Michael Baumgartner

On Music, Machines and Posthumanism. American Minimalism and Video Art

This paper, which focuses on American minimalist music from the 1980s to the early 2000s, proposes to examine new music within an intermedial context. Holly Rogers (2013) has argued that the fusion of contemporary music and art in video works occurred in the 1960s in the New York art and experimental music scene. New music was thus no longer only played in concert halls but also in gallery spaces. Steve Reich and Philip Glass, who both had often also performed their early works in the late 1960s and early 1970s in art galleries, were influenced by this experimental video movement of the 1960s and 1970s. Following the movement, both embarked on creating their own audiovisual works. Reich collaborated with his wife, the artist and filmmaker Beryl Korot, and Glass with the experimental filmmaker Godfrey Reggio on several projects. This chapter demonstrates that Glass and Reggio's Koyaanisqatsi: Life Out of Balance *(1982) and Reich and Korot's* Three Tales *for video projection, five voices and ensemble (1998–2002) continued the video-art-music tradition that began in the New York Downtown scene in the 1960s. The central concern of both projects is the alienation through technology that modern life in America governs, changes and threatens. Minimalist music with its repetitive patterns akin to mechanical motion and drained of emotions typically associated with more conventional forms of music is thus particularly well suited to depict this artistic goal in the aural realm.*

From the 1960s onwards, the dogmatic and dominant canon in contemporary art music propagated and safeguarded by the proponents of the Darmstadt School had increasingly begun to show cracks in an already crumbling wall. In Eastern Europe, Arvo Pärt, Henryk Górecki, Vladimir Martynov and Alexander Knaifel, amongst others, were dissatisfied with the strict serial concepts of the Darmstadt School and turned instead to a less dissonant musical style, which later became known as "spiritual minimalism".[1] The urge to develop alternative aesthetics to (Western) European serialism was generally correlated closely to the specific society in which these alternatives emerged. Accordingly, the trend to go against the European grain became a trademark early in the twentieth century in US American contemporary music. Aaron Copland, who had studied with Nadia Boulanger in Paris, developed an unpretentious, diatonic, folk tune-influenced language in the 1930s that suited his progressive, social-minded

1 For Pärt, see Hillier 1997, for Górecki, see Thomas 1997. About "spiritual minimalism" from a Western point of view, see Dies 2013, from an East European perspective, see Wilson 2021. Wilson shows that the officials in charge of the arts in the Soviet Union had an ambivalent position towards minimalist music. On the one hand, the origins of minimalism in the West were viewed as problematic, for the first generation of minimalist composers in the Soviet Union were apparently "purposefully stripping Russian music of its national identity" (ibid., p. 24). In addition, in the apparently atheistic Soviet Union, music that embraced a spiritual, religious realm was seen as highly controversial. On the other hand, music that defies dodecaphony was considered a lesser evil.

worldview of writing music for the people – literally for the 'common man' – despite his adaptation of the serial method later in his career, after the Second World War.[2] Henry Cowell, on the other hand, experimented primarily with timbre and harmonic rhythm.[3] The notion of American composers as mavericks continued with John Cage and his dedication to chance music and indeterminacy.[4] Other American composers searching for alternatives to the European dodecaphonic canon were the minimalists represented by Steve Reich, Philip Glass, Terry Riley, La Monte Young and, to a certain degree, also John Adams.[5] Glass and Reich were both aware that music always closely correlates to the era in which it is conceived and reflects on the events and circumstances occurring in a given period.[6] With their music, Glass and Reich took a step back and looked at their works from a bird eye's view with a critical gaze. With these premises in mind, they used their music as a tool for social criticism; in some of their works, they expressed scepticism about the present state of the world and the future of humanity. As music is used as an artistic means of articulating a concern for various societal and historical developments, in the case of minimalism, the music becomes the crisis itself.[7] This music mimics the object it criticises, whereby the issue at hand is implicitly inherent in the music itself. One of these points of criticism, which Glass and later Reich voiced in some of their works, was the impact that technology had on human beings. They used the repetitive structure of minimalist music to show their concern at the consequences of a society that relies too much on technology. In other words, at specific moments in certain of Glass's and Reich's works, minimalist music simulates machines and, therefore, becomes 'machine music', for the music negates its teleological thrust through excessive repetitions in favour of "objectification of sound and musical structure".[8]

Minimalist music as machine music often occurs in cases where the music is paired with an audio-visual medium such as film or video. At its inception, minimalism sought out associations with other arts such as dance, experimental theatre, film and video art.[9] In terms of moving images, Steve Reich admired the films of Michael Snow, whose work was exhibited together with Reich's in various New York art galleries and who participated as a musician in one of the first performances of Reich's *Pendulum Music* (1968) at the Whitney Museum of American Art on 27 May 1969.[10] La Monte Young wrote the score for Tony Conrad's structural film *The Flicker* (1965/66), Philip Glass for Richard Serra's *Tearing Lead from 1:00 to 1:47* (1968) and Jon Gibson for his own short film *30's* (1970). Pwyll ap Siôn and Tristian Evans claim that by forging links with moving images, minimalist music was the "complete antithesis to traditional, functional film music: it stubbornly resisted references, clinging instead to a distilled, extreme form of musical absolutism". It further "set up musical equivalences with painting, sculpture, dance or film, in order to allow [minimalist] music to coexist" with these artistic expressions instead of becoming subservient to them.[11] In this chapter, I attempt to show how minimalist and post-minimalist music engages in a perfect symbiosis with experimental cinema and vid-

2 See Meyer et al. 2014 and Oja/Tick 2018.
3 See Sachs 2012.
4 See Nicholls 2007.
5 See Potter 2000, pp. 1–20, and Schwarz 1996.
6 See Strickland 1993 and O'Brien/Robin 2023.
7 See Nickleson 2023 and O'Brien/Robin 2023.
8 For a discussion of minimalist music linked to machines, see Peyton Jones 2013, p. 148.
9 For a survey of the minimalist music composers' contribution to experimental video and filmmaking in the 1960s and beyond, see Suzuki 2013.
10 See photograph in Reich 1974, pp. 12f.
11 Ap Siôn/Evans 2009, pp. 673f.

eo art. My examples are taken from Godfrey Reggio's influential full-length feature *Koyaanisqatsi* (1982) with a score by Philip Glass and from Beryl Korot and Steve Reich's video opera *Three Tales* (2002). These two works represent two different audiovisual formats. Reggio's essay film, conceived as a commercial product, was intended for a general public and was shown in movie theatres. Korot and Reich, by contrast, wrote their video opera for a classical music audience, to be performed primarily in classical concert halls. At the centre of my exploration are questions such as why and how the mechanical nature of minimalist and post-minimalist music associated with moving images is related to a larger socio-cultural context, and in what sense minimalist and post-minimalist music[12] is quintessentially an American art form that could only have emerged in the United States.

Philip Glass's machine music in Godfrey Reggio's *Koyaanisqatsi*

Our journey begins with *Koyaanisqatsi,* which means in the language of the south-western Hopi people "life of moral corruption and turmoil" or "life out of balance".[13] Except for the title, the film operates without language, meaning without dialogue or voice-over narration. As arguably one of the first environmentally critical films that reached a large audience, *Koyaanisqatsi* begins with stunning landscape shots of Monument Valley Navajo Tribal Park and gradually proceeds to images of the artificial reservoir Lake Powell, mining and oil fields, the Navajo Generating Station, the Glen Canyon Dam and a detonating atom bomb in a desert. A longer sequence shows the controlled demolition of the Pruitt-Igoe apartment complex in St. Louis, an example of a failed affordable housing project constructed in the early 1950s.[14] The journey continues to Los Angeles, Chicago and New York with images of life in these large cities almost in the style of an ethnographic study. The film concludes with a rocket blowing up in outer space.

The director Godfrey Reggio initiated work on the film in the spirit of a counter-culture project, but after its release the film unexpectedly achieved considerable, near-worldwide commercial success, presumably also because of Francis Ford Coppola's endorsement.[15] Regarding the film's meaning, Reggio has remained rather close-lipped. He claims that any meaning or value in the film "comes exclusively from the beholder. The film's role is to provoke, to raise questions that only the audience can answer".[16] Despite Reggio's somewhat nebulous elucidation about the meaning of *Koyaanisqatsi,* various commentators have observed that the film is an early example of an ecocritical essay film depicting how humankind is systematically exploiting and depleting the resources of the earth. Michael Dempsey, for example, notes that "the demon in the garden is the human lust for technology – especially in the form of that mega-conglomeration of machines and mobs, the modern super-city".[17] Gregory Stephens, similarly, claims that the film explores the "human–nature relationship", criticises the "modernity-as-

12 Post-minimalist works are generally less rigidly conceived, more varied, contrasting and shorter in length than the earlier non-teleological, austere minimalist compositions. In the case of Glass, *Koyaanisqatsi* is arguably one of his last minimalist compositions in a strict sense of the definition.

13 Hill et al. 1997, p. 863.

14 The project was named after the Second World War African-American army pilot, Wendell Oliver Pruitt, and after a former member of the United States Congress, William Leo Igoe.

15 During the post-production of *Koyaanisqatsi,* Reggio met Coppola who wished to see the film. After having seen a rough cut, Coppola decided to add his name to the credits and to help promote and distribute the film. See MacDonaldS 1992, p. 399.

16 Glass n.d.

17 Dempsey 1989, p. 4.

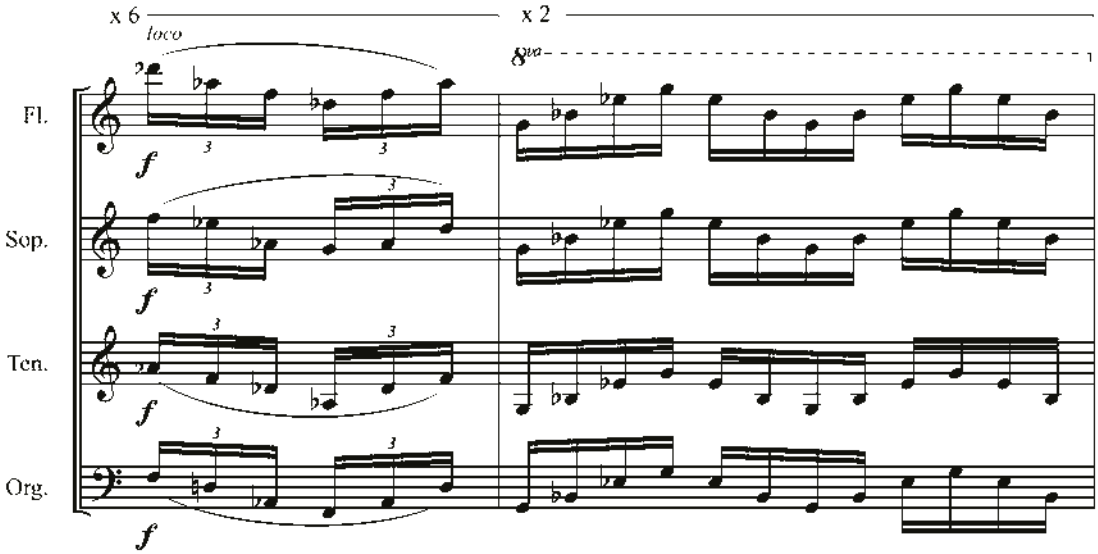
Fig. 1a/b Two stills from the "Grid" segment in Godfrey Reggio's *Koyaanisqatsi* (1982) in the sequence as they appear in the essay feature film. Frankfurters on a conveyer belt followed by commuters on a row of parallel escalators (Reggio 2012, 00:54:23–00:55:51).

machine" trope, and thus constitutes an early cinematic attempt at ecocriticism.[18] According to Stephens, *Koyaanisqatsi* is ultimately an environmental film somewhat conventionally "representing the earth as a character with 'a life of its own' and a sort of volition independent of humans".[19] Based on Jean Baudrillard's theory of consumption,[20] Robert Fink postulates a more nuanced notion that the film conveys "something crucial about the subjective experience of late capitalism".[21] Along a similar line of thought, Mitchell Morris surmises that the film's idea "grew out of a concern for the impact of technology on everyday life" in a capitalistic consumer

18 Stephens 2010, p. 2.
19 Ibid., p. 6.
20 Baudrillard 1998.
21 Fink 2005, p. 162.

society. The film's central purpose is, therefore, not to show the "effect of technology on people's lives, but […] how they are always already immersed in it".[22] As a critic of modernity and late capitalistic society and depicted through a rather simplistic lens juxtaposing "scenes of environmental degradation and frenzied modern life with unspoiled vistas from the natural world", the "film's hypnotic recurrences […] suggest the endless mutability of the material world".[23]

Glass's score, which – together with the album *Glassworks* (1982) – made him famous far beyond the new music circuit, echoes this "endless mutability". It becomes particularly evident in a segment right in the middle of the film, which in the score is titled "The Grid" (00:44:40–01:06:09).[24] To a breath-taking musical passage that alternates between extremely fast arpeggiated semiquaver triplets of a dominant-seventh chord on B-flat and slightly less busy semiquaver arpeggios of a dominant-seventh chord on E-flat that in fact form a simple abbreviated blues progression, the audio viewer[25] witnesses timelapse shots of cars and pedestrians frantically moving about in the street canyons of Manhattan, commuters dashing up and down the hallways of the New York subway like ants and conveyor belts busily transporting frankfurters and the quintessential American cream-filled sponge cake Twinkies. These images are juxtaposed with more images of foot-travelers on a row of seven parallel escalators suggesting an association between the mass-production of food and the efficient conveyance of human beings (Figs. 1a and 1b), cashiers in a supermarket, players in a video-game arcade, factory workers assembling television sets, speeding cars on a multi-lane highway at night and computer circuit boards (Ex. 1).



Ex. 1 Beginning of "Cue 9" of "#15" of Philip Glass's score for the "Grid" sequence of Godfrey Reggio's essay feature film *Koyaanisqatsi* (1982), starting at 00:54:37.

22 Morris 2007, p. 122.
23 Ibid., pp. 130, 128.
24 Whereas the rental score calls this sequence "The Grid", Glass gives it the neutral name "#15" in his autograph score. The timestamps for *Koyaanisqatsi* refer to Reggio 2012.
25 I borrow the term "audio viewer" from Chion 1993, first used there on p. 56.

For Rebecca Eaton, the "Grid" sequence "suggests a loss of subjective experience and the dehumanization and mechanization of mankind".[26] She further notes that Glass's music in this sequence acts as a "sign of machines and technology". Indeed, the music in "The Grid" satisfies Eaton's definition of minimalist music featuring a "regular, steady pulse", the repetition of short motifs instead of long-wound melody lines and a "limited dynamic contrast". In other words, "all of these musical attributes are also characteristics of the working of machines, be they manifested in sound, visually observed motion, or internal process. Minimalism, then, functions as an iconic sign".[27]

In Rebecca Leydon's often-quoted typology of the six tropes of minimalist music, Glass's score for "The Grid" fulfils the criteria of the "motoric" trope, which "evoke[s] an 'indifferent' mechanized process" due to the impression of the repetition being perceived as mechanical.[28] While this correlation is somewhat self-evident, Wim Mertens's observation that "in repetitive music the concept of work has been replaced by the notion of process"[29] helps us to understand more clearly the aesthetic complexity of Glass's music in the "Grid" sequence. Mertens notes that a repetitive work as process does not "represent something outside itself but only [refers] to its own creation". Hence, "the subject no longer determines the music, as it did in the past, but the music now determines the subject. This reversal results in a shift towards extra-musical elements".[30]

With the support of Mertens's interpretation of minimalist music, I suggest that Glass's score for "The Grid" exceeds the characteristics of a mere "possible onomatopoeia with the machine", in Eaton's words.[31] Emphasising the shift "towards extra-musical elements", Glass's music *is* machine music and *becomes* thus the machine's sonic and rhythmic constituent. Like machine noises, Glass's music is smooth, sleek and scrupulous. It is constructed from small cells that are repeated verbatim and endlessly. Similar to machinated motions, the process-oriented repetitions prevent the musical structure from having a clear beginning and ending and thus a specific, individualised musical development in the conventional sense. Existing only as a middle section, this process music is as much streamlined and rationalised as the industrious workers shown on screen manufacturing various consumer goods. Glass's music as a non-progressing, circular gesture, frozen in time, suggests mass-produced music, 'assembly line music', or dehumanised, technoid music. Supporting a decidedly pessimistic worldview, the music references such synonyms of industrialisation as speed, motion, productivity, efficiency, exactness, automation and precision, but also loss of humanity and the sheer absurdity of a lifestyle that has reached the point of being 'out of balance'. Because of Glass's repetitive, hypnotic, mechanical music and the frantic timelapse shots, the audio viewer experiences the human activities shown on screen giddily as a no longer sustainable, now alienated lifestyle and as a manifestation of the sombre consequences of post-industrialist technology being inflicted on humankind.

In a self-reflexive manner, with this dystopian world shown in almost celebratory excitement, the industrious actions of factory workers and restless commuters become mechanised activities with the help of a mechanical medium: film. The sound and images have been mechanically produced and are mechanically reproduced for the enjoyment of the audio viewer. With

26 Eaton 2014, p. 7.
27 Ibid., pp. 5f.
28 Leydon 2002, par. 18.
29 Mertens 1983, p. 88.
30 Ibid., pp. 89f.
31 Eaton 2014, p. 6.

a great deal of self-reflexivity, the loss of the human factor and its gradual approach to the machine is expressed through the medium of film, which itself heavily relies on technology. Technology thus allowed Reggio to manipulate time. To show the irrationality of a post-industrialist lifestyle, Reggio and his cinematographer Ron Fricke decided to compress time massively in the "Grid" sequence to accelerate the movements of the people in Manhattan. To achieve the desired timelapse effect, which has become iconic since the film's première and has been emulated innumerable times since, Fricke increased – as a cumbersome DIY exercise – the technical abilities of a 35 mm Mitchell camera. Aligned in perfect synchronicity with the accelerated images, Glass wrote machine music that mirrors the effect of speed and efficiency. The performance of his score required such a spectacular tempo that during the recording session, musicians were hardly able to keep up with the *vivace* of a crotchet at 100 beats per minute. Errors were later ironed out in the studio with added synthesiser lines.[32] The chorus further sings mostly without audible rests to take a breath, a "bodily aspect [that] has been removed from the soundtrack".[33] In other words, mechanical means and machines were used to cover up any human errors and traces in the same way as in the film faulty Twinkies or frankfurters are sorted out before they proceed on the conveyor belt to the packaging station.

Glass's machine music matches the observation of the German critic Clytus Gottwald in the mid-1970s, who compared Steve Reich's *Drumming* to dehumanized "assembly-line labour"[34] or of the British music critic Ian MacDonald, who heard minimalist music as the "passionless, sexless, and emotionally blank soundtrack of the Machine Age, its utopian selflessness no more than an expression of human passivity in the face of mass-production and The Bomb. A kind of organized underachievement".[35] With his machine-influenced score for the "Grid" sequence, Glass expresses a decidedly pessimistic outlook about the trajectory that the interrelationship between technology and humanity has attained in the post-industrial age towards the end of the twentieth century. The unrestrained enthusiasm about technological progress articulated by such compositions as Arthur Honegger's orchestral work *Pacific 231* (1923) in the first three decades of the century had turned in "The Grid" into emphatic scepticism in terms of a healthy balance between nature and unrestrained human exploitation of its resources. The playful approach to technological advancement, such as in George Antheil's music for Fernand Léger and Dudley Murphy's experimental short film *Ballet mécanique* (1923/24, rev. 1952/53), was replaced in Glass's score with the dominant element of a dehumanised, threatening machinated sound underlining the imminent threat that an overly human dependence on technology entails. One recalls here Susan McClary who describes postmodern music, such as Glass's score for "The Grid", as "perpetual bricolage and fusions of hand-me-down codes and conventions" born out of a history "in which Western musicians have always been reveling in the rubble".[36] Whereas Antheil's score calls for an eccentric orchestration associated with machines like sixteen player pianos, three airplane engines, seven electric bells, sirens and typewriters, Glass prefers a compact, uniform sound of woodwinds, keyboards and voices performing dense, astonishingly fast, repeated arpeggios against a repetitive pattern of vocalise devoid of meaning and hence devoid of human emotion. Glass's orchestration with its very bright, brassy and metallic sonic quality especially evokes the metaphor of music as a machine. Closely correlat-

32 Maycock 2002, p. 154.
33 Eaton 2014, p. 9.
34 "Die Monotonie des hier sich abspielenden Arbeitsprozesses erinnert nicht von ungefähr an das Fließband: immergleiche Handgriffe produzieren Immergleiches." (Gottwald 1975, p. 4, translated by the author).
35 MacDonaldI 1987, p. 263.
36 McClary 2000, p. 169.

ed to Fricke's stunning timelapse city images, Glass's music for "The Grid" invites the audio viewer to question the accelerated hasty lifestyle in urban areas whose end goal is uniquely dedicated to maximising one's work efficiency, whereas for example Edmund Meisel's score for Walter Ruttmann's *Berlin. Die Sinfonie einer Großstadt* (1927) interprets the city as a lively, exciting, optimistic metropolis. The same upbeat meaning can also be attributed to music related to dance in that period, which was often referred to as the machine age. The key examples are the mechanised choreographies of Florenz Ziegfeld and Busby Berkeley, Agnes de Mille's choreography for Kurt Weill's "Forty Minutes for Lunch" ballet from *One Touch of Venus* (1943) and Jerome Robbins's choreography for the "Time Square Ballet" from Leonard Bernstein's *On the Town* (1944).[37] Mechanised ballets have been replaced in Reggio's film essay with choreographed episodes of assembly line food processing, humans at work executing the same short gestures repeatedly and armies of employees on large urban boulevards dashing from one place to another like out-of-control ants.

Whereas Honegger, Antheil, Meisel, Ziegfeld and Berkeley generally considered technological progress as a positive development, Glass, Reggio and Fricke used the machine trope over forty years later as a warning sign that we have reached a point of no return regarding the unregulated exploitation of our limited resources. At this point, two crucial questions arise which Rebecca Eaton omitted to ask in her study of minimalist music as a representation of technology and machines. First: How does Glass's machine music relate to the inherent critique of dehumanisation? And secondly: In what way is this music 'made in the USA' a specific American phenomenon that arose in the second half of the twentieth century? Robert Fink associates the rise of minimalist music with a quintessential American phenomenon that occurred at the same time: the "incessant pulsed repetition of mass-media advertising campaigns" or the "endless repetition of advertising".[38] Fink elucidates that a "culture of repetition arises when the extremely high level of repetitive structuring necessary to sustain capitalist modernity becomes salient in its own right, experienced directly as constituent of subjectivity".[39] In the arts, this cultural phenomenon was expressed in an exemplary manner in Charles Chaplin's *Modern Times* (1936), which may have well served as a further model for Reggio and Glass. In terms of advertising as a model for minimalist music, Fink continues that

> process music is thus pure media sublime: its incessant repetitions present the listener with the sublime experience of living through every last iteration of every piece of advertising in an entire media plan, missing nothing – as if one could sit in front of every television in every home in America for as long as the plan runs.[40]

In another study, Fink proposes that "minimalism […] is a profoundly American cultural practice"[41] because its history runs parallel to the evolution of commercial postwar television in the United States. Fink bases his argument on the British cultural thinker and sociologist Raymond Williams, who has argued – in Fink's words – that "broadcast television is not really a series of distinct programmes interrupted by commercial 'intervals', but a single undifferentiated *flow* of segments".[42] In analogy to broadcast television, minimalist music itself is thus rephrased and repetitive. Fink concludes his study with the thought that "the history of repetitive music in

37 See, for example, Baumgartner 2012, pp. 326–336.
38 Fink 2005, pp. 9, 164.
39 Ibid., pp. 3f.
40 Ibid., p. 165.
41 Fink 2013, p. 202.
42 Ibid., p. 204. Emphasis in the original.

American culture looks quite different if one imagines its rise and fall correlated […] with the complex evolution of our consumer culture and its mass-mediated cultural forms".[43]

In addition to an "industrialized, mass-mediated culture of repetition"[44] and an "endless, unitary flow of *television as a process*",[45] minimalist music as machine music is also closely linked to American industrialisation and its related development of machines that permitted virtually unfettered capitalism in the United States. As the "Grid" sequence in *Koyaanisqatsi* reveals, the American (post-)industrialisation is thus another crucial factor, which minimalist music as a cultural practice reflects upon. The United States became a leading player in the global market in the 1860s. By the early twentieth century, such industrial magnates as Andrew Carnegie and Henry Clay Frick dominated the steel industry, John D. Rockefeller the oil business, Henry Ford the automobile trade and J. P. Morgan, Andrew Mellon and the Goldman-Sachs family banking. Also in the early twentieth century, economists such as Thorstein Veblen critically described the mechanics of the industrial age. In fact, the "Grid" sequence invokes several observations made by Veblen, such as "[t]he machine process compels a more or less unremitting attention to phenomena of an impersonal character and to sequences and correlations not dependent for their force upon human predilection nor created by habit and custom" or "[t]he working population is required to be standardized, movable, and interchangeable in much the same impersonal manner as the raw or half-wrought materials of industry".[46] Jacques Ellul, who was influenced by Veblen's pessimistic writing and who was one of Reggio's inspirations for making *Koyaanisqatsi,*[47] wrote in his influential book *The Technological Society* that "[i]n the coupling of man and machine, a genuinely new entity comes into being", namely "the complete adaptation of the man to the machine".[48] Such theoretical deliberations reverberate in the score and images of *Koyaanisqatsi* in a disturbing fashion and they use the format of film (which is inherently more popular than scholarly literature) to invite the audio viewer to contemplate the issue of technology gradually intruding on the human body.

Posthuman Music in Beryl Korot and Steve Reich's *Three Tales*

Similar questions, but dealt with in a more complex fashion, are at the core of *Three Tales* by Steve Reich and the video artist Beryl Korot. This one-hour-long "digital video opera", which belongs to the genre that Jelena Novak calls "postopera",[49] investigates three pivotal moments of technological advancement in the twentieth century, whereby all three events are closely linked to the United States. According to Korot, "one of the subtexts" of this video opera is the "double-edged sword of the gains and losses of each new technology that we incorporate into our lives".[50] The first tale is concerned with the Hindenburg Zeppelin disaster, which occurred on 6 May 1937 in Lakehurst, New Jersey, and which caused 35 fatalities. The second tale addresses the nuclear tests executed at the Bikini Atoll between 1946 and 1954 and the dislocation of its indigenous residents, and the third the cloning of Dolly the sheep in 1997 and its impact on humanity in general. As Helena Grehan has argued, *Three Tales* invites the audio viewer to meditate upon the "complicated process" of negotiating "questions of otherness and responsibili-

43 Ibid., p. 210.
44 Fink 2005, p. 165.
45 Fink 2013, p. 204.
46 Veblen 1915, pp. 310, 326.
47 Dempsey 1989, p. 4.
48 Ellul 1964, p. 395.
49 Novak 2015.
50 Allenby 2003, p. [6].

ty".[51] I will return later to the essential question of "otherness" in connection with AI technology and the posthuman.

The last and longest tale, *Dolly,* deals with life and the body, in particular the evolution from "carbon-based life" to "silicon-based life".[52] This video opera tackles questions about life along a Darwinian path from cell reproduction, cloning (segment "Cloning"),[53] evolution theory (segment "Darwin"), experimentation with DNA (segment "Dolly") and then the transition into information technology with computers, AI, cyborgs and robots (segments "Human Body Machine" and "Robots/Cyborgs/Immortality").[54] The half-an-hour tale is open-ended in terms of the future of the evolutionary trend and possible consequences for humankind after it has invented genetic experimentation, cybernetic organisms, robots and artificial intelligence. Korot and Reich present the disturbing last tale in a hybrid form situated somewhere between an experimental video production, a talking-head documentary, an avant-garde art-music composition for voices, acoustic and digital instruments and an ultra-modern musical theatre production. Reich employs a small ensemble comprising of a vocal quintet, string quartet, two pianos, four percussionists and pre-recorded sounds. The ensemble and five vocalists perform the work live in front of a large screen on which Korot's video essay is projected. *Dolly* – as much as the other two tales – stimulates the audio viewer's senses "synaesthetically" by "forging connections between visual representations and rhythmical, melodic and sung forms", as Jem Kelly observes.[55] The audio viewer discerns these connections from a series of snippets of short, thought-provoking prognostications made by seventeen scientists and the Jewish philosopher and social critic Adin Steinsaltz regarding the present and future state of humanity, which continues to be dictated by technology. The scientists, whose various standpoints "generate an open and nuanced exchange between spectators and the performance",[56] include such prestigious leaders in their fields as the former Oxford Professor for Public Understanding of Science Richard Dawkins, the co-discoverer of DNA and Nobel Laureate in Physiology or Medicine in 1962 James Watson, the palaeontologist and evolutionary scholar Stephen J. Gould, the MIT professor for Social Studies of Science and Technology Sherry Turkle, the cognitive psychologist and psycholinguist Steven Pinker, the professor of media arts and sciences at MIT and robotics scientist Cynthia Breazeal and the cognitive and computer scientist Marvin Minsky who specialises in AI.

In *Dolly,* Reich resorts to a compositional technique he had already used in two of his previous collaborations with Korot. One is the three-movement work *Different Trains* (1988) for string quartet and tape, which juxtaposes stories of Reich's train journeys between New York and Los Angeles during the Second World War with those of prisoners deported on trains to concentration camps in Europe at the same time. The other work is the three-act multimedia opera *The Cave* (1993), which is based on Abraham's life as handed down in various religious texts. For *Dolly,* as with *Different Trains* and *The Cave,* Reich first extracted and sampled short excerpts from the interviews he and Korot conducted with the scientists and the rabbi. In a second step, he used the collected excerpts as compositional motifs by converting their speech

51 Grehan 2009, p. 145. Regarding the concern of responsibility in *Dolly*, see Rabbi Adin Steinsaltz's significant question directly addressing the consciousness: "The real question would be, are you responsible or not responsible for anything?" (bars 568–575; DVD 00:49:08). For this analysis, I use the score Reich 2002 and the DVD Reich 2003.

52 See Richard Dawkins's comment at 01:02:23. The timestamps printed in this chapter refer to Reich 2003.

53 These titles refer to the ones used on the DVD Reich 2003.

54 On the DVD, *Dolly* starts at 00:38:30 and finishes at 01:04:51.

55 Kelly 2005, p. 234.

56 Grehan 2009, p. 146.

melodies into musical notation. In a last step, he used the motifs as building blocks to shape the vocal and instrumental parts.[57] On some occasions, he looped them or made "an extension of a single vowel in time" from a specific thought uttered by an interviewee, a technique he compared to a "freeze frame in film". This "kind of audible vapor trail", in Reich's words, often amplifies a significant word or the last syllable of a word and enriches the musical texture sonically with an additional sustained voice. A last compositional technique that Reich utilised was also borrowed from the moving images: Reich sporadically chose to slow down "a speaker or other sound without changing pitch or timbre", an effect which he called "slow motion sound".[58]

Danielle MacRobbie terms the heavy reliance on technology for composing and performing *Three Tales* "Technology as Tool". She further identifies two other layers of technology in the work: "Technology as Subject" and "Technology as Theme". The latter refers to the fact that "[t]ech[nological] developments of the past have been ill-used and facilitated disastrous events".[59] I suggest adding a fourth category: technology as aesthetic expression. This fourth category in *Dolly* illustrates how the music can be situated somewhere between human-made music and machine music. Reflecting on the topic of the third tale *Dolly,* the idea of a gradual replacement of "carbon based life" with "silicon based life",[60] the music emulates the state between human-made music and pure machine music as posthuman music. Reich's music in *Dolly,* therefore, assumes the role of a posthuman automaton.[61]

Around the time that Korot and Reich were working on *Three Tales,* the effect and ethical consequences of posthumanism were vigorously debated by such theorists as N. Katherine Hayles, Judith M. Halberstam, Ira Livingston, Neil Badmington and Elaine L. Graham.[62] The concept of a posthuman body departs from the prerogative of a humanist body, which conforms to the Cartesian mind–body dualism and postulates instead "reinscrib[ing] the 'technical' within the very fabric of the human".[63] According to Judith Halberstam and Ira Livingston, posthuman bodies "emerge at nodes where bodies, bodies of discourse, and discourses of bodies intersect to foreclose any easy distinction between actor and stage, between sender/receiver, channel, code, message, context".[64] At the core of posthumanism is the notion of extending the body's abilities through prosthesis.[65] The idea of the hybrid body means that information is stored outside of bodies, for example in computer memory banks, and mechanical devices – such as machines and robots – are executing manual work that the body did itself in the past. Reich

57 In relation to *Different Trains* and *The Cave,* Reich states that he finetuned this specific working method for *Three Tales* by altering the pre-existing sound samples to fit the musical requirements. This freer appropriation of technology "allows the musicians to work up some momentum in one tempo over a longer period of time" (qtd. in Allenby 2003, p. [9]).

58 Qtd. in ibid., p. [9].

59 MacRobbie 2013, p. 15.

60 See the interview excerpt in "Dolly" with the British evolutionary biologist Richard Dawkins (01:02:22; bars 1261–1283).

61 John Richardson and Susanna Välimäki have also observed the correlation between (post-) minimalist music and posthumanism. They suggest that "[t]he music's mechanical quality most effectively conveys this modality [of a "quality of disaffection"], which is reflected in the broader structures of a feeling of modernity and stems in part from the subject's state of discontent (or ambiguous content) within modernity" (Richardson/Välimäki 2013, p. 223).

62 See Hayles 1999; Halberstam/Livingston 1995a; Badmington 2003; and Graham 2002.

63 Herbrechter 2013, p. 4.

64 Halberstam/Livingston 1995b, p. 2.

65 Jelena Novak analyses *Three Tales* from the perspective of "how singing appears monstrous as a result of existing beyond the body that produces it" (Novak 2015, p. 15). For her, the "vocalic body" in *Three Tales* becomes a "speaking machine" (ibid., p. 16).

and Korot, however, embrace the posthuman concept much less affirmatively than the aforementioned scholars and treat it in *Dolly* as a catastrophic failure of humanity. They articulate in *Dolly* that the evolution from human to posthuman reveals itself as a disaster for the human species. With the help of the selected interview excerpts, music and images presented in *Dolly,* which illustrate that the two artists acknowledge the human body to be an autonomous self, they express a similar uneasiness, scepticism and even outright panic regarding the consequence of a posthuman body, as Norbert Wiener does in his early treatise on *Cybernetics* and Bernard Wolfe in his dystopian novel *Limbo.*[66] In N. Katherine Hayles's words, such a "view of the self authorizes the fear that if the boundaries are breached at all, there will be nothing to stop the self's complete dissolution".[67] Agreeing with this fear, Reich and Korot accordingly disregard the thought that through the posthuman body we extend "embodied awareness in highly specific, local, and material ways that would be impossible without electronic prosthesis".[68] As Hayles declares, a possible long-term goal is that "we can craft others that will be conducive to the long-range survival of humans and of the other life-forms, biological and artificial, with whom we share the planet and ourselves".[69]

At odds with such a visionary interpretation of a posthuman future, Reich and Korot articulate their apocalyptical notion about the posthuman through quotations borrowed from several interviews, such as Richard Dawkins's postulation that "We and all other animals are machines created by our genes".[70] Given the tale's subject, it is hardly surprising that this excerpt encapsulates the first musical idea for *Dolly* that Reich jotted down in his sketchbook in the form of a transcription of Dawkins's remark as a speech melody (Fig. 2).[71]

Korot and Reich lifted this snippet from their interview with Dawkins and inserted it into *Dolly* three times, almost like a leitmotif.[72] During the first and second iteration of this passage, Reich uses the same rhythmic pattern in all parts and similar melodic and chordal contours in different keys (Ex. 2). Reich has already notated the D major 11 chord, which appears numerous times in the right hand of Piano 1, in the sketch reproduced in Figure 2.

In other words, the 53 bars from bars 67 to 119 in the first passage are the same as bars 235–288 in the second passage, except for very few exceptions such as bars 89 and 257 respectively. Much of this repeated passage is constructed from compact musical cells: From bars 84 and 252 onwards respectively, the same three-bar cell alternating between two bars in a 3/8 metre and one bar in 2/4 is repeated 12 times.

During the second iteration, first built on a G#-minor chord (bars 235–246) and later on a D-minor 9 chord (bars 247–277), the machine motif, which is introduced by Dawkins's "We and all other animals are machines", returns as in a rondo form.[73] The repeated machine pattern, whose aesthetic reminds the audio viewer of Antheil's pounding music for Léger and Mur-

66 See Wiener 1948 and Wolfe 1952.

67 Hayles 1999, p. 290.

68 Ibid., p. 291.

69 Ibid.

70 Bars 67–78; DVD 00:40:17.

71 The first musical idea, the speech melody of the Dawkins quotation, which Reich notated on 17 April 2001, can be found in Reich *Sk 48,* p. 0449_0170. I would like to express my sincere gratitude to Pwyll ap Siôn who was so kind as to provide me with Reich's source material for *Dolly* as presented here.

72 It appears the first time in the score at bars 67–119 (DVD 00:40:17–00:41:01), the second times at bars 235–367 (DVD 00:43:22–00:45:05) and the third time at bars 549–590 (DVD 00:48:44–00:49:35).

73 DVD 00:43:22–00:45:05. It is not clear from the following interview excerpt whether Reich specifically refers to the Dawkins passages discussed here. In more general terms, he acknowledges that "certain kinds of material" recur "in no clearly discernible pattern. Musically one might say 'Dolly' was a kind of free rondo" (quoted in Allenby 2003, p. [13]).

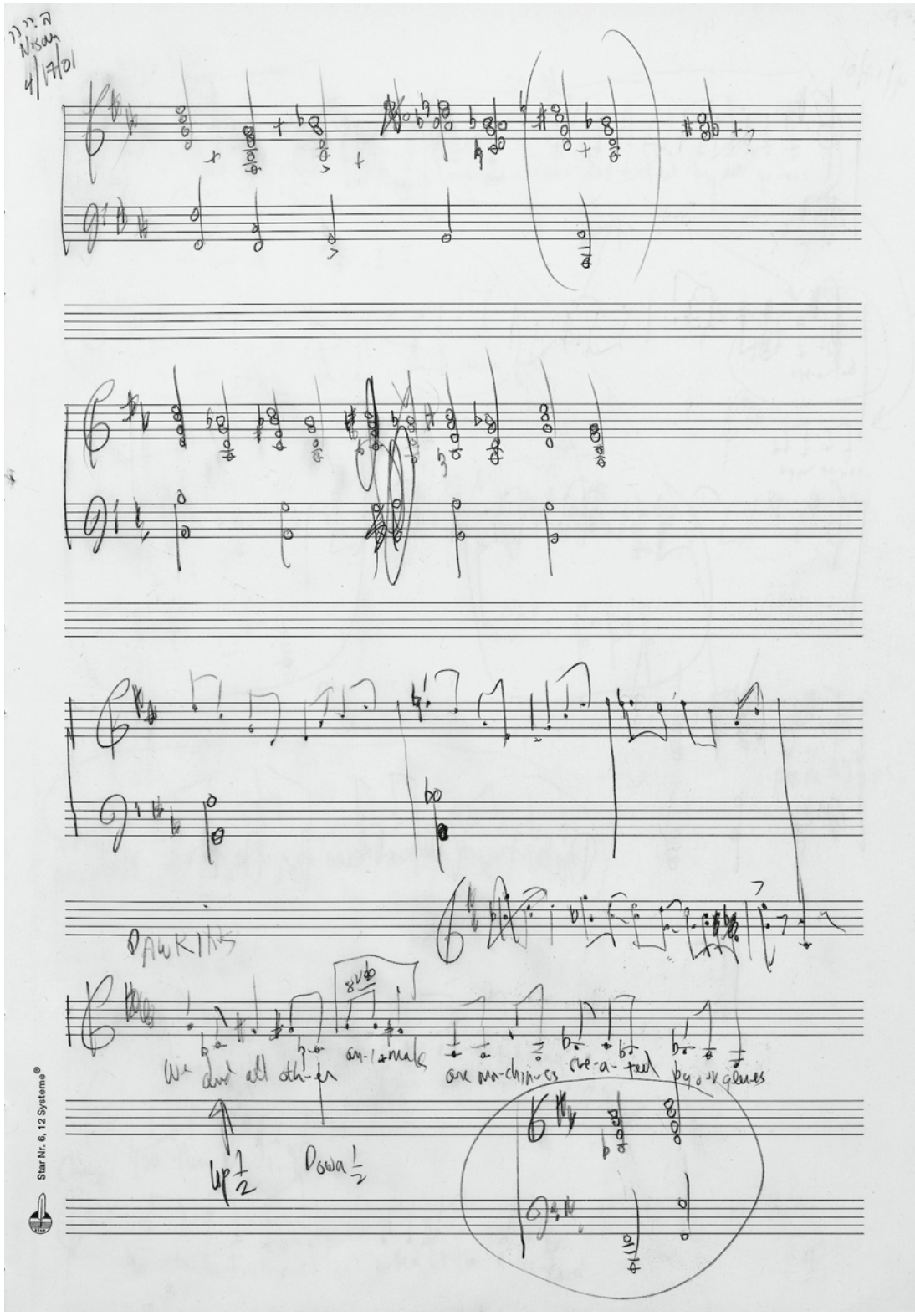
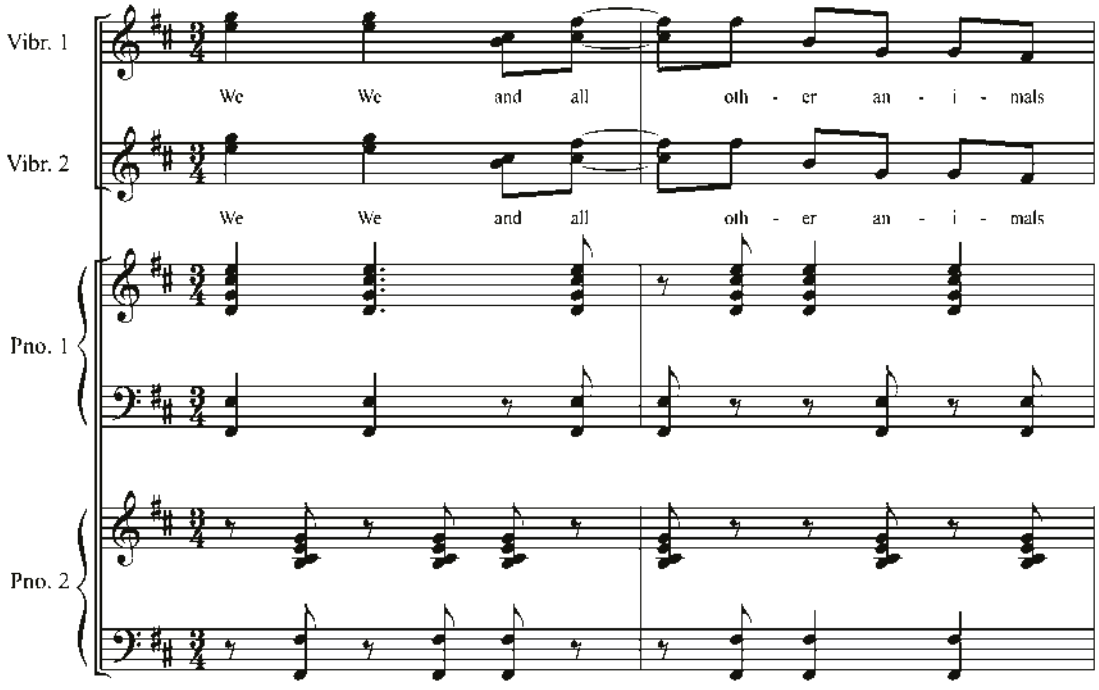


Fig. 2 Reich's first musical idea for *Dolly* from *Three Tales* (2002). As this autograph shows, Reich developed the speech melody for this passage on 17 April 2001, which was derived from a quotation expressed by scientist Richard Dawkins on video (Reich *Sk 48*, p. 0449_0170, courtesy of Paul Sacher Stiftung, Basel).



Ex. 2 Steve Reich: *Dolly* from *Three Tales* (2002), bars 68–69.

phy's *Ballet mécanique,* becomes a loop serving as the background for the several quotations articulated by Dawkins and Sherry Turkle.[74] As a visual background realised in the form of a split screen, Korot shows various images of a 'machine' – such as the MIT robot Kismet – followed by Dawkins's head on the screen's left side and its mirror image on the right side. The loop created from the two mirrored shots with Dawkins incessantly repeating "machine" transforms his likeness from a human being into a cyborg. Superimposed onto this busy visual background, we see Sherry Turkle stating in a close-up: "When Marvin Minsky said, 'The mind is a meat machine', people freaked".[75] "Freaked" embodies a case in point of one of the electronically extended vowels that Reich frequently employs throughout *Dolly.* It is meant as the musical equivalent of a freeze frame, which in fact occurs at the same time as Korot turning Turkle's close-up into an actual visual freeze frame. Meanwhile, eight multiplied silhouettes of Dawkins's head appear against Dawkins's close-up in the foreground claiming that "a monkey is a machine that preserves genes up the trees", with the vowel "trees" freezing in time.[76] Followed by James Watson's statement that "The script for human life is three billion letters", another freeze vowel happens on "life".[77] As a graphic representation of Watson's scientific finding, random letters scroll by on the screen behind the multiplied silhouettes of Dawkins's head. Turkle assures us with a soothing voice that "It doesn't seem so frightening anymore".[78] Reich's interpretation of Turkle's persuasive assertion, however, articulates the opposite of comfort, namely outright anxiety, for Reich adds a freeze vowel on "fright". This freeze vowel lingers on like the ghostly trace of Turkle's previously uttered phrase, which transforms her in Korot's and Reich's audio-visual interpretation into a sort of cyborg. The real Turkle, as a carbon-based living being, is mecha-

74 See Reich *Sk 48,* pp. 0449_0182 and 0449_0183, sketched out on 24 June and 27 June 2001 respectively.
75 Bars 266–279; DVD 00:43:52; see Reich *Sk 48,* p. 0449_0179, written down on 18 June 2001.
76 Bars 290–299; for the entire transcription of Dawkins's speech melody, see Reich *Sk 48,* p. 0449_0180 conceived on 20 June 2001.
77 Bars 302–309; DVD 00:44:18.
78 Bars 320–323.

nised twice: first through the transformation of her living being into the sphere of video production – the capturing of her person on video – and then through the intense manipulation of the video image and its soundtrack. In other words, the real Turkle here becomes an organism augmented with visual effects, emulating cybernetic qualities. Through artistic interpretation (and manipulation), Turkle embodies the very subject she speaks about. Followed by Turkle's "preparing for a new kind of cyborg consciousness", Dawkins's quotation "They're all about preserving the code, preserving DNA" concludes this section.[79]

The same cellular construction as in the two "We and all other animals are machines" sections is also present in other passages that can be identified as posthuman music. Somewhat later in *Dolly*, Dawkins reminds the audio viewer that the "self-replicating molecule […] produces copies and copies and copies".[80] Korot emulates the endeavour of making copies on the screen by layering the same silhouette of Dawkins's head multiple times, one on top of each other. In a self-reflexive manner, Reich also mimics the same procedure in his music. A musical two-bar cell in a 7/8 metre is repeated verbatim 19 times.[81] The speech melody of "copies of copies" appears in the vibraphone supported by a syncopated interlocking pattern involving the first and second pianos, both of which are doubled by the first percussionist. As in the "copies of copies" passage, a section later based on Raymond Kurzweil's utterance "intelligent machine" is constructed in a similar fashion with a complex pattern consisting of the speech melody line in the vibraphone pitted against an interwoven syncopated rhythmic pattern in the two pianos and the first percussion. Similar to the previously discussed cases, the passage consists of a three-bar cell A repeated 9 times, with one bar in a 2+3+3/8 metre, one bar in 6/8 and one bar in 5/8, followed by a shortened cell A' repeated 12 times with one bar in a compound 2+3+3/8 metre and one bar in a 5/8 metre, and finally by a third cell A'' repeated 8 times, shortened again to one bar in a 3/4 metre and one bar in a 5/8 metre.[82] In fact, A' and A'' provide the effect of condensing the music, accelerating its pace and thus creating a sense of rising urgency.

Korot settles on the same visual choice as before. She depicts the head of the interviewee – this time Raymond Kurzweil – as a silhouette multiplied four times. Superimposed onto this backdrop is Cynthia Breazeal with her 'baby', the robot Kismet, which she designed at MIT in the late 1990s; it is meant here as an example of a machine. Realised as a slow-motion shot, we see Breazeal playing with Kismet as if the robot were a real toddler. On the soundtrack, we hear Turkle's words, which also relate to a children's subject, "When my ten-year-old said to me the robots are like Pinocchio not like real boys; they're sort of alive".[83] Her thought ends in a freeze vowel to express the ghostly state of "sort of alive".

The same artistic ideas, which are visually embodied with Korot's repeated multiplication of the same talking head and musically with Reich's construction of a longer musical texture based on discrete minute cells, are also present in an extended passage somewhat later. This section is introduced by the roboticist Rodney Brooks, who forecasts that cybernetics will one day become reality through implanting technology in the human body. Despite having built her own robot, Kismet, when a doctoral student at MIT under Brooks, Breazeal reacts with consternation to her PhD advisor's prospect with the exclamation "*This* gives me pause". As

79 Bars 353–361 and 369–373 respectively; DVD 00:44:55; see Reich *Sk 48,* pp. 0449_0182 to 0449_0184, sketched out on 24 and 27 June, and on 8 July 2001.

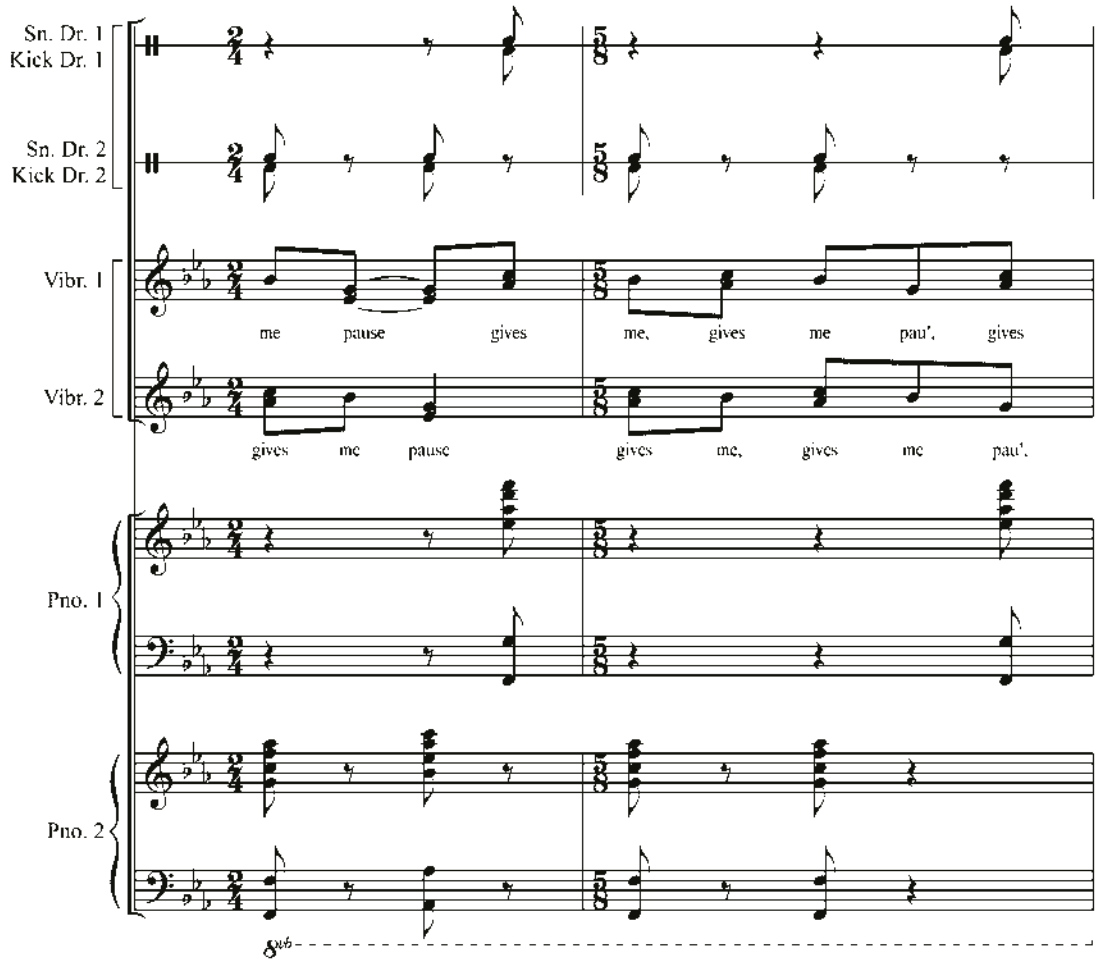
80 Bars 627–668; DVD 00:50:21–00:51:21.

81 Bars 631–668.

82 Bars 908–934, 935–958 and 959–974 respectively; DVD 00:55:21–00:56:47.

83 Bar 938–955.

earlier with Dawkins's head, Korot turns Breazeal's close-up shot into a cyborg-like machine by first mirroring her head and then looping the two heads facing each other multiple times. With this technique, she creates a disturbing image of Breazeal's close-up and its copy, for both execute jerking head gestures, which imply that Breazeal has been turned into a mechanical device. In the musical realm, Reich realises Breazeal's hesitation by incessantly looping her concerned reaction over the extraordinary length of 129 bars (Ex. 3).[84]



Ex. 3 Steve Reich: *Dolly* from *Three Tales* (2002), bars 1137–1138.

With this repeated, frozen musical phrase, he interrupts the forward motion of the musical flow and brings its unfolding development to a sudden halt. This longer passage, built modularly from cells, can be subdivided into three sections. In the first section, Reich and Korot add to the static musical texture a line uttered by the cognitive and computer scientist Marvin Minsky, who was instrumental in the development of AI technology: "You go and buy this module […] in the Mind Store […] have it connected to your brain […] and then […] you do four or five part counterpoint".[85] Reich amplifies the eeriness of this consideration by extending the last syllables "-dule", "brain" and "point" with his freeze vowel technique digitally reproduced from a pre-recorded track. The musical structure becomes even more troubling with the repeated looping of Minsky's "four or five part" phrase occasionally interjected by Breazeal's word

84 Bars 1130–1258; DVD 01:00:03–01:02:21.
85 Bars 1130–1172; DVD 01:00:23.

"this".[86] The words "this", "four or five", "counterpoint" and "pause" are interlocked here. Following the musical structure, Korot takes the background image of Breazeal's silhouetted head, multiplied eight times, and superimposes a close-up of Minsky or Breazeal, both flashing in and out, tightly synchronised to Reich's counterpoint-like music (Fig. 3).

Fig. 3 A composite still image from the third movement of *Dolly* from *Three Tales* (2002). Scientists Marvin Minsky and Cynthia Breazeal become cyborg-like creators in video artist Beryl Korot's visual manipulation (DVD 01:01:02).

Reich, however, does not fall into this trap by mimicking strict contrapuntal techniques here. Instead, the audio viewer no longer feels that there is a human composer behind this work, controlling all the musical parameters, but rather that the composition unfolds in fully automated fashion, working without any human interaction. It appears as if the work has acquired the momentum to develop through its own will. Through technology, the human voice has been dehumanised and starts to sound like a computerised voice. The instrumental parts incessantly hammer out their preconceived repetitive patterns. In other words, at this moment, music has reached the point of being in between the technologies of cloning and cybernetics. Driven by the "give me pause" phrase, the music makes endless copies of its own DNA – the basic rhythmic cell – and as if controlled by artificial intelligence, human speech has been forced into a machine-like form of expression.

In the second section, Raymond Kurzweil echoes Minsky's earlier thought by suggesting that "If I scan your brain […] download that information […] I'll have a little you […] right here on my personal computer". A little later, Minsky claims that there is "No reason why people should put up with death […] Start redesigning ourselves […] I think we'll turn into […] something quite different".[87] Kurzweil's and Minsky's reflections invite the audio viewer to see a correlation between posthumanism and immortality. Both latch on here to a "metanarrative about the transformation of the human into a disembodied posthuman". In fact, at the time that *Three Tales* was being made, Minsky was seemingly convinced that it would "soon be possible to extract human memories from the brain and import them, intact and unchanged, to computer disks".[88] According to Hayles, Minsky does not, however, altogether abandon "the

86 Bars 1180–1206.

87 Bars 1208–1234 and 1235–1258; DVD 01:01:34 and 01:02:00 respectively.

88 See Hayles 1999, pp. 22, 13.

autonomous liberal subject but is expanding its perogatives [sic] into the realm of the posthuman". Hence "[w]hat is lethal is not the posthuman as such but the grafting of the posthuman onto a liberal humanist view of the self".[89] Reich and Korot support just such a viewpoint and in this longer section they accordingly defend the humanist ideal of the Cartesian mind–body dualism. They reinterpret Breazeal's "*This* gives me pause" as an exclamation of disbelief advocating against any further invasion of technology into the human body.[90] In Korot's and Reich's montage of the rearranged interview snippets, this passage with Breazeal's incessant repetition of the same phrase invokes implicit doubt regarding Minsky's and Kurzweil's predications about the future of computers, AI, posthumans and eternal life. In this new context, Breazeal's statement conveys a decisively sceptical reaction.

To summarise, in a postmodern fashion, Reich and Korot recombine and rearrange fragments lifted from interviews, various isolated visual elements, such as talking heads and their silhouettes and compact musical cells in such a way that these disparate elements create a new artwork. In particular, the machine-like, posthuman musical passages in *Dolly* force a different methodology onto us regarding how to analyse music. In the context of *Dolly,* it is tempting to argue that the music works like an organism in which a single cell is multiplied manifold times through an "automatic process" to create the whole musical structure as a fabric of "colonies of cells".[91] The individual musical parameters in these cells subsequently encompass the DNA of the music. Each musical cell can, therefore, be compared to those "self-replicating molecules", which Dawkins mentions early on in *Dolly,*[92] an original nucleus from which the whole musical work is constructed. A more fruitful approach, however, can be attained if we consider these passages in *Dolly* as autopoietic systems. Humberto M. Maturana defines such systems

> as unities and as networks of production of components that (1) recursively, through their interactions, generate and realize the network that produces them; and (2) constitute, in the space in which they exist, the boundaries of this network as components that participate in the realization of the network.[93]

Indeed, a leading stylistic feature of Reich's music is the "notion of recursive closure of the system". As an autopoietic system, the music constructed from distinct cells in the passages in *Dolly* discussed here

89 Ibid., pp. 286f. Hayles refers here to Moravec 1988, who argues for a 'postbiological' future (see Hayes 1999, p. 35).

90 This short exclamation is part of a 41-minute-long interview that Reich and Korot conducted with Breazeal. It gives an impression of how Reich and Korot selectively lifted a particular sentence from an interview and embedded it, newly combined with other quotations, into *Dolly*, so that the short excerpt in its new context produces a different meaning. The integral passage reads: "Are we just machines? Somehow, we seem to be more than just machines. And, listening to a lot of people, seeing the scientists working on technologies that we're bringing into our bodies – first of all to try to thwart disease, to impose our quality of life as we're getting old – but then people even talk about enhancement, to be better than what we were before, so they're starting to speak of ourselves and our brains and our bodies as being technology: we can engineer something better, we can start eschewing our biological component, and integrating technological improvements and enhancements. This gives me pause [laughs]. It will give a lot of people pause. And part of the reason for that, I think, is, for me, through the process of trying to build something like Kismet, you develop such a tremendous appreciation – the sense of humility into how amazing people are. The human experience is incredible …" (at 00:22:45). The interview is held by the Paul Sacher Stiftung and the passage here was transcribed by Pwyll ap Siôn.

91 See Dawkins at 00:51:28 (bars 672–673) and at 00:50:48 (bar 650).

92 Bars 604–606; DVD 00:49:52.

93 Maturana 1981, p. 21.

> is not only able to produce and eventually to change its structures, but is also capable of reproducing its components, and in particular its undecomposable elements, through recursive self-reference of these elements. Thus, its self-reproduction relies exclusively on internal operations and is not dependent on the environment.[94]

Within the context of *Dolly,* the aesthetic result of this posthuman music, which operates according to an autopoietic system, constitutes a transformation of the interviewees' appearance through music from human beings to cyborg-like creatures and the music, therefore, erases the clear borders between carbon-based and silicon-based life.

A moment that further confirms that the music in *Dolly* assumes the role of posthuman music occurs when the incessantly pounding syncopated chords suddenly stop and the music freezes into a static drone.[95] At this moment, the autopoietic system comes to a sudden halt. In this unusually poetic, nostalgic interlude in the context of *Dolly,* Rabbi Adin Steinsaltz postulates that "every creature has a song"; there is the "song of a dog", the "song of a fly", the "song of a fox", etc. At this moment, the music can no longer satisfy the purpose why humans have invented music in the first place, namely, to invoke the song melodies mentioned here that have now vanished. As posthuman music bound to the rules of an autopoietic system, it has lost its ability to generate melodies. To reinforce this loss, it returns in bar 822 to its busy syncopated pattern dominated by rhythm and not by melody.

Conclusion

Reich's posthuman music in *Dolly* from *Three Tales* alienates the subject matter depicted and raises awareness about the disturbing reality of a technical invasion of cybernetics into our human bodies. It is much more pronounced than Glass's machine-like score in the "Grid" sequence from *Koyaanisqatsi,* which promotes concern about a looming environmental catastrophe. In addition to the already existing environmental issues, the emphasis on the posthuman has to do with increasing concerns regarding cybernetics and AI that had become prevalent at the turn of the century. These two works are a testament to how the discourse had changed within the twenty years between them. Nonetheless, the music in both works embodies a reification of the sombre consequences that modern life brings to us – or, more tellingly, *is* caused by us – and the new technology invented by us that offers a preview of things to come. It is thus no coincidence that the specific aesthetic parameters of minimalist music originated in the United States. The proximity between composers, musicians, technological invention and the capitalist framework of the US economy gave the impetus for minimalist music with its repetitive, busy patterns in certain combinations with extra-musical events (such as film, theatre or video art) to be heard as 'machine' music or 'posthuman' music. The link between minimalist music, the specificity of the American economic system and the inherent drive for technological advancement appears to be reflected in the music through the critical theorising of the streamlined production process by such economists as Thorstein Veblen or later in the leading role that US universities and private enterprises have played in developing posthuman devices such as AI technology, robots, cyborgs, etc.

Contrary to Reggio and Glass's aesthetically striking and hypnotic audio-visual depiction of the domination of technology over humanity, Korot and Reich employ a much gloomier and more pessimistic audio-visual language. Whereas Glass's music takes on the quality of

94 Rogowski 2001, p. 8500.
95 Bars 787–821; DVD 00:53:41–00:54:10.

machine music in the "Grid" segment in a fairly straightforward fashion, Reich's music in *Dolly* – particularly when Korot and Reich discuss human bodies as machines – is considerably more complex. In these passages, the music – as posthuman music – emulates scientific procedures, such as an autopoietic system, and replicates the message of evolution, cloning, posthumanism, AI, cyborgs, computers and robots in a self-reflexive manner with compositional techniques, resulting in a rigidly, concisely organised musical structure. *Dolly* not only nurtures questions regarding our perception of otherness and of responsibility, as Grehan notes, but also encourages a re-evaluation of the ethical implications that arise in a posthuman era caused by scientists who thoughtlessly attempt to erase the borders between human beings and machines.

Bibliography

All weblinks in this article last accessed 26 August 2025.

The Steve Reich Collection at the Paul Sacher Stiftung in Basel houses all materials for *Three Tales*, from sketches to interview recordings, computer files, printouts of the score and video material, including Reich *Sk 48* and *Sk 49.* The sketches for *Dolly* extend over 67 pages from 0449_0166 to 0449_0233.

Allenby 2003 | David Allenby: A Theater of Ideas [DVD booklet text], in: Reich 2003.

Ap Siôn/Evans 2009 | Pwyll ap Siôn/Tristian Evans: Minimalist Music. Parallel Symmetries? The Relationship Between Minimalist Music and Multimedia Forms, in: *Sound and Music in Film and Visual Media. A Critical Overview,* ed. by Graeme Harper, Ruth Doughty and Jochen Eisentraut, New York: Continuum 2009, pp. 671–691.

Badmington 2003 | Neil Badmington: Theorizing Posthumanism, in: *Cultural Critique* 53 (Winter 2003), pp. 10–27.

Baudrillard 1998 | Jean Baudrillard: *The Consumer Society. Myths and Structures,* London: Sage 1998.

Baumgartner 2012 | Michael Baumgartner: *Exilierte Göttinnen. Frauenstatuen im Bühnenwerk von Kurt Weill, Thea Musgrave und Othmar Schoeck,* Hildesheim: Olms 2012.

Chion 1993 | Michel Chion: *Audio-Vision. Sound on Screen,* ed. and trans. by Claudia Gorbman, New York: Columbia University Press 1993.

Dempsey 1989 | Michael Dempsey: Quatsi Means Life. The Films of Godfrey Reggio, in: *Film Quarterly* 42/3 (Spring 1989), pp. 2–12.

Dies 2013 | David Dies: Defining "Spiritual Minimalism", in: Potter et al. 2013, pp. 315–335.

Eaton 2014 | Rebecca M. Doran Eaton: Marking Minimalism. Minimal Music as a Sign of Machines and Mathematics in Multimedia, in: *Music and the Moving Image* 7/1 (Spring 2014), pp. 3–23.

Ellul 1964 | Jacques Ellul: *The Technological Society,* trans. by John Wilkinson, New York: Vintage 1964.

Fink 2005 | Robert Fink: *Repeating Ourselves. American Minimal Music as Cultural Practice,* Berkeley: University of California Press 2005.

Fink 2013 | Robert Fink: Going with the Flow. Minimalism as Cultural Practice in the USA since 1945, in: Potter et al. 2013, pp. 201–218.

Glass n.d. | Philip Glass Film: *Koyaanisqatsi. Life Out of Balance,* online, n.d., https://philipglass.com/films/koyaanisqatsi/.

Gottwald 1975 | Clytus Gottwald: Signale zwischen Exotik und Industrie. Steve Reich auf der Suche nach einer neuen Identität von Klang und Struktur, in: *Melos/NZfM* 1/1 (1975), pp. 3–6.

Graham 2002 | Elaine L. Graham: *Representations of the Post/Human. Monsters, Aliens and Others in Popular Culture,* New Brunswick: Rutgers University Press 2002.

Grehan 2009 | Helena Grehan: *Performance, Ethics and Spectatorship in a Global Age,* Basingstoke: Palgrave Macmillan 2009.

Halberstam/Livingston 1995a | *Posthuman Bodies,* ed. by Judith M. Halberstam and Ira Livingston, Bloomington: Indiana University Press 1995.

Halberstam/Livingston 1995b | Judith M. Halberstam/Ira Livingston: Introduction. Posthuman Bodies, in: Halberstam/Livingston 1995a, pp. 1–19.

Hayles 1999 | N. Katherine Hayles: *How We Became Posthuman. Virtual Bodies in Cybernetics, Literature, and Informatics,* Chicago: University of Chicago Press 1999.

Herbrechter 2013 | Stefan Herbrechter: [Review of] Rosi Braidotti: *The Posthuman,* Cambridge: Polity Press. ISBN: 978–0-7456–4158–4, in: *Culture Machine* (April 2013), pp. 1–13, https://culturemachine.net/wp-content/uploads/2019/05/495-1102-1-PB.pdf.

Hill et al. 1997 | *Hopi Dictionary. Hopìikwa Lavàytutuveni. A Hopi-English Dictionary of the Third Mesa Dialect with an English-Hopi Finder List and a Sketch of Hopi Grammar,* ed. by Kennth C. Hill, Emory Sekaquaptewa, Mary E. Black, Ekkehart Malotki and Michael Lomatuway'ma, Tucson: University of Arizona Press 1997.

Hillier 1997 | Paul Hillier: *Arvo Pärt,* Oxford: Oxford University Press 1997.

Kelly 2005 | Jem Kelly: Auditory Space. Emergent Modes of Apprehension and Historical Representations in *Three Tales*, in: *International Journal of Performance Arts and Digital Media* 1/3 (2005), pp. 207–236.

Leydon 2002 | Rebecca Leydon: Towards a Typology of Minimalist Tropes, in: *Music Theory Online* 8/4 (December 2002), www.mtosmt.org/issues/mto.02.8.4/mto.02.8.4.leydon.html.

MacDonaldI 1987 | Ian MacDonald: What Is the Use of Minimalism, in: *The Face* 38 (March 1987), reprinted as: "Ian MacDonald on Minimalism (The Face, 1987)", in: O'Brien/Robin 2023, pp. 255–265.

MacDonaldS 1992 | Scott MacDonald: Godfrey Reggio, in: *A Critical Cinema 2. Interviews with Independent Filmmakers,* Berkeley: University of California Press 1992.

MacRobbie 2013 | Danielle MacRobbie: *An Investigation of Technological Impressions in Steve Reich and Beryl Korot's* Three Tales, M. Mus. thesis, Bowling Green State University 2013.

Maturana 1981 | Humberto M. Maturana: Autopoiesis, in: *Autopoiesis. A Theory of Living Organizations,* ed. by Milan Zeleny, New York: Elsevier North Holland 1981, pp. 21–33.

Maycock 2002 | Robert Maycock: *Glass. A Portrait,* London: Sanctuary 2002.

McClary 2000 | Susan McClary: *Conventional Wisdom. The Content of Musical Form,* Berkeley: University of California Press 2000.

Mertens 1983 | Wim Mertens: *American Minimal Music. La Monte Young, Terry Riley, Steve Reich, Philip Glass,* trans. by Jan Hautekiet, London: Kahn & Averill 1983.

Meyer et al. 2014 | *Crosscurrents. American and European Music in Interaction, 1900–2000,* ed. by Felix Meyer, Carol J. Oja, Wolfgang Rathert and Anne C. Shreffler, Suffolk: Boydell Press 2014.

Moravec 1988 | Hans Moravec: *Mind Children. The Future of Robot and Human Intelligence,* Cambridge: Harvard University Press 1988.

Morris 2007 | Mitchell Morris: Sight, Sound, and the Temporality of Myth Making in *Koyaanisqatsi*, in: *Beyond the Soundtrack. Representing Music in Cinema,* ed. by Daniel Ira Goldmark, Lawrence Kramer and Richard Leppert, Berkeley: University of California Press 2007, pp. 120–135.

Nicholls 2007 | David Nicholls: *John Cage,* Urbana: University of Illinois Press 2007.

Nickleson 2023 | Patrick Nickleson: *The Names of Minimalism. Authorship, Art Music and Historiography in Dispute,* Ann Arbor: University of Michigan Press 2023.

Novak 2015 | Jelena Novak: *Postopera. Reinventing the Voice-Body,* Farnham: Ashgate 2015.

O'Brien/Robin 2023 | *On Minimalism. Documenting a Musical Movement,* ed. by Kerry O'Brien and William Robin, Oakland: University of California Press 2023.

Oja/Tick 2018 | *Aaron Copland and His World,* ed. by Carol J. Oja and Judith Tick, Princeton: Princeton University Press 2018.

Peyton Jones 2013 | Jeremy Peyton Jones: Accommodating the Threat of the Machine. The Act of Repetition in Live Performance, in: Potter et al. 2013, pp. 141–157.

Potter 2000 | Keith Potter: *Four Musical Minimalists. La Monte Young, Terry Riley, Steve Reich, Philip Glass,* Cambridge: Cambridge University Press 2000.

Potter et al. 2013 | *Ashgate Research Companion to Minimalist and Postminimalist Music,* ed. by Keith Potter, Kyle Gann and Pwyll ap Siôn, Farnham: Ashgate 2013.

Reggio 2012 | Godfrey Reggio: *The Qatsi Trilogy* [Blu-Ray], New York: Criterion Collection 2012.

Reich 1974 | Steve Reich: *Writings About Music,* Halifax: Nova Scotia College of Art and Design 1974.

Reich 2002 | Steve Reich: *Three Tales* [score for hire], London: Boosey & Hawkes 2002.

Reich 2003 | Steve Reich: *Three Tales. Hindenburg + Bikini + Dolly* [CD and DVD], New York: Nonesuch 2003.

Reich *Sk 48* | Steve Reich: *Skizzenbuch 48 (5 September 1999–24 July 2001).* Paul Sacher Stiftung, Basel, Steve Reich Collection.

Reich *Sk 49* | Steve Reich: *Skizzenbuch 49 (24 July 2001–25 April 2004)*. Paul Sacher Stiftung, Basel, Steve Reich Collection.

Richardson/Välimäki 2013 | John Richardson/Susanna Välimäki: Disaffected Sounds, Temporalized Visions. Philip Glass and the Audiovisual Impulse in Postminimalist Music, in: Potter et al. 2013, pp. 220–237.
Rogowski 2001 | Ralf Rogowski: Law, Autopoiesis in, in: *International Encyclopedia of the Social & Behavioral Sciences,* ed. by Neil J. Smelser and Paul B. Baltes, Oxford: Elsevier 2001, pp. 8500–8502, https://doi.org/10.1016/B0-08-043076-7/02931-4.
Sachs 2012 | Joel Sachs: *Henry Cowell. A Man Made of Music,* New York: Oxford University Press 2012.
Schwarz 1996 | K. Robert Schwarz: *Minimalists*, London: Phaidon 1996.
Stephens 2010 | Gregory Stephens: *Koyaanisqatsi* and the Visual Narrative of Environmental Film, in: *Screening the Past* 28 (Fall 2010), pp. 1–29, http://tlweb.latrobe.edu.au/humanities/screeningthepast/28/koyaanisqatsi-visual-narrative-of-environmental-film.html.
Strickland 1993 | Edward Strickland: *Minimalism. Origins,* Bloomington: Indiana University Press 1993.
Suzuki 2013 | Dean Suzuki: Minimalism in the Time-Based Arts. Dance, Film and Video, in: Potter et al. 2013, pp. 109–128.
Thomas 1997 | Adrian Thomas: *Górecki,* Oxford: Clarendon 1997.
Veblen 1915 | Thorstein Veblen: *Theory of Business Enterprise,* New York: Scribner 1915.
Wiener 1948 | Norbert Wiener: *Cybernetics. Or Control and Communication in the Animal and the Machine,* Paris: Hermann 1948 (2nd revised ed., Cambridge: MIT Press 1961).
Wilson 2021 | Tara Wilson: Russian Minimalist Music. A "Maximalist" Approach, in: *Iskusstvo muzyki. Teorija i istorija* [*Art of Music. Theory and History*] 25 (2021), pp. 8–27, https://imti.sias.ru/upload/iblock/cee/imti_2021_25_8_27_wilson.pdf.
Wolfe 1952 | Bernard Wolfe: *Limbo,* New York: Ace 1952.

Michael Baumgartner *teaches at Cleveland State University. His research focuses on music in relation to cinema, theatre and visual arts, music of the twentieth and twenty-first centuries and the exploration of the narrative capacity of music. He is the author of the monographs* Metafilm Music in Jean-Luc Godard's Cinema *(Oxford University Press, 2022) and* Exilierte Göttinnen. Frauenstatuen im Bühnenwerk von Kurt Weill, Thea Musgrave und Othmar Schoeck *(Olms Verlag, 2012). He is also co-editor of the three anthologies* Music, Collective Memory, Trauma, and Nostalgia in European Cinema after the Second World War; Music, Ideology, Commerce, and Popular Cinema in Europe. 1940s to 1980s; *and* Music, Authorship, Narration, and Art Cinema in Europe. 1940s to 1980s.