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OF CLOCKS TICKING: HETEROTOPIC SPACE, TIME AND MOTION IN WILLIAM KENTRIDGE'S *THE REFUSAL OF TIME* (2012)

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ABSTRACT

In William Kentridge's *The refusal of time* (2012), comment on time as both a scientific and a human entity is produced. A complex mix of the visual and nominal vocabularies of early 'rudimentary' technological invention, scientific experimentation and contemporary digital language characterises the artwork. Conceptually, the structural, technological and visual components of the work predominantly articulate figure tropes of space, time and motion. The work is explored through the lens of heterotopia as articulated by French philosopher Michel Foucault, with special attention to the artist's articulation of space, time and motion. The construal proceeds through the investigation of the visual metaphors implied by the organisation of space; the depiction of movement; time ticking; the allusion to human beings' fascination with invention; science and technology; and the products thereof, especially the creation of automatons. Interpreting the work as representing heterotopic temporality in space, it is

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argued that such heterotopic entities defy clock time as stringent 'regular' time. An examination is conducted of the meta-narratives on science and technology alluded to in *The refusal of time*, including mention of the early development of automatons; Modernistic French thought; advancements in physics around 1900; and postmodern takes on science and technology.

Keywords: automaton; clock; heterotopia; motion; space; *The refusal of time*; time; William Kentridge

INTRODUCTION

In 2012, South African artist William Kentridge's[1] *The refusal of time* (hereafter 'TRT') premiered at Documenta 13 (2012) in Kassel, Germany. The work was specially commissioned by the curator of Documenta 13, Carolyn Christov-Bakargiev, and since then it has been exhibited at various other venues in Japan, Italy, Australia, the United States, Brazil, Holland and Finland.[2] The work was produced in the artist's studio in the Maboneng district in downtown Johannesburg and as a prelude to Documenta 13, a series of notebooks entitled *100 notes – 100 thoughts* was published by Hanje Katz in 2011, which included a notebook (number 9 in the series) on *TRT*, co-authored by Kentridge and Peter L. Galison and titled *William Kentridge & Peter L. Galison*. In South Africa, the artistic production was shown first from November to December 2014 at the Johannesburg Art Gallery and then at the National Gallery in Cape Town in 2015. A collaborative piece, the artwork entails teamwork with Peter L. Galison,[3] Philip Miller[4] and Catherine Meyburgh.[5] The chamber opera, *Refuse the Hour* (made in collaboration with Miller, Meyburgh, Dada Masilo and Galison) – with an international cast of 11, including dancers, musicians, performers and vocalists – is the theatrical accompaniment that laid the groundwork for the artwork and is also an independent production. Prominent in the production is the artist presenting a lecture-performance on productive procrastination, myth, entropy, empire, black holes, the ancient Greek myth of Perseus, and Einstein, flanked by imagery of swirling dancers, singers with megaphones, instrumentalists and a solitary physicist (*BAM|Refuse the hour* 2015).

As an installation, *TRT* comprises five digital film projections on 30-minute loops and a large automaton, occupying the entire space of a single, large hall. In this article, the artwork is hypothesised as producing cogent comment on time as both a scientific and a human entity. The work is explored through the lens of heterotopia as articulated by French philosopher Michel Foucault, with special attention to the artist's articulation of space, time and motion, although memory and colonialism also feature prominently in this work.[6] The construal proceeds through the investigation of the visual metaphors implied by the organisation of space; the depiction of movement; time ticking; the allusion to human beings' fascination with

invention, science and technology; and the products thereof, especially the creation of automatons. Interpreting the work as representing heterotopic temporality in space, it is argued that such heterotopic entities defy clock time as stringent 'regular' time. To some extent, the approach to the investigation of the scientific and technological dimensions of *TRT* reveals a postmodern conflation of these very different yet interrelated fields. This is done with a certain degree of poetic licence, although a historical preamble to such conflation is traced. The methodology followed in this article entails a textual-ontological approach with regard to the technological imagery and objects, divided into three sections dealing consecutively with the scientific and technological dimensions of *TRT*; space; and time and motion.

SCIENCE AND TECHNOLOGY

In the dark, enclosed space of *TRT*, a hive of moving figures and intersecting stop-frame imagery in the five film projections creates an impression of vibrating energy. The complex imagery includes the artist as one of the performers, walking, reading and performing acts such as changing hats; a female figure, dancing and doing 'wagon wheels' and performing other acts; figures in comical scenes in colonial rooms *à la* George Méliès;[7] figures in a laboratory-like space; dispersing and flying anamorphic fragments becoming human figures, representing a kind of chaos rendering; a rhinoceros; silhouettes; ticking metronomes and clocks; and imagery of, inter alia, megaphones, starry skies, stop-frame animations and drawings.

Centrally placed in the installation and in striking contrast to the fluid and high-tech digital projections, a huge automaton is found: it is simultaneously machine-like and animal-like, made of metal and wood; and pneumatically breathing and pumping in jerky, low-tech, mechanistic fashion. An automaton[8] is a self-operating machine, designed to function according to a predetermined set of coded instructions and operations – especially to a range of programmed responses to different circumstances – and to either operate by its own power or create the impression that it is doing so. The sound of the pumping automaton intermingles ambiently with the reverberation of Kentridge's performed lecture, French accordion music and ticking metronomes. Conceptually, the various components of the work predominantly articulate awareness of space, time and motion, set against the backdrop of a complex mix of the visual and nominal vocabularies of early 'rudimentary' technological invention, scientific experimentation and contemporary digital language.

Figure 1: William Kentridge, *The refusal of time* (2012). The pneumatic automaton. Metropolitan Museum of Art, New York. Photo and copyright: Goodman Gallery.

In one of several YouTube film commentaries on *TRT*, Kentridge (2014) maintains that the work is not about a grand or deep scientific statement, but about how human beings and their emotions function within the given of mortal time, and the attempt to understand it all through various means, utilising science and technology. This artistic idea – to specifically engage with human beings' predicament with time – was fuelled by the artist's interest in the work of Galison (Kentridge 2013). In an article entitled 'Einstein's clocks: The place of time', Galison (2000, 355) argues the philosopher-scientist toppled Newtonian absolutes of space and time, which was more than a contribution to relativity: it was a symbol of the overthrow of one philosophical epoch for another. It is interesting to note here that Einstein's relativity theory started with basic assumptions about the behaviour of clocks, rulers and bodies in force-free motion (ibid.); in his writing, Galison (ibid, 358) refers to Einstein who wants to know what is meant by the arrival of a train in a station at seven o' clock. In a 1905 paper, 'On the electrodynamics of moving bodies', he inter alia asks how we ought to coordinate our clocks (in Galison 2000, 358), and hypothesises that, due to the delay in signals relayed via telegraph wire, peripheral railway stations synchronised on a centralised clock were forever fated to operate seconds behind schedule. Einstein's embryonic theories about the relativity of time converge with French mathematician and president of the Bureau des Longitudes,

Henri Poincaré's development of global time zone maps at the dawn of the 20th century (Kentridge 2013). In a newly industrialising and interconnected world, both Einstein and Poincaré buoyed the radical idea that time is not absolute but relative, and resistant to control (ibid.).

In the aforementioned revolutionary scientific exploitations, the elements of space, time and motion form critical philosophical components and are also seminal ingredients of the conceptual structuring of *TRT*. Within the relationship of space, time and motion, technology is an indispensable constituent, especially technological invention (besides instruments, apparatus and other equipment and machineries). In *TRT*, several clocks are depicted, including the ticking metronome dispensing time; there are stop-frame images of ticking clocks in the sky; and in the shadow procession the silhouettes of clocks are observed. Mechanical clocks are automatons and one of the earliest inventions thereof, and as such historically an early manifestation of human beings' relationship to machinery, tools and artifice. The clock dates as far back as three centuries BCE in China (Needham 1996, 243), with the invention of the water clock. Another commonplace example of an automaton is the *jacquemart* (bell striker) found in mechanical clocks dating from the early Renaissance.[9] In 1901, the *antikythera* (Figure 2) was discovered in Greece: it is a complex clockwork mechanism composed of 38 meshing bronze gears that could calculate the dates of lunar and solar eclipses[10] (Freeth 2009, 77). Kentridge's metronome (Figure 3) is a variant of a clockwork mechanism, and together with the other clock images and the pneumatic automaton,[11] these automata in motion are presented as relentlessly ticking and pumping.

Figure 2: *Antikythera* mechanism reconstructed (Freeth 2009)

Figure 3: William Kentridge, *The refusal of time* (2012). The ticking metronomes. Metropolitan Museum of Art, New York. Photo and copyright: Goodman Gallery.

Emerging since the 1800s, modernity has been marked by a scientific revolution and major discoveries in especially physics, mathematics and astronomy. With the industrialisation of societies and escalating interest in technological development, renewed experimentation with clockwork automata and robotic, humanoid automatons came to the fore.[12] The French materialists of the 18th century were representative of Enlightenment[13] thought, but seminal in their deconstructive approach to the motions and properties of matter, such as Julian Offray De La Mettrie who altered René Descartes' postulation that human beings are *like* machines to the explicit claim that they *are* machines (Woesler de Panafieu 1984, 130). In *L'homme machine* (1748), De La Mettrie (2009, 26) explicitly compares the human body to a clockwork mechanism by arguing that '[a] special feature of our machine is that every fibre in it, right down to the smallest, oscillates, and this natural oscillation is like that of a clock'. In the 18th and 19th centuries, intellectuals such as the Marquis de Sade, Charles Baudelaire, and in the 20th century, artists such as René Magritte, Marcel Duchamp and Raoul Hausmann explicitly reconnoitered the human–machine confluence. Of interest here is the pairing of science, technology and art with the human body, and especially the engagement with the 'mechanics' of the human body.

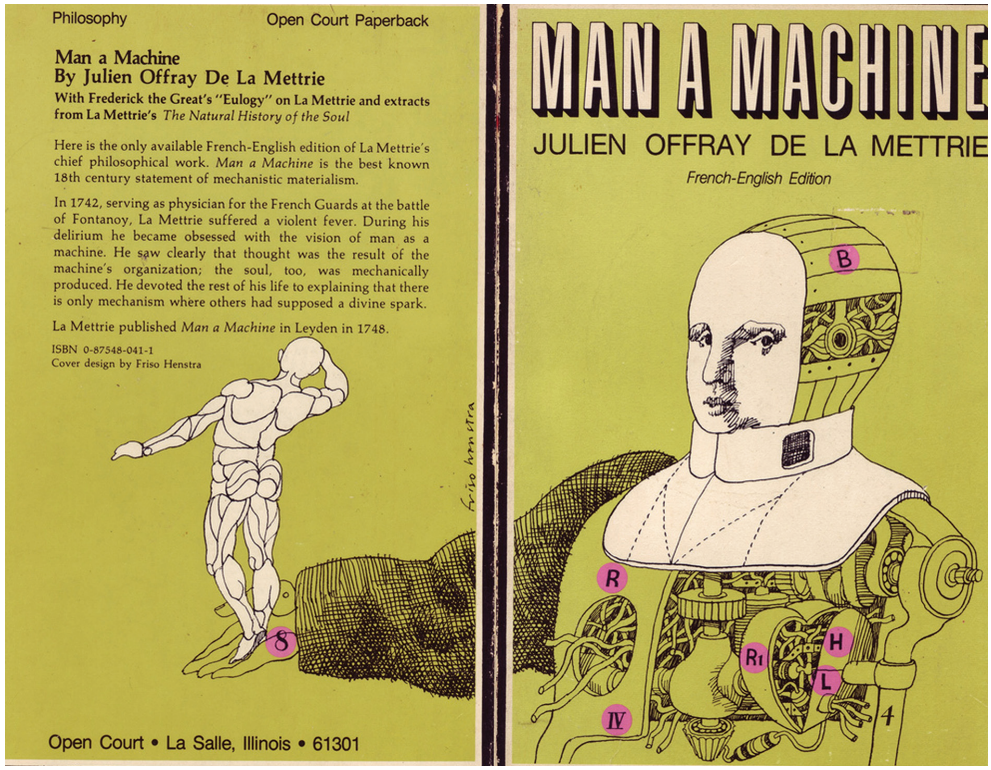

Figure 4: Cover of De La Mettrie, J.O. 1974[1748]. *Man a machine.* French–English edition. Illinois: Open Court Classics.

Foucault's postulations of heterotopia are useful in the investigation of time and the human body in the context of science and technology.[14] In a nutshell, Foucauldian heterotopia can be described as a philosophical engagement with human geography. To an overriding extent famous for his articulation of heterotopia theory, Foucault borrowed the term 'heterotopia' from the medical and biological sciences, which allowed for figurative and syntactic recourses, and triggered a 'tidal wave of reactions from the spatial disciplines' (Sohn in Dehaene and Cauter 2008, 41). As Behrent (2013, 77) concludes, Foucault's humanistic outlook in this regard hypothesises that 'both science and technology are determined by the objects and forms of subjectivity that *savoir* inaugurates and interrelates'. Whereas technological apparatuses are founded on systemic thinking and logical process, he (Foucault 1995, 15) views the regulating technologies and principles that are constructed by institutions as operating through systems of power, such as the architectural 'apparatus' of the panopticon (see also Behrent 2013, 86). In *Of other spaces*, Foucault (1986[1984], 27) refers to how clocks and bells[15] have always regulated the daily life of individuals and, more rigorously so, in religious communities such as 17th-century Puritan societies in

America and other utopian and fundamental societies.[16] Foucault's humanist view of technology (Behrent 2013) is especially concerned with its dehumanising (ibid, 76) effects, which is reasoning that extends to Descartes via Kant (ibid, 66) through its insistence on subjectivity. Foucault favours technique (presuming a human agent) over technology, especially evident in *The order of things: An archaeology of the human sciences* (1970). His view formed part of post-war scepticism towards technology – a turn Jacques Ellul (1964, 20) refers to as 'the technological phenomenon'.

Kentridge positions the human body centrally within the science and technology discourse embedded in *TRT*: technically, his scientific and conceptual method levies each projection that transforms intermittently from graphic, more abstract imagery into stop-frame animations to human figures (including the artist himself performing), clothed idiosyncratically in contemporary as well as traditional outfits. Other transmutations include a turn to colonial comical scenes with actors performing in rooms with historical architecture; walking and dancing figures; and figures in shadow procession, recalling some of Kentridge's well-known earlier works. The sculptural automaton is given equal presence to the five film projections, which generates the conceptual comment that technological development has shown progress from elementary, handmade technologies to advanced digital technologies, but that the embedded techniques and processes are equally relevant. As such, technique predominantly generates the required comment and meaning, and prevails as highest value.

Such postmodern eclectic use of technology in *TRT* demonstrates the epochal transition from modernity to postmodernity, whereby the science–technology relationship and its hierarchical and hegemonic ramifications have become deconstructed. A demolition and conflation of the boundaries between science and technology transpired during the watershed decade of the 1980s, when cultural, social, constitutional, artistic and other margins were questioned, often rejected and obliterated. An eminent historian of science, Paul Forman (2007, 1), argues:

> The abrupt reversal of culturally ascribed primacy in the science–technology relationship – namely, from the primacy of science relative to technology prior to circa 1980, to the primacy of technology relative to science since about that date – is proposed as a demarcator of postmodernity from modernity: modernity is when 'science' could, and often did, denote technology too; postmodernity is when science is subsumed under technology.

Scholarly areas of study expanded the 'purity' of disciplines into applied and multi-disciplinary fields, also into science/technology ranges 'without any difference or distinction between technology and science, and thus without any primacy imputed to science or subordination of technology' (ibid, 5). With technology acquiring primacy in postmodernity, the word 'technology' gradually became capable of including science in its denotative compass; for Forman (ibid, 3–4) such subordination of technology to science points to the foundational importance for the modern mind of means, process and procedure. This hierarchical inverse that emerged concerns

the higher degree of certainty and prevalence in the belief in the functionality that became vested in technology, and manifested in other concomitant domains such as cultural fabrication and the configurative basis of disciplines.[17]

In *TRT*, preference is given to a conceptual engagement with the human technological condition, instead of a lofty statement about science itself. Kentridge 'relegates' science to technology, and succeeds in generating comment and meaning through the very processes of the techniques used. The artist's integration of technologies is typical of the 'impurity' of the eclecticism in postmodern artistic use of technology, whereby different styles and media are often combined in a single work. In *TRT*, the blurry edges and moving figures transgressing boundaries visually encode such conceptions without becoming dogmatic or literal. The overlapping images and intersecting figures speak about an interconnected global world, and the digital projections combine with the elementary technology of the pneumatic automaton to evoke an impression of hybridity, loss of purity and an interdisciplinary technology utilisation in which past and present time fuses.

As an idea, the use of mixed technology – in a single room – aligns with heterotopic thought. Central to Foucault's heterotopia is the idea that human space functions as a hybrid set of relations and similitudes or semblances. At this point of the investigation, the focus is shifted to the depiction of space in *TRT*.

SPACE

TRT relates to Foucault's conception of space as a keystone concept in his heterotopia theory. In *The order of things: An archaeology of the human sciences* (1970, original French 1966), Foucault develops the idea of heterotopia as a social concept fundamentally tied to place and space, being an 'other space' and functioning under non-hegemonic conditions. Heterotopic space relates to the idea of 'other spaces' and can be uniquely propositioned, but simultaneously contains traces or even a grid of the main societal structure it relates to (Foucault 1970, 18; 1986[1984], 23). Initially, according to Foucault (1986[1984], 25–27), heterotopias (such as prisons) were methods of disciplining and controlling those deviating from the system; however, the concept has expanded and become less negative in view of the development of 'other spaces' created 'away' from the open public space, such as gated communities, or other separate independent spaces such as themed parks for entertainment. Throughout *The order of things: An archaeology of the human sciences*, words depicting utopian, regulating order – such as 'grid', 'categories', 'grouping', 'the fundamental codes of a culture' and 'space of order' – are constructed as rostrum to oppositionally deconstruct into heterotopia.

Caught within the spatial confines of its mechanical destiny, the pneumatic automaton in *TRT* – its breathing motion a sign of its regulated life – manifests as a heterotopology in which the delimited 'space' of the automaton and its

humanoid motion command a contestation of its mythic and real dimensions. The visual appearance of the automaton recalls the concept of the elephant in the room[18] (signifying an obvious entity that goes unnoticed due to its overexposure or familiarity, but actually needs attention), but also heterotopia, due to the reference to enclosed, confined space and finding meaning within that space. The idea of the 'elephant in the room' is linked to that of the rhinoceros in the room,[19] also frequently occurring elsewhere in this and other works by Kentridge. Both animal tropes evoke a sense of mortality, but concurrently refer to issues that are 'in the room', thus referring to mortality as the primary ontology of the human body and as defining human life. As such, an inverted analogy is created and a mirror is erected to the biological clockwork of the human being. Translated in terms of the main conception of *TRT*, attention is focused on the notion of time, humans' condition of being subject to biological time, and their attempts to defy it. Within this configuration, a ticking clock is a grim reminder that biological time does not wait for anyone or anything.

Figure 5: William Kentridge, *The refusal of time* (2012). The pumping mechanism of the pneumatic automaton. Iziko National Gallery, Cape Town, 27 February 2015. Photo: Elfriede Dreyer.

In *TRT*, five ancillary virtual 'rooms' have been created through the demarcated space of each projection, overlapping with another. An artificial environment has been created, entrenched in the technologies of the digital age, which has borne

witness to emerging engineerings such as electronic communications, artificial intelligence and biotechnology. The latter includes human genetic manipulation and nano-technology derived from quantum technology, creating unprecedented governance and jurisdictional challenges (Fukuyama and Wagner in De La Mothe 2001, 188). Steven Jones (1997, 15) defines cyberspace's ontological space as 'discontinuous' and as forsaking particular space. Here, body and place become 'an imagined and imaginary space and thus is a narrative both because it is an area of discursive interaction and because it contends very successfully, for our imagination' (ibid.). The space in *TRT* becomes an 'other' space by virtue of its fictive and imaginative dimensions: a chaotic and creative, yet strangely ordered space inscribed by text, history, subjective decision and movement. Kentridge presents an inventive, dynamic space where seemingly random ideas and actions ensue, residing primarily in the domain of the imagination. This spatial configuration recalls Foucault's (1970, xvii) view of heterotopic spaces as

> disturbing, probably because they secretly undermine language, because they make it impossible to name this and that, because they shatter or tangle common names, because they destroy 'syntax' in advance, and not only the syntax with which we construct sentences but also that less apparent syntax which causes words and things (next to and also opposite one another) to 'hold together'. This is why Utopias permit fables and discourse: they run with the very grain of language and are part of the fundamental dimension of the fabula.

Set in virtual reality, the rooms in the Méliès-type comical scenes in *TRT* resemble colonial architecture, but notably these are graphically hand-drawn, inducing a sense of humanly determined space. Through the very technique of the linear and expressive sketching of doors, windows and other paraphernalia, heterotopic 'frames' are created that resonate with the racial and gender regimes of the histories of colonial culture in South Africa. Several spaces are represented in the work, but in a dualistic sense they are both material and immaterial, and ambivalently premised. The physical space of the installation is 'real', yet only the pneumatic automaton is materially present; the film projections are digital presentations, thus immaterial, but the light of their projections creates physical, drawn spaces; then again the imagery of the films consists of both the documentation of real actors and of imaginary stop-frame animations. Such dualities and ambivalences in terms of physical and virtual space reflect Edward Soja's (2009, 19) interpretation of Foucault's dualistic idea of space, or what the former calls Foucault's 'bicameral' notion of space, where the one emphasises 'material conditions, mappable spatial forms, conditions, things in space … and the other [is] defined by mental or ideational imagery'.

In *TRT,* filmic inserts of figures performing as scientists in a pseudo-laboratory are found. More so, the entire space of the installation functions as a heterotopic laboratory-like space filled with virtual projections, technology and people. In *Discipline and punish*, Foucault (1995, 144–145) describes his idea of 'laboratory' space as follows:

> In the factories that appeared at the end of the eighteenth century … it was a question of distributing individuals in a space in which one might isolate them and map them; but also of articulating this distribution on a production that had its own requirements. The distribution of bodies, the spatial arrangement of production machinery and the different forms of activity in the distribution of 'posts' had to be linked together. … It was made up of a series of workshops specified according to each broad type of operation …. By walking up and down the central aisle of the workshop, it was possible to carry out a supervision … .

As such, Foucault once again touches on the conception of the panopticon. Behrent (2013, 86) refers to Foucault's interpretation of the panopticon as a 'laboratory' space that 'could be used as a machine to carry out experiments, to alter behavior, to train or correct individuals'. It is a 'privileged place for experiments on men, and for analyzing with complete certainty the transformations that may be obtained from them' (ibid.). The artist is virtually placed *in* the space of the work – as a kind of cosmological space – simulating the insular 'studio' or production space of the artist functioning as a laboratory.[20] The demarcated boundaries of each projection and the enclosed space of the total artwork mirror Foucault's (1986[1984], 27) conception of the boat (with delineated boundaries) as a 'heterotopia par excellence'. Demarcated with reference to the Renaissance notion of a 'ship of fools', the artist's studio exists likewise as an 'other' space that relates to the 'main' space of the world out there, but functions according to its own internal rules and envisionings.

Doubling as the inner space of the studio, the physical space of *TRT* is presented as functioning in isolation from, yet in conjunction with, South African society and its conditions and histories. In previous works, such as *Johannesburg, 2nd Greatest City after Paris* (1989), *Monument* (1990), *Mine* (1991), *Sobriety, Obesity & Growing Old* (1991), *Felix in Exile* (1994), *History of the Main Complaint* (1996), *Weighing and Wanting* (1998) and *Stereoscope* (1999), the artist produced postcolonial and postapartheid comment on the complex politics of the country. However, in *TRT* the imagery of colonial settings, attire and technology serves to underline human history and presence within a world entrenched in technological development on all levels. More so, the threat of technology is insinuated through references to life-threatening revolts, rebellions and colonial endeavours in which weaponry played a major role. A triumvirate of relations of world, artist and spectator is established in which a set of socio-cultural (and -political) relations is recounted about human beings' experience in terms of their being-in-the-world and within the circle of relationships, bonds and emotions. This echoes Foucault's (1986[1984], 23) viewpoint that 'we do not live in a kind of void … we live inside a set of relations that delineates sites which are irreducible to one another and absolutely not superimposable on one another'.

In the hybrid space of the virtuality of *TRT*, the physical dimensions of the human body as well as other spatial properties, such as distance and proximity, are abandoned in favour of an imaginatively constructed world. The virtuality of the work confirms a contemporary position on technology whereby an inclusive

collection of technologies and positions is presented and hybridised. The digital format of the work creates a fluid platform of integration and inference, simulating the technological space where human beings of the third millennium are at home.

TIME AND MOTION

Contained in and underscored by scientific and technological inventions and theorems, the markings and markers of time are arguably the most significant structuring principles of human life. In an interview (Kentridge 2014) the artist indicated that the title of the work, *The refusal of time*, refers to a defiance of clock time and the black hole of the grave; humans look back and forward in time and experience emotions such as regret, joy and so forth. The artist compares the human body to a clock which is wound up at birth and unavoidably ticks down; to him the work is a celebration of making, with the main question being how to make time visible (ibid.). Setting forth such intention in *TRT*, the artist presents time in both its scientific and technologically precise dimensions, and in its human, subjective facets.

In the artwork, time is primarily grappled with through different forms of motion rendering. Both machines and human beings are tendered in time and motion, having limited lifespans. The performing actors (including Kentridge and Masilo) are shown as interacting and moving in circular and repetitive patterns. According to Nicolás Salazar Sutil (2015, 38), the movement time of the human body can be visually materialised and conceptualised within the realm of eidesis; via such very eidetic transferals Kentridge presents his comments on time through repetitive motion and looping. As a space and a living clock, the human body entertains a heterotopic framework of action and motion: it functions in relation to clock time, but in 'other' time aligned with human subjectivities, deviations and preferences. The performers 'work', walk and dance in a confined room as a time capsule, and by doing so a peculiar, technological space of otherness is created. Foucauldian ideas of heterotopology and topology play out in the imagery of the moving figures within a durational space where time is dispensed by the metronomes, mirroring the ebb and flow of life through the figure of the moving body.[21]

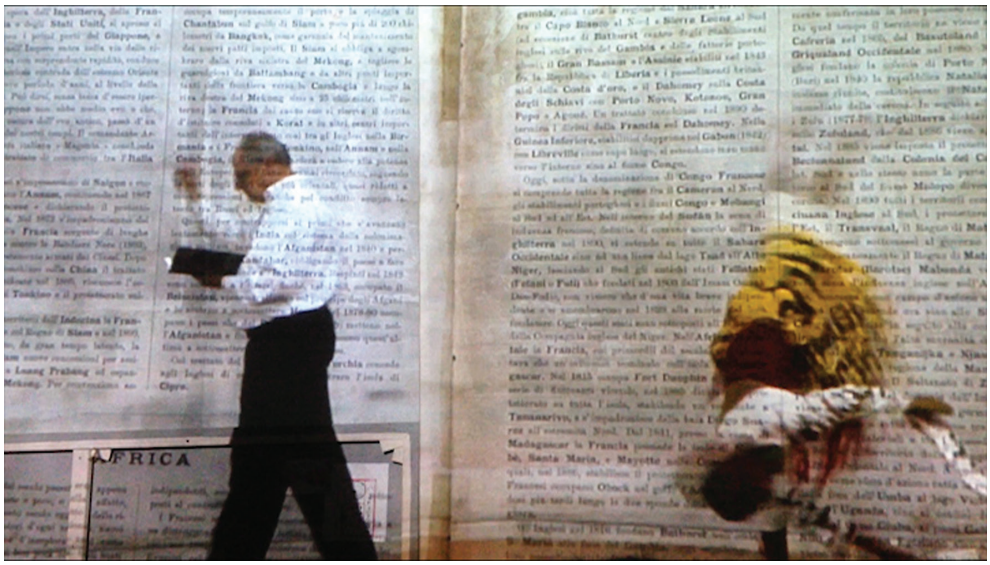

Figure 6: William Kentridge, *The refusal of time* (2012). Kentridge and Masilo in filmed performance. Iziko National Gallery, Cape Town, 27 February 2015. Photo: Elfriede Dreyer.

Figure 7: William Kentridge, *The refusal of time* (2012). Masilo in performance. Metropolitan Museum of Art, New York. Photo and copyright: Goodman Gallery.

The artist's performance of chronemic walking and reading his lecture (a main component of *Refuse the hour*) mostly takes place against the background of a Dadaist collage of an historical and a personal nature, including a colonial map of Africa, words referring to his own history (as a mortal being) and perilous events (potentially harnessing death) in Africa. Aside from the words and texts creating an annotative context for the performance, the bodies' nonverbal chironomy communicates such death-in-life through the very motion of the living bodies. As an independently functioning entity, Kentridge's bodies operating according to their own, subjective choices and biological condition become heterotopic in Foucauldian language. In *Discipline and punish: The birth of the prison*, Foucault (1995, 15) suggests that there may be a 'knowledge' of the body that is not exactly the 'science of its functioning' and a 'mastery of its forces that is more than the ability to conquer them'. This postulation Foucault (ibid.) calls the political technology of the body. Formulated as manifesting in bits and pieces and communicated in fragments, the knowledge of such body politics is neither disclosed nor accumulated methodically and scientifically, but through a disparate set of tools or methods (ibid.).

The moving human agents in *TRT* 'transgress' the confines of the delineated boundaries of each projection by walking across the edges, and by so doing become emplaced in in-between, liminal zones. Utilising the theories of Sutil (2015, 37) on motion and representation, the body parts are 'stamping' their own quantitative measure relations 'on the canvas of durational space', although their numerable relations or space rhythms are created naturally in the kinespheric space. The moving body parts of the performers simulate the arms of a clock and reflect Sutil's (ibid, 37–38) view that the base unit of timing in locomotion is stepping; to him the foot is a body part and therefore also a 'standard unit of measurement':

> In sum, feet become a natural symbol, which is directly extracted from the activity of physical contact between body and space, or by the marking of body-time in space, which is then assigned a value (even a meaning) within the domain of representation. (ibid, 38)

Through the presentation of a double screen the artist is looking at and interacting with himself. Mirroring his own performance in a locomotive inverse, reflected form (Figure 7), the artist is not only looking outward at the world and its subsets of ideas, speculations and musings, but inward as well, and introspectively and solipsistically considers his own relations to the world. He becomes both actor and spectator, and performs both as actor and artist. By assuming double roles on several levels, Kentridge expresses his own cosmological stance and asserts double worlds of actuality and virtuality; reality and theory; veracity and ideology; and certainty and imagination. The visual trope of a turning clock escalates into human time rolling and spiraling finitely. Spatially, such positioning infers a sense of doubling serving as a heterotopic image, exposing Foucault's (1986[1984], 24) postulation on heterotopic mirroring:

> And I believe that between utopias and these absolutely other emplacements, these heterotopias, there might be a sort of mixed, in-between experience, which would be the mirror. … The mirror functions as a heterotopia in the respect that it renders this place that I occupy at the moment when I look at myself in the looking glass at once absolutely real, connected with all the space that surrounds it, and absolutely unreal, since in order to be perceived, it has to pass through this virtual point, which is over there.

The space of the reflection or the semblance is a liminal space, mostly the abode of the imagination and the fertile soil where new inventions can be generated. In Foucauldian terms (Foucault 1986[1984], 23), unrelenting opposites and unresolved dichotomies create existential *Angst* related to space, more so than to time, since time merely appears as one of the many possible patterns of distribution between elements that are scattered over space. Mortal conceptions of the physical body appear in the form of chaos imagery of disintegrating matter; and swirling moving figures, transgressed boundaries, and fleeting script and words render an awareness of temporality and transience in order to defy conceptions of certainty and fixed systems. The flying particles in *TRT* subtly reveal thin red lines, crossing and indicating geographical points of intersection, but without any explanation of what they represent. Metaphorically they could function as relational reference points, historical markers, psychographical moments or points of reference from which the 'walk' into time takes place, or even the liminal 'place' where life and death meet. Einstein's influence on Kentridge is evident here: in his doctorate, Einstein (1905) describes mathematically a phenomenon known as 'Brownian motion' or how particles move in a fluid (either a gas or a liquid).[22] According to Mörters and Yuval (2008, 13), Brownian motion is the macroscopic picture emerging from a particle moving randomly in D-dimensional space; on the microscopic level, at any time step, the particle receives a random displacement, caused for example by other particles hitting it or by an external force where 'random walks' can occur.

In the collaged, animated text in the film projections, the word *Torchlusspanik* – the fear of diminishing opportunities as one ages – flashes in outsized red letters for a few seconds. As a major clue to the understanding of the work, this word encapsulates the existential *Angst* thusly generated by the idea of time having an end, and the location of physical mortality within the confined heterotopic body-as-space. Playing out in the confined space of *TRT*, ambivalence with regard to the rendering of time is encountered: on the one hand, a teleological time zone (clock time and biological time) is presented, having a beginning and an end. On the other hand, chaotic time is presented as humanly, existentially and imaginatively inferred.

Figure 8: William Kentridge, *The refusal of time* (2012). Chaos taking form. Iziko National Gallery, Cape Town, 27 February 2015. Photo: Elfriede Dreyer.

CLOSING

It cannot be disputed that technology and science as integrated concepts still propel humankind adventurously into new and exciting frontiers of existence. Human beings continue to be amazed by technological invention, especially when they can give life to machines by turning them into self-propelling mechanisms. The persistent drive to become 'undying' is still evidenced through contemporary scientific and technological experimentation with, for instance, genetic engineering and artificial life preservation. Design and invention in science and technology can then be more fittingly argued to be primarily driven by human beings' attempts to defy biological time, to *refuse time.*

Space, time and motion – as main constituents of science and technology – were considered in this article as constituting the main metaphoric configuration and conceptual structure of *TRT.* It was surmised that the articulation thereof in the artwork manifests as a human condition of heterotopic temporality in space. Mediated through blurry transitivity in *TRT*, the imagery posits ongoing questioning about the world; unresolved matters pertaining to the human condition; and the uncertain nature and destiny of it all.

NOTES

1. William Kentridge (b. 1955) lives and works in Johannesburg. His work is mainly engaged with the histories of the world, and specifically apartheid and postapartheid South Africa. The artist works in several kinds of media, including film, video, installation, sculpture, drawing and stop-frame animation. Besides many other coveted awards, he received the Kyoto Prize in 2010, which in Japan is equivalent to the Nobel Prize.
2. The work showed at prestigious venues such as the Van Abbe Museum, Eindhoven (2013); the Metropolitan Museum of Art, New York and San Francisco (2013–2014); MAXXI, Rome (2013); Marian Goodman Gallery, New York and Paris (2014); City Gallery, Wellington (2014); the Perth Institute of Contemporary Arts (2014); and EMMA, the Espoo Museum of Modern Art (2014).
3. Peter Louis Galison is the Joseph Pellegrino University Professor in History of Science and Physics at Harvard University.
4. Philip Miller is a South African musician and composer.
5. Catherine Meyburgh is a South Africa film director, projection designer and editor.
6. With regard to the notions of time, space and technology, Kentridge's work has been mostly investigated in terms of its presentation and conceptual methodologies, as in S. Buchan's *Pervasive animation* (2013). This article makes a specific contribution to the canon of publication on Kentridge in terms of the lens of heterotopia applied within the context of time, space, motion and technology. Academically, Kentridge's work has mostly been interpreted through the lenses of memory, history, society, myth, narrative, quotation and appropriation. Philosophers such as Theodor Adorno, Max Horkheimer, Karl Marx, Jean-Francois Lyotard, and others have been explored in this regard. Examples here are the Master of Fine Arts dissertation of D.Z. Belluigi of Grahamstown University, entitled *Broken vessels: The impossibility of the art of remembrance and re-collection in the work of Anselm Kiefer, Christian Boltanski, William Kentridge and Santu Mofokeng* (2002), in which especially Walter Benjamin's ideas of history as catastrophe, the role of the historian and his messianic materialism are explored with regard to Kentridge's work; or E. van Caelenberge's article 'Visual storytelling: A progressive strategy? The animated drawings of William Kentridge' (2008), in which the author problematises Kentridge's work in view of Benjamin Buchloh's denunciation of neo-expressionism and Gilles Deleuze's theory of 'faciality'. Kentridge's output is often interlaced with quotation and his working method entails a kind of quotational method using history and ideas as a visual and conceptual archive for his own work – a methodology that has been greatly responsible for the depth and scope of his conceptual grasp.
7. Georges Méliès (1861–1938) was not only known for his silent films inspired by the work of the French brothers Auguste and Louis Lumière, but also as a magician and toymaker, which led to his experiments with automata. His silent films in the comical sci-fi genre include *Le voyage dans la lune* (transl. *A trip to the moon* [1902]) that was inspired by Jules Verne's novels *From the earth to the moon* and *Around the moon*. Kentridge has often produced work influenced by Méliès, for instance his *7 Fragments*

for Georges Méliès [2003]) and sky imagery, such as stars and figures with telescopes.

8. Automatons can be classified into two groups: those that are ancillary to a functional article and those that, in themselves, are fanciful objects, solely for decoration and pleasure (see http://www.britannica.com/art/automaton).
9. The level of sophistication in clockwork technology had been lost in Roman times and only returned when brought from the Islamic world after the Crusades, along with other knowledge leading to the Renaissance; clockwork finally recovered the equivalent of pre-Roman technological levels in the 14th century (Bedini [sa]).
10. The *antikythera* could model the moon's subtle apparent motions through the sky to the best of the available knowledge, and kept track of the dates of events of social significance, such as the Olympic Games (Freeth 2009, 77).
11. According to Bedini [sa], pneumatics (a branch of physics applied to technology that makes use of gas or pressurised air and which greatly interested Heron) created much interest among Renaissance scholars. A text on the subject was translated and published for the first time by Giovanni Battista Aleotti in 1589. Prior to the inventions of the Renaissance, the greatest experimenter of antiquity is generally accepted to be Hero or Heron of Alexandria (c. 10–70 AD), a Greek mathematician and engineer whose work is representative of the Hellenistic scientific tradition. According to Bedini [sa], fragments of Heron's writings were the first of the Greek works to be translated during the Renaissance, and appeared in the work of Giorgio Valla in 1501. According to Bedini [sa], Ramelli described and illustrated for the first time the rotary pump, mechanical details of windmills and a coffer-dam of interlocking piles, as well as other technological developments. Consistent with other writings of the period, Ramelli included several biological automata in the form of hydraulically operated singing birds. Notable among similar writings was the *Pneumaticorum Libri Tres* of Giambattista Della Porta of Naples, published in Latin in 1601. Other well-known historical automata include Arabic polymath Al-Jazari's mechanical creations; James Cox's silver swan of 1773, an avian automaton; and Jacques de Vaucanson's series of lifelike automatons (1770s) (History lists: 7 early robots and automatons 2014).
12. Such emergence also shows the establishment of the genre of science fiction in the 17th to early 19th centuries. In his sci-fi novel *Erewhon* (1872), Samuel Butler (1872, 228) presented old clocks evolving into watches. In Butler's utopian vision, human consciousness was tempered by development over millions of years, whereas machines have evolved within decades, at a speed so fast they could get out of control before humans are really aware of it (Butler 1872, 222–230). Butler foresaw computers, which he called 'sum-engines' and admired specifically the fact that they never make mistakes (ibid, 231–232), as well as the power of machines to help humankind produce more food and other necessities. Another early example of a science-fiction exploration of the human–machine relationship is Fritz Lang's film *Metropolis* (1927), in which gender, utopian and paradisiacal visions are projected onto machine culture and urban life. In many of these works, such as *Metropolis*, science remained a fantasy no-man's land for

imaginative invasion by the artist/writer, and the novel brainchildren of the communion were seen as conceived through an obsessive concoction of disparate offshoots of curiosity and operation. In most of the works exploring the human–machine relationship, automata formed a core part of the imagery and technological imagination, and stood out as definitive tropes of scientific ingenuity and technological invention, with the clock probably as its most customary delegate.

13. Marked by a belief in progress, authority and rational thinking, the Enlightenment era (c. 1660–1836) promoted belief in the scientific method in which knowledge and so-called truth could be obtained through repeated experiments. Three centuries later, theorists such as Bruno Latour (Forman 2007, 5), for instance, in *Laboratory life: The social construction of scientific facts* (1979), argued that naïve descriptions of the scientific method (in which a body of techniques is investigated in order to acquire new knowledge, or to correct and integrate previous knowledge, often through a single experiment) are inconsistent with actual laboratory practice. In *The order of things: An archaeology of the human sciences*, Foucault (1970, 154) states: 'The Method is another technique for resolving the same problem. Instead of selecting, from the totality described, the elements – whether few or numerous – that are to be used as characters, the method consists in deducing them stage by stage.'
14. *Of other spaces* presents the first crystallisation of Foucault's heterotopia theory. The editor's footnote in *Diacritics* (Foucault 1986[1984], 22) states: 'This text, entitled "Des Espaces Autres," and published by the French journal *Architecture /Mouvement/ Continuité* in October, 1984, was the basis of a lecture given by Michel Foucault in Tunisia in March 1967.'
15. It is interesting to note here that Einstein scientifically investigated time, space and motion by probing their social and human dimensions, as well as their constituent metaphors long before Foucault's seminal postulations on heterotopia became known.
16. Technology development is entrenched in utopian thinking that seeks to change the status quo and propose something 'better' in the place of the existing. However, the delimited scope of this article does not provide for an in-depth account of the utopian dimensions underpinning developments in science in utopia. Thomas More coined the term 'utopia' in his 1516 publication *De optimo reipublicae statu deque nova insula utopia*. More derived the term from the Greek, meaning 'no place' or 'land of nowhere', but according to Tod and Wheeler (1978, 19), the term is used tongue-in-cheek and becomes a pun by combining meanings of *both* the ideal *and* the imaginative, since, pronounced as 'eu-topia', the word means 'good place'. In the preface to *The order of things: An archaeology of the human sciences*, Foucault (1970, xix) opposes utopia to heterotopia by describing utopias, the difference being in the solidarity of the vision in utopias versus the multiplicity and fragmentation of heterotopias.
17. The newly emerging emphasis on and valuing of the socio-cultural in works such as Latour's *Laboratory life* turned attention toward technology, and as Forman (2007, 5) maintains, obliterated 'the boundary between science and technology, but [Latour] did

so from science outward, treating technology as super-stabilized science'. Developing social theories of science, echoing other Structuralist notions of the social production of knowledge, such as those of Claude Lévi-Strauss, Latour and Woolgar, produced a highly heterodox and controversial picture of the sciences. Also drawing on the work on the psychology of science of Gaston Bachelard, they advanced the notion that the objects of scientific study are socially constructed.

18. The origin of the expression, 'elephant in the room', is generally attributed to *The inquisitive man* by Ivan Andreevich Krylov (1814[1921], 4).
19. This idea has been derived from a famous encounter in 1911 between Ludwig Wittgenstein and Bertrand Russell, about whether there was a rhinoceros in the room (MacDonald 1993). This dispute concerned the certainty of propositions and knowledge, and shows similarity with the encounter between Jean-Francois Lyotard and Jürgen Habermas regarding issues of the consensus vs. dissensus about the certainty of knowledge and propositions.
20. Kentridge produced a number of works dealing with the space of the artist's studio and its inherent production processes, as in *7 Fragments for Georges Méliès* (2003) and *Six drawing lessons* (2012).
21. For Foucault (1986[1984], 23), time constitutes the fourth principle of heterotopia and he argues that it probably appears only as one of the various distributive operations that are possible for elements that are spread out in space.
22. According to Mörters and Yuval (2008, 41), although the physical phenomenon of Brownian motion is usually attributed to the Scottish botanist, Robert Brown, and was explained by Einstein, the first rigorous construction of mathematical Brownian motion is attributed to Norbert Wiener, the American philosopher and mathematician. The French mathematician Paul Lévy was also instrumental in pioneering Brownian motion theories (ibid.).

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