

1: Xenakis: His Life in Music, 1st Edition (Hardback) - Routledge

Xenakis: His Life in Music is a full-length study of the influential contemporary composer Iannis Xenakis. Following the trajectory of Xenakis's compositional development, James Harley, who studied with Xenakis, presents the works together with clear explanations of the technical and conceptual innovations that shaped them.

Grant sat sweltering in the parlor of a farmhouse outside of Vicksburg, trying to determine when would be an appropriate time to start drinking. Dinner would not be served for a few more hours, and he not did prefer to sober up again for the night. He eyed the bottle on his writing desk, then turned to work on the daily reports. He closed his eyes, ground palms to sockets to concentrate a moment. Grant started in his seat, blinked his eyes to relieve the dazzle of the purple retinal afterglow. Loveless cheerfully, "And how goes the Siege of Vicksburg on this Loveless was impeccably attired in a silk morning coat, silk hat, and gold tipped cane. He wore an enormous green cravat that made his pink face look like a grotesque flower. Behind Loveless hulked his assistant, the giant Voltaire. Voltaire clutched a large metal barrel. Next to the giant stood the lovely Antoinette, who held a wicker basket. I admired your aplomb and composure! It is true what they say of your complete sangfroid in unusual situations. My hat is off to you, sir! I am Doctor Miguelito Quixote Loveless! These are my companions, Miss Antoinette, and Mr. We are all of us time travelers, having come from your far future! He held up a hand towards Loveless and pointed towards the basket. The doctor, interrupted in his prepared speech, somewhat disconcerted, nodded. A token of our esteem, a gift basket for you, containing- " "a bottle of Old Crow Bourbon, apples, oranges, some pieces of fried chicken, fresh bread and butter, and a brace of quite excellent Havana cigars". She looked at Loveless, who pale and stiff, nodded permission. As she placed the basket upon the table, Grant looked up at Voltaire. Voltaire humped the barrel to the floor with a grunt. Doctor Loveless, his handsome face suddenly becoming pale and stiff with anger, demanded "What do you mean not the first time? We have just now travelled here to this time and place! By appearing in the past, you have created a time loop. I have, by my count, gone through this encounter perhaps a few hundred times. Fortunately, the loop is recursive, and so is never the way same twice, else I - and the rest of the universe - would be quite insane. But to you, it will always be the first time". Sir, do you indulge? I must appraise this new information". Loveless stopped his pacing. I completed the time machine that year! Or rather, if you will, a Do loop, an iterated algorithm where the result of the computation is fed back into the formula and repeated. So, it would seem to you, at the start point, that you arrived from Yale University, where you were a professor of the physical sciences, with the means and resources to assemble the material and device that you call a time machine. And at the same time, constructed the nuclear device which Mr. Voltaire has placed upon the floor. All you needed from me was my signature. I, foolishly, accepted your offer, thinking the siege would continue for several months. The blast not only wiped out Vicksburg, it irradiated and incapacitated nearly a third of my army. It did end the siege, and the war, once news spread of a horrible weapon possessed by the Union. You then travelled forward in time, produced a land grant with my now Presidential signature transferring much of the state of California into your possession, but in turn, meaning you never took the position at Yale, and thus never created the time machine, which created a paradoxical loop in time. But you obviously need more convincing. You and I have spent a great deal of time as adversaries, Doctor, and I know a great about you. Grant proceeded to tell Loveless his whole life, the family history. How the Liebloses of Austria had been exiled. How they emigrated to America, how the Viceroy of New Spain granted the family large tracts of the province of Alta California. How the land was stolen by the Republic of California. And on and on until finally Loveless, dark browed and stiff lipped, admitted this all might be true.

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I wake up in hospital beds a lot in this story. Maybe I should get you up to speed if you are not familiar with my circumstances. I currently live in Spiral City, have lived here since , give or take. Spiral City is on a peninsula fronting a bay on the western edge of the biggest continent of the planet Alterra. Alterra, and its moons Algemina and Sessus, circle a G2 star about midway inside a spiral galaxy two hundred and fifty million light years from Earth. Back on Earth, if you look up at the nighttime sky, we would be in the constellation of Hercules, if that helps. I rent space in one of the downtown frontier strip malls. I have a corner shop there. Trillionaire owner of the entire freaking planet Aaron Willis. This is his world and the rest of us just live on it. Jonbar hinges are a science fiction term for those forks in the road of history where things go all different. I gotta take this call". If you get the impression I might be in trouble, you are right. Worst of all is little sister Johanna. Johanna leans forward, elbows on my counter. I talk past Hanna towards the Bundys. I think I know why you are here". I receive a glower in response. Blinded by tears, I hear a commotion of big bodies in a rush towards me. Someone is thumping on a drum. They must have doped me up. My neighbor Aaron sits next to me leafing through a National Geographic. Getting stoned too often, man. I stretch and shift and, realizing I am just sore, sit up. How do you feel? You know you should be mangled, you dumb fucker. Every one of your bones broken! What those goons did? Who all do you think kept you alive? Camilla got me, but we would have heard anyway. Your place is trashed. The doc did a full body scan on you. That titanium nail driven into your skull? Like it got knocked out? They knocked it out? Aaron looked at me expectantly. Full body scan you said? You got it, ace. Some kind of fascial enhancements. Skeletal and muscular enhancements, too". More like industrial strength human. Elephant skin and bones of, well, titanium. Yeah, Fucking Octopussies, man! When they beat me? It fucking hurt a lot! Apparently, while my place was getting trashed and I was having the living shit beat out of me, a giant neon fantasy cosmic circus which is a Furry Octopoid space station appeared in orbit above Spiral City. Or so they claim. They could be drones for all I know, a chosen shape to interact with us. I suppose if you want a moon base on a desolate airless moon, you want it to be comfortable. What do they want? We pass through a series of airlocks to get to the staging area. And there it is, my coffin. It snorts a little wad of mucus, right in my ear. We can begin the training immediately! Another spray of snot. Hatchlings are always so cute! Training to rescue a lost colony, silly! You are going to be a hero! Terry cloth towels for the ugly two legs please! What do want us to call you? We have found one of your lost colonies! They are from Asia! Um, a colony? One of the earliest. We are surprised by this. We did not think the Japanese would be so adventurous. So, still, we have found them! They are in big trouble! But you will rescue them while there is time! We can entangle them for maybe a week. But you will be ready! Can you swallow air? How loud can you belch? I had asked exactly what kind of very big very bad space creature it was, how belching and wrenching was going to be of use, and how I was going to be of help. They ignored all my questions. We poofed into existence over a single solitary planet next to an immense nebula almost as colorful and flamboyant as the teuthid station. A swirling tentacular tip indicated the nebula. You must go down to the planet and protect them. I look around and, hmm, rooftops. I must be way up someplace in a building. I look down, and - What the fuck? Can you hear me? The monster is coming! You are a daikaiju! The space creature that is plaguing these people is coming! You must destroy it! There was a path of destruction leading back to a harbor. The space creature is here to lay eggs. If the eggs hatch this planet will be eaten alive. You have to stop it! I know that sound. Where is the fucker? Hyper hurricane winds are knocking buildings down around me. I instinctively grab a wing by the root and twist. Mothra emits a loud screeching electronic tone which deafens me. It breaks free and wheels up into the air. This fucking thing is beating the shit out of me! Swallow air and belch and puke! Just as I swallow air and start to belch, Mothra hits me in the belly again.

3: Random Walks: June

"The outsider -- From the personal to the individual -- From architecture to algorithm -- The voice, the stage, and a new conception of time -- Arborescences, random walks, and cosmic conceptions -- Sieves, ensembles, and thoughts of death -- Melody, harmonic color, and nonlinear form -- The late works: abstraction and intensity."

I am suspicious of the supposed origin of this algorithm as well: At any rate, there is a well-known fraction-free algorithm called the Bareiss algorithm from that predates the date of given here. As far as I can tell, the two algorithms are the same or very nearly the same. Could possibly be a case of people naming the result after the one among several independent discoverers that they identify with the most. These links appear to be too different to all be self-promotion. It feels at least plausible that some Spanish-speaking project member would be able to dig up a reliable source for the name. Anyone have access to a collection of Mexican linear algebra textbooks? This very algorithm appeared in a widely cited article by Bareiss five years before Montante allegedly came up with it. It seems to be a neologism that should be avoided. I found an interview published by a different university in the same city, here. I cannot truly attest to whether this method was found independently or not, but it is a method whose credit is given to him, at least here in the city. And about the article deletion, please understand that EsWiki is waaaay behind EnWiki. If we were to quality-test every article, most would most likely disappear. Comment added after archival. They say a four dimensional space could be any sort of space not necessarily Euclidean whereas others have said it refers in this instance to an extension of Euclidean 3-space. I would like to remove the dubious tag or otherwise resolve this. This is a bit similar I guess to the N-dimensional space business mentioned in a section above but as far as I can see there has been no real follow up to that, also I think they are a bit different in that N-dimensional space is actually used for many other things like configuration spaces whereas four-dimensional space is rather specific. Talk is at Talk: For example, a vector space over any field with a basis consisting of 4 elements, a manifold whose charts map to \mathbb{R}^4 , a manifold whose charts map to \mathbb{C}^4 , a topological space of Hausdorff dimension 4, etc. So I feel strongly that 4-dimensional space should not be restricted to 4-dimensional Euclidean space. CRGreathouse t c If you ask a mathematician about "a point in 4-dimensional space", with no qualifiers and not saying "a four dimensional space", she will immediately assume you mean 4D Euclidean space. The term "4-dimensional space" as a proper noun is completely tied to Euclidean spaces in ordinary mathematical usage. We have to add other words to make it clear when we mean some other sort of four-dimensional space. Out of context, it would be unlikely for the mathematician to be referring to a particular complex manifold or topological space. However, I argue that "a point in 4-dimensional space" would just as commonly refer to an element of a four-dimensional vector space. In teaching, we often draw pictures of vector spaces, even when we have not assumed any Euclidean structure on them. Furthermore, a major point of contention at Talk: Fourth dimension is whether "four-dimensional space" should default to Euclidean or Minkowski space. There is a strong physics influence here, and maybe there should be. In my experience, physicist avoid the term fourth dimension in favor of space-time. Without proof, I would guess that the most common reason for a user to go to the fourth dimension article is because of this popular misunderstanding of space-time. Some fraction would be interested in 4 spatial dimensions as well looking for concepts related to a non-self-intersecting Klein bottle, etc. I think part of the problem is combining fourth dimension with 4 dimensional 4D space. Gauss's Codazzi equations relativity I have no idea what these two are about exactly, but these two articles seems to be about the same thing. Opinions on what should be done? If someone wants to bother doing a merge, go right ahead. One of the answers to these questions deals with the "number" 0. The answer asserts, correctly, that this number is meaningless as a real decimal. I added a brief parenthetical comment here to the effect that one can make sense of such a number in a proper extension of \mathbb{R} , providing a link to a page where this is discussed. The parenthetical remark was apparently too much for the guardians of purity at 0. I would appreciate some input. So I think the point of the FAQ is to be very simplistic. The article itself does discuss infinitesimals, as I think it should. You are lucky if you get them in high school in many cases. The purpose of a FAQ page is not to address a particularly young segment of our readership, but to attempt to answer typical

questions that might arise on the talk page. A number of inexperienced editors have reacted with interest to the suggestion that infinitesimals have a role to play here. Here is an NCTM worksheet that puts that skill in middle school. From the point of view of a wider continuum, they hold up to an infinitesimal error if the infinity of periods is interpreted in terms of an infinite hypernatural. From the real view point, all such infinitesimal differences are erased by an application of limit or standard part. None of this contradicts the fact that student intuitions about 0 . There are several ways of making sense of the 0 . These are closely related to the surreals. Meanwhile, the maximal surreals have recently been shown to be isomorphic to the maximal hyperreals. But getting this past the purists at the FAQ page seems to require a titanic effort. They are currently busy eliminating any vestiges of an alternative to the reigning dogma. It seems to me that an FAQ does not need to cover every alternative theory. The point of the FAQ is to give very simple answers to a few questions, not to replace the main article. Suppose we had a FAQ in solar system about whether the sun orbits a stationary Earth or the Earth orbits a stationary Sun. The right answer to that would be "modern science accepts the theory that the planets of the solar system are in orbit around the Sun heliocentrism. The lack of infinitesimals on the real line is similar: Only after they are comfortable with that fact could they be in a position to study other systems in which there are infinitesimals, but which like geocentrism are considered only potentially-useful fictions by modern researchers. I am obviously not going to pursue the FAQ thread if you are against it. Perhaps we can settle for a more meaningful mention of infinitesimals in the lede of 0 . The following comment is somewhat predictable, but I will make it anyway: Another analogy that I have in mind is quantum mechanics. Surely many people would find that surprising at first, and there are always some people who look for a way to work around the theorem so-called "loopholes". But the overall consensus of physicists as far as I have been told is that the theorem is correct in rejecting local variable theories in quantum mechanics. For an outsider like me, the primary question to ask is "why do physicists feel that way", rather than "what arguments can I use to avoid accepting what the experts have accepted". Similarly, I think that an article on 0 . A lot of text books on subjects particularly in the field of science and maths have been written in this style and it leaves the reader frustrated and confused. Surely an encyclopedic article should be accessible to the widest audience possible? I think some simplification of the language with perhaps more steps and examples would help to get across to the reader some of the concepts involved. Readers are generally not stupid people else why would they be there but the knowledge should be communicated better. Language, next to knowledge, is the most important asset an encyclopedia can have. Sam- Helsinki, Finland

â€”Preceding unsigned comment added by Charles Matthews talk It is quite difficult remembering what problems one had learning something so probably the best thing to do is to flag the specific bits that first give trouble and the bits you find hardest to follow. Minsky exhorts the reader to be suspiciousâ€”although a machine may be finite, and finite automata "have a number of theoretical limitations": It reads like one of those controversial, he-says-she-says, social science articles. I just wanted a second pair of eyes. Created on the appropriate calendar date for such. Michael Hardy talk Still, I expect an interesting daily update tomorrow. So if the internal-link-muse speaks to you, figure out which articles should link to it and add the links. A merger proposal is being discussed at Talk:

The next chapter (pp.) looks at 'Arborescences, Random Walks, and Cosmic Conceptions'. Harley gives a mainly chronological account. This eases the reader into assessing Xenakis's compositional development, but it should be pointed out that, here and elsewhere, those works grouped together for discussion do not necessarily fit into the.

A Generative System Approach The significance placed on developing the generative system by Xenakis and Le Corbusier corroborates existing evidence of different approaches to designing by novice and expert designers Kavakli and Gero ; Kokotovich, Design grammars or generative systems operate at fundamental macro-levels of idea conception. Shared mathematical, stochastic, probabilistic and serial methodologies for structuring designs exist at this foundational level. This paper examines some examples of stochastic and serial design grammar in works by architect, Le Corbusier, architectural and musical compositions by Iannis Xenakis to identify mathematical and stochastic procedures that traverse two disciplines. The generative process underlying both is a form of transformational analogy. It is the universal nature of mathematical laws and their relation to natural phenomena that validate these grammatical principles for organising structure at microcosmic and macrocosmic levels of the design strategy. The generative principles provide a method for determining large-scale structural proportions as well as localised, relatively superficial, details. Designing space in architecture and in music are both three dimensional practices. Further parameters of condition such as colour, dynamic intensity music and texture apply to both disciplines and restrictions also moderate stochastic design processes – performability, construction materials, building regulations, gravity, cost, etc. Stochastic rules of design in both disciplines are informed by rules of mathematics. This potential, utilised by expert designers to achieve transference of generative techniques from discipline to another, relates design thinking across a group of creative, yet structured, fields of design. This paper explores mathematical procedures as a single basis for stochastic design grammar traversing two design disciplines. Composers who have applied this way of thinking include: Compositions by Iannis Xenakis, himself an architect and composer, demonstrate the influence of architectural structure, in particular the serial design concept of his mentor, Le Corbusier, applied to the discipline of musical design. The spatial and geometric relationship between the disciplines of music and architecture highlight their shared generative technique. Xenakis articulated the mathematical bases for inter-disciplinary grammatical practices in his treatise, *Formalized music: Thought and Mathematics in Composition* Xenakis, The architecture of Le Corbusier, alongside whom Xenakis worked as assistant for many years, applies serial proportions as a foundational design grammar. There is correspondence between musical generative systems and the formation of mathematical series, probabilistic theory and algorithms in other design disciplines. Xenakis articulates the connection with expertise in design: The epitome of an integrated generative system is the way in which the designer relates different granularities of process and applies a pervasive grammar to different style-determining parameters. It is supposed that relational systems at the macro- and micro-levels of design are more typically found in highly conceptualised and formalised work of expert designers than novice designers. Confidence in the generative system is such that the artefact is the outcome of a well-defined generative system. The apparent rapidity with which Frank Lloyd Wright was purportedly able to produce his design for Fallingwater Web-b , might be explained by his well-refined aesthetic and generative approach, of which the specific design was simply the outcome. The most significant design thinking occurred in the invention and refinement of the generative system. During his career, Xenakis eventually moved from composed sounds for analogue performance to computer-generated sounds: Generative Stochasticism applies broadly to the gamut of deterministic, procedurally constructed design including music by Karlheinz Stockhausen, Anton Webern, Pierre Boulez, Milton Babbitt, and Elliott Carter, amongst many. Within the broad definition of stochastic design, serialism, especially integral serialism, is a subset. Xenakis viewed his musical compositions as the experimental dossier of his design strategies. Considerable design preparation occurs at the pervasive, objective mathematical level. It might be argued that it is the objectivity of mathematics and its ubiquity in nature that make it the suitable grammatical grounding for generative systems across a range of design disciplines. Xenakis reiterates the long

history of determinism in design practice, from deterministic European Schools of antiquity influenced by Platonic and Pythagorean causality and geometrics to the ubiquity of the Fibonacci Series and the Golden Sequence that is revealed in Pyramid design, Mozart Sonata Form, art works of Leonardo Da Vinci, Michelangelo and proportional influences in Mondrian, the Cubists, and Escher. Strict causality was subsequently followed by fertile transformation, facilitated by statistical theories in physics. Le Corbusier, for whom Xenakis worked for some time as an engineer and architectural assistant, is known for his application of serialism to architecture. His most documented stochastic contribution to generative design was his instigation of a proportional system, The Modulor Boesiger and Girsberger, Serialism and Stochasticism in music A subset of so-called atonal music composition followed a new path parallel to physical sciences, simultaneously almost absolutely deterministic. Two methodologies for applying statistical procedures to design were in probability theory and polyvalent logic: Every design generated by determinism is more or less pure, the degree affected by the breadth of application and fundamental logic. The designer or composer chooses the parameters and values initially assigned in a stochastic system. Music can be an organisation of elementary operations and relations between sonic entities Xenakis, In the words of the composer: The designer or composer reaches the abstract and grammatical roots of a generative system by examining the construction level. To generate structure and purpose, the composer uses a system of causality. The traditional heritage of Functional Harmony "the year tradition of tonal, modal harmony from the time of J. Bach onwards" served this purpose. Olivier Messiaen, with his multimodal music, and the Viennese Serialists who mastered logical determinism in atonality through serial pitch organisation, both offered monumental steps towards abstraction of the principles governing structural design and system design in musical composition. There is contradiction between the polyphonic linear system and the perceived heard result. Instead, the significance will be the statistical mean of isolated states. If the link seems too arbitrary or abstracted, Xenakis points to another manifestation that is so often cited as a foundational influence in designing: Nature has long been the other informant of design grammars and generative systems "e. The correlations between natural phenomena and those mathematical principles applied to design in music and architecture will reveal that the origins are the same. Perhaps it is the fundamental truths, described by mathematics, revealed in natural phenomena and borne out in stochastic design systems, with which we identify. Mass events, such as the sound of a crowd, are both aleatoric and stochastic. The laws of passage from complete order to total disorder in a continuous explosive manner are stochastic laws, a chain of logical reasoning. Continuity may produce either continuous or discontinuous elements. Xenakis believed that if glissandi smooth pitch slides, usually on a bowed stringed instrument were sufficiently long and interlaced, it would be possible to obtain sonic spaces of continuous evolution, equivalent to ruled surfaces in architectural design see Fig. He first employed this design technique in his composition Metastasis first performed in in Donaueschingen and later he used the same principle in his design suggestion to Le Corbusier for the architecture of the Philips Pavilion in Brussels for the World Trade Fair Fig. Different stages in the development of the first design of the Philips Pavilion, experimenting with various configurations of conoids to build a shell comprising as few ruled surfaces as possible with varying triangular peaks and hyperbolic paraboloids. Relations of temporal design to spatial design: These are briefly outlined below. An extended mathematical discussion of their rationale and validity is not the subject of this paper. The illustration demonstrates some transference of probabilistic laws to serial composition. Space between points represents duration. How are the points and positioning of points chosen? The following example Fig. With this information one can deduce the amount of chance included in a choice. Inclusion of intervals of intensity and pitch within a segment. Distribution of constant speeds is calculated on a basis of density of concurrent mobile sounds. Speeds are mobile entities. The hierarchy is isotropic, i. This attitude produces both symmetry and the mathematical potential to calculate relative frequency of occurrence. Their distribution is Gaussian Xenakis, These generative processes have been applied to sonic parameters by Xenakis but could equally form a generative technique for other design domains. This affects the phases of the design process and also integrates the macrocosmic and microcosmic relations of the design system. Xenakis works through the compositional process in the following sequence: It can be seen that this highly stochastic approach actually affects the way the designer thinks and works. The graphical representation phase during

design is a valuable reasoning process that can invoke further idea generation Akin and Weinel, These grammatical rules are established to give some arbitrary choices to the conductor resulting in individual performance renditions and running permutations like spatial seating of performers on the stage and audience through the game matrix. This is an interesting combination of Chance and Choice in a stochastically generated composition. There are three matrices employed in Stratgie. They are used to provide symmetry as well as advantage and disadvantage in the strategic play on the part of the two conductors. This example demonstrates the notion of progressing between internal and external representations found in expert design Kimbell, It also illuminated the notion that the design or the grammatical formalisation was the most significant part of the creative process and realisation was execution of design grammars formulated by the composer. It was important to Xenakis to represent Boolean expressions and functions graphically, e. The graphical representation clearly elucidates the symmetries and economies of the musical structures Fig. The graphic mapping is consistent with findings that sketching and visualisation support creative mental synthesis Kokotovich, Graphs summarise the affects of the system on intensities, densities, and silences and it demonstrates the correspondence between values and pitches, thereby showing a higher level overview of the composition. The lower levels are also extrapolated graphically before the composer denotes the artefact in traditional musical notation on a score. Venn diagram representation of Boolean expressions in Herma for piano. The function for three classes, each of which intersects with the other two. The flowchart of operations. The same function, F can be obtained with only ten operations. The micro-structures generate specific values within a cosmic structure see Fig. Elementary ruled fields, graphically representing distinctive general qualities of registers, textural density ensemble scale, intensity, variations of timbre, fluctuations localised and degree of disorder. Symmetry transformations of a cube are used to generate the hexahedral group isomorphic to the symmetric group Fig. These transformations give rise to the rules for organisation in time. Symmetry transformations of a cube, used to generate the hexahedral group isomorphic to the symmetric group Xenakis, Organisation outside time uses macroscopic sound complexes mapped in different ways: Kinematic sets map various operations musical such as plucked sounds, tremolo, harmonics across the parameter of pitch. Variations of macroscopic sound complexes are mapped onto products of the vector space of pitch and playing techniques " plucked, bowed, struck, etc.

5: Xenakis : James Harley :

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At the end of it, not one, but two people independently asked me about Overholt et al. I told them that the paper had really stupid mistakes and it should be discarded in the waste bin of history, but given that Overholt et al. Before I get into the technical details which will cause many of the readers to click their way out of here , I do want to say something general about the refereeing process and how it can easily break down, as it did here. Given that there are many more people who are eager to shoot down the cosmic ray climate link than people researching it, very often I find that the criteria used to accept papers which refute the link are way more lenient than the criteria needed to accept papers that supposedly refute it. This is because any paper has a much higher probability of getting refereed by the refuter camp than the proponents camp. The second comment is that I wrote them politely, it ended up with an erratum , but to save face they continued claiming the that their paper supports the erroneous claim that my original conclusions are unsubstantiated. One can show that even those leftover criticisms are plagued with errors. Main Problem In the their paper, Overholt et al. The gravest error is that the analysis was carried out using a spiral arm pattern speed that was totally different from the range of pattern speed they actually wrote they used! They wrote that they take However, if one looks at the average spiral arm crossing as obtained in their analysis, it is about Myr the first of their group of 4 arm passages is at roughly at Myr and their second group is at roughly Myr. In fact, an average spiral arm passage every Myr implies a relative pattern speed of about: Because they accidentally took the absolute pattern speed, they obtained spiral arm crossings which are much more frequent than the climatic data or meteoritic data. If they would have taken the The phase would have agreed as well. I then suggested that they publish an erratum to that paper, which they did. However, to save face, they claimed that their re-calculated spiral passages are still inconsistent with the meteoritic data or with the climate record, which brings me to the additional problems still present in their analysis. Additional Problems A few more problems relate to the way Overholt et al. First, they take the spiral arm model of Englmaier et al. In fact, it is so distorted that 2 consecutive arm crossings are of the same arm, which even with the radial epicyclic motion of the solar system is ridiculous. Last, and perhaps most important. The cosmic ray flux can be shown using Iron meteorites to be periodic with a roughly constant Myr period , and in phase with the appearance of ice-age epochs, which means that any distorted reconstruction such as that of Overholt et al. Summary Overhaul et al. However, will people still quote it and claim that it refutes the galactic spiral arm explanation for the appearance of spiral arm passages? Probably, but now you know better.

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motion, the random walk, which distinguishes itself by its unpredictability. The virtually uninterrupted glissando played by the violinist represents the sonic equivalency of the imaginary trace left by an elementary particle which brutally.

9: Central limit theorem - Wikipedia

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