magic." Respondent No. 3 (age group 60+) stated that although he was watching a "lifeless object being manipulated by a person" he felt "the humanity of the puppet." Respondent No. 4 (age group 40–59) stated that she saw "an inanimate doll transform into a living being."

CONCLUSION

In this research, we set out to conduct a practical project based on the construction of five animal marionettes. Our purpose was to make them come across to an audience convincingly and realistically solely on the basis of their movement achieved through their construction, which was informed by an in-depth study of animal physiology and locomotion. Our other purpose was to demonstrate the centrality of realistic movement in the creation of convincing animal marionettes, so much so that movement becomes the language of communication and emotional connection between marionette and viewer.

To the extent that puppets are controlled and manipulated by humans, it can be said that puppets are in fact a form of bodily extension, and that puppetry, like other modern art forms, strives towards visual accuracy and realistic representation. However, having acknowledged that, we attempted to introduce a complementary perspective/approach. We rejected the emphasis on visual accuracy and spoken language, which is the hallmark of modern realism and naturalism, arguing that for inanimate objects such as puppets, realistic and convincing approximations of reality as experienced through the senses can be achieved through movement that is solely based on a physiological study of animal locomotion.

Having presented our show of skeletal puppets to an audience of 60 adults, and analysing their responses, we surmised that the movement of the marionettes was convincing enough to cause a number of respondents to connect emotionally with the marionettes and to willingly suspend disbelief.

In spite of the five marionettes' bare and skeletal structure, the movement of these marionettes persuaded the majority of the respondents to anthropomorphise the marionettes, even though the researchers tried to avoid ascribing a persona or a language to the marionettes so constructed.

The movement of the marionettes was so convincing and realistic that it caused the creation of ambience—another feature that the researchers deliberately tried to avoid for this performance. It would seem that the movement was so convincing that it imbued the marionettes with a personality, which created a sense of ambience.

In spite of the fact that all the usual elements of the art theatre, such as lighting, sound, persona, spoken dialogue (i.e. language), and ambience, were deliberately stripped from the puppet performance, the majority of the respondents still identified with the performance and ascribed persona to the marionettes and ambience to the presentation. In these circumstances it is reasonable to conclude that the convincing and realistic movement of the marionettes was behind the ascription of persona and ambience to the marionette performance.

We have attempted to demonstrate that visual accuracy and faithful representation need not be the hallmark of modern forms of realism and naturalism as experienced through the senses. We have aimed to demonstrate that in representations of inanimate objects, such as animal marionettes, sensory experiences can be elicited through convincing and realistic movement that is based on a study of animal physiology and locomotion. If respondents saw only the skeletal frames and joints of marionettes that moved, unaccompanied by any form of sound (including language) but were still convinced that they were looking at and experiencing something "real," then it must be the movement of these joints (locomotion of the marionettes) that allowed them to communicate and connect with the marionettes. Therefore it can be concluded that realistic movement is the language of the inanimate.

REFERENCES

Attenborough, D. F. 1998. *The Life of Birds.* London: BBC Natural History Unit PBS. Video Recording. http://www.bbc.co.uk/programmes/b007qn69.

Britannica Illustrated Science Library. 2008. *Birds*. London: Encyclopædia Britannica. ePub. https://issuu.com/parrin/docs/britannica_illustrated_science_libr_65dd384d812544.

Bonnan, M. F. 2016. *The Bare Bones: An Unconventional Evolutionary History of the Skeleton.* Bloomington, IN: Indiana University Press.

Brockett, O. G., and R. J. Ball. 2000. *The Essential Theatre.* Belmont, CA: Thomson Wadsworth.

Carlson, M. 1996. *Performance: A Critical Introduction.* London: Routledge.

Cohen, R. 2000. *Theatre*. 5th ed. Mountain View, CA: Mayfield.

Currell, D. 1992. *An Introduction to Puppets and Puppet-Making*. London: Apple.

De Panafieu, J. B., and P. Gries. 2011. *Evolution in Action.* London: Thames & Hudson.

Encyclopædia Britannica. 2013. "Encyclopædia Britannica Ultimate Reference Suite." Chicago: Encyclopædia Britannica. CD-ROM. https://store.britannica.com/products/04211380jcas.

Flower, C., and A. Fortney. 1983. *Puppets: Methods and Materials*. Worcester, MA: Davis.

Greenwald, M., R. Schultz, and R. Pomo. 2002. *The Longman Anthology of Drama and Theatre: A Global Perspective*. Los Angeles, CA: Longman.

Kisia, S. M. 2011. *Vertebrates: Structures and Functions.* New York, NY: Taylor & Francis.

Malpas, J. 2015. *The Intelligence of Place: Topographies and Poetics.* London: Bloomsbury.

Polly, P. D. 2011. *Introduction to the Skeleton*. Bloomington, IN: Indiana University Press.

Sanchez, R. 1997. *Persona and Decorum in Milton's Prose.* Madison, NJ: Fairleigh Dickinson University Press.

Star, C., C. Evers, and L. Star. 2015. *Biology: Concepts and Applications.* Boston, MA: Cengage Learning.

Taylor, J. 2009. *Handspring Puppet Company.* South Africa: David Krut.

Tillis, S. 1992. *Toward an Aesthetics of the Puppet: Puppetry as a Theatrical Art.* Santa Barbara, CA: Greenwood.

Walker, R. 1995. *The Visual Dictionary of the Skeleton*. London: Dorling Kindersley.

Wilson, E., and A. Goldfarb. 2002. *The Living Theatre: A History*. Boston, MA: McGraw-Hill.