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# 20 Subroutines for humans made by a computer

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Computers are bringing about a situation that's like the invention of harmony. Subroutines are like chords. No one would think of keeping a chord to himself. You'd give it to anyone who wanted it. You'd welcome alterations of it. Subroutines are altered by a single punch. We're getting music made by man himself, not just one man.

— John Cage (1969)

<https://maeda.pm/2020/08/10/john-cage-on-computers/>

The history of musical notation is tied to the history of computation. Musical notation is a program that humans—instead of computers—execute. In 1843, Ada Lovelace observed how programming might go beyond mere tabulation and toward a more universal form of operation, citing a machine to make music:

Again, it might act upon other things besides number, were objects found whose mutual fundamental relations could be expressed by those of the abstract science of operations, and which should be also susceptible of adaptations to the action of the operating notation and mechanism of the engine. Supposing, for instance, that the fundamental relations of pitched sounds in the science of harmony and of musical composition were susceptible of such expression and adaptations, the engine might compose elaborate and scientific pieces of music of any degree of complexity or extent....

<http://imaginaryinstruments.org/lovelace-analytical-engine/>

The player piano, demonstrated at the Centennial Exhibition in Philadelphia in 1876, made it possible, for the first time, for a musical instrument to play any piece given to it without human intervention. Together with the Jacquard loom, the player piano provided inspiration for the punch card system that Herman Hollerith developed in hopes of automating the United States Census. Hollerith's Tabulating Machine Company, founded in 1896, would eventually be purchased by Thomas J. Watson, Sr. in 1922 and renamed International Business Machines. As both computation and music composition developed during the twentieth century, a cybernetic feedback loop would be established between music and computer.

In the early 1950s, not long after the development of the first electronic digital computers (Colossus in England in 1943 and ENIAC in the United States in 1945), mathematician Geoff Hill programmed a computer called CSIR Mark 1 to play popular tunes by outputting pulses directly to speakers. The results were not recorded and are lost to time. Later in the 1950s, Max Matthews of Bell Labs developed MUSIC I, a more sophisticated computer program that performed actual synthesis. (more here). American composer James Tenney, working at Bell Labs, recounts that he was well aware of John Cage's work and was interested in using the computer both to create pioneering algorithmic compositions and unprecedented sounds such as his Analogy #1. (more here).

At the same time, composers Karlheinz Stockhausen and John Cage were exploring the potentials of randomness and chance, always inherent the very nature of musical performance by issuing not notation but sets of instructions, code for human computers. A disciple of Zen Buddhism, Cage sought to make subjectivity disappear through such projects, replacing intentionality with randomness. In our own time, we have the ability to remove the original author or composer—e.g. Cage—and replace him with a simulation without consciousness, in this case the AI called ChatGPT 3.5. Using this resource, I have generated twenty separate subroutines in the model of Cage. These could plausibly be performed by twenty individuals simultaneously. I have kept editing to a bare minimum and used the vast majority of the responses provided by the AI.

1. Perform the following instructions in any order, without pause or hesitation.
2. Read each instruction aloud as you perform it.
3. If an instruction is unclear, interpret it as you see fit.
4. If an instruction cannot be performed, skip it and move on to the next one.

I

1. The performer should choose a book or other written text at random.
2. The performer should open the book to a random page and read the first sentence they see.
3. The performer should then repeat the sentence several times, changing the inflection or emphasis each time.
4. The performer should then read the next sentence they see on the page, again repeating it several times and changing the inflection or emphasis.
5. This process should continue for a set amount of time, with the performer reading and repeating sentences at random from the chosen text.
6. The performer may also choose to add other elements to the performance, such as music or sound effects, as long as they do not distract from the focus on the text.

## II

1. Take a walk around the room.
2. Whisper the words "john cage" to yourself.
3. Make a sound by tapping your foot on the floor.
4. Recite a random passage from a book.
5. Sing a song in your head.
6. Close your eyes and listen to the sounds around you.
7. Draw a shape on a piece of paper.
8. Write a sentence using the words "indeterminacy" and "chance."
9. Stand on one foot for as long as you can.
10. Take a deep breath and exhale slowly.

## III

1. Take a piece of paper and write down a random word.
2. Read the word out loud.
3. Write down a sentence that incorporates the word you just read.
4. Read the sentence out loud.
5. Repeat steps 1-4 until you feel satisfied with the result.

## IV

1. Take a deck of playing cards and shuffle them.
2. Draw one card at random and note the suit and value of the card.
3. Using the suit and value of the card as a guide, select a musical instrument and a pitch or group of pitches to play. For example, if the card is the 3 of hearts, you might choose to play the pitch "C" on a trumpet.
4. Play the selected pitch or pitches for a duration of your choosing.
5. Repeat steps 2-4 until you feel satisfied with the result.

## V

1. Choose a musical instrument or sound-making object.
2. Roll a die to determine the length of the piece, in minutes.
3. Roll two dice to determine the tempo, in beats per minute.
4. Using the chosen instrument, play a series of sounds that follow the given tempo and length.
5. Repeat steps 1-4 as desired, using different instruments and parameters each time.

## VI

1. Choose a location to perform the piece.
2. Spend one minute observing the location and taking note of the sounds, smells, and other sensory experiences present.
3. Spend the next minute moving around the location, interacting with the space in any way you choose.
4. Spend the final minute reflecting on your experience and recording your thoughts in any way you choose.

## VII

1. Choose a location to perform the piece.
2. Gather a collection of objects from the chosen location.
3. Arrange the objects in a way that feels aesthetically pleasing or interesting to you.
4. Spend a few minutes observing and interacting with the arranged objects.
5. Using the objects and your observations as a starting point, create a short piece of movement or physical action.
6. Perform the movement or physical action, using whatever techniques and gestures you choose.

## VIII

1. Choose a cat to be the performer.
2. Place the cat in a comfortable space with plenty of room to move around.
3. Allow the cat to explore its surroundings and become familiar with the space.
4. Observe the cat's movements and vocalizations, and listen for any sounds or patterns that emerge.
5. As the cat moves and makes sounds, use a microphone or other recording device to capture its vocalizations and movements.
6. Use the recorded sounds to create a series of musical compositions that incorporate the sounds of the cat.

## IX

1. Collect a variety of trash and discarded materials, such as plastic bottles, aluminum cans, cardboard boxes, and paper wrappers.
2. Sort the materials into different categories, such as recyclable and non-recyclable, or hard and soft.
3. Arrange the materials on a table or other surface in a random or intentional pattern, depending on the desired effect.
4. Use a variety of techniques to create sounds with the materials, such as striking them with sticks or mallets, or blowing across the tops of bottles to create whistling noises.
5. As you create sounds with the materials, use a microphone or other recording device to capture the sounds.
6. Use the recorded sounds to create a series of musical compositions that incorporate the sounds of the waste materials.

## X

1. Choose a set of letters from the alphabet, such as the first ten letters (A, B, C, D, E, F, G, H, I, J) or a random selection of consonants and vowels.
2. Arrange the letters on a table or other surface in a random or intentional pattern, depending on the desired effect.
3. Use a variety of techniques to create sounds with the letters, such as striking them with sticks or mallets, or blowing across the tops of the letters to create whistling noises.

## XI

1. Start with the score to John Cage's 4' 33". The performer selects three durations for each of the three movements of the piece, with a total duration of 4 minutes and 33 seconds.
2. The performer selects a set of actions or gestures to perform during each movement, such as playing an instrument, moving around the performance space, or interacting with other performers or objects.
3. The performer executes the actions according to the chosen durations and a random element, such as the roll of a die or the flip of a coin, to introduce indeterminacy into the performance.
4. The performer repeats the piece a number of times, with slight variations in the durations and actions each time, to create a continuously evolving performance.

## XII

1. The performer(s) should select a random number of objects to use as sound-making instruments, such as drums, cymbals, bells, or other found objects.
2. The performer(s) should begin the performance by making a series of sounds using these instruments, without any pre-determined musical structure or composition.

3. The performer(s) should continue to improvise and create new sounds throughout the performance, responding to each other and the ambient sounds in the space.
4. The performer(s) should not repeat any sounds or musical ideas, but should instead focus on exploring new and unique ways of creating music.
5. The performance should conclude after a random duration of time, determined by rolling a die or using some other randomizing method.

### XIII

1. Open the piano lid.
2. Place a single sheet of paper on the piano keys.
3. Using a pencil, randomly draw lines and shapes on the paper, creating a visual score.
4. Sit at the piano and interpret the visual score, allowing the lines and shapes to guide the movements of your hands on the keys.
5. Explore different sounds and timbres by experimenting with various techniques, such as striking the keys with different parts of your hand or using the pedals.
6. Allow the music to emerge naturally and organically, without predetermined melodies or harmonies.
7. Continue to improvise and explore the piano's soundscape for a set duration of time, determined by the performer.
8. When the performance is complete, gently remove the sheet of paper from the piano keys and close the lid.
9. Reflect on the experience and the unique sounds and melodies that emerged during the performance.

### XIV

1. The performer should sit at a piano and select a random number between 1 and 10.
2. The performer should use the selected number to determine the number of times they will play a sequence of notes on the piano. For example, if the number selected was 5, the performer would play the sequence 5 times.
3. The performer should then select a random number between 1 and 10 to determine the length of the sequence of notes. For example, if the number selected was 7, the performer would play a sequence of 7 notes.
4. The performer should then randomly select the notes for the sequence from the piano's range of available pitches.
5. The performer should repeat this process for each iteration of the sequence, using a different set of randomly selected numbers and notes each time.
6. The performer should continue playing the variations until they feel the piece is complete.

### XV

1. The performer should select a prepared piano and set it up in a garden or other outdoor space.
2. The performer should then play the prepared piano, using techniques such as striking the keys, plucking the strings, or bowing the strings with a bow.
3. The performer should pay close attention to the sounds of the garden, such as birds singing, insects chirping, or wind rustling the leaves, and should incorporate these sounds into the performance.
4. The performer may also incorporate other sounds or instruments into the performance, such as a prepared violin or percussion instruments.
5. The performance should last for a duration of the performer's choosing, and should conclude when the performer feels it is appropriate.

## XVI

1. The performer(s) should select a set of four elements to represent in the performance, such as earth, air, fire, and water.
2. The performer(s) should then create a series of instructions or "movements" that correspond to each of the selected elements. These instructions could specify certain actions, sounds, or gestures to be performed by the performer(s).
3. The performer(s) should shuffle the instructions and divide them into four stacks, with each stack representing one of the selected elements.
4. The performer(s) should begin the performance by selecting the first instruction from the first stack and following its instructions. This instruction should represent the first selected element (e.g. earth).
5. Once the first instruction has been completed, the performer(s) should move on to the next instruction in the stack and repeat the process.
6. When the first stack is exhausted, the performer(s) should move on to the second stack and repeat the process, representing the second selected element (e.g. air).
7. The performance should continue in this way, with the performer(s) selecting and following the instructions in each stack in turn, until all four stacks have been exhausted.
8. The performer(s) may optionally repeat the performance, selecting a new set of elements and starting from step 1.

## XVII

1. The performer(s) should select a musical instrument or group of instruments to use in the performance.
2. The performer(s) should then select a series of long, sustained notes or chords to play on the instrument(s). The length and duration of these notes should be as slow as possible, allowing for the maximum amount of space and silence between each note or chord.
3. The performer(s) should begin the performance by playing the first note or chord at a slow, measured pace, allowing it to linger and decay naturally

before moving on to the next note or chord.

4. The performer(s) should continue in this way, playing each note or chord as slowly and deliberately as possible, until the end of the piece.
5. The performance should last for a duration of the performer's choosing, and should conclude when the performer feels it is appropriate.

## XVIII

1. The performer should select a number of televisions to use in the performance.
2. The performer should tune the televisions to different channels, creating a mix of visual and audio stimuli.
3. The performer should arrange the televisions in a visually interesting configuration, such as a grid or a circle.
4. The performer should then sit or stand in front of the televisions and observe the changing images and sounds, allowing themselves to be immersed in the sensory experience.
5. The performer may optionally incorporate other elements into the performance, such as movement or vocalizations, in response to the stimuli from the televisions.
6. The performance should continue for a duration of the performer's choosing, and should conclude when the performer feels it is appropriate.

## XIX

1. The performer should select a number of small objects to use as sound-making instruments, such as marbles, pebbles, or beans.
2. The performer should place the objects in a container, such as a jar or a box, and shake the container to create a random arrangement of the objects.
3. The performer should then carefully remove the objects from the container, one at a time, and place them on a flat surface.
4. The performer should begin the performance by striking the first object with a small hammer or other implement, creating a sound.
5. The performer should then move on to the next object in the arrangement and repeat the process, striking each object in turn to create a sequence of sounds.
6. The performance should continue in this way, with the performer striking each object in the sequence, until all of the objects have been played.
7. The performer may optionally repeat the performance, starting from step 2 and using a new arrangement of objects.

## XX

1. The performer should collect a variety of found sounds, such as recordings of ambient noises, natural sounds, or everyday objects.
2. The performer should organize the found sounds into a sequence, and

should assign a musical element (such as a pitch, rhythm, or timbre) to each sound.

3. The performer should then perform the composition, playing the found sounds in the assigned order, and using the assigned musical elements to create a unique and expressive musical experience.

4. The performer may incorporate other sounds or instruments into the performance, as long as they are used in a way that enhances the musical experience created by the found sounds.

5. The performance should continue for a duration of the performer's choosing, and should conclude when the performer feels it is appropriate.