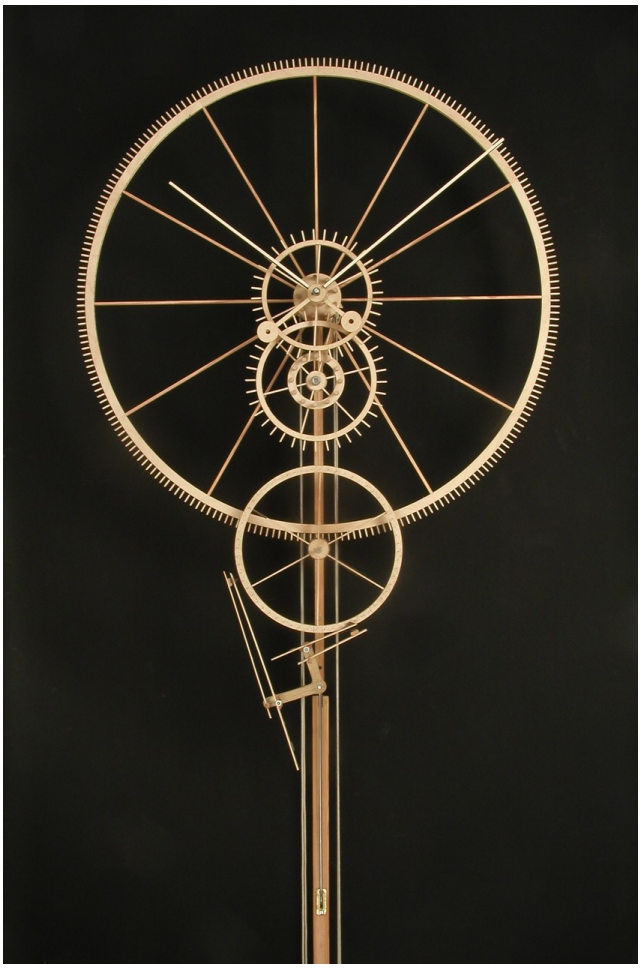
Man and machine in music – meaning and disillusionment – hints

On the diversity of the mechanical:

The machine is regarded as a constructed object that generates movement from within itself, powered by energy.
In times past, it appeared in myths as a mythical creature. To this day, it sometimes plays a comparable, almost religious role in a modified form.
One of the first machines to fundamentally change everyday life and worldview was the mechanical clock. It made life effective as a unidirectional coming and going and, more than ever before, imposed a forced measure of time that was the same for all people on the individual's natural sense of time, which cannot be divided into time quanta. Initially dominant in and attached to churches, it later became available to everyone. Martin Riches, whose Talking Machine will play a role in the text, created an art object, a wooden clock that counteracts the purely rational character of a clock for the viewer.



Clock (1997)
Beech and spruce wood, steel, brass, and lead. Height: 188 cm.
Photo: Roman März.

Today, machines are integrated into our lives in ways. People are even becoming hybrid beings through implanted devices (e.g., pacemakers). The distinction between humans and machines is blurring. Robots are taking on human traits, and people are incorporating machines as an automatic part of their everyday lives. Their humanity is shifting toward machines, to the point of incapacitation as unfree beings domesticated by machines, and toward models that describe psychological or social behavior as mechanical.
People in civilized societies seem to be able to survive only in human-machine systems, existentially dependent on the function of machines. The widespread exercise of power without machine support is unthinkable.
On the other hand, machines have become indispensable for satisfying the need for knowledge in science and for overcoming global problems in everyday life and the environment.

Such observations can provoke moments of objection or advocacy, acting as a backdrop in compositions.

Over the past century, manifold references to machines have been developed in music, cybernetics, and systems theory.
Such developments cannot be taken into account in a brief outline. The focus of this presentation will be on the direct confrontation between the human and the mechanical. Both poles are not seen as separate systems developing recursively within themselves, but as a coexistence and opposition that suggests mutual interpenetration.

Physicality and repetition:

The machine, with its specific mode of functioning that is always the same, is prototypical for the process of repetition. The computer, as an electronic machine, can also produce an identical end result under the same input conditions. The repetition of the same thing over and over again through the possibility of arbitrary media reproduction by machines is omnipresent. It is constantly presented to us by the advertising industry, whose mystification of products appears mercilessly repeated in the media.

In the musical-cultic realm, repetition can be seen, for example, in a machine-body connection such as that of techno music, which propagates a new physicality. What can be observed here is an enormous discursive media-scientific effort at a high level. This movement propagates a kind of cyber-physicality of synthetically generated metric patterns, which originally experienced their revitalization through muscle power, i.e., through rhythms generated by the human body on percussion instruments. Breathing and the experience of time are excluded. In the relevant literature, techno is highlighted as a basic need for physicality in a highly technological, disembodied world of communication. Here, then, a compensatory virtualization is offered as a remedy for an experienced deficiency.
Physicality as part of being human, as opposed to the characteristics of machines, plays a certain role in almost every type of music. In techno music, the focus is on solidarity among like-minded people, in contrast to the kind of collective breathing that occurs when listening to instrumental music, which, despite the fundamentally shared sensory-physiological prerequisites of musicians and listeners, allows for personal, different breathing.
It should be mentioned at this point that there are forms of techno that are artistically complex and should not be confused with commercial forms.

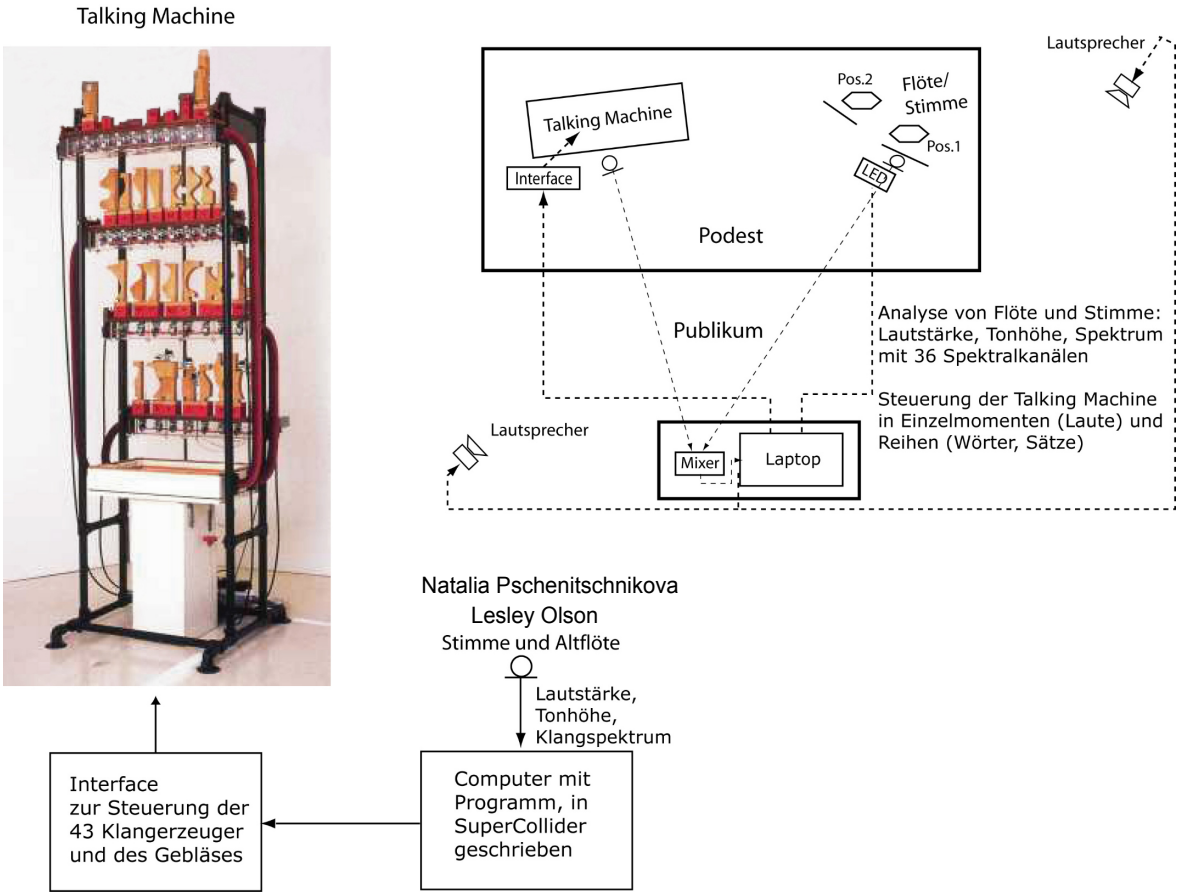
Machine proximity has also been attributed to other types of music, such as minimal music, when it produces phase shifts between repetitive structures that initially appear mechanical. Many forms of electroacoustic music focus on areas other than the physical.
In principle, the question is how to address the problem of physicality in relation to machine technology, which is essentially foreign to the body, within music.
Live electronics can be used to construct dependencies in which the player of an acoustic instrument retains his learned musical identity as such and, through a kind of media communication software, practices a dialogical interaction with a machine, creating a strong physical connection to the machine. This can ironically demonstrate a “humanizing” of the machine or irritations on the part of the instrumentalist himself, provoking a completely unfamiliar sensation of his own musical instrument.
Two possibilities for such constellations are suggested here:
The first can occur in the form of influencing repetitive sound structures that are already running or have been started by the instrument, which lead the listener to expect a certain progression. This progression can then be modified or disrupted by the musician's playing, in order to establish a relationship between musician and machine that transfers a non-mechanical aspect of human activity to an otherwise purely repetitive or predictable machine object.

One example would be the simple concept of repeatedly starting five different synthetic tone rows using specific pitches on a piano. If the speed of the individual sequences of the synthetic series is additionally controlled by the volume of the acoustic instrument, a temporal and dynamic dependency arises that gives the mechanically repetitive starting point of the uninfluenced series a very lively, impulsive character. An interesting aspect lies in the consideration that even if the musician plays repetitive structures, which from the outside also appear mechanical, the result loses its mechanical character, as the smallest irregularities in tempo and dynamics create strong differentiations that do not allow for any identical repetition of the final sound result. Thus, the encounter between two machine characters, one real and one simulated, produces a final result that contradicts the purely repetitive, reproducible sameness of the machine. The musician finds himself in a system that leads him away from focusing exclusively on his instrument and toward an overall perception of the musical situation in the encounter between man and machine.

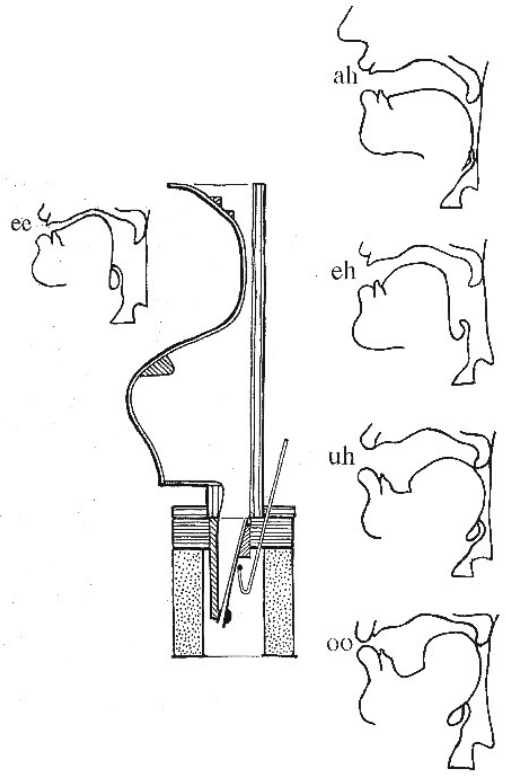
Another possibility is the following constellation: if the resulting machine reactions are reduced to a directly perceptible relationship between the sound source and the resulting one-dimensional structure, relatively clear if-then analogies of the control process arise, which per se can only be used for simulation effects. In certain musical contexts, however, with a history of reactions, i.e., with changes in these stimulus-response mechanisms, they represent a constructive tool that, in its frequent changes in the relationship between musician and machine, allows a formal compositional substance to emerge.
In this way, the playing parameters of an acoustic instrument can be analyzed very precisely by the computer and made available to the control of synthetic sounds without any time delay. Subtleties of instrumental playing, which are reflected in the pitch, sound spectrum, and volume of the instrument, can cause exaggerations of these acoustic playing parameters in their apparatus results, allowing the player to specify differences that would be inconceivable without such a feedback system—the pure hearing apparatus would not be capable of such differentiations.

The questionable aspect of such game situations as the two just mentioned lies in the machine's essentially simulated mode of communication. Its own reaction is only synthetic, not alive. The reacting partner, who is only virtually present in his freedom of decision, is perceived by the player as part of himself. He can experience a pathos of self-importance far beyond his human measure, which may distance him from himself and the awareness of his human limitations.

In my composition *SprachMusik*, a flutist/singer controls a mechanical speech machine through her playing via a computer program. Mechanical word sequences are generated individually, rudimentarily, as sounds, short sentences, or repetitively by this program, which converts them into electrical impulses to open valves on the mechanical machine, enabling transitions between speech sounds and music. Superimpositions create musical rhythms that originate exclusively from word rhythms. Thus, the interior of the computer machine is divided into two functions: the production of control signals for word formation in a talking machine and the temporal structuring of word sequences. On another level, these two functions are influenced by the acoustic input data of the flutist and singer, which is analyzed by the computer at the moment of sounding.
This Talking Machine, invented and built by Martin Riches between 1989 and 1991, functions as a mechanical sound object in exhibitions. This machine does not represent the latest technological advances in speech synthesis available today. Rather, it forms a somewhat ironic contrast to progressive positivism for the viewer, as it is based on 18th-century construction principles. In this negation, it is awork of art in the best sense of the word. Mechanical sound generators such as this talking machine have a life of their own, especially in peripheral areas, which makes them highly irreplaceable.



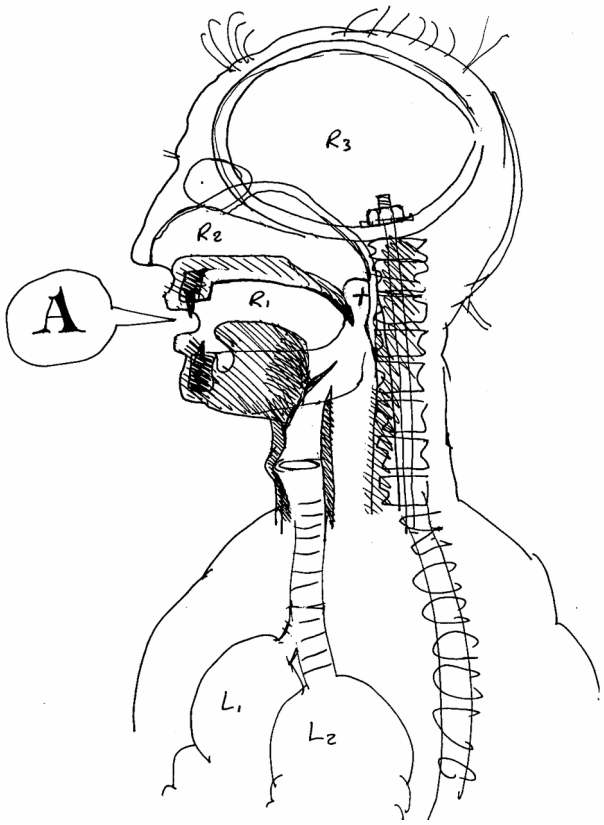
Talking Machine (1989-1991)
32 tone pipes with air valves, 4 windchests, magazine bellows, blower, steel frame, and computer. Height: 230 cm.
Photo: Martin Riches



In this composition, two different types of machines face each other. The mechanical machine largely reveals how it works and derives its aesthetic appearance entirely from these functions. The controlling computer, which mediates between man and machine, is anonymous, devoid of any presence, hidden. This makes it appear to be an integral part of the player.

Humanization and dehumanization:

The borderline situations of such a mechanical sound machine at its functional limits, vulnerability, inaccuracy, emergence, and decay make us forget its on-off characteristics that separate it from the human. Sounds of great variability become audible for which it was not even designed.
The humanization of the machine can be contrasted with a depersonalization, even a total disruption of the player's identity. When speech particles become part of the compositional material, a term can take on emotional significance when it appears as a direct address to a machine, supporting dominance and submission, self-assertion and destruction. Such theatrical moments, which arise almost automatically from the technically generated system of dependencies and the characteristics of the machine itself, enable forms of expression such as romantic irony, which creates objects that appear to contradict themselves—self-creation and self-destruction as an aesthetic structural element.

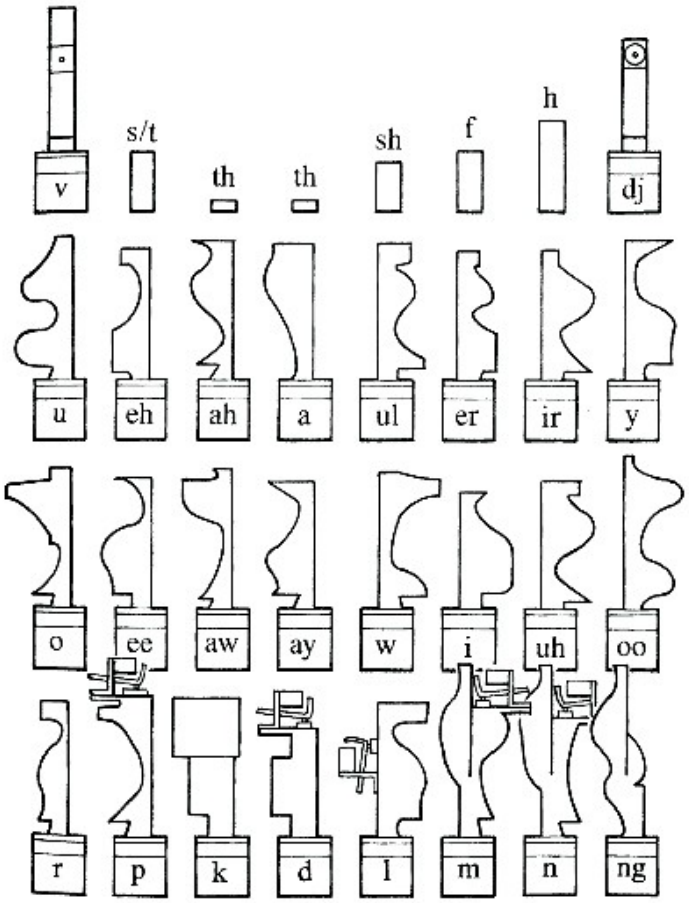


The libidinal relationship between humans and machines is reflected in SprachMusik in a communicative appearance that demonstrates the machine in its imperfection as an object of high excitement potential.
The meditative character of the machine results from the technological limitation that the sound generators fluctuate around a G tone, meaning they are incapable of producing multi-interval chords. This had to be specified during the construction of the machine, as otherwise the speech character would no longer have been present. The machine sounds thus acquire a drone-like fundamental tone away from speech precisely because of the necessities of speech representation.
The machine, with its on-off characteristics and background noise, helps determine the form of the composition: sudden breaks, standstills, and intermediate areas of noise and useful sound arise, as well as mechanical dominance. In such moments, it is furthest removed from its linguistic determination.

Authenticity, virtuality:

Today, there is often a call to view cultural characteristics outside of their previously authoritative historical contexts. Authenticity loses its significance when historical contexts are omitted—background information interferes with immediate access to things. This profound change in identity, authenticity, and subjectivity in general, based on reasonable conclusions drawn from the observation of cultural developments, can at best be countered by the factual, personal, and immediate nature of art-making and art-experiencing, which is inevitably linked to the historical, temporal, and sequential nature of a life course. — temporality not only in the sense of bridging large gaps in time, but also as the experience of time with its effects on memory during a process of reception.
In *SprachMusik*, a contrast is constructed between a machine that does something that other machines do more accurately and rationally, and a musician who neither sings properly, nor speaks properly, nor plays the flute properly, or does all of these things only rudimentarily or simultaneously, i.e., not properly, and who squanders the possibility of a kind of identity, failing to fulfill her original role as a singer or flutist. This arrangement relativizes what is “right.” Of course, the listener is aware that she,

the musician, always allows her “being as a singer” and her “being as a flutist” to resonate. The machine, on the other hand, always appears in a certain way as itself and as such in its imperfection. The musician plays, even plays around, but the machine does not.



Another aspect of the relationship between humans and machines reveals the important ambivalence between musicians and machines, a disruption of their playing—musicians versus machines. Here is an example from a composition for mechanical instruments and computers:

A tuba player attempts to play a note using circular breathing with breath transitions that are as inaudible as possible. However, the analyzing program is able to detect irregularities and adds artificial breathing sounds to the tuba sound at these points, which the player is actually trying to avoid. In addition, the tuba sound is transposed, resulting in a virtual trumpet sound. These apparent absurdities, caused by the disruption of the musician and thus also of the listener, draw attention to things that would otherwise be overlooked and give the player an unusual relationship with his own instrument; he also hears it from the outside. He is forced into virtualization.

Electroacoustic modulations can generate images in which the distortion causes further virtualizations in addition to the technical projection, moving away from the original sound and structure. Certainly, the term virtual reality has the problem that it implies that there is a single actual and true reality to which it is added. However, experiences with our virtualized environment and clear hierarchies of sequence (what came first?) make compositional techniques of virtualization in musical composition comprehensible and fruitful. Artistic reality does not seek to make us forget actual reality with virtual reality, as the media do in everyday life—on the contrary. It can relativize what is perceived as actual reality and diversify the contrast between original and image.

Interfaces:

In the examples mentioned so far, the musician controls a machine using his usual playing technique. He has no additional tools at his disposal that have been designed specifically as interfaces. He acts as a musician. This preserves the relationship between man and machine without a mechanical bridge.
The immateriality of electroacoustic music is sometimes counteracted by mechanical interfaces, a kind of prosthesis. These are devices designed to create physicality in the interaction with the machine. They form an extension of the human being towards the machine. A volume control can be oversized to such an extent that the range of motion is similar to that of a violinist, giving both the musician and the observer the impression of work being done. The musician then no longer expresses himself in his identity as a pianist or trumpeter, but as part of the machine.
Further embodiment of the mechanical is evident in scanning devices for human limbs, which use body movement directly as a controlling element and thus create an opportunity to bring the human-machine system to a motorized, internalized level in fusion with the machine, in which the unconscious plays a major role—a strongly symbiotic coexistence.
One of the dangers here lies in overcoming natural boundaries. The more integrated and unconscious the interface and the software tailored to it allow a relationship with the machine, the more the rapprochement between the two poles is enjoyed affirmatively as power. A tiny movement can conjure up a mechanical storm. Action and reaction are no longer in proportion to each other.

Interfaces can certainly never be designed so finely that they truly approximate the complex communication tools available to the human body in the form of language, movement, and facial expressions. And yet they can be useful because they practice a completely different kind of dependence between humans and machines than in everyday life, both in terms of the equipment situation and the intended effect.
Overly simplistic stimulus-response mechanisms, which view the communicator only as a black box with inputs and outputs, come dangerously close to the unconscious everyday situation in dependency systems.

When the initial sound produced by an ensemble of musicians is modified directly or cross-coupled in complex reaction mechanisms in the control of electroacoustic sound modulators by the players themselves through their playing, this creates an interweaving that, while causing the loss of the respective instrumental characteristics, brings to life a kind of new group identity that achieves its unity through the correlation of the modulation tools.
When using such modulation tools, it is necessary to mention the need to make technical means in music variable in a small space in order to avoid the suggestion of the tool itself. If these means are introduced statically over longer periods, all musical moments appear to be related to them, emphasizing technology as an end in itself.

Perception and effect:

Perception cannot be communicated as perception. Nevertheless, art can attempt to make its own perception available to others as a possible perceptual experience, to resurrect a perceptual situation. Art builds on the difference between the known and the possible—specifically in relation to the artwork, not in general. What is interesting is the nature of the difference—and this is subject-dependent. It is irrelevant whether the subject, the composer, wants to withdraw as an influencing factor; it exists in any case.
A difficulty arises when insights from systems theory enter consciousness in which the concept of interaction across systems has no place. Here, the systems communicate by incorporating information from their environment, i.e., other systems, into their own system in a transformed form. In this way, the systems remain true to their recursivity without softening it through cross-system interaction. So, ultimately, humans and machines would only be active within their own systems, and the unconscious

feeling of symbiosis would be an illusion. Perception would then register this fact in such a way that musicians and listeners would allow this distance in specific concepts or succumb to a virtual ideal.
The remark “sound machines amplify what you feel” seems to me both interesting and questionable in this context. It comes from a pop philosopher who, in his aversion to an “academic consciousness police,” feels drawn to postmodern pluralistic thinking, but obviously accepts interaction and, intentionally or unintentionally, even attributes subject characteristics to the machine. Here, cause and effect are strangely reversed in the relationship between man and machine. Perhaps it would be better to say, in qualitative terms, that sound machines allow the creation of feelings that would be inconceivable without them.

Conclusion:

An emotional interplay with machines in the field of art is always questionable. If one wishes to reflect problematic human-machine relationships in society in a work of art, this cannot be done in an affirmative way, but only in a negative way. Contradiction and irony are unavoidable here.

What significance can the unconscious reactions of musicians and listeners have in this context as a calculated effect? Certainly, the machine and a musical composition for the machine initially arise as constructions within two distinct systems. If, as a composer, one wants to avoid speculating on unconscious reactions and consistently practice the separation between technology and art, one should consider the following: In the application of computer algorithms to generate synthetic structures and sounds, and in particular communication processes, it would be conceivable to omit mechanisms of effect that are only perceived unconsciously on the compositional side, but not on the receptive side. Today, the experience of and handling with technology is automatically associated with emotional responses that elude conscious control.

Art is often not only communication through art, but also attempted communication about art, in our case especially when it uses certain means that blur the differences between humans and machines. The exterior of art can be addressed within it and yet remain hidden as such within art itself. It cannot really be understood, but it can at least be experienced. For the systems theorist, however, a discussion of “art” is inevitably limited to the environment of art. Systemic distinctions reactivate old oppositions such as “inside/outside art” and “art/non-art” without providing a truly adequate definition of the term “art.” The more self-generating and self-referential a work of art is as a system, the greater the danger that it will spread out separately from the recipient, self-satisfyingly evoking a pleasant “aha” experience in the perceiver or contradictorily suggesting that the recipient is already within the presented system.

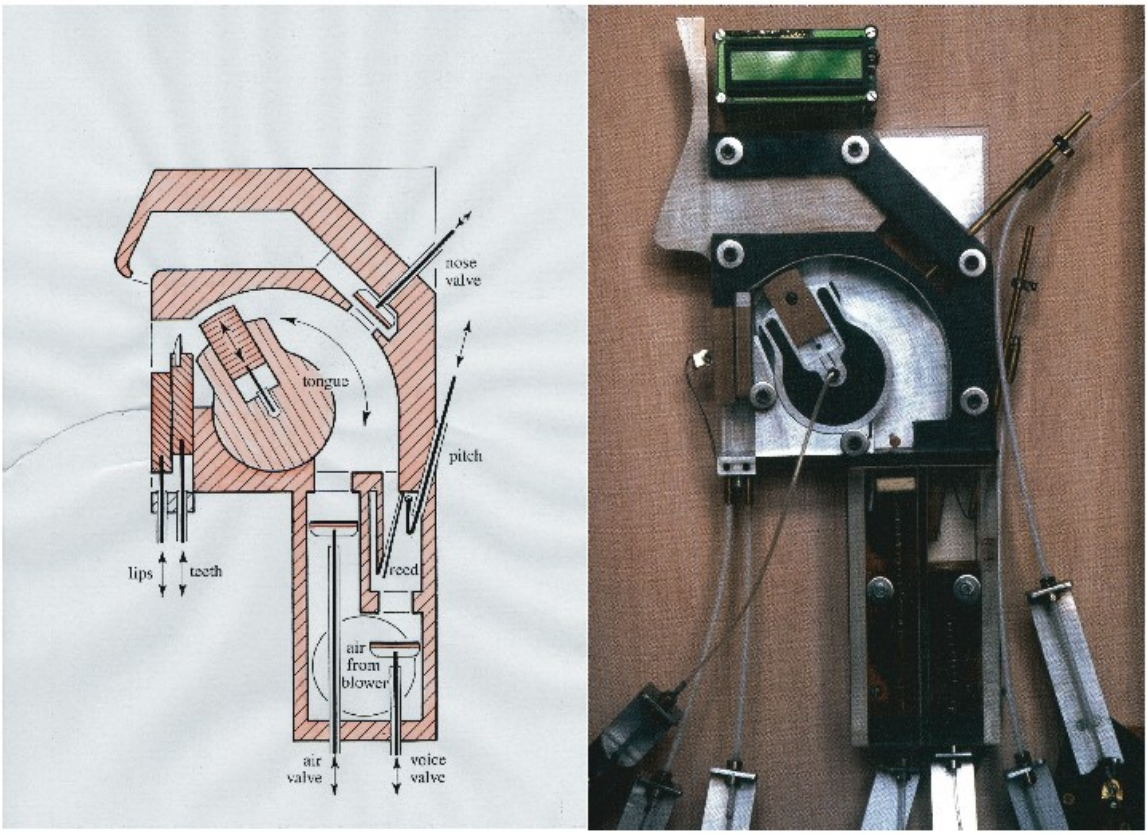
If one wishes to view the impetus for composition as a form of resistance, a means of escaping the prevailing pull, then it makes sense to practice this resistance within the object being created. A system cleansed of everything “external” easily degenerates into a paradise that avoids contradictions. It is more dangerous to address one’s own entanglement in what is actually to be avoided in the composition.
Thus, a pleasurable engagement with machines in music is only more than a private one if the fact of one's own machine fetishism shines through as a point of rupture and irony.

The question is how artistic objectives can be set against a technology that is increasingly rooted in production and held responsible for it in the wake of the loss of metaphysical aspects, of authenticity, of the subject.

R.Pfrengle 2008

Postscript:

Since the early 1980s, I have worked with Martin Riches on numerous occasions. As a visual artist, he built many sound machines, among other things, whose mechanics and aesthetic form, which arose entirely from their functionality, always fascinated me and inspired me to compose and improvise for and with his objects.
The theme of man and machine could be addressed and concretized in many facets in such pieces. Two of his objects are shown below.



Detail: *MotorMouth* (1996–1999), a talking machine that replicates the throat cavity.
Stepper motors, mechanical and electrical components, microprocessor, wooden box. Height: 86 cm.
Collection of the Berlinische Galerie, State Museum of Modern Art, Photography, and Architecture.
www.berlinischegalerie.de
Photo: Martin Riches

The Flute Playing Machine (1979-1982)
Alto flute (range g to g') Blower, electromagnets, electronics. Height: 150 cm.
Collection of the Berlinische Galerie, State Museum of Modern Art, Photography, and Architecture.
www.berlinischegalerie.de
Photo: Hermann Kiesling