Can they walk the talk?

Title: An Exploration Of The Creative Challenges In Representing Human Movement In Digital Animation

Subtitle: Exploring the range and limits of human and quasi-human expression in animation and related disciplines, defined by technology, nature and imagination

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A thesis submitted in fulfilment of the requirements of Nottingham Trent University and Southampton Solent University for the degree of Doctor of Philosophy

September 2015
Acknowledgements

I wish to express my sincere thanks to Dr J. Issapour for his support and guidance and encouragement in my research.

I would like also to thank Diana Brown MA RCA MA Middlesex, Senior Lecturer at South Bank University for her invaluable consultation.

And thanks go to Colin Taylor for his practical support.
Abstract

‘Can they walk the talk?’

Title: An Exploration of The Creative Challenges in Representing Human Movement In Digital Animation

Subtitle: Exploring the range and limits of human or quasi-human movement in animation and allied disciplines, defined by technology, nature and imagination.

The research began from Mori’s Uncanny Valley hypothesis, which suggests that new technologies present significant challenge in animation for human simulation? If so, how can we better identify and engender an appealing, aesthetic reality that both Mori and Disney recommend in the context of digital animation? Can alternative mimodynamic methods used by Lecoq (in creative education) assist animation process, justifying a contribution to knowledge?

The thesis explores the significance of Mori’s theory of the Uncanny response by examining current opinion from within science and animation production, as well as analysing recent cultural and technological change. Disney’s original Twelve Principles of Animation are re-evaluated, in the light of new additions (from Industry) and to see how far they address current concerns. Research into the influence of artistic (and social) trends on digital animation: aims to establish what constitutes appeal and aesthetic reality and whether views change. Research into body language (chiefly P. Eckman, Chap. 5 Ref. 1, and J. Navarro Chap. 5 Ref. 3) assesses newly uncovered insights and analyses the possible outcomes of knowledge or alternatively, knowledge gaps. This evolving science is also studied to assess the range and limits of human gesture and enable comparison between real and virtual movement. Performance methods are explored (particularly mimodynamic methods), to establish whether they provide any unique creative outcomes, relevant to animation. Diversity of research sources aims to reflect the interdisciplinary nature and complexity of animation and those attracted to it. The theoretical framework mirrors most closely design history; quality being partly defined...
by the scientific theory of evolutionary aesthetics.

The research highlighted the importance of imagination and sensitive design, in creating movement sequences with digital tools. However exploration of cultural trends ascertained that new technology and the new realist aesthetic often contradicted design principles.

Study of body language proved instructive but highlighted its limitations for creative invention. Finally, a review of performance practice validated the special relevance of mimodynamic method for animation production, training and critique. This research represents an important progression in the understanding and appreciation of digital character animation and an alternative creative approach to animation practice.
DECLARATION

The research described in this thesis is the original work of the author except where otherwise specified, or where acknowledgements are made by the reference. It was carried out at the Faculty of the Creative Industries, School of Art and Design, Solent Southampton University and under Supervision of Dr. J. Issapour.

The research has not been submitted for another degree or other academic or professional institution during the project.

ANNABEL LAGASSE
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Introduction Chapter 1

Introduction

The legendary animator Glen Keane remarked in 2011 that ‘The computer fights against anything organic and a sensuous kind of feel’. [1] And so the research began with a question. Why is much computer animation less subtle or diverse than traditional stop motion or cel animation? Or is this assumption based on prejudice towards a new technology?

The research therefore asks: do new technologies present significant challenges to human representation and expression. This is a focus of current explorative work, in diverse and emergent areas of science. (E.g. in Robotics with C. Bartneck’s research; in Psychology with P. Eckman’s research on facial expression referred to in Chap. 2 Ref. 20 and within Neurology with A. J. Nusca, Chap. 2, Ref. 5.)

The research presents a theoretical, inter-disciplinary inquiry into the issue by examining several viewpoints on animation, art and aspects of physical expression. It aims to uncover the essential components in successful character animation (past and present).

Theories on the importance of ‘human appeal’ in animation and outside of it, along with what generates emotional appeal, have been declared (e.g. Disney’s Twelfth Principle: Appeal in character design Chap.3 Ref. 1, Eckman’s theory Chap. 5 Ref 1. And Norman’s theory on Emotional Design Chap. 2 Ref. 19) but require updating in the light of recent technical innovation.

The thesis aims to determine what problems may be evoked by realistic human or quasi-human animations, (using photorealistic 3D software). And whether circumnavigating these difficulties requires more stylistic and original approaches to character (as roboticist Masahiro Mori [2] suggests).

The research asks whether digital animation would benefit from a deeper understanding of non-verbal communication, since digital movement is arguably both the synthesis and antithesis of organic movement. It examines related art processes, such as the
performing arts, to see whether they could inform the discipline. One such process, mime, is an art solely based on gestural expression and for this reason it receives special focus.

Computer scientist, Lev Manovich, claims the computer animation industry is driven by software innovation. Manovich asserts that technology has a negative impact on creativity, stating that ‘The amount of labour involved in constructing reality from scratch makes it hard to resist the temptation to utilise pre-assembled, standardised objects, characters and behaviours’. [3] (Manovich, L., 1997) According to Manovich, realism is the aim of computer engineers and computer science research. In his 2013 book, Software Takes Command [4], he claims that the computer can homogenize culture.

If we accept his view, then digital tools present two challenges to creativity: 1) the challenge of increasing realism in character design which provokes the ‘Uncanny ’ response, and 2) the challenge new technologies give the creative process and outcomes (now that ambition and production time is often dictated by software design).

The self-conscious and inorganic nature of digital tools makes it hard for artists to think and work spontaneously. Additionally, the craft of digital animation demands significant time spent learning and working with software, limiting time for creative skills. Formal art and animation training (i.e. university degree courses) is increasingly subdivided and measured, making experimentation (especially across disciplines) difficult. And yet innovation is often produced at the intersection of disciplines.

Examination of gestural expression: in nature, art and performing arts (chiefly mime) ultimately aims to provide a broader understanding of character and guidance and inspiration for creative work.

**Research Rationale**

The Uncanny Valley phenomenon is a relatively new area of research, and to date there is little detailed study within animation, exploring issues it may provoke.

Aside from industry expert and author Isaac Kerlow (referred to in chapter 3), there has been little critique or revision of the original Disney Principles contained in the
animation ‘bible’ *The Illusion of Life* (Johnston and Thomas rev. ed. 1995) [5]. Yet the
significant social and technological changes of the last four decades
recommend a review.

The chapters: 3 *Animation Principles* and 4 *Cultural Influences*, present two contrary but
important arguments when defining the process of art: 1) the value of established
principles, and 2) the importance of risk, experimentation and a personal approach. It is
beneficial to examine the role that personal emotion and experimentation play in
making art. This is because digital animation reduces the artist’s intuitive process.

It is also necessary to ascertain whether animation principles remain pertinent or
whether controversy exist and, if gaps in knowledge occur, to recommend
further exploration.

The close relationship between live performance and animation performance is a factor
animators themselves often acknowledge (p.27 *The Illusion of Life*, Thomas and
Johnston). However, there has been minimal scholarship on the subject or its processes
beyond the texts by L. Bishko, E. Hooks and P. Wells referenced in chapter 4. This
writing is far from extensive. Additionally, exploration of its value (in terms of creative
practice) has been particularly limited and the examples chosen somewhat irrelevant.

Reflection on personal experience of performance training and production, particularly
in the discipline of mime, lends this research added weight.

In supporting Manovich’s view (that technology currently leads industry and realism is
the dominant goal for technologists), it is fundamental to consider how the realist and
techno-aesthetic took root in the twentieth and twenty-first century, and how this might
have limited creative opportunity.

By examining non-verbal communication along with changing cultural norms (in
chapters 4 and 5), it is necessary to clarify what we now perceive as human expression
and whether current perceptions represent a full and accurate picture.

Adopting Mori’s perspective that symbolic and imaginative approaches to design are
most advisable and Wells’s and Pilling’s viewpoint that the genre distinguishes itself by
its diversity in visual style, action and imaginative fantasy, I aim to examine the imaginative potential of corporal expression through studying the performing arts. The mime theories and practice of Jacque Lecoq (discussed in chapter 5) provide a valuable (and unfamiliar) resource, its relevance rivalling other performance methods previously discussed.

**Theoretical Framework and Methodology**

The thesis is a theoretical investigation into interdisciplinary art process and outcomes within computer animation and related disciplines. It follows chiefly a design history approach - rather than an art or film theory model.

Design and computer animation, are both relatively new and fast evolving disciplines.

Design history describes the pluralistic nature of animated film (as both art and science, visually experimental but limited by commercial pressures).

Design theory describes the industrial/ technological context of art making, and the importance of market response (discussed chiefly here as the artist to audience dynamic and changing audience perception).

(Design audiences have been examined by J Walker [6] e.g. in his discussion of Reception Theory, Taste and Rubbish Theory (1989) and is pertinent to the context of computer animation.

The challenge of appealing to a diverse but sizeable market has been well realised by Disney but increasing technical and commercial pressures mean this challenge remains and has intensified.

The narrative content of animation may be perceived to take it beyond design. However, narrative is an element of design too (in the unique craft and branding behind a quality product, its advertorial, product loyalty etc.) Cartoon art or fine art is limited by its static nature and live-action film relies to a greater extent on reality – which is not the defining feature of animation. The authorial/directional element of animation is more than evident in design when seen in a broad context (e.g. the fantasy quality of a
Gaudi building, the theatrical design of the Diagelev ballet company, or an Alessi, Versace or Apple product range).

Our escalating technological culture, represented well by the popularity of computer games, has introduced a separate audience to animation, attracted by the technology behind the craft. New audiences and their perceptions/expectations need examining therefore. (Scholarly work is used as a basis for analysis of audience response or animation critic and includes M. Pierson’s writings in *Still in Search of Wonder*, (2002), [7] J. Walker, L. Manovich and J.Pilling [8]. This is alongside industry evaluation e.g. Oscar nominations and wins, articles from film critics and transcript talks, authored texts etc. and from those involved in production e.g. J. Lasseter from Pixar and E. Hooks, writer of *Acting for Animators*.

The thesis examines the mindsets and actions of individual makers, team dynamics and audience, frequently from a design history viewpoint (often influenced by social science). Pixar president Ed Catmull states in his book *Creative Inc.* (2014) [9] that success in animation production depends not only on good people (with certain characteristics) but also effective working environments that encourage free/creative exchange between people. Yet this is a challenge with the large teams and industrial production processes of computer animation.

Jane Pilling has highlighted the difficulty of decoding animation. The visual richness and diversity of animation, the propensity for stylisation and fantasy, make film theory a poor fit.

The art and design school The Bauhaus (1919-1933), serves as a historical model for interdisciplinary training, incorporating performance specifically and effectively in its stage workshop.

The thesis therefore includes different pertinent theoretical models: as animation is both industrial process (especially with the advent of software technology); visual art and cinematic art, sharing some (though not all) elements of live-action film and therefore film theory.
The sources of information I have used are predominantly published texts, conference papers and online interviews. Technological, media or social trends (past and present) are also sometimes reflected on, as in themselves they form what Lev Manovich refers to as cultural analytics.

The character of digital animation means that much work is cutting edge and is discussed through contemporary media (e.g. online blogs and popular web journals) as it happens, rather than significantly later in books. The thesis aims to reflect the transmutable, progressive nature of the art form through reference to these digital processes, which have shaped and continue to shape it.

Definitions are at times deliberately loose, as the industry and other bodies refer to the discipline in multiple ways: e.g. digital animation, 3D animation, computer animation, character animation and motion-capture animation.

Theory is also informed by practical experience in media training and performance training (specifically mime), which I outline in a key section of chapter 5.

In examining different theories of animation and its processes, I have chosen an intentionally diverse range of voices to reflect the mix of professional minds and talents attracted to and involved in the subject – in the recent past and present. Their varied experience or interest (singular or multiple) may lie in academia, technology, the visual or performing arts, psychology, neurology and other related sciences. For example, the subject is examined historically looking at views on training and process from early Disney artists Johnston and Thomas in their book The Illusion of Life (rev.ed. 1995). These views are compared to other more current opinion on computer animation by (technologist and teacher) I. Kerlow, (CEO and pioneer computer animator) J. Lasseter and E. Hooks, (actor/director); reflected in their separate SIGGRAPH addresses and Hooks’s online blog, referred to in Chapter 3.

Comparative analysis is employed to examine different established (and less established) animation principles (chapter 3); as well as the changing audiences - their expectations and responses and changing cultural norms (chapter 4). Alternative performance practices, such as dance, mime and method acting is also compared to assess the extent
of their usefulness to animation. (For example, in dance the ideas of innovator Rudolf Laban and their application is examined along with brief reference to the emerging choreographic software by Credo Interactive ‘Life Forms Studio 4.0’) referred to in chapter 4.

The research at times draws on visual aesthetics, media, film and cultural theory, performance and audience theory and relevant scientific disciplines (e.g. psychology, biology, robotics, anthropology, etc.).

Additionally, David Kolb’s theory on experiential learning is an influence on my own analysis of the creative process as theatre practitioner and student of mime. [10] The theory of evolutionary aesthetics [11] provides a justification for discourse on quality and evaluation and counterbalances more out-dated or limited theories (for example, Aristotle’s views on the aesthetics of symmetry and perfection of form.)

However, the new sciences of evolutionary aesthetics, sociobiology, evolutionary psychology etc., go some way to explain the importance of movement (e.g. rhythm and quality) in our understanding of what constitutes appeal. Though debate exists, theories on natural selection and mate selection have increasing influence. The Uncanny Valley phenomenon fits well within this context as research suggests the Uncanny is evoked for survival purposes. The Uncanny response may be triggered by our need to distance ourselves from perceived threats or to optimise environmental advantage (i.e. avoid infection or make good reproductive choices etc.).

Evolutionary Aesthetics connects our common visual / or aesthetic preferences (such as a liking for certain colours, physical movements or musical harmonies etc.) to evolutionary adaptations related to more fundamental instincts of survival and mate selection.

Philosopher and media activist Denis Dutton has claimed that: ‘Artistic expression in general, like vocabulary creation and verbal display, has its origins according to sexual selection in its utility as a fitness indicator’. Dutton, 2003, [11]
Research by Hugill, Fink and Neave on mate selection explores movement quality in detail. Hugill et al., 2010, [12]

Geoffrey Miller is quoted in The Oxford Handbook for Aesthetics as saying: “Applied to human art, this suggests that beauty equals difficulty and high cost. We find attractive those things that could have been produced only by people with attractive, high-fitness qualities such as health, energy, endurance, hand-eye coordination, fine motor control, intelligence, creativity, access to rare materials, the ability to learn difficult skills, and lots of free time” Miller, (2000). [13]

Creative process is reflected on chiefly from the viewpoint of the artist, both within character animation and in performance. According to John A Walker, this is a neglected area of design practice but absolutely central to design. He states in the chapter *The Design Process as Object of Study: that ‘Any process is, of course, much harder to observe than a finished product. Processes take time – perhaps years …and they are, to some extent hidden from view: the ideas and unconscious inspirations of designers are not readily accessible to the historian.’* Walker (1989) p. 64 [6]

**Objectives**

1. To establish whether the Uncanny Valley phenomenon does produce a significant challenge to art practices and commercial outcomes; and if so, tentatively exploring potential design solutions.

2. To consider the relevance of a growing body of knowledge on non-verbal communication to digital character animation (its practice and discourse), chiefly through the examination of Eckan’s theory on emotion and his ‘Facial Action Coding System’ [14] and Navarro’s 2008 text: *What Every Body is Saying.* [15], both referred to in Chapter 5. This is in order to ascertain the key elements that contribute to emotional expression (to convey emotional credibility and engender empathy).
3. To determine whether the performing arts (chiefly the theories on mimed performance from Jacques Lecoq) are relevant to the new context of digital character animation, and if so, in what ways.

Additional Objectives:

- To establish the special factors (for example the mindsets, creative processes and rules of craft that constitutes success or failure in digital character animation).

- To develop a broader framework or language for animation discourse that explores and represents the breadth of animation culture or aesthetic.

To consider the forces (such as changing audiences e.g. popularity of computer games, commerce (e.g. more blockbuster or shoestring film, less middle ground) and technology (e.g. the rise of 3D film and motion capture technology) that are not only shaping animation but also changing them in specific ways now and in the future.
Principle Findings


Moreover, the Uncanny response can be provoked even with cartoon imagery, if some small aspect seems especially true to life. A creative approach to character animation, invariably offers not only greater liberty for the artists but largely bypasses the problem of the Uncanny, increasing character appeal, as discussed in Price, D., 2009, [19].

In examining design principles suggested by scientists and artists, the question of character appeal has proved particularly difficult to define (and achieve), as it is not reducible to any simple formula (though it carries great importance). It requires not just animation craft, but creative ability, which the research suggests is best encouraged by experimental, experiential processes. Refer to chapter 3 for discussion on the Disney Principles (including appeal) and Lasseter’s 1987 SIGGRAPH address.

2: The practice and guiding text The Moving Body: Teaching Creative Theatre by Jacques Lecoq [20], describes an investigational method for training the imagination of artists, where the body is used as a central reference point. This rooting in the body enables practitioners to ground their imaginative ideas, and achieve an aesthetic reality necessary for any dramatic interpretation. These methods (relatively unknown outside theatre) therefore prove particularly relevant to the discipline of character animation, and are discussed in more detail later (in chapter 6, The Performing Arts).
Benefits:

1. Exploration of a growing body of knowledge on non-verbal communication, would clarify key factors in the expression of emotion, and debunk certain pop psychology myths. (E.g. low eye contact is a sure sign of deception, arm crossing signals hostility, the face is the best indicator of a person’s emotion.) It would verify the importance of developing understanding in this area - to apply knowledge to art practice with more accuracy and/or potency.

2. The exploration of the Uncanny response enables greater understanding of both the scale and specifics of the problem.

Solutions (even if tentative) could help inform practitioners, students and cultural commentators (be they scholars or media critics). For example, a technologist working in animation, will not have the same skills in visual observation as an artist.

3. Lecoq’s methods would provide an alternative model for training artists’ imaginations, while keeping their ideas rooted in the body and its emotional language. Current training methods include a general arts school foundation in visual observation, experimentation with materials and applied projects. Animation training employs the Twelve Disney Principles laid down in Johnston and Thomas’s book *The Illusion of Life* (rev. ed. 1995), referred to in chapter 3.

Key reasons for examining creative processes (either inside or outside of animation) are summarised as follows:

Digital animation requires teams of diverse people, but with very different educational backgrounds. This thesis is focused on the visual, creative, intuitive skills relevant to animation art. Disney animators were art-school trained but found their training insufficient for animation, learning on the job over time. In order to master the craft of animation it proved necessary then and now to understand gestural expression.

Animators also need to develop imagination and intuition. And they need to understand the basic principles of the discipline. Additionally they need to understand how to engage with their audience. Finally they need to develop their authorial style while working effectively in a team. Reasons for examining creative process are therefore:
To benefit the animator
or student/teacher /animation professional/ critic or theorist

1. Enabling animators and involved professionals to create/teach/ evaluate with more awareness. By this I mean an awareness of the Uncanny phenomena and how to avoid it.
2. Stimulating imagination – by enabling creative transposition of an idea or a reality into an appealing character performance.
3. To enable animators to create with more confidence (i.e. greater freedom and less inhibition) In order to create original work, an artist has to be in touch with their intuition. They also need to be able to challenge themselves to go into new areas: be it new themes or modes of communication.
4. Enabling animators to create with more authenticity (free of cliché, mannerism etc.) An animator has to move with the times. In order to communicate effectively with changing public, artists must re-invent. Repeating past successes may please marketing, yet rarely produces work of quality. Artists can become stuck in certain modes of expression that are familiar to them. To be truly inventive requires effort and boldness. Ed Catmull (President of Pixar) has repeatedly stressed the importance of risk taking and the willingness to experiment in his authored text *Creative Inc.* (2014)
5. Enabling animators to be more empathetic (to their audience) Animators need to be able to connect with their audience, through their character’s performance (by engaging their audiences’ emotions through dramatic gesture). Animators must first learn how to engage with their creative work and then how to express this to a public, which requires further transposition. The theatrical arts and mimicry provide an animator the opportunity to embody their creative idea and get immediate feedback as to its success through audience response.
6. Strengthening the mind body relationship (to become more effective and integrated animation artists). Some animators may be skilled at a certain kind of animation, yet they may be separated from their own emotional lives to a large extent. Therefore they would lack perception of other people and their work would remain narrow. They would need to undertake more in-depth observations of
emotion and gestural expression. Performance process enables an animator to intuit directly and immediately, through the art of mimicry. This provides an animator with greater breadth of expression, more nuance and depth.

7. To aid collaborative work – Performance in particular is predominantly collaborative, with many strong traditions of group work (from Greek tragedy, ballet or opera chorus, to two hander comedy and commedia del arte etc.).

8. Following universal working principles – for greater economy and effectiveness

9. Aiding experimentation and communication – All art is self-referential and artists including animators thrive on crossing boundaries be it between disciplines or genre etc. Experiencing the interactive nature of performance can also be beneficial to animators who generally work alone and are often tied to the computer. (Strong examples of the interactive nature of performance include Brechtian drama, theatre in the round and stand up comedy etc.).

10. To consider the influence of commercial forces on animation process. For example the rise of certain new technological processes indicates the popularity of new techniques to audiences interested in technology rather than artistic merit.

11. To consider the degree to which technology and animation are different from each other and how technology may impact animation. Understanding is built through examining the views of practitioners i.e. Glen Kean, John Lasseter, Thomas and Johnston (Referred to in Chapter 3) and Ed Catmull, along with media commentators i.e. Lev Manovich, and Paul Wells and Jayne Pilling. (Referred to in Chapter 4)

12. To create alternative and additional training paths by highlighting the value of Lecoq’s method and theories to animators.
- To identify and explore cultural diversity (by observation of a range of gestural expression)

Chapter Summaries

The *Uncanny Valley* Phenomenon Chapter 2

The chapter begins with an investigation into the *Uncanny Valley* phenomenon. Part one: examines evidence, in order to identify the extent to which the *Uncanny Valley* may be a factor in digital character animation. Key dialogues and case studies have been chosen to show the potential relevance of the problem, its possible scope and any controversy surrounding it. The thesis then explores general advice on the design of movement (from mainly the scientific community), asking whether this, satisfactorily addresses the issues identified. Part two looks more closely at key technologies that impact character animation now and the challenges these may present. Part three examines relevant cultural change in recent decades and asks to what degree this alters our tastes and even our notions of normality.

Animation Principles Chapter 3

This study examines in more detail industrial animation practices past and present. It looks at key aspects of the craft as discussed through published texts by notable Disney employees Ollie Johnston and Frank Thomas (rev. ed. 1995) and Isaac Kerlow (2009), [21]; as well as Pixar's CCO John Lasseter, (1987), [22].

The research centres around Disney Studio’s original Twelve Basic Principles (outlined by Johnston and Thomas), from the first principle: *Exaggeration* to the last: *Appeal*. However, the principles concerned with dramatic interpretation (rather than naturalism) receive greatest emphasis.

Additionally, Kerlow has suggested further principles in the light of major technological and cultural trends, and these are also analysed. Comparisons can then be made between practice past and present, to ascertain the degree of change, and whether the Disney principles need revising as Kerlow suggests.
Some key questions asked are:

1) How can principles of exaggeration (1 ‘Squash and Stretch’) or simplicity (3 ‘Staging’) be interpreted with photo-realistic software and greater three-dimensionality of image?

2) What did Disney discover about the importance of character Appeal? And how may the greater realism available now alter this?

3) Finally, is there any problem in offering guidelines to animators generally – or does it depend on who is advising?

**Cultural Influences on Animation Chapter 4**

This chapter examines the wider cultural influences such as performance and live-action film, which have shaped and in some cases continue to shape digital character animation.

Firstly, the influence of performance on early film and animation is examined to establish its significance both past and present.

Performance is then compared to live-action film and animated film, to ascertain the key differences in product, process and audience that come with each change in medium. Questions asked are – What might be gained? What might be lost?

Another important questions raised is has live-action film and the realist aesthetic controlled and dominated current tastes expectation and cinematic understanding (scholarly or otherwise)? Is by comparison animation marginalised?

Additionally, how much has social change, instigated by scientific innovation, altered our expectations of the human body and human movement?

The views of scholars: Jayne Pilling, Paul Wells and Manovich are investigated – as they each provide a different exploration of the subject.

Through their opinion, the research reveals the true potential of the genre, unbounded by commercial or other constraints.
Body Language Chapter 5

The chapter on body language examines and correlates research from multiple study sources, but chiefly that of psychologist and international facial reading expert Paul Eckman together with views from surveillance expert Joe Navarro, as discussed in his book *What Every Body is Saying*. The research examines scientific analysis of non-verbal communication and also cultural influences. Principal issues raised and resolved are as follows:

1) Research (within science, and relevant disciplines) provides new insight into the subject of human movement and human response.
2) Public knowledge on the subject is often limited and sometimes inaccurate.
3) Although emotion and intent is demonstrated in facial expressions its importance is often overstated. Feet and hands can also reveal much, as well as a person’s rhythms of movement or gestural emphasis/ intensity.
4) It is always important to contextualise or interpret what we can read from a person’s body language.
5) Knowledge of the subject can aid animators in designing movement that:
   1. Appears credible (unless unnatural, artificial movement is the aim)
   2. Adds to character appeal
   3. Avoids negative appeal (if that is the aim)

Performance Chapter 6

Research into performance explores current methods more closely in particular Ed Hooks [23] (a trained actor/director) and his theories formed from workshops in various key games and animation studios and universities (e.g. DreamWorks, Disney, Microsoft, Sony and Bournemouth and Teesside University).

The research examines performance process and theory originating from industry, academia and education. My own experience of cross-discipline performance training is evaluated, to see how it compares with other collaborative work for example the *Bauhaus School of Art and Design* [24], or the theatre company *Complicite* [25].

In academia, opinion on Laban’s Movement Analysis and the relationship between dance and animation is explored. And in education, the Jacque Lecoq School provides a
model of experiential interdisciplinary work (using the body as a focus),
for creative outcomes.

Lecoq’s observational and technical practices, focusing on the body (e.g. masked work
or physical and emotional gesture), as well as nature (animals, materials and elements)
are analysed.

This is to determine whether they provide assistance for animators in terms of a)
increasing their imaginative scope b) sharpening observational skills or c) freeing them
from conventional constraints – thereby helping them to express themselves.

Performance research reveals insights into how to create expressive movement, build
caracter and (indirectly) meet the challenge of digital animation.

Limits of Research and Future Research

The research does not look extensively into every art discipline but only the most
relevant aspects of art practices. For example, visual art influences on animation are
largely ignored (i.e. the futurists or early cartoons) because the fine arts or graphic arts
are principally to do with static representations even if they allude to movement
through sequencing or line. Additionally, analysis of this type is well covered in other
texts, and therefore adds little originality to this investigation. (E.g. Furniss, M., (2008),
[26]. The thesis also avoids in-depth examination of the Laban method for
the same reason.

- The impact on animation art of commercial pressures or trends (coming from
  software development, the film industry, the public’s thirst for novelty and
  special effects, or the growing popularity of games) also remains relatively
  unexplored here.

- Additionally, the cultural impact of related areas like games or human computer
  interaction etc., are only given superficial treatment at best, as they represent
evolving and complex disciplines demanding more considered attention than possible here.

- **Audience:** The research does not examine in detail the response of audience to digital character animation in general or in relation to specific films. Though some background research has been done on the reception of key films, no systematic surveys have been carried out, or data sets examined etc.

- **Whilst the thesis does explore the impact of technology (generally and specifically) on animation art, this is not the central focus. The research does not explore in depth the technological goals of software engineers in leading animation studios or outside of them. Nor does the research consider in detail, any creative opportunities presented by innovation. This could present an interesting counter-argument to this thesis in future research**

- **The scientific analysis of non-verbal communication has been touched on but is not discussed in every aspect. This is principally because I wish to focus most on *creative responses* to human expression. However there may be further benefit in disseminating additional findings from science into art theory and practice.**

- **Additionally, little practical work using Lecoq's method has been applied to animation practice— beyond Complicite’s brief collaboration with St Martins School of Art. This remains a fertile area for future research. [25]**

- **Dance practice is currently affecting film practice, as new technologies incorporate both animation and choreographic software. This may create new genres (and influence existing ones) in a similar way to the recent trend known as *Machinima.*
Chapter 2

Technological Challenges of Digital Character Animation:
Chiefly Related to The Uncanny Valley Phenomenon
(The Problematic Response to Human Simulation)

This chapter will explore three key research questions
(the first question being of most significance):

1. Problematic Emotional Response to Realistic Human
   Simulation, examined using Mori’s theory Uncanny Valley
   (with reference to digital character animation)

2. New Technological Trends,
   and their influence on Computer Animation:
   strengths and limitations of technology explored

3. Changing Culture:
   brought about by New Technology
1. Introduction

a. Study of the Problematic Emotional Response to Human Simulation, using Mori’s theory - The Uncanny Valley

Why Uncanny Valley theory may be relevant to digital animation

New technologies create new disciplines - like computer animation, which can change the rules of human engagement (subtlety or profoundly depending on your viewpoint). As more realistic human simulation becomes possible, Mori’s idea of the Uncanny Valley has increasing relevance in animation for reasons I hope to explore.

The problematic nature of human simulation gained considerable public awareness as new technologies developed (firstly in robotics, but then in film and new media). Mori’s theory of The Uncanny Valley when introduced in the 1970s was sketchy and tentative and his brief exploratory essay addressed a purely scientific audience. [1] However its influence has grown. Film production and reportage, as well as new media (e.g. games and human-computer interaction), increasingly refer to the Uncanny Valley.

Mori’s Theory –

Difficulties with increasing realism in human simulation

The essay on the Uncanny Valley by the roboticist Mori, describes the ambivalence we have to human simulation (in the field of robotics). Mori believed that the better we achieve human likeness the more our negative responses can be evoked (ranging from cold neutrality, confusion, disgust, or outright horror). He visualised this changing response to simulation as a graph showing (on the x axis) a starting point of barely human e.g. an industrial robot to an end point - fully human. His graph describes (on the Y axis) a peak of positive response towards an anthropomorphic robot or object, followed by a sharp Valley of negative response, leading finally to the second peak: a fully human person. Mori believed that realistic robots achieved a negative aesthetic because they were not fully human but close enough to confuse or repel us. He put forward provisional ideas linked to our natural fear of mortality and instinct for self-preservation (defending against proximal dangers i.e. corpses and different species).
These theories have since been elaborated on by other cultural commentators. (Ho, MacDormoan, & Promono, 2007; MacDorman & Ishiguro, 2006; MacDorman et al. 2009)

Mori believed that movement accentuated the peak or valley – making the simulation more - or very much less - appealing.

His design philosophy was to avoid total realism aiming instead for the first peak of moderate likeness and high affinity.

Mori had observed in the 1970 World Exposition in Osaka a robot that demonstrated the complexity and challenge of realistic simulation. One robot he noted: ‘had 29 pairs of artificial muscles in the face (the same number as a human being) to make it smile in a humanlike fashion. According to the designer, a smile is a dynamic sequence of facial deformations, and the speed of the deformations is crucial. When the speed is cut in half in an attempt to make the robot bring up a smile more slowly, instead of looking happy, its expression turns creepy.’ MacDorman and Norri Kageki (1970).

Mori’s hypothesis was influential for a number of reasons. It evoked age-old questions that reoccur in different cultural contexts: What makes us human? What do we innately value? Is our sense of self, changing in an increasingly technological world? Are we fundamentally unsuited for this technological future? What is Reality? And Artistry? What do we fear and love? Some of these questions have been explored in literary culture from the past through the motif of the Frankenstein monster by writers like Mary Shelley and Isaac Asimov. Freud (in his essay of 1919) had also hypothesised about ‘The Uncanny ’ as a subsection of aesthetics: namely the theory of the qualities of feelings and particularly feelings of dread, repulsion (as opposed to beauty or the sublime etc.). [2]
Criticism, and Consensus, about the Theory
(from the scientific community and the wider public)

Some critics of the theory have suggested that transcending the Uncanny Valley is easily attainable and merely a matter of good design. Roboticist David Hanson claims making fairly minimal changes by adding neotenous features to entities achieves this. Though in the world of robotics his view is probably in the minority. Hanson et al, (2005) p. 1728-1729 [3]

One opinion the scientific community do seem to agree on is that the phenomenon is hard to define (and therefore verify), because it is both complex and wide-ranging. MacDorman et al (2005) p.226 [4] [5] Bartneck (2014)

Additionally -

a. *Individuals can also vary in their response:* being more or less emotional, more or less positive. MacDorman & Entezari (2015) [6]

b. *Culture can undoubtedly play a part in our responses:* e.g. 1) whether we are familiar with robots or an abundance of technology in our environment – in the way the Japanese are (Rowan Hooper 2015 [7]; or 2) whether we are, worryingly, more comfortable with some human simulations than others e.g. those outside our own ethnic group (for which we presumably have less empathy). Marek Cohen 2011 [8]

c. *The phenomenon also seems to appear in a variety of design contexts* (in a spectrum ranging from the abstract e.g. the MIT robot Lazlo [9], a theatrical puppet, or china doll; to the perfectly human (e.g. someone with too much facial botox, or a circus clown). Mori agreed that the phenomenon could occur in more than one context, admitting to a fear of wax figures.

Within film production, some critics or audiences argue (either with or without reference to the Uncanny Valley) about the success of certain human simulations; claiming they achieve a high level of realism and artistry simultaneously P Debevee (2014) [10] And that the animation adds enough fantasy elements to give the viewer a...
necessary distance to engage with the film. The quality of film characterisation can therefore be hotly debated and it comes down to whom is doing the evaluating (respected professional: be they filmmaker, journalist or scholar; or simply film fan). Sites like Rotten Tomatoes aggregate multiple reviews but also includes a sub-listing of "Top Critics", such as Roger Ebert and calculate their reviews separately. Opinion is also dependent on the evaluator’s definition of aesthetic appeal. David Bordwell, (2011) [11]. Although discourse on aesthetics and appeal is largely confined to the humanities, the sciences have now begun to take interest. Science disciplines refer to this new area as ‘evolutionary aesthetics’ - explored further in this chapter.

**Scientific Evidence for the Uncanny Valley phenomenon**

Recently scientists have begun to explore the phenomenon, in order to verify, understand and define it. Specific, isolated studies have begun to prove its existence and these studies originate from a variety of disciplinary viewpoints: i.e. biology, neurology or evolutionary psychology.

One such study (in 2011) is from the international team of researchers led by Ayse Pinar Saygin at the University of California. They base their research conclusions on functional MRI images of the brain that measured brain response to human appearance and human motion. On both sides of the parietal cortex, particularly the part that connects the visual cortex with motor cortex, (an area thought to contain ‘mirror neurons’) there exhibited evidence of a mismatch when a humanoid appearance and robotic action occurred simultaneously. According to Ayse Saygin, ‘The brain doesn’t seem tuned to care about either biological appearance or biological motion per se,’ ‘What it seems to be doing is looking for its expectations to be met — for appearance and motion to be congruent.’ [12]

Another research project carried out in 2009 in Princeton University by Asif Ghazanfar and Shawn Steckenfner [13] has indicated a biological basis for the Uncanny Valley. Macaque monkeys were shown realistic (static and moving) computer simulations of monkeys, and grew frightened, averting their gaze. The CGI faces the monkeys viewed pulled different expressions), but the macaques gave a consistently negative response to
these simulations as opposed to viewing real monkey faces or wholly unreal ones. The responses were especially negative when these simulations moved. Interestingly, the monkeys grew more familiar and habituated to these simulations in time.

Thalia Wheatley, a psychologist from Dartmouth College, has also carried out research with groups of urban Americans and tribesmen in Cambodia.

When shown a series of doll-like and human faces made with ‘morphing’ software, people said a face was more human than doll only if it had at least a 65 percent mix of a human face. People could even judge an artificial figure's human appearance based on seeing a single eye. Wheatley is quoted as saying ‘To go after a human-looking robot or avatar is to go up against millions of years of evolutionary history.’

Wheatley, T., 2012 [14]

The computer scientists MacDorman (Indiana University) and Ishigiro (Osaka University, 2006) have complicated the search further, by suggesting a number of explanations for the Uncanny Valley [15], ‘ranging from expectation violation and cognitive paradoxes [Ramey, 2005] to evolutionary aesthetics [Etcoff] and pathogen avoidance’.

Additionally, MacDorman has highlighted the significance of androids in understanding the social construction of personal and human identity. He suggests that our sense of self is fragile. He claims: ‘Each of us possesses a worldview that helps to give our transitory lives meaning. If an Uncanny android subconsciously reminds us of our mortality, it can create a strong aversion to people who threaten our worldview.’ [16]

Michael Persinger is a neuroscience researcher and professor at Laurentian University, Canada. He has devised a helmet that uses electromagnetic fields to induce electrical changes in the brain's temporal lobes, which he believes are linked with religious belief, induce unusual states and even visions. His research is controversial, but human visions (i.e. of a doppelganger) can certainly be caused by unusual brain activity. This can be a result of certain mental states or because of artificially induced brain activation (such as in Persinger’s research and Ehrsson’s research at UCL) [17] [18]. Out of body experiences and other Uncanny states are also fairly common. They are sometimes
extreme, or most often prosaic, like the feeling of déjà vu.
Certain scientists speculate that an inclination towards seeing visions, or a fragile sense of self, may help give us a species advantage. It may help us move beyond our habitual selves and current perceived boundaries of space and time. Tucker, L., (2003) [17]

These human experiences highlight the far-reaching nature of the Uncanny response.

Evidence for the Uncanny Valley phenomenon – as applied to the Reception of Film
(e.g. character animation, live-action film employing motion capture)

If Mori’s theory is correct, then characterisation in computer-generated animations could require an equally sensitive approach to design as robotics.

Animation is defined by movement and strong characterisation, which aims to reach a high affinity with its audience. Contemporary western animation is now produced predominantly on computer with software that is able to create photo-realistic pictures. A combined goal of behavioural affinity with realistic human appearance could be problematic.

The first film to achieve realism in human simulation using computer software was the film Final Fantasy: The Spirits Within (2001) [19]. The film generated a great deal of excitement up until its release – owing to its cutting edge technology. Final Fantasy heavily employed the technique of motion capture to create character animations. However, it was poorly received.

Angela Tinwell, senior lecturer in games and creative technologies at Bolton University (UK), has a theory for why this might be so. She has coined the term Uncanny wall, suggesting viewer discernment for detecting imperfections will simply keep apace with new technology. Final Fantasy may have failed to deliver its promise as the first truly realistic animation. Tinwell has been critical of the accuracy attainable, saying "False smiles are particularly common because the fidelity of the simulated skin below the eyes isn't high enough to show the lines and bulges that might be created by a genuine smile." Tinwell, A., et al (2011) [20]
Pixar was innovative from the mid eighties onwards, in producing computer generated character animations – making short films for an audience of technologists and later a full feature *Toy Story* in 1995 for mainstream family audiences. However, its lead characters were rarely human, and tended to be anthropomorphic objects like in *Luxo Jr.*, or *Red’s Dream*, and animals like in *For the Birds* or *The Adventures of André and Wally B.*

According to a recent article in *Scientific American* 2012, early test audiences of the 1988 Pixar short *Tin Toy* reacted negatively to the human baby named ‘Billy’. The journalist Jeremy Hsu, asserts that this unfavourable response persuaded Pixar to avoid realistic humans in favour of toys, robots and talking cars. Hsu, J., (2012) [21]

More recently, president Ed Catmull has stated that full photo-realism is not the goal of Pixar technologists and animators and that Pixar try to take one step back from realism when designing any character – aiming instead for greater variety in computer generated imagery. Catmull, E., (2014) [22]

When Pixar has represented people they have indeed taken a stylized approach. For example, *The Incredibles* (2004) were given suitably cartoonish proportions or movement dynamics (disappearing, stretching, shooting flames etc.) In *Up* (2009) the lead old man has an exaggerated square head and body. And invariably when humans are depicted in a more conventional manner like in *Ratatouille* (2007), they will still have one or more exaggerated features and/or proportions.

The film *Rango* produced in 2011 (Dir: Verbinski) [23], is an interesting case: exploiting photo-realistic visuals from the well-known effects company Industrial Light and Magic (ILM). It won the 2011 Academy Award for best animation. The film features only one human – a parody of Clint Eastwood. In a clever contrast, he is made into the mythic character ‘the Spirit of the West’. The rest of the cast are true to life anthropomorphic desert animals. The film unashamedly exploits photo-realism, however the director Gore Verbinski was paradoxically on a quest to capture imperfection.

In an interview with the animation director of *Rango* (2011) [24] Hal Hickel is quoted as saying in reference to the director ‘What he wanted was something very different from the neat and tidy and colorful mainstream feature
animation that we've become accustomed to [with computer animation]. He wanted something dirty, grimy, dusty, and fuzzy. And also it was just toward the goal of crafting a well-intentioned, deliberate, tactile world that you can believe in: something not photo-real but photo-surreal.’

This process was allegedly challenging. The senior editor of Animation World Network Dan Sarto stated in his published interview of Hickle that it was ‘not easy beating perfection out of computers.’

Films featuring realistic human CG characters have invariably received mixed or negative responses: e.g. *Polar Express, Tintin, Final Fantasy, A Christmas Carol, Mars Needs Moms, Avatar and Beowulf*. These films tend to rely to a large extent on motion capture (Mocap) technology in order to portray human movement. This technology represents a sophisticated process whereby live-action film is painted over - much as Disney had used with the early technology of rotoscope in films like *Snow White* ('37). However, Disney had used it as a method for studying human motion only, and animators were therefore given considerable leeway in their interpretation of live action and human appearance on *Snow White* and subsequent films involving human characters.

Motion capture techniques generally mean that the movement produced originates primarily from an actor's performance – rather than an animators creative imagination as visualized through pen or plasticine etc.

Motion capture combined with 3D computer software also enables a high degree of realism, both in movement and appearance of characters. But such films invariably fail to appeal – probably because they fall into Uncanny territory. Comments made include criticism about ‘dead eye’, ‘wooden expression’, lifelessness or plain creepiness.

Movement that is predominantly mocapped is now rarely considered true animation – despite the 2006 Oscar win *Happy Feet*, which relied wholly on the technique. The Academy Awards have since tightened their rules for Best Animated Feature nomination in an attempt to distinguish quality work from this now common technique.
However, the technique does not always receive negative criticism. In *Rango* the actors’ movements were captured – but only used as reference – following the Disney model. In the film *Lord of the Rings: The Two Towers*, the character of Gollum is exceptionally life-like although a fictional Hobbit. He is creepy, both in appearance and movement, however since he is an ambiguous villain this only adds to his charisma. His acting performance by Andy Serkis (motion captured) is inspired, but his facial movements employ a significant amount of animation. Interestingly they used Paul Eckman’s facial coding system, a system Pixar had used in its early days but later abandoned (perhaps as it was no longer necessary, or because it was too prescriptive and they were unsatisfied with its limitations).

Journalist Jamie Madigan writes about the related field of video games and the psychology of gaming for various gaming publications. In the online magazine *gamesindustry.biz* he says:

‘movement matters if you're trying to be realistic. Some games spend a lot of money to get this right and they really stand apart from others. It's not just about having characters doing human things like shifting their weight or changing poses. It's about having them do it really smoothly and realistically. Double for facial animations.’

Madigan, J., (2013) [25]

If filmmakers are aiming for close realism, evidence seems to suggest that simulated facial expressions invariably lack subtleties we are adept at picking up in natural human contact. Facial gesture and expression is therefore thought to be more problematic and requiring extra sensitivity and awareness.

Tinwell, Grimshaw, and Abdel-Nabi published a study in 2011 on exaggerated facial expression and how different emotions affect perception of the *Uncanny*. [26]

For the key emotions fear, sadness, surprise and disgust they said: ‘Results of a previous study show that the Uncanny was exaggerated for realistic, human-like characters when emotional expressivity had been limited in the upper face region, including the brows and forehead…‘ Designers were therefore recommended to give special attention to the upper face region when communicating these emotions.
Sadness was regarded more favourably than the other emotions when presented in virtual characters with full or restricted animation in the upper face. They hypothesized that ‘This was attributed to people’s ability to anthropomorphize virtual characters and express sympathy towards them…’

On observing the emotions of anger and happiness they remarked: ‘a lack of upper facial animation had a less noticeable effect on perceived Uncanniness for the emotions anger and happiness…As the lower facial features are of greater importance when communicating the emotions anger and happiness…’ Another insight they uncovered was that happiness was rated most Uncanny in characters with full facial animation due probably to people’s innate sensitivity to fake smiles. Disgust was an equally problematic emotion due to the inability of software to reproduce the classic ‘nose wrinkler’ gesture.

In the study by Karl MacDorman, Robert Green, Chin-Chang Ho, and Clinton Koch published in the journal of Computers in Human Behavior, Madigan, J., (2013) [25] the researchers produced a realistic 3D image of a human face based on an actual person. They then created eighteen versions of that face by adjusting texture photorealism (ranging from "photorealistic" to "line drawing") and level of detail (i.e. number of polygons). Chosen participants were then shown these 18 versions of the face and asked to adjust sliders for eye separation and face height until their face looked "the best." For realistic faces (with photorealistic textures and more polygons), participants pursued their "best" face by adjusting the eye separation and face height until they were extremely similar to the actual face the original 3D image had been based on. But for less realistic faces with lower polygons and less detailed textures, the ranges of acceptable eye separations and face heights were much larger.

The above examples in filmmaking and scientific research seem to suggest, that the more successful animation directors and teams do best by adopting creative strategies to bring life and appeal to their characters rather than realism per se. Animation directors often aim for film realism rather than true realism, by which I mean they must successfully hook audiences into immersive stories and characters, where one can suspend belief. This invariably means customising appearance and movement to a high
degree, rejecting software defaults and formulaic approaches, adding numerous subtle nuances, sometimes making for labour intense work (even for animation).

**Design Principles as Anticipated in Science**

Design Principles should essentially encompass consideration of negative responses to the design of human simulation and how to avoid them. Ideally this would imply knowledge of social cues in non-verbal communication, and of the importance of design appeal, as well as how to achieve this. One general text written by the engineer Donald Norman titled *Emotional Design: Why we love (or hate) everyday things* (2005) [27], intends to inform product designers as to the basics of aesthetic response.

However, certain scientists have acknowledged the complexity of such a task as well as the limitation of Mori’s original paper. The roboticist Ishiguro and Bartneck of Eindhoven University of Technology have remarked (2010) [28] that: ‘Robots’ movements and their level of anthropomorphism may be complex phenomena that cannot be reduced to two factors. Movement contains social meanings that may have direct influence on the likeability of a robot. The robot’s level of anthropomorphism does not only depend on its appearance but also on its behaviour...The Uncanny Valley can be used in attributing the users’ negative impressions to the users themselves instead of to the shortcomings of the agent or robot.’

The computer scientist MacDorman (Head of the Android Science Center in Indiana) has advised more specifically that photorealistic human texture demands equal naturalism [15] [16], in human facial proportions to avoid falling into Uncanny territory. (These realistic attributes must always be used together). However avoiding photorealistic textures allows for more leeway in facial proportions e.g. larger eyes.

The findings of Steckinfinger and Ghazanfar at Princeton [13], have suggested there may be an adaptive element to realistic simulation and consequently some believe that audiences might catch up with technology once they become conditioned to realistic computer simulations. However, the response to films like *Spirits Within* and *Polar Express*, combined with other research would negate this.
Scientific research, like that of MacDorman’s, conclude that stylized rather than realistic simulations are not only a safer approach but also maximise choice and possibility for designers – while a realistic approach to character design is distinctly limiting.

Mori’s original argument for avoiding high-realism in design was simply that symbolism was more inspiring, citing a classic Buddha carving as an example.

Indeed if absolute realism was possible (which it currently is not e.g. 3D film is actually 2D) then we might ask – what is the point? In such a circumstance it might be cheaper and easier to hire real actors to play story characters. If virtual actors are used, then creative imagination and artistry becomes redundant in character design. And would audiences want the passivity of a total simulation? Additionally, if audiences could no longer tell the difference between real life and simulation, would this not engender new moral dilemmas? These questions reveal the many potential problems of achieving perfect human simulation – should it be entirely possible.

Returning to MacDorman’s recent research on *Uncanny*, a lack of appeal in human simulation is one possible factor (of a number of possible factors) that contributes to the *Uncanny* phenomenon. [29] MacDorman & Entezari, (2015)

Character appeal is an elusive quality: that artists including Disney, and other animators since, have tried to define, the better to achieve. The problematic nature of photo-realistic, technological effects, as highlighted by commentators on the *Uncanny*, strengthens the importance of character appeal and nuances of what is now referred to (by the Scientific establishment) as ‘evolutionary’ aesthetics.

Evolutionary aesthetics is according to author and biologist Eckart Voland and anthropologist Karl Grammer:

“The attempt to understand the aesthetic judgement of human beings and their spontaneous distinction between "beauty" and "ugliness" as a biologically adapted ability to make important decisions in life. The hypothesis is - both in the area of "natural beauty" and in sexuality, with regard to landscape preferences, but also in the
area of "artificial beauty" (i.e. in art and design) - that beauty opens up fitness opportunities, while ugliness holds fitness risks.’ Voland and Grammer (2003) [30]

**A Moving Model of Aesthetic Appeal**

Attractiveness in humans has been attributed to static visual markers like symmetry of form and symbols of health and youth like colour of skin, glossiness of hair, curved forms etc. Yet psychologist Ed Morrison has been researching into the role of motion in human and animal attraction. He says: ‘Despite the wealth of studies in the area of facial attractiveness, the general reliance on static stimuli in research to date is a concern… Facial motion is known to convey clues about identity and emotional expression. Rubenstein (2005) showed that emotion is an important clue to attractiveness in dynamic faces, suggesting that static images may lack important social clues relevant to attractiveness...’ Morrison et all, (2007) [31]

Certainly within the visual arts, fine art has historically provided standards of taste and aesthetic beauty (that remain culturally dominant) but related to static forms (like painting and sculpture. Thinking of visual appeal in a strongly kinaesthetic sense requires something of a paradigm shift.

**The Role of Asymmetry in Human Appeal**

The importance of symmetry in the visual arts (and in human attraction) is a common rhetoric coming from Aristotle’s idea of *the golden mean* etc., and the aesthetic quality of asymmetry is more overlooked.

In a study on attractiveness of natural faces compared to computer constructed symmetrical faces, carried out by Zaidel and Deblieck at UCLA, [32] their research compared attractiveness judgement of normal full-faces to the perfectly symmetrical LL and RR created from them. Their paper claimed that: ‘Regardless of how high the attractiveness rating of the normal full-faces, perfectly symmetrical faces received significantly lower beauty ratings…’ The researchers also observed that: ‘Functionally, humans display asymmetrical emotions in the two halves of the face; expressions such as smiling, sadness, and disgust are more salient in the left than in the right half in most people…it is quite common to see asymmetric moles, asymmetric
grins or moving talking faces, which do not seem to detract from general facial attractiveness or popularity. Rarely do these facial features appear bilaterally symmetrical. Their asymmetrical presence is not arbitrary or coincidental…’ Zaidel, Deblieck, (2007) [32]

The computer simulations created by Zaidel and Deblieck while theoretically more perfect were unnatural and (not coincidentally) less attractive to people. The mathematically perfection of the computer is something that instinctively leaves us cold.

Their research in conclusion stated that: ‘Many facial parameters contribute to the appearance of beauty, but they are not all understood…’ So science seems to present no easy answers and certainly no concrete formula for design.

Artists, particularly those at Disney, have certainly recognised the attractive powers of asymmetric design, as recorded in Thomas and Johnston’s book *The Illusion of Life* (1981). Thomas and Johnston remark:

p. 68 ‘Few fluid forms are completely symmetrical, and the contrast in form and shape makes an active type of balance. …We call these forms “plastic” as opposed to “static”. Trainee animators were reminded with signs saying ‘Does your drawing have weight, depth and balance?’ Another sign admonished animators to watch out for “twins” in their drawing (meaning a too symmetrical posture - characters whose left and right sides mirrored each other, and therefore looked lifeless).

‘We learned that it is always better to show the action in silhouette. Chaplin maintained that if an actor knew his emotion thoroughly, he could show it in silhouette. Walt was more direct: “Work in silhouette so that everything can be seen clearly.”’ (This highlighted a problem specific to animation that ultimately aided the communication of character within the medium.) The importance of avoiding twins and exploiting silhouette was crucial in staging action and character.
Some Design Principles examined

Design principles have been proposed by scientists for a science audience. It is useful to examine them to see if they provide solutions relevant to animation. A design principle advocated by the psychologist Goetz, computer scientist Kiesler, & usability expert Powers, in a 2003 scholarly paper [33] recommends that –

1. **Design elements should match in human realism**
   (This idea is generally supported by other scientists like Saygin and Macdorman.)

Other principles advocated by Saygin and Macdorman include:

2. **Reducing conflict and uncertainty by matching appearance, behavior, and ability**

3. **Human facial proportions and photorealistic texture should only be used together**

Although this is generally good advice it is probably far too prescriptive for filmmakers working in animation now. A good example that breaks the rules is the character of Jessica Rabbit in the film *Who Framed Roger Rabbit*. The film employs digital effects (although not computer animation software) but combines a high level of realism (in voice and lighting) together with great stylisation in character. The film was universally praised both for its technical innovation and artistic merit and credited as generating an animation renaissance after its release in 1988 Dir: Zemeckis [34]. Another example that seems to break at least one rule is— the *Spirit of the West* in the film *Rango* 2011. Taken literally the above advice from the science community could be stultifying for artists, taking loosely it could serve as a sensible guide.
2. **New Technological Trends, and their influence on Computer Animation:**

   strengths and limitations of technology explored

**The Goals, Processes and Culture of Science and Technology**

The goals and processes of scientists and artists are not the same – although they sometimes coincide. Scientists are beginning to recognise the importance of appeal in avoiding the Uncanny response. They have discovered that total realism is a poor design strategy for human simulation. When scientists give advice however, it is invariably either tentative (as in Mori’s) or limited.

Technologists are interested in pushing the frontiers of knowledge within technology and software design. Aesthetics is clearly not their primary concern – even if they do make adaptable and novel software for use by creative artists. Introducing new technical innovations in animation is also a risky endeavour: adding extra complexity to an already tight production schedule and budget. The added pressures must surely encroach on the creative process in subtle or significant ways. Although in innovative companies like Pixar they claim that technologists follows the lead of the artists, is this on examination necessarily so?

There is also the issue of training. Software develops rapidly – and in certain notably companies like Pixar, the software can be customised for a particular film. This burdens both experienced professional and new recruits with a relentlessly challenging learning curve. Students who are battling to learn the rudiments of a difficult craft also have much of their time taken up learning the ins and outs of software; meaning there is less time to build experience and feeling for their medium.

But aside from these realities, there has been a cultural shift with the introduction of modern technologies like the computer, Internet and video game. Technology was once the preoccupation of a small minority. Now that technology has entered many more people’s lives, interest has spread. As the writer and broadcaster Alain de Botton commented: ‘Over the course of the nineteenth century, the dominant catalyst for that feeling of the sublime had ceased to be nature. We were now deep in the era of the
technological sublime, when awe could most powerfully be invoked not by forests or icebergs but by supercomputers, rockets and particle accelerators. We were now almost exclusively amazed by ourselves.’ Alain de Botton, (2009) [35]

Michele Pierson, author of the book _Special Effects: Still in Search of Wonder_ (2002) [36] has described this shift in culture as ‘technofuturist’, and a ‘hyperreal, electronic aesthetic’, saying ‘whether conscious or not, it represents a response to audiences’ own demands for aesthetic novelty. Aesthetic novelty is promised with each new technical innovation, and its dissemination in computer magazines, the Internet and genre filmzines etc.

Pierson also discusses the often uneasy relationship between scientists and artists within the film industry, saying: 'In 1994 Variety published an article that looked at some of the difficulties facing many of the engineers and software designers who found themselves jobless and looking for work in Hollywood. A manager in charge of a Los Angeles County job-placement project suggested that the crossover was never going to be easy, if for no other reason than that ‘a lot of these people have no idea what the entertainment industry does or requires’ Even the article’s success stories stressed the level of retraining needed to ‘combine engineers with art.’ Pierson, p.62

‘Ron Cobb—effects designer on _The Last Starfighter_ added an insiders criticism of the early digital aesthetic, saying: ‘Essentially, a lot of technicians who developed this technology were in charge of making images, and they tended towards a tasteless excess.’ Pierson, p. 129

The rise of ‘technofuturism’ or ‘techno awe’, describes a new audience – more techno-enthusiast, techno savy and revelling in technology for technologies sake. Audiences who like to know (or tell) how a particular computer special effect was achieved, rather than appreciate visual metaphor and any deeper emotional message. Once the province of the science fiction enthusiast/nerd, such audiences have moved into the mainstream, bolstered no doubt by journalism that propagates the same obsession and by the proliferation of CGI effects in every kind of film genre.
Scientists have discovered that aesthetic judgement plays a significant role in human experience. Davies, 2013 [37] However, they have no unifying theory of aesthetics (evolutionary or otherwise) and can as yet only offer a supportive role to artists. This is arguably how it should be: seeing as scientists’ aims are generally very different to artists.

Additionally (at risk of stating the obvious): their intention is not to advise the artistic community but the scientific community, and at their most concrete they design products with very specific functions, where entertainment or artistic expression are at best only of secondary importance.

Deliberate collaboration between scientific, technological and artistic disciplines can be surprisingly fruitful for all parties. There is often much the sciences can learn from artists though it is more often acknowledged that artists learn much from science. However when scientists generate the very tools by which the artists’ produce their work, collaboration is especially important.

**Digital Tools and Trends:**

The traditional techniques used in animation remain current (drawing and model making, staging etc.) and enable the animator to gain greater mastery by refining their knowledge and skill over time. With digital animation the problem of keeping up with new technology and software advancements is a challenge in itself. The training of animators has now become more difficult in this regard.

Making models or drawing has an immediacy to thought and action. Famed Disney and Dreamworks animator Glen Keane has said when commentating on his 2010 film *Tangled*: ‘There’s so many aspects to CG that take all your time’ and ‘The computer fights against anything organic and a sensuous kind of feel….rhythm, expression, tilt flexibility.’ (2010) [38] The computer demands that the artist works within the software program. It directs the thinking process in that sense, and reduces some of the spontaneity possible with the hand-controlled method.
The medium is also less personal (than drawing or clay), conveying less of an artist’s visual personality through the idiosyncrasies of individual mark making or handcrafting.

In character animation, the ‘universal man’ wireframe base makes the process of depicting characters (female, very young, old, funny or dramatic) counter-intuitive.

However, this challenge (though great in itself) is not the only one to impact the art form. New choices are increasingly available, that add further complexity to the basic digital tools of 3D computer software. The most obvious of these are: motion-capture technology and 3-D film.

1. Motion Capture

The technique of motion capture (or Mocap) is increasingly a part of both live-action film and certain types of film animation. China’s government has recently invested $700 million in animation (with the hope of competing with Disney) and created a state of the art production facility near Beijing. However, the main focus of the campus seems to be its motion-capture studio claiming high-end technology.

Disney, in parallel, bought ImageMovers Digital home studio in 2007, with the hope that film director Zemeckis and his company could perfect performance capture (a process they had started with the mocap films *Polar Express* (2004) and *Beowulf* (2007). However, Zemeckis’s film *A Christmas Carol*, only did modestly in terms of gaining box-office revenue and *Mars Needs Moms*, his follow up film, fared much worse. By the beginning of 2010, Disney announced the studios closure. McClintock, 2011 [39]

General opinion (amongst filmmakers as well as critics and public alike) is that movement recorded with motion capture is often let down by poor facial expression (particularly the eyes), as well as the opaqueness of skin and eyes. Middle distance camera shots tend to predominate. And close ups are rarely savoured. In the animated film *Rango* (2011) motion capture was considered but abandoned, because the director wanted the townsfolk and hero to have a desperation in their faces and mocap has been criticized as resulting in frozen eye. The film used instead the technique of ‘emotion capture’. By this the director meant that some scenes were used as loose reference for
the animators. Additionally, these scenes were set up like a piece of staged theatre, with all the actors together for the scene, in costume, with rudimentary props sparking off one another in real time.

True motion capture, by contrast, is rarely in costume with additional props and with the whole cast for the scene present. Actors are often acting in isolation on artificial blue screen stages, sometimes in special restrictive suits with senses all over them. And the actors’ performance (physically and imaginatively limited) tends to lead the animation.

The similar technique of rotoscope has been employed previously in the history of animated film, but generally only as an aid to the process and not an end in itself. The motion capture technique is increasingly employed in animated film, and the Academy Awards has had to issue stricter guidelines, for what constitutes animated film.

2. 3-D Film

The production of James Cameron’s film Avatar marked a turning point in film. Cameron was allegedly instrumental in paving the way for the development of 3D film cameras, 3D projectors and ultimately a new type of audience. (Cameron claims that he influenced movie-theatre exhibitors to create screens capable of 3D projection back in 2005 at their annual convention, and since 2005, 3-D films have certainly grown in popularity. Several animation filmmakers have taken advantage both of the new technology and the new audience taste and the key studios (in stop-motion) Aardman and Leika, (in computer animation) Blue Sky Studios, Dreamworks and Pixar have got on board.

However, 3D projection is known to generate a significantly darker and smaller image and to present certain problems like strobing and ghosting.

According to the renowned film editor and sound designer Walter Murch, the key problem with 3D film is focus. He says:

“The audience must focus their eyes at the plane of the screen…say it is 80 feet away. This is constant no matter what. But their eyes must converge at perhaps 10 feet way,
then 60 feet, then 120 feet, and so on, depending on what the illusion is. So 3D films require us to focus at one distance and converge at another...All living things with eyes have always focused and converged at the same point...This is a deep problem, which no amount of technical tweaking can fix...' Murch, (2011) [40]

In addition, he argues 'The editing of 3D films cannot be as rapid as for 2D films, because of this shifting of convergence: it takes a number of milliseconds for the brain/eye to “get” what the space of each shot is and adjust.'

Murch discussed these points in his letter of January 2011 to the critic Roger Ebert published in the Chicago Sun-Times and made clear that: far from improving the audiences’ feeling of immersion, it destroys it, because it makes the audience more aware of a certain perspective’ relationship to the image. Murch says good film narrative by contrast, will pull one into a dreamlike ‘spaceless’ space. His final point is it is more expensive to produce and therefore simply reduces the funds available to realise any project.

Film is essentially a 2D medium. Only a truly holographic image gives real dimensionality. As it is, characters can appear to walk towards you and then simply dissolve. Sound does not follow the illusion even when surround, because it does not increase with a person’s proximity to the viewer.

Digital animation films requiring the addition of special auditoriums and glasses are in danger of making the technology the star performer.

Nevertheless 3D film is an increasing phenomenon. Walt Disney Pictures has announced release dates for Disney and Pixar animated films through 2018. While the films are untitled, all eight movies will be released in 3D in 2016, 2017 and 2018. Ford, R., (2013) [41]

Whilst some directors, like Cameron, feel 3D technology creates the most fully immersive experience, not all directors agree on all counts. Gore Verbinsky, director for *Rango*, purposely avoided 3D because he wanted a real feeling of space and light in his desert shots (having also hired the well known cinematographer Roger Deakins as
lighting advisor). He also felt the technology would demand too much of the total film budget.

3. **Changing Culture: brought about by New Technology**

How technological innovation can change culture: (and our perceptions and expectations)

Technological advances change culture and our perceptions of what is normal, commonplace, acceptable or desirable. This can affect our response to human simulation: appearance, movement and behaviour etc.

For example, the invention of blade like prosthetic limbs in high-level sport has made stylised rather than natural looking aids acceptable. And, most significantly, athletes who wear them have changed our perception of disability itself. (Double amputee and Olympian sprinter Oscar Pistorius was known as ‘the fastest man on no legs’, having competed against able-bodied athletes in 2012. And now ‘jumping’ blades based on prosthetic blades, have become a fashionable leisure activity, for those interested in extreme sports. They enable the wearer to jump six feet into the air.) *Scotsman News* (2005) [42]

What was considered strange or surprising, can in time lose its shock factor. For example, earlier film effects like those in *Psycho*, or *Terminator* are now so familiar to the public they have lost their original impact. Films like *Jurassic Park* at the time of release seemed to turn fantasy into reality. This desire to turn fantasy into reality is an enduring human impulse. And technology can enrich culture and produce new modes of expression such as computer animation.

However, technology can also take us far away from nature and has the power to disturb as well as delight. For example, *shoot em up* computer games have been criticized for encouraging violence.

The pursuit of a physical ideal has fuelled different industries and professions – like plastic surgery, photographic portraiture and software design. But airbrushed images of
people in magazines has created a false and increasingly homogenised visual ideal. In films software is used together with body doubles, and other visual and technological tricks, to create a hyper-reality (e.g. as in the 1990 film Pretty Woman). [43] Cinema has always used illusion, as all art does, but never has the lines between reality and artificer been so blurred. And creative vision is not always the driving force.

Plastic surgery has further distorted our sense of beauty and self; with the frozen, botoxed faces of the wealthy or famous, along with unnatural body proportions etc. Sometimes these changes are perceived as natural and sometimes they invoke the very Uncanny repulsion they hope to avoid.

The anatomist Gunther Von Hagens has presented to his public a view of humanity never before seen. In placing plastinated corpses in dynamic poses, he sought to humanise them and popularise his work. Movement here is used to make the wholly unacceptable - acceptable.

The monsters and alien creatures in cinema, alongside depictions of real life characters like the Elephant man, sometimes use the same materials and techniques as medical prosthetics. Life imitates art. The robot designer David Hanson has engaged in cross-disciplinary work exploring facial reconstruction with revolutionary materials (he refers to as ‘frubber’). [3] He foresees the day when sympathetic facial reconstruction for casualties of war, accident or illness, will be a possibility; and he believes accumulating knowledge will be beneficial to many disciplines - social, technological or artistic. Currently robotics strives to mimic several aspects of human behaviour, from the physical to the psychological.

Psychologists when explaining or interpreting human emotions and body language use scientific methods of reason and logic to explain intuitive reactions to events and situations. They provide the language with which we discuss. However, different disciplines use language differently creating confusion between opposing mind-sets. Scientists often aim to extend human capabilities and this can be a source of inspiration. However, losing touch with our true nature can also be problematic.
Chapter 2 Conclusion

The development of new technologies in the last three decades has generated new products that change the rules of audience engagement with animated film. In human simulation (and specifically character animation), a high level of realism is currently technically possible and often desired. But scientists, cultural observers, and filmmakers now frequently refer to the problem of the Uncanny Valley and hard evidence has been found to prove the existence of this phenomenon (e.g. MRI scans of observers neurological responses to human simulations).

The research here, documents some of these case study conclusions and the cultural shift in attitude that has resulted. Mori along with many current scientists, and professional animators, now believe that a high level of realism in human or quasi-human appearance, together with life like movement, paradoxically increases negative response for the audience. Many approve of Mori’s original solution: 1. sensitivity in design and 2. avoidance of total realism in favour of more symbolic representations.

However, the research explores some of the controversy around belief in the Uncanny response, as well as the strong consensus. It examines some of the tentative solutions proposed from the scientific research for generating appeal. However, design solutions provided by scientists are problematic. The research proposes there is a clear cultural and ideological difference between science and art. Additionally, several scientists have highlighted the profound nature of the problem, which is difficult to classify touching on several disciplines at once.

There has been debate about the scale (and nature) of the problem within both scientific and artistic communities. Perhaps the most interesting insight for filmmakers is: that the Uncanny response appears in a variety of design contexts. This only adds complexity to current related debates (post-modern aesthetics, the newer scientific field of evolutionary aesthetics, and the value of aesthetic evaluation itself).

Within animation, new cultural trends have complicated matters further. Certain published interviews examined here, of studio animators in discourse, state that the computer (the medium and its processes) lacks the sensuality of more traditional tools,
and its digital perfection destroys naturalism. And audiences can be repelled by the pseudo realism of new digital effects. The extreme techno fetishism of some digital animation may satisfy nerdish fans, but box office failure reinforces what some professionals state: that when technology leads, characters lack universal, enduring appeal and can even appear unnatural.

In revisiting the debate about the scale and nature of the Uncanny problem, the research explores some of the enormous cultural shifts that have taken place in the last few decades. Technology leads to certain extreme outcomes: like numerous facially enhanced actresses whose features are increasingly frozen and expressionless, or disabled athletes who with enhanced prosthetics can leap six feet into the air and run faster than other competitors. This calls into question our very definitions of normality. However, in weighing much of the data, the research asserts, that even with huge social change, we cannot outdo millions of years of biological evolution.

Moreover, this research proposes that the wholehearted pursuit of realism through technological tools, fails to appreciate the role that the artist’s unique viewpoint plays and indeed should play on any final creative product. It also fails to appreciate the human propensity towards indirection, suggestion, parody, stylisation, abstraction and natural imperfection etc.

The following chapter sets out to explore classic Disney principles and various re-workings of these principles, to see how far they do - or don’t - address this Uncanny response.
Examples of Uncanny Valley

Figure [1] ‘Monkeys fall into the Uncanny Valley’ (2009) Princeton University Neuroscience Institute, Research by Ghazanfar & Steckenfinger, Monkeys respond negatively to CG images according to research. [1]

Figure [2] Transcending the Uncanny Valley? *The Emily Project*, (The Image is provided by - Image Metrics & ICT Graphics Lab - University of California). *The Emily project* set out to create the world's first convincing photo-real CG face at HD resolution. It is worth noting that only the face of the character is CG; the hair and body are those of a live-action actor (shown on the left).
Figure [4] A diagram of the Uncanny Valley. The theory of the Uncanny Valley has been adopted by animators, who believe a certain level of stylisation, makes human characters more palatable or appealing for animation audiences. (Shutterstock, Reuters, Heather Knight.)

The diagram shows an increase in brain activation (activation in many more localities of the brain) when viewing the android movement.

Figure [6] Publicity Picture for Cosmetic Dermatology – showing results for Botox treatment, Before and after 7, 90 and 120 days.
Figure [7] Portrait of Gabriela, 42 and Victor, 43, from Buenos Aires, Argentina, (2014). They hold the official *Guinness World Record* for the most modified married couple, with a total of 77 bodily alterations (including four microdermals, 11 body implants, five dental implants, four ear expanders, two ear bolts and one forked tongue).

Figure [8] *Powerisers: run fast, jump high, lose friends* (2006) Reviewed on Popgadget.net

Gizoo's Powerisers jumping stilts let you jump up to 6 feet high, make strides over 9 feet wide, and run up to 20 mph.
Figure [9] Gunther von Hagens – *BodyWorlds* Exhibit

The Basketball Player

Figure [10] *BodyWorlds* 3
(2006)

The Skateboarder
Animation Principles Chapter 3

Introduction

This chapter explores the *Twelve Disney Principles* set out by Thomas and Johnston in their book *The Illusion of Life*.

Traditional (hand-drawn) animation has established principles, chiefly created by the Disney Studios, which have guided animators over several decades. But the strength of these principles diminishes when applied to current digital animation, or the Uncanny Valley phenomenon would not have developed. What has changed is both the animation process; the audience (their response and expectations); and the producers: their mind-sets and objectives. This chapter re-examines the foundation principles lain down by Disney, and the cultural differences that have taken place between their inception and now - in the digital age. Additionally, it looks at the changing perception of human movement and the effect of changing processes on artists and audience.

The commercial nature of animation results in its need to 'please' or satisfy its audience. The audience in turn affects individual response. This is how trends are born.

Key questions explored in this chapter are – what are the cultural (and social) changes that have resulted in the art of digital animation? Alternatively, have changing factors within animation itself, alone produced shifting perceptions of artist or audience? Ultimately, what is culturally significant to the Uncanny Valley response?

This chapter explores the cultural dynamics- the changing theories, working principles and public perceptions of film art and art in general where it impacts on the portrayal of realistic or fantastical human representations in animation.
## Animation Principles

Principles become established within any art form or industry out of necessity. Animation is generally not a solo pursuit and so a shared language or culture developed by reflection on practice, is essential for teams to share vision and directive.

Digital animation requires even larger production teams and yet more complex processes, so common principles are especially valuable. However, the culture of filmmaking changes continually, presenting a significant challenge to practice, training, evaluation and analysis.

The international vanguard for animation was Disney whose desire for greater sophistication within the art, led to development in the 1930s of principles, born from experiment and discovery. Disney’s later vision to establish a school (*The Californian Institute of the Arts* – founded in 1961) heightened need for formal guidance. These principles, written down by Disney animators and teachers Frank Thomas and Ollie Johnston, were published in 1981 (revised in 1995) [1]. The book became a seminal text to animators and artists in related fields (i.e. games design, interaction design, animation historians). It continues to be used as reference – for example by Pixar President John Lasseter in his original SIGGRAPH presentation on *Digital Animation Principles* of 1987 [2] and by industry expert Isaac Kerlow. Lasseter and Kerlow have both commented on the 12 Disney Principles and their thoughts about its relevance to computer animation are explored here.

Lasseter (Chief Creative Officer of both Pixar and Disney) stressed in his address that although the computer was a new tool, requiring a different approach, nevertheless the fundamental principles of Disney were still relevant. He asserted that principles were important to digital animators and software designers. He claimed that neglecting these principles could result in unnatural looking animation (jerky, unreal, dull and lifeless etc.). And he felt that new tools would enable people to produce higher quality computer animation, but also ‘more bad computer animation,’ due to ‘unfamiliarity with fundamental principles’.
Kerlow was leading the art production group at Disney Interactive in the late 1990s. He is author of *The Art of 3D Computer Animation and Effects* (2009) [3]. Kerlow has also been involved in education since 1980 with the first BFA/MFA Computer Animation program in the US. [4] He was also appointed SIGGRAPH Computer Animation Festival director in 2010. Kerlow is neither animator nor software designer, but has straddled several disciplines, including video games, and is well placed to offer a broad perspective on digital animation.

Kerlow points out at the beginning of his book chapter on *Animation Principles* that many of the key terms of animation are borrowed from previous crafts like cinema, theatre and the visual arts. He says that principles are chiefly *about* five things: 

A) *Telling a story*  
B) *Acting and/or directing the performance*  
C) *Representing reality*  
D) *The craft of representing or creating a reality in a believable way*  
E) *Editing a sequence of actions*

According to Kerlow, some computer animation techniques are based on techniques and principles of traditional character animation; others are based on the findings of experimental animators and filmmakers; and many are unique to the new expansive medium of computer animation.

### 12 Disney Principles re-examined from comparative contemporary perspectives

Index:

1. **Squash and Stretch** (about dramatic expression)  
2. **Anticipation** (about clear visual communication but can also be about dramatic timing)  
3. **Staging** (about clear visual communication)  
4. **Straight Ahead Action and Pose to Pose** (about different processes, the first of which can contribute to dramatic expression)  
5. **Follow through and overlapping action** (chiefly about representing realistic action, but also may add to dramatic expression)  
6. **Slow in and Slow Out** (chiefly about representing realistic action)  
7. **Arcs** (about realistic action)
8 Secondary Action (about representing realistic action, but also may add to dramatic expression)
9 Timing (about character expression or dramatic expression)
10 Exaggeration (about character expression or dramatic expression)
11 Solid Drawing (similar to principle 3’ Staging’ about posing the animate figure for naturalism)
12 Appeal (about the gestalt of character expression)

The Disney studio strove for two essential qualities in their quest to refine animation art and character design: namely 1) naturalism and 2) emotional expressiveness or drama. Some principles reflect the first aim, and some the second: the latter having particular significance to this thesis. This second quality receives little attention by Kerlow, as he describes crafting or representing reality – but says little about representing the imaginative and fantastically.

Principle 1 of the 12 Disney Principles: Squash and Stretch

The first principle is arguably the most critical technique for animation success described in the Disney book. Thomas and Johnston acknowledged its importance: to make the drawings connect or interrelate with each other and suggest action, thereby maintaining a measure of realism. For example, they described the deformations of squash and stretch seen in the face as:

‘The face, whether chewing, smiling, talking or just showing a change of expression, is alive with changing shapes in the cheeks, the lips, the eyes…’ [1]

But according to Thomas and Johnston, the technique reached further levels of experimentation (and imaginative distortion), as:

‘…the animators tried to outdo each other in making drawings with more and more squash and stretch, pushing those principles to the very limits of solid draftsmanship…a mouth chewing on a straw was first shown far below the nose, and
then it actually was compressed up beyond the nose (which changed shape as well)... we found we could make each position stronger in both action and drawing.’

Lasseter has stated that this principle is especially important in facial animation but needs careful treatment, remarking that:

‘Because of the realistic look of computer animation, an animator needs to be aware of how far to push the motion. The motion should match the design of the character and the world. Animating very cartoony motion with lots of squash and stretch on a realistic looking object may not look believable, as would realistic motion on a caricatured object.’ Lasseter, (1989) [2]

Lasseter also clarifies his view on motion capture in relation to this principle: ‘…This is the pitfall of using motion capture devices to create final animation. You can use the motion capture data as a starting place, tweak the timing and poses to make it more caricatured, then apply it …‘ Like Disney before him, Lasseter sees motion capture as a means to an end and not an end in itself.

The Disney animators had discovered that simplicity in visual presentation, added to the success of squash and stretch motion. As Johnston and Thomas remarked: ‘…We found that many little interior lines were not necessary.’ [1]

In contrast, Kerlow asserts that three-dimensional squash and stretch can be implemented with a variety of techniques: skin and muscle, springs, direct mesh manipulation and morphing. He adds that it can also be implemented in more experimental ways with weighting, especially for dynamics simulations, and special-purpose rigging systems. Kerlow places emphasis on the technicalities of creating squash and stretch motion, but not on the emotional and expressive qualities of this type of animation. He also fails to say anything about the potential problems of this technique in 3D computer animation (for example achieving the correct balance of distortion when using photorealistic models, or seeking a sense of life). [3]

**Principle 2 of the 12 Disney Principles: Anticipation**

Lasseter has emphasized that character design and movement, must be driven by the
thinking processes of the character. This was also Disney’s view. With anticipation (where action is staged ahead of time, so as not to be missed) the eyes or the head lead. The eyes and the face or head can therefore have special significance in the careful timing of motion.

**Principle 3 of the 12 Disney Principles: Staging**

Simplicity in the staging of both action and character not only strengthened character expression (as it does in other art forms like theatre) but also proved to be essential. The creation of two-dimensional character animation presents a very great challenge. Both hand-drawing and the cinematic screen are flat, and the visual representation of fantasy characters has to be very clear for the audience to be able to suspend their disbelief. As Thomas and Johnston put it:

‘Everything is out in the open where it can be seen; nothing is confused or tangled up in lines or shapes.’ Simplicity of message and visuals is important…we learned that it is always better to show the action in silhouette. Chaplin maintained that if an actor knew his emotion thoroughly, he could show it in silhouette. ..Constant redrawing, planning, and experimenting were required to make the action look natural and realistic while keeping a clear silhouette image. We had to find a pose that read with both definition and appeal.’

Kerlow alternately refers to the principle of Staging as being helped by certain contemporary cinematic techniques such as slow motion, fast-forward and looped motion, frozen time, and hand-held camera moves. Many of these techniques relate to software editing techniques and therefore the timing of visuals. But a technique like frozen time is more special effect, than general principle. His comments do however emphasise the dominance of computer software techniques (digital editing and digital camera techniques – simulating live-action film) and the merging of live-action film (post-production) processes with digital animation processes.

**Principle 4 of the 12 Disney Principles: Straight Ahead Action and Pose to Pose**

This Disney principle perhaps highlights most strongly the importance of intuition in crafting animation characters and action. Certain scenes require action that is simply too
complex to plan out and visualize perfectly in advance. Certain character scenes require a more experimental, experiential and sensory approach. Solutions can be part intuited and later reworked to perfect composition and form etc. Additionally, variety in emotional expression and communication is important and even natural. If everything is planned out very carefully it becomes too uniform. Ideally there will be a balance. As Thomas and Johnston state:

‘With Pose to Pose, there is clarity and strength. In straight Ahead Action, there is spontaneity…the animator literally works straight ahead from his first drawing in the scene. He simply takes off, doing one drawing after the other, getting new ideas as he goes along, until he reaches the end of the scene…A series of actions all with the same intensity and amount of movement will quickly become tedious and predictable. … But if the overall pattern contains accents and surprises, contrasts of smooth-flowing actions with short, jerky moves, and unexpected timing, the whole thing becomes a delight to watch. Obviously, this is impossible to attain with Straight Ahead Action. ‘

Digital animation has changed the process of devising character action. Planning is even more critical because of the complexity of the technical process. However, intuitive processes are equally important, not only for creativity but to counteract the inorganic, impersonal and even un-natural processes of digital animation and the mechanical results.

The original technique of building character action using key poses via the pose-to-pose technique has largely changed in digital animation to the hierarchical layer based system for building character action. Fewer key (extreme) poses are used and therefore more importance is given to inbetweens with the motion built up piece by piece (e.g. first the head, then torso, next the arms etc). The difficulty of controlling computer generated inbetweens generated makes this necessary. As Lasseter states: ‘The action must be well thought out, the timing and poses planned so that even in the early layers, the poses and actions are clear.’

Kerlow likens the original Disney process Straight Ahead Action to the newer processes of motion capture, dynamics simulations, and three-dimensional rotoscoping. But this negates the creative element of this animation process, as creative control is chiefly
given over to the actor and their live-action performance – and the animator becomes merely passive recipient – there to achieve a technical blend.

He states that ‘straight-ahead motion’ can be blended with pose-to-pose motion through the use of animation channels. However, the three techniques Kerlow suggests would require additional animation to achieve satisfactory movement and creativity would still be best realised using free-form sketching, collaborative discussion, experimentation etc.

**Principle 5 of the 12 Disney Principles: Follow Through and Overlapping Action**

Three-dimensionality (or rather the simulation of it in animation software) is sometimes discussed as if it were the magical ingredient in digital animation that creates character realism and/ or added expression and drama. However, one element that seems to be consistently important in animation is a character’s relation to gravity – which does not necessarily bare any relation to its three-dimensionality. The principle of *Follow Through and Overlapping Action* signifies the importance of gravity and its effects on form, for creating a feeling of life. Johnston and Thomas assert:

‘The loose flesh on a figure, such as its cheeks or Donald Duck’s body or almost all of Goofy, will move at a slower speed than the skeletal parts. This trailing behind in an action is sometimes called “drag,” and it gives a looseness and a solidity to the figure that is vital to the feeling of life.’

Physical dynamics can have emotional resonances, and so the following quote from Johnston and Thomas illustrates the dramatic potential of follow through and overlapping action:

‘... The way in which an action is completed often tells us more about the person than the drawings of the movement itself. …we come to the “punch line” of the gag, the follow through, which tells us what happened-how it all turned out. Obviously, the ending should be considered part of the entire action before any drawings are made, but, amazingly, the ending was hardly ever developed in early animation.’
In Kerlow’s book on digital animation Pg. 307, he states that ‘In three-dimensional computer animation a lot of the common follow-through motions of clothing and hair, for example, can be animated with dynamics simulations. ‘Again, if naturalism is purely the goal, the task can be given over to the computer. However, as Lasseter and Disney point out, the technique was also used to impose added interest. The personalisation that an animator concentrating on a particular character might add with this technique would make the computer arguably less surprising in its visualisation.

**Principle 6 of the 12 Disney Principles: Slow In and Out**

In hand-drawn animation animators found that by grouping the inbetweens closer to each extreme (keyframe), with only fleeting drawing halfway between, they could achieve a very spirited result, with the character zipping from one attitude to another. Slow In and Out simply refers to the timing of the inbetweens. However, in most 3D keyframe computer animation systems, the inbetweening is done automatically using spline interpolation. Nevertheless as Lasseter states Slow In and Slow Out is also achieved in CG animation by adjusting the tension, direction or bias, and continuity of the splines.

**Principle 7 of the 12 Disney Principles: Arcs**

Creating movement arcs was critical to portraying life-like characters – as nature does not move in straight lines. This was nevertheless a constant challenge for the Disney animators to visualize and achieve.

As Johnston and Thomas state: ‘One of the major problems for the inbetweeners is that it is much more difficult to make a drawing on an arc than one halfway between two other drawings…No one has ever found a way of insuring that the drawings will all be placed accurately on the arcs, even when experienced people are inbetweening the action, and it is one of the most basic requirements for the scene. Drawings made as straight inbetweens completely kill the essence of the action.’

Kerlow states: ‘In three-dimensional computer animation we can use software constraints to force all or some of the motion within arcs. Motion-captured
performances can also be fine-tuned with curve editors, as long as the motion is not flattened. ‘ Kerlow is clearly of the opinion, that 3-D animation simplifies this process.

**Principle 8 of the 12 Disney Principles: Secondary Action**

Lasseter supports the view of Thomas and Johnston here. In explaining secondary action as action that results directly from another action, he claims it is important in heightening interest as well as naturalism. (Total realism is not in his opinion the goal, but character and story credibility.)

Kerlow points out that in three-dimensional computer animation one can take advantage of layers and channels for building up different secondary motions, for example, a layer for hair, a layer for the character’s hat etc. This may be so, but it is not significant enough to be a principle - more like a comment on the principle.

**Principle 9 of the 12 Disney Principles: Timing**

The principle of timing proved critical not only to the depiction of natural movement, but to describing the whole emotional tone of movement and character. As Johnston and Thomas describe:

‘…the personalities that were developing were defined more by their movements than their appearance, and the varying speed of those movements determined whether the character was lethargic, excited, nervous, relaxed. Neither acting nor attitude could be portrayed without paying very close attention to Timing…even the most basic moves showed the importance of Timing and the constant need for more study. ..’

It is difficult to imagine how the automated process of digital in-betweens could achieve satisfactory results without considerable tweaking to fill out character and emotion. Thomas and Johnston gave several examples of the effect subtle differences in timing could have:

According to Lasseter, timing is inextricably linked to weight and mass. Lasseter says that ‘the computer gives the ability to create images that look absolutely real…you can
make an object look just like it’s made of marble or rubber…But to make it look like marble or rubber when it is in motion, has very little to do with the way the object is rendered. …It is animation that gives an object its physical properties. More than anything else, the timing of the movement of an object defines the weight of that object.’ This he states depends mostly ‘on the spacing of the poses and less on the poses themselves.’

Another point Lasseter raised, is that in traditional animation, it is common to animate an action, then slow into a pose and hold the drawing of that pose for several frames, then move into action again. …But in 3-D computer animation, as soon as you go into a held pose, the action dies immediately…It must be the combination of the dimensional, realistic look and the smooth motion (usually on ‘ones’) that makes a hold cause the motion to die. The eye picks it up immediately, it begins to look like robotic motion. To combat this, use a ‘moving hold,’ Instead of having every part of the character stop, have some part continue to move slightly in the same direction, like an arm, a head, or even have the whole body. ‘

This is a good example of how action needs to be approached differently using digital software. And of the more exacting nature of computer animation.

Principle 10 of the 12 Disney Principles: Exaggeration

One of the fallacies about the Disney style is the belief that Disney artists were principally interested in depicting realism. It is true that Disney wished to push the art form to a high level, akin to live-action film, and that they achieved a high level of naturalism in character movement, but Disney never let realism get in the way of expression. Thomas and Johnston stated that:

‘When Walt asked for realism, he wanted a caricature of realism …Every so often the character would do something unconvincing, it was phony. “Walt would not accept anything that destroyed believability, but he seldom asked an animator to tame down an action if the idea was right for the scene.’
In three-dimensional computer animation Kerlow points out that one can use procedural techniques, motion ranges, and scripts to exaggerate motion. And that exaggeration can also be applied to the cinematography and editing, not just the performance. Certainly, with the production of animation on computer, many of the techniques incorporated into digital animation will come from digital film – such as digital editing and digital cinematography. There is greater blurring of disciplines, particularly when less orthodox styles are employed, like motion capture.

Lasseter reiterated here many of the original points recorded by Thomas and Johnston. He states that exaggeration can work with any component (design of scene, shape of object, action, emotion, colour or sound), but not in isolation. Neither should everything be exaggerated; something should remain natural to maintain the overall illusion of naturalism and therefore believability. He says ‘If just one thing is exaggerated in an otherwise lifelike scene, it will stick out and seem unrealistic.’ In using the example of Luxor Jr. he says: ‘The movement had the sense of natural physics, yet almost every motion and action was exaggerated to accentuate it: when Jr. he hit the ball, he really whacked it. When he jumped up for a hop, his whole body movement was exaggerated to give the feeling of realistic weight to his base…On the soundtrack, the lamp sounds were recorded from a real Luxo lamp, then exaggerated sounds were added to accent certain actions. The ironic effect of all this exaggeration was to make he film more realistic, while making it entertaining.’

From this quote we can see that too literal an approach to character design is not best, but that any stylisation in movement (using digital tools) must be devised with consideration and a strong feeling for the whole action.

**Principle 11 of the 12 Disney Principles: Solid Drawing**

In traditional Disney animation, a high-level of draughtsmanship is expected, however, there are additional skills in the presentation of 2D drawings for animated film. One of these is the avoidance of twins. A certain amount of asymmetry in the human form is natural, but in animation it also helps create greater interest and much needed clarity. In Thomas and Johnston’s words:
‘Another sign admonished us to watch out for “twins” in our drawings. This is the unfortunate situation where both arms or both legs are not only parallel but doing exactly the same thing. ..If you get into acting, you would never think of expressing an emotion with twins anywhere, but, somehow, in a drawing, if you’re not thinking, it creeps in time and again.”
(This is an example where it pays to observe body language, enact a scene, or observe others enacting a scene.) According to Thomas and Johnston this rule was applied to the composition of all character movement and posing. p.67:

‘Character looks more natural simply because each part of the body varies in some way from the corresponding opposite part. ‘ For example eyes are revealed in perspective and fingers that vary give the hands a more dynamic look. Contrasts in form and shape makes an active type of balance. For example, one side can be straight while the other bellies out with the relaxed weight, Thomas and Johnston refer to these forms as “plastic” as opposed to “static.” Lasseter supported this view.

Kerlow’s assessment is almost in direct opposition to them. He states that good three-dimensional modelling, with the help of lighting and good cinematography, helps to convey the weight, depth, and balance of a character. However both Lasseter and the Disney artists felt weight and mass were best described through movement, and specifically the unique timing of a particular movement.

Another view of Kerlow’s is that the digital camera (rather than the animator’s pencil or pen) aids in the presentation of character silhouettes, helping to delineate the pose and intention. Drawing is certainly less important in computer animation than in traditional animation. Kerlow then goes on to say that animation rigs that are optimized for a specific type of motion help reveal the personality of the character. This may be so, but at risk of stating the obvious, the technology is a supportive tool by which creative ideas are realised, and don’t in themselves create character personality.

Another problem that computer technology has is the complexity of image produced. The solid Drawing principle strove for simplicity of visual communication: simplicity equalling strength.
Principle 12 of the 12 Disney Principles: Appeal

The principle of Appeal in design has been discussed in the previous chapter, such is its importance to avoidance of the Uncanny in human simulation.

The Disney chapter on principles from Thomas and Johnston’s book *The Illusion of Life*, is by necessity brief and to the point. However, the book in its entirety answers more adequately the complex issue of appeal in design.

In the visual arts it can include things that are pleasing to the senses (e.g. harmonious colours, shapes and curved movements), however it can also include the powerful expression of feelings – negative as well as positive; feelings clearly represented (as in more naturalistic human simulation) or abstracted through visual symbolism.

Appeal can also be reflective (a point explored in part in the previous chapter), as much about the ideas a character or dramatisation represent as the thing itself. In computer animation, to certain audiences high-tech special effects are appealing, not only because of the visual novelty they may present, but because we are aware of the complex technology behind such effects, and as fans we can perhaps imagine ourselves as forward thinking or technically savvy. But effects tend to have a shelf life, which is why we hope for enduring quality in character and story execution. Evaluation can be challenging but is still important.

In discussing appeal Lasseter uses the example of *Luxo Jr.* and the relationship of the father and son lamp, depicted with adult and childlike proportions respectively. The relationship is both clear and endearing, and the fact that they are anthropomorphised objects rather than humans adds further to their appeal. (We are charmed by this indirection along with the quality of animation.) Another point Lasseter states strongly and repeatedly, is the necessity to once again avoid twins in behaviour and action. He says: ‘In ‘*The Adventures of Andre and Wally B*, the poses and action (in the scene where he wakes up and yawns) are not duplicated from one side of his body to the other. His feet rotate with a slight difference, the head rotates to the side, the upper part of his body rotates to the right and tilts, which raises his right arm higher than his left...’
Lasseter feels appeal is not a principle as such, but rather the intelligent application of all the principles.

He stresses the need for characters and the story to become more important and apparent than the technique that went into the animation. This is regardless of whether characters are drawn by hand or computer. Character is supreme, and no two characters should be alike. He concludes by saying: ‘The animator must have two things: a clear concept of exactly what will entertain the audience; and the tools and skills to put those ideas across clearly and unambiguously. Tools, in the sense of hardware and software are simply not enough. The principles discussed in this paper...are tools as well...tools which are just as important as the computers we work with.’

We are left in no doubt that Lasseter believes digital character animation conforms to the same principles of hand-drawn animation – but with some altered processes and particular limitations.

**Kerlow’s Additional Principles:**

Within his book, Kerlow provides an additional six principles of his own. Kerlow’s justification for including more is that the traditional twelve principles were put together in the 1930s. Animation techniques and styles have changed tremendously since then. In the 1930s the dominant style was hand-drawn animation but today Kerlow notes, many styles coexist in animated feature movies, independent shorts, non-linear interactive games and non-narrative music videos. Kerlow also remarks on a cultural shift in audience taste as certain styles that were once thought inferior can gain credibility. This has happened with what is now referred to as _Limited Animation_.

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Additional Principles:

- Limited Animation
- Cinematography and Editing
- Facial Animation
- Visual Styling
- Blend Motion
- User-Controlled Animation

Kerlow’s New Principle (13): Limited Animation

Kerlow’s reason for the inclusion of this animation principle is that Limited Animation is both prevalent (on US TV and in the influential Japanese anime) and distinct enough to be worthy of separate discussion. As he says: ‘Initially developed as a clever creative style to address restricted resources, limited animation was for a long time considered a lesser style incapable of delivering fluent motion. But throughout the decades limited animation developed into an expressive form with an extensive formal repertoire. ‘

It is true that the heavy stylisation often seen, runs counter to classic Disney naturalism, but the divisions between Disney and say the Warner Studio are not as clear cut as Kerlow might think. Certain styles or techniques used by say Japanese Anime or Warner cartoons could be covered by the principle Exaggeration. But whether or not it should have separate reference, Kerlow has little insights to share.

Kerlow’s New Principle (14): Cinematography and Editing

A point previously mentioned by Kerlow, is that animation is now strongly influenced by digital live-action film because it borrows many of the same techniques. However, he claims later in his book, that the computer is only just beginning to be designed to imitate the camera lens – though this is likely to be a continuing trend. It is interesting that the quality often most appreciated in film cinematography is the distinct visual signatures brought about by its very limitations – i.e. lens flare, soft focus and other distortions. These lend different emotional qualities to a visual narrative.

Kerlow’s New Principle (15): Facial Animation

Kerlow states here that: “Three-dimensional computer animation offers more facial animation controls than any other animation technique, including very subtle motions
of eyeballs, eyelids and small muscles.’ Kerlow advocates the use of Dr. Paul Eckman’s Facial Analysis and Coding system in the design of facial animation. He stresses the importance of building expression profiles, correlating intensity (and speed) of expression to intensity (and speed of emotions). He also discusses Ekman’s discovery of microexpressions (which occur at 1/25th of a second typically) related to concealed emotions. He discusses all the different routes to designing facial expression: muscle systems, bones, motion capture, morph targets or blend shapes. (Pulling vertices in the geometry, by using bones, or by using simulated muscles that control both the way the skin moves and the facial expression: can sculpt blend shapes, he states.) Finally he concludes that expression must be suited to the character’s situation and performance needs.

Ideally an animator would use Eckman’s analysis as a support when needed, internalising it so that she or he can work intuitively but with more accuracy and confidence. This would avoid a kind of paint by numbers approach to character design while allowing Eckman’s insights to sometimes inform animation work.

**Kerlow’s New Principle (16): Visual Styling –**

Kerlow’s case for including the subject of visual styling, is that it is now possible to create many different looks, while still producing films on an industrial scale. Whether the computer always achieves its promise of visual variety some would debate. However, it is the current ambition (certainly within Pixar). Software has been produced to simulate organic materials like clay and watercolour – but does this best represent a creative use of new tools? Imitation is part of art, but it usually has to be intelligently or creatively applied. Kerlow has no detailed information to share on this subject, however it is certainly the primary ambition of some industry leaders and therefore an interesting point to consider.

**Kerlow’s New Principle (17): Blend Motion**

Kerlow states here that: ‘Good computer animation must have consistency of motion, but combining different styles of motion can also enrich it. It is possible today to easily blend motion from different sources, and combine multiple animation techniques.
on a single motion, I believe Kerlow is referring to the blending of digital techniques like motion capture with more standard animation. This principle seems to serve better as a subset of *Visual Styling*.

**Kerlow’s New Principle (18): User-Controlled Animation**

This final principle relates to games, which because of its considerable audience may in some ways be influential to mainstream animation. Kerlow claims that: ‘Games are a combination of user-controlled animation and present/narrative animation. ..User-controlled animation relies on strong animation cycles with built-in anticipation that are able to branch smoothly into reaction shots…’ However the design goals in games differ greatly to traditional and current animation and therefore there is an inherent contradiction in including the above principle.

Kerlow’s views seem to represent how far technology (and the technologically minded) diverts from artistic concerns. His ideas read more like a list of functional options available within animation software tacked on to the briefest summary of the original 12 Disney. There may be creativity in the array of technical choices, but this is not the same as artistic creativity. I feel these two types of innovation are often confused.

**Chapter Conclusion**

The Disney principles have proved to be an enduring guide within education and industry.

Lasseter is steadfast in his belief of the continuing value of Disney principles – feeling a lack of adherence to them results in ‘unnatural’ animation. He feels this is especially so when the technique motion-capture is used as an end in itself – because of the additional mismatch of styles between live-action realism and cartoon animation. Heavy exploitation of motion capture seems to make the characterisation ironically *less* real, i.e. in films like *The Polar Express* (2004). If we consider Lasseter’s views, then ignoring the animation principles will likely produce the *Uncanny* response, along with over-reliance on motion capture.
Disney animators, when reflecting on their art, considered simplification in character, form and action, strengthened dramatic emphasis. This is most obviously indicated by animators’ use of the silhouette – discussed within the third principle Staging. Simplification is not an obvious quality of digital animation – making staging more difficult, as well as anticipation etc. There is simply too much richness for the eye to take in easily, in fully photo-realistic scenes. This can diffuse emotion, rather than build emotion. The complexity of image is a problem, requiring a real feel for the medium beyond just the technique.

According to both Lasseter and Disney, character design and movement must be driven by the character’s internal life: the character’s thinking process and emotions. This is particularly indicated in the eyes, but also the face and whole body gesture – which is why the study of body language is important. In digital animation, facial animation is often more limited, as sticking to the photo-realistic aesthetic can make generous squash and stretch seem contrived. Too naturalistic an approach to facial animation also limits creativity and provokes the Uncanny. Kerlow is therefore in my view wrong when he states that facial animation should be a key principle - reflecting the greater subtlety of facial movement available with digital tools. He certainly flags the importance of greater awareness, in the light of both its new emphasis and the problems connected to it.

It is a misnomer that the Disney studios desired realism above all else, when the characters were a caricature of reality – not true reality. Indeed, exaggeration was included in the key principles, as they discovered that too close an adherence to reality created lifeless animation.

The importance of three-dimensionality (as in the technique of 3-D film) tends to be overstated. The impression of life according to Lasseter and Disney, is created by the rhythm of the character’s movement, rather than their appearance or pose. Rhythmic movement, and the emotional tone of rhythmic movement, were considered most significant for appealing characterisation.

Lasseter felt that appeal was the summation of all the principles ‘intelligently applied’ – but even this description in his 1987 lecture is somewhat reductive and misleading.
Appeal is the gestalt, the concentration of animation craft. It is therefore the principle that is most elusive, complex and difficult to describe, but ultimately the most important. Gestalt is therefore not about technique but about art making in its highest sense. It is the right balance or unity of all principles and techniques, where the summation of the parts comes to more than the whole. Where there is a feeling of rightness in the unique choices that make up a piece of classic/qualitative animation.

In order for art to communicate powerfully, it has to be a personal, authentic communication, rather than simply a formula to entertain an audience. Any principles, however good, cannot provide a blueprint for personal expression. Character appeal is often expressed through distinctiveness. Originality of character is best developed through an instinctive process and an animator who has developed their own idiosyncratic style. It cannot be developed merely through systems, techniques or formula.

Audience tastes have changed considerably since the origins of animation. Most animation is targeted to mainstream family audiences, with only a minority of films aimed at a more niche art-house audience. Ed Catmull, president of Pixar, has often described the managing of the Pixar Company as a battle between art and commerce (where neither side must win). Mainstream audiences do not look to be challenged and are therefore more passive in their appreciation. The business of animation requires that risk be minimised which impacts on creativity. Film entertainment (and entertainment in general) is consequently more standardised and less diverse. A sizeable proportion of techno enthusiasts (often young and male) also now make up animation audiences. Such audiences impact on the films that have been and will be made. But however audiences have or will change their basic emotional nature remains and the instinctive animal response can never be completely sidestepped. Therefore close observation of body language remains essential to the craft. Indirection in communication likewise remains seductive, persuasive and appealing to us and stylised and imaginative modes of communication expand creative possibilities and expressions.
The process of animation needs to allow for experimentation. This is described well in the principle of *Pose to Pose* and *Straight Ahead Action*. Without the spontaneity in process of ‘*Straight Ahead Action*’, characters themselves lack spontaneity and life. Such characters appear ‘programmed’ lacking the inherent unpredictable rhythms of real people/animals.

Artists also need to experiment in order to come up with new ideas and expressions that are authentic – or they risk repeating themselves.

The training for producers of animation is now a complex task, as the goals of technologists and artists differ considerably. Technology seems to lead the art rather too often. This is because digital tools present challenges to the already exacting craft of animation.

Another problem that arises from digital tools, are the unnatural strangeness of digital forms, surface appearances and environments. The photo-realistic visuals lack the subtle imperfections and nuance of real life – be it in colour, texture, dimensionality, emotional tone and movement. And manipulating the geometry and photometry etc. of digital data is a real challenge – each new context (like creating a natural smile or the appearance of human hair) can require extensive attention. In this sense the objective reality of the computer is a myth. The computer however, gives us a kind of mathematical perfection that leaves us cold and has to be extensively re-worked.

Digital tools seem to have exacerbated the Uncanny response to human simulation in animation.
Figure [1] An example of the Rotoscope technique, film still from *Waking Life* (2001) Dir: R Linklater, but pushed beyond reality into exaggerated fantasy.


The hero – retiree Carl is lifted up metaphorically and literally – when he is forced to leave his home. Carl is squarish in appearance to symbolize his containment within his house – and to avoid any *Uncanny* realism.


Another example of *exaggeration*, Gondry creates a webspace and imagines all the ‘hits’ he and other people might get.

Examples of EXAGGERATION Principle
Figure [4] An example of the Staging Principle: *Rango* (2011) Dir: Gore Verbinsky, The anthropomorphic lead character fails spectacularly here to ‘blend in’: wearing a loud Hawaiian shirt, standing alone, his body echoing the strong vertical of the cactus against the blank, featureless sky. Such staging succeeds in raising the audiences’ anticipation and amusement.

Asymmetry is most obvious in Rango’s head and neck (based on the literary illustrations of the character Raoul Duke in Fear and Loathing in Las Vegas) but is also subtly shown in the face of Rango’s love interest Beans and also in their personality contrasts.

Figure [5] Rango and Beans: the lizard hero and heroine of the film

This provides an example of Principle: Solid Drawing – Avoiding Twins (aiming for asymmetry in appearance, and/ or pose) to create tension, interest or action etc.

Left is an example of the Principle Squash and Stretch

Figure [6] Helen Parr aka *Elastigirl*, does the hoovering with Bob Parr assisting. Film still from *The Incredibles* 2004
Figure [7] This demonstrates the Disney Principle *Squash & Stretch*. It is named *The Disney Flour Sack Exercise* - a simplified learning platform for understanding deformations in movement and inherent limitations. Imparting of character, personality and emotions were a secondary part of the exercise. Published in *The Illusion of Life: Disney Animation* (1981), Thomas & Johnston.
Chapter 4: Cultural influences on animation art:

principally live performance, still photography and live-action film

This chapter discusses key technical and cultural developments that led to the genesis of computer animation. It explores the following territories:

- The influence of live performance on animation
- Comparing live performance to live-action film and animated film
- The influence of still photography: on animation, the arts, mainstream culture
- The development of live-action film (as comparative model and influence)
- Changing cultural norms
- Key theory on animation:
  - Jayne Pilling on: perception and reception of animation
  - Paul Wells’s on: the potential of the genre, and the influence of Performance on animation and animation theory
  - Lev Manovich on the impact of technology on computer animation

The influence of live performance on animation

Body language is far more critical in conveying emotional narrative and characterisation in theatre than it is in live-action film. Understanding and conveying body language is also critical to the success of character animation. This is a key reason for examining performance theory and establishing the extent of influence live performance plays on computer animation.

The influence of performance on the early days of animation is great. Films like Gertie the Dinosaur (1914)[1] included live stage interaction. Melies’s special effects films were often re-inventions of stage shows [2].
The hugely successful cartoon *Felix the Cat* of 1919 [3] was, according to the staff at the Sullivan studios, based on an animated version of the stage and screen actor Charlie Chaplin, created for the studio by the lead animator Otto Messemer.

The animated series *Out of the Inkwell* produced by Max Fleischer from 1918 to 1929 [4], featured a clown modelled by Fleischer’s brother, – a working clown at the nearby Coney Island resort. Fleischer also used his invention the Rotoscope, a device that enabled one to trace over live-action film performance, to achieve highly realistic animated movement. Fleischer was unusual in the way he created screen characters based on humans rather than anthropomorphic animals. Other characters in the studios repertoire include: Betty Boop, Popeye and Superman. The character Betty Boop was based on another live performer: the singer Helen Kane and ‘flapper’ girls in general. [5]

The early technique of rotoscope – and the later technique of motion capture, as well as Director Gore Verbinsky’s use of ‘emotion capture’ – have an obvious link with live performance.

Disney’s first huge hit was the sound film *Steamboat Willie* [6], which was a parody of the silent movie comic Buster Keaton’s *Steamboat Bill Jr.*, also released in 1928. [7]

Many silent screen actors had been vaudeville acts prior to their movies and had perfected the art of slapstick and physical or visual humour. Silent movies emphasized pantomime gesture and action in a way that the talkies never could. As the silent film star Clara Bow stated: "I hate talkies", "they're stiff and limiting. You lose a lot of your cuteness, because there's no chance for action, and action is the most important thing to me". Golbeck, (1930). [8]

Emphatic body language and exaggerated facial expression, is clearly more a feature in both live performance and silent film.

Silent movie acting was extremely influential to animated cartoons. Physical slapstick, chase scenes, visual puns and exaggerated expression, are most obviously evident in the Warner cartoons, the MGM cartoons of Tex Avery and the Tom and Jerry cartoons of Hanna and Barbera. [9]
Even contemporary animation directors can be influenced by silent movie performances. For example, Andrew Staunton reportedly played Buster Keaton films daily while working on the Pixar film *Wall-E* (2008), [10] He allegedly wished to discover how much a silent character could express and carry a film.

Another contemporary example includes the French/Canadian film The Illusionist of 2010, loosely based on the French stage and film comic Jacques Tati. [11]

Vaudeville or Variety performance - as it was also known, was a hugely popular entertainment throughout the Western world from late 1880s to the early 1930s. Vaudeville was extremely varied, including: circus performance, song and dance, magic, mime, puppetry, striptease, freak show, scenes from plays or one-act plays and Wild West shows – designed to appeal to a working class and later more middle-class mixed family audience.

It therefore could include both classical repertoire and popular entertainment. It was this rich mix that would directly or indirectly influence both film actors and future animation directors. The commercial success of film and later sound film and the great economic depression, would make the culture of Vaudeville recede but its influence was already visible within film culture.

**Comparing live performance to live-action film and animated film**

Early animated film showed a rich diversity of style: from stop-motion effects, early claymation like Segundo de Chomon’s Sculpture moderne in 1908, to drawn cartoon animation in both surrealist, comic-strip and naturalistic style, and techniques that exploited the human figure directly (like pixilation and rotoscope).

However, the most popular type of film was live-action film, requiring less expertise and labour and inevitably less visual creativity. A taste for real life documentation provided a visual rationale for an increasingly complex age. Modern society was now able to see itself reflected and the world around it – in ways unprecedented before: both its public and its private face.
Film eclipsed stage performance as mass entertainment, because of its novelty and the ease of reproduction. American film culture came to dominate, compared to the arguably more innovative European film culture.

Nevertheless, the lack of dialogue in early silent films forced filmmakers to develop a sophisticated visual language. Spoken language inevitably adds a layer of complexity that masks subtleties of visual language. Spoken language can also interfere with our intuitive responses. This is so for both filmmakers and film audiences. Spoken language with its accompanying social conventions can make people less perceptive in reading emotional cues as displayed in body posture and movement.

There are clear cultural differences between the reception of traditional staged performance and live-action film. Film is more immediately accessible in its communication mode and therefore film audiences are generally more passive in their interpretation of character and narrative. The realism in live-action film appeals to a modern, more scientific age. But it has little of the richness of register that animation or theatrical performance have.

Theatre audiences play a more active role in shaping their experience. Stage performers highlight the interactive nature of theatre when they talk of ‘playing off the audience’; timing and emotional emphasis can be subtly different every show and heckling and audience interaction is sometimes integral to the show. Theatre is generally more abstract in its depiction of character and narrative (e.g. it lacks the abilities of a camera - to move in close and study facial expression, or take you to any geographic location and capture its infinite details).

The art form is restricted in its characterisation to what a performer can do in real time and space, or to what they can simulate through puppetry or stage tricks. For these reasons the Uncanny Valley phenomena is of little concern.

The introduction of other entertainment forms (like computer games, motion capture film, or 3D animation,) marks a further change in audience response. Games characterisation also incorporates interactive elements – but this usually means choosing from a range of pre-defined options. Giving more control over performance
to players rather than animators highlights the combative elements or cognitive challenge of games entertainment and undermines the visual artist’s role. Movement in games (whether due to ideological differences or technical differences) is generally less subtle and nuanced. It also is distinctly masculine in tone, with its emphasis on fighting or car chases etc.

**The influence of still photography on animation**

Photographic images have become the most common type of figurative reproduction today. They therefore influence our perception of the human form: its expression and action. Photography is also an influence to (and is influenced by) live-action film.

The Uncanny Valley phenomenon has also been analysed in photographic portraiture: employing editing software, in select research projects (involving both children, adults and even primates). With new software, it is now possible to not only create highly detailed portraits, but to distort the human form by small or large degrees, resulting in various outcomes for the viewer. The Uncanny Valley can therefore be induced through photographic distortion. Paradoxically, carefully employed distortion can also transform an ordinary record into a work of art. The static nature of photography makes human representation undoubtedly less problematic than human performance in highly realistic 3-D animated film.

Photography is a popular, still form of visual communication, involving imaginative invention, derived from life. It therefore has relevance and value to animation. Additionally, its relevance has been highlighted recently by animation studios, eager to imitate with software, the distortions of certain camera lenses, or photographic lighting etc.

The development of the still camera brought with it a new way of seeing and a new aesthetic. We can observe this as far back as Renaissance art – with the introduction of the camera obscura and the growing knowledge of perspective revealed in Renaissance painting. Later, in the twentieth century, Muybridge’s photographic motion studies attracted audiences of both scientists and artists, eager to experience or explore the new technique. By the twentieth century the photographic image was ubiquitous and public
showed no waning of interest. (Whether for images of the celebrities of the day, pushed into prominence by the newspaper men, or images of exotic people and places as in the National Geographic magazine –its editorial led by its photographic reportage, not its copy.) The realism of photographic art spoke to a more taboo-busting, politically strident, scientific age.

In its nascence photographic documentation was restorative to the fine arts, which was often stuck within the confined space of the studio and static still-life studies or artificial classical re-inactions. Photography brought the movement of modern life to art: by representation of urban as well as rural life, work and play, and the poorer classes along with ‘the great and the good’. Several artists used photography to inform their work: Delacroix, Lautrec, Degas and Gauguin to name a few. It caused both a social and artistic revolution.

Artistic scope was increased as cameras became more powerful, and because of their extraordinary adaptability to various environments and situations (e.g. night photography, infrared photography, under water photography, aerial photography, microscopic photography, the moving shot, freeze-frame etc.).

Whilst the world was quickly enamoured with the invention of photography, it still took time for the art form to develop its own distinct aesthetic. Photography seemed to follow three distinct directions: 1) a naturalistic approach, 2) a documentary approach, and 3) a fine art approach. However, the majority of photographic production was used for commercial purposes which were numerous and extensive.

Many early photographers sought a consciously naturalistic approach in their work. P.H. Emerson in his book Naturalistic Photography 1890 proposed that the human eye focuses only on the subject of its attention and everything else remains soft and out of focus. [12] He felt this effect should be mimicked in photography to preserve the aesthetic of mystery and naturalism. Alfred Stieglitz was another photographer who rebelled against ‘salon’ photography. Other photographers like the f/64 group took portraits with plenty of close-up detail, devoid of artifice.
By contrast, many photographic images are now altered considerably using graphic software like Adobe Photoshop. The human figure in fashion and advertising is routinely airbrushed free of blemishes, rouged, nipped in or elongated to achieve certain currently desirable proportions and looks. This creates a certain youthful, ethnically homogenous, and often artificial ideal. The general public are not always aware of the extent of artifice that goes into these human representations. These exaggerated portraits could be said to signify a new cultural normalcy.

Photographic art takes its inspiration directly from life; however, many artists have used the genre to explore different visual styles and expressions: from the painterly, to the surreal, and the abstract.

The photographer Julia Margaret Cameron (1815-1879) blurred her images to achieve a painterly softness of line, creating remarkably powerful soft-focus portraits of her celebrated friends. She aimed to capture qualities of: innocence, virtue, wisdom, or passion that made them modern embodiments of classical, religious, and literary figures. Her original aspirations were, "to secure for it the character and uses of high art by combining the real and the ideal.” [13] To Julia Cameron, it was better to capture spirit in her portraits than photographic perfection.

Other artists like Moholy-Nagy at the Bauhaus, were interested in a broad photographic aesthetic. Moholy-Nagy experimented with photomontage (as did the Dadaists) and photogram. To Moholy-Nagy a broad visual palette was important to an artist interested in abstraction and innovation. In the twentieth century the exponents of surrealism in France and of futurism in Italy, all explored the medium of photography. Clearly photographers and fine artists inspired and imitated each other in equal measure.

Another portrait photographer with a strongly idiosyncratic style was Philippe Halsman. Halsman started his career taking action shots of popular comedians in the 20s. He would often capture them mid-air and this encouraged him to make other jump pictures of celebrities such as Richard Nixon and the Ford Family. Halsman’s actual intention behind his jump photos was to capture more truly the personality of the subject. He believed that when they were engaged in jumping their psychological
defences – or facial mask - fell away.

Halsman’s views show that he considered the action, behaviour or performance of the photographic subject all-important. The photographer’s goal was to capture that truth. But to Halsman, this was best achieved with the figure (or subject) in dynamic, heightened movement. Whilst contrived, it lent the portrait greater vibrancy. We can see this exaggerated movement in his famous portrait *Dali Atomicus* (1948). [14] His use of suspended motion, here and elsewhere, adds intrigue.

After the II World War, museums and art schools opened their doors to photography. Many new photographers felt little inhibition against handwork, collage, multiple images and other forms that were an anathema to practitioners of the straight aesthetic. Prejudice between different photographic approaches largely disappeared and a broad aesthetic was embraced.

In the contemporary world the practical applications of the photographic medium are legion, which is why it has become such a dominant artistic medium. It is an important tool in: education, medicine, anthropology, commerce, criminology, and the military. New techniques such as holography, a means of creating a three–dimensional image in space, continue to expand the medium’s technological and creative horizons.

The development of the media has been due to the continual cat and mouse game between technological and artistic concerns and progress.

Photography proved to be an enduring, sophisticated art form. It enabled us to view the un-viewable: capture the ephemeral, the unusual, the impossible and shocking. It allowed artists to employ distortion and make the familiar seem unfamiliar. Its dominance changed art and how we view art. Photography is separate from the fine arts in its ability to portray realism (while simultaneously distorting time: by speeding it up or slowing it down). However, in its pure form its realism can be limiting. On the downside: it has often created a desire for realism above all; downgrading art, and encouraging easy, unimaginative production/ reproduction, side lining primary artistic skills like drawing and modelling etc.
Live-Action Film (as comparative analysis)

Animated film technology presents its own distinct opportunities and problems. The technology it employs is more complex than the processes involved in either still photography or live-action film.

Live-action film distorts the natural laws of time and space to a greater degree than still photography (but less than animation). In so doing it increases excitement, fashions fantasy and shows individual or multiple viewpoints.

However, the early stop-motion films of Melies (with the many in-camera tricks,) highlighted the blurring of live-action film with animation, which is an increasing feature in the digital age.

Early cinema, devoid of sound, struggled to develop a visual language.

Before film culture developed, films would be heavily reliant on intertitles to explain the narrative. Over-reliance on the written word or dialogue showed a lack of sophistication in the medium and nowadays: poor cinematic direction. Much of early film language developed from an ambition to present narrative from the emotional viewpoint of a character, or to manipulate the emotions of the viewer. Changing film speeds dramatically, along with clever edits could build audience excitement. The camera viewpoint could give the audience a psychological viewpoint – whether it looked down on a subject, level with it, or up to it. Close-ups could allow the audience to feel a greater level of intimacy and involvement with the character(s). The emotional language of film is prevalent in contemporary culture: its codes now familiar and generally understood. This is less the case for animated film.

Additionally, when animation begins to rely too heavily on cinematography for its analytic framework and inspiration (aside from clever or artistic parody), it looses its distinctive qualities. Pilling, (1998) [15]

Digital technology has undoubtedly made certain processes both cheaper and easier. This has encouraged a more diverse group of people to participate. However, as
peoples’ skill sets change, the loss of more traditional skills and knowledge is to a degree inevitable.

**Key Theory on Animation:**

In this chapter I wish to examine some of the key theories and commentary from contemporary writers on animation (within the English language). Leading academics on the subject have been chosen. Their views represent three significant themes of this thesis: the perception and reception of animation, the relation between performance and animation, and the influence of technology.

Jayne Pilling (the rise in popularity of animation and difficulties of criticism)

Jayne Pilling is an author on animation, an academic, festival and conference organiser in Europe and America. She is well placed to understand rising trends and to appreciate and comment on the range of work the genre offers up: both its strengths and limitations. In her book *A Reader in Animation Studies* (1998), Jane Pilling highlights both the rise in popularity of the genre, and the (in many ways lasting) difficulties of classification. [15]

On discussing definitions and the development of a critical language, she is keen to point out animation’s genesis and dominance in early cinema (starting with Méliès’s trick photography amongst others) and its lasting presence. Its enduring success is most obvious in advertising, children’s entertainment (film and TV) and film post-production. Seen from this viewpoint, it is hard to understand its media marginalisation (comparing it with live-action film) and difficulties of classification. The diversity of animation both artistically and technically, coupled with its confinement to certain filmic forms (e.g. the short TV cartoon) has limited understanding of the art form. The development of the photo-realistic aesthetic with the use of computer graphics, only adds to this confusion. The range of mediums and styles possible in the art form, make discussion especially problematic, with no obvious common ground.
The dominance of (live-action) film theory within journalistic and academic writing, according to Pilling, adds more uncertainty: as people try unsuccessfully to tag on the familiar themes and structures borrowed from mainstream film criticism.

The dense visual nature of animation and its abstractions (in the past linked with European Modernism – and the artistic avant-garde) is harder to categorise than standard film theory, since a frame-by-frame description would exhaust the patience of any audience or reader. Pilling states:

‘Few film critics... seem to feel equipped to deal with an aesthetic that often relates more to the graphic and plastic arts than to conventional film fiction narrative grounded in photo-realism and psychologism. When writing about live action, references to genre, shooting style, performance modes, lighting or editing can be used as shortcut descriptions or points of comparison, so that even if the reader hasn’t seen the film under discussion, they can follow the writer’s argument.’

Additionally the often non-linear narrative of many animated films adds further complications. Nevertheless, historically (in Europe at least) there was no obvious division between live-action film and animation – especially when they were considered together under the label of art-house cinema. According to Pilling, in French and Italian film journals, animated film (both short and feature length) is given serious discussion alongside mainstream cinema. Commentators in the English language clearly find it harder to see the link.

The dominant perception of animation is arguably constructed by Americans – in reference to popular TV cartoons or Disney. Pilling remarks that the development of auteur theory and the interest in ‘art’ cinema was related often to the work of many Hollywood directors, and failed to recognize a parallel development in animation (in East and Western Europe, Canada, and to a lesser degree in other Western countries)

Commercial factors have also marginalized animated film – once cinemas abandoned the practice of supporting programmes (which showed animation shorts) in order to
maximise revenue by repeat screenings of more bankable features. The often only viable option for animated film was in mainstream family audiences.

Additionally, while animation shares many similarities with the graphic and plastic arts, ease of reproduction means that it has been largely ignored by the art world, as galleries and exhibition organisers see it as unprofitable.

However, perceptions of the art form have changed, as audiences have expanded and become more diverse. Certain high profile films such as Burton’s The Night Before Christmas or Pixar’s Toy Story, and art house distribution of films by for example Jan Svankmajer, as well as the rental market - first Video then DVD and the Internet, have raised the popularity and reach of such films. More talent has become attracted to the art form and students of the genre represent a potential future workforce – needing guidance, clarification and training. These students may be channelled into the multiple employment paths of: TV, advertising, post-production, games and film etc.).

In the late 1990s when Pilling published her book: A Reader in Animation Studies, Pilling felt that most publications on animation filled the criteria of practical how-to’s or historical accounts, but little else. This paucity of theoretical writing has been readdressed in part but arguably not altogether.

Pilling remarks that: ‘The internet has…made an enormous difference. While much of the material on the Net maybe ‘fanzine’ in approach, its value as an information source is enhanced by the potential for dialogue between users. In addition, information in the American print magazines, for example, The Animation Journal and the Animation World Network Magazine, …provides a lively monthly forum on all aspects of animation internationally and has contributions from academics, industry figures and filmmakers.’

Pilling’s views on the power of animation to express transformation (literal and symbolic) parallel Eisenstein’s earlier views expressed in his essay on Disney (published by Jay Leyda in 1986). [16] Eisenstein had commended the intellectual or political and artistic freedom of Disney’s early work and resisted Disney’s neo-realistic style (most fully realised in the 1942 film Bambi (or later Disney films).
Paul Wells’s views on the true potential of the genre (and a taxonomy of animation styles)

Paul Wells (director of the research group ‘Animation Academy’, author on animation, screenwriter and director in theatre and broadcasting) has also commented on the freedom of the animation genre, and limitations imposed on it by Disney naturalism. In his book *Understanding Animation* [17] he comments on Disney’s introduction of ‘the pencil test’ in 1927, the addition of Technicolor in 1932 and the multi-plane camera 1937 as technical developments that aligned animation with aspects of photographic realism. These innovations misrepresented the form’s more distinctive characteristics, and Well’s quotes Merritt and Kaufman’s supporting words: ‘the story of Disney’s silent film career is not so much a struggle for artistic expression as it is a fight for commercial stability.’ Wells, (1998) p.23

Paul Wells formalises this neo or hyperrealist aesthetic with some key codes and conventions, to enable comparison. These are:

- The design, context and action with the hyperrealist, animated film approximates with, and corresponds to the design, context and action within the live-action film’s representation of reality.

- The characters, objects and environment with the hyperrealist, animated film are subject to the conventional physical laws of the ‘real’ world.

- The ‘sound’ deployed in the hyper-realist animated film will demonstrate diegetic appropriateness and correspond directly to the context from which it emerges.

- The construction, movement and behavioural tendencies of ‘the body’ in the hyperrealist animated film will correspond to the orthodox physical aspects of human beings and creatures in the ‘real’ world.

Wells also includes within his book a table of specific elements contained in both ‘orthodox’ and ‘experimental’ animation.

He also defines a third style ‘Developmental animation’ that combines elements from both approaches and relates the TV cartoon to this style. Developmental animation, he remarks, is usually storyboarded first in the manner of a comic strip using a similar linear narrative. And animated to a pre-recorded sound track. These animations are
achieved when ‘key drawings’ are produced indicating the ‘extreme’ first and last positions of a movement, which are then ‘in-betweened’. Most often this is how animation is described, but Wells makes us conscious that this is by no means the only way to create animation, nor is it superior to any other approach, unless industrial production is the goal.

Experimental animation by contrast, according to Wells abstracts by redefining ‘the body’ or resisting the body by using it as an illustrative image. Within this style he describes the elements of: 1) Abstraction (Rhythm and movement is examined in itself rather than most specifically through a character); 2) Specific non-continuity (rejection of logical and linear continuity); 3) Interpretive form (using a predominantly visual aesthetic vocabulary borrowed more from the fine-arts); 4) Evolution of materiality (concentrating on the forms made: enjoying colours, shapes and textures for their own sake, rather than because they are especially symbolic to the narrative); 5) Multiple styles (with the purpose of widening an artist’s expressive range, or to challenge conventional codes and create new effects); 6) Presence of the artist (the style is characteristically personal and original, sometimes even deliberately impenetrable in the way they avoid conventional logic); and lastly 7) Dynamics of musicality (Experimental animation has a strong relationship to music and indeed often attempts to represent music in visual form and movement. It also uses both music and sound unconventionally).

**Well’s thoughts on Acting and Performance**

**in relation to Animation Theory**

According to Wells, the animator: ‘must essentially use the techniques employed by the actor…Like actors in the theatre or live-action film, the animator develops the character from a script, considering the narrative implications of the role in the determination of character design, the range of movement available to the character, and the character’s predominant motivation, which inevitably informs modes of expression and behaviour.’

[Wells assumes a conventional process to character construction here.] He continues:
‘The animator, like the actor, though, is seeking to extend the possibilities of the character beyond the information given or suggested in the initial text.’ Wells declares that the process of acting through animation requires some proper analysis. He therefore outlines the most widely known and used theory of acting: the Stanislavski system. Although Wells’s acknowledges that ‘The Stankislavskian system is as complex and self-conscious as the process of animation’, he adds ‘it is the very fact that it is a conscious technique with particular processes, that make it another useful tool in the perception and understanding of the animated form. Well’s emphasises the use of personal ‘sense memories’ to inform moments of narrational action, and highlights Stanislavski’s emphasis on detailed observation and the matching of inner feeling to outer expression.

According to Wells, Stanislavski insists that actors break the text down into units and objectives. Each unit of text has a specific set of objectives which fall into three categories: 1) external or physical objectives; 2) internal or psychological objectives; and 3) rudimentary or mechanical objectives. Wells then points out that ‘Clearly, the animator must prioritise the physical objective because he/she is investing the characters with movement per se,’ Wells, (1998), [18]

Whilst his terse breakdown of the Stanislavski system may in some way be helpful to animators or animation theorists, it is chiefly concerned with the realistic depiction of character states and behaviours. It therefore undermines his earlier point that the animation genre (and animation performance) is perhaps best characterised by a non-realistic, unorthodox treatment – where visual, auditory and kinaesthetic elements are explored and enjoyed for their own sake. He makes no reference to any other appropriate performance theorists except Laban.

The pioneering animator Norman McLaren felt that every animated film echoed dance ‘because the most important thing in film is motion, movement. According to Wells the choreography of animated films has never been properly allied to theories of dance, an anomaly he states, because of the proliferation of animated films, which directly use dance. Wells sees Laban technique as the most appropriate tool for analysing animated performance. He states that animation, in prioritising movement of itself, beyond the
restrictions of character, uses the figurative as part of its determinant vocabulary. The body is used as a general representation of human or animal form, or simply a purely abstracted shape. Wells presents the sixteen basic movement themes of Laban, which represent aspects of the construction of movement, which Wells suggests echo the processes shared by animators (and inform Laban’s contemporary dance students and dance practitioners). They include:

1. Awareness of the body
2. Awareness of the body’s resistance to weight and time
3. Awareness of space
4. A recognition of the flow of the weight of the body in time and space
5. The need to adapt to the movement of others
6. A recognition of the instrumental (functional) use of limbs
7. An increased awareness of isolated actions
8. An understanding of occupational rhythms (work-related movements)
9. The ability to create different shapes of movement
10. The deployment of the 8 basic effort actions

Wells states that whilst animation clearly moves through ‘time’ and inherently illustrates ‘flow’, it generally only gives the impression of ‘space’ and ‘weight’. The other eight elements of Laban’s movement themes cover the rhythmical and functional aspects of movement and enable one to break down the minutia of specific movements. They include:

- Wringing
- Pressing
- Gliding
- Floating
- Flicking
- Slashing
- Punching
- Dabbing
11. Orientating the body in space, playing out the following key tensions:
   - Firm or Light
   - Sustained or Sudden
   - Direct or Flexible
   - Bound or Free

12. Relating shape of movement to effort action

13. The ability to elevate the body from the ground

14. To create group feeling through the expression of movement

15. To create group formation through movement
   (e.g. circles, rows)

16. To determine action moods through the expressive qualities of movement.

Whilst these movement theories might enable animation theorists to discuss certain details of animation movement, they do not help to inform practitioners or students about the imaginative possibilities of movement. Creative work is also rarely if ever approached in such a systematic way. Whilst Wells acknowledges the potential uses of the Stanislavski system, he stresses the characteristic potential for abstraction present in the genre. Mimic movement is ignored, but it represents the most abstract version of acting method available. As discussed later in the chapter on performance, mimic theory can go beyond observed reality or ‘sense memories’. Yet it is more accessible a narrative form – related closer to real life than dance.

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Lev Manovich on the impact of technology on the culture of computer animation

Lev Manovich is a media theorist and computer scientist.

In Manovich’s essay on New Technologies: ‘Reality’ effects in computer animation [19], Manovich quotes Bordwell and Staiger’s claim that realism ‘was rationally adopted as an engineering aim’. Manovich goes on to describe the culture of computer animation (from a scientist’s point of view):
‘The specificity of industrial organisation of the computer animation field is that it is driven by software innovation. (In this, the field is closer to the computer industry as a whole, rather than to film industry or graphic design.) New algorithms to produce new effects are constantly being developed. To stay competitive, a company has to quickly incorporate the new algorithm. Correspondingly, the effects possible with older algorithms are featured less often – available to everybody else in the field, they no longer signal ‘state of the art’.

Manovich clearly believes that the pace of technological innovation has impacted on the animation process. Jayne Pilling also noted in her forward to *A Reader in Animation Studies*, that within academia, the discipline of computer animation now attracted academics with a science background into a field previously dominated by those from the arts and humanities.

Manovich clarifies particular aims of academics from science, saying: ‘Indeed, a typical research paper includes a reference to realism as the goal of investigations in computer graphics field.

However, he is cynical about the ultimate realisation of such a goal, saying: ‘The photorealistic simulation of ‘real scenes’ is practically impossible because the techniques available to commercial animators only cover the particular phenomena of visual reality. For example, the animator using a particular software package can easily create a shape of human face, but not the hair; the materials such as plastic or metal but not cloth or leather; or the flight of a bird but not the jumps of a frog. The realism of computer animation is highly uneven, reflecting the range of problems that were addressed and solved. …In computer graphics it is still easier to create the fantastic and extraordinary than to simulate ordinary human beings.’

He describes the genesis of this culture as having resulted from an original motivation to develop flight simulation and other training technology. The development of realistic environments were important within this context and he states: ‘since simulators require synthetic landscapes, a lot of research went into the techniques to render clouds, rugged terrains, trees and aerial perspective.’
Finally, he states that technology has a negative impact on the creativity of the genre saying: ‘The amount of labour involved in constructing reality from scratch in a computer makes it hard to resist the temptation to utilise pre-assembled, standardised objects, characters and behaviours readily provided by software manufacturers – fractal landscapes, checkerboard floors, complete characters and so on. Every program comes with libraries of ready-to-use-models, effects or even complete animations.’

Andy Darley is another animation theorist featured in *A Reader in Animation*. In his essay on *New Technologies: Second-order realism and post-modern aesthetics in computer animation*, he discusses the attraction of a new kind of animation audience: one explicitly concerned with the technological process. [20] He says:

‘The computer imaging professional’s preoccupation with realism forms the basis of popular discussions and reviews … there will be a corresponding interest in this regard on the part of the spectator. Knowledge of how the images in *Red’s Dream* (an early computer animated short by Pixar) were produced makes the film interesting, and certainly, for a particular kind of ‘non-innocent’ spectator it would seem that this element is increasingly becoming the central factor for his (such spectators are overwhelmingly male) appreciation of such images. In this instance, a fascination with the extent to which a particular technique can be made either to mimic external appearances and action, or in addition, create surface illusionism in fantastical or impossible scenarios, becomes, the essential perquisite of appreciation: technique (means as ends) and the spectacle it produces are both fetishised. The subsidiary texts (journalistic criticism, review and articles) which give insights into both the techniques themselves and the production of those primary texts which employed them thus become a central part of the spectating experience itself: star images and signs of authorship are here displaced by technical fascination.’

Previous cultural theories on the *Uncanny* from Jenst and Freud have largely been overlooked by current scientists and animators. Perhaps this is because psychoanalytic theory has been somewhat discredited. Sulloway (1983). [21] However they remain in many ways pertinent as they describe various expressions of our fear of mortality. This
is not the only source on the *Uncanny* that is overlooked however. According to S. Christian (2011) ‘...scientific literature remains far removed from other, lucrative applications for robots and photo-realistic animation: the sex industry and the military, which already creates lifelike sex-dolls and uses hyper-realistic videogames as military training programs... ‘ S., Christian. (2011) [22]

Charlie Gere’s writing in *Art, Time and Technology* (2006), [23] claims that the military is influential in driving technological innovation (as in computer hardware and software) and that we should therefore never be too at ease with technology. It certainly plays an increasingly dominant role in our culture.
Chapter Conclusion

Character animation is rich and complex. Working principles have developed to assist individuals, teams and students in the art. However, these principles only go some of the way in explaining creative process and analysing creative results. The introduction of many new technologies has only increased the challenge of character design.

Theatrical performance has had an enduring influence on animation. Comic performers like Chaplin and Keaton, invented exaggerated or simplified physical attitudes and movements (i.e. the silhouette and the comic walk) that inspired past and present animators. However, animation theory largely ignores this fertile influence, and examines instead performance theory from Stanislavski and Laban. These theories are mostly too naturalistic or too abstract to be useful. Additionally, they are already in circulation.

The Uncanny Valley phenomena, demands a particularly imaginative, larger than life approach to movement and character animation (such as is utilised in the alternative discipline of theatrical performance - particularly mime. Generating highly realistic characters (as is possible with new animation software) paradoxically only diminishes naturalism and can unwittingly disturb the audience. A creative approach to character design can bypass this problem and more fully exploit the genres penchant for fantasy and stylisation.

Photo-realism is the current dominant aesthetic. But the realism photography and film present is only at best, partly true. Photography is a static, two-dimensional art form. Photographic pictures are also often manipulated by hand, or more typically with software, creating a false realism.

Photographic and film art, distort time and space to increase tension or create mood. Portrait photography must always imply movement (internal emotion or external action) or results prove dull and lifeless - like the average passport photograph. The editor in live-action film is critical to the success of the film. They must think carefully about the emotional rhythm of the shots – success being resultant on fractions of a second. Spatial relationships are implied: by the chronological positioning of shots, and
the framing of shots. Film (even when enhanced with 3-D technology) is essentially
two-dimensional. The current popularity and high profile of 3-D film, downplays this
reality. Movement must be dynamic for good character design to ascend
cinematographic limitations.

Animation is more densely visual and experimental than live-action film. However, live-
action film theory is invariably applied to animation discourse. Other familiar views on
aesthetics are derived from the fine arts: (i.e. painting and sculpture) which
are wholly static.

However, the new sciences of evolutionary aesthetics, socio-biology, evolutionary psychology etc.,
can explain the importance of movement (e.g. rhythm and quality) in our understanding
of what constitutes appeal. The Uncanny Valley theory fits within this context, as
research suggests the Uncanny is evoked for survival purposes (triggered by our need to
distance ourselves from perceived threats).

Evolutionary Aesthetics connects our common visual / or aesthetic preferences (such as a
liking for certain kinds of movements to evolutionary adaptations connected to survival
and mate selection. Dutton, (2003), [24]; Hugill, Fink and Neave, (2010),
[25]; Miller, (2000), [26]

Returning to the art of animation, animators who are now trained with software, and work
within a techno centric culture, need to know the true limits of body mechanics. They
need to understand how particular emotions are revealed dynamically through body
movement. Ed Hooks has commentated on the poor quality work of new and
inexperienced animators who ‘design women with no hip sway’ or animate characters
with ‘no motivation’ Hooks, (2011) [27]

Animators need to be especially insightful about physical communication because they
frequently create characters that are animals or inanimate objects and then endow them
with human motivations and expressions.

The performing arts is a discipline that trains mime artists, some comics and actors in
observing how emotion (and motivation) reveals itself in human behaviour. Other
experts in ‘body language’ include the zoologist Desmond Morris, certain surveillance
experts like Joe Navarro, and the psychologist and facial reading expert Paul Eckman. The work and views of these last three experts will be examined in the next chapter.

The pictorial examples on the following pages, demonstrate how many well-known animators are influenced by their own particular cultural backgrounds. Though each artist has developed their own distinct style it is frequently affected by their country of origin. The environment of their formative years has an impact, even if negative.

In the case of the director Adam Elliot, he often references his own family in his work, directly or indirectly.

Well-known animation directors like Miyazaki also frequently employ signatures in their work. For example, they may have recurring themes, recurring visual styles (e.g. Tim Burton’s taste for the Gothic, recurring characters (e.g. Nick Park’s Wallace and Gromit) and a penchant for a certain type of humour (e.g. dark or slapstick) or melodrama.
The below examples demonstrate: singular artistic styles (often influenced by local/national culture)

Adam Elliot is an animation director whose work is often seen as both typically Australian and highly personal (in the way it explores disability or difference as a subject and as a visual metaphor – using hand-made clay and deliberately retro techniques).

Japanese animation is typically traditional line drawn animation. Surface pattern is emphasised. Eye expression is melodramatic. Elemental spirits are frequent fantasy characters.

Director Miyazaki has recurring themes of: childhood transition, environmentalism, pacifism and flight and strong female central characters.

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Figure [1] Film still from the Australian stop-motion animation *Mary & Max* (2009), Dir: Adam Elliot, Prod. Melanie Coombes, featuring the central character Max, a morbidly obese autistic man.

Figure [2] Film still from the Japanese hand-drawn film *Spirited Away* (2001) Dir: Hayao Miyazaki
Park’s animations are seen as typically British in their visual style and sense of humour (specifically N. England) – and they are also full of personal quirks, though universally admired. His characters frequently have large malleable mouths or are completely silent, expressing with their eyes and eyebrows alone.

This film depicts suburban hero Wallace driving a classic British Austin A35 van (a feature that did not fit well with the American film financiers, who wished for a more fashionable image).

The anti-hero Wallace wears a fair-isle pullover eats Wensleydale cheese and drinks tea.

Figure [3] The UK claymation *Curse of The Were-Rabbit* (2005) Dir: Steve Box and Nick Park, Ardman Animations and DreamWorks Animations Studios


This image shows well the French/ Belgian cultural influence of adult comic book illustration, in its sensitive use of colour and line and its satirical characterisation. This film focuses on the French sporting event - the *Tour de France*, the post war era (also visited in his film *The Illusionist*) and plays on the love hate relationship between France and USA and other national clichés.
Figure [5] The Czech puppet animation short film *Dimensions of Dialogue*, 1982 Dir: Jan Svankmajer, Inspiration for the film was taken from Archimboldo – the renaissance portraitist for the Prague Court of Rudolf II.

Figure [6] Film still from *Frankenweenie*, (2012) 3D stop-motion film, Dir Tim Burton, Tim Burton Productions

Tim Burton’s style is unmistakeable and internationally recognised: gothic, quirky and imbued with a strong design sense; he makes both animation films and live-action films.
Chapter 5 Body Language

Introduction

Our heritage as (predominantly social) animals means that our emotions and motivations are invariably revealed in our physical movements: both subtle and gross. Our attitude and positioning within our environment and in orientation to others, also reveals much (about occupation, status, personality and relations). The Zoologist Desmond Morris has documented this subject in detail in his 2002 text *Peoplewatching*. [1]

The study of non-verbal communication is carried out in diverse disciplines: such as national security agencies, robotics, zoology, psychology and the arts.

Recent technology has allowed previous knowledge to be scientifically verified, lending greater credibility to the subject and increasing interest in further study.

Although everyone has some intuitive understanding of non-verbal communication, real expertise is rare. (For example, Dr Eckman the world expert in facial reading claims only one percent, out of 15,000 people tested, can spot microexpressions.) [2] Ekman, 1992 Therefore there is always more to learn through observation and reflection.

Additionally it is beneficial to gather data from diverse sources for: better understanding, to aid inspiration and to improve application. The imagination and understanding are both diminished when intellectual and visual sources remain limited.

Increased mechanisation in the process of digital animation has meant that artists are arguably more cut-off from their intuitive response; and the complex processes of the computer diminish their observational powers.

Our instincts ultimately control our reactions. Therefore an audience responds first to any non-verbal signals of communication. The Uncanny response can be invoked when there is an unintentional mismatch between the body language of the character, and
their spoken dialogue (or other mismatching aspects of external appearance and behaviour). The character becomes unconvincing. Their movement and actions feel false. The more in tune artists are to these primal messages, the better. Anything that increases understanding of body language and alerts us to our instinctual responses will aid animation performance (and evaluation). Intimate knowledge of emotion enables an animator to depict more accurately what they wish to communicate in a character’s performance.

Discourses on non-verbal communication come from a variety of disciplines. Expertise comes from the areas of zoology (from Darwin to Desmond Morris), psychology (with Eckman’s theories on emotions and his Facial Action Coding System [3], and the areas of security, surveillance or crime investigation. Because human response and behaviour is open to cultural influence, anthropological theory is also pertinent.

The majority of public knowledge is shaped however by management and business discourse on subjects like leadership skills, negotiation techniques, hiring employees, maintaining good working relations through listening skills, or non-confrontational posture and gesture etc. Whilst some of this information is sound, it is sometimes erroneous and does not explain the whole complexity of non-verbal communication.

This chapter serves as an introductory exploration into the value of such information (sometimes new and poorly understood and sometimes well known and well assimilated). However, even known information can be sidestepped or misinterpreted. The directness of the subject and its surface simplicity means that non-verbal cues are often dismissed or insufficiently understood.

Joe Navarro (who honed his skills as an FBI agent) has both written and lectured on the subject at Harvard Business School. He claims that cultural conditioning weakens our natural ability to read people and develop interpersonal awareness. [4] This is because the limbic system, or the mammalian brain, rather than more conscious processes largely governs non-verbal communication. Our conscious mind suppresses our animal instincts, relying more on language and cognition driven by cultural or social forces. Yet reading non-verbal cues, according to Navarro, takes consistent concentration and effort. Its value is measured in: greater understanding of people,
which generates self-confidence, and also better relations, increased authority and increased safety.

The social psychologist Amy Cuddy, believes our responses to non-verbal expressions vary, not only due to the perceived skill of the communicator but inevitably their gender, cultural background, physical disabilities and so on.

One recent discovery, most closely linked to the psychologist Eckman’s research into emotion (though discovered earlier by scientists Haggard and Isaacs (1966)), is microexpressions. Microexpressions are characteristically involuntary, brief (fractions of a second) expressions that can reveal suppressed or repressed emotions but are difficult to pick up except by the initiated. Although imperceptible to most, they may perhaps be registered at an unconscious level. Microexpressions are usually discussed in relation to facial expression, but they can also be applied to bodily movement: e.g. of the hand(s), foot, arm(s), and even breath (suddenly shallow or frozen) etc.

The Facial Action Coding System or FACS developed by Eckman, is used to identify the full range of facial expression. This system identifies muscle movement that produces expression. To measure muscle movements, the theory of the Action Unit (AU) was developed. This system measures the relaxation or contraction of an individual muscle and assigns a unit. More than one muscle can be grouped into an Action Unit or each muscle may be divided into separate action units. The score consists of a) duration, b) intensity and c) asymmetry. This is useful in a number of ways: for example, identifying depression or pain levels in patients that are unable to express themselves.

The security agent Joe Navarro discusses the freeze, flight and fight response and the corresponding comfort discomfort paradigm in his book *What Every Body Is Saying* (2008). According to Navarro, the limbic brain is never off (as it is uniquely responsible for our survival) and it is designed to react rather than reason. He says: ‘When we experience a sense of comfort…the limbic brain “leaks” this information in the form of body language congruent with our positive feeling…when we feel distressed…the limbic brain expresses nonverbal behavior that mirrors our negative state of being. ….we want to learn to look more closely at the comfort and discomfort
behaviors we see every day and use them to assess for feelings, thoughts, and intentions. ‘Navarro clearly accentuates the accuracy of our instinctive responses.

Desmond Morris has also researched discomfort and comfort cues, especially as they present in interpersonal relationships. He asserts that the amount of space someone takes up in relation to others, demonstrates their level of comfort as well as their status. The theatre practitioner (and author) Keith Johnston has also credited status gestures or the corresponding emotional cues of comfort/discomfort, as the essential factor in creating believing relationships for staged drama. [5] Johnstone, Status (1989) p.33.

The freeze, flight and fight responses are manifestations of our animal heritage. It can be shown in numerous ways: through still hands and arms, cessation of breath, avoidance of eye contact (freeze response) blocking and distancing (flight response), rising tension, violating personal space (fight response). The freeze, flight and fight response, is generally the order in which we respond to threat: freezing demanding the least involvement and energy and fight the most. These responses are also infectious, in that often when one member of a group freezes, so do all the others. Again this is an example of our survival imperative, stemming from a time when humans had many predators and the group depended on each other for concealment or protection.

According to Marvin Karlins., (trained psychologist and professor at the University of South Florida), much of what Navarro discusses in his book, was not recognized fifteen years ago by the scientific community. Karlins states: that it is only through recent advances in brain-scan technology and neural imaging that scientists have been able to establish the validity of the behaviours Navarro describes. [4] He adds that: ‘Unlike many other books on nonverbal behavior, the information presented herein is based on scientific facts and field-tested findings rather than on personal opinion and armchair speculations.’

Navarro advocates the analysis of behavioural clusters, rather than singular gestures and expressions: as the best or most accurate approach to reading people. He also claims that physical norms should be observed (a person’s baseline, typical attitudes and responses) the better to understand abnormal behaviour that might communicate
something new and important (e.g. particularly strong emotional responses or repressed emotions).

**Facial Expression and Core Emotions**


The primary emotions have different rhythmic qualities. Some emotions have a slow quality (sadness) and some are rapid (anger). Some have a bounce (surprise, joy) and others are flat or even oppressive in tone. Marked variation exists also between individuals in the speed of onset of emotion and the speed of its dissipation. Eckman, (2004) [3].

The US researchers, Paul Eckman and Wallace Friesen, have identified six principal facial expressions which are used to show when people are happy, sad, angry, afraid, disgusted or interested (though the last is less an emotion – more an attitudinal state). Smiles are used to indicate varying degrees of pleasure, amusement and happiness, though in some contexts they can show aggression, sarcasm and other negative feelings. This indicates why emotions cannot be divided simply into those that are positive or negative in quality. Smiles are typically used as a greeting gesture and can be also used to give assurance, perhaps with greater frequency by women who generally smile more. A genuine smile is an indication of joy mild or extreme and since humans are wired for empathy, a smile – like a scowl or a yelp of surprise is infectious. Individual internal emotion can become externalised in an individual’s facial/ body expression and in the reciprocal relationship with other individuals who mirror their mood. Positive emotions and their display can therefore cement long-term loyalties and friendships and instigate displays of affection, caring or attraction.

The principle emotion fear, like anger and many other emotions, has no single
expression to betray its presence. It can be indicated by wide-open eyes, an open mouth or by trembling affecting the face as well as the rest of the body. Perspiration can increase along with breathing rate; colouring can turn pale as blood rushes to core muscles, ready for fight or flight.

Anger is most commonly characterized by steady gaze at the source of offence, frowning and a gritting of the teeth. Some people go pale when angry, but others go red in extreme anger or fury. The whole body posture will be tense, as if ready to spring into offensive action or attack.

Different parts of the face are focused on particularly when perceiving different emotions. Fear is usually looked for in the eyes, as is sadness. Happiness, by contrast, is seen in the cheeks and the mouth as much as the eyes. Surprise is seen in the forehead and mouth movements.

Sadness is the emotion that inspires most strongly nurturing feelings in the observer. We can feel another’s grief and pain and our instinct is to assist them in their anguish. Observing anger or fear in another is less likely to arouse sympathy but anger, like fear or joy, can become contagious, infecting others with tension and negativity.

According to Gordon R. Wainwright, author of the book *Body Language* (2003), there are a limited number of emotions that can be reliably recognized by observers of the face. Additionally, facial expression tends to be more consciously controlled. Nevertheless Wainwright asserts, that the face can reveal emotional intensity. [9]

Researchers have recently identified micro momentary facial expressions that last a fraction of a second, but often indicate a person’s true feelings. Although such expressions are generally too fleeting for most people to perceive, they can be easily captured on camera and with training one can become adept at observing them. Some people claim to be especially intuitive and these types of people may be able to read such movements and respond to them (perhaps picking up clues on a subconscious level).

With regards to movements of the whole head, lowering the head can indicate submission or even depression. If a head is held high and tilted back, this can suggest an opposed haughty or even aggressive attitude (if accompanied by other indicators of
aggression – such as a fixed stare). Viewing the body and its gestures in parts is the subject of Kinesics.

**Kinesics: gestures and whole-body movements used in communication**

Kinesics refers to the scientific study of gestures and body movements. There are numerous gestures made in human communication, many are universal but some are purely cultural. In sketching out just a few which derive from different parts of the body, we can see how the physique can be used as an expressive tool and communicate in specific ways.

If we consider the torso, the most common *shoulder* movement is the shrug, which usually conveys the messages ‘I don’t know/care/am doubtful’ etc. A single shoulder being shrugged can mean something quite different – usually ‘Leave me alone.’ or ‘Take your hand off…’ The *chest* can also be puffed out as a gesture of mock pride. The *stomach* can be sucked in to suggest physical fitness – perhaps as a courtship signal. However, it can also indicate fear or readiness for assault. Reading the general body language is therefore important to understanding. Navarro (2008) [4]

In the lower body, the *pelvis and the buttocks* can be used to make gestures most often interpreted as sexual invitation, and if carried out overtly in public they are often considered obscene. However, a retraction of the pelvis might perhaps indicate tension of a different kind – say partial fear and a desire to retreat.

With regards to the extremities: the *arms, hands and fingers* are used for a great variety of gestures both general and specific, enabled by greater anatomical autonomy and flexibility.

Legs can be drawn together or crossed and also placed apart at a variety of angles – all signifying various messages.

Feet can be interesting as they sometimes display *leakage*, which means they give away emotional information the person may be trying to conceal. For example, a tapping foot can display nervousness or irritation. Women’s heeled feet can also be used as a sexual signal and are sometimes fetishised. Navarro (2008) [4]

The above gestures, which are predominantly universal, Eckman, (1973) [3]
communicate to others: levels of emotional interest, tension and aggression of one type or another. These signals can be localised (i.e. just the hands), or general. For example, in courtship, readiness is usually signalled by high muscle tone over all (decreased slouch of jaw, tighter stomach, shoulders etc.). Grooming behaviours can be observed and actions of invitation such as flirtatious glances, leg-crossing to expose a thigh, and so on.

Sometimes the intention is to communicate emotional states consciously and sometimes the intention is to conceal such information from others. Much communication is often instinctive and therefore difficult to conceal – whether we want to or not. A good example for this would be the instinctive phenomenon known as *gestural synchrony*. Wainwright says:

> ‘As a person speaks, his or her bodily movements keep pace in a kind of dance with the rhythms of speech. Listeners’ movements also dance to the same ‘tune’, as it were, as the speaker’s. In mentally ill patients, this rhythm is missing – another illustration of how we only notice the existence of something when it is not there: conspicuous by its absence, in fact.’ [9] G. Wainwright (2003)

Another aspect of physical communication is that certain movements receive strongly favourable support from people. Open gestures – say of the arms being raised to chest level and slightly drawn apart - are rated by people as signifying of action, positivity and potency, particularly if undertaken with a smooth motion and relatively measured rhythm. Closed or hesitant body movements prove not to persuade or influence – according to tests carried out by social researchers.

According to research by Brown (2003) and Fink et al (2015), frequent non-verbal movement results in people being rated as warm, whereas minimal movement meant people were viewed as logical and even cold. This example would suggest that participants here are drawing conclusions not only about another’s current emotional state but also about their general personality. These conclusions and corresponding responses could be based on truth or falsity. Fink, Weege, Neave, Pham, Shackelford, (2015), [10] Brown, Palameta and Moore, (2003) [11]

> ‘Gerard Nierenberg and Henry Calero suggest that [emotional] gestures are used even in situations in which the other person cannot be seen, as when making a telephone call.
or using a tape recorder.’ [9] G. Wainwright (2003) From this research we can see how primary and significant emotional gesturing is to human behaviour and that much of it is instinctive and therefore below conscious awareness.

**Posture and Attitude**

There are three main postures: standing, sitting (which may include squatting and kneeling) and lying down. Of course, there are many variations on these, depending upon the different positions of the arms and legs, and the various angles at which the body may be held. Postural attitudes are significant for a number of reasons.

Firstly, Ekman and Friesen found that whilst facial expression gave much information about emotions, posture could illustrate further the *degree of intensity*. Additionally, in the extreme example of facial paralysis, posture could still reveal ample information about emotion and intent. And viewed from a distance, the body becomes the primary messenger.

Posture is so fundamental to attitude and cognition, that there are even regular shifts in posture during sleep, that clearly mark transitions between states such as between dreamless sleep and REM.

In addition, posture seems to have a degree of influence over our attitude to time and general cognition. For example, people tend to reflect and remember and sometimes imagine more when lying down. However, they are also less receptive to action. When standing, thoughts result more readily in action – hence the popularity of the stand-up meeting, but one can become less responsive to new suggestions or close examination of a topic.

Like other aspects of physical expression, postures have *patterns* and contain an element of predictability. According to Wainwright, one particular psychiatrist observed that a patient adopted a particular posture every time they talked about their mother and a quite different one every time they talked about their father.

A person’s emotional state often reflects clearly in their posture. For example, extremes of posture can be observed in mental patients. Depressives droop, are listless, sit brooding and look downward. By contrast, manics are alert, erect and their bodies can
display a high level of tension.

Assuming a particular posture can also cause emotional as well as physiological change. The strong link between mind and body means that adopting a fear crouch position can make one feel both uncomfortable and psychologically vulnerable. Smiling more has also been found to effect brain chemistry subtly, causing a greater feeling of optimism or positivity.

Posture also communicates the status of an individual in relation to others. Social animals have inborn rules which prevent them killing each other for food, mates, and so on. They may confront each other, and sometimes fight, but then a hierarchy is quickly established and will not be changed unless a challenge is made to disturb the order. This system or ‘pecking order’ is present in all human relationships.

Keith Johnstone an international authority on theatre improvisation has written specifically on status transactions in life, storytelling and theatre. It is Johnstone’s belief that all people have a preferred status: that they like to be either low, or high in relation to others. This may be connected to their position in life (for example, playing high status may be the choice of a CEO at a major corporation), or it may be directly opposed to their position in life and say more about their self-identity. [5] K. Johnstone (1989) The later example might be shown in the surly or haughty behaviour of a waiter or unhelpful shop assistant. A person’s status is therefore a reflection of not only their current environment or life situation but also their complex psychological make-up.

Status transactions can be read through body language alone without anything actually being said. A major purpose of assuming a certain status: is to avoid direct confrontation, physical or otherwise over dominance or territory. A high status person is effectively saying in their physical attitude ‘Don’t come near me, I bite,’ while a low status person is saying ‘Don’t’ bite me, I’m not worth the trouble.’ Johnstone has observed that such transactions always engage people and in a performance, build realism. They are aesthetically appealing and feel right.

However, status is not a static phenomenon. People are endlessly changing their status – making minute, or grander adjustments according to the situation. The display of or conflict over dominance or territory is always present in our relationships – friendly or
otherwise - meaning that no movement or action is without implication or truly ‘motiveless’. According to Johnstone, acquaintances become friends when they agree to play status games together.

Status displays may sound exaggerated but kings and lords used to surround themselves with dwarfs and cripples so that they could appear elevated by contrast. TV programs like ‘The Secret Millionaire’ may serve a similar purpose. Extreme status displays can be seen today in certain formal settings and situations. Rituals of State or Church or initiation ceremonies are good examples.

In formal group photos, people tend to guard their status. If people are unaware they are being photographed the effect can be quite different, more spontaneous and revealing.

People displaying dominance or higher confidence levels: adopt more erect body postures than those feeling submissive, shy or depressed. Positive attitudes towards others tend to be accompanied by a forward lean, especially when sitting down. Leaning backwards signals negative or hostile attitudes while arms folded across the chest can also signal an unsympathetic attitude. Arms held loosely down by the sides are usually interpreted as an openness and willingness to interact.

Posture therefore communicates powerfully about a person’s state. In any kind of performance context (such as giving a speech or conducting a religious ceremony) posture communicates effectively over space. We can see whole body movements but we lose details, such as facial movement or intricate gestures when spatially distance.

Status relations can also be shown in a person’s relationship to an object or their environment. If you enter an empty room, you can play high or low status to the furniture. A king may play low status to a subject, but not to their palace. The space occupied can affect status. For example, in the wilds of nature, people in isolation prefer to stand beside objects, like their car or a nearby tree. Perhaps this is prime territory as it offers a potential refuge.

**Closeness and Orientation**

Lovers will accept greater proximity from each other than perhaps any other relationship; however, even when kissing, lovers will often close their eyes. Personal
space is therefore an important element of human relations.

According to Wainwright ‘American policemen are sometimes trained to sit close to a suspect, with no table or desk between them. They gradually move their chair forward during the interrogation so that after a time one of the suspect’s knees is just between the policeman’s knees.’ Such closeness, when uninvited, is almost always perceived as threatening.’ [9] G. Wainwright (2003)

Groups can signal their allegiance when standing together, by leaning forward and tipping their head forward. Outsiders from a group typically stand with weight on one foot (perhaps to symbolise their uncertain status). The angle of orientation, as well as proximity, can control the degree of privacy between a pair or group. People exchanging confidences will therefore often turn away from the general interaction in order to discourage intruders.’

Orientation in space is both horizontal and vertical. In a horizontal plane the significant detail is whether the people are facing or not. In the vertical plane, what matters is whether one person is higher up or lower down than another. Being higher, or even simply being taller, can significantly affect the interaction that takes place. For example, a person placed on a rostrum will be at a higher status than observers lower down. As will a person standing and talking to a seated audience.

Some activities do allow real physical intimacy. Social greetings can include kissing or hugging and when people come together to dance, touching is then encouraged, albeit within the confines of dance steps. Sport is another of the few formalised domains where physical proximity is permissible.

The space we occupy in relation to others is closely linked to our status. Wainwright states: ‘…low-status individuals tend to stay near the door on entering. Those of higher status approach the desk. Those of equal status will come in and sit down next to a person’s desk.’ [4] G. Wainwright (2003)

Equality of status is often indicated by matching postures or near matching postures. Low status individuals may bow their head and maintain closed body positions (as if to protect themselves from attack and to make themselves smaller, apparently weaker and
less of a threat). They are on the defensive. The complete opposite of this is the ‘cherub posture’. Here, all the planes are open – signalling vulnerability and tenderness – which has a powerful effect on the onlooker. High-status people often adopt versions of the cherub posture. If they feel under attack they’ll abandon it and straighten, but they won’t adopt a ‘fear crouch’.

If two strangers approach each other along an empty street, one or the other usually moves aside. The one who remains where they are is assuming a higher status. If they think they’re equal, both might move aside, or alternately they will continue walking and once face-to-face begin a sideways dance while muttering apologies.

High-status people will allow their space to flow into other people. Low-status people will avoid this. Low-status people can shut off their space in ritualised ways by: kneeling, bowing and prostrating themselves to others. As Johnstone writes ‘If we wish to humiliate and degrade a low-status person we attack him/her while refusing to let him switch his space off. A sergeant-major will stand a recruit to attention and then scream at his face from about an inch away.’ [5] K. Johnstone (1989)

Events or strong emotions can also alter the way we relate to each other. People left standing at a disaster zone can appear to rise in status: as their movements can have a simplicity, stillness and nobility about them befitting the tragedy.

**Culture and its Effects on Body Language**

Culture is diverse. As we move increasingly into a global market, it becomes useful to reflect on this diversity. Such knowledge is beneficial to counteract the homogenisation of culture when selling to an international market. And it means that animation filmmakers can more truly reflect their audiences: who are not all white, male, young and American etc.

Culture can impose on behaviour: subtly or strongly. Addressing the subject of appearance, some races have strict conventions. Arab women must sometimes be so well covered that only their eyes are visible. [9] BBC News (2008) This affects their freedom of movement (and sense of self). In Japan, uniforms are common. School children and students have monotone uniforms. Conformity to the group is highly valued and bowing to superiors is expected. What this demonstrates is that separate
nations can have a unique relationship to their body. As Johnstone writes:

‘The placing of the personality in a particular part of the body is cultural. Most Europeans place themselves in the head, because they have been taught that they are the brain…The Greeks and Romans were in the chest, the Japanese a hand’s breath below the navel, Witla Indians in the whole body, and even outside it.”… as soon as you try to shift the centre to some other place within or outside your body, you will feel that your whole psychological and physical attitude will change...’ [5] Johnstone (1989)

Culture has a bearing on the way we interact with others: the amount of eye contact or physical contact that we share. According to Wainwright:

‘In research into the use of eye contact…Greeks look at each other more in public places, both at those they are conversing with and at other people. ….Swedes have been found to look at each other less often than other Europeans, but they look for longer. Arabs are very dependent on eye contact…They look at each other when listening and when talking…The Japanese look at other people very little and tend to focus their eyes on the other person’s neck when conversing.’ [9] G. Wainwright (2003)

Certain occupations utilise certain specific gestures. For example, conducting road traffic, silent communication in a TV studio or military ceremonies. We gesture differently to a child as opposed to an adult, if we are at leisure as opposed to work. Gesture is communicative shorthand and adds interest and an important degree of expressivity to everyday social interaction.

Appearance

As I have just indicated the socio-cultural evidence demonstrates that humans have always been concerned with their appearance and have sought to heighten, disguise or alter their looks through diet, exercise, dress and other means. According to archaeologist and professor João Zilhão, recent evidence suggests that Neanderthal man used necklace adornments and pigment for make-up, just like modern humans.

[12] Zilhão states:

PhD Thesis, Nottingham Trent and Southampton Solent University
Annabel Lagasse
'They are clearly used as something to convey ideas and to decorate the face and body. It shows a symbolic dimension in behaviour and thinking that cannot be denied.' João Zilhão et al., (2010) [12]

Appearance is an important aspect of movement. It affects not just how we are viewed: strong, youthful, unconventional etc., but how we move. It covers such topics as: weight, height, hair, clothes and sometimes, personal props (e.g. the policeman's truncheon, a business man’s briefcase, a traders mobile phone etc.). External appearances influence our centre of gravity, physical confidence, fluidity or strength and physical posturing.

Intuitive response can also be influenced by second-hand appeal. Another study carried out by psychologists at Aberdeen University in 2007, highlighted that attraction to someone could increase if the person is surrounded by smiling members of the opposite sex. [13] Jones, B. (2007).

Choice of clothing seems to be affected by personality. More cautious people will have a tendency to dress more conservatively, in quieter, drabber colours. Their movements will likely reflect their attire, remaining somewhat restricted and modest. And more extrovert people may go for brighter or contrasting colour schemes in their dress, befitting their bolder interaction style or their desire to draw attention. For example, a hip-hop star may wear outsized baggy clothes to exaggerate their large masculine frame.

Clothing can also suggest age and sex, and can give hints about our social class or status and our occupation. Sharp, formal, heavy suits in dark colours generally convey a serious business-like persona and the person dressed in such a uniform may move in cleaner, more confident lines and patterns or display a heaviness and sombreness signifying gravitas.

Uniforms can also suggest certain qualities like discipline (i.e. army uniform) perhaps by removing all marks of individuality.

Some clothes deliberately restrict movement to suggest order, piousness etc., such as the stiff clothes of the Victorians, the sackcloth of a monk, or the tiny shoes and bounded feet of aristocratic Chinese women. Other clothes can provide status by displaying the wearer’s wealth in choice of materials, exaggerating their stature with
elaborate head displays or their masculinity as with the European codpiece of the 1500s.

Basic body shapes also seem to elicit particular reactions. The key body shapes are generally classified as ectomorph (thin and bony), mesomorph (muscular) or endomorph (fat). Social psychologist Michael Argyle reports that ectomorphs are usually perceived by others as quiet and tense, mesomorphs as adventurous and self-reliant, and endomorphs as warm-hearted, agreeable and dependent.’ [9] G. Wainwright (2003)

The Social Mask and Societal Pressures

Socialised people generally conceal strong emotions and often obscure their true motivations and intent. Most people therefore present a civilised mask to the world and repress certain instinctive drives or feelings. In time, our faces and body language reflect these tensions and we may communicate: toughness, dourness, or harmlessness – masking other complex or contradictory emotional attitudes and states that lie inside us.

Modern life means that many of us live in environments removed from our natural origins. Houses and offices are filled with hard surfaces and fragile objects that restrict our freedom of movement. Even leisure spaces are often constructed with concrete or brick – limiting further are physical expression. These limitations can create tensions and distortions in the body.

Our education system encourages the young to sit still, and be quiet. Levine, J., (2010, 2014); [14] Our occupations can also limit our physical and expressive range – by emphasizing certain limited skills like data entry or assembly line work or till work and by repressing our emotional scope. The examples given utilize qualities like efficiency and side line others like creativity, empathy or even spiritual expression. This has relevance for various reasons, but particularly when considering the changing process of animation production: from the personal and sensory process of hand-drawn work and modelling, to the impersonal process of software manipulation. We become less and less physically engaged: glued to screens, transported by cars, fed fast food etc.

The culture and time that we live in also promotes specific dominant responses or
behaviours: good, bad or neutral - like scepticism, anxiety or egotism – again restraining other qualities. Our body language will often communicate subliminally any internal conflict between desired human responses and undesired ones. The need to be part of the group is a strong, instinctive survival strategy that exists in playful conflict with our equally instinctive desire to assert ourselves as individuals and seek individual gain.

The social mask however, cannot always be maintained. When people are taken out of social intercourse for any significant period of time (such as enforced imprisonment) personality can disintegrate. This is disturbing to the people experiencing it and those observing it.

People are frequently alarmed by strong displays of emotion as the person emoting can seem irrational or out of control. A lack of emotion in communication can also be disturbing. Emotional extremes generally need to be contained within ritualistic ceremony (the church, the football match, the office party) or within drama to be socially acceptable. Within staged performance, emotional extremes and conflict serve a cathartic purpose.

**Human Deception**

Another aspect of communication is signals of deception. As stated in Wainwright’s book, *leakage* often occurs in the lower half of the body. Shuffling the feet, twitching the toes, crossing and uncrossing the legs, and so on, increase when we are trying to deceive others. Attempts at deception do also involve the upper half of the body. Facial expressions may be capable of control, and an accomplished liar may be able to maintain eye contact with his listener, but the movements of the hands may be less easily controllable.

Albert Mehrabian, (Social Psychologist and Professor at UCLA), on investigating how people behaved when they conveyed truthful messages and how they behaved when the messages were untruthful, discovered that those who were lying talked less, talked more slowly, and made more speech errors. Their rate of body movement also seemed to be slower. ‘ [9] G. Wainwright (2003)

Blushing, perspiration, voice tremors, gulping, shaking and diversionary tactics like
playing with pencils or spectacles are other activities to watch for in people who are not telling the truth. Liars are less likely to engage in bodily contact or even to approach closely. Their body language can contradict their spoken words. Navarro (2008), [4]; Eckman (1973, 1993, 1994) [3].

Of course, some liars and con artists are delusional and have succeeded in conning themselves. They may therefore be very cool and convincing liars. Certain people also stay calm when under stress and are inherently less emotional.
Chapter Conclusion

The research into non-verbal communication, examines some of the recent theories on body language from multiple disciplines. Two theorists examined in particular were the surveillance expert Joe Navarro and the psychologist and facial reading expert Paul Eckman. The study of body language can most obviously be classified as facial, or corporeal (e.g. torso, legs and feet) but also incorporates gesture proxemics, chronemics and cultural influence. Recent technology, for example in brain scanning, gives unequivocal validity to information gathered on the subject by experts Navarro and Eckman. However our intuitive understanding can also be highly accurate though it is open to bias.

Our animal heritage clearly makes us respond in a primal way to most emotional signals. [3], [4], [7] Indeed, MIT professor of robotics Sherry Turkle, has stated that anthropomorphism makes us ‘read emotions and intentions into all sorts of things’, including cold automatons. [15] This is why the Uncanny Valley phenomenon is such a challenge. We are programmed to respond emotionally in all contexts. It is therefore important to understand fundamentals of human expression and behaviour. However abstract, stylised and impressionistic an animation performance is, there needs to be some underlying truth to its design. The audience needs to recognize specific moods and intentions in order to connect emotionally to any character or narrative.

It helps to understand the rhythm of various emotions and animal drives, and how these express, or suggest themselves spatially. It is equally important to understand the physical range and limits of different emotions – as articulated in the body. Additionally, it is important to understand how personality is shaped by our unique, complex emotional experiences and how these manifest in the physicality of an individual.

Our anthropomorphic tendencies mean we read emotional significance into anything: therefore it is important that character animators are aware of the symbolism inherent in any character’s performance, or narrative approach.

However, an artist’s role is complex, going beyond honest representation. An artist
needs to make imaginative leaps to translate everyday behaviour into character performance with ‘appeal’.

1) Making the numerous imaginative leaps necessary in artistic work takes effort and practice. It requires a type of creative training quite different to the acquisition of technical skills (For example, art school training or Lecoq’s training differs from many other kinds of training, as it emphasises the development of an individual above method or style.)

2) Experiential learning that involves all the senses, can aid the artist in developing creative ‘vocabulary’. Through experiential learning, the artist may develop rich, unique emotional memories. This often requires open-ended approaches that defy conventional measures. As visual arts curriculum become more structured and formulised, students are not necessarily given time or space to develop these creative skills.

3) Any open-ended exploration involving sensory observation needs ideally to be centred on the body and its dynamics, for this is central to character animation. Theatrical performance, can inform us of the dramatic potential of the body in relation to its environment or to another.

4) In researching performance practice and theory (where corporal expression is central), one can discover how experiential learning translates into creative production: be it new ideas, new forms, or more accurate and subtle expressions etc.

The outcome from learning of this type is not to teach rules but to ultimately encourage personal responses and develop individual artistry.
Michelle demonstrates submission to the queen by curtseying. Barack maintains a respectful distance.

Figure [3] *Open and Positive Body Language Postures: Honesty*, Sinay Tarakanov, (published 2012-2014). When we want others to trust and believe us we need to show that we have nothing to hide. By exposing the ventral side and removing physical objects in front of us we remove the physical block.
Figure [4] Film still of *Alice in Wonderland* (2010) Dir: Tim Burton. Green screen action with the Red Queen, Alice and Tweedledee and Tweedledum

Figure [5] Film still of *Alice in Wonderland* (2010) Dir: Tim Burton. Green screen action with the White Queen, Alice and The Hatter

Figure [7] Diagramatic photograph from the Twentieth Century Fox TV show *Lie to Me*, (2009-2011), Creator: Samuel Baum, based on P.Eckman’s research work
Chapter 6 The Performing Arts –

Related Disciplines – Chiefly Exploring the Pedagogy and Writings Of Jacque Lecoq

1. Introduction

The rational in examining the performing arts is that they provide for the creative artist a more direct link between their emotions (the true seat of inspiration), their creative work and the audience response. The Walt Disney animation director Mark Dindal remarked in 2004, on the value of acting with the body, portraying emotion through attitude and gesture. He had been impressed by a workshop given by the mime and movement coach Lori Eric Salm. He claimed his ideas of giving life to animated characters using subtleties such as breathing, universal mannerisms and timing, showed a deep affinity between mime and character animation.

As the late theatre teacher Jacque Lecoq stated: Children mime the world in order to get to know it and to prepare themselves to live in it. Theatre is a game which merely extends this action in different ways…To mime is literally to embody and therefore to understand better.’

Experiencing the performance/audience dynamic can provide immediate objective feedback to artists who are sometimes too close to their work – and whose professional process is famously slow and laborious.

The embodied experiential nature of performance, whether its outcome lies in workshop ideas, (typically staged performances) or actual screen animations, stimulates profoundly the creative imagination. This is especially so in the discipline of mime – the central focus of this chapter, which most closely parallels the art of animation.

Mime is a primary form of expression, innate in all of us (a point which is discussed later in the chapter) from the frequent physical mirroring in social communication to the fantasy play of children.

Western mime is a self-devised (as opposed to interpretive) entertainment art, with the performers intimately involved in the creation of their performance. Mime has the same strong emphasis on corporal gesture as animation. Additionally, western mime in its broadest sense, allows a wide scope for imagination; it is not bound by the written text (staying in the physical
and visual realm) nor bound by realistic treatments or any codified rules of movement (like say Noh theatre). It is also more tangible in its communication style than say dance, which generally leans towards extreme abstraction.

2. A Direct Experience of Theatre Arts

My own experience of an early, mixed-arts education, has given me a unique and informed perspective on the value of interdisciplinary study, and performance training.

As a longstanding student of dance, I have an appreciation of the body abstracted into 3D form and pattern; and the expressivity of choreographic movement: tonal and rhythmic. At the Arts Educational School in London, and later as a performer in various theatre and dance companies, I have experienced the dynamism of live performance and audience response, where success or failure is evaluated immediately.

However, the direct communication and imaginative scope of drama is a particular influence – its emphasis lying in characterisation and caricature. The heavy emphasis of technique within much dance (especially ballet technique) is an inevitable constraint. The discipline characteristically concentrates on a more total abstraction of character and emotion and therefore is of less value to anyone trying to understand and negotiate the Uncanny Valley.

An appreciation of European theatre has taught me to see the divisions between separate disciplines as potentially fluid. I studied mime in Animate Theatre School, (where training was influenced by theatrical radicals Etienne Decroux and Jacque Copeau [1]. This approach favours naturalism in performance and therefore close observation of nature, but it also emphasises the vital role improvisation plays in creative devising. Animate Theatre School collaborated with Decroux, training and teaching at his school. Decroux (like Lecoq) explored still points and attitudes (a similar idea to keyframes in animation). His body training was based on what dancers term isolations, which demonstrated how weight was shifted through the body. The torso was emphasised, partly to avoid pantomime gestures common in the face and hands. Like
Lecoq (another influence on Animate) Decroux was interested in the emotions and appetites (thirst, lust etc.) and how they expressed themselves in the body. He was also interested in how certain occupations (labourer, desk clerk etc.) could be expressed in people’s physicality. Animate Theatre continued this tradition but was influenced by others (e.g. Lecoq), seeking to appeal to contemporary audiences. Animate Theatre strove for a breadth of physical and visual expression that parallels animation. A key example is the work *Object of Desire* devised by William Dashwood. (2013) [2]

Dashwood says: ‘it demonstrates one of the great qualities of mime by condensing time: 5 years are compressed into 5 minutes. The theme of addiction traces the evolution through attraction/curiosity/temptation/rejection, guilt and obsession to desperation and salvation.’

Decroux describes this as Subjective mime, rather than objective (e.g. exemplified by performers like Marcel Marceau). Objective mime is what the UK public recognizes as mime but the discipline is equally as diverse as animation.

Mainland Europe has cultural traditions that demonstrate less separation between the arts. Theatre is more eclectic, as it was in Georgian England – where the King and Nation’s entertainer of choice was the Italian/ British comic, acrobat, actor and dancer Joseph Grimaldi., McConnell Stott, 2009 [3] Continental Europe has many strong theatrical traditions: Ballet originated in France, Commedia dell’ arte in Italy, Flamenco in Spain, the high art of Puppetry in E. Europe etc. And certain key European visionaries enriched the culture: the Hungarian Laban, Jacques Copeau and Antonin Artaud in France, Brecht in Germany and Stanislavski in Russia etc. In England, taste-fixing Victorians began the separation of the arts (e.g. the highbrow from the popular), limiting some performances to static and artificial posturing accompanying the recitation of classical texts. This has had a detrimental effect on our theatrical culture and arguably the Anglo culture in general.

Returning to personal experience, I observed that people with creative ambition were attracted to the discipline of mime, because it provided them with many opportunities. It put them in touch with their emotions and physical expression. It improved their imaginative powers. It sharpened their observational skills. It allowed them to develop
abilities in writing and devising. And it allowed them to collaborate with like-minded people (and those with different mind sets). Students found the mix of minds and skills and openness of approach advantageous to learning and creatively stimulating.


Mime combines the physical forms and lyricism of dance, with the directness and imaginative range of drama. The British public generally dismiss mime as an anachronistic sideshow. They associate it with white-faced pantomime (such as Marcel Marceau playing Bip climbing an imaginary ladder) or as the crude slapstick routine of a circus clown. [7]

In counter argument, experience has made me respect the creative freedom of the discipline and value interdisciplinary work in general.

People drawn to the art come to it from a variety of backgrounds and have different motivations. Students are recruited from conventional acting training but also dance, music, puppetry and the visual and literary arts.

Actors are inevitably attracted, as they learn how to build greater physical presence and develop the understanding and flexibility to assume a range of identities convincingly – against type.

Those with wide creative ambitions (to direct, design, write etc.) appreciate the improvisational approach. Reflection on improvisational work stimulates ideas, but also reveals insight into character and imaginative expression.
3. Industry perspective on the influence of performance on animation practice -
Chiefly a review of the text *Acting for Animators*
by industry professional Ed Hooks

The following analysis, aims to ascertain the impact performance practice may already have on animation production, by examining key ideas and people of influence.

Acting experience for an animator was both valued and employed by Walt Disney himself from the early days of the Disney Studios. Ed Hooks is at present the leading authority on an actor’s perspective to character animation. He is an author of several books on acting – the most relevant being *Acting for Actors* now in its 3rd edition. [8] He has lectured to animation, effects and games studios around the world, and at notable conferences, festivals and universities. (By way of example he has worked for: Disney Studios, Tippett Studios, Blue Sky Studios, PDI/Dreamworks, SIGGRAPH, Valve Software and Lucas Learning.)

His latest 2011 edition of *Acting for Animators* provides a useful text – both to lend support and as a system of comparison with the work and writing of Jacques Lecoq examined later in the chapter.

Ed Hook’s provides seven essential acting principles, somewhat analogous to the 12 Disney principles on hand-drawn animation Johnston & Thomas (1997). In addition Hooks sheds insight on character creation for different genre and for new technologies (such as motion capture or games design). However, I believe there may be certain significant limitations with his system (beyond any acknowledged limitations), which I hope to explore in this chapter.

Ed Hooks’s Seven Essential Acting Principles are (summarized) as follows -

1. Emotion tends to lead to action
2. Humans empathize only with emotion (He defines emotion as a character’s automatic value response.)
3. Theatrical reality is not the same thing as reality (it is given extra dramatic shape, condensed in time and space). This is why an aesthetic sensibility is necessary and needs to be developed.
4. Acting is doing; acting is also reacting

5. Your character should play an action until something happens to make him play a different action (Hooks explains that obstacles must be deliberately deployed in order to create character conflict and therefore dramatic structure.)

6. Scenes begin in the middle ‘…And they do not end at the end.’
In other words in conventional narrative, characters come to a scene with a history, which may or may not be wholly evident but nevertheless affects their behaviour. They undergo a psychological progression as the narrative plays out.
And they maintain some degree of intention throughout.

7. A scene is a negotiation (A scene demonstrates a character in relationship: invariably a relationship of conflict with a) the situation, b) another character or c) themselves; sometimes the conflict is compound.

Hooks states in his book that his instructional advice is ‘mainly concerned with realism...’ P. 9 Hooks, E. (2011) [8] No doubt he feels training in the essentials of naturalistic performance are of key importance to the beginner or professional animator. He may indeed be making a valuable contribution, however he only explores realistic action in his method and animation is very much an exaggeration of reality, its true power lying in the imaginative realm.

Hooks gives minimal description as to the quality of movement in any action, stating: ‘Your character will tell you how he is supposed to move when you understand his context.’ P. 25 Hooks, E. (2011) [8]

This is understandable if we consider Hooks’s own creative training, influenced to some extent by Stanislavski (whom he mentions in brief). Acting training (particular following the Stanislavski model) is based on achieving naturalism in performance. How a performer interprets their character’s motivated behaviour within a drama will be inspired by the creator’s own or (easily) observed experience and in this sense, understanding context alone may provide them with logical ideas.
However, he is clear to stress the complexities of character building, stating that a character is in conflict with another, a situation or self - and can have compound conflict.

There is little further explanation as to how to design such character complexity – particularly with regard to gesture. What are partially explained are ideas (contained in the above principles) that are common knowledge to writers as much as performers. These ideas are also only applicable to conventional dramatic structures and characters. They are namely that a character should have depth (some previous inner and outer life and that the narrative arc (and character) is best revealed through action and a logical progression of some action.

He also makes a rather more powerful point about the significance of contradiction or inconsistency - saying that the sign of an inexperienced animator is that their character behaves in a way that is too reasoned and predictable. Real humans he considers are full of contradictions. They are emotional rather than logical in their reasoning and their inconsistency is part of what defines their humanity. He goes so far as to state that avoiding this fact can create characters that fall into the Uncanny Valley because their every gesture and word is justified. P. 66 Hooks, E. (2011) [8]

Other comments from Hooks also relate to this problem of Uncanny Valley. For example, he claims that animators are more inclined to be emotionally distant from their character than an actor and that this can result in either unbelievable characters or characters the audience has no empathy for, as he sometimes describes: ‘very cerebral and overly-cute’. Additionally Hooks has stressed in published interviews two basic problems when designing character animation.

1) Problem - Unmotivated movement

(The cliché here is that an actor is always searching for their motivation - so a character must also indicate some clear motivation in their movement or action. However, he has also stated the importance of (some) inconsistency in character portrayal. His chief point is that the artist must display an emotional connection to the character – so that the audience can respond to this
emotional message and thereby empathize (even with a villainous character). Without this the audience cannot suspend their disbelief and become absorbed in the narrative.

2) *Problem - Over-gesticulation:* Put simply, characters move around too much (he provides an explanation below)

Over-reliance on the Dialogue Track -

Hooks proposes that the problem of too much movement stems from over-reliance on the actor’s dialogue track, and that the animator is animating too literally - every word or line. He claims that the standard process (in Hollywood mainstream) of recording the dialogue track before animation is carried out began as early as 1933 with Disney’s The Three Little Pigs (though many early animations – including *The Three Little Pigs* - employed little dialogue).

He affirms that videotape performances of actors recording dialogue are useful but only for facial reference. This is because the actor’s movements are necessarily restricted (they must not move off mike). They are also usually recording in isolation and therefore not actually relating to any other actors in the scene.

He confirms that the Japanese produce animation differently, adding the voices after animation. (Miyazaki has worked this way at Studio Ghibli for example in his film *Spirited Away* (2001).) He believes this must undoubtedly give the animators more latitude.

Another point he makes, is that the dialogue in the film is very much less important than the reaction shots. Johnston and Thomas have discussed the importance of reaction shots in their seminal text *The Illusion of Life* (2011). Hooks states that in theatre the audience watches the person speaking and in film they watch the person listening. Reaction shots are significant because of their dramatic power and matter more than the voice over.
He acknowledges that in acting (and in life) movement precedes words and that character emotion and motivation (underlying the words) is infinitely more significant. The audience picks up a character’s body language more than their dialogue.

Additionally, he explains that a character’s emotional behaviour will often be contrary to the impression they give in their dialogue.

Motion Capture and the Facial Action Coding System -

Hooks believes there have been three significant transitional moments in the history of animation: Disney’s Mickey Mouse, Pixar Toy Story and Gollum in Lord of the Rings: The Two Towers (Weta Studio, 2002). Gollum’s body utilised motion capture to animate the character’s movements (using the emotive performance of Andy Serkis). However, Gollum’s face was manually animated using the Facial Action Coding System (published in 1978, updated in 2002), created by Paul Ekman, psychologist and world expert on facial reading. Hooks recommends further investigation of FACS for those interested in creating ‘photo-real animation’. Additionally, he points out that many researchers are now building on Ekman’s work.

In the case of Gollum’s performance, a pure imitation of natural movement (following FACS) may fall in to the Uncanny Valley. But since Gollum is a creepy monster: part human, part alien, this only adds to his charisma. Pixar have reported that though they have utilised FACS in some of their early animations, they then abandoned it (I propose) perhaps because it was too prescriptive and did not inspire imaginatively.

Hooks is generally critical of motion capture. He says: ‘Mocap makes everybody, actor included, think about movement too much. When you think about your movement, it automatically stiffens…Performance Capture is an improvement over Motion Capture, but it is still not a home run, and it is terribly expensive. Performance Capture lets you capture an entire scene involving two or more actors. That works better for the actors, no doubt about it, but they will still have to be aware of their movements to some degree.’
Hooks points out that eyes cannot be mocapped. Eyes are challenging to animate photo-realistically for a number of reasons: 1 it is complicated to animate the many changing light reflections in a person’s iris. 2 the blink rate of the eyes correlates both to a person’s emotions and to their thought patterns. (The well-known film editor Walter Murch (3-time Academy Award Winner) claims he discovered the importance of ‘cutting on the blink’.) People also have a particular communication style (often relating to status transactions – or their pecking order in relation to others). All these factors make achieving life-like performance particularly challenging. (Additionally, I would say that the quasi-realism available through motion-capture and other different systems like FACS, make the phenomenon called Uncanny Valley increasingly likely.

Hooks freely admits that the goal of an actor is different to that of an animator. Acting is typically naturalistic and therefore not principally creative in intent. It is a more interpretive art, relying generally on the scriptwriter to create narrative and character. Actors build characters principally using the Stanislavski model or its contemporary counter-part: method acting. This system is based on the concept of emotional memory for which an actor focuses internally to portray a character’s emotions. There is no clear indication with this technique, how to employ artistic licence and use exaggeration or visual imagination. The actor needs to know what they think and feel and perform this authentically. The actor does not need to find a new expressive or visual language to demonstrate character and narrative.

4. Dance Practice and Laban Movement Analysis

The interrelationship between dance and animation is evident in many films both past and present for example with Bugs Bunny performing ballet in What’s Opera Doc? (1957 Warner Bros.) [9] And penguins dancing tap and Latin in Happy Feet and Happy Feet 2. (2006, 2010) [10] Dance choreography overlaps other theatrical disciplines like mime to some extent in its study of gesture.

Choreographers will study the movements of people in everyday action – be it private, social, sportive or occupational. They also consider the affect on: breath, posture, action and the rhythm of action, of different emotions – albeit in a largely intuitive (personal)
way. If they are so inclined, they will also draw from nature and the wider world to explore the movement of animals, elements or machines etc. They can also work in the imaginative realm sometimes – devising fantasy forms and movement vocabularies (within the bounds of what a body can do). Additionally, they explore the effects of gravity on the body in falls of various kinds or changing centres of balance and the countering of gravity in jumps, lifts and skips etc.

However, dance employs greater abstraction of corporal movement and is closer to music and spectacle in many ways than drama. Indeed dance invariably aims to mirror the quality and rhythm of its accompanying music. There have been a noted few choreographers like Cunningham, who have deliberately choreographed against the music but this is atypical. Additionally, Cunningham aimed for total abstraction: shunning conventional narrative or character interpretation of any kind.

Nevertheless, dance choreographers have begun to collaborate with software designers to develop new choreographic software, and this has implications on the discipline that are both advantageous and disadvantageous and may impact other disciplines like animation.

The principal goal of dance is live performance and therefore real corporeal movement in space will always be more immediate and evocative than a computer (for choreographer as well as audience). It will never fully educate the choreographer (as to what the bodies true limits and range are) nor deliver as much inspirational (provoking us with the tactile, the personal, the social or communal, the emotional (both subtle and big in scale) the immediate, or poetically transient etc. However it can be a powerful tool that can inspire new artworks. And the use of choreographic software may prove to be a pervasive cultural trend.

Cunningham was the first choreographer to explore the computer as a tool, using the program LifeForms (later known as DanceForms). An animation was commissioned by SIGGRAPH, employing motion capture technology in 1998 and this collaborative experience went on to inspire Cunningham’s work Biped. [11] Cunningham continued to use LifeForms technology as a creative tool way up until his death in 2009. The company
that developed *LifeForms* (Credo Interactive) went on to develop other tools for both fight choreography and character animation (both human and animal). [12] It also supports other professional animation software like Maya, 3D Studio Max and Lightwave 3D.

Other choreographic tools have also been developed, for example ChoreoPro by ChoreoTechnology. [13] This allows choreographers to animate paths and formations, using figures and libraries of movements or poses. Music and beat counts can be added to clarify further the phrasing of particular dance styles or dance pieces. A number of styles are provided and can be mixed (e.g. jazz, ballet, hip hop, tap). Additionally video of rehearsal/improvisation and performance can be uploaded, as a tool for choreographer, performer and student.

These innovations are provocative and suggest the possibility of increasingly interdisciplinary work (either sharing method or artistic intent), creating perhaps new forms of art – much like *machinima* (a combination of real-time games and animation) [14].

Another interesting resource and innovation within the discipline of dance are the ideas and methods of the visionary Rudolph Laban. Laban’s theory and influence is both complex and wide ranging. Ed Hooks (and no doubt other animation teachers) are aware of Laban’s philosophy and methods. However, Hooks admits that he largely dismisses them, as he has found Laban Movement Analysis impossible to disseminate in any useful way in workshops to animators. Lesley Bishko animator, certified laban movement analyst and lecturer at the Emily Carr University in Canada, has begun to teach *laban movement analysis* (LMA) to professional and student animators. [15] Bishko hopes to expand understanding of animation movement by presenting to animators (through LMA) the full richness and complexity of movement. She believes this will aid animators to create more authentic and embodied character performances.

Her work may indeed be of value, and she is certainly the best person to bridge the gulf between Laban’s movement philosophy and the principles of animation. However,
LMA is a tool for codifying movement and its primary intention is not creative. This is a limitation.

In researching mime and performance, I propose that Jacques Lecoq provides an authoritative model for creative method - using the body as the focus. This is demonstrated in his pedagogy and writing (in his school and his authored texts, as well as texts written about him).

Lecoq valued an experiential learning style, supported by other educational theorists like David A. Kolb. He felt that mime was the ideal medium for experiential learning.

> “I would like to mention the potential value of *mimodynamic methods for all sorts of areas of training, quite apart from theatre, …The same pedagogic process can be adapted to all artistic education; it means involving the miming body in the recognition and understanding of reality, allowing each person to embody the world around him before sitting down to paint it, sing, dance or write about it. The resulting forms would, no doubt, be more deeply felt and less cerebral.”

 (*mimodynamic - a method allowing the actor to discover physical movements which translate into bodily action the sensations aroused in them by colours, words, music etc.*) p.162-3 Lecoq, J. *Glossary* (2000)

Lecoq founded a theatre school in Paris in the fifties, gradually building a strong international reputation, producing several noted teachers, reputable artists of film and stage (like the Nobel Prize winner Dario Fo, award-winning stage designer and filmmaker Julie Taymor and the writer and actress Yasmina Reza) and prestigious offshoot theatre companies (Mummenschanz, Moving Picture Mime Show, Complicite etc). His training courses in theatre, scenography and more recently writing are now active under the directorship of his widow Fay Lecoq.)

Lecoq’s foundation in theatre arts emphasizes two parallel though interrelated paths: on the one hand the study of improvisation or artistic experimentation and its rules and on the other, movement technique and its analysis. What is surprising and unique about his educational approach is the importance he places on play/improvisation – a subject he believes worthy of significant study, in its own right.
Lecoq’s conception of play is sophisticated. As it says in the glossary to his book *The Moving Body* ‘He exploits to the full the overlap of meanings contained in the words, ‘play’ and ‘player’ between child’s play and drama, games and performance.

Part two of his book (headed *The World and Its Movements*) begins with an in-depth discussion of the role of improvisation. He says: ‘We approach improvisation through psychological *replay*, which is silent. Replay involves reviving lived experience in the simplest possible way. Avoiding both transposition and exaggeration…’ p. 29

Situations first relived could include the metro, hospital, market place, etc.

He continues: ‘*Play* [acting] comes later, at the point when, aware of the theatrical dimension, the actor can shape an improvisation for spectators, using rhythm, tempo, space, form. *Play* may be very close to *replay* or may distance itself through the most daring theatrical transposition, but it must never lose sight of the root anchoring it to reality.’

Lecoq’s pedagogy is therefore based on close observation of both the natural and man-made world. Through experiential learning and repeated analytical observation, students are better able to intuit and to imagine as they have rich experience and understanding to drawn on. Improvisation is seen as a way to expand the imaginative possibilities of an artist, refine their observational and thinking skills and strip them of mannered expression and cliché.

**Movement Technique –**

The other key component of Lecoq’s teaching is *movement technique* and its analysis. The aim of movement technique is to equip students with a better idea of the true limits and range of physical expression, and to give them a distinctly physical grammar (both basic and sophisticated) by which they can communicate.

Analysis of movement helps students look directly and with more clarity at both corporal expression and the movements of nature (namely animals, elements and materials). Insight is gained by reaching a common understanding as a shared audience,
through dialogue, rather than the teacher handing on a set body of knowledge, which inevitably means influencing too strongly opinion, taste or style.

Observational skills are again accentuated in movement analysis, for Lecoq says: ‘…acting requires more than memories drawn from life. We must constantly go back to live observation: watching people as they walk down the street, or waiting in a queue, attentive to the behaviour of others in the queue.’ p. 31

However, he is careful to extend these skills together with acuity for dramatic invention, insisting: ‘We always try to push the situation beyond the limits of reality. We aim for a level of aesthetic reality which would not be recognisable in real life in order to demonstrate how theatre prolongs life by transposing it’. p. 34 (Lecoq believes that truly creative work has an enduring quality, which ideally is able both to awaken us to the present moment and yet speak to us of all times. In other words, it provides an aesthetic distortion of reality.)

For Lecoq masks play an important role in his teaching. Training begins with the neutral mask. This is a mask that produces a face in perfect balance, devoid of any emotional conflict. Lecoq declares that it puts the wearer in a state of calm and receptivity prior to action, enabling the performer to achieve both an attitude of curiosity and a greater economy of movement. This economy of movement aids the performer in reaching a more aesthetic and more readable transposition of realistic action.

For the spectator, the neutral mask or indeed any mask places greater visual emphasis on the body. It also highlights particularly movements of the head, or head and neck, and the hands – which is why prop play becomes central.

With non-realistic animation, the effect is presumably the same – the body achieves much greater importance in expressive communication.

Lecoq provides explanatory information about the setting up of masked play, saying that the mask must not adhere too closely to the performers own face and should be larger in size. This then provides the necessary symbolic distance (for performer and spectator), allowing for greater theatrical play.
The neutral mask, claims Lecoq, has specific limitations, he states p. 39: ‘…a neutral mask is never able to communicate face to face with another mask. What could a neutral mask say to another mask?...All they can do is to find themselves together, facing an outside event which interests both of them.’

It is the quality of neutrality that makes it limited, because it cannot enter into a dynamic relationship with anyone, as that would require a subjective response. An interactive relationship requires the distortions of various different emotional expressions and a distinct psychological bias.

Although the neutral mask shows little character complexity, it does enable the students to reach a kind of universal expression of man in isolation with their environment because it helps to highlight the underlying dynamics of a situation. This clarity and simplicity lays the foundations for study in character or caricature.

Taking the theme of ‘The Fundamental Journey, the students employ the neutral mask to walk, run, climb or jump in an imagined natural environment. Lecoq describes the natural world as speaking directly to the neutral state. In a mood of calm and receptivity our senses recognize strongly our environment to the point of identification. As he says: ‘When I walk through the forest, I am the forest…’ p. 41 These experiences prepare his students for work on identification of all kinds.

Lecoq’s training is similarly catholic to that of an art school foundation year, in that students observe their environment and different living entities, using their experiences for further artistic experimentation.

Students are encouraged to work on identifications with different materials (e.g. wood, paper, cardboard, metal, liquids). He says: ‘For the actor the objective is both to broaden his field of reference and to sense all the fine shades of difference which separate one material from another or which co-exist within the same material….To do so involves hard work over a long period,’ p. 44

The study of ‘identifications’ or materials is then explored in its dramatic dimensions and transferred into human behaviour, or as Lecoq describes: ‘basing oneself on natural dynamics … using them for expressive purposes in order to achieve a better playing of
human nature… to humanise an element or an animal…’ p. 44 In this way the students begin their study in characterisation or caricature.

A second possible approach is to invert the process by starting from a position of neutrality or naturalism and ‘gradually, at particular moments of the performance, the elements or animals in which it is grounded show through…’ p. 45 Here the portrayal is largely realistic but with subtle elements of characterisation.

Having experienced, by means of these identifications, the greatest possible number of natural or animal dynamics, the actor (or creative artist) is in a position to use these experiences, sometimes unconsciously, to develop. They then acquire a set of references, at once very complex and very precise, as a support for future work.

Improvisational work on *Identifications* ranges from silence and immobility to maximum movement, and takes in innumerable intermediate dynamic states. Lecoq affirms that these experiences remain forever fixed in the body, saying: ‘in truth nature is our first language. Our bodies remember!’ p. 45

Identification work then continues in a more fundamental and abstract dimension with the exploration of space, light, colour, materials and sounds. Lecoq describes this work as the *universal poetic sense*. By way of example, he remarks that though we can neither see the form nor the movement of a colour, nevertheless the emotion which they arouse may set us in motion—even in emotion. Students explore through gesture or *mimages* (mimed images with no reference point in the real world) their responses. P. 46 At a later stage, students approach works of art in the museums, or poetic texts or music. The aim being to sense the spirit of classical works of art and use them as a starting point for translation into gesture and into dramatic situations. It is not Lecoq’s intention that they merely illustrate or explain. He says:

‘The challenge for the teacher is to observe with a practised eye that can distinguish, among the different gestures made, which ones are explanatory, which are formalised, and which are both truthful and poetic. Gradually, the students themselves begin to acquire subtlety in observing gestural nuances...’ p. 52
Lecoq's foundational year is moving towards one clear and simple objective: character acting. Work on expressive masks move further towards caricature, as they impose on the body particular attitudes both physical and emotional. Gestures again are expanded and reduced. Expressive masks continue to help the students avoid too literal a performance, giving them the necessary distance to really play imaginatively. (In theatre, as opposed to film, a wholly naturalistic performance does not carry an image all the way from stage to spectator.)

The Role and Formation of Movement Technique -

Lecoq's pedagogy is unique in relation to its reliance on movement as a path to all kinds of artistic work. Movement is studied not in formal ways by learning pantomime tricks, dance or fencing moves, or by detailed categorisation as in Laban but in explorative ways subtle and multifaceted.

Movement technique is used to serve as introduction, as support, or as an extension of the different course components. Technique is divided into three distinct aspects: first physical preparation; then dramatic acrobatics; finally, movement analysis (which changes, in the second year, into applied techniques relevant to different dramatic territories such as melodrama, comedy etc.) p. 66

The primary technique of physical preparation involves simple warm-up movements (swinging arms, bending trunks) but which are given meaning later. The movements are then enlarged to test their limits, filling the largest possible space. The starting and ending points of the movement are concentrated on particularly. As Lecoq states ‘These two moments, which precede and follow the extension of the body, carry a strong dramatic charge. The state of suspension just before the beginning is part of the dynamics of risk (risk of falling) and includes a sense of anguish which emerges clearly. Conversely, the concluding suspension is one of landing, returning to a state of calm, coming gradually closer to immobility and serenity.’ Breathing is then used to change the movement: timing the in and/or out breath in particular ways can change the emotional meaning considerably.
Body Limits -

(Dramatic) Acrobatics exercises, in the secondary stage of Lecoq’s movement technique, serve to free the actor from the force of gravity – through rolls and flips. Students work on the fundamental four qualities of suppleness, strength, balance and lightness. Juggling complements acrobatic work, exploring different props and dramatised play (in a restaurant, shop, etc.). (Play) Fighting is also explored, creating the illusion of violence; and then fighting with props (flying chairs, rolls over tables etc.). All this is in the service of giving the artist greater freedom.

Movement Analysis -

Movement analysis forms the third branch of Lecoq’s movement technique and is applied to both the human body and to nature, charting the economy of physical actions.

Lecoq says: ‘When I started, I used Georges Hebert’s ‘natural method’, which analyses movement under eleven categories: pulling, pushing, climbing, walking, running, jumping, lifting, carrying, attacking, defending, swimming. These actions lay down circuits in the human body, through which emotions flow. Feelings, states and passions are expressed through gestures, attitudes and movements similar to those of physical actions. Young actors have to be aware of how the body can ‘pull’ or ‘push’ so that, when the need arises, they can express the different ways in which a character can ‘pull’ or ‘push’. p.71
Natural, Foundational Movements -

Three natural movements of the body are analysed: undulation, inverse undulation and eclosion and through these physical movements students first experience masked play. Eclosion corresponds to the neutral mask, undulation (a movement pattern described in animation as arcs) corresponds to the expressive mask and inverse undulation the counter-mask, summing up three dramatic positions: being with; being for; being against. Figure [2] Eclosion, J. Lecoq (2000)

Inverse undulation starts from the head and mobilises the whole body – expressing dramatic reaction. (Lecoq’s view is that ultimately all drama inverts the techniques of movement.) Figure [4] Inverse Undulation

Undulation and inverse undulation share four main body-positions as the movement unfolds: inclined forwards, drawn up to its full height, inclined backwards and hunched. Lecoq states: ‘I ask the students to adopt these positions one after the other and then, in the course of this physical progression, to experience passing through the different ages; infancy, adulthood, maturity, old age.’ p. 74 Figure [3] Undulation

Eclosion opens up from the centre. It starts from a crouched position down on the ground, the body occupying the smallest possible space, and opens up to finish on the ‘high cross’ position, upright, legs together and arms extended above the horizontal. After these simple gestures are analysed, they are expanded on in three new ways, using: 1 expansion and reduction, 2 equilibrium and respiration, 3 disequilibrium and progression. These are applied to all the basic analytic movements and then to physical actions, and can then be adapted for performance suggesting particular feelings.

Expansion and reduction: firstly movements are expanded to their maximum to find their spatial limits, and then reduced to the limits of visibility. P.75 ‘In this procedure we move from expressionism to impressionism, from the play of the whole body to the play of the perceiving eye.’

Equilibrium and respiration: this describes the extreme limits of all movement applicable to the performer as well as the limits of dramatised emotion. Starting with a simple narrative situation, movements and feelings are increased to their maximum and then
reduced again. This enables the performer or artist to react or create with great subtlety and vividness.

Finally, the situation is explored beyond its limits. Pushing a movement beyond the point of balance obviously provokes imbalance. This law of physical movement is no less valid for the stirring of the emotions.

Bringing out Attitudes -

Students explore a series of nine attitudes initially (which serve a similar role dramatically to an animator’s key poses). Lecoq describes the term attitude as a powerful moment of stasis, isolated within a movement. It is a moment of stillness, which can be placed at the beginning, at the end or indeed at any key point. Lecoq also states that attitudes are revealed when you push a given movement to its limits (much as an animator illustrates key poses by pushing the limits of squash and stretch (and employing exaggeration - sometimes going well beyond reality). These attitudes help provide a structure for movement that goes beyond natural gesture.

Lecoq organises these nine attitudes in an ordered progression. He states: ‘This exercise gives rigour to the pelvis, the trunk and the head, thus going against their natural movement.’ P. 76 Previous treatments are explored along with them, the treatments: 1 expansion/reduction, and 2 equilibrium/respiration. Various ways of breathing are also investigated. The students find dramatic justifications from these improvisations.

The nine attitudes are interesting according to Lecoq, because of their contradictions. He says: 'The great Harlequin', a movement pulling the pelvis back, may equally well suggest reverence, fear or stomach-ache…All the main attitudes bring multiple possibilities, and this makes them eminently dramatic,…It is up to the students to strike out, and discover all the variants, especially in transitions from one attitude to the next.’ P. 77
Researching the Economy of Physical Actions –

‘Action mime’ provides a basis for analysing physical actions (labouring trades like wood cutter, boatmen) or sport exercises like pull-ups, by reproducing through mime the action of 1 an object, 2 the obstacle and 3 the resistance. Action mime is also applied to the handling of objects (e.g. opening a suitcase, drinking from a cup). The most economical form of the action is researched first as a reference point, and then actions are pushed to their maximum to discover their dramatic content.

Gestures are fitted into dramatised sequences, having a beginning and an end, to avoid falling into pure technique. Lecoq claims that: ‘Action mime shows us that everything a person does in their life can be reduced to two essential actions: ‘to pull’ and ‘to push’. …These actions include the passive ‘I am pulled’ and ‘I am pushed’ and the reflexive ‘I pull myself’ and ‘I push myself’ and can go in many different directions: forwards, to one side or the other, backwards, diagonally, etc.’ p. 79-81 Lecoq calls this multidirectional pattern of movement or relation to space the effort rose. Figure [5]

Lecoq claims the effort rose can be adapted to all human dynamic, whether physical or psychological, whether a simple movement of the arm or an all-consuming passion. A dramatic situation can be reduced essentially to pull/push with a variation of levels, and then an inversion of forces. Lecoq gives the following example:

‘I urge someone to move forward…he refuses
I go in front and pull him by the band…he resists
I pull harder…he pulls me in the opposite direction
I pull even harder…he gives in
He comes with me…he overtakes me
He drags me after him…I resist
I let him go…he escapes’

‘Harlequin refuses to go to war. Everyone tries to convince him. At first he gives a categorical refusal, insists, but then gradually allows himself to be persuaded and ends up agreeing. Everyone is delighted, but then he retracts. At last he makes up his mind to go alone, into the front line, ready to kill anything that moves. People try to make him understand that it’s dangerous, that he could just as well
The three main directions contained within the effort are: verticals, horizontals and diagonals. Lecoq states that these three directions correspond to three dramatic territories: Horizontal ‘pull/push’ corresponds to ‘you and me’. This is dialogue as found in the commedia dell’arte or clown routine. Vertical movement, on the other hand, situates man between heaven and earth, or zenith and nadir, in a tragic event. The diagonal is more sentimental and lyrical and therefore less predictable – it is the territory of melodrama. Lecoq sees this concept as applicable to current genre, not only the melodrama of the nineteenth century but, for example, the melodrama: of the migrant worker, a war-torn family, a jobless man awaiting the call to hear the outcome of an interview etc. Additionally, Lecoq views drama as without fixed boundaries and encourages invention of form. He says: ‘Every precise definition of pedagogic method, from my approach to the great dramatic territories onwards, suggests the need for combinations. Only by going beyond the frontiers, passing from one territory to another and overlapping them, can true creativity be nurtured and new territories come to light.’ p. 162

Analysing the Dynamics of Nature –

Lecoq’s foundational year in theatre arts, explores in some detail the dynamics of nature (elements, materials and animals). This has particular relevance to film animation, as a key feature of animated films is the endowment of animals and objects with human characteristics. Lecoq’s improvisational work enables students to observe and experience natural phenomena in a direct way that aids dramatic transference or personification. They consider from a technical point of view what parts of the body are involved, as well as the dramatic justifications of a particular kind of movement. For example, in the study of the elements, the dynamic of water is explored:

‘we observe the movement of a body in relation to the sea: it is lifted by the water, thrown back by the waves, dragged into a sideling struggle in its desire to penetrate.’ p. 83. Lecoq states that it is only from the pelvis this overall sensation can be transmitted to the whole body.
Fire has its dramatic justification in anger (combustion, flames boiling etc., are all explored).

Materials -

With the study of materials Lecoq confirms the importance of reaction, in action drama. This compares favourably to the opinions of Thomas & Johnston in their twelve principles set down in *The Illusion of Life* – that reaction shots contain a good deal of emotional drama and that their quality and timing can be especially revealing of character. He claims that materials are distinguishing in their passivity – displayed largely through reaction.

Lecoq organises the study of materials around the quality of their physical response.

He says: 'We have to throw, crumple, pound, tear or shatter a material before we can observe its reaction…First there are those which settle and remain inert when you act on them: lead thrown to the ground, clay which splats, wire which is bent. …

On the other hand, elastic materials, once stretched, are nostalgic for a return to their initial shape, even though they may not quite succeed. There are innumerable variants: rubber, elastic, various fibres. The more you pull them, the more they suffer fatigue, …Dramatically speaking, the dynamics of nostalgia and fatigue are very interesting.

Then come the marks, bruises, creases and folds which you can observe in crumpled paper. Paper also tries to recover its initial shape, but cannot do so with the ease of elastic materials. This introduces the tragic dimension,…’ p. 84-85

Finally, students investigate breakages, splinterings, cracked glasses, shattered window panes, explosions. Here more than anywhere else, Lecoq remarks that we are looking at ourselves, at the variety of our internal cracks and divisions.

Materials may also be altered by cold and heat as well as by being physically attacked. Things that melt, evaporate or solidify are rich in dramatic analogies, as can be seen from common turns of phrase: ‘his anger melted’, ‘that man is like a block of ice’ etc.
Cookery is also ground for analysis. Equally, another person’s body can also be treated as if it were a material. An actor can grasp their partner, crumple her up and throw her on the floor, as the partner continues on her own, showing the reaction of the paper as it straightens out again. By the end the students will have experienced every possible nuance between different materials and within each of them. These dynamics feed in to their artistic vocabularies so they will be able to say ‘it’s too oily’, ‘she’s not leaden enough’ etc. This language of analogy is very rich and precise.

Studying Animals –

Animal studies help with character creation. Broadly, animals resemble us, having bodies, feet and heads, making them easier to approach in some ways than materials or the four elements. Research on animal bodies begins with their purchase on the ground, asking how do they stand? contact the ground? – in what way different from our own contact? Then animal attitudes are investigated, asking how many attitudes are available to them? In what rhythm or quality do they move? Locomotion in animals can be extremely complex and it is explored experientially with regard to different types of animals (the undulation of reptiles, flight of birds, swimming of fish etc.). The study of animal locomotion in sea, air and on land, feeds in to previous work on the elements strengthening both.
Figure [1] A diagram of Lecoq’s two-year acting course. Published in translation (2000) UK.
Figure [2] *Eclosion*

Figure [3] *Undulation* (in animation this is referred to as movement arcs)


Figure [5] The *Effort Rose*, Lecoq, published in translation (2000) UK.
Figure [6] Production photograph showing *Emotion Capture* for the 3D animation *Rango* (2011), Dir: Gore Verbinsky. *Rango* used live-performance (without motion-capture) to a great extent: to enthuse, inspire and inform the animation of film characters.

Figure [7] Photograph of animator Chuck Jones acting out a pose while working on a Bugs Bunny picture, Warner Bros. Cartoons (Jones worked on these cartoons from 1941-1963). Published in 1981 in *The Illusion of Life*, Thomas & Johnston. A good sense of pantomimic performance is an essential part of any animator’s craft.
Figure [8] Next, UK TV Animation for Channel 4 (1989), Dir: Barry Purves

Figure [9] Film still from the French hand-drawn animation *The Illusionist* (2010) Dir: Sylvain Chomet, Pathé & Django Films. The film was based on an autobiographical screenplay by Tati, which seems the perfect subject matter for the French animation.

Figure [10] Walt Disney Mickey Mouse in Giantland, A United Artists Picture, Joseph M. Schenck.
Figure [11] *A Minute Too Late* by Complicite Theatre with Simon McBurney, Marcello Magni, at the Lyttleton Theatre January ’05

Figure [12] *A Minute Too Late* by Complicite Theatre with Simon McBurney, Marcello Magni,
Figure [13] *The Master and Margarita*, Complicite Theatre, 2012

Figure [14] *The Disappearing Number*, Complicite Theatre, 2007
CONCLUSION

Animation has changed radically; it is now a big, complex entertainment form. With its seemingly rich pallet, the challenge for artists grows. Once niche art, animated visuals are used in everything from games, to cell phones, and film effects. Animation is losing visual and creative distinction. It is moving closer to live-action film. Technological and commercial trends have changed the nature of production to an unprecedented extent. New technologies present challenge beyond dilution of the genre. The negative (increasingly familiar) term Uncanny Valley is now applied to film animation as well as robotics.

One reason is the wizardry of new technology often masks emotion, intrinsic to character, narrative and art. We can see this in Burton’s fantastical Alice in Wonderland, incorporating a plethora of digital techniques, but lacking any emotional nuance. (The Metacritic score rates it a mere 53% and reviews on internet movie database describe it as ‘Alice in Bluderland’, ‘Nothing Wonderful’ and ‘Disenchanted’. (Peter Bradshaw reviewing in the Guardian also gives negative criticism, saying: ‘Tim Burton’s gothic treatment of Alice is all too conventional’. [1]) A similarly under par response can be seen with the frozen eyed characters in motion capture films like Polar Express ‘04. Such impressively real effects, but emotionally cool performances, unwittingly engender the Uncanny response Mori described back in 1970. Since the Uncanny phenomenon has been found to be universal, children audiences are no warmer or more appreciative than the adults.

Feelings reign in our cinematic memories. Emotions shape our fundamental attitudes, and values, underpinning all debate on aesthetics. Examining emotional response (as audience, or artist in process) therefore heightens understanding of gesture and character design and sheds light on circumnavigating the Uncanny.

Examining research on the Uncanny by technologists, scientists and psychologists: like Ayse Saygin, Pai; Eckman and Thalia Wheatley, has proved it presents design challenges in digital animation, requiring special sensitivity. Any simulation of life –
from an animated toaster to a complex human, needs to consider our emotional response to anthropomorphic or simulated movement.

Mori’s ideas postulated that realism in human simulation, increased problems of acceptance, and research proves this. Most scientists and artists agree the Uncanny response is innate and unchangeable. Moreover, our sensitivity to incongruence is acute. (We can respond negatively viewing just a single ‘frozen’ eye.) [1] Wheatley 2012

Research examined not only the Uncanny but also what constitutes appeal. Our nature makes us attribute human qualities to anything vaguely imitative of life. We are wired for human relationship. Scientists believe expressive movement engages us most. Animation distinguishes itself by its creative approach to movement (primarily through character). Without this distinction it blurs into live-action film, or fine art. The thesis therefore sought to define: limits and range of gestural expression, the origin of all animation performance. Scientists now pursue this knowledge, once only the domain of artists. But the two disciplines look at emotion from wholly different perspectives. Clearly in digital animation they are inexorably linked, which creates its own challenge.

Companies like Pixar and ILM have consulted psychologist Eckman in the past on his facial coding system. But the research discovered such companies now prefer intuitive methods. (As revealed in an interview with Pixar director Pete Docter at a conference for The Association for Psychological Science in 2005, Journalist: Eric Wargo, (2005), [3] Moreover, according to Eckman, using observational skills alone, Pixar’s results are near perfect. In science, finding answers produces more questions, and isolating emotional factors, often fails to explain how they inter-relate. Research highlights the complexity of emotion and human simulation.

Scientists like Goetz, Kiesler, & Powers, (2003) set out guidelines for simulation of life. They advocate close matching between realism in appearance and behavior. These principles are too prescriptive to be followed literally in all contexts. Additionally, roboticists Ishiguro and Barneck of Eindhoven University have acknowledged the
difficulty of developing design strategies. Scientists wish to establish agreed rules to build on. Yet artists characteristically seek to disrupt orthodoxy, and create the unexpected or new forms of expression. Both camps agree avoiding high realism is advisable, and allows creative license. (Total realism negates imagination and creativity entirely.)

For animators, the importance of emotion is well indicated by their reliance on observation and direct experience, as stated in the Disney Principles Referred to in Chap 3. By way of example Pixar production designer Harley Jessup in discussing the feature Ratatouille says: ‘A research gathering trip to the location… Paris for Ratatouille, is very important to bring back images that are impossible to find in books and to experience just being there.’ Journalist: Ron Barbagallo, (2008) [4]

When animators work on character, they may have a type in mind, but this is usually based on someone living. A friend, co-worker, movie star, a mix, or ultimately themselves, informs their work. Building emotional details into gesture creates the illusion of life.

Sensory experience and sensory learning is critical to the animation process. We receive emotional cues through our senses. Digital tools remove the sensory stimulus from the artist (e.g. the feel of the pencil or clay), making it harder for them to develop feel for their craft and intuit.

Our senses play an integral role in triggering, processing and interpreting emotion. As audience our emotional reactions are guided by sensory information – received in real time experience or reflected memory. At its best animation is richly sensual as in Ratatouille. Yet images created in animation software are highly artificial. Directors like Gore Verbinsky or Glen Keane remark on the sterility of computer graphics, its lack of natural imperfection, sensuality or surprise. The artificiality of computer-generated animation goes way beyond the artifice employed in traditional animation. (Refer to Chapter 2 The Uncanny Valley)
Verbinsky has commented (in reference to the digital animation *Rango (2011)*) that natural anomalies have to be added – requiring ample time, labor and ingenuity. In animations like *Wall-E*, emotions are cleverly implied by the idiosyncratic rhythm of *Wall-E’s* movements and his distillation of gesture. A contradiction inherent in art is that sometimes less is more. Perception of emotion behind any movement is often more important than the movement itself. (The training site *Animation Mentor* advises animators to not be afraid of stillness to accent rhythm or communication.)

Boadway, 2011 [5]

Artists can exploit an audience’s tendency to anthropomorphise, provoking audiences to be active participants in the fantasy; thereby increasing engagement. The literalism of photorealistic 3D visuals hampers this play between the audiences’ imagination and the artists’.

However, a sizeable proportion of audiences now get enjoyment from film effects rather than character. Pierson (2002) They enjoy understanding the mechanics behind the effects rather than be emotional participants in the experience. Games and gaming are an undeniable influence on film culture – an accompanying game often being included in film merchandise.

Culture has shifted greatly, and experience is often less communal or interactive and more virtual. We are less ‘in touch’. For all these reasons, the artist is losing importance in animation production.

Artists’ aims are often in conflict with technologists. The purpose of art is often to remind us of our humanity (even within fantasy narratives). Technology frequently wants to remove us from our humanity or at least make significant adjustments in terms of efficiency, accuracy or maximization.

Motion capture sequences remove all control from animators, placing it in the hands of technologists, or other creative professionals (script writers and actors). The critical audience took time to understand this limitation. The 2006 (motion capture) Academy Award winner *Happy Feet* is testament to this. Criteria now exclude predominantly mocapped films.
The appreciation for mocap appears to have waned. Software is poor at replicating subtle emotional cues, like smiles and eye gazes: important for building empathy and credibility. Such films are often commercially and critically unsuccessful.

The Disney principles of animation craft, established in the 30s, published in the 80s, have endured. However, they diminish in strength when applied to current contexts or the Uncanny response would not exist. The principles developed when technology (e.g. the multiplane camera) did not interfere with traditional process (e.g. pencil drawing). They were intended for a small and therefore highly adaptable team (chiefly creative, skilled craftsmen). Principles were an adjunct to a process involving: considerable observational study, experimentation and collective or individual reflection. The blueprint for success is more complex now. Teams are larger. Technology often imposes limits on budget, time and creative and artistic options. Additionally principles cannot replace time learning craft. They cannot provide an artist a unique voice – a prerequisite for original work.

Another difference between Disney past and present is cultural context. Disney originated in the silent film era, where emphasis was on gesture and performers had great physicality (coming from Vaudeville, or dance troops and performing slapstick routines or stunts). Art is self-reflective, borrowing from other genres. Animation characters like Koko the Clown, or Betty Boop were based on circus or flapper dancers. Classics like Chaplin’s *Modern Times* (1936), or Eisenstein’s *Battleship Potemkin* (1925) show high sophistication in visual narration and are arguably more emotionally nuanced, mixing wit, irony and parody with pathos, tragedy, and social comment. All this achieved without dialogue, indeed because of it. It is now less likely that wit or drama is drawn from gestural performance: its timing or quality, but scripted dialogue.

Influences on character animation often come from games and technology, with fantasies based on the super-human or robot-human.

Animated film developed from photography. Portrait photography implies motion with asymmetry in pose or background, like animation. However photography is ultimately static. Its art is iconographic and less ambiguous than many animation films. Generally, photography and cinematography are less diverse and easier to read than animation.
Critique or evaluation of animation tends to employ standard film theory. Yet scholars like Jane Pilling (98) or Paul Wells have noted its aesthetic is closer to the avant-garde visual arts or performance. Of course much animation is by necessity highly commercial, following predictable conventions in character and narrative, appealing to mainstream taste.

What makes animation good is often distinctiveness. This is difficult to achieve with financial pressures. Replicating past successes is more desirable than risking new ideas. Now animation has entered pop culture, the public fixes taste and herd mentality overtakes discerning critique. Previously animation was either for a niche audience or for children.

Current audiences are often male, young and game playing and this influences style of action (ideally fast paced, with plenty of explosions and crashes – more like Avatar ('09) than Wall-E ('08) or Rango ('11)). This new audience responds most to technology rather than any aesthetic qualities of a film.

Another point about audience is Disney has received criticism for its poor representation of different cultures: for depicting ethnic heroes or heroines with distinctly European features and for defaulting to stereotype. Animators need to appeal to a diverse audience and would do well to study the full breadth of society: representing varied ages, class, gender, occupations, personality types etc.

**Relevance of Body Language for Computer Animation**

Whatever impact culture has on audiences and producers, they cannot undo our in-built biological responses to human or quasi-human simulation.

Study of body language is especially relevant because of challenges engendered by the Uncanny response and (for animators) digital tools.

Research into non-verbal communication examined and compared recent data from biology, zoology, psychology, robotics and the arts. It considered the potential use of
this information to animation, and problems that occurred in the absence of such knowledge.

Specialised research on emotional expression (by Eckman) has already been used in industry. Eckman’s Facial Action Coding System (FACS) demonstrates the complexity of the subject and necessity for close and repeated observation. Emotions display in distinct areas of the face, often asymmetrically, and each having discrete rhythms. Some emotions prove especially subtle, difficult to read or simulate (like smiles and eye expressions). Individuals vary in the duration, intensity and asymmetry of expression, and context also alters factors. Detection and replication of emotion is a specialised skill.

Everyone has some intuitive understanding of body language, but deep understanding is rare. (For example, the world expert in facial reading claims only one percent can spot microexpressions. Eckman (1992); (for further data refer to Chapter 5). [6] Public knowledge is often erroneous and incomplete. Cultural conditioning and language weaken our ability to pick up non-verbal clues Navarro (2008). Expertise is not easily achieved because gestural observation needs to be intelligently interpreted, taking time and practice.

Intensity of expression interests character animators particularly—encapsulated in Disney’s principle Exaggeration. Extremes (or contrasts) of emotion and behavior engage our attention, because they provoke instinctive responses. Psychologist Dacher Keltner has remarked that ‘It’s our extremes that tell us who we are.’ And our engagement is often further increased when these extremes are presented in a stylized and exaggerated way, as Disney highlighted. The pursuit of high realism ignores this insight. Keltner, Interviewing Journalist: E. Wargo, (2005) [7].

According to Pixar’s CCO John Lasseter, timing of movement is also especially significant to character (providing emotional clues).
Science is interested in the quality of appeal. Research indicates that the (visual arts) idea of beauty: as symmetry (e.g. originating from the Aristotelian idea of the Golden mean), does not describe the true complexity of attraction. Scientists have discovered that people prefer to gaze on faces with some level of asymmetry, as discussed in chapter 2. And in additional reference: Swaddle, (1995), [8]; Pound (2006), [9]; Kowner (1996). [10]; According to Eckman, certain expressions also have an asymmetrical bias. Eckman (1981, 2003) [11] [12].

This supports the Disney principle of avoiding Twins. Another discovery was that frequent movement was generally preferred, especially when combined with open gestures and attitude. However the unified expression of body, face, gestural rhythm and context must always be taken into account. Additionally, people can often hold contradictory emotions and intents and this can peak audience interest. Industry advisor Ed Hooks has remarked that too much continuity in character performance is the sign of a novice. This alone may provoke some Uncanny response – making it difficult for audiences to suspend disbelief and engage. Yet continuity throughout design is what scientists like Aysee Saygin (University of California) advise.

Artists prefer to come to their own conclusions. Their results can be highly precise. Eckman has remarked in reference to the Pixar short Geri’s Game (1997), on the accuracy of facial expression, finding only one error after several viewings, stating: ‘They look in as fine detail as we do in our research.’ Eckman, (2005), Journalist: E. Wargo. [3].

Another contradiction regarding human expression is that emotion is often hidden or repressed. [13] The face apparently indicates least about a person’s feelings. Surveillance expert Joe Navarro has remarked that feet can reveal more about someone’s emotions (in their positioning and orientation). Hands are also very expressive, and interesting hands are a mark of an experienced animator. General understanding is also gained from observing a person’s baseline expressions and then seeing when and how they deviate from this.
The research revealed *status gestures* were an important aspect of body language and *appeal*. Author and theatrical director Keith Johnston, emphasizes the essentialness of status signals in simulating natural relations. Status signals play out even in our interactions with our environment and objects: since we feel humbled in grand churches, or puffed up wearing designer clothes. Consequently we take up more or less space, (horizontally or vertically) dependent on our level of comfort or discomfort with others or our surroundings. These signals are always fluctuating (subtly or grossly) and according to Johnson, we find these power plays engrossing. To ignore such signals would result in performances both unconvincing and unappealing.

In observing body language, it is important to study a wide range of people and behaviors. Not only do occupation, age, class, ethnicity and gender profoundly impact physicality, but also contrasts between people highlight individuality as well as commonality. Disney has been criticized as losing touch, when its majority of character leads look, move and sound like white North Americans, even when this is unintended. And games designers have been criticized for animating female characters without any sway in their hips, despite their often overtly sexual appearance.

A critical aspect in representing or decoding body language is timing. Animators who employ ‘emotion capture’ (as opposed to MOCAP) are chiefly studying actors’ emotional rhythms. Physical proportions in films like *Rango* (2011) are radically altered and movement caricatured, making close realism pointless. The discovery of micro-expressions and gestural synchrony highlights the extreme subtlety of emotional gesture, which in situations of social harmony or intense emotion, can be measured in fractions of a second by the initiated [13] Isaacs and Haggard 1966. Our strong tendency to anthropomorphosise, means we can attribute emotional intention into anything or nothing. Director Pete Docter states that the success of animation rests on the role of audiences in supplying emotional reactions that may not be visible on screen. The audience is required to put their own reading into what they see and therefore become involved. By creating hyper-realistic 3D characters and environments there is often paradoxically less opportunity to involve audiences emotionally. Additionally, the human eye (and brain) has particular biases, which make
such simulations wholly unnatural. For example, we never see the entirety of a subject in full focus and our eyes cannot imitate a wide-angle lens. Providing so much detail makes the audience more passive. Less engagement reduces the potential for emotional catharsis – a key function of art.

**Performance Process**

Artists need to be keen observers in order to invent. However invention demands a deeper connection to ones sensory, emotional self than passive observation. Particular creative processes can encourage this connection but it requires practice. The discipline and practice germane to animation art is performance and mime. Yet this bond is poorly understood and underexploited. The link is apparent in the early Disney silent movie era (with Mickey Mouse inspired by Chaplin and Keaton). Yet the research looked beyond historical connections to current practice in industry and education. Theory was examined (on the relation of animation/ performance) from academic Paul Wells, comparing this with industry opinion from Ed Hooks. There was discrepancy on the perceived usefulness of Laban theory (coming from dance). Laban proved too abstract and complex for industry application and disadvantageous to animation work.

Ed Hooks advocated acting method (based on Strasberg and Stanislavski). Yet the research found this process limited, as it focused on naturalism.

Hooks recommended Eckman’s FACS as a tool for truthful expression. Yet Pixar director Pete Docter has commentated on the lesser significance of facial expression, advising design from the ‘bottom up’.

Research highlighted: the value of performance practice is it provides a direct link between ones senses and emotions (the stimulus to ideas), the creative work itself, and an audience. The purpose: to aid artists in creative interpretation of gesture. Clever use of gesture expresses character individuality – at best a mirror of the artist’s own. The embodied nature of performance stimulates profoundly imagination. And enables authentic expression: the basis of original work.
Mime relies on bodily expression, and on caricature specifically. Reflection on personal experience confirmed further evidence of its usefulness in building skills for characterization.

The open, experiential approach to learning (advocated by Lecoq) encourages creative ideas with many potential outcomes. It enables artists to work instinctively, a necessity for creative results.

Psychologist David Kolb considered experience fundamental to individual development (Kolb, 1984). His four stages of learning included 1. Experience, 2. Reflection, 3. Conceptualisation and 4. Testing. Research confirmed this structure mirrored Lecoq’s method. Lecoq’s process intends to provoke new work and forms of expression and to this aim it is highly successful. Open experimentation is central to method, but reflected on constantly. More time and effort is spent in Kolb’s initial stages: experience, reflection and conceptualization (the equivalent of animation pre-production), to achieve results. [14] By comparison, training (within animation and visual art) has become more formalized, with frequent measures, and less (or no) time to play or reflect.

The separation (or side lining) of arts disciplines is detrimental to creativity – (separation through interests of commerce, fashion, educational standards). Useful knowledge is lost, and it encourages a limited viewpoint and narrow skill set. Providing a broader cultural context in training enriches imagination. This is challenging currently, because of competing priorities and resources (time given to technology training, educational measures, financial and schedule constraints). But without a rich cultural base that encourages free learning, creative growth is uncertain.

Research revealed Lecoq’s improvisational methods: stimulate imagination, refine observation and conceptual skills and discourage mannered expression.

Examination verified Lecoq’s study of nature and corporeal movement as deep, broad, and for the student highly personal. The purpose being transposition into dramatic characterization. His methods provide a route from merely interpreting reality to
developing an ‘aesthetic reality’ (fantasy-with truthful resonance) that Disney describes. His approach goes beyond limitations of Stanislavski or Laban, avoiding the neutrality and literalism of trends like MOCAP, which often invoke the Uncanny.

Lecoq’s movement techniques demonstrate the body’s physical and imaginative range and limits. They determine any psychological resonances to physical action (the push and pull within all movement, or the being pushed and pulled). Movements are expanded to maximum spatial limits and reduced to the barely visible. This focus on exaggeration makes it especially apt to animation. Movement is also explored beyond limits to see how it breaks down and note emotional features.

Research revealed Lecoq (like Disney) concentrates on start and end points, believing them especially dramatic. The importance of gestures of anticipation and reaction, are highlighted in animation principles. While theatre emphasises oratory, film (and animation) emphasizes reactions. The timing of reactions, Lecoq, Lasseter and Disney all believed, reveal much about character.

Research found that students work on the physical/ psychological features of suppleness, strength, balance and lightness and incorporate object or prop play. Once again this is highly relevant to animation.

Lecoq’s exploration of nature (elements, materials and animals) fosters range, moving from the abstract (e.g. liquid oil) to the related – animal locomotion. The study of materials and elements is useful to animators, as it explores passive movement and therefore reactions. The quality and timing of reactions are therefore studied in detail. This frees artists from literal characterization, which can provoke the Uncanny. It provides them an extraordinary movement vocabulary both nuanced and highly defined.

This thesis asserts that Lecoq’s methods are valuable to character animators, superior to other (performance related) approaches, and largely unknown. It represents a unique opportunity for students and practitioners grappling with digital tools who wish to
create engaging character design. The research offers those concerned with evaluating or understanding the subject, greater awareness of expressive gesture, and new creative pathways to movement design.

Insights into the *Uncanny* response, body language and emotional communication, have now widespread importance. Culture has changed, with technology impacting many facets of our lives. These ideas matter therefore, not only to animators, filmmakers or other artists but also for anybody interested in human simulation, human interaction or person-centered design. The study of emotion: as manifest in physical expression, is central to this enquiry. The research demonstrates that emotional display is the most direct and primal form of communication. In animation it is transference of emotion from artists to character and character through performance to audience that matters.

The thesis affirms character animation must be rooted in animal biology, to impact audiences emotionally. But equally significant to animators, is the development of imagination, especially the visual and kinaesthetic translated into imaginative movement.

Our experiences in life are complex our emotional responses are layered and frequently contradictory. Any artistic communication must reflect this. And this is why art regularly exploits many different stylistic registers: e.g. abstraction, humour, seduction, pathos, etc. The pseudo-realism or hyperrealism of the computer makes it harder to achieve this. Ideally art also encapsulates the personal – both in the artist’s individual expression and also the allowance of audience members’ unique interpretations of that expression.

Credibility is important in film characterisation; we want to recognise some degree of reality in order to suspend disbelief and become engaged in the narrative. But equally we want to be transported to something more than reality. The formula for success in animation is different for each film.
Lecoq provides an intuitive method for artists to express complex felt experiences directly to audiences. This is possible through experimental play and a focus on the primary expression of mime. In his own words he says:

‘We constantly mime the world around us without realising. When you are in love, your own actions instinctively mime those of the loved one. At the school we try to externalise this element instead of retaining it inside, and, for it to emerge, there must first be a recognition before this may develop into understanding and creation. In order to develop the poetic sense, whether one is an artist, writer or actor one must feed off all these experiences.’ Lecoq (1998), P. 47, [15].
Chapter 8

8: REFERENCES

8.1: Bibliography & Filmography

8.2: List of Figures

8.3: Glossary

Chapter 1 Introduction


**Chapter 2**

**Technological Challenges of Digital Character Animation: Chiefly Related to The Uncanny Valley Phenomenon**


[34] *Who Framed Roger Rabbit*, 1988, Dir: Robert Zemeckis, Touchstone Pictures, US


[38] Glen Keane, G., commentating on 2010 film Tangled: (November 2010)


**Chapter 3 Animation Principles**

[1] Thomas and Johnston, (1995) *The Illusion of Life*, Revised Ed. P.67 (The bible of animation craft: provides guidance on: how to make drawings connect or interrelate with each other and suggest action - thereby maintaining a measure of realism. It describes the use of deformations of squash and stretch and the importance of character appeal.)


Disney Interactive in the late 1990s.

Chapter 4: Cultural influences on animation art:


[3] *Felix the Cat*, lead animator Otto Messener, 1919


[9] *Tom and Jerry* cartoons, of Hanna and Barbera. 1940-57


[16] Sergei Eisenstein’s essay on Disney, 1941, published by film critic Jay Leyda, 1986


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[25] Hugill, Fink and Neave, 2010, *The Role of Human Body Movements in Mate Selection*, Department of University of Göttingen, Germany. (Explores movement quality in detail)


Chapter 5 Body Language


Chapter 6 Performance Art


http://www.britannica.com/EBchecked/topic/364094/Marcel-Marceau


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p.164-8, Glossary
mimodynamic - a method allowing the actor to discover physical movements which translate the sensations aroused in them by colours, words, music etc.

p. 29, Improvisation: *replay and play* - Part two of his book titled *The World and Its Movements* begins with a long discussion on improvisation. On *replay*, he says: ‘We approach improvisation through psychological *replay*, which is silent. Replay involves reviving lived experience in the simplest possible way. Avoiding both transposition and exaggeration…’

p. 31 *Improvisation: Replay and play* - Observational skills are again accentuated in movement analysis, for Lecoq says: ‘…acting requires more than memories drawn from life. We must constantly go back to live observation: watching people as they walk down the street, or waiting in a queue, attentive to the behaviour of others in the queue.’

p. 34 *Improvisation: Towards the Structure of Play* - ‘We always try to push the situation beyond the limits of reality. We aim for a level of aesthetic reality which would not be recognisable in real life in order to demonstrate how theatre prolongs life by transposing it’.

p. 39 *Improvisation: The neutral mask* - Lecoq, the neutral mask has specific limitations, he states: ‘…a neutral mask is never able to communicate…’

p. 41 Taking the theme of ‘The Fundamental Journey, the students employ the neutral mask to walk, run, climb or jump in an imagined natural environment. Lecoq describes the natural world as speaking directly to the neutral state. In a mood of calm and receptivity our senses recognize strongly our environment to the point of identification. As he says: ‘When I walk through the forest, I am the forest…’

p. 44, *The neutral mask: Transposing* - On discussing work on materials: e.g. wood, paper, cardboard, metal, liquids, Lecoq says: ‘For the actor the objective is both to broaden his field of reference and to sense all the fine shades of difference which separate one material from another or which co-exist within the same material….To do so involves hard work over a long period,’

p. 44, *The neutral mask: Transposing* - Lecoq describes: ‘basing oneself on natural dynamics … using them for expressive purposes in order to achieve a better playing of human nature… to humanise an element or an animal…’
p. 45, *The neutral mask: Transposing* - The elements or animals in which it is grounded show through...’.

p. 45, *The neutral mask: Transposing* - ‘Our bodies remember!’ Identification work then continues in a more fundamental and abstract dimension with the exploration of space, light, colour, materials and sounds.’

P. 46, *Improvisation: The Universal Poetic Sense* - By way of example, he remarks that though we can neither see the form nor the movement of a colour, nevertheless the emotion which they arouse may set us in *motion*-even in *emotion*. Students explore through gesture or *mimages* (mimed images with no reference point in the real world) their responses. At a later stage, students approach works of art in the museums, or poetic texts or music.

p. 52, *Improvisation: Masks and Counter masks* - ‘The challenge for the teacher is to observe with a practised eye that can distinguish, among the different gestures made, which ones are explanatory, which are formalised, and which are both truthful and poetic. Gradually, the students themselves begin to acquire subtlety in observing gestural nuances...’

p. 66 *Movement Technique: Giving Meaning to Movement* - Technique is divided into three distinct aspects: first physical preparation; then dramatic acrobatics; finally, movement analysis (which changes, in the second year, into applied techniques relevant to different dramatic territories such as melodrama, comedy etc.).

p. 71 *Movement Technique: Foundational analysis of everyday movements* - Young actors have to be aware of how the body can ‘pull’ or ‘push’ so that, when the need arises, they can express the different ways in which a character can ‘pull’ or ‘push’.

p. 74 *Movement Technique: Foundational analysis of everyday movements* - Lecoq states: ‘I ask the students to adopt these positions one after the other and then, in the course of this physical progression, to experience passing through the different ages; infancy, adulthood, maturity, old age.’

P. 75 *Movement Technique: Foundational analysis of everyday movements* - *Expansion and reduction:* firstly movements are expanded to their maximum to find their spatial limits, and then reduced to the limits of visibility

P. 76 *Movement Analysis: Bringing out attitudes* - ‘This exercise gives rigour to the pelvis, the trunk and the head, thus going against their natural movement.’

P. 77 *Movement Analysis: Researching the economy of physical action* – ‘It is up to the students to strike out, and discover all the variants, especially in transitions from one attitude to the next.’

p. 79-81, *Researching the Economy of Physical Actions* –

Lecoq calls his multi-directional pattern of movement or relation to space the *effort rose*.

p. 162 Part Four: *New Perspectives* - ‘Only by going beyond the frontiers, passing from one territory to another and overlapping them, can true creativity be nurtured and new territories come to light.’

**Extra Performance References:**

Conclusion References

[1] Peter Bradshaw (2010), ‘Tim Burton’s gothic treatment of Alice is all too conventional’)
The Guardian: Film.


[14] Referred to in Chapter 2 Uncanny Valley - Kolb, D, (1984), Experiential learning: Experience as the source of learning and development (Vol. 1), New Jersey: Prentice-Hall

8.2 List of Figures

IMAGE References – Chapter 2 Uncanny Valley:

Figure [1] Monkeys fall into the Uncanny Valley ’09 Princeton University Neuroscience Institute. Research by Ghazanfar & Steckenfinger. (Monkeys respond negatively to CG images.)

Figure [2] Transcending the Uncanny Valley? – The Emily Project
(Only the face of the character is CG; the hair and body are those of a live-action actor, shown at left in the image above. Company Image Metrics - set out to create the world's first completely convincing photo-real CG face at HD resolution.)

Highlighted are the mouth and eye expressions – often referred to as ‘frozen’ expressions, as they are difficult to replicate realistically in CG.

Figure [4] Diagram of the Uncanny Valley. (The theory of the Uncanny Valley has been adopted by animators, who believe a certain level of stylisation, makes human characters more palatable or appealing for animation audiences.) Shutterstock, Reuters, Heather Knight.

The MRI images were taken by a team of researchers led by Ayse Saygin at the University of California. The findings measure brain response of subjects viewing robot movement, android movement (Repliee Q2) and human movement. The brain reacted strongly in response to android movement, registering a mismatch.

Figure [6] Publicity Picture for Cosmetic Dermatology – showing results for Botox treatment, Before and after 7, 90 and 120 days, from We Love Skin in San Francisco [Online] <http://weloveskin.com/botox-san-francisco/> Accessed 2014

Figure [7] Gabriela, 42 and Victor, 43, from Buenos Aires, Argentina, hold the official Guinness World Record for he most modified married couple. [Online] <www.coolval22.com> Accessed 2014. The Argentinian lovebirds are the world’s most modified couple with a total of 77 bodily alterations that include four microdermals, 11 body implants, five dental implants, four ear expanders, two ear bolts and one forked tongue.


IMAGE Ref. – Chapter 3 Animation Principles:


Figure [6] Film still from The Incredibles (2004), Helen Parr does the hoovering with Bob Parr assisting. An example of Disney’s: Squash and Stretch.

Figure [7] An example of the Disney Principle: Squash & Stretch: The Disney Flour Sack Exercise - a simplified learning platform for understanding deformations in movement and inherent limitations. Additional imparting of character, personality and emotions were a secondary part of the exercise. Published in The Illusion of Life: Disney Animation, Thomas & Johnston, (1981).

IMAGE Ref. – Chapter 4 Cultural Influences on Digital Animation:

Figure [1] An example of the Disney Principle: Squash & Stretch: The Disney Flour Sack Exercise - a simplified learning platform for understanding deformations in movement and inherent limitations. Additional imparting of character, personality and emotions were a secondary part of the exercise. Published in The Illusion of Life: Disney Animation, Thomas & Johnston, (1981).

Examples of singular artistic styles influenced often by local/national culture

Figure [2] Film still from the Australian stop-motion animation Mary & Max (2009), Dir: Adam Elliot, featuring the central character Max. Prod. Melanie Coombs, Icon Entertainment International.


Figure [7] Film still from *Frankenweenie*, (2012) 3D stop-motion film, Dir Tim Burton, Tim Burton Productions [Online] <collider.com/frankenweenie-trailer/>Walt Disney Studios & Motion Pictures

**IMAGE Ref. – Chapter 5 Body Language:**

Figure [1] Barack and Michelle Obama visit the Queen 2009 at Buckingham Palace, [Online] <en.wikipedia.org>, Accessed 2014


Figure [6] P Eckman, Diagram on Core Emotions from his book *Emotions Revealed* 2004 edition, Pheonix, London


**IMAGE Ref. – Chapter 6 Performance:**

Figure [1] A diagram of Lecoq’s two-year acting course (pg. 16-17), published in *The Moving Body: Teaching Creative Theatre*, Methuen, (2000), GB.


Figure [3] Diagram of *Undulation*, (in animation this is referred to as movement arcs) published in *The Moving Body: Teaching Creative Theatre*, Methuen, (2000).


Figure [6] Production photograph showing ‘Emotion Capture’ for the 3D animation *Rango* (2011) Dir: Gore Verbinsky, Industrial Light and Magic, US
*Rango* used live-performance (without motion-capture) to a great extent: to enthuse, inspire and inform the animation of film characters.

Figure [7] Photograph of animator Chuck Jones acting out a pose while working on a Bugs Bunny picture, Warner Bros. Cartoons (Jones worked on these cartoons from 1941-1963). Photographic image published in *The Illusion of Life*, 1981, Thomas & Johnston.

Figure [8] Next, UK TV Animation for Channel Four Films (1989), Dir: Barry Purves, Prod: Ardman Animations

Figure [9] Film still from the French hand-drawn animation *The Illusionist* (2010) Dir: Sylvain Chomet, Pathe & Django Films. The film was based on an autobiographical screenplay by Tati, which seems the perfect subject matter for the French animation


Figure [11] *A Minute Too Late* by Complicite Theatre with Simon McBurney, Marcello Magni, at the Lyttleton Theatre January ’05,[Online], <http://geraint-lewis.photoshelter.com/image/10000je1sBG8SnFO>

Figure [12] *A Minute Too Late* by Complicite Theatre with Simon McBurney, Marcello Magni [Online]

Figure [13] *The Master and Margarita* Complicite Theatre, (2012), [Online], <http://matdeely.net/COMPLICITE.html>

1. **Aesthetic Reality** and **Aesthetic Appeal** - (Abstract Pg. 3) The thesis uses the term *Aesthetic Reality* and *Aesthetic Appeal*, to mean an animated film that contains enough realism to engage an audience but without spoiling the fantasy. The animation appeals through sensory communication.

Mori in his 1970 essay on robotic simulation discussed the value of symbolic interpretations of reality e.g. the *high level of affinity we feel for a Bunraku puppet*. Mori claims a more symbolic representation of reality avoids loss of appeal engendered by falling into the *Uncanny Valley*.

*Aesthetic Appeal* is also a term used within science – (Referenced: by the article *The Aesthetic Appeal of Prosthetic Limbs and the Uncanny Valley: The Role of Personal Characteristics in Attraction* International Journal of Design Vol. 9 No. 1 2015, www.ijdesign.org, Stefania Sansoni et al)

*Aesthetic Reality* is also referred to in the Disney book *The Illusion of Life*, by Thomas and Johnston (1989). This was allegedly what Walt Disney strove for.

Einsenstein refers to Disney’s fluid concept of reality as ‘plasmaticness’. As Whitley states (2008), it is a term used ‘to encompass animated film's capacity to reshape reality’ (Reference: David Whitley’s *The Idea of Nature in Disney Animation* (2008))

David Whitney in quoting Eisenstein, claims he goes further in describing the genre’s ability to shape reality: ‘What we deem to be natural and what is perceived to be unnatural’ – film theory Sergei Eisenstein on Disney.

2. Realism –

The research refers to realism as the photo-realism to computer graphic imagery. (Another expression for this might be similitude). It is not to be confused with ‘Photo-realism’ in painting of the late 60s and 70s.

3. Corporeal Mime –

Decroux is said to have “Called the form he created “corporeal mime” to distinguish it from the white-faced mime of the 19th century. Reference: New York Times, *Etienne Decroux is Dead at 92; Master of Modern*, Jack Anderson, 1991