

All possible CDs.

All possible CDs is a thought experiment, which runs as follows:

An audio CD stores music by patterns of bits. Each audio sample is 16 Bits, and each second of sound has 44100 samples. So a second of sound is 16 multiplied by 44100 bits, or zeros and ones in the binary number system. Multiply this by two for stereo, and then by 60. And this gives the number of bits which make up one minute of sound. The original Audio CD standard allowed for a maximum recording time of 74 minutes, so multiply this number again by 74, And this will give us the maximum number of bits on a CD. (For longer disks, or DVD and blue ray the number of minutes is greater but still finite.)

Multiply 16 by 44100, by 2 by 60 by 74 and we get 6265728000. That is the total number of bits that can be stored on a normal CD or CDR. If you convert this to bytes, you get around 740 megabytes, which is about right, 740 megabytes is the storage capacity of CDs and CDRs. Given that each bit in this totality can be different this gives us 2 to the power 6265728000 possible CDs, and no more, in this format. What we have done in effect is to create a virtual fixed universe of finite objects. The arithmetic is simple, if we only had 2 bits, then the possible number of combinations would be , 0 0, 0 1, 1 0, and 1 1. No more possible combinations using only two bits can be made. For 3 bits there are 8 possible combinations, for 4 bits 16 possible combinations. The formula then is 2 to the power of the number of bits. 2 to the power 2 is 2 times 2 which is 4. 2 to the power 3 is 8, two to the power 4 is 16, and so on. 2 to the power 6265728000 is extremely large but a finite number.

So in a “2 bit” universe, (literally a very cheap universe), there are 4 and no more possible objects, 0 0, 0 1, 1 0, and 1 1.

This “thought” experiment although based on real “physical” objects can be treated as a simple mathematical object and so allows us to explore some of the consequences of this object or objects. The important feature is that any finite series is fixed, so greater sized disks, blue ray, whatever, is not significant to the idea, that is in a finite universe there are a finite number of finite objects. The size of the bit strings set real limits on the number of possible objects; web pages typically use 24 bits to encode colors, 8 bits for red, 8 for blue, and 8 for green that gives 256 x 256 x 256 or 16,777,216 possible colors, and no more.

In Deleuzian terms, you could call this, all possible CDs, the “virtual plane”, thought experiment, in the case of 2 to the power 6265728000 of all possible audio on CD, a virtual set of possibilities or a virtual plane, and the actual physical CDs in the world are actualizations of these virtualities. Actual objects, physical CDs, being intensities on this virtual plane. Actual CDs are not mere copies of there virtual counterparts, they are not re presentations of the virtual, for they have many more properties, many physical properties, color, size, shape etc., just as in the Deleuzian Virtual and Real planes, the real is not a copy of the virtual, but an intensity.

Using this as a model we can “experience” actualities that are physically unlikely for humans if not in practice impossible, for 2 to the power 6265728000, is approximately 10 to the power 2000000000. There are only 10 to the power 118 particles in the universe so a full and total actualization of the virtuality of CDs seems impossible.

The realization of all the experiences of the thought ‘Experiment’ of ‘All possible CDs’ is also an impossibility, but a different one to the actualization of the objects as

physical objects. This impossibility is a theoretical impossibility, for although superficially, and logically, simple binary logic at that, the number of objects here is fixed and finite, it does not follow that the number of experiences of these objects is fixed and so also finite. And it is important to note that what speculations, experiences that follow from this trivial, mathematically trivial and scientifically uninteresting, set of finite CDs will be true also of any other larger sets of objects that contain these, for instance the totality of all possible objects whether finite or infinite.

The set of all possible CDs we have said is mathematically trivial and scientifically uninteresting; however, it is not for the “musician” . The set would contain every possible recording in this format, all Sinatra’s hits, all of Bach, Mozart etc. It thus has many similarities to Borges’ La biblioteca de Babel, however Borges indicated this library is a product of randomness, the set of CDs is different, as it is neither infinite or the product of randomness, or contingency. This is important as the set of all possible CDs, unlike randomness or contingency, guarantees all possible CDs are virtually presented. Unlike randomness which has no such guarantee, for instance in tossing a coin, randomly, it is not impossible to get a continuous number of heads and no tails, this is not impossible, though it is improbable. The significant difference in the thought experiment of all possible CDs, is that it is a binary matrix, and so it avoids the criticism, or “mathematical” difficulties of random ness, and contingency. From contingency, even its necessity, and even given infinite time, it is still not a necessity for all contingencies to be actualized. Simply put, the famous chimp typing forever need never produce Hamlet, such is probability and randomness that the chimp is allowed to type A A A A A A A A forever, or miss Hamlet or Shakespeare altogether. No such problems occur in the CD collection, firstly it is finite, and secondly it is all of the possible permutations, it offers, or should offer no surprises. Most of these CDs would sound like noise, though this might not be so simple, with more thought, more properties emerge, for instance not only would Beethoven’s Symphonies 1 through 9 be there but also Beethoven’s 10<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup> and 13<sup>th</sup>, any recordable “Beethoven” work that both exists or could possibly exist would be present, and that seems very strange. And of course all audio books, in all possible, languages that are recordable, and presumably all CD ROMs, all computer games and software that would fit on 1 or more CDs would be present. The chimp may never get to typing out the play Hamlet, but with the ‘total number of all possible CDs’, all recordable Hamlets, would be present.

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The data on an audio CD is numeric, a CD player interprets, de codes these numbers as sound. But it is possible to de code these numbers in other ways. These numbers on computer software CDs are de coded into computer programs, or if the CD, contains pictures, in JPEG format, these are de coded into images. And so it is also possible to display the data on a CD as an image, and it is possible to load such data into a word processor or even attempt to execute the data as a program, or computer application. For instance a CD of Sinatra's Hits, could be loaded as a picture, or as software, and though most times this would be rubbish, unplayable, unrunnable, nonsense, or "noise", there is in principle nothing to say an Audio CD in some operating system, on some playback device, might not happen to be, also a computer game, or software as well as being a Frank Sinatra, L.P., when played on what we call a conventional CD player. The binary data in effect could represent 'anything' representable in binary data. What does this mean? Any single audio CD has the potential to be an infinity of things, for although the captureable data in bits is finite, as the number of bits is fixed, how these are interpreted, and by this I think we mean also, 'how they are experienced', is not fixed, is not limited and is not finite. The number of possible interpretations is not finite, as interpretation is not limited by a finite physicality, but it is unlimited by a theoretical possibility of infinity. This might be seen to mean that absolute or, full knowledge, or experience of these , or any objects is a hopeless, and impossible task.

The philosophy of Kant removes the experience of the thing in itself from us, and by virtue of Derrida, and the object oriented philosophers, amongst many others; the totality of experiences of this, or any thing, text, or object are rendered infinite.

Now let us revert to a “2 bit” universe, 0 0, 0 1, 1 0, 1 1, we have 4 possible states or ‘objects’, and following the argument above these give a potential infinity of representations, or experiences, for instance 0 0 could represent the color red, 0 1 = green, 1 0=yellow, 1 1 = blue, or 0 0 = CAT, 0 1 = DOG, 1 0 = BIRD, 1 1 = FISH, or 0 0 = A, 0 1 = B, 1 0 = C, 1 1 = D... where A, B, C, d, are infinitely variable. However in our 2 bit universe the things in themselves are 0 0, 0 1, 1 0, 1 1, and I see no reason why we cannot perceive or experience them as just that. As such they are now meaningless, they no longer represent anything, and we experience them as they are. Here is a kind of reversal of Derrida’s effacement, of the signified, as the object re-appears in itself outside of signification, it is in significant.

This “achievement”, this experience of noise, of the thing in itself, outside of concept is not a philosophical move but a musicological, or non-musicological move, one that however does have certain philosophical parallels, for instance in Adorno’s attempt to conceptualize about the non-conceptualizable real or in Meillassoux’s desire for an absolute knowledge, by virtue of the necessity of contingency. These are issues for philosophy and not music, or as I would now rather say issues not for ‘noise’, noise qua noise. In radical musicological terms noise qua noise can now be experienced as is, even without hearing a sound. Here the first few thousandths of a second, 01001001010100100100100100100100100000001, of 1.207 seconds of noise, which when printed makes more than 360 plus pages of binary data.