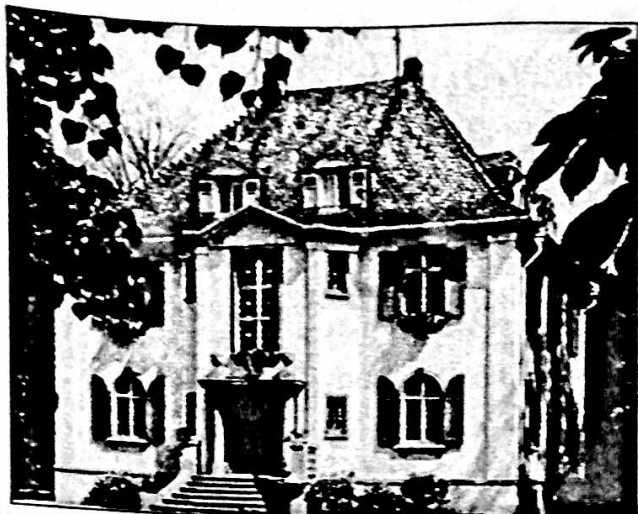


### Radical experimentation



This old-fashioned facade masked one of the most avant-garde musical establishments of the post-war period—the Darmstadt Institute—where composers like Stockhausen and Boulez worked on electronic music.

After the Second World War, Modernism was still the main thrust in music, but it was more radical, more extreme. In some respects it was more intellectual, as composers tried to take Schoenberg's serialism even further. Music became increasingly mathematical.

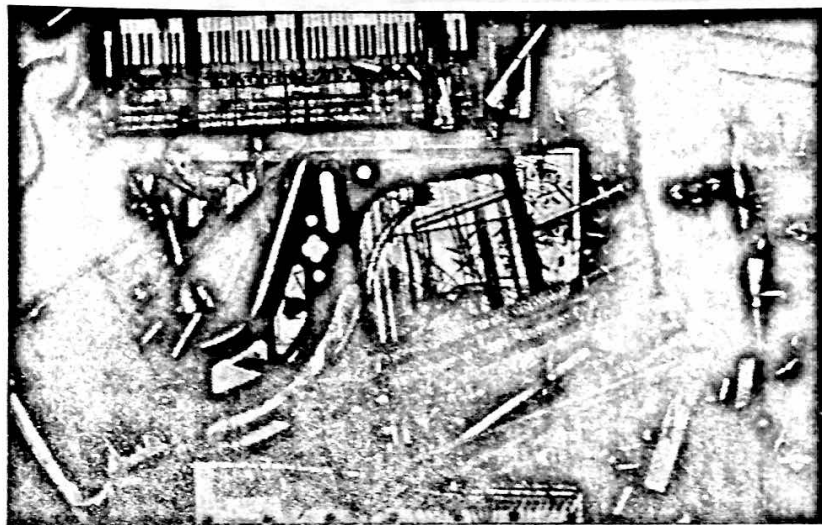
New sounds were also explored, even non-musical sounds, sounds that some people would consider just noise. New technology like tape, and then synthesizers and computers, enabled composers to produce and manipulate sounds in a totally new way.

### Postmodernism

As in the other arts, the Modernist movement was followed by Postmodernism. Postmodernist composers have responded to the doubts cast on traditional Western culture by incorporating many different elements into their music. They include quotations from familiar music of other eras, other genres and other cultures. This philosophy of inclusion is part of the cultural relativism that is such a strong feature of Postmodernism.

#### Arman, *Chopin's Waterloo*

The artist seems to be making a comment about the destruction of traditional music.



Postmodernism has closed the gap between classical and popular music: today's classical music includes elements of rock and even rap, chamber music groups include electric guitars and amplification, Broadway musicals are based on nineteenth-century operas. This openness and eclecticism (the deliberate mixture of different styles) is Postmodernism's defining characteristic.

## Total Serialism

Schoenberg's twelve-tone system, with his use of tone rows, was extended by the new composers to include other elements of music. In addition to organizing pitches into a strict sequence, they made arrangements of time durations, degrees of loudness and tone quality. They could also serialize to an even greater degree by controlling registers, the intervals between pitches, the attack on the instrument. The twelve-tone technique had sometimes been called serialism, because it arranged the notes in a series; this new expansion was therefore called total serialism. Rational and intellectual to an extreme, this kind of work was also exceptionally complex. Although the composition is strictly organized, the music sounds more or less random and it is almost impossible to hear the structure.

The first composition based on these theories was *Structures I*, written by French composer Pierre Boulez. The diagram below shows the chart for the work. Boulez set up four rows. The first lays out the pitches, the second the durations, ranging from a dotted quarter note to a thirty-second note. The third row specifies twelve methods of attack, the way the pianist hits the keys, and the fourth the dynamics, moving from *pppp* to *ffff*. Each row can be used independently, and the whole series can be run backwards or forwards or with transposed pitches.

Other composers experimenting with total serialism were Karlheinz Stockhausen in Germany, Milton Babbitt in the United States and Luciano Berio in Italy.

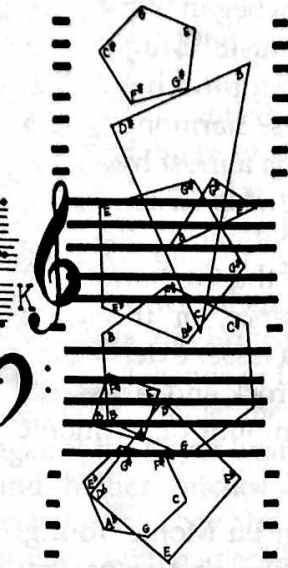
The complete set of Boulez's series for *Structures I*

Order:	1	2	3	4	5	6	7	8	9	10	11	12
Pitch:	E $\flat$	D	A	A $\flat$	G	F $\sharp$	E	C $\sharp$	C	E $\flat$	F	B
Duration:												
Attack:	>	>	.	$\wedge$ sfa	:	v	sfa	v	-	-	-	-
Dynamic:	<i>pppp</i>	<i>ppp</i>	<i>pp</i>	<i>p</i>	<i>quasi p</i>	<i>mp</i>	<i>mf</i>	<i>quasi f</i>	<i>f</i>	<i>ff</i>	<i>fff</i>	<i>ffff</i>

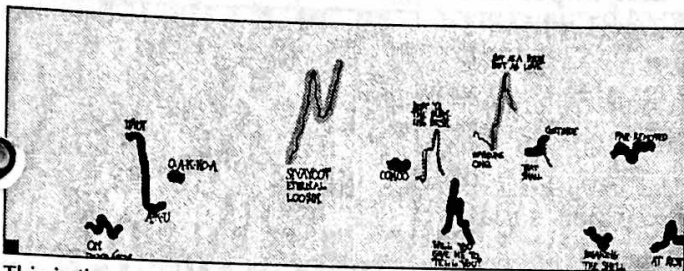
## Aleatoric Music

Other composers rejected the rational, controlled approach of serialism in favour of "aleatoric," or chance, music. The word aleatoric comes from the Latin word *alea*, meaning dice. And some works of this type really are played according to the roll of the dice: the performers roll a pair of dice to see which section is to be played next. Sometimes the musicians are given several sheets of music and they can choose which ones to play when. Or perhaps the performers are told to play anything they want to at a particular point in the work, within certain limits imposed by the composer.

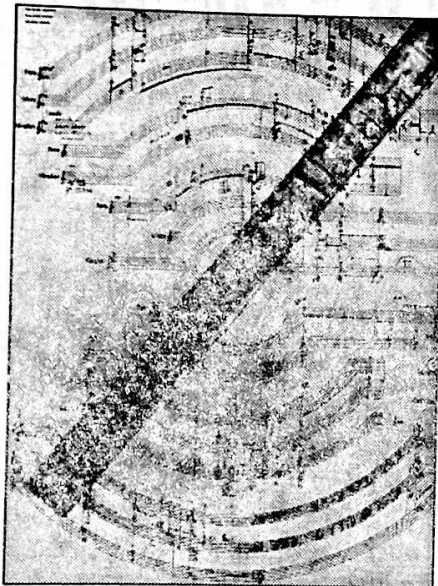
This might mean, for instance, playing very loud and fast on any notes for a period of time, and then moving back to written-out music. In this way, a piece of music is re-created every time it is played. Other composers abandoned traditional notation altogether, using rough drawings or sketches



The graphic score from John Cage's Piano Concerto



This is the score for one of Cage's vocal works, *Aria*.



The score for Stockhausen's *Refrain for Three Players*

The performers spin the ruler and begin where the ruler stops.

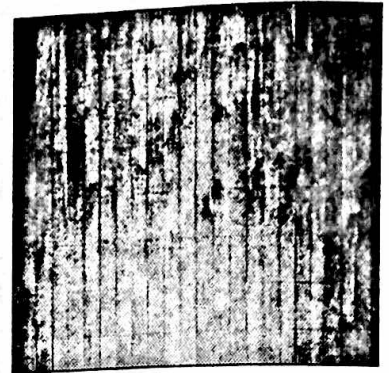
and letting the performers interpret their graphic representations in any way they wanted. The point was to give more freedom to the performers, or leave things to chance while at the same time expanding the meaning of music, which some composers felt was too narrowly defined.

One of the primary proponents of this kind of music was the American composer John Cage, who wanted audiences to expand their ideas of what music is. In his *Music of Changes*, the performers toss coins to choose the next passage to play. The Polish composer Witold Lutosławski wrote a string quartet in which the performers improvise on phrases that Lutosławski has given them, only moving on to something else when the first violinist makes a signal. In a piano piece by Stockhausen, the player is required to make decisions, while performing, on which sections to include and in what sequence.

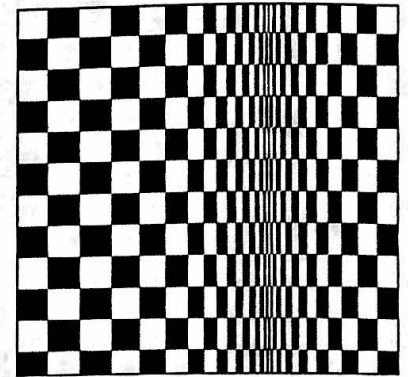
## Minimalism

In the 1960s, a number of American composers began working in what has come to be known as Minimalist music. Minimalism is the opposite of the complex intellectual approach of total serialism. It is based on repeated melodies, harmonies, and rhythms that change so slowly that the music is almost hypnotic. The music is stripped down to its bare essentials. Listeners are forced to focus their attention on a minimum of detail. Parallels can be drawn between non-Western music, the contemplative mood of music from the Far East, for instance, or the semi-obsessive rhythms of some African music. To a lesser extent, there are also similarities between Minimalism and rock and jazz, since all three are based on repetition of a small amount of harmonic material or a strong repeated rhythm.

The central figures in Minimalism have been La Monte Young, Terry Riley, Steve Reich and Philip Glass. The first important Minimalist work was probably *Composition 1960 #7* by La Monte Young. The piece, for stringed instruments, has two notes, F# and B, and the composer's instructions say "To be held for a long time." They were held, at the premiere, for 45 minutes. In Terry Riley's *In C*, written in 1964, a pulse in eighth-note, Cs are played continuously at the top of the piano, and other instruments play small bits of melody repeatedly. There are 53 fragments, like the ones below, and the performers can decide how many times to repeat each one, so there is change in the piece over time. Steve Reich's *Piano Phase* has two pianists playing a continual eighth-note pattern at the same time. One speeds up, so the two become out of phase, and then slows down until they are together again. The music of Philip Glass has been very popular, attracting a large audience. He has used Minimalist techniques in much larger forms like operas, film scores and theatre pieces. His best-known compositions are *Glassworks* and *Einstein on the Beach*, a five-hour opera that was extremely successful when it was performed. His work draws on Indian and African music as well as rock and jazz. One of the most successful Minimalist composers of the late twentieth century is John Adams, who prefers to work with the traditional orchestra and voice. He is best known for two operas, *Nixon in China* and *The Death of Klinghoffer*, which are based on contemporary events. The style of both operas is Minimalist, with elements incorporated from Far Eastern music, rock and rap.



Agnes Martin, *Trumpet*  
Minimalism was also a force in the visual arts.



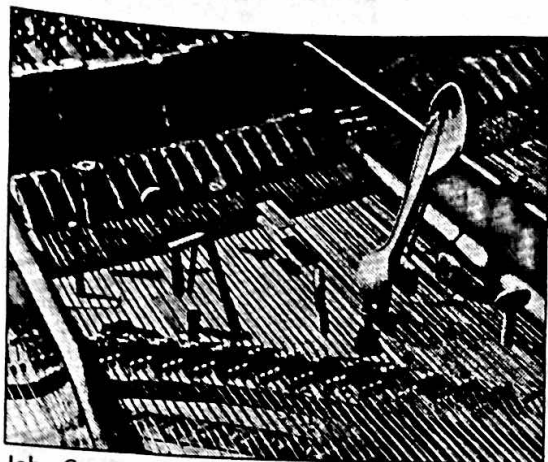
Bridget Riley, *Movement in Space*

This painting is suggestive of Steve Reich's compositions in which the different parts of the music go in and out of phase.



Fragments from *In C*

New Sounds



John Cage's prepared piano

The new music required new effects and techniques from both instrumentalists and vocalists. Pianos were modified with the addition of things like spoons, nuts and bolts, or pieces of paper between the strings to change the sound when the strings are struck, or the pianist might be asked to lean over and tap, scratch or pluck the strings himself. Sometimes they were told to slam the keyboard with their hands or fists. Violinists were told to bow below the bridge and to tap or slap the instrument with their hands or bows as though it were a percussion instrument. Sometimes they had to pluck the strings so hard they slap against the finger board. Wind players were asked to produce higher and higher pitches by means of special fingering or blowing techniques. They also had to learn to play multiphonics, or two notes at once, with a special kind of breathing technique. Sometimes they were required to make squawking, squeaking or chattering noises, and both wind and string players had to be able to produce quarter tones, the notes between half tones. Percussion sections became much more varied, including all kinds of sounding objects, from the typewriter to the boat whistle. An amazing diversity of noisemakers were added for special effects. Singers had to include hisses, moans, whispers, groans and shouts in their repertoire of techniques. At times they were even asked to sing into the piano while the pianist holds the pedal down.

At various points in the score for Cage's *Water Music*, the performer is instructed to pour water from one glass into another; at others, a siren sounds and a radio turns off.

Composers began developing works that would never have been considered music in earlier times. In one of Charles Ives's major works, the *Concord Sonata*, the pianist has to use his elbow to press down a special wooden block that holds down 16 different keys at once.

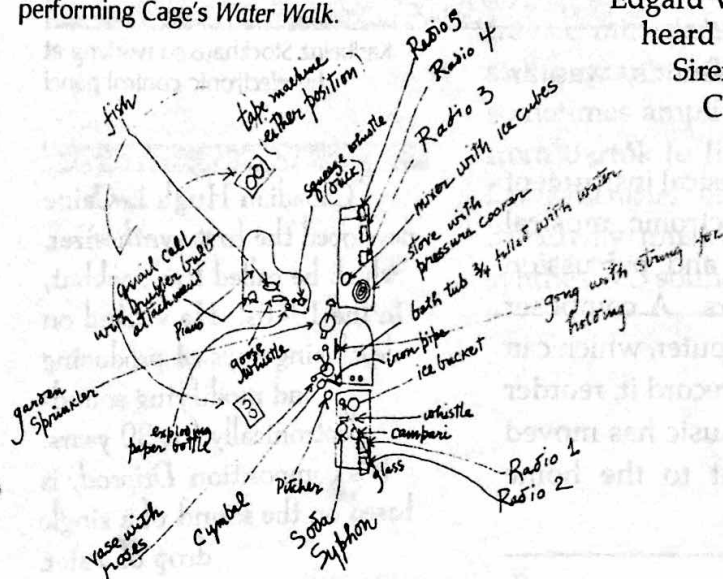
Edgard Varèse in part based his works on the sounds he heard around him in an industrialized urban society.

Sirens are used effectively in his *Ionization*. John

Cage composed a work called *Imaginary Landscape No. 4* in which 12 radios tuned to 12 different stations play simultaneously. Once

he attached a microphone to his throat and stood on stage drinking a glass of water and smoking a cigarette. He also wrote *4' 33"*, in which someone sits down at a piano for 4 minutes and 33 seconds and does absolutely nothing. The audience is forced to listen to all the sounds around them in the concert hall, perhaps even outside the building. According to Cage, "Everything we do is music."

This diagram illustrates the stage directions for the musicians performing Cage's *Water Walk*.



## Electronic Sounds

New technology made it possible to create and alter sound electronically. This began in the late 1940s and 1950s when magnetic tape came into use. Composers were able to record natural sounds and change them by playing the tape faster or slower, which alters the quality of the sound until it is almost unrecognizable. They could play recorded passages backwards, and superimpose sounds from another tape. They could even cut the tape up and splice it back together in a different order. The first to work with these techniques was a group in Paris, led by Pierre Schaeffer, who produced what they called *musique concrète* with natural sounds like street noises, or the wind blowing through the trees. Schaeffer's first *musique concrète* piece was called *Étude avec chemins de fer*, made with the sounds of railway trains. After these pioneers, other composers adapted these techniques to work with electronically generated sound.

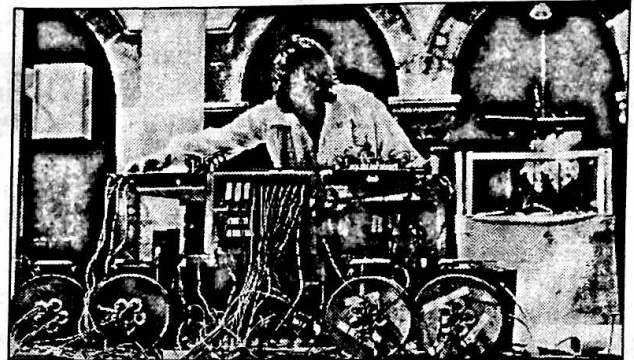
With the advent of the synthesizer, composers had a single device that both could produce and modify sound. It could generate completely new sounds or mimic instrumental sounds, and control their pitch, duration, rhythm and dynamics. It eliminated all the time-consuming, labour-intensive manipulations required by tape recording. The German composer Karlheinz Stockhausen wrote *Electronix Studies* using completely synthesized sounds. His *Song of the Youths*, based on vocal and recorded synthesized sounds, was an electronic examination of language.

In the computer age, the adoption of MIDI (musical instrument digital interface) standards means that electronic musical instruments, like electric guitars, keyboards and percussion instruments can communicate with computers. A composer can control several instruments through a computer, which can take the electronic input from the instrument, record it, reorder it, transpose it and play it back. Electronic music has moved from a studio full of electronic equipment to the home computer, within reach of everyone.



Pierre Schaeffer in the recording studio

One side effect of electronic music is that the composer is the one who manipulates the sounds directly—the performer becomes unnecessary!



Karlheinz Stockhausen working at his electronic control panel

Canadian Hugh LeCaine developed the first synthesizer, which he called the Sackbut, in the 1940s. He worked on developing ways of producing and modifying sounds electronically for 30 years. His composition *Dripsody* is based on the sound of a single drop of water.

## Fusion

One of the most important changes in music in the late twentieth century is the increasing overlap between one genre and another. This phenomenon has been termed fusion, or the blending of musical styles. The word was coined to describe the mixture of jazz and rock created by jazz trumpeter Miles Davis, but in this postmodern era, fusion describes a great deal of the music we hear. The music around us today is often an amalgam of everything from Bach to the Beatles, Gregorian chant to the Balinese gamelan, Bob Dylan to African drumming.



The Kronos Quartet performing with poet Allan Ginsberg in 1994

Many artists are working in more than one genre and combining them. The pianist Keith Jarrett moves between jazz and classical music. The classical cellist Yo-Yo Ma and the vocal improviser Bobby McFerrin have made a recording that mixes Bach and Vivaldi with jazz and traditional songs. Jazz trumpeter Wynton Marsalis has made several classical recordings. Former Beatle

Paul McCartney composed the *Liverpool Oratorio*, a full-length concert work. The Kronos Quartet are a group of classically trained musicians who deliberately avoid the stereotype of the string quartet. They appear in non-traditional concert wear, sometimes amplify their instruments and perform everything from Bartók to Jimi Hendrix. Musical theatre spectacles like *Les Misérables* and *The Phantom of the Opera* combine the Broadway musical with the continuous music of opera, the synthesized sound and beat of rock, and high-tech staging.