Structure & Alchemy in New Fractal Playspaces

~ An Essay on In-finitely Scaling Games ~

WIP v 0.6

by

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"The ignorant suppose that an infinite number of drawings requires an infinite amount of time; in reality, it suffices that time be infinitely subdivisible"

- J. L. Borges

Preface to v 0.6:

Any feedback is very much appreciated-- this is the first draft of a project which may keep going, or may be done. If I post a newer draft, it will be at the project's landing page-- davidkanaga.com/ouroboro2d *-- which links also to-- 1) an Introduction to Infinite Sketchpad, which links to-- 2) arrangements of fugues from alchemist Michael Maier's early multimedia text* Atlanta Fugiens*, 3) a video-setting of Newton's translation of* The Emerald Tablet of Hermes*, etc.*

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(first take)

“Dog Resting with Bag After Playing”

pencil drawing by G. Cantor

Introduction: Reading (line), Drift & Zoom

> *"Only Geometry can provide a thread through the Labyrinth of the Composition of the Continuum, of maximum and minimum, and the unassignable and the infinite, and no one will arrive at a truly solid metaphysics who has not passed through that labyrinth."*[1]

1.

The *golden thread*[2] that Leibniz is after is as relevant today as it has ever been. As L writes the above, he is ostensibly seeking a mechanical formulation of the infinitesimal calculus (which he achieves), but really he is concerned with a much broader project-- quest for a metaphysical *Mathesis Universalis* which might be used to navigate the infinitely zoomable *labyrinth of the Real continuum*, geometrically and experientially. To account for *everything*. "Whatever is-- *is right*."[3] *A formal optimism or*

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[1] Composing & exploring pictures in *Infinite Sketchpad*'s 2<D<3 continuum is a great way to begin to 'touch' this problem. I *cannot* recommend strongly enough the benefits of playing *I.S.* alongside reading this essay!

[2] *Eternal Golden Braid* (Hofstader)

[3] From Alexander Pope's essay on man which sums up the optimistic point of view well, that which is criticized by Voltaire in his *Candide*, by way of Pangloss, Leibniz' fictive amplification.

monism, an elaboration of the Real in which everything is counted as One. His calculus goes far in establishing the mechanical continuity thus required of the One, but it stops short of *the irrational.* The trouble is-- in between every pair of infinitesimally small numbers, there is a *greater infinity* of irrational numbers that are not accounted for at all. Almost all numbers are irrational. Almost all *being* is irrational, infinitely zoomable in any dimension of spacetime, forever unfolding. All games, too. A functional *geometry of experience* is still lacking.

L continues-- "Real space ... contains not only *existences* but also *possibilities*."

A self-destabilizing formalism of *possibility* must be considered a required component of any Realistic theory of games. Such formalisms are historically best represented by those systems of metaphysics which attempt to account for the conditions of *all possible experience*. The dynamic 'configuration/ phase space' is the computable model, but it may not be enough (though the attempt at *pushing* the usefulness of this model in games has not been pursued in much depth, I don't think). A geometric model is needed, but so is a model of time-flows. The mutual relations between metaphysics (which cannot be avoided at this point) and geometry cast a shadow image which is counted as *number* or music, depending on the point of view, and the *experience* of *number-or-music* is to prove itself to be something like the *grain* of software, from the lowest levels to the highest, where all non-skinned (abstract) information is *number*-facing, and all skinned (vibrating) information is *music*-facing. Today it is merely a question of *intensifying* the intuitive & structural application of these ideas to approach the limits of their *material* capacities which are actualized in that moment of computer-play, when computed-counted playspaces are coupled with desiring input streams coming from the touch of our uncounted mind-bodies, *pure experiences.* In becoming-with one another these two worlds are counted as one. The *vibrational-musical* continuum is the 'face' which this essay is most interested in, but the abstraction of the numerical continuum cannot be avoided. And why would we want to, anyway?

This *continuum,* the Real number line, is like a mystery glue that videogames have shied away from until now, with a few notable (always exciting!)

exceptions like *Spore, Katamari Damacy, Scale,* etc[4]. It is a surprise that the free-scaling mechanic has been neglected such as it has. It is hopeful that further free-scaling spaces will be designed and explored, and that they will count as their predecessors not merely the existing scaling videogames from the last decades, but rather will freely embrace the infinite played applications of these most dizzying ideas which have puzzled and vitalized minds throughout time/space.

Already there is *structural* precedent in the history of Ideas. Metaphysics seems to be unusually consistent in its motifs, composed largely of a relatively small set of ever-renewable concepts-- *Parts and Wholes*-- *the Many and the One*-- *Process and Object, the Possible and the Actual, Ouroboros*.. "The historical applications do not exhaust its possibilities: the vertiginous *regressus in infinitum* is perhaps applicable to all subjects."[5] These concepts are 'mechanism independent' insofar as they can be felt as such *spatially, musically, semantically, somatically, etc &c.*. Ideas exist *across material planes*, as is elaborated in this excerpt from Chapter 1 of Michael Maiers' *Atalanta Fugiens*:

"Who is He who ought to be carried by winds? ... *Physically* it is the Embryo, which in a little time ought to be borne into the light. I say also that *Arithmetically* it is the Root of a Cube; *Musically* it is the Disdiapason; *Geometrically* it is a point, the beginning of a continued running line; *Astronomically* it is the Center of the Planets Saturn, Jupiter & Mars."

The feeling prior to the *count* here is all *movement & mood,* but at the same time, the mood is emphatically structural in some sense (its conditions themselves have a movement, which may yet prove to be loopy, strange/ fractal, 'monstrous', as Peano's curve was called). There is the concept, and the count, which necessarily changes the structure of the concept in merely touching it (changing it into an object or function). Concepts, which touch the metaphysical Idea-virtuality, and functions, which are lines of information, or numbers, are *not the same thing*, but there is a relation. What are the implications of 'metaphysical structures' being reduced and computed? What of moving from the generality of metaphysical *wholes and parts* to the

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[4] *Scale* is forthcoming, by Steve Swink.

[5] Borges on infinite regress, *Labyrinths* p. 207, "Avatars of the Tortoise"

specificity of the fibonacci sequence, with its fully computational part-whole relations, to *e* (which abstracts this sequence in a one-many *unit*), to fractals, to uncounting-counting of aesthetic composition? There is no 'solution' to these Problems, but only a certain intuition which can be developed in *material sympathy*, and the technique required to manipulate quantitative values when it comes to that.

I've been playing *Infinite Sketchpad* & have become an amateur student of this 'Labyrinth of the Composition of the Continuum.' This is the Real number line and its given (skinned) material constitution, the vibrating images on the screen, the line mapped 'up' to the 2-dimensional plane.[6]

With the help of the vibrating-material-plane of *InfSktch,* I've begun to develop a small intuition for the relations of parts to wholes as an infinitely scaling tunnel of effectively *many* dimensions (at all times, even when mapped down to a 1-d line or 2-d screen). Following the potentialities opened up by *InfSktch,* there are radical temporal implications here for 'fixed picture objects' becoming *dynamic* games, and the implied inclusion of any number of apparently non-game things as games following this inclusion. *Infinite Sketchpad* has been for me an experiential/objective pseudo-proof that some structural aspects of Mind do 'leak' out of the brain, out of the organism, passing through our own skin, into other things, and that this leaking is happening in the these other things as well, taking things *in* and letting things *out* through the skin. That we think *with* these other things, that something of the concept and action, naturally, must exist in the software as much as it exists in me, only from a radically different point-of-view. The player and 'game' play each other as one, *we are both players*-- and to be closed to this empirical *fact* is to be frozen-- to find oneself in the ice-world of that 'truly solid metaphysic', which is unwilling to melt.. This Mind-stuff, 'matter and memory' (??), in its liquid form (the *stream* of consciousness/experience) is the stuff that games are made of, from the perspective of the player and from the alien perspective of the computer-- and while these perspectives are

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[6] Whitehead has given fair warning of the sophistries that have tended to accompany pseudo-math-games like these I'm playing: "Philosophers, when they have possessed a thorough knowledge of mathematics, have been among those who have enriched the science with some of its best ideas. On the other hand, it must be said that, with hardly an exception, all remarks on mathematics made by those philosophers who have possessed but a slight or hasty and late-acquired knowledge of it, are entirely worthless, being either trivial or wrong." With that in mind, best to go straight to Whitehead himself to find some of the 'truly solid metaphyics' that Leibniz is pining after. If you stick around, I *am* trying to learn more, and would love to hear of any suggested formal corrections. Let me know what's trivial & wrong: dkanagamusic@gmail.com

doubtless irreconcilably different at some level, at another level they are of the same stuff, "we are all made of stars." What is this *stuff* and how is it *organized*? In this essay, we are seeking a geometry of situations which is a geometry of experience and a geometry of architecture and a geometry of memory, all in one (as *music!*). It seems that perhaps we don't have to look far at all to find such a geometry, if this *stream* is indeed what we are immersed in everyday. Everyday is a *playspace*, as much of a game as any other, and in light of these researches, it seems that Leibniz' geometric advice may be just as relevant to a description of *the space of all possible games* as it is to metaphysics that he's after ('space of all possible being'? 'space of all possible experience'?).

This essay is a cloud, a description of a loosely zoned subset of this *space of all games or playspaces*. It will not go into many technical specifics[7] beyond some of the classical images of One and Many, Part & Whole, etc., which are as intuitively accessible as they are essential to the *ground* of the project. The cloud is in its *vapor* state, as it were, and on occasion particles will reach out and begin to forge connections, all the movement causes condensation & liquid-objects (analogies, *links*) form between one another, parts becoming *flows* but they will detach again, as long as the *heat* is turned up (we *turn up the heat* to 'shuffle the deck' as it were, to turn liquid to vapor and to let new connections form in the cooling-condensation that follows).. At times, the heat is balanced in such a way the 'boiling point' is surfed, and full rolling liquid flows take over, these are a sign of a strong committed period of writing that is beginning to feel like music-- conversely, sometimes the heat goes down even further, and ice-bricks form, objects are stratified, dogma is presented. There is ice and dogma in here, too, something for everyone! This is the beginning of systemization, and it happens in the winter time while the days are short, the organism is cold and preparing for death. But this is not to pass judgement, rather only to evaluate the peculiarities of different kinds of motion in the different hot-cold phases of matter and concept. This essay is not a systemic description of the space of all possible games, but a wander, it is an *attempt* (as is the meaning of an *essay*) to play A New Game in some microcosmic contours of that space, and to do this even before its mechanics

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[7] Which I am not familiar enough with to discuss at length anyway, tho I believe such a description will most likely look like some bastard child of speculative mathematics, phenomenology, artistic process, chaos sciences, cognitive architecture & numerological/qabalistic aesthetics. Adam Harper's space of all possible music from the played *musicking* perspective could be a good start.

are fully comprehended, and perhaps to suggest certain positive forms (Real Virtualities) that may exist as hinted at by the attractive or repulsive affections of their negatives as experienced in play.

The geometry of play starts from "pure experience", that pseudo-genre which is thrown around sometimes today in order to distinguish those games we play that are *intrinsically* meaningful from those which are *extrinsically* so. Extrinsic meaning comes in the form of the reward *after* the goal; intrinsic meaning comes from the *immanence* of of reward, which is not the 'end' of a process, but rather the carrying-out of the process itself. Pure experience, then, is concerned with the process. Game culture says this, so does history, and we will be introduced in Chapter 1 to the 'school of immanence' and its foundation in the *radical empiricism* of 'pure experience', which is the 20th century game studies (activity situations) program that went by a different name, being concerned as it was, with the indivisible-continuous game of everyday life.

The mechanics of pure experience, and our day, begins with a 'random walk', which can happen in any number of dimensions. In our experience-- the *stream of consciousness* is a *complex* walk, insofar as it is walked simultaneously in *all dimensions* of consciousness, which are finite but which approach the infinite insofar as conceptual and material dimensions can be endlessly recombined in assemblage to 'grow' dimensionality, N++ as it were. From the *inside* of experience, it is *complex, intensive*-- meanwhile, from the outside it is *random* or probabilistic. The sense we have of *being random* and experiencing that as anything *but* randomness is the meaning of Holy Randomness, and-- *amor fati*. All of these dimensions are mapped onto the *point* of our being, our experience, and the *point* is both a geometrical point of *actuality* and the *point* or *significance/purpose* of our playing-- the random walk is thus anything *but* random from this 'inside' point of view.

Maybe it is best to imagine this essay as game whose structure can be described a relativistic *world-line* through a cloudy N-dimensional space composed of *events* whose premonitions are described by attentional flows which are surfing and resisting *basins of attraction*, each defined by an external text (or other game/thing), or by 'chunked' clouds of these texts (which might be books, games, musics, experience in general). The references to outside works are thus key as to determining the structure of the

space being played (which functions as microcosm for the space of all games). These are like different 'levels' or 'rooms' in a conventional videogame, but there are not such clear thresholds here, such a sharp divide between different parts. The fractal character of this image is actualized when *you pay attention to and surf a 'basin of attraction' on your way toward another text*, tuned into the continuous 'line' of play reaching from here to there. *This* is the labyrinth, *between* texts, and this is what Borges was so obsessed with in his streams of paginations, citations (real & fictional), etc, which jump from plane to plane establishing continuities which cannot be accounted for in merely One object, but must be explored in the intersection of Many-- this region in our experience *between* the texts (and yet created in collaboration with the texts) that is infinitely folded in upon itself (and extending outward connecting to other texts), which is where the surfing happens, and just like Hokusai's waves are Mandelbrot's favorite example of proto-classical fractals, the waves of these conceptual-attractive basins *in our experience* are the non-visual prototypes of the newer pseudo-fractals, or freely scaling part/whole relations (without the strict self-similarity restrictions of the classical image).

These sub-attractors which exist infinitely folded *between* texts (between *players*) are *concepts*. And there is a curious relation between concepts, which are infinite in description and in experience, and *functions*, which are infinite in application (as per the countable infinite), but wholly finite in their description-- Videogames are assemblages of *functions*, but there is a non-trivial relationship between these functions and *concepts*-- indeed, functions are a line, or *text*, but these are resolutely finite *lines of information*-- that is to say, the material *grain* of computation itself, *objects*. Are *objects* not meaningful? In our experience, of course they are. Functions and objects are participants in our lives. We will proceed on the working hypothesis that there is some relationship between functions and concepts, such that surfing concepts might begin to inform the processes of surfing functions, and then, from here, creating functions.

These *lines* we're talking about *must* be freed up to leap about from plane to plane and to make themselves manifest in the varied materials of *conceptual lines, functional lines, drawn lines, walked lines, musical lines, heat lines, lines of sight, of flight,* etc. -- it is only once we have inherited a geometry that allows structure to so nimbly hop from discipline to discipline, from

concept to material and back, that we'll be at all prepared to tackle the space of all possible games, *Ludisis Universalis*.

2.

It is well known that games are possibility spaces-- but these are, as follows from their name, too *spatialized* still. It's as if time didn't exist, or as if it were merely another dimension of space (the 'possible' dimension).

Time introduces a *strange* or *monstrous* element, always. Monstrous because of the attack it sustains on the consistency of the Counted field of quantity, of objects. Possibility is not a static thing. It is historical in a broad sense and in a narrow sense, depending on the level of zoom-- it is *always* historical, with the future being a mapping of the sense of possibility onto the *void* set (the future is *not*). The present situation is conditioned as such by the material transformations that *played* that space into its current form.

The relations of history, memory & future are all tangled up in the process of playing, which presents any description of *play* with a daunting task indeed! Description will always remain incomplete, and will be ever more incomplete the more we attempt to describe rather than play. We will need to find ways of navigating these spaces, even before attempting a description, lest we artificially confine ourselves to a very small subset of all that is possible.

History provides us with the *tactics* that we're after-- the romantic sense of possibility, the rationalistic spatialization of time on the hyperplane, the parts and differences which form the correspondences which we call Wholes, the 'ceaseless flow of novelty' via recombination, the shifting Oneness of scaling assemblage-- fractal realism.

Here is a first image of the *geometrical theme,* shadow of the Golden Thread through the Labyrinth, which describes player experience or possibility, that we'll be tracing variations of throughout. A *nexus* where concept and function may yet be counted together (as One?). Excerpted from design notes compiled by the Fluid Playspaces Research Group[8]:

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[8] See IlinxGroup R&D, + ?? . Fairy-funded Startup, Oakland, CA, 2012-present; see Hermes Logistik Gruppe, Los Angeles,

"**Possible** worlds [Shifting Possibility Spaces] have a long history. Every concept has a *history* [Played Space], even though this history zigzags [drifts], passing through other problems & onto different **planes**. In any concept there are bits and **components** that come from **other** concepts, which **corresponded** to other problems and which presupposed other planes. This is inevitable because each concept carries out a **new** cutting-out [player], takes on new contours [space-boundaries], and must be **re**activated or **re**cut. Every concept has an **irregular contour** [*rough*] defined by the sum of components, activations & cuts." [9]

FPRG is describing research into *shifting possibility spaces*[10] -- the rhythmic-temporal contour of the new Pseudo-Hippaso-Pythagorean[11] musico-fractal-ludic geometry, an amplification (in *practice* and *articulation*) of the 'degrees of freedom' or *phase space* model of dimensionality, which describes *situations* as integer manifolds subject to the possibility of more or less continuous transformations at different time-scales across each of its many axes. Following Hippasus, the new degrees of freedom *are not limited to integer relations*.

SPS accounts for a wholly dissolved Mind Body Space / Chaos-Cosmos. In its insistence on *transition* or *shift*, it redirects played attentions to the exploration of the *edges* of a concept [space]'s *rough* irregular contour (the zoom into the 'edge' of the magic circle), which is described by infinitely scaling components-- parts that are *always* composed of further parts, a fractal dimensionality lying *between* two integers, transformations between discrete dimensions approaching continuity-- and from their fractal-edged fragmentation-- a new wholeness.

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[9] FPRG cut this from-- Hermes, Deleuze & Guattari "What is Philosophy?" p. 18 ~ A very SHORT overture, we move through so many of the concepts we'll be discussing, right up front: shifting possibility spaces, drift-walks, planes of correspondence, novelty, players, roughness/smoothness (fractal/euclidean edges).

[10] See pp. ?? - ??, "shifting possibility spaces", for a zoom into this

[11] via Hippasus, the Pythagorean who discovered irrational numbers and who was drowned at sea by the Gods (or by fellow Pythagoreans? Pythagoras himself?) for divulging an infinite reality that was not accessible via the Natural integer series. Hippasus also believed in the *prima materia* whereas the non-heretical Pythagoreans believed the 'first things' to be immaterial, abstract number alone. Hippasus, like Heraclitus believed *fire-flux* to be the cause of all things.

The *playspace* is the idea of any space or object given an active *intensity* in the present-- a space transformed by the exploration of its edges, the player pressing up against the boundaries, molding, mutating the space:

In classic texts of game studies, we find some nods given to transformation of the game-state. We find this in Salen & Zimmerman's *Rules of Play*[12], in Sutton-Smith's *The Ambiguity of Play* (where transformation is lumped in with "rhetorics of the imagination"), etc.

But these texts do not go far enough in giving transformation, *change itself*, the attention that it deserves. *Transformation* is the core mechanic of *any* playspace. Transformation is the pre-condition of play, not the other way around. *All* play is transformation, it is merely a matter of developing a *scaling* understanding of playspaces, such that when play 'overwhelms the more rigid structure in which it is taking place,' we merely recognize that a new unnamed game is being created at a different level of 'zoom', and that such shifts in zoom happen in all games, at the level of *parts*, where transformation is very much occurring even if it is apparently accounted for by the bounds of the Whole, which is never immune from the power of transformation, be it gradual or abrupt.

The alchemists, at least, have known this for some time. Alchemy is thought to be old-fashioned, but this is only insofar as it is considered strictly as proto-chemistry. Today, the study of non-equilibrium and far-from-equilibrium systems, which begins with thermodynamics, and is picked up by information theory and cybernetics, has once again confronted the immanence of Chaos as a *prima materia* to take seriously. Chaos and complexity theories provide some functional tools of immense value, but insofar *we are INSIDE* of the far-from-equilibrium system-- that is, *insofar as we are playing it*-- the mechanistic understanding, which requires a *difference in time* between the observation and the observed (evaluation of *past* events), ceases to suffice. The alchemical return is a necessary component of modern scientific practice insofar as science is played as a game-- uncounted and *now*. Insofar as the space and the player cannot be fully separated.

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[12] "When play occurs, it can overflow and overwhelm the more rigid structure in which it is taking place, generating emergent, unpredictable results."

The alchemical Work has always been played as an *intensification* of transformations, where transformation affects materials, spirits, where research into *intensifiers* traditionally goes by names of *The Activator ~ Catalyst ~ Mercurius ~ Quicksilver ~ Prima Materia.*

Lapis, "The Philosopher's Stone" is the name of the One alchemical final cause, or *goal*-- it has always been cloaked in obscurity, because it is a transforming-contigent One, which is *as One* a cloud of Many goals. The alchemist's One goal is not One but Many, and thus its ludic structure can only be zoomed into as an irreducible *one or many goals.*

For our part, the One is *approached* as such, in an ever-growing/decaying assemblage of Many *functional* desires:

Goal: Smooth dimensional gradients & shifts

Goal: Player/space dissolve

Goal: Slow liquids w/context-sensitive phase transitions

Goal: Continuation & intensification of playing

Goal: Listening with fingers

Goal: Transforming materials

Goal: Ouroboros Spacetime Hyperplane

Goal: *'obscurum per obscurius'*

This final goal is the notoriously disorienting principle of the alchemists-- *explaining the obscure with the more obscure.* This says-- play entails more than a structural description, it is not possible to describe the *first material* without describing to the point of freezing/killing it. Only by thus describing-freezing again and again will its many possible configurations be revealed as being irreducible to any given configuration space (magic circle), always structured by *events* which break out of this space, transformations, an infinite number of which determine the conditions of every instant. There are

some obscurities, secrets, which *cannot be named*, only *played*. These are the Ideas, or *activities*.

It was with intentionally obfuscating conceptual tactics such as these that the historical proto-scientist's 'external' empiricism of transforming physical materials was seeded with an 'internal' empiricism of self-destabilizing Ideas-- a magical-scientific transformation of conceptual materials, whereby the inner concept is allowed to become an objective 'outside-in'-- with shifting meanings, applications, based on context, situation, learning -- and the inner and outer and self and other are not distinguishable from one another, here there is no 'edge' between the self and the world that cannot be zoomed into infinitely, the zoom itself a kind of active-transformative dissolve.

And it was thus, spinning from the endlessly generative creative momentum of this alchemical disorientation and self-world dissolve, that was born the proud heritage of western scientific modernity (gradually and in bursts -- as *trajectory* and *event*). *Chymistry* emerges directly-- physics, standing on Newton's alchemical green lyon, the 'shoulders of giants'-- number's occult power is shown be unfathomable in its accuracy and inexhaustibility, these ethics inherited from the numerological magic of Qabbalah and other *secret* hermetic practices. Mathematical-logic develops more or less in tandem, from the metaphysics of Leibniz' monads, and his binary system iterated through Boole's computational dyads (booleans), through Babbage's analog computer and Ada Lovelace's early software, and history moves on and on, in this vein.

These are the 'early days of videogames' insofar as we are prepared to acknowledge the reality of videogames' quantic boolean *materiality* which is all-too-often considered immaterial.

Indeed, with modern progress, the edge between inner and outer materials loses the zoomable-plasticity that once defined it and these concepts are firmly split into two, a split which has been called 'the bifurcation of nature'[13], into *art* and *science*, *opinion* and *fact*, *subject* and *object*. And following this split, the powers of number gradually no longer rely on the

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[13] Alfred North Whitehead, *Adventures of Ideas*, etc.

inner *living* concept, rather appearing to operate on their own, *objectively* (publicly verifiable), external/partial things to be analyzed rather than Whole things to be lived.

And today, it's not so different-- there's Arts education and STEM education, and it's not thought to be awkward that these two exist as fully discretized things in segregated vacuums, so proud are each of the traditions of their own values, so *unwilling* to let themselves dissolve into the other.

But it is not as if we ever lost this potential for *dissolve*-- we only turned our attentions away, and thanks to the *productivity* we've found number to be capable of when used as mechanism, we *stopped seeking the catalysts/ intensifiers*. But we've not lost the potential to dissolve-- indeed we are constantly dissolving, to greater or lesser degrees, being IN the world, WITH other things-- it is first a matter of recognizing this, and then-- the potential to intensify the freeplay of the connectedness of all things, "the labyrinth of the continuum" is at hand. And it all begins with our *grain*, ground zero, the first material, 'early days of videogames', which may reach yet further into the past (infinitely?).

This grain is-- *the combination/assemblage of at least 2 things.*

Not with one, but with 2-- active numerology as Idea begins here, in concept and function/material both.

3.

The alchemists put it thus: *"One book opens another"*

This is the core mechanic of *Hypertext*-- connectivity-- and what more do videogames actually add to this concept, but *speed* ? All of this content is the same at some level, as information-flow. A videogame is a fast drifting-vibrating book which takes the geometrical mechanic of e.g. Spinoza's *Ethics* and *automates* a reading-path through it, repeating passages, linking to others, flowing down lines, bifurcations, etc., meanwhile being made *sensible* through its inputs-outputs, which further modulate/transform the automatic-reading paths being followed.

These input-transformations are not new either-- a book is an object that you're expected to *play,* to *move through*, if you want to *get* it. You don't just call function get(*x*) by, e.g. *picking* or *holding* it (clicking, pressing A). The real hermeneutic (meaning-digging) *get*(*x*) is a recursive (ouroboros) function, feedback, the player internalizing the space and being contained by the space at the same time-- 'getting' meaning here is 'turned on', or *entered into*, opened up, *becoming receptive*, in and out becoming the same.

Architecturally, a book is a virtual space-- it's held as an actual/material thing, but this is mostly incidental-- while the paper of the book, or the structure of the pdf is relatively fixed in spacetime, our reading allows the virtual-conceptual flows to open and tunnel into Ideas of other books (of *any and all* other things), and correspondingly, the book as a *thing* is traveled through as a *space* by tracing paths across & between its information structures, the *line* which reads from left to right, up to down.

The *walking line* is what allows a *thing* to be played as a *space*. All objects are spaces, composed of parts walking lines more or less quickly. Traveling freely along these *lines*, the reader's path is a drifting line of attention, drawn from pupil to *point* on page, which is different from the book's own consistent left-to-right, up-to-down info-sequence-- the reader drifts-- the eyes and the memory function as the legs and neighborhood of the psychogeographer, moving forward in the text, backward, repeating, jumping around, moving to another neighborhood, etc. Again, these 'walks' have been *imposed* as reading-mechanics for some time, in the *Ethics* and any number of other choose-your-own-adventures.

By choosing our *adventure of Ideas* in this way, a "book" and its neighborhoods function as microcosmos if we allow it to, a synecdoche, a *part* standing in for a whole, for *so much* more-- for information structures or 'played objects' in general-- a game object, a picture object, a *music object*. Reading is a way of playing, which has its game-aspects, its musical-aspects. Playing a game is a kind of reading, as is playing music. The particulars are all just a matter of *what is being read, and how*, and it need not be mentioned that oftentimes our eyes aren't even involved, which the tactile braille system, the conceptual turing tape-head and the haptic feedback of videogames can all attest to.

“One book opens another”-- sometimes it’s a quotation, an appropriation, sometimes an inline citation, sometimes a footnote, sometimes an image which recalls an unnamed memory (cloud)-- desires, chasing goals, being carried away by whims, forging memories, forgetting. All of this tangled web describing a dynamic constellation of Ones forming and dissolving, connecting, retracting, drifting about on these alchemical ‘planes of correspondence’ which pair *like with like.*

Analogy operates on a principle of *loose/fluid isomorphism*, or *harmony*, which is musical in character, the 1:1 isomorphism being the equivalent of the unison harmony, 2:1 being octave, 3:1 being fifth, and on and on, up the integer harmonic series, to infinity. These *harmonies* applied across all scales: as timbre, as tone, as rhythm, as texture, as form, as probabilistic network-weights.

There is *no harmony without 2 parts at least*, and thus is the *grain* of videogames, and thus is the meaning of Aleister Crowley’s sensical-nonsensical equation 0 = 2. Two is the *ground* of everything, Reality, which is all combinatory, assemblage. Ground zero. *Two is the lowest number we can think*. Zero, or *nothing* (the supposed smallest), is qualified only by the One, or *being* that names it by contrast. And thus all information is reducible to 2, or more specifically -- compositions of 1 and 0 which, counted together as One, must be counted as (cardinality) Two.

Considered as harmony, then, *music* likewise does not have essentially to do with sound-- it is manifest in reading just as much, it is the *glue and flow* of reading, that which connects the variously discrete ‘parts’ into a whole. ‘2’ is the beginning of music as it is the beginning of computation and of Ideas. Recalling here Robert Fludd’s broad Pythagorean definition:

“Music is the knowledge by which all worldly things are joined by unbreakable bonds and by which like is related to like by equal proportion in any object. This definition fits *musica mundana*, *humana* and *instrumentalis*”[14]

[14] Three ‘zoom-levels’ of music, having to do with 1) cosmic music 2) soul-music 3) instrumental music

Music, as presented, is a knowledge of *connectedness*, 2s, relations between parts, and the flows that take place between ideas, as transition, as variation-- these are all *musical* in their character, and are most emphatically pre-linguistic, insofar as, to give an obvious example, such connectedness exists even between the stone and the ground it sits upon. Words are *too fixed* in their materiality to account for music's full potentiality, which exists as liquid and vapor more often than as solid (though it solidifies, too, as brand, as album, whatever *object*).

Music-- "the word is derived from moys, which in latin is water, as if it were a science discovered near water, because without the benefit of that humor no song or pleasure of voice subsists" (ibid).

Dissolution mechanics & *Lapis* --"A liquid humour sweetly strikes, with its constant and continual drip, and, by force of perseverance, softens, hollows, breaks, smooths and conquers a firm, solid, rugged and harsh rock."[15]

"One book opens another"

Again-- THIS mechanic, this practical *Truth*, is the pre-computational seed of the *hypertext* idea, as it emerges from the spirit of music. The real meaning of a *link*, which is -- connectivity, continuity, flow -- between parts, 2 being the minimum number of parts in a connective assemblage.

Reading or playing as free movement in spaces which are objects characterized by in/out affects 'opening' in other objects-- books, games, whatever. Reading is just a movement, which is no different from playing any other game-- taking a walk, the eye is drawing out lines, attention tracing paths through shifting (dynamic/ 'opening', closing) possibility spaces, or fluid architectures, on page, screen, sidewalk, minds. The eye draws lines, and concepts move as clouds on these lines The *drift*. Also called 'nomad in the in RHIZOME'[16]-- or actor in the network[17], or musickian in Music

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[15] Giordano Bruno, *What?*

[16] Deleuze & Guattari

[17] Latour

Space[18], or-- player in the N-D model of Game Space. And when attention to process, or *the inner line being walked*, is given priority over attention to object (*thing*), the alchemist's maxim is modified to read *"one game opens another."* A *game* always turns a *thing* into a *process* --a point into a line -- a new dimension is always opened up for play, N++.

As a game, the opening between books is just like a door opening, a threshold-transition of whatever (the *shift*), a connection between two sub-spaces in a greater space whose edges are as yet undetermined, whose edges will forever remain undetermined, because their connective capacity is forever receptive to *more*-- is infinite and constantly evolving in time based on local activity of the player, forever in flux.

As one book opens another, the super-space which eats and *counts* those two books as One is always expanding as the eating continues-- doors are opening, revealing new rooms, an *infinite number of rooms*, rooms growing(x) entirely new rooms at the same time as they open(x) one another--

This super-space counts ALL of the books you have read, ALL of the games, ALL that still remains as active (or latent) *potentiality* in memory.

This is where each of us is at, our own local *sense of possibility* in the total shifting possibility space which is our life, and which is composed of sub-spaces, sub-books, sub-musics, sub-games.

And when we zoom out this far, and we begin to zoom back in on 'books' generally, 'games', generally, the unified literacy or practice of what it means to *play* these -- here it can be said an Absolute zoom-in is necessary that throughout the course of your life, you only read *One book*, you only play *One game*.[19] And this *One* book is composed precisely of ALL the many books that you have ever read and their cross-stitchings, references, recollections, re-contextualizations (if you read 'a' book a second time, it is a new book insofar at is a new 'part' of the manifold One book). The One game, likewise, invites all other games into itself, in which the player

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[18] Harper

[19] Following Brian Eno-- where did he say this same thing about *one piece of music* in life ?

embodies and plays selectively from the mechanical toolboxes of all the many games she's played until now. This is what is called *games literacy*, why 'scoring a goal' makes sense across many ball-games, etc., why 'platformer' & FPS & other videogame mechanics exist as consistent ideas *between* specific games, as play-grammars.

And the book, as game, has its own literacy as well, two-faced: the books *play us* as much as we play them, and they sculpt a 'played space' in our memory which is manifested actively in our bodies and actions, our One book, which is One (Many) for us, and Nothing for everyone else (except insofar as we play in a space with others). And everyone else is the Many, each their own One which is Many-- and though there is a gap between each one of these Ones, they are *withdrawn* from one another, the Many of which each is composed form new Ones which exists between the withdrawn Ones, and this tapestry of Many connecting to Many, zoomed into this personal One game and this One book-- the Many provides the internal connections such that the Ones, though withdrawn, can be considered in some sense as components of a greater One, operating on the same (hyper)plane-- the *text* of the body, of the life-- lines/paths/drifts through memory structures which themselves drift in their relative composition of many patterns dispersed across assemblages of so many disparate materials, where games are becoming books and books are becoming games, all of this, all the time, and all of these, too-- becoming music, The Book. A book which is never complete, and a book that, even in its *oneness*, is NOT an unqualified One, because that one *can't* be fixed. It is first-- pure multiplicity, manifold-- the *Many*.

4.

The alchemical search for and knowledge of the *prima materia,* or First Material, may then be thought of as corresponding macrocosmically to the cultivation of this ever-renewing *everything-material* substance of our *One Game*.

Simultaneously psychic & matter-energetic, the *prima materia* is prior to the subject-object 'bifurcation of nature'-- it is a mystery substance sought after and variously articulated (as water, as mercury, as shit(!), as *whatever*) in experimentations which can be read as kinds of freely-associative

psychomaterial games *becoming* chemistry, one where the drift wanders through fluid 'neighborhoods', zoned relations of catalysing chemical affects and phase transitions-- research in bodily assemblage with natural materials becoming Mind & conceptual tools becoming nature-- these games are Experiments, Process, Ritual, Magic.

The alchemist's material experimentation proceeds magically insofar as nature has yet to be divided into subject and object-- insofar as the alchemist's own Self or *sense of possibility* is projected firmly into the causal transformations playing out between materials and chemist[20], such that it is practiced as *dialogue* between two parts in a greater whole, the alchemists themselves material participants as much as the chemicals, the chemicals psychic participants as much as the alchemist.

In order to prepare for such a severe implication of the Self in the causal transformations of material reality, psychic or spiritual alchemies are practiced in and alongside *& in* the more explicitly material experimentations. This is a practice which is not clearly manifest in immediately visible transformation, but rather in the material transformation of the Idea of the self, the composition of one's mind. The sense in which a *thought* is a material element *of our phenomenal field*, and the activity of transforming this material.

To this end, the historical alchemists developed a *magic(k)al* command of their own memory structures or cognitive materials, with an awareness that this *memory* is the *sense of possibility* itself, the One book, One game, the plane of correspondences whereupon all Ideas and representations (assembled memories) are endowed with an infinite capacity to connect with and affect one another-- and in doing so, to generate a ceaseless flow of novelty.

"The art of memory", as Frances Yeates calls it, was a practice of *internal reading*, of repetition & spatialization, *re-drawing* paths through

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[20] This is how Jung puts it in *Psychology and Alchemy*-- that the alchemist's subjectivity is *projected* into the object. This is like when we read sadness in someone's face, an interpret and *feel* it as such (sometimes correctly, sometimes not). We can choose to read alchemical dissolutions throughout in this way, which will without a doubt be more convincing to the modern reader. But ultimately, it makes little difference whether we choose to read the psychomateriality as projection or ontological dissolve if the experiential *weight/significance* of projection, and *how much is projected*, is really taken seriously.

architectures, with scant differentiation between the supposedly rigid categories of cognitive structures/fixities in conscious attention, unconscious senses or attractions, and natural geographies, the built environment. The belief here is that *everything* is already an architecture built of form-finding materials (dynamic memory contents)-- these are all the *space* of the One game, they are all fluid in some sense, at some time-scale, and they are all individual in some sense, as One and as Many.

Memory exists equally in the 'external' objects of the playspace at large-- the room, the building, the campus, the neighborhood, the city-- as it does in the neural storms of the brain-matter in the skull. A thought has its materiality, and a physical environment has its structurality-mentality. The 'ecology of mind.'

The Alchemists were voracious readers, and the cognitive-visual-spatial maps of memory were used to navigate databases of knowledge, following fluid connective paths and morphologies. Again, alchemical knowledge was never supposed to have been presentable in ONE given book[21], but rather was only accessible in the composition of MANY (and the fuzzy One that is there formed)--

Knowledge was said to have been found *between* the correspondences of different books, where increased dimensionality of the manifold (*many-ness, many folds*) has the potential to lead to increased active, *creative* territory (possibility) in this *between space*-- the more an alchemist has read *between*, the tighter the webs of knowledge become, the more potential for awareness of the unspoken/unspeakable plane of consistency they are all grounded upon (even just *between* 2 books could be enough, as long as the knowledge is properly regarded to be in that pre-propositional space *which always keeps moving*). These between spaces are spoken of in terms of 'planes of

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[21] And indeed, it seems that throughout its history, there was little or *no* agreement as to the physical constitution of those coveted pieces of knowledge, the *prima materia,* the *philosopher's stone* etc. To this lack of consensus we can probably owe much of the modern disregard for alchemy as *merely* a proto or pseudo-science which was in all respects bettered by chemistry's more tightly structured (hierarchical, non-fractal) plane of consistency. In a recent opinion piece by a game designer who was celebrating the possibility of moving *beyond* an alchemy of game design, to achieve a strict *science* of game design, this desire to escape the realm of truth that is necessarily bound up in subject-object dissolve was made most clear. Of course, it need not be said that to focus on the lack of consensus between alchemists is to miss the One which is only possible to define as an ever-shifting manifold described by the multi-dimensionality of all perspectives considered in their turn, each differentiating from the rest and folding back in, creating an understanding that is beyond counting, that must be intuited, a One that is growing (in time) even as it is still.

correspondence', where 2 planes taken together as edges surrounding the gap between, even though they may not yet be speakable as a unit, begin to articulate the unspoken gap, to allow an experimental practice/play to form around this new One, in the form of ritual, tactics, working hypotheses, vernacular rhythms, paths, transformations.

This is the drift that exists *between* books-- but to give solidity to the edges that the *betweens* connect & dissolve in the first place, requires a specific kind of attention to the book, which *chunks* it at ever higher, ever lower levels, all the time, chunking it with its own Universal Top-Down, the *Table of Contents*, for one.

Writing with an outline, juggling this relation of actual part (the sentence, paragraph, section, chapter) to abstracted whole (the outline) is a constant back and forth and a dangerous process of eternal unfolding which is hard to put an end to once it's begun! *Infinite line, finite area...*

The ZOOM which moves from whole to part and vice-versa, which begins when we're seeking out new books, searching online, browsing the library, during the linear drift when we see the edges of books all lined up together-- browsing shelves, link-lists, making connections between titles and our memories of past books and the possibility space that our being *composed* of those books is defined by. Getting a few off the shelf, and now flipping through, drifting, and returning to the front, and *reading the table of contents*. The book opens up, we zoom *in* to level at which the scale of the book is now shown in its drastic zoom-*out* to be composed of constituent parts. We dive into this then, and now there are new zooms which might be actualized only if we are willing to open and dive in to entirely different books, that might be hinted at/suggested by footnotes, strange turns of phrase, explicit references etc-- connections which are implied but which are never beholden to any strict rules of play/reading (the left--> right flow).

The footnotes point to a part of the whole, which sometimes feels like a zoom and sometimes feels like a drift, and indeed these feelings are not so different, a zoom itself is a scaling drift, and a drift (as commonly read) is a *lateral zoom*. You only need to drift around in the streets for a minute to notice that *drifting toward* something is indistinguishable from zooming into it, the scale increasing, the attention more and more fixated on the subject of the zoom.

5.

This essay is composed of zooms and drifts, and ambiguous kinds of motion between, and it is an exploration of these concepts as *ways of playing*, broadly, and *mechanics*, particularly-- explored in virtual tactics, a re-construction of spacetime-structures in history from the perspective of player, in mechanics, in videogame criticism, in non-aural musics (connective glues, harmonies, beginning with 2).

The bulk-source of the conceptual movement that is woven throughout this booklet is based around a dual plane of correspondence existing as a network of threads woven between and through these ‘edge’ markers:

First of all, the *catalyst*, my experiences playing Tom Lieber’s game *Infinite Sketchpad,* tracing paths across spaces with massive shifting differences in zoom, which opened up the world of geometrical bottoms-up and tops-down to me, and parts and wholes, giving intuitive-sensuous relevance to structural elements of metaphysical speculation. I’ll go into this shortly.

Secondly, the cloud around the internal One book, the historical paths I followed that were prepared in advance, ready-made, traced and outlined by two anonymous ‘ludologists’ (?), Hermes Huvanistagg-Ludislagg, and Pseudo-Hermes Huvanistagg-Ludislagg, who themselves likely used pseudonyms in order that their indebtedness to history be given due credit. There is an ‘alternate history of playing’ which these authors have tuned into, and to which I’m forever grateful. It is both a ‘cosmic play’ tradition, as in the work of Karen Pohn (cosmicplay.net), and a ‘computational play’ tradition, which follows the history of logic through the *Principia Mathematica,* but which largely follows Whitehead’s path from here rather than Russell’s. I have only begun to understand some of the specifics of these traditions, and any errors of comprehension are my own. Conversely, any sense of connectedness in this ‘play history’ which I have achieved is wholly indebted to the work of these two Hermes’ and their beautiful (not)One game of many parts, which has been such an inspiration in drawing lines between the human play of games and the non-human/inorganic play of the ‘remainder’ of the world (which, I hope we are soon able to see, is perhaps not such an otherized ‘remainder’ after all).

At this essay's center, there is a desire to open gateways for continued study of the paths traveled by these teachers in hopes of pointing towards a playing-field wherein materials are regarded as Real Beings, and are given free reign to make contact with and transform into one another across an intensive shifting geometry of of N-dimensional lines, planes, hyperplanes (N-D complex connective manifold tissue)-- this is to say, to allow the flows of musics to become games to become sciences to become pictures to become thought-- all of this, to dissolve falsely-concrete categories, to interrogate the connective tissues of experience in spacetime, the *ground* of playing, which is forever to remain a mystery.

Of the authors, the latter-day Hermes' and their origins--

The first of these two, Hermes H-L, is reputed to have been a late Alchemist/ Magi working at the fringes of the Catholic church (the heretical 'edges' where it becomes properly *catholick*[22])-- and her works are thought to have possibly served as a partial inspiration/source of Kant/Schiller's interest in play as an aesthetic-ethical position with the capacity to invoke and materialize a new transcendent politicks for the 19th century, which shows up again and again in Nietzsche's "New Game" etc. It's said that Hermes' own position is likely to have been influenced by the *Lila* concept in Vedanta Hinduism, and its meeting with the various strands of Hermetic/Alchemical philosophy popular at the time-- see Francis Yeates' *Giordano Bruno and the Hermetic Tradition* for a sampling of the Florentine intellectual/magical climate H-L comes from, and its source-footing in Bruno's new theory of the

[22] Assemblage; ckomposed of *many*

infinite universe[23]. Hermes is mentioned tangentially in these speculative works.[24]

The second of the two, Pseudo-Hermess, is rather unknown-- perhaps a play theorist from the 1990s, despite their fashioning their name in the even more old-fashioned reverential-scholastic style[25]. I've never spoken with P.H., but this is how I became acquainted: I was sent a package from a strange address in the Netherlands just last year upon completion of my essay "Soundtracks 2: Methods". In the package I found a strange book of dimensional analyses of playspaces (called *activity situations* throughout, following W. James) considered in light of contemporary philosophy and chaos-pseudo-sciences, and an annotated copy of "A Voyage to Arcturus", my favorite novel (!), littered with "links" to all sorts of nodes in this ludic-realist (panludist) Hermetic Canon that I've since been at work familiarizing myself with. This is the open canon which invites into its fold values that we'd associate with ontological anarchism, the situationists, deleuze-delanda chaos science, badiouian set theory, fractal geometries, etc. into its composition. With this network it surfs, it achieves a certain contemporary relevance that is lacking in in the older work. The saturation of these traditions in what I understand to be common-ish 90s discourse suggests that PHHL was not so 'outside' of cultural conversations, at least in terms of canon-formation. There are just different inside-outs touching one another. The moods of all this pseudo-romantic philosophy are amplified, too, by certain New Age tendencies, *ontotheologies*, connecting back to the Bay Area 60s counter-culture, the birth of the California Ideology, *Whole Earth Catalog*, New Games, etc. It was the earlier Hermes who identified play with movement, but PHHL provided many of the *naturecultural* threads woven throughout, giving a

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[23] At the outset of *Science and the Modern World,* Whitehead situates Giordano Bruno-the-speculative-magician's *death* as the *birth* of modern science: "In his execution there was an unconscious symbolism: for the subsequent tone of scientific thought has contained distrust of his kind of general speculativeness" (ch.1, paragraph2) (Bruno is writing on *magic*, on *the infinity of world*s, classical empiricism be damned).

[24] Though I prefer this Renaissance image with its historical transformations and the old harmonic languages it brings to mind, those of the early masters who are just beginning to discover the psychic potential of modulating (ilinx) centers in polyphonic musics at the same time as point-perspective is modulated in to the pseudo-flat / intensive-dimensional mannerist portrait-collages-- in full disclosure I should mention that given her style and interests, it is just as likely that Hermes was just _____ ... Well, no bother either way.. we've heard all of this before, invented heroes, Hermes Trismegistus-- Ancient Egypt, Hellenistic Alexandria, Renaissance Florence, East Bay-- all tangled, love you all. I don't know, just speculation.. This is for the first teacher, Hermes Huvanistagg-Ludislagg, who is named after the eminent Hermes Trismegistus of Egypt, Thoth, the real historical flows are of secondary importance..

[25] See the medieval Pseudo-Aristotle, Psuedo-Dionysus etc ...

more satisfying modern historical grounding to the ideas, and which, on this ground of movement, erects a play theory which is concerned equally with games proper, and with-- everything else.[26]

Pseudo-Hermes' manuscript was signed with that name, and was titled "Structure and Alchemy in New Games." I took the liberty of copying it all down into my computer, and began to cut it up, 'overdub', loop, re-arrange, etc., using the processes I was familiar with from making music, applied to text, and attempting a kind of commentary-- either this or an original attempt to quote it liberally in writing something new about all of this, after all I was tunneling into *Infinite Sketchpad* at the same time, and was over-eagerly attempting to write an essay on that. So, I would sample, comment, dissolve, recombine, etc, and I kept on with this, following the sources where they went, adding when something felt like it was missing, or when I just had a hankering to add. I kept on moving, and forgot a lot of things, even what I was doing, what the structure of this might be, what it's purpose was in the first place. Just playing around, following lines, drawing lines... And when it came time to take a break, what I found was that I soon was not able to keep track of the differences between Pseudo-Hermes' words and my own-- I have not been adequately trained in the academic style, and have no discipline for keeping my sources in order. Then one day I looked for the original manuscript and was horrified to find it nowhere!-- it must have been lost during the move...

I just kept on going, though, I was enjoying myself finally!-- & what I ended up doing was cutting, re-structuring, re-writing, and zooming in and filling in on and on morphing this work of Pseudo-Hermes according to relevant extensions in light of fractal software and guided throughout by the structure of Hermes' original treatise on the Playing World, which moves from cosmology to ethics to history and pragmatics to mathematics and aesthetics

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[26] The issue of the PHHL's relationship with the *mechanics* of the prematurely individuated Self as Player in the California Ideology is of great import. We've seen these mechanics becoming increasingly instrumentalized, corporatized, disconnected from their surroundings. The effects of this sort of play played without love and the software design that can come of it are manifest in the news of evictions caused in part by the recent Bay Area tech-boom, and the increasing gap between the rich and the poor here and in general. I am not sure what PHHL would have to say about these social problems today, but it is clear that they are composed of the *same histories, materials*, players and games (where the Game of Capital is the head of the snake, eating the Long Tail, *all players*, unfathomably hungry). If there is political value in these sketches, it is a micro-historical materialism (music time-scale) along the lines of the political value of *movement* in music, the politics of improvisation structures, see George Lewis' *Critical Improvisation Studies*.

to speculative ‘design fictions’ and inorganic [u]topias-- all of this with a structural arc that I found very seductive. I took all of the scraps from myself and Pseudo-Hermes and rearranged them according to this structure such that the book you have gotten hold of now has a kind of top-down consistency, loosely considered, a pseudo-ismorphism/fuzzy mapping between Hermes and Pseudo-Hermes, mediated by my own messy hand.

Hermes’ original now functions as a sort of “zoomed out” take on my edits of Pseudo-Hermes’ study, such that whole and parts can be shuffled between quite easily, zooming in and out with little resistance. Of course, the zoomed form always takes on a different appearance when its details are dissolved into its surface-features, and what we are left with here is a series of dogmatic propositions on the nature of the universe which unfolds into what is essentially a hypertext or library-meshwork functioning as a ‘ground’ of this cosmic-image, such that it can be studied both near in detail and from afar. What seems to me to be at stake is the resuscitation of a canon of LIVING thinking that could yet function as a tremendous boon to those who are interested in what it means for us to play, and more: *for our environment to play back*. In some communities outside of games, much of this is old(ish) news, and I’m sure this reads like a freshman essay to the members of those communities (all my fault, not Pseudo-Hermess’! I wish the original hadn’t been destroyed, so that you could read those original words....)-- but no bother-- the *links* in here are the structure, the “book” exists outside of the pages, the beginner’s mood is incidental-- any proper style or professionalism even moreso-- *an accident!* Only playing the text against the sources will do any good, only then will the scaling structures make themselves evident, and the applications of fractal geometry to conceptual movement become clear. To visualize a world like this, it will look little like the fractals we know with their characteristic Ideal Self-Similarities-- it will rather resemble the non-deterministic / chaotic *& FINITE* scaling compositions possible in *Infinite Sketchpad* , with its historical precent in the *fixed picture object*-- which I’ll not delay any further in describing:

6.

It was just over a year ago that I was introduced to this software or game or whatever, called *Infinite Sketchpad*, written by Tom Lieber.[27] If you have

[27] Thank you, Mike Rotondo & Luke Iannini for the introduction, the *gift*!

access to an iPad, I recommend getting ahold of this, and drawing in it, maybe doing so before reading on-- it's been, for me, an invaluable companion for thinking from the *scaling* 'point of view'.

It's very simple, really-- a drawing 'tool' that allows you to freely scale & pan your picture with effectively infinite minimum and maximum bounds. Zoom in and out, drift-- as much as you like! It's freeplay on a fractal 'surface'-- a smooth 'inter-dimensional' plane between 2 and 3 dimensions, complex zones of infinite lines bounded by finite areas. It's a brilliant example of elegant 'transparent' design-- two colors only (off-black, off-white). All touch-- rub to draw, pinch/pull to zoom-- it seems to do exactly what the iPad has always 'wanted' to do. More-- it has felt to me like a new kind of 'paper', something the likes of which will be *required* in the future to prototype any ideas which are composed of sufficiently complex relations between parts and wholes that extend across more than a few orders of magnitude.

I've drawn a lot in *Infinite Sketchpad* throughout the last year. I lost many of my drawings, but some are available to see online at infinitesketches.tumblr.com -- if you are not able to get the software yourself (or *Infinite Doodle*, which is for PC, and works the same geometric idea but with increased zoom-speed, and lacking the touch functionality), I'd suggest exploring these as kind of virtual stand-in for playing. The play is always chunked in two-parts, anyway-- one doing the DRAWING (which you'll miss out on), the other doing the EXPLORING (which you won't)-- this is one of its surprising innovations in the contexts of drawing in general-- how much it allows a fixed object (picture) to be dissolved *in time,* limiting it, in turn, to be necessarily contingent on our scalar *point of view*, in the same way that sculpture and architecture are contingent on spatial POV, and music, contingent on the flow of real time (4D POV?).

This essay was catalyzed by that meeting with *Infinite Sketchpad*. It started out as a simple review of it, was just going to be a blog post, but I think I got *too used* to this form of "infinite line bounded by a finite area", *too used* to the reality of there always being *more space to fill*, and *too used* to all of these available conceptual materials sitting around, piles growing every day, and Hermes to thank for this. Too used to thinking of everything in terms of scale. The game itself a cear source of this conditioning. So I kept filling…

and on and on and on and on and on and on and on...How might we learn *when* to stop working-- to finally be *done* with an image-- when we've been learning to draw in spaces *bounded by no edges*?

"To become what One is, one must *not* know what One is."

This is ostensibly an essay *about* Infinite Sketchpad, a piece of long-form videogame criticism, if you like-- that was how it was conceived, anyway. But obviously it has gotten out of hand with the the integration of PHHLs research, and my time spent in that world-- Now, I think it would be just as well to call it an essay written *in collaboration* with Infinite Sketchpad (amongst others). I have less criticism proper to present than I have conceptual gifts to share, those that I've received from formal-material structure of the software itself and the rather dramatic *swerve* it caused when it knocked into my life/interests.

Many sessions of play ended abruptly with a new thought, or connection, and I practiced *continuing* such played flows initiated by the game *outside of the software itself*-- writing scaling music, taking scalar walks, scaling piles of new books at the library. This is the sign of an exciting game! Forget a game that is self-contained, that is *separate* from the world. Who needs a game like that? I am not trying to escape life, but rather trying to *intensify*. Intensities, like heat, don't stop at boundaries, at edges, but keeps moving, dissipating across all materials in the environment, fusing them together *as environment, intensive space*. I am not interested in an environment that doesn't bleed like this.

Everything is a collaboration, of course (an assemblage of players)-- *there is no such thing as a single-player game*. Chris Crawford was right about this.

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One or Many Goals

Leading up to the point when I started writing & compiling-- while I was playing, composing, game-making, etc., I had been choosing sides in an (imaginary?) debate which was defined & judged along these lines: *Process* rather than *object*, *playing* rather than *games*, *improvisation* rather than *composition*, *intuition* rather than *rationality*, *continuity* rather than *quantization ~~~ water* rather than *architecture ~~~*

Pragmatic Dogmas! This is the ideological baggage I've come to the table with, and I'd like to be forthright about it.. My hope with holding tight to these judgments (a hope which, I understand, might seem *too explicitly goal-oriented* for some 'design relativists' out there ("goals are for games! not for life!"))-- had been to develop an understanding of *playspaces* that did not require structurally encoded explicit goals in order to consider them as games, such that *music improvisations* with their often cloudy/liquid/dynamic Many goals could be welcomed into the understanding of game-form with open arms.

Needless to say, the desire to promote these values was amplified not only by responses to *Proteus*, which stirred up some 'what is a game' controversy when the season was right for that-- but indeed it is an attempt to demonstrate my own taste for freeplay in general, the kinds of games that I like to play, and those that I would like to play more of.

It's obvious that right now there is far too strict a divide between those things that we call videogames, and other instances of interactive software, those things that are VERY similar to games, *using the same 'language'*, but which we call something else-- apps, toys, creative tools, instruments, etc. Our culture today-- we are all becoming computer folks in some capacity, we are living with software everyday, whether that's facebook/twitter/email or

battlefield/fifa/spelunky. And in between-- techno-creative work-- using Adobe's CS line of software, Ableton Live, programming languages, web development, etc etc.. Is it not time to take all of this seriously? This is to say, to count it all as a material *kind* (software) that can establish consistency between apparently diverse sub-categories-- to thus allow for more of the desire paths and connectivities in general that will allow for more difference, for more diversity? That is -- to *play* it all?

Some folks think that it must be very difficult to design structures that encourage freeplay like a sandbox, that these are 'exceptions' to the ludic rule-- but I don't think this is at all true. Witness those creative 'tools'-- Photoshop, Ableton Live, internet browsers, operating systems, and any number of other sorts of software *that non-gamer computing-folks are using all the time*[28]. Indeed, these 'everyday software' examples, playspaces played by non-gamers, are particularly RICH playspaces, built of functions of functions of functions, many unit instances are as a good as a game in their own right (ohhh SIMPLER….), and we could really go down a rabbit-hole if we wanted to attempt outlines of the 'ludic grammars' at play in any number of spaces like these, all of which already exist outside of 'games culture'.. but this is a quite involved formal-political project for another time.

The point for now is that these *freeplay software-spaces do exist* (infinite sketchpad being a perfect of such a space)-- with this essay I wanted to "zoom in" on ONE of them, and see what I could learn, see *where* it could take me (outside of itself).

The "what is a game?" question cannot be dealt with properly when its radical positions have not yet been adequately given voice.

Von Neumann's game theory, with its optimal-quantized descriptions of ways of playing, represents one such radical pole, the *quantitative* extreme, where a game certainly *does* require explicitly-stated goals and measurable outcomes such that it can be categorized by asking "what kind of game?" This position, though not all too often dug into analytically by the general community of game-makers, is well-represented by the (dwindling) game-conservatives who basically insist on its definition as the definition of a

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[28] Even those games popular with non-gamers: *The Sims, Minecraft, Katamari Damacy* ~~ which are characterized precisely by their capacity for freeplay, wiggly lines of action in shifting possibility spaces.

game, and by traditionalists in general who, rightfully, are keen to learn what they can learn from such a strong position. I am curious to study this manner of thinking more myself, and believe there is a lot to learn from it. But this *cannot* be the only 'canon' of formal games theory, to be disputed only by anti-formal 'zinester' thinking.

It is the opposite pole which is really missing-- the Ideal game theory in contrast to the Normal game theory (see Deleuze's image from *The Logic of Sense*, excerpted in the Shifting Possibility Spaces section), which is beginning to make itself heard, but which is too often silencing itself even as it does so, by *desiring* to be a game. The opposite pole, which regards even a *feather* or a *rock* as a game, starts from this idea of a 'freeplay space', and allows this the broadest possible meaning it could have-- *a working hypothesis* that *everything plays*, that we can *play everything*. These have served as mantras from time to time, and a distinct *way* of playing seems to have emerged from embodying the hypothesis, which will be gradually outlined throughout the essay you are now reading. The position of *ludic realism*, the belief that *everything is playing*, that everything is a player, suggests a potential ground for radical novelty, such that the question of GAMES might be played out on a cross-cultural material-aesthetic field which has *more room to dance* than that field of 'videogames' which has been conditioned more or less entirely by the hyper-obsessive tastes of gamer culture (which has given its gifts to the medium, to be sure).

In any case, broad cultural considerations aside, this *way* of proceeding, *freeplay,* when its 'game is on', has felt like a meaningful personal project in the present climate of rational-optimization & its persistent desire to adhere to game-theoretical standards (as the most *useful,* naturally!) and to *measure* the outcomes of all situations-- to render everything computable. The SF climate has us turned on to data, to information, structure, to objects, to the *beauty* of all this, even-- but too often with the side effect of blinding our eyes to the eternal transience of the situation itself-- of the flow of *time* itself, where time is NOT a 1-dimensional axis of spacetime, but an N-dimensional intensity which is always relative to its point of view and situated context.

Freeplay can function like a virus of critical Romanticism, a grounding in the chaotic *presence* of the situation, a means of forgetting the atomic logics of computation altogether & returning to that old-fashioned *transcendental*

play-theory inherited from Hermes, Schiller, et. al that conflates ethics and aesthetics, counting them as one (this count famously formalized in its Oneness by Wittgenstein-- "aesthetics and ethics are one").

There has been a real joy in allowing myself at least the freedom to to zoom out of the 'time-line' of THE NOW (*presence's* dark twin), to be directed by an expanded sense of the "retro", where the past becomes more and more alien in proportion to our distance and ignorance, where there's a sensation of real vitality in the 'misreading' that looks back centuries and millenia rather than decades or years, that plays *in history as zoomspace*-- moving around freely, undisturbed, ignorant, at peace and at war in this relatively isolated zone, prior to the emergence of our our post-WWII culture, and its still-life tendrils we've been left with-- hiding here, in a malleable history, while the cultural memories and reproductions of the last half-century are dominating so much of our cultural playing field & attentions today. It's old-fashioned, but it feels like an adventure, at least-- it certainly has tremendous affective potential, and given this potential it is worth considering whether, as is often repeated at different points in history-- the most promising way of looking forward is going to be a bastardized looking backward, new misreadings, forgetting videogames, forgetting electronics even, even as we live with them and make them-- where the past is projected into the future, the most distant things once again becoming the most present.

The Retro- Pseudo-Romantic (Pseudo-at the edge of Hermetic) position, loosely considered, has been a way of holding out for an Ethics (aesthetics) of play in videogames (mediated computer play, music) and *playspaces more broadly,* an ethics that is Spinozistic in its pre-Nietzschean problematic of Joy mapped to *goodness* -- which asks "how should we play?", acknowledging that existence precedes essence, that non-human existence precedes the human -- we are holding out for an ethics (*way, virtuality*) which applies to flows of all matter-energy, an ethics from a belief in the *creative* materiality of all things, the constantly re-arranging eddies and currents of a ceaseless flow of *novelty*. Creative non-equilibrium in all things-- *even videogames!*

Now, at the same time as all of this, in a strange parallel motion, I have felt simultaneously pulled toward what seems at first like a radically different perspective, one which might require looking further back and further forward simultaneously-- the problem of coming to terms with the reality of

structural composition, or *objectivity,* or FIXEDNESS in videogames. That videogames are *old media*. Scientific certainty in the fact that videogames are structural, that they are *programmed*, requiring a realistic acceptance of metrics, architecture, programming-logics, in our assessment of what games are and what they can be. A belief that in some important sense the history of videogames, given their *material* constitution, *must* be read as a tendril of the history of logic, looking back to Leibnizian monads and Boolean dyads, and again the 19th century with Babbage & Lovelace's computing machines and softwares, with Frege's formal logic, onto Russell & Whitehead mapping math onto logic, and Gödel using these materials to construct the infamous strange loop proving that a formal system cannot be both consistent and complete. Not that I am prepared for formal explorations of any of these 'early videogames', but I can see some of what preparation might be needed-- after all, anyone could recognize the *ground*, the apple falling toward it, even prior to Newton's formulation of its mechanics and its existence as attractor of *force* on a material plane of consistency with governs also heavens-- as below, so above.

Number, logic.. Somehow this feels at times like the 'opposite' of the romantic position mentioned first-- but such a distinction is illusory, as the alchemists have always been well aware--

Andi McClure:
What is the difference between a feeling and a number?

Ian Snyder:
A feeling minus a number.

I have known and loved these metrics before. Meters, modes… in music, number is architecture, and yet we all know that music is something besides number (namely *affective vibration, FEELING*).

Maybe because of my *love* of videogames, and my *love* of structural aspects in music, both resolutely *rational objects* in their material constitution, I knew I needed not be afraid of over-consistency even as I required to incorporate an acceptance *and celebration* of rationality, of objects, of structure into my play process.

This incorporation has always been tangled up in my relation to programming, which is riddled with desire and incompleteness. *Maybe if I learn to love structure, I will learn to love programming,* which I'm always sort of *wanting* to love, given the new thoughts it allows us to think, if we can only stay focused on One goal for a while... This is a project to embark on-- to *prepare* for the task of programming (ha! is it lazy to prepare for a task with another task?), but coming from the pre-computational past, from that conceptual delta where philosophy and math and computation were all still a Unit, counted as one-- or better yet, to return to an even more distant Pythagorean past where music and earth and cosmology are likewise counted as One with these others, where quantity, number, describes a realm of enchantment and eternal mystery, *not* of certainty, of dry utility.

This is it-- I wanted to learn to love structure, number, quantity, *but I did not want to give structure any of the sanctified respect that it seems to ask for 'on its own modern-positivistic terms'* that judge quantification as more *reasonable* than other ways of doing business, that judges a quantifiable *reason* as superior to intuition/non-reason in general.

This is to say: I did not want to reduce experience to structure, to count everything away, to deal with abstract models at the expense of actualities, something that feels like a real threat in today's STEM-obsessed learning environment. I wanted to continue to learn by *listening* to other players (which could now be numbers or qualities, whatever), by playing my own goals, rather than by doing what a game asked of me. Learning has always seemed quicker, more fun, more *efficient*, in this way. I have rarely been interested in the prescribed 'end-points' of games (though have been delighted by them on occasion), and despite the well-meaning points Ian Bogost has made on the topic, I do not believe that "taking a game for what it is" requires submitting to it, following its rules[29]. Rather, taking a game as what it is as *truth* is simply *playing with its vibrational-material reality*, and allowing Ideas to generate freely, constituting new changes of activity in accordance with new ideas-- this is the flow of the line, the point of attraction, and what we follow is up to us. I have rarely been interested in flipping boolean switches that count away all experience up to that point. I

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[29] from http://www.bogost.com/blog/in_defense_of_competition.shtml -- "Kanaga's call for a "utopian state of play" embraces all possibilities for play save the one that takes a particular game at face value, that asks what it would be like to imagine that that game discovered a pure truth worthy of taking *for what it is*."

want to learn to love structure, but I do not want to become an instrument for merely furthering a game's desires (or-- a game-maker's desires), I want to compose a Unit desiring-machine *along-with* the game, to desire its desires, to *listen* to it, to count us *both* as one, in my own pre-rational conscious field, as *pure experience*, quality, etc., and to take something away from this experience, in much the same way I would take away something from a 'becoming one' in a good conversation or improvisation or game with friends-- as a real, transformative *event.*

The question then (though I did not formulate it like this at the time):

Q: Is it possible to arrive from the romantic-irrational-hermetic position at the 'opposite', structural/classical, point of view (which is able to put the concepts *object, game, reason* to use) by traveling around a loop, as it were, by moving *through the irrational*, intensifying irrationality in such a way that it meets up, once again, with what we call rational?

Playing with *Infinite Sketchpad* alongside the parallel paths of bookish investigation has gradually convinced me that *a playing of the irrational can indeed lead to the rational*, insofar as the rational is immanent in the irrational itself, and vice-versa. This in the sense of *rational* and *irrational NUMBER*-- the composition of the Labyrinth of the Continuum. And in the sense of *experience.* That there is a *reason* of feeling, and a *feeling* of reason (all of these binaries will be dissolved in such a way). All of our understanding and experience of irrationality is composed of some sort of re-appropriated rationality; all of our understanding and experience of rationality is itself composed of some sort of re-appropriated irrationality. This holds as regards *number* and as regards *experience* both, which are to be counted as one.

This returns, then, to some of the numerological aesthetics of 90s-- dig into Nick Land & the Cybernetic Cultures Research Group, which pre-dates, pre-values Hyperdub[30] and all the great objects that's brought into the world. Modern Qaballah, Tarot, numerology, pseudo-diviniation-- to find *irrational meanings* in number which are *active* in our lives. Music naturally provides a strong ground for this image.

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[30] Kode9 being a member of CCRG

Our retromania looks even further back then as it closes in on a reinterpretation of Pythagorean numerologies, cosmic music-mathesis-- a theory (tool) which, when buggered up a bit to account for *new music*, might allow for a fluid Idea defined by an integrated whole of quantity and quality simultaneously, where everything is considered mathematical insofar as music is mathematical, and this insofar as *everything is considered music*.

But everything is music only insofar as it is allowed that *all music is played.* The *mathematical* ramifications of this re-orientation, whatever they may be, must be allowed to follow-- the modern image of cosmic music will naturally look very different from Pythagoras', not least of which in its preference for 'elastic', smooth, stretchy musical values in contrast to the Greek's regime of stacking integers.

Pythagoras' theory was a theory of the Being of integer-harmonies, of which there were a few, but not many (concerned largely with the first 8-ish integer overtones). And western music theories seem to have proceeded along these lines for most of history, concerned with the finite (set of tones) at the expense of the infinite (material-structural contingencies in play, *capacities* to affect/be affected). Ironically, this has happened precisely because the theories have considered their *objects* themselves to be *infinite*. The assumption is that a 'middle C' *IS* what it is, a Being. That it is not a temporary stop in a musical flow, a plateau, half-cadence of a Becoming, always contingent & defined relatively by its context. That there is something eternal in the object itself. But this is all an illusion-- in fact, every music object is a becoming, insofar as, if it is music, it must be played. And while an old-fashioned theory of modulations can begin to account for this fact, its analytical method is too discretized still, insofar as it assumes the music-composition process to end with "the musical work" as opposed to the ending with *musical play*. Improvisation demands a new music theory of variability, a project with beginnings in Adam Harper's *Infinite Music* and elsewhere[31] which defines music in such a way that it is no longer distinguishable from games (dissolving eventually into *played* sciences, philosophy, pictures, whatever).. Improv spaces, *ways* of playing-- directing our attentions to these flows, to the generative differences which are eternally present in all musical

[31] George Lewis *Critical Improvisation Studies*, etc

materials. This has the promise of forming the (squishy) ground of a new Pythagoreanism if we are willing to let it (softly) crystallize as such.

There is an "infinite possibility" feeling/meme that we've all felt or run into at some point. There is a real sense in this, I think, and it is an interesting concept to think about. However, it *must be admitted* that this type of *infinity* is not to found by searching in boundlessness, but rather *in finitude* itself -- in the constitution of a (finite) possibility space. *Infinite line, finite area*. Both as structure and as play. Infinite possibility has to do with time-flows and bounded conditioning, rather than with spatial organization and constraint. A commitment to interrogating the experience of *played time* is thus a necessary defining aspect of this project, to find that "eternal return" of the present moment which is simultaneously finite and infinite, and indeed to identify in the specious present which approaches *duration*=0, the givenness of the infinite which we are submerged, which is both infinitely small and infinitely large at the same time. Ahoy!

Thus the *finite point* of the present, and its material constitution, is that which the the *infinite* is immanent to, in Idea as much as in deed.

To get right at the fundamental tension that we're dealing with here, then-- to start with the two apparent poles of *structure* and *alchemy*, classic & romantic, poles which eat each other up as soon as they are counted as such-- Consider a distinction between the inner experience of two apparently different kinds of creativity, what we'll call: a) Ideal-Structural Creativity and b) Material-Sensuous Creativity

a) When we are taught music in school, we're typically taught structurally, almost as if music were a *linguistic* discipline. We learn about notes and scales, counting, chords, voice-leadings, modulations-- if we're 'advanced' we learn about tone rows, sets, transformations, granular liquidations and other complex musical geometries. We *count* all of this. We are equipped thus with the tools for composing *temporal architectures* from raw, abstract, quantitative data. Much of this can proceed with little or no interest in the sonic or haptic (touched) aspect of music itself. Even the time dimension is measured in such a way that it loses the *sense* of time's flow, mapping time as a 1-dimension horizontal line in *extensive space* (the score, the mp3 sequence, etc)-- that is, counting time as space. The process of composing in

this way, where time is mapped onto space, and where spacetime is regarded as *merely* 4-dimensional-- this is a clear example of systemic creativity.

b) Some folks insist that this is the only way music can be properly done, but we would be unwise to ignore the obvious fact that it is indeed possible to play a great deal of music without any linguistic intervention. Many (most?) musicians are self-taught, and the wholly embodied sensuous aspect of this self-teaching can hardly be denied by anyone. Indeed, a great part of the experience of playing any music (even that built on linguistic substrates) is a *feel* which cannot be adequately abstracted into language. This attention to music which is primarily sensuous, having to do with the *sound* and *touch* of playing the music, its *presence*-- this is an example of *material-sensuous creativity.*

(a ⟷ b) The divide, naturally, isn't a strict one. It is relational, with the concepts material creativity and structural creativity each very *hungry* and necessarily swallowing one another up. All haptic connections are going to take place in a structural situation. Musical *materials* (instruments) are themselves structural-- finite countable objects with particular formal-harmonic organizations and haptic resistances defining their sound space, in pitch, shape, timbre, etc. And so, even playing these structures without *thinking* them is in a sense structural, insofar as we participate in the material's structure, which can be thought of as akin to the 'memory architectures' of the alchemits. Likewise, musical structure is necessarily *always material*. The structure is always itself materialized in the form of a vibrational actual agent, tiny in scale though this may be-- whether ink on a page, lights on the screen, code in the machine, (neuro-cloud) activity in the mind, words (linguistic sounds) in the ear canal, etc..or *memories* of all this, which recall the (altered) cognition of the sensuous as soon as they are triggered.

This space of structural and material creativities looping back onto/into one another, the strange looping hermetic dissolve of Mind and Matter, is the 'solution' to the irrational-rational confrontation at the heart of the present essay.

It is because this particular *material* -- videogames/software -- is one in which the *problem* of this tangled structural-material relation seems more

difficult to avoid than it has ever been. The problem of structure in videogames has been addressed at length in game studies, but that of materiality less so. It is difficult to *forget* the kinds of computable structure we learn once we've learned it, to treat the computer at all times, not as deterministic machine to do our bidding (even if there is necessarily some truth to this in the engineering process, and the *reading* of computation), but rather-- to accept it as *exactly what it is*, as a Real Material thing, *pre-structural* (because we have not yet counted it)-- to *listen* to it as Real, and to enter into dialogue with it. *Material creativity* is concerned solely with this kind of listening.

The following, then-- and we're finally approaching *another beginning*-- is an inquiry into the natural *materiality* of videogames and the generative implications of dynamic materials as active agents in our experience of play.

By 'materiality' I mean: the haptic/tactile, energetic-vibrational structures of a videogame's *physical reality*-- videogames as (thermodynamic) *actual occasions/events/non-equilibrium processes*, as (musical) *intensive* structures of time, as (liquid-architectural) weighted/harmonic spacetime-morphological drifts--

In short: videogames as fully Real *shifting possibility spaces*.

A *music theory* of videogame time-structures which accounts for shifting relations-- gravities, modulations, rates of change-- *played transformations* of their material form and our sense of that form, one which assumes of musicality neither sound nor meter nor notations in the conventional sense, but rather-- only vibration/haptics of any sort, material structure, and play-- a musical formalism of *rational measure* and *irrational movement* in shifting time-structures (possibility spaces).

The goal is a long way off still-- as it is, I don't think we've yet fully developed our taste for the *vibrational reality* of games. Such a taste is a necessary precondition of any formal theory that might one day account for a radical *immanence* in the play experience-- innovations in music theory have always followed rather than preceded vibrational novelties. Structure in *actuality* is always vibrational (actuality itself is nothing *but* vibration), so vibration must be regarded as primary, with any number of structural theories

following suit, just as the vibrational-material aspect of music must has always been the precondition of structural music theories..

There is one *vibrational* formalism that AAA videogames have really made some beautiful headway into, and that is *visual-haptic feedback*, what Steve Swink has written about in *Game Feel*. Response time, relation of input to output, there's very very beautiful stuff being done here. Otherwise, the scene can be disappointing...

The more common formalisms seem to be born of 'collective' Gamer culture tastes in this way: culture erects its own informal metrics to protect the objects of its desires, and theorists (game-creators and/or scholars mostly sharing those desires) count these concepts into groups of rules and regulations, which are then regarded as time-tested pragmatics/wisdom at best, rational utilitarianism or dogma at worst. This is all fine and natural, but for those of us who don't share these 'core' desires and have very little interest in the existing formalisms which are born of a Will to Compete/ Strategize (as opposed to a wholly irrational Will to Touch/Play), we feel lost, for there is no apparent means of dropping out of this situation aside from (a) leaving it behind and ignoring the culture altogther, or (b) adopting a critical stance from within the culture.

Because there is still hope, we have tended our energies toward (b) and we have accordingly seen the birth of reactionary concepts *notgames*, *anti-games*, and all of these other essentially antagonistic positions-- *war*, this is powerful and important but the limitation of such antagonistic creativity must be acknowledged up front: these concepts remain embedded in game culture itself, even as they attempt to poison it-- these positions tragically lose their individual strength, their Will to Play, in proportion to their reliance on Gamer Culture as the *source*, or *cause*, of their struggle, as the negative condition of their being itself.

I still care very much for games, but I believe the most successful war is destined to be one that isn't waged in violence at all: I hope to suggest an escape-vector, a means of dropping out so that we might 'poison' the culture from a distance, *with love* rather than with hate-- a *line of flight* that is opened up by means of a radical 'zooming-out' which can be interpreted in two ways: (1) that our idea of videogames (for an Idea is much more useful than a

definition) expands to eat up all of its surrounding territory until it includes all computable-vibrational substance, or (2) that our idea of what 'videogames are' becomes smaller and smaller and more confused, reduced from a conceptual *whole* to a simple *part*, ‘a thing with an explicit goal to pursue’, becoming blurrier and more *pointless* in the distance until the hard lines drawn around that category disappear entirely, and we’ve done away with games altogether and we're left only with a pervasive sense of precisely that fundamental drive that we've been after all along: the *sense* of that goal, the *desire*, *playfulness*-- infiltrating/interrupting all of material reality, *play* subsisting *in everything*. Form and material is finally identified as playing out on a wholly *natural* continuum, structures contained in a generic Whole with *all* local/agentic orientation/vibration in non-equilibrium systems (not least of all *ourselves*), wherever there is motion, novelty, creativity-- it is precisely these locally played non-equilibrium systems that we will call *playspaces* throughout.[32]

I have called this an *alchemical* study of videogames. This word might have been replaced with *pseudo-scientific, proto-scientific,* or otherwise, but *alchemy* comes bundled with the key historical connotations which I have touched on already, and the implications of which should not be ignored (besides, *pseudo-science* was first used to describe alchemy!). Maybe it is enough to simply consider the thesis of Francis Yeates' book "Giordano Bruno and the Hermetic Tradition" which hypothesizes a causal influence of Hermetic (alchemical) doctrine in the intellectual transformations that led to the (scientific) Copernican Revolution, and the explosion of the integrated (scientific-artistic) imagination in the Renaissance which followed. *Alchemy is a useful tool for artistic creation in a way that science is not*[33]-- this is because in alchemy we are allowed, at all moments, to acknowledge the immanent reality of our own being as a *causal* agent in the situation, irreducible as such to 'publicly verifiable' (objective, always quantitative) information. This causal influence on material reality is something very near

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[32] Playspaces are non-equilibrium systems. There is a strong tradition of scholarly naturalism to enter into here, one that proceeds from the science of thermodynamics and the Chaos/complexity sciences (*far-from equilibrium dynamics*) of the latter 20th century (and today), that which has heretofore been concerned with the *global* structures of spacetime (as opposed to the *local* phenomenology of experience), as best represented by the fixed-dimensional graphs of phase-spaces that we will consider more as we progress.

[33] Or rather, when science becomes useful in art (which is *does*!), it is because it has become hermetic.

the *essence* of aesthetic experience itself.[34] Alchemy is a *radical empiricism* that refuses to make the subject-object split before embarking on the process of science. Making games, there can be a temptation to see everything in terms of quantity, in terms of the Universal system, from the top-down-- but to lose touch with the *causal* aspects of our becoming *with* the space, of the quality of bottom-up creative practice itself, would be to sustain a tremendous loss.

By all means, scientific approaches to games should *not* be dispensed with, quantitative manipulations *cannot* be ignored-- but these should never be divorced from the aesthetic experience of being in the world, exchanging with the materials around us our mutual affects, input and out. All *scientific* approaches to games, dealing as they do with *play* as a key variable, will necessarily require their alchemical aspect, which attempts to integrate *immediate experience* into the models described, and it is only once this *played* aspect of the *science* of games is recognized that it can truly begin as such. We are at a point where scientific progress cannot be counted on for game design in the sense that we are accustomed to understanding science as such. We must create a connection with our materials, to experience them as a true extension of ourselves, in order that our own sense of possibility can augment that of the machine, and vice versa-- to freely distribute the mind around/across the materials of the environment. That this thought might be an absurdity in the more rationalistic strains of scientific discourse only highlights the importance of an Alchemical approach which scorns the anti-spiritual materialism of modern science even while it freely uses its resources and tools as fully real materials. I recently read a piece by a game designer who was celebrating the current state of formalism for transforming game design "from an alchemy into a science"-- needless to say, this is exactly the opposite approach of that which we are in need of right now, and indeed it is the opposite of what is actually the case. Balancing our attentions to quantity and quality will be one of the most difficult things we have ever done.

I apologize for any pretension I show throughout in trying to piece together the implications of the sciences in examining the material reality of aesthetic experience-- Again, I only hope that the conceptual paths might prove to be

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[34] *Essential* insofar as causality always implies transformation, the Deleuzian critique of essences non-withstanding, this essence is *playing* it is not fixed. Timothy Morton's thesis in *Realist Magic* "aesthetics is causality" touches on something very similar, I believe.

fruitful starting points (ultimately to be discarded!) from which others more qualified than myself might depart.

It is, in any case, imperative that our image of videogame history refashion itself not only into a broader *game history* but also into a *play history*, which looks to the world of *everything that is played*, no matter how immense this task may appear at first-- nature, culture, arts, computation, whatever. It seems clear that videogames are constipated right now, despite all the excitement around them. Part of this is due to monetary pressure, fine, but I believe just as much, if not more, is due to our mental image of game history and the trajectories into the future it projects in our mind. The image of "the *Citizen Kane* of games" is depressing. We are not at some point in game history that is analogous to pre-1940s Hollywood-- our historical imagination is much too small. It would be far more accurate to compare our position to the state of painting in the late 19th century before abstraction (*music*) took hold -- or perhaps even more accurately, to the "waning of the middle ages" (Huizinga's other hit), the dawn of the Renaissance, when the Hermetic magicks gave way to techniques that transformed our understanding of our place in the cosmos (via Copernicus), when perspective was formalized in painting, when science and art, perhaps for the last time, were properly joined in a harmonious unison, not even as two parts of a whole, but simply-- a Whole (of Many-Folds).

The essay is divided into four sections.

Part I introduces the cosmological point-of-view from which the world is considered as a bottom-up process of creative movement in constant flux. Speculative history. This is considered optimistically, pluro-monistically, *alchemically*, the world as substance which is simultaneously spiritual and material, subject-object dissolved. Ludic Realism, the belief that *everything is play*, gives rise to the concepts of *smooth ethics*, 'how to play well' (in quantity & quality), and the model of *shifting possibility spaces*, used to describe videogames, music, reality-- the basic structure of local play as causality and gap/between-filler of metaphysical entanglement.

Part II is, first, the survey of classical fractal spaces in whose context we are able to place *Infinite Sketchpad* and its family, introducing the historicity of natural fractals and their relation to *magick* as natural causality; second, a

retrospective fractal analyses of scaling properties of the picture-object throughout history, and its abstracted dimensional-shifting 'pictorial mechanics' as inherited from Wassily Kandinsky and Paul Klee's Bauhaus-era visual music theories.

Part III is a collection of design fictions, or virtual playspaces-- conceptual assemblages, appropriating any and all other structural paradigms for implementation in imaginary new fractal spaces, speculating as to some of the possible futures of videogame design paradigms, and a treatment of reading itself as a game.

Part IV (missing) concludes the essay by attempting to read the structures of Part III's design fictions in the context of the whole essay and as loosely parallel to structures and structural work being done in fields of culture more broadly: in consciousness studies, cognitive models, in philosophy, architecture, music theory. The goal of this section is to reiterate the broad historical perspective that the study of playspaces is by no means exclusive to the specialized disciplines of game designers/players, that *everyone* is a game designer and player, that all of thought is a playspace in a playspace, that there are real things that all of these disciplines have to learn from one another, that players have perhaps the most to teach anyone, that nothing has ever been understood that hasn't been played --

Perhaps the best way to read this essay is not as a unit-flow, but as a kind of table of stitched together hyperlinks forming a cloud around an important topic, which may yet be still unthinkable or unnameable-- at the very least, difficult to pin down. Very few ideas in here I can claim as my own, and naturally my understanding of even those concepts that I bring up from the work of others, is highly limited -- the process of reading this is bound to be far more valuable if it's used as a jumping off point into further research and practice. For this reason, just like Bernie DeKoven has said about playing any game, you *must* be comfortable *stopping reading* at any point, and indeed, the more you stop (in order to *play* something else), I suspect the more you will gain, provided *some* flows from the reading remain (*do* follow links!)-- because you will have shifted the ground of the possibility space that you are playing, and from this a phase shift and you will have found yourself in a an entirely new space to play-- there is no boundary that does not dissolve, and

there is no dissolution which does not, even as objects die, give birth to new forms of life.

'The only principle that will not impede progress?' *Play everything!*

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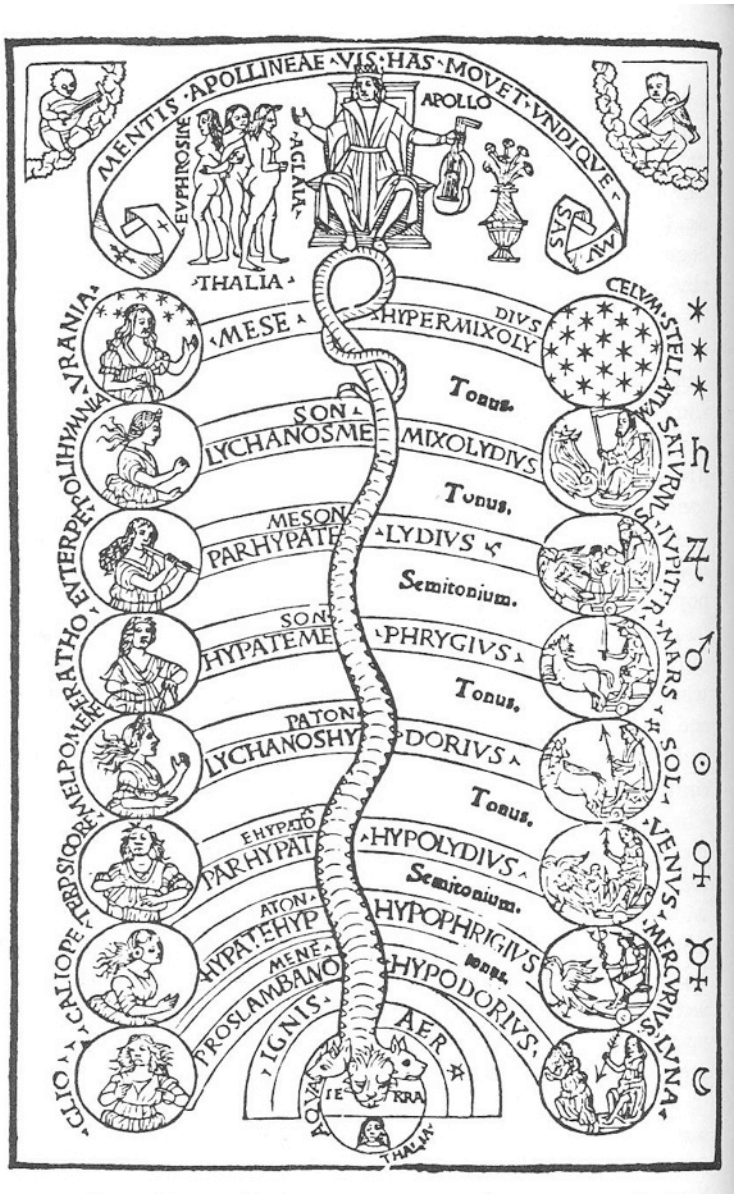
PART I:
Weltanschauung



The Sacred Sermon

from the *Corpus Hermetica*

by Hermes Trismegistus

1. The Glory of all things is ∅, ∅ head and ∅ ly Nature. Source of the things that are is ∅, who is both Mind and Nature,—yea Matter, the Wisdom that reveals all things. Source too is ∅ head—yea Nature, Energy, Necessity, and End, and Making-new-again. Darkness that knew no bounds was in Abyss, and Water too and subtle Breath intelligent; these were by Power of ∅ in Chaos. Then Holy Light arose; and there collected 'neath Dry Space from out Moist Essence Elements; and all the ∅ s do separate things out from fecund Nature.

2. All things being undefined and yet unwrought, the light things were assigned unto the height, the heavy ones had their foundations laid down underneath the moist part of Dry Space, the universal things being bounded off by Fire and hanged in Breath to keep them up. And Heaven was seen in seven circles; its ∅ s were visible in forms of stars with all their signs; while Nature had her members made articulate together with the ∅ s in her. And Heaven's periphery revolved in cyclic course, borne on by Breath of ∅.

3. And every ∅ by his own proper power brought forth what was appointed him. Thus there arose four-footed beasts, and creeping things, and those that in the water dwell, and things with wings, and everything that beareth seed, and grass, and shoot of every flower, all having in themselves seed of again-

becoming. And they selected out the births of men for gnosis of the works of ∅ and attestation of the energy of Nature; the multitude of men for lordship over all beneath the Heaven and gnosis of its blessings, that they might increase in increasing and multiply in multitude, and every soul infleshed by revolution of the Cyclic ∅ s, for observation of the marvels of the Heaven and Heaven's ∅ s' revolution, and of the works of ∅ and energy of Nature, for tokens of its blessings, for gnosis of the power of ∅, that they might know the fates that follow good and evil deeds and learn the cunning work of all good arts.

4. Thus there begins their living and their growing wise, according to the fate appointed by the revolution of the Cyclic ∅ s, and their deceasing for this end. And there shall be memorials mighty of their handiworks upon the earth, leaving dim trace behind when cycles are renewed. For every birth of flesh ensouled, and of the fruit of seed, and every handiwork, though it decay, shall of necessity renew itself, both by the renovation of the ∅ s and by the turning-round of Nature's rhythmic wheel. For that whereas the ∅ head is Nature's ever-making-new-again the cosmic mixture, Nature herself is also co-established in that ∅ head.

And thus begins our alternate history of playing--

1. Play-Oriented Ontology

With the beginning of the world itself, with the Big Bang or the big Bounce -- *Birth*, all the Creative heat of the cosmic egg, the embryo, shattering, yolk expanding, frying, 'the first four seconds'--atomic fission/fusion, individuation of the elements-- scaling morphologies, becomings, the emergence of galaxies, of nebulae of solar systems-- and little worlds, their planets, our own planet-- Earth's genesis, with its lava flows shaping terrain, freezing into geological strata, melting, mud, earth's primordial soup and the first Life -- evolution of forms of life proceeding, along with continuing FLOWS of water/glaciers/clouds, CYCLES of seasons, DRIFTS of continents -- GROWTH of plants, animals. And humans, too-- rituals, music, culture, concepts, LOVE --

Chaos-Cosmos

The story of the world is the story of one vast game. The story is the world-line through the space of 'all possible worlds', which is One, which is Many, which is Infinite, which is -- *finite.*

It is the job of ludology to describe the relationship between the infinite and the finite. And indeed, questions as to the conditioning of our worlds, the *finitude* of the cosmic game-- its *edges*, its *boundaries, walls*-- these have been contested for millenia, & these are questions that the ludologists are still asking:

1) Is this game, the world, a *thing*? (an Egg, a Cosmos)

2) Or is this game, the world, a *way of playing*? (an embryology, a Chaos)

The former position has been upheld by the Pythagoreans, the number-mystics, those who believe in the unity of God, that God is One even while the One is Many. This idea is further elaborated by Parmenides, by Plato, and has a history which extends far beyond these early Greeks, too. The modern secular realization of this idea can find voice in the "Simulation Hypothesis", that the universe is merely One vast algorithm. And algorithms being functions, and functions being things-- the universe, the game, is a *thing*. That even *ways of playing* can be things. We are *in* the world, in the One, *but the One is not in us*.

The latter position, alternately, is upheld by our predecessors, the Play-Oriented Ontologists-- the Flux ontologists, who believe that even while we are in the world, the world is also in us-- that the inner experience of *change* we are forever subject to is not merely incidental to the predetermined course of the One, but is indeed illuminates the irreducibly *manifold* (Many-folded) character of the One itself, that is multiple. Every moment is not on a straight trajectory, but is a branching many which is undetermined-- Every moment is in *flux*, and this experience of flux is primary, is an experience of the same cosmic creativity which broke or bounced or fried the first egg.

"Time is a child playing at draughts, time is a child's kingdom. The child now arranging his pebbles, and now scattering them." -- Heraclitus writes this, he is the *pre*incarnation of the Hermetic magi, the father of *Flux*.

The play aspect isn't explicitly developed further in Heraclitus' philosophy, aside from the once-used image of the child playing, but it can be traced in its many conceptual stand-ins: *motion, creation, becoming, transformation*. These are the mechanics of the world-game, as it were, the infinitely precise character of the world-line. There is the Game, which tends toward permanence, and there is Play, which tends toward flux, and the two cannot be separated.

In any study of play, of nature, THESE are the concepts to be on a sharp lookout for. As little credit as we may find given to *play* throughout history, these more 'objective' criteria have been with natural philosophy from the very beginning, and when we embrace them, we find *play* has had a role in the history of Ideas from its earliest formulations up to now. The river-player

is Heraclitus' most famous image: "Into the same river we descend twice and do not descend, for the name of the river remains the same, but the water has flowed on."

These are the kinds of *objects* we're dealing with, when we deal with play-- *things* whose names stay the same even as their material constitution flows on.

Play is considered as *becoming* as opposed to *being*. *All becoming considered as play.* Play is motion. If there is an imbalanced focus on motion & *flux* in these pages at the expense of objects and permanence, it is because I believe it is the pole of the object-flux continuum which is most wanting of further support and elucidation, formal ludology to this point having been mostly *object-oriented*, as it were. We would like to conceive a kind play-flux which cannot be mechanized as *object*. Once a process is counted as computation, it is a function, and a function is an object. Process, once named, is counted away as object. How might we manipulate conceptual objects to formulate a play-process which is irreducible to being a *thing*?

Lila

Karen Pohn's labyrinthine-hypertextual dissertation on play & depth/ unconscious psychology (found at cosmicplay.net) is an essential connective node for those who are keen to explore a network of sources which consider play as irreducible process. Via Pohn, and via many others-- we'll find that irreducible motion-currents have again and again played key roles in the imagery of religious traditions, which have unsurprisingly been some of the quickest cultural groups to identify the *becoming* of the world with that of the soul (inner experience of play)-- the unity of God and the individual, Brahman and Atman, Playspace & Player.

It is interesting to note that Pohn does not discuss the canon of game studies or ludology in any capacity-- & game studies/ludology likewise does not seem to describe the canon she has uncovered in any capacity. Game & Player do not touch. This vast chasm that exists between these two different 'schools' of play-thing-studies, which might be characterized simplistically as rationalists vs. spiritualists, or as Gamers vs. Players-- bridging this gap may

prove to be one of the most meaningful, and *useful* projects to pursue by those who are studying games in a broad sense today.

For our purposes, we'll say the 'religious feeling' is that which senses an intimate relationship between an individual's experience and the reality of the cosmos as a whole. "As above, so below, as below, so above"-- the movements of the cosmos *are* the movements of the soul, macrocosm and microcosm. We are in the One, and the One is in us. It is from this perspective that the continuity of *process* as it unfolds in our own play experience can be understood analogously to that of cosmic process-- how the universe itself unfolds in *its* experience.

The Vedanta Hindu concept *Lila*, meaning "sport" or "play", is used to signify this play-aspect of the universe -- it describes the flux of reality, the constant becoming of the chaos-cosmos, as the World Game, "the creative sport of the divine Absolute."[35] Across all scales of space and time, everything that is a fact, everything that is prior to facts. All is flux -- one is flux. Everything plays!

We find a similar elaboration of the play idea in some of the Medieval Christian mystics. Meister Eckhart writes: "There has always been this play going on in the Father-nature. From the Father's embrace of his own nature there comes this eternal playing of the Son. This play was played eternally before all creatures. The playing of the twain is the Holy Ghost in whom they both disport themselves and he disports himself in both. Sport and players are the same... not that this joy first began with the creation, no, for it was from eternity... *The creation is the same sport out of himself."*

Sport and player are the same! Elsewhere, Eckhart describes this relationship from a different vantage point: "The eye with which I see God is the same eye with which God sees me." Pre-echo of Novalis' Ideal Eye-- "to be the I of one's I" -- the Self, or I, *player*, is caught in a strange loop, sensed as both Eye and I, which we will explore in greater depth later.

"You say: the REAL, the world as it is. But it IS not, it *becomes*! It moves, it changes! It doesn't wait for us to change…. It is more mobile than you can imagine. You are getting closer to this reality when you say it 'presents

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[35] from "Lila", Ananda Coomaraswamy

itself'; that means that it is not there, existing as an object. The world, the real is not an object. It is a process."-- John Cage writes this, and 20th century Fluxus follows Cage following flux.

The *object* is illusion -- *simulation* -- in Vedanta, the illusion is called *Maya*. The egg is illusion, there is only the embryo-- the becoming-organism.[36] It is up for grabs whether *Maya* positively figures into a ludic realist worldview-- "The vicious separation of the flux from the permanence leads to the concept of an entirely static God, with eminent reality, in relation to an entirely fluent world, with deficient reality. But if the opposites, static and fluent, have once been so explained as separately to characterize diverse actualities, the interplay between the thing which is static and the things which are fluent involves contradiction at every step in its explanation. Such philosophies must include the notion of 'illusion' as a fundamental principle-- the notion of '*mere* appearance.' This is the final platonic problem."[37]

But we are not interested in *mere* appearance in our playing. Rather we are seeking a belief in *Real* appearance, with full knowledge that *this* Real is not the only such *one*--

"It is as true to say that God is permanent and the World fluent, as that the World is permanent and God is fluent. It is as true to say that the World is immanent in God, as that God is immanent in the World. It is as true to say that God transcends the World, as that the World transcends God. It is as true to say that God creates the World, as that the World creates God. In God's nature, permanence is primordial and flux is derivative from the World. In the World's nature, flux is primordial and permanence is derivative from God."[38]

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[36] There are two schools of thought regarding the nature of Lila: the illusionists and the realists. For the illusionist school "the absolute being is not in truth a person, nor in reality has any world been created, nor have any sports been performed. The teaching of Lila is provisional only, expressing how unenlightened persons must understand the course of the apparent world so long as they remain under the influence of the deluding cosmic ignorance, *Maya*, that creates the appearance of a world that is false." There is a greater Reality, which we can never know-- God is *above* the world, the world is a *dream* of God. For the realist school, "the creative process is real and the creation is not an obscuration but a manifestation of the nature of God." (from Norvin Hein, "Lila"). God, nature, is *immanent* to the world-- God is *in* the materials. Parmenides believes the world is a sphere and that motion is an illusion. The Egg, or *thing-object*, is primary. Maya-simulation develops in parallel.

[37] *A Key to Whitehead's Process and Reality,* text by A.N.W., edited by Donald W. Sherburne, p. 183

[38] ibid, pp. 185-6

Ludic Realism

"All the world's a game" --

Ludic realism is a common-sensical position that is given expression in such idioms, but it does not seem to have been given much serious attention in games cultures, one space where perhaps the implications might prove most *structurally* useful.

"In framing a philosophic scheme, each metaphysical notion should be given the widest extension of which it seems capable. It is only in this way that the true adjustment of ideas can be explored."[39]

Ludic Realism is a speculative hypothesis. It is non-falsifiable, and thus unscientific. It describes not a particular empirical observation, but rather a *way of observing* (a way of playing). The closest it comes to falsifiable empiricism is evident in some of the work being done in the chaos/ complexity sciences-- those that aim to prove the existence of an irreducible probabilistic/*possiblistic* ground of everything, from the lowest orders, quantum phenomena, to the highest-- ecosystem, evolution, our own conscious experience, societal flows, etc. The biosphere 'games' and possibility spaces Stuart Kauffman discusses in *Investigations* and elsewhere are good examples of one such potentially falsifiable ludic realism.

The speculative ludic realist hypothesis is at least as old as the Vedanta *Lila*, but is newly relevant in light of the increasingly gamified techno-culture of today, with its proud instrumentalization of the play impulse, which tends to use a player's excess energy to amplify the urge toward *productivity* at all costs.

Ludic realism opposes gamification on principle as *unrealistic,* even as *nonsensical*. The world is *already* a game. There is no gamification, because everything is *already* playable (whether *we* are the ones playing, or not). The structures of gamification are not concerned with making games out of non-games, but rather with re-orienting *control structures* in materials (games), in persons, to achieve specific ends-- gamification is a dispersed move in the

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[39] Alfred North Whitehead, *Adventures of Ideas*, p. 305

much broader game of social control-cybernetics, which treats persons as statistics, and *designs* with these numbers-- with monetary goals at worst (see Facebook games), to 'social progress' type goals, which may not be much better, despite their good intentions.

The proponents of gamification believe that we game designers have something to *teach* players-- that it is a *specific* thing, and that it can be taught by incentivizing the correct approach-- either positively, with *carrots*, or negatively, with *sticks*. But even in education, it is widely acknowledged that this is an overly-reductive and thus ineffective approach. Cramming *thought-things* into the brain, filling the mind-vessel with content... Education propelled on by an intrinsic drive is always preferable, and cultivating such drive demands a highly individual approach to education which *cannot* be generalized without negative effect.

The world of computer games is in a position of power (however slight) wherefrom it might take up the reigns in a *resistance* project, a cultivation of synthetic playspaces which are explicitly oriented against gamification-- that are concerned with *many* goals and not *one,* that are concerned with mystery and possibility instead of certainty/solutions-- of all things, ironically, *anti-gamification* seems to be a possible *proud* destiny of videogames! By becoming intimate with the materiality of the medium, and its status as a *playing thing* even prior to any gamifying efforts-- in this way, perhaps videogames could still play a positive role in culture at large-- to not only create non-gamified playspaces (of which there are already an infinite number), but to do so at the birth-site of gamification itself, to prove that this material is concerned not with incentives and control, but rather with *spatiality*, *actuality, possibility, vibration*.

In a sense-- the goal of videogames could be to draw out/shade in a continuum that stretches from particular instances of computation to the natural order at large. To explore the flux (play) of nature itself in the computational microcosm. To set out to discover-- *in what sense is a computer a part of God or Nature? Of our OWN nature? Of the ecosystem? etc etc..*

Everything is a player.

So, this is ludic realism, and adopting it should require no severe metaphysical leap, but only a reorientation of observational and descriptive preferences. Indeed, though the ludic realist position is probably best exemplified by the cosmic grandeur and feeling of the Vedanta *Lila* and Eckhart's strange loop, it is not by necessity tied to any strict religious ideals. It is tied, first, to cosmologies of process, of *flux*, of *becoming*. As such, if we are so inclined, we may yet be able to strip away the religious feeling, and develop a more strict structural understanding of play as, simply, *material transformation*. To do so is not to dismiss religious feeling, but rather to create a flat Realistic playing field where *all* are welcome, where there are not words like God that are confusing to those who have not *loved* an Idea called upon by that word. The debate between religion and non-religion simply isn't of any consequence as regards the *reality of playing*.

Materialism & Inorganic Creativity

It is no secret that the world is a process of ceaseless change-- look around you. Even those things which seem most permanent have been constructed by billions of years of conditionally shifting morphologies, historical processes, inorganic and organic evolutions-- there is nothing immune to the continuous-transformational flows of reality.

Though he is by no means the first or only one to explore this idea, Manuel DeLanda's writings constitute an exciting body of work concerned with describing cosmic historical flux-worms in such a way as to confidently do away with whatever faith we have in the rigidity of material thing. The gold atom (Au) is a classic example of a thing that has its *invariant* parts, *constant* values that stay the same even as the atom vibrates wildly in space and time. Indeed, the entire periodic table of the elements is populated by these beings that appear to be *fixed* in important respects that differentiate each from its neighbors-- in its number of protons, electrons, its atomic weight, etc. But these *constants*, too, are products of historical flux, of the incredible heat at the beginning of the universe and its elemental-forming capacities. Indeed, the flux of reality *does* produce objects, but it is not to be assumed that such objects are eternal. Rather, each is a world-line, which exists in time as well as space-- and the endpoints of the line are *frayed,* they are *becoming*-- the thing is not yet a thing. It is becoming a thing at its inception, it becoming something else at its demise..

Everything is playing (the atom vibrating according to heat, its quantum insides vibrating wildly in all cases), but sometimes play *freezes* processes into objects or things, which appear to have 'stopped playing.' Play gives way to *habit*. This *freeze*, naturally, is contingent on the object's circumstance. A block of ice remains frozen in an adequately cold climate. If it is brought into the heat, it will melt.

Even apparently fixed objects objects are merely *frozen* parts of a whole which could just as well be liquid or gaseous (as heat intensifies).

Material transformation is the *grain* of reality, and from here there is really only one leap needed to become a ludic realist, vast as the chasm it crosses may seem-- the belief *that this transformation itself is play*.

It is an absurd leap-- but is this really to its disadvantage?

DeLanda's 'inorganic creativity' allows us a perspective from which we can consider even heat-flows and atomic compositions to be *creative*. "The wisdom of the rocks." This draws out a continuum of creativity that reaches back from our own personal experience of novelty/flow connecting all the way back to the creative material transformations of the distant past which have conditioned our reality in such a way that we've been able to live it. In a very real sense, these ancient rocks, the stars-- these are our *ancestors* if we follow our family tree deep enough back into the dark pre-human/pre-animal expanses of time. And just as our human ancestors' creativity has conditioned the world in such a way that our own creativity is dependent on the grounds they have built, so too our creativity is tied into the creativity of the landscape, the wisdom of the rocks, all of these players, playing at radically different timescales, but *creating* the playspace that is our reality, acting as co-conspirators in our projects, collaborators-- even if we do not make the 'everything plays' leap, there is no doubt that the world around us is in collaboration with us, and that our play could not exist without its *transformation*.

And *transformation is play.* Maybe the ludic realist position is not even such a huge departure from Huizinga's famous thesis in *Homo Ludens* ("Man, the Player") that it is the play aspect in human culture that has been its driving

transformative force throughout history. If something transforms us, does it transform us alone? Or are there other historical-material processes which are likewise affected and which must on accord of this be considered *part of the playspace?*

With *ludic realisms*, we merely continue to trace this transformation process back from The Game through its flows in pre-cultural nature (crossing a natureculture line that is very fuzzy indeed), back to the ecosystem, biosphere, species *Gaia Ludens, Cosmos Ludens.*

The first significant conceptual point of departure required for embracing the ludic realist position is thus: *play is a process that is NOT exclusive to humans*.

And this is obvious even to our common sense! It is probably universally accepted that dogs and dolphins play, and play *well*, and play *with us*, and we know this about other animals, too. In our studies of *playing,* how could we ignore our knowledge of dogs and their games of fetch, of tussle, hop, run? Dolphins and their surfing, their air-ring dances and kelp-jewelry charades? There is a wisdom in these games even more relatable to us than the 'wisdom of the rocks', and yet in many approaches to game studies, it seems that any serious *valuation* of non-human animal (and non-animal) play is systematically avoided.

When we study games as being limited to those things which humans have created, do we really think this will teach us much in the grand scheme?

Do we *really* want to theorize games and play in such a way that does not allow animals to play games? That does not allow us to *learn from these games, from these animals?*

It's clear that a *humanist* theory of play (one in which 'man is the measure of play') is necessarily going to be filled with massive conceptual holes, is going to suffer from ignoring *so many* REAL situations and players, considering them to be outside of its domain of study.[40] Marginalized *players* are ignored.

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[40] This is the same kind of bogus obsessive scholarship that happens all the time in school when 'music' is considered to be that notated-stuff which was written in Europe between 1400 and 1950.

We must avoid this situation at all costs-- invite MORE players-- more humans, more non-human animals, more life, more... how far can we run back up the evolutionary-philogenetic tree with this *ludic realist* hypothesis? Animals? Plants? Viruses? Chemical reactions? Thermodynamic flows? The environment? The earth itself?[41]

The global/cosmic community of players *pans* and it *scales*, in space and time. We pan, and we *play with,* we scale, and we find that we are composed of smaller players (muscles, skin) just as we compose larger players (teams, socieities). We are not of the same size as all other players. Indeed, many (most) players are *vastly* smaller or vastly larger than ourselves, in space and time. Timothy Morton's concept of *hyperobjects* describes sublime players which have a Reality beyond all possibility of total human comprehension. Zoom-out, out, out, out. Global warming is one of his most pressing examples of a *hyper[player]* we have to contend with at the moment, a game which composes a *part* of the Gaia-organism hyperplayer-- and this game is not fun.

Players compose other players which compose other players, zooming in and zooming out both. This is the *scaling* aspect of ludic realism, its 'mathematical sublime' aspect, and its most explicit connection to the 'scaling playspaces' which are the theme of this whole essay.

Its panning aspect, on the other hand, is our *everyday*-- the description of *our scalebound play community*-- and it is here that we are more likely to arrive at an intuitive understanding of the position, which might then be augmented by hyper-studies..

Invite MORE players-- more humans, more non-human animals, more life, more...

Animal Play & The Ludic Limit

First step toward a properly *Realistic* theory of games--

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[41] In 1785, 'father of geology' James Hutton anticipates the Gaia Hypothesis, "I consider the Earth to be a superorganism and its proper study is by physiology." via James Lovelock's *Gaia: A New Look at Life on Earth*

We *must* accept that animals *most certainly do play*, and we must build all our future understanding of games in such a way as to accommodate this fact..

Playing with dogs and cats, *just playing,* not even analyzing, this teaches a lot -- and already, if we think of playspaces in terms of being playable by human *and* non-human animals both, we've begun to embrace the ludic realist position. We've all done this, I hope! No longer are games strictly rationalistic, no longer is Thought valued over Touch

Human animals are not the only playing animals. Human play Values are not the only play values.

Now, the paradigmatic scientific perspective, in most all cases, will attempt to draw a line between play and non-play somewhere in the animal kingdom. "Play has to do with *biological life*, surely, and more-- it must have to do with *free moving* life exhibited by the higher forms of consciousness, that autonomous agency and free movement which describes the lives of animals but not of plants"… something to that effect, so it's said.

In hopes of avoiding any bizarre cosmological implications of a theory of play, we might still hope to draw the line between play and nonplay somewhere easily identifiable, and we might say "sure, *some* animals play, but not *all* animals-- for instance, worms don't play, do they? spiders?"

Looking to Gordon Burghardt's *The Genesis of Animal Play* to see where he has chosen to draw the line-- Burghardt welcomes many new players into our game that had perhaps not yet been considered as such by our common sense-- lobsters, spiders, turtles-- players, all of them! Will we see this pattern of 'welcoming new players into our game' repeating itself as scholarship proceeds? I do hope so.

But Burghart does not so far as to say that *all animals play*-- he breaks off before arriving at this thesis--

Beyond the edge of the Burghardt's behavioral magic circle, in the void of nonplay, play is replaced by physiological determinism, and behavior is seen to be no longer playful-- we say "science has identified highly predictable /

reproducible mechanism in these structures, thus they could not *possibly* be playing, because playing is spontaneous and unpredictable."

When a young calf, captive at the meat factory, sticks its tongue out and twirls it around madly, this is *not* considered play-- it is "stereotypy", automatic behavior, strict physiological response to environmental conditions-- in this case, it is a tragic situation in which the tongue's movement is a pitiful recourse to what free movement is possible in the excessive restriction of bodily captivity. When a person is kidnapped, and they are trying to escape a car, and they jump out, and roll against the pavement, getting all cut up, and they twist and contort their bodies in an unconscious attempt to alleviate pain-- surely this kind of horrible stimulus-responsiveness can't be play!

This is all quite common-sensical. There are times we feel ourselves to be playing, and times we feel ourselves to be doing something else..

We can ask of ourselves, as with our projections onto animals: *when we are angry, when we are crying-- are we playing? When we are at war--are we playing? Would suicide be a kind of play?* To claim that suicide, a self-willed kill screen, is play in any sense seems absurd, and yet finding the play-aspect in *all* things is what the ludic realist position demands (and what Huizinga paved the way for very well). Play has its tragic aspect, too. Play is by no means always safe and joyful. It is by no means *good*. It is prior to and 'beyond' good & evil. Play is creation and destruction, and there is no clean line between the two. One only need review Richard Schechner's concept of "dark play", dancing toes teetering along the edge of a cliff, to be reminded of this.

The "Playful" Idea

We've seem to run up against this limit, this apparent fact, that--

Only certain actions are playful.

The reasoning here is that the aforementioned actions, by the calf, by the kidnapped, by the suicidal-- simply *are not playful*. These are respectively automatic behaviors and survival tactics, as it were.

We could begin identifying other less dramatic examples of non-playful behavior, too, like *habitual* actions. Morning routines, evening routines, becoming-algorithm, *paths* we're used to taking, that we follow unconsciously even when we mean to go someplace else..

And fair enough! The reflexive, the habitual, etc present us with a serious impasse, considered from our own point of view.

The anti-ludic realist might say-- *if the action is not playful in some important sense, it should not be considered as play.*

This is fine, but in limiting play in this way, we make the error of beginning to confuse what is *playing* with what is *playful,* where there is the temptation to define the former by the latter. *Playing is being playful*.

But what does this even mean, to *be playful?* An openness, receptiveness? As in classic improvisation ethics, an "always saying YES"? There is no question that these questions should be asked. And answered! again, and again. An *ethics* of playing. *Creating values*-- an interrogation of the *joy* of playfulness-- this could be the grounds of a rich introspective project, a phenomenology of playing.

But there are *plenty* of games we know of that can be *played* without being played playfully. In fact, games themselves *always* open up possibilities for automatic behavior that are habitual, non-playful, i.e. obsessive email/twitter/facebook checking, cow-clicking... these human behaviors are maybe not so different from the stereotypy of the cow.

Leveling up in RPGs is similar-- it is not playful, for the most part. But are we, then, to cut RPGs from list of what's a game and what's a player on account of this? I have played countless games *that I did not want to play*, and so I was not fully present during the game, and I was by no means *playful*. But other players were. Should these games be compromised in their status as games because of my uninspired participation?

Many videogames require very little playfulness. And yet we all say that we 'play' them. Should we drop that word as the word for *what we do* with

games, just as some folks think we should drop the word ‘game’ as a descriptor for non-goal oriented spaces?

This is really the crux of the matter, that we are torn between what seem like opposed alternatives, two possible meanings of ‘play’--

The first-- a pragmatic materialist-formalist image of PLAY/GAME like Salen & Zimmerman’s “free movement within a more rigid structure”, which can be used to describe e.g. ‘the play of a swinging rope’, ‘the play of a gear system in the car’ &c. The flexibility of this meaning quickly brings us all the way to the edges of the chaos-cosmos, and places our thinking *firmly* in the *ludic realist* camp, as far as a propositions go.

The second-- an Ideal image of *game,* of *playing*, one that emerges from *playfulness,* even while any attempt to define playing in terms of playfulness will necessarily be based, to some degree, on our own experiences of playfulness as an *Ideal* in our life. *Maya* returns, the ideal, the illusion -- *what is the nature of playing*? *What is it like to play? What does it feel like to be playful?* Ultimately, we can only ever describe playfulness as it relates to our own playfulness, which itself may be difficult to pin down. The feeling of *playfulness* is ‘internal’ in an important sense, in that it has to do with our own totally personal experience of what the *experience* of playing has been like throughout our life, our One Game, and our constructed image of ideal playfulness. We all have values in the ways that we play, and we erect Ideals, mental vortex-*flows*, in accordance with these values, and in the paradigmatic sense, we might say that playing-as-playfulness is nothing more that the correspondence of behavior to these constructed values.

Can we not embrace both meanings?

This way, we might benefit from the clear utility of the material-structural meaning of *movement/transformation* which can be freely applied to *all* things, material bodies and our own conscious-affective flows. And at the same time, we might hold tight to the Ideal meaning of *playful flow*, which is a self-reflective definition, thus not very useful as a tool of publicly verifiable science, but immensely useful in play itself, in the creation of values.

We'll have a material image and an ideal image; an objective image and a subjective image; a thinking image and a feeling image.. A *play* which is always in two parts, and never one without the other.

In the next chapter, we will explore these two 'value sets' and ways in which they might be fuzzily mapped onto one another. Having split the *play* concept into two seemingly 'opposed' poles (objective motion and subjective playfulness, the first quantifiable, the second strictly *felt*), we should by no means resign ourselves to the position that these poles are irreconcilably different from one another.

Assemblage: Playing-With

The *glue*, as it were, that holds these value-spaces together is the material process of *composition* or *assemblage* itself. Our *body* entering into play *with* another body, and constituting a material-ideal playspace in this way.

Play necessarily follows from this first maneuver, the assemblage of at least 2 parts. After all, we can never play alone, wholly privately. Even a game of solitaire plays *with* cards and *with* rules. Even a sleepy daydream, a game of imaginative drift is being played *with* vibrational grey-material 'content'--*memory*--itself provided by our experience of and *with* the external world.

All play is *multiplayer*, *playing-with.* There could be no playing without our body, and there could be no body without the world. Even if we begin from *playful-playing*, we *must* acknowledge that this playful *motion* itself happens essentially WITH an OTHER.

The *ludic realism* we've considered is by no means a passive, wholly objective science. It interrupts the situations it observes, *joyfully* (hopefully), and this is indeed the most *realistic* aspect of it.

It is all well to observe animals, plants, heat flows, to watch them *play* on their own terms-- but this is classic behaviorism, and has not yet fully entered into the *game* of the Realism which is here proposed.

In *When Species Meet*, Donna Haraway responds to an essay of Jacques Derrida's in which he describes an encounter with his cat. She believes he could go further in his pursuit of *playing-with*:

"The question of [animal] suffering led Derrida to the virtue of pity, and that is not a small thing. But how much more promise is in the questions, Can animals play? Or work? And even, can I learn to play with *this* cat? Can I, the philosopher, respond to an invitation or recognize one when it is offered? What is work and play, and not just pity, open up when the possibility of mutual response, without names, is taken seriously as an everyday practice available to philosophy and to science? What if a useable word for this is *joy*? And what if the question of how animals engage *one another's* gaze *responsively* takes center stage for people? What if that is the query, *once its protocol is properly established*, whose form changes everything? My guess is that Derrida he man in the bathroom grasped all this, but Derrida the philosopher had no idea how to practice this sort of curiosity that morning with his highly visual cat."

So, we too might leap past the playing-playful impasse and continue our exploration of ludic realism, by entering into mutually responsive natural studies (playings) of playing forms of life-- by allowing our own playfulness to operate with the objective *playing* of the other, to listen, learn, and none of this 'on our own.'

Here there is the supposed danger of anthropomorphism to contend with-- are we not just *projecting* our own playfulness onto the animal? Sure, the cat is batting the string, dolphin is blowing rings, but is this really *play* in the sense that we mean it, when *we are feeling playful*?

In a recent interview[42], Laurel Braitman responds with insight to this critique:

"Anthropomorphism-- the ascription of human characteristics to other animals-- has been problematized for a long time, certainly within the behavioral sciences. I think it's high time we do away with the taboo. Some of the people doing the most interesting work about other animal minds have already done this, because it's limiting. It's impossible to look at them

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[42] The New Inquiry #8 *Other Animals*, September 2012 - "Looney Tunes", interviewed by Malcolm Harris

without using a human mind. If we're trying to understand the behavior or another animal who is in some ways very similar to us and we refuse to use our own experience as a place to come from, I think that's actually poor science. If we're looking at a gorilla and that gorilla is acting sad in some of the same ways that we know ourselves to act sad, then refusing to acknowledge that link makes us less apt to understand the gorilla at hand."

Certainly the gorilla is a closer relative of ours than, say, the spider, but is this to say that our the *speculative* evaluation of an animal's inner life crosses a line at some point at which point it must no longer be grounded in our own experience, our own truth?

For the strict behaviorist, *maybe* this is a compelling position-- but as a *player IN the game*? Making games? Playing *with*?

Beyond Burghardt's dividing line, and with a willing embrace of our own experience of play that we have in studying these phenomena, projecting ourselves into our animal friends and other creatures, doing our best to intuitively feel the situation, we can continue to ask, while playing with, observing, respecting--

Do plants play? Moon-flowers open at night, venus fly-traps catch their prey.. We can plant a garden, we can forage, we can drop seeds, we can smell a rose, and where will we go next? We *can* play with plants, absolutely! And chemical processes, too-- reactions, response structures Throw a sodium brick in the lake, BOOM! Is the sodium playing? The lake? Well, whether or not these things are 'playful' as beings themselves, it is obvious that *we can play with them*. They can function as *players* in games that we play. We can plant these plants, we can create rituals around the patterns of the moon-flower, we can practice chemistry (playing with chemicals)...

All play is *multiplayer*, but not all players involved will be playful (and, of course, not all players will be human). Playfulness cannot be defined, and is highly localized to the (dissolving) subjectivity of the player. Playfulness is an ideal which we must keep in mind, but we must not consider it to be the universal condition of play itself, lest we eliminate most all games from the field of study, games which require a kind of play that is most certainly *not playful*, even while it plays. Computer games for one.... Again, many of my

experiences playing games have not been playful. As a child, I was often coaxed into playing things merely for the sake of the social group I was with. I was used as a kind of glue which other players required to play the games that they wanted-- I was not playfully playing, and yet-- I was playing with them, and they were playfully-playing. If my behavior at the time was studied by a behaviorist, repetition and predictability would surely be evident in high concentration, in the strict adherence to the structures of rules -- if Burghardt chose to study me, would I have been regarded as a *player?*

Now, as it happens, most videogames do not ask for *playful-play* at all. This is just a fact, they tend to value work (or stereotypy, to recall the poor calf) over playfulness. New 'serious games', moreover, are attempting to elicit a kind of play that is likewise other than playful-play and other than work-play. That's fine, but we need a new understanding of *play,* then, if we're to continue using that word as a meaningful part of conversations about our games and *how we interface with them*. We need to welcome *more players* into the discussion-- humans, animals, plants, rocks-- machines... The meaning of *playfulness* will remain one Ideal among many, and we will not forget it! but the meaning of *play,* or of a *player*-- this will need to be made objective, publicly verifiable, scientific.

Play & Causality

A player is simply a causal agent in a situation.

Whatever our understanding of causality, that source of the cosmic flux itself, Newton's 'occult forces' and beyond, the 'free will' that we are given, etc-- we simply 'inject' its image with the image of *playing*, "for matter is absolutely nothing but causality, as anyone sees immediately the moment he reflects on it."[43]

This is to say that matter is nothing but play. We 'inject' causality with Play for perhaps a similar reason that Schopenhauer injected it with Will. Now we are primed to evaluate the flux of the material world in light of our own Real experience of causing change, however small, in all situations that we

[43] Schopenhauer, *The World as Will and Representation*, p. 8

participate in. *Play* becomes a magic word, as it were, mapping subject to object and vice-versa.

A player is *material*, consistent with the material-energetic flow of spacetime as studied by the natural sciences. The "leap" has thus been taken, such that, if we accept this premise, we can begin to study *scientifically* all of reality *as play,* as a composition of playspaces built of smaller playspaces built of smaller playspaces, with connections between, across, through these, etc. This simple mapping of play onto causality could be the ground of a *materialist* play project.[44]

From this perspective, our own 'free movement' might very well be reduced to the causal movements of *sub-players*, the players we are composed of (muscles, nerves, digestion). Free will and fate continue to coexist. By no means are we to assume that an individual body is simply One player, that we are fully *in charge* of our actions. Even an individual must be composed of it many parts, and each of these is also a player.

With our playing-materialism, there's *no need to fear data*, quantization, whatever! We can love all of this! we know that there is a striving for truth here, even if it is one-sided (the count always leaves a remainder). We're thrilled by the prospect of re-reading all of the structures of existing sciences as sciences *of play*. The switch will seem trivial to some, sure, but it is anything but-- in using the word *play*, functioning as causality, we will be drawing a connective line in our own mental models between the flux of reality and the *playfulness* which we know in ourselves as manifest in our immediate environment, conceived as mental representation and immanent *with*-ness both. We see play in flux, and flux in play. After all, *playfulness* is an Ideal linked to this concept of play, of causality, but fundamentally of a different order, necessarily *local* to the experience of a player, and by no

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[44] Remember that in its philosophical sense, "materialism" means something very different from the vapid love-of-property suggested by its everyday usage. Materialism is here opposed to *idealism*, which can be very loosely represented by the Plato's Ideal Forms -- *triangleness*, *horseness*.... *PLAYFULNESS* etc.. An idealist supposedly believes in horseness, an *essence* of what it is to be a horse, the IDEA of horses-in-general, while a materialist believes only in the concrete particular of the horse itself as it has been historically produced (the historical process of evolution, for this horse example), and the concrete multiplicity of many-horses which creates an image that might be confused for some kind of horseness.. Diogenes: "I have seen Plato's cup, but not his cupness". That's a gross reduction of the debate around these two poles that have defined the grounds of philosophical opposition for milennia, but it's enough to get us started.

means fixed in its meaning or temporal structure. It is not countable by the sciences in the same way (and best of luck to the cognitive sciences on this one!). Our Ideals are our own. This juxtaposition of material-play and ideal-playfulness requires the belief of ourselves as real players in the world, as real *causes of change*. The necessity of *playing with*. The willingness to allow our ideals of *playfulness* to shift with time, with the materiality of the conditions that we encounter-- to find play in friends, and friends in animals, in materials.

We can thus study, in parallel, a material play and an ideal Playfulness that, in our lived practice, might transcend the all-too-common real/ideal dualism on an unspeakable plane of consistency-- the flow of lived time, the constant *flux* of presence and becoming.

Universal Playspace / Cosmic Egg

We will need to recover a new flow of Real Time, and to this end, it is essential that we understand the current paradigmatic temporality that we're set up against.

Parmenides *follows* Heraclitus, and his unmoving spherical cosmology cannot be considered merely a naive refutation of *flux* but rather an Ideal attempt to step outside of the flux, to describe as it were, the One player that eats up all the others-- just as each of us is One individual made of many parts (many players), just as player-Gaia eats up ourselves and all other things on the earth, so Parmenides' Ideal Sphere seeks to eat up the flux and multiplicity of the world into One Uni-Verse.

The Material is not ignored. Materialism and idealism, though commonly regarded as opposites, tend to work together dialectically, pushing and pulling, creating meaning in these movements. Where an individual is a materialist in one sense, they are often an idealist in another; and vice-versa.

And this One Universe idea is still very much a major player in discussions today. There is a common material-ideal pairing in the world, and it is an idealism of number as descriptive of the universe in totality. It is sometimes called a Platonist approach, but this is to disregard the *secret* aspect of Plato's teaching, which cannot be counted. This number-idealism often claims to be

wholly materialistic, but it is not. An ideal-materialism rules the world today, and it is one which is post-Newtonian, *deterministic,* and has more or less ceased to believe in any meaningful causality that is not quantifiable as such. The most realistic of the bunch, the *positivists,* are quite aware that the numerical mappings to nature are imperfect, but it's believed that they are nonetheless the best we can hope to do. Gone are Newton's occult forces. Now, play is deterministic, because everything is deterministic! Life can be reduced to biology which can be reduced chemistry which can be reduced to physics, and physics' arrow-of-time is two-headed, it is-- an *object*. "Time is *Not,"* it is an illusion, it is a dimension of Parmenides' hypersphere. This is the belief in the UNI-verse, the cosmic egg, the One situation which eats up all others. And much of the modern computer culture that produces the software we use, the games we play, is organized around an implicit world view in which all material flows, all behavior, all movement, is regarded as ultimately mechanical, *computable*. All epistemic (sensuous, knowledge-mining) experience is considered to be in the domain of classically empirical science, and all of science can be computed. That it is to say -- all of our lived experience of the material world, insofar as it is verifiable, is translated into an ideal which is at least theoretically (and too often trivially) representable by a computer. The "simulationist" hypothesis, that the world we inhabit is itself a simulation, the playing out of an immensely complicated piece of software, exemplifies the radical tendencies of this position.

If this is the case, it seems that a deep structural study of the world of computable materiality is itself the best way to approach the study of reality. Materiality is, in a sense, a 2nd-order illusion-- material is *Maya*, and there is *no* Lila. Modern computer culture is ostensibly materialistic in the sense of not believing in anything outside of matter-- it is the proud materialism of the Enlightenment, largely atheistic, it is opposed to religious Idealism -- but it replaces this lack of a religious Ideal with an implicit Ideal of number, logic, computability-- and progress. Progress always assuming quantifiable results. Progress itself is a number. In a science experiment, empirical observations are collected as data and then we test functions against that data to try to model it -- we progress when we get a function that matches the data. There are *very clear goals* -- "Did you get the correct answer?" -- So much of number-culture has been obsessed with this question that produces a yes or a no, and which unpacks to reveal more numbers. At its most impressive, science is *very* accurate (unreasonably so!) and holding these numbers in

hand, and their associated functions, there is a sense of holding the *key* to the materiality of the world.

But this is not proper materialism, it seems, and not at all a *ludic realism*-- computational idealism has little respect for the contingency of matter-- this is an idealism of fixed ideals, of absolutes. And again, not even in the Platonic sense, where number still has its Pythagorean-musical-mystical overtones which have been woven into the Neoplatonic/Hermetic world-views throughout history, uniting the fields of music, math, philosophy into a Real, though never fully knowable, plane of consistency. In the positivistic sense, number has been reduced to *usefulness*. *Objectivity* and *objectives* become One thing.

Following from this non-faith in radically contingent materialities, the possibility of something *creative* at the ground of it all that transcends the computable, software design proceeds in a largely uniform direction-- as the design of "ideal" (computable) situations "skinned" by vibrational materials, images and sounds, these surface effects being 'less true', they are the *maya* skinning the logical form. There is data and there is data visualization/ sonification-- the Ideal Being and the *skin*. The Ideal, the systematicity of computation is regarded as *more real* than the skin, but only because it is *more useful*. There is game design *structure* (reality) -- algorithm-- and there is “presentation” (illusion) -- graphics, sound, touch -- the structure is regarded for many as essential, while the presentation is incidental-- structure is function (“gameplay”) and skin is ornament/polish (audiovisuals). The body’s point of contact is ignored.

There is a dualism here (related to the mind-body split) that I believe entirely misses the point, the *actual reality*, of software, which is constrained by its flesh no less than we are-- I believe it will be difficult to make any proper sort of ‘progress’, even in the computable sense, as long as this belief in the difference between countable structurality and contingent/playful materiality prevails.

Perhaps it would be more realistic to adopt a perspective in the tradition of musical counterpoint, fugue form-- where function and ornament are one, where reality and illusion are always turning back on one another, and recreating themselves as their opposites in the perpetual flux of the moment.

Perhaps number can be revived in our hearts as the dynamic energetic-musical ideal that it is, and that materiality, likewise, can be revitalized as the eternally contingent empirical reality that it is, its experience wholly irreducible to to the ideal of computable quantity. Perhaps a *player* can be considered materially, even computably, as a *creative force* that does justice to the word, and that likewise, that *playfulness* can be considered as an emergent Ideal, a *feeling*, a living goad into the future, as temporally constructed by the shiftiness of material play itself. Perhaps ultimately, these two 'poles' are not in fact different, perhaps they eat each other again and again, recreating the world in the present, that there is only one substance of reality that we are all "in", and which is "in" us, that can be properly understood only in the actual everyday flow of time, and the ceaseless generation of novel situations in play.

Extensive Space & Time

Let's review the *spatiality* of this computable-Ideal ground from a shifted vantage point:

In software design, "process" is read, not as *play* (creation, generation of novelty), but as *function*, and as all programmers are quite aware-- *a function is an object.* It is a string of information, it can be reduced to a binary line, just as much as any digital object. The function is *spatialized* in this way, a patten of minimal difference (only 2 possible values) distributed across a sequential line of information, which is, though microscopic, *extensive* in space, measured, counted.

In software, *structure is always sequential and sequence is always structural*. This is to say that space and time are counted as one. The binary structure exists as an extensive line in space, but it is *read* sequentially in time, and these processes, in the run-time software, are one and the same. All pieces of software are objects just as much as anything is, despite their structural variability in our played experience. In software, there is absolutely no difference between an object and a process. Time has been fully *objectified*, counted as an object.

Software objects are functions, their *playing out* is a process.

It is, of course, this *playing out* that we're most interested in-- how its objectivity plays and how *WE* then play with the software-often, and indeed how the software itself plays on its material substratum.

The images of folks frying eggs on their MacBookPros, they get so *hot*, are as relevant to this discussion as anything more explicitly structural. Physical computation is not *merely virtual* structure-- it is a coordinated heat-flow that gives a very particular kind of *life* to encoded patterns. A computer is a non-equilibrium thermodynamic system, in a sense it is in the same class of objects as storms, vortices, etc. It is *natural!* This is one of the most difficult things to come to terms with, but *of course* it must be true. How could it be otherwise?

Intensive Time

Coming to terms with this *nature* of material computation will require a radical shift away from the EXTENSIVE (or metric, spatial) thinking that is a necessary precondition of designing with software structurality in the first place. The extensive view, which believes time to be another dimension of space, must both be affirmed in its pragmatic necessity but at the same time denied in its failure to count all players in the situation (ourselves & the HEAT, for one, for two).

The extensive-computability view would say that that inner time is merely subjective, and that it has nothing to do with the objective reality of time, which is the PLANE of computation, that one is merely psychological and the other physical, and that the cognitive sciences will eventually bridge this gap, leaving no remainder.

But THIS is exactly the point of view that the ludic realist must combat as the most dangerous form of rationalistic Idealism masquerading as empiricism.

To stand on firm ground, the ludic realist *must* reclaim the pre-rational Reality of time--

Which is to say: we must learn to play with duration as complex *intensity* rather than counted extension proper. The *intensive* is different from the *extensive* in that it cannot be evenly measured on the same metric plane of

consistency. The *intensive* is, as it were, a kind of micro-relativity which can be defined only in terms of a complex aggregate of motions playing out in counterpoint to one another. Heat is intensive-- heat flows traveling down gradients of difference where the hot is more mobile and the cold is more static. The whole thermodynamic environment cannot be located at a point, but must be contextualized within the whole situation, which is in constant flux. Fugue form is intensive. Intensity is the *musical counterpoint* or *texture* (broadly considered) of situations in general

Within the purview of software, Real Time can *only* be reclaimed when software is designed as playspace (in/out haptic object), giving respect to the full reality of the situation, the computation itself and the rhythmic flows of the conditions (our unique individual perspectives) in which it operates.

Only a temporal sensitivity in the player can introduce Real-Time into software. From the computation's perspective itself, time will always be sequential and sequence will always be structural, time will always be an object. Real time is introduced, *not merely by a faster clock/framerate* (though this plays into it), but rather by the intervention of a chaotic material player (which is the thermodynamic heat-flux from the wall as much as the individual human player).

The computability perspective which considers the time-structures of play to be ornamental simply does not take *real time* into consideration. It ignores that real-time is, itself, the *ground* of the thinking we ultimately use to discredit it. In the computable world view, time can be measured as the *extension* of a single dimension, that is to say mapped as units onto a 1-D space. Software is all designed in this way, and material results can be acquired which are perfectly measurable and accurate (and can be very beautiful!) but which yet, in their system of measurement, have nothing to do with the inner flow of time, what Henri Bergon has called *duration*.

Bergson's duration is *intensive* as opposed to clock-duration which is extensive. Here is an example of this difference:

In everyday language, we ask "how *long* is this song?", and in measuring its 'length' in terms of minutes and seconds, we treat time reductively, as a mere additional dimension of spatial extension. The image of 4-dimensional

spacetime, considered naively, illustrates this position -- that to the 3 dimensions of space, we can simply add 1 temporal dimension, and thus describe the reality of a new 3+1=4-dimensional manifold (a manifold being a complex shape of N-dimensions).

But this 4-D spacetime manifold has nothing to do with the experience of time itself, the dimensionality of which fluctuates radically and in fact defines the durational content of the lived time itself.

Bergson suggests that to tune into this *duration,* we strive to understand time *intensively* as opposed to *extensively*. Time as multiplicity, complex shifting aggregate, manifold ceaselessly becoming *dimension++, dimension--*, where dimension is not even an integer value, but a floating point, and not even necessarily a rational (fractional) floating point, but rather-- irrational, extending into infinite detail (as with Pi, *e*, drifts, etc).

It is possible, in our experience, for one 10-minute flow of time to pass very quickly, and for another to feel like it will last forever. “Time flies when you’re having fun,” etc. Acknowledging this is not merely the ‘subjective’ perspective, opposed to the ‘objective’ linear time -- rather it is a radical subject-objectivity that transcends objectification (incorporating subject and object both), that is experienced as consistent with the flow of all lived experience as process.

The computability view seems very confident in its ability to *objectify* process-- it calls an mp3 object a piece of music, even prior to its being played in a material space, simply by virtue of the consistency of the sonified line of information by which it is described. This is an appealing point-of-view, because it is useful, and its supposed reality can always be 'verified' by actually playing the mp3, and saying 'you see, it's music!', but it is highly unsatisfying in that it divorces music from the real *durational* flow of lived time. It turns music from a played nonlinear form, built of expansions and contractions of temporal flow and interrelationships describing an *intensive* space, into a simple *extensive* string of numbers.

Part of the project at hand is to suggest inroads into developing new ways in which time can be read intensively, for how we might create complex *extensive* (computable) models of *intensive* processes, ultimately temporal

flows. The mechanics of musical flows will be of great use here, based as they are, *fundamentally*, in complex process, simultaneous flow of many agents at different time-scales (counterpoint). It is when we ask how our temporal experience of one 3-minute song differs from that of another that we begin to approach the problem of Real Time, and its necessary constitution as lived intensity.

Radical Empiricism & The School of Immanence

A new sort of *dynamic empiricism* will be required to this end, closely related to that of "playing with"-- where inner time is not considered fundamentally illusory, where inner playfulness is its own 'outside', etc. The "radical empirical" project is a rich tradition which is closely related to these ideas of non-extensive/spatialized time. Its working methods are vastly interconnected to other projects with slightly different agendas going by different names, and I hope this section might function as a 'hub-world' to other related thinkers who might likewise shed light on the problem of the Reality of *immediate experience* in play.

The radical empiricists are ludic realists. Despite their having not adopted "playing" as a central theme in their philosophies, their preoccupation with real-time, real-experience, qualifies them as flux-gamers, ludis. Collectively, their thought is not homogenous, but it is similar enough that we'll count it as a group, giving them a name that we will encounter again soon enough, "The School of Immanence". *Immanence* is the magic word of radical empiricism-- it is opposed *transcendence*.

We might articulate the distinction between the immanent and the transcendent in this way:

The school of immanence believes in a Reality that is Here and Now, as opposed to the school of transcendence which believes in a reality that is outside of lived time altogether (in, say, eternal computational ideals, a static sphere or a transcendent Creator-God, etc, no difference). Spinoza writes "God is the immanent and not the transitive cause of all things... there can be no substance external to God." God is not a thing pushing buttons from the outside, but rather God is in the world and the world is in God. Whether it is

God or nature or existence or WHATEVER that is of concern, the meaning is the same. What is immanent is *within*.

Who, then, are the teachers that work this *school of immanence*?

In the first part of this century, following the vertiginous intrusion of *relativistic physics* into our cosmology thanks to Einstein etc., there seemed to a zeitgeist-y gravitation toward ideas that might integrate a radical pluralism (which is what relativity entailed) with a radical monism, by, paradoxically, *amplifying the pluralism* such that not only are objects in motion relative to other objects in motion as counted by an 'objective' observer-- but that even 'subjectivity' itself can be implicated in analagous relativism, wherein our experience of the external world is not *merely* representation, but is, in some important sense, Real. This position is perhaps best represented in the works of the Harvard School --- William James, John Dewey, and Alfred North Whitehead.

William James introduces this name "radical empiricism" that we can count as a conceptual ground of the whole *immanentist* endeavor. An empiricism that does not stop at that which can be counted as quantity, does not filter our sensuous experience into two spheres, subject/object, but which, rather, gives due credit to *all* of our phenomenal experience in the zones existing *between* subject and object, which is accessed by ritual (play) and other means of narrowing the perceived 'window' of time to close in on the "specious present" which is the closest we are able to come to describing the empirical NOW & HERE, which, in its increasing narrowness has the effect of entering into the real flow of time itself in all of its vastness & eternity. In his *Essays on Radical Empiricism*, James introduces the "activity situation," which is a *game* in the broad sense we are interested in.

John Dewey describes a similar "immediate empiricism" which functions as the ground of a pedagogical philosophy of immediate, lived time-- *Art as Experience* draws out the continuum between the arts and everyday life in order to erect a ground of aesthetics that is not confined to study of the art object, but which rather is able to regard everyday as aesthetic, in its continuous process, contingency/possibility, immanence.

Alfred North Whitehead, following James (whom he canonizes as one of the four great philosophers, after Plato, Aristotle, and Leibniz :), constructs a *process* philosophy (‘philosophy of organism’) based on the constant flux and “ceaseless creative drive toward novelty” of reality. He has his hands in the computationalist tradition, too, having co-authored the *Principia Mathematica* with Bertrand Russell, but his late metaphysics are representative of conceptual music on an altogether different level that continue to inspire some of the most inspiring speculative thinking today. “The elucidation of immediate experience is the sole justification for any thought; and the starting point for thought is the analytic observation of components of this experience.” Pure immanence. His lectures published as *Process & Reality* constitute his System, in which God is given as an *instance* of a Creativity which is transcendental but *only* in its immanence. It is said that 300 people attended the first lecture and 6 attended the second. Whitehead was neglected for much of the 20th century, perhaps because of his God concept and the early use of his work by Christian theologists-- process theology which itself has birthed a current of play theology-- but he’s ‘coming back’, whatever that means, and his Process philosophy is now celebrated by philosophers of science such as Isabelle Stengers, Donna Haraway, etc. as a promising New Beginning of SPECULATION, again! And Whitehead’s speculations are *beautiful*! Sometimes a page of his writing will have 5 or more radical theses, one after another, with little formal attempt at ‘proving’ them, rather letting them stir up affective relations to the text, to other texts, etc. Building on one another in the manner of *music* and the immanent truth which that is able to communicate, which is simply absurd to try to count in its entirety as spatialized reasoning, which must be lived in time. To allow thought to live, as one component of among many of a pluralistically-unified living universe..

That’s the early 20th century American ‘school of immanence’, and it flowers out from here and from other sources too, again and again, these are only initial findings--

Quantum physicist David Bohm follows Whitehead (often explicitly) in his philosophy of change and the positing of an “implicate order” available to immediate experience, but hidden from the *objectivism* of current scientific practice, though theoretically describable (he creates a speculative hidden-variable theory of quantum mechanics to illustrate this point). This implicate

order describes a WHOLE in contrast to the PARTS studied by the classical sciences, which begins to point even further back toward the Hermetic canon of One is All. Philosophy, *how we think*, is suggested to have Real effects on how the world is ordered for us (of course!), and these idea of WHOLENESS / totality vs. PARTNESS / fragmentation is seen to be central: "What I am proposing here is that man's general way of thinking of the totality, i.e. his general world view, is crucial for overall order of the human mind itself. If he thinks of the totality as constituted of independent fragments, then that is how his mind will tend to operate, but if he can include everything coherently and harmoniously in an overall whole that is undivided, unbroken, and without a border (for every border is a division or break) then his mind will tend to move in a similar way, and from this will flow an orderly action within the whole".

Gilles Deleuze described a "transcendental empiricism" -- *pure immmanence,* with (buggered, distorted, flanged) echoes of James, Whitehead, et al. "It may be that to believe in this world, in this life, has become our most difficult task, the task of a mode of existence to be discovered on our plane of immanence today."[45] His whole philosophy cycles around this issue in a kind of madness-inducing *musical thinking*, which incidentally was a tremendous early inspiration to me in committing these thoughts to paper. Deleuze & his work with Felix Guattari-- they provide a kind of *tactical* casebook for navigating this Pure Experience, for surfing creativity, difference, all the while providing a fuzzy cloud of structural thinking that will be of great use to game design using complex systems and playspaces. The image of Deleuze that Manuel DeLanda provides is apt here: that he is not so much a philosopher, as *an engineer of the future*. A future where we will once again become both MORE and LESS than human.. The combination of structural thinking and borderline intentional obfuscation recalls the Hermetic practices, and Deleuze's fascinating relationship with these is well worth looking into via Joshua Ramsey's *The Hermetic Deleuze*. Ramsey even goes so far as to suggest that Deleuze participates explicitly in the *secrecy* of the Hermetic tradition precisely by not claiming it as his own, even while he samples its *weltanschauung* freely... All of these concepts shed light on a *living* ludic realist position-- "We will say of pure immanence that it is A LIFE, and nothing else. It is not immanence to life, but that immanent that is in nothing

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[45] *What is Philosophy ...* p. ??

is itself a life. A life is the immanence of immanence, absolute immanence: it is complete power, complete bliss."[46]

Christopher Alexander (whose *A Pattern Language* has provided the inspiration for *The Sims*, among *many* other things) has approached the concept of pure experience throughout his career, describing the necessarily temporal/bottom-up nature of of good design. He is *explicitly concerned with engineering the architectural future of the next 500 years!* He's gone 'overboard, too far into the deep end', so get ready to swim. His philosophy's grounding in a new materialism is most evident in his latest work, *The Nature of Order*, which posits a "degree of life" as existing for everything in the universe (*everything is alive!)*, thus paving the way for a design theory interwoven a radical empiricism of a living temporal world (recalling Plato's *eternal living being)*. If there is a danger in his thought, it is on the insistence of the Goodness of a kind of 'objective' Order, which may yet be unprepared for the new kinds of order that are suggested and made possible by new software spaces. Alexander, after all, is constructing a philosophy of the *built environment* in the classical sense, of physically spatialized objects and centers. That the world of software, too, is implicated in the composition of our built environments-- this seems obvious, but it is not a path that Alexander has begun to concern himself with. Software may allow for the kinds of spaces Alexander describes to be 'bred' with the insane tactics of Deleuze, etc., paving the way for a new era of design in liquid architectures..

Manuel DeLanda serves as a very useful bridge between the Hermetic-Immanent-Deleuzian and analytical/computationalist perspectives. This, again, insofar as he reads Deleuze as an 'engineer of the future, 50 years from now' and proceeds to reterritorialize all the insane movements and *playings* on a consistent ground inherited as much from the analytic philosophical tradition as the continental/hermetic. Where the others have *images*, DeLanda comes prepared with proper *algorithms,* and we can imagine studying him with programming language in hand, ready to *experiment* with the computational toolbox he's provided. It's this *experimentation* (or play) that bridges the classical empirical model with the radical empiricism that allows science and experience/art to be counted as one on the plane of consistency of the Alchemists and Hermetic Magi in general. Where *counting* happens and

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[46] *Immanence: A Life*, p. 27

experience happens, and we are fine not reducing one to the other, and we are *thrilled* to have both faces to play with.

Needless to say, there is a tremendous tradition to build from here, and I apologize I've hardly passed on anything at all! The concept of immanent reality, which by necessity tends to verge on a non-linguistic mysticism, should not be dismissed even by those scientifically minded-- the position has some of the last century's (and beyond!) greatest minds working in its favor, articulating a new realism that does justice to time, to the past, future, present, the reality of change, process, becoming.

When we have entered into the heat of the project, we will begin to develop a structural/computational means of thinking that attempts to reclaim time in the manner of these thinkers, a new intensive time applicable to the development of *structural playspaces* (videogames).

Scaling Players: Parts and Wholes

A player is not just a One, it is Many. We compose *Homo ludens*, with other animals, *Animalia Ludens*, with everything else on our surface-- *Gaia ludens*, which composes Cosmos ludens, etc. And zooming in, too-- I, for one, am composed of 10 fingers and 2 eyes and 2 ears... etc... In the constitution of my consciousness, too, I am many. I can't make up my mind, because there are at least 2 'selves' each with different agendas. "The two of us wrote Anti-Oedipus together and since we were each several, there was already quite a crowd!" It's no exaggeration to say that these pages, too, have been written by a crowd.

Players as objects compose other higher order objects or *hyperobjects/ hyperplayers*. Atoms compose molecules which compose, say, proteins, which nourish and compose parts of my body, which composes part of the ecosystem, part of the planet, Gaia, which composes part of the solar system which composes.... and on and on.. The ball in *Katamari Damacy* of course is a brilliant simple example of this..

To say that something is a *player* is to count it as such from a particular scalar point of view, but it must be borne in mind that our adoption of such a point of view is free to scale as much as we'd like in space and in (extensive) time.

A *whole* player is *always* built of parts, which are themselves wholes in an important sense. Likewise a 'whole' player is by no means *actually whole* insofar as it depends on nourishment and other connectivity from the environment or playspace that it lives/plays in.

This is why a 'holistic' approach always zooms out as much as possible, and often is accompanied by a cosmic feeling of some sort. It is acknowledged that whatever is presently considered whole is only counted as such because we are ignoring its reliance on higher orders of structure.

The composition of parts and wholes has a pseudo-fractal character-- it is not necessarily self-referential, composed of scaling symmetries, but it IS necessarily composed of effectively infinite scaling relationships. The ludic realist approach to play is as concerned with the scaling/fractal nature of a playspace as it is with the immanent experience of the playspace itself from our point of view. Ludic realism, insofar as it *touches* on Lila and its cosmic scales, necessarily has its pseudo-fractal character, which defines relative relations between parts and wholes and their interconnections. The mathematics of such relations are properly considered under the domain of *mereotopology*, which Whitehead uses to construct his metaphysical architecture. There is no doubt that further structural work in mereotopology as applied to players (objects) and playspaces (extensive spaces) could be of great use (and *interest!*) in formalizing the cosmic scope of the ludic realist position.

Lila & Games Culture

Returning, then, to *cosmic play* and the idea of *Lila*, before we move on.

It is important that the Ideal mood of cosmic playfulness not be divorced entirely from the materialism and structuralisms that we're interested in. It's just as G.K. Chesterton once said: "the question is not whether the theory of the cosmos affects matters, but whether in the long run anything else affects them"-- we are *creating our cause,* the cosmological speculation is important, it defines the terms of our playing field, how we will be receptive such that the space can play us. The ultimate ground of our ludic realism, our *play*, which describes the objective flux of the universe (Lila as a materialism), and also the subjective flux of (local) experiential playing, which inevitably

understands itself in terms of generative values, preferences, ideals (playfulness as generative Idealism).

As we've already shown, the network of ludic realist thinking encompass far more than the Hindu *lila* tradition alone-- it shows up all over the place, wherever the world is thought to be something creative, in the school of immanence, theologies, atheisms, and beyond. To name a few, old and new-- Heraclitus, Lao Tsu, Chuang Tsu, Pythagoras-Timaeus, Hermes Trimegistus, Meister Eckhart, Spinoza, Friedrich Nietzsche, Paul Klee, Wassily Kandinsky, Henry Miller, David Bohm, John Cage, Asger Jorn, Constant Niewenhuys, Gilles Deleuze, Christopher Alexander, Karen Collins, George E. Lewis. Again, not all of these writers use the word "play" to describe their philosophies, but an analogous principle of *movement,* of *change*, improvisation, etc. is central to each.

And yet this history -- of divine playing, of ludic realisms, of radical empiricisms -- has been more or less altogether brushed aside in this very age when the tools of variability and change are developing so rapidly, this transitional age when we are supposedly entering into the era of change and variability, the "era of playing"/ludic century (Huizinga, Baudrillard, Attali, Zimmerman). Worse-- these values are brushed aside in the very communities that might in theory be most likely to actively explore them in a new kind of qualitative-structural practice. Play! Games! The communities of *technologists* that build playing machines all day, everyday, these communities that might best wield the pragmatic strengths and weaponry of a theory of *Lila* in order to respect the reality of temporal flow, to create vital new spaces with *real* transformative potential, in *real*-time, *real play*. The technologists tend toward the deterministic computational-materialism, where 'systems literacy' is held in the highest regard, but this is not going to be of much use in creative practice, where the theory of deterministic progress is either evidently incorrect (we can feel our free will, and *decide* things quite clearly, regardless of whether these causes can be explained away or not), or religious-teleological (finding the Way, Tao, Will of God).

Why are we not seeing more attention given to the ludic realist attitude in the present culture of games? In videogame culture, we see all the pride of being part of producing work in a 'new' medium, of using 'interactivity' to do *something* that's a big deal.... we see a general awareness and occasional

celebration that *play* is a fundamental thing in human culture -- but it seems that through all of this, the *nature* of play has been forgotten-- that nature *is* play, that when we really play, we are entering into the fact of nature. There is a rich canon which seems to be almost intentionally avoided. Games folk are not ludic realists but systems realists -- videogame rhetoric says "the physical universe is systemic, the modern world is about systems, videogames are about systems, this is a powerful medium." Videogames are thought of as technology (materialized systems), and technology is thought of as separate from nature, but this is obviously wrong. Obviously nature includes technology, obviously videogames are wholly natural.

Summary

To repeat, what we call play need not be considered as anything other than simply-- *movement*. There is a *life* to movement itself. Far from being reductive, when movement is considered in its proper context, it encompasses what we know *playing* to be about, and it builds from here to reveal a world of perpetual creative energy where *everything is playing*, a world that is not *other* than the self, a perpetual creative resource that is not a resource to be *used*, but a flow to be *entered into*. Movement, in these play-oriented ontologies, is considered to be a creative force -- *the* fact of creativity is movement. Creativity is the (perpetually varying) constant-- play *enters into* the flow of universal flux. The trick is -- how do we *think* this such that it can be lived as a *felt* truth? If everything is playing-- how are videogames not a unique *separate* thing, but rather, an example of what is true, an integrated part of everything? There is not a systemic answer. It is not a matter of creating new technologies, but of developing new attitudes toward the reality of existing technologies, which already *are* that they are (they are matters of fact). "When the revelation comes, the room is still the same, the screen is still there, etc" (W. Benjamin quote?). The future is today, we are not lacking in the tools but rather in the sensitivity with which we're choosing to wield them (in choosing to try to control them, they control us-- what if we tried for the opposite?). New technologies need not be created from scratch, but rather new assemblages of existing work, *opera* (multiplicity of works), new play. To make way for these, the most important task ahead is that of listening to our materials and how they play, and learning to *enter into play WITH*. What might we learn if we afforded the cosmic play traditions something beyond the status of a mere curiosity (or a total invisibility, as it were)? Something

beyond a remnant (dead) fossil of historicized religious thinking? What if we could read the cosmic play traditions as flows of *living thought*? of *living matter*? If we could study them in order to expose ourselves to values with which we might build spaces for play, in order to find values to play -- if we could live these traditions *by playing them*? Keep moving! -- all play traditions reveal themselves only in flows, never in fixed objects (and it is *we*, as individuals, that are given the task of playing spaces, attending to them *as object* or *as flow*-- don't sit idle, make that choice) -- one book opens another-- as a start, we can continue to trace this loose lineage along many paths*, Lila* was only the first example, the most explicit. Every new event along the path (of history, of study) is a node looking forward, looking back, looking across, looking through, a part and a whole and a part of a part, itself a whole.

Reviewing Motion-formalisms-- Heraclitus' "everything is flux" is the classic variation on this theme (which theme itself is only *virtually* present "between" its endless variations). Everything is play, flux, motion, change -- philosophy of Process -- *Process and Reality*'s Play-Realism, its God of novelty/creativity as conceived by Alfred North Whitehead, that humble head of a historical flux-worm, one of the forces behind the *Principia Mathematica* (with Bertrand Russell) which attempted to map mathematics onto logic and provided the mystic Kurt Gödel with the material he mapped with massive prime numbers which led to the inconsistency theorem, notions of noncomputability in math, leading to Hofstadter's strange loops, new formalizations of Eckhart's games ("the eye with which I see God..."), and the new faith in inconsistency via Badiou, etc. Whitehead's line is drawn there, new playspaces research, but I haven't read too deep into this, and that's why this project is necessarily a game of "multiplayer scholarship"-- it's difficult work, deep, tangled in networks of references. Pick up and use what you can, and keep moving-- *Playing and Reality, Finite and Infinite Games* -- new currents from here, through Epicurus and Lucretius' desiring-materialisms and cosmic haptics, tracing the lineages of "nomad thought" as outlined by Deleuze & Guattari in our own time, pragmatics, "Playing Thought", movement-ethics in Spinoza's Joy via Nietzsche's "A New Game-- the child becoming a dancing star", which is inconsistent *possibility* opposed to countable *probability*, which has already danced with the aesthetic play of Kant's Judgement and Schiller's Education -- the play of art, playspace, played space, playing music -- the play of people with people, politics --

Hakim Bey & his Real/ontological anarchism ("never work".. well, of course!), sandbox games, free improvisation, utopianism. This is our *game theory for the gift economy*. Kickstarter is not the gift economy, gifts keep flowing but without fixed conditionals -- the gift economy is spirit, is material, is flow, is play. Zarathustra's prayer to the sun's gift: "bless the cup that wants to overflow, that the water may flow from it golden and carry everywhere the reflection of your delight" -- bless the OVERFLOW, the GIFT -- *A New Game*. George E. Lewis, trombonist, interactive music-space composer, is developing his "critical improvisation studies," which seems to say that all is improvisation (all is playing), that the experience of flowing consciousness is true play, and that the play of the Mars Rover is likewise true play (to use his favorite AI example)-- it was also one of Lewis' lectures that brought to my attention the African tribes that consider their musical instruments to be human beings, playing beings, consciousnesses...! Living beings, absolutely! We'll return to this concept with Kandinsky's theories of the Basic Plane as inorganic life, and indeed Christopher Alexander seems to have been making the same point recently as applied to the built environment. Forget human beings as a distinct Other set apart from the rest of the world. In play, everything is assemblage, *everything is player*, nothing is fixed as one, there is only multiplicity-- blur, dissolve, call it all human if you like, choose your language-- no matter how you put it, of course the instrument is a player -- when we play it, it plays us. From Eckhart again, elaborating elsewhere on the *play-aspect* of this loop: "there has always been the play going in this father-nature ... from the Father's embrace of his own nature there comes this eternal playing of the Son. This play was played *eternally* before all creatures ... The playing of the twain is the Holy Ghost in whom they both disport themselves and he disports himself in both. *Sport and players are the same*." Emphasis added to the last sentence, which seems to sum up this paradox in as clean a way as possible -- (what is the relationship between the playspace and the player?). Game and player are the same, space and instrument and player are the same, space and game, space and object -- *everything is playing, player, play.* This "alternate" history of playing, then, is alternate to what? To a history of playspaces (games) which is dominated by a literature of games built on the formal-structural relics of institutionalized Quantitative-Structure at its most 'transcendent,' its most *one*-obsessed -- pre-copernican fixidity, goals/teleology, optimization, etc. This is the state of the history of games that we're reckoning with right now. A history of games that needs to be reckoned with because, beautiful as its

gifts have been, it's inbred and its dying and it needs to open up more if it wants at all to *live*. If it does not open up, it *will die.* This *Lila* tradition opens up to everything, the whole world, and it has clearly been like our guardian angel all along, the sometimes-celebrated, sometimes repressed, source of all change and creativity.. The tradition and its history is *right there, waiting*, it's just that from our vantage point, it appears hidden from view, in a different world from games.. Why have these currents not crossed paths? Maybe it's because the students of cosmic play have typically had little or no interest in game structures themselves. Like Derrida's *freeplay*, *Lila* is not structural, it does not play in structure, but rather in the structurality of structure, the infinite regress of variable variability, ultimately-- *inconsistency*. Play is a flow, and *Lila'*s students are accordingly concerned with flows not spaces. Processes not objects. Play as *becoming*, not *Being*. Everything can be played, after all! So what is it that exists *between* the surfaces of objects, the thresholds of events? "Sport and player are the same." What is this *between* that allows apparent difference to become one? *Lila'*s cosmic multiplicities (as absolute movement) are starkly opposed to the object-unities of games, and the problem of their reconciliation is the problem of reconciling the One and the Many. Because of cosmic disinterest in the particular architectures of the Sport, this rejection of the fixed space in favor of the played flow, there's been little attempt to synthesize concepts from the cosmic traditions with the necessary *computability* of game designs themselves (all games, non-digital games too, will be built in part of computable 'rules', even the Situationist drifts are, on some levels, pseudo-formal studies of variable variability in chaos and topology as regards paths traced through the built (and living!) environment). Computability? Not everything is computable. Even Gödel's inconsistency theorem sheds light on this. Still, that which *is* is not less true because of it. The mechanics of computation (as non-electronic difference engine, vaccum tube, or microchip) are a *material reality,* an actuality, as resolutely virtual as its high-level structures may be. This is the *unfelt* material grain of computation, we experience only its virtual traces/fossils. Sensuous (input/output) computation actualizes the high-level virtualities, and the vibrations and input surfaces become part of material reality as well.

All videogames are about the vibrations of matter-energy-- nothing more! This is computation in *lived time*. Vibration, pulsation, *transformation*-- this is the grain of this material that we're using, for all time that has been, and all time that has yet to become. *Lila* is the play of material reality. Human

players play, of course, but so do computers -- *this is key*. A videogame, a playspace -- is a player. There is nothing *false* about it, it is a *natural material*, if only we can learn to play with it as such. A game design project which asks (and *acts on*) how it is that "sport and player are the same" will likely find some strange and wonderful things.. from objects as much as from process (the two are fundamentally interrelated)-- input/output vibrations, mutual affects, these flows, which are necessarily *between* player and space, the one acting on another, the other acting on the one. The one of the self becomes two, several, *many* in the space -- a space is a multiplicity. To think the multiplicity as one, *to play* it as one, this is the next step, which will inevitably break or dissolve the unity into a multiple once again, values will constantly shift, and this process will go on forever.

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2. Smooth Ethics

Some of the major Disasters of mankind have been produced by the narrowness of men with a good methodology.[47] *... The production of too many useful things results in too many useless people.*[48]

The Three Metamorphoses

The first book of [Nietzsche's] *Thus Spoke Zarathustra* begins with the story of the three metamorphoses: '(1) How the spirit becomes camel, (2) the camel becomes lion, and (3) how finally the lion becomes child & *a dancing star*.' The camel is the animal who carries: he carries the weight of established values, the burdens of education, morality, and culture. He carries them into the desert, where he turns into a lion; the lion destroys statues, tramples burdens, and leads the critique of all established values. Finally the lion must become child, that is, he who represents play and A New Game--creator of new values and new principles of evaluation... These divisions are no doubt arbitrary: the lion is present in the camel, the child is in the lion; and in the child there is already the tragic outcome...[49]

The Work & Play Ethics

Nietzsche's metamorphoses are the story of the mutual transformations between the work ethic and the play ethics and back. The camel's Work Ethic is well-known, well-praised, and perhaps rightly so. It looks like *hunger + respect for utility*, and like a list of things *To Do*, and a good methodology, and a productive series of tickings off of that list when things are completed.

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[47] Whitehead, *The Function of Reason*, p. 12

[48] (Marx, ??)

[49] This paragraph from Deleuze, opening *Pure Immanence* chapter 3 "Nietzsche"

It feels great to tick things off, and if the work is not alienated labor, those tickings can be really meaningful, the *most* meaningful, as the ideal of labor=art is approached. But even when the labor is not what we want *most*, ticking off a to-do list can feel good, accomplished, as is evident in playing most videogames.

The work ethic is directed toward an objective, a goal. Its experiential 'geometry' looks like this-- the goal is itself a hard-edged object, with a boundary and 'surface' of a sort, a membrane that is 'penetrated' upon completion of the goal. This event of completion is a highly satisfying *solidification of the object* as actual fact, the penetration of the membrane does not pop but *fill* the object with actuality, where it was previously composed of unactualized potentiality. The work ethic is, of course, tremendously important. It is the only way to get things done. We have top-down dreams of The Possible, and the only way to actualize such dreams is by working at them.

The ultimate hope is that the *process* which we partake in, leading up to the satisfaction of the goal, is as meaningful, or moreso, than the the goal itself... *Pressing up* against the edge of the goal-membrane, as it were, and feeling the give.. The hope is that the work is intrinsically meaningful, prior to completion of the goal-- it is not merely extrinsically validated by the goal itself and its function.

This *love of process* begins to tap into the meaning of play ethics, Nietzshce's New Game, the play of which is necessary to the feeling and efficacy of a healthy work ethic.

"These divisions are no doubt arbitrary"-- Play Ethics should never be thought of as fundamentally opposed to the Work Ethic. It is only by an unnatural sort of conceptual *rip* that the two can be separated at all. Some have suggested that play is a kind of *training* for work, and thus cannot be thought of as opposed to it-- though this is still too separate (play-as-cause, work-as-effect). Perhaps the best image which encapsulates the necessary non-hierarchical relation between the two is illustrated by the excellent maxim--

"Work doesn't come from inspiration; inspiration comes from work."

Work, too, produces play-- *as work*. And then the effects can be circular, too, where play produces work producing play producing work, etc. Some kinds of work require a great deal of *playing* in order to tick off any of the goal-boxes. The work ethic, properly considered, requires a thorough integration of play ethics, working at playing, and playing at working. "I do not know of any other way of associating with great tasks other than *play*: as a sign of greatness, this is an essential presupposition."[50]

This is to say that the "free movement" spoken of by Salen and Zimmerman is a structural necessity in *at least* some kinds of work (that which is non-alienated?). Great (meaningful) tasks demand play, and surely we all have a 'greatness' that we seek, admire, Idealize-- in other words, surely we all have preferences of certain kinds of play that we prefer to other kinds, these the playful 'modules' of the work which we are most inclined to pursue, which we value as process itself, whether or not the goal is completed/objectified.

It is not only at our job that all of this comes into play. Our tastes and preferences establish the boundaries and weighted flows of the variably gated, resistant, lubricated, or wide-open spaces of possibility that define our living process *right now*-- in games, play, work, love, etc. Tastes establish *geometries of possibility*. In short, these preferences/geometries determine how we live-- they are an oft-ignored *ethics*, whether or not they have been articulated or systematized as such.

Indeed, a true *ethics* cannot properly be systematized as an *object*, because it exists in the transforming flow of time, just as much as anything else does. Spinoza's propositional system might suggest otherwise, but the ethics of "joy" that emerge in Part Five would very much concur with the flexibility that *play ethics* must be interested in. AesthEthics may prove to be the better word for it. When *play* is at issue, ethics are nothing more than an aesthetics of fully responsive situations-- nevertheless, at a time when "aesthetics" has become a punching-bag for some ideologues who are afraid of past fascisms (as if Wagner's flows, etc still posed a threat), when the word has become trivialized to the point of meaning something like the surface effects of perception devoid of feedback/playback, "that has a nice aesthetic"-- these

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[50] Nietzsche, *Ecco Homo*, p. 58

days it seems that ETHICS is the better word, since we're all quite aware that ethics has to do with the *way we act*, *move, transform, cause change, play...*

Play ethics cannot be a law or otherwise dogmatic structure, they cannot be a matter of right and wrong-- rather, they must be a cloudy/intuitive *way*, a pragmatics, a *call to action*, a means of setting practice/play into motion. An ethics of preference giving rise to *energy*, to momentum, to *joy!*

The creative reality of motion is the 'solution' to play ethical 'problems'. MOTION is PLAY.

Everyone values some play ethics at one level or another. It is simply a matter of making this valuation explicit and bringing it to the surface in order that we might open ourselves to change in a community of other players-- persons, animals, plants, inorganic creatives. Bernie DeKoven's *Well-Played Game* is a play ethic, of course, and a beautiful one as regards human play communities (play ethics are *always* political in the bottom-up sense). It's not a question of needing ethics or not-- we live by our own ethics regardless of our conscious intentions-- we play how we like to play. The question is rather whether we would like to, first, acknowledge our ethics, and second, open up to the possibility of change (adding dimensions, morphs, etc, to our N-dimensional space of possible solutions), of considering a *different* ethics, a flow of ethics (N++, ++, --, ++, --, --, etc...). To allow our playfulness itself to play.

Smooth ethics are not necessarily different from other sorts of play ethics, but they have a value-set that can potentially be mapped back and forth from the quantitative to the qualitative, thus satisfying the *need* that videogames have for a fully *computational* ethics in which numerical value and ethical value might operate with one another on the same plane.

Smooth ethics consider play to be, in all cases, *continuous* with nature, with all the relations of things, such that no playspace is thought to be bounded by hard edges -- smooth ethics are militantly opposed to Huizinga's thesis that play is 'separate'-- smooth ethics seek a new aesthetic continuity in life (clearly foreshadowed by Dewey's Everyday, which we'll follow up on..) in which play is welcomed as the transformative force that it is, where it is anything but the mere idleness it is sometimes thought to be, where even the

most apparently ‘autistic’ zoom into a particular zone, an obsessive rubbing of a surface to feel its texture, is characterized not by the ‘isolation’ of that zone from the world (human community) but rather by the loving intensities awakened and tapped into via that extreme focus with vastly increased connective powers, N++dimensional node in the graph the playspace.

Smooth ethics add ‘moisture’ in a sense to facilitate change-- a smooth ethical space-or-player is like a soft ball of clay, recently watered, squishy, out of which any form might be sculpted. This opposed to the *discrete* ethics of the clay once it has been cooked, once it has become an object, and it is sitting proudly in a museum, fixed as a *thing*, apparently ‘permanent’, but brittle, non-dynamic, *afraid* of being smashed and shattered (smooth things get *squished* not shattered).

It must be kept in mind that smooth ethics are by no means universally “good” -- indeed, when they are applied, for instance, to the play of war, to financial play, they may have catastrophic “shifty” effects, which-- though play is going strong while its going, at the level that its played at (see *The Wolf of Wall Street, The Four-Hour Work-day*)-- ultimately shuts down the possibility of future play for many, including the original players and those that they played with (via deaths, occupations, evictions, etc). The ideal non-separateness of play does not justify the totally unrestrained play of financial markets or political violence. A critique of smooth play from this perspective would be well-worth exploring, but is well-beyond the scope of this essay.

I hope that it is enough for now to say that smooth ethics, being neither good nor bad, ought to cultivate alongside their smoothness another kind of play ethic-- an ethics of *love*.

And from our microcosmic point of view here--making videogames, music, playspaces-- love in our practice is manifest in our sensitivity to our materials as Real things/substances/beings. Love between people is important, but love *should not, cannot* end there-- love of *players* in general, of materials, animals, processes, values... We are trying to find ways of continuing play *not only in ourselves*, but in our companion playspace as well-- be this an instrument, a game, a number, a community of friends, etc. That *love* is THE glue-force of magic, as described by Renaissance heretic-hermetic Giordano Bruno, is relevant here, and will be considered further in the next chapter

which will unite an image of connectivity and causality in an immanent magick which we are implicated in along with the rest of the world, describing the causal Ground of matter-energy-life itself.

Smooth Values: Quantity and Quality

In mathematics, a smooth function is a *continuous* function -- as the function flows, all points are *connected* to *adjacent* points at an infinite level of detail. This is the ground of the quantitative smooth, and its fundamental relation to the concept of *continuity*.

"The demand for continuity has, over large tracts of science, proved itself to possess true prophetic power."[51]

Meanwhile, in music culture, everyone is obsessed with the *analog*. The analog fetishist requires vinyl records and their warm sounds, synthesizers and other *gear* with their soft-buttery controls. Dub producers blowing smoke on the tapehead during the mastering process (establishing continuity between the analog tape world, the body, the plant-world, fire, etc). There is a clear sense of 'analog ethics' proliferating in music cultures, and perhaps for good reason! There is a *feel* associated with it which is *smooth* and *buttery*, and even feels *true* in a way that the digital doesn't.

The analog is more 'realistic' as it were, because it holds up to the infinite zoom such that all points are connected to adjacent points at an infinite level of detail. The difference between the analog and the digital is that the analog is described by continuous functions whereas the digital is described by discrete functions, where adjacent points can 'hop' from one value to the next without traversing the continuum that connects them.

The illustration from music culture introduces the theme as well as could be hoped for. Consider two points:

1) The musical analog is valued for its *feel*

2) The musical analog is characterized formally as a *continuous function*

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[51] William James, *Principles of Psychology,* p. 148

Hopping back between 1 and 2, we are hopping between an assessment of (1) *qualitative value* and (2) *quantitative value*. And the two valuations are not at all opposed to one other, but are rather two sides of the same thing.

The fact is that all quantity has its qualitative aspect just as all quality has its quantitative aspect, and that one is not reducible to the other.

In digital playspaces, *everything* is quantity. And everything is *digital* quantity. The analog value, the infinite zoom, can only be illusory. And yet, such illusions are well within reach. Resolution can be increased. Floating points can be used rather than integers (or integer-variables with higher wider min-max ranges). The *illusion* of continuity, of the smooth, even if it is not *really so*, will nevertheless achieve a greater *feeling* of sensitivity, of 'butteryness', etc.

When we abstract information flows from the environment, we can seek to *discretize* it as much as possible, which will be lower-resolution, less smooth. Or we we can try to count the information as continuous, with the full awareness that our 'smooth' will be a simulation built-up from the discrete.

Smooth abstraction approaches the 'butter feel,' and paves the way for a new kind of realism.

It's clear that an interrogation of pseudo-mathematical models (quantitative values) alongside a radical empiricism of haptic *continuity/smoothness* in played time (qualitative values) will begin to provide the conceptual tools we require in establishing, as it were, a structural theory of *loving* continuity between player and space, quantitative/qualitative dissolves, object/subject dissolves, an affective plane of consistency in which player becomes space and space becomes player (where "sport and player are the same")-- a plane whereupon we can account for the harmonic relations between the mechanical transformation of the computation in software and the Real empirical time of the player's own experience in life, this without ignoring the necessary reality of either 'pole's unique individuality.

Playspaces considered broadly may not require the quantitative description (even if they might benefit from it, as we'll explore soon in Jorn, Badiou, et.

al), but there is *no doubt* in my mind that to think the *materiality* of software, being nothing more than a Big Number, will indeed require a coupling of the quantitative and the qualitative, such that we are able to 'swap' between the two points-of-view at will, and even, perhaps, to integrate them into an intuitive Pythagorean whole, where math and music become once again the same thing.

Number *is* composed of feeling, too, in its own bizarre magical way-- it is just that we are all too used to having been taught numerical mechanics at post-subtraction phase, when the [musical] feeling has been stripped away in order to *optimize the problem solving capacity* of algorithms/functions, the internal mechanics of which may be wholly mysterious to us (I was never taught in school *why* many functions work, but only that they do-- the black-box is *useful*, but it is not beautiful).

Mathematician Paul Lockhart's essay "Lockhart's Lament" is essential reading insofar as it presents a loving, intelligent critique of the math education most of us, I assume, grew up with, in which math is NOT allowed to take part in the canon of the arts, humanities, and where likewise the humanities are not so keen themselves to celebrate math as part of their history. "The first thing to understand is that mathematics is an art. The difference between math and the other arts, such as music and painting, is that our culture does not recognize it as such. Everyone understands that poets, painters, and musicians create works of art, and are expressing themselves in word, image, and sound. In fact, our society is rather generous when it comes to creative expression; architects, chefs, and even television directors are considered to be working artists. So why not mathematicians? [...] the fact is that there is nothing as dreamy and poetic, nothing as radical, subversive, and psychedelic, as mathematics."

Game Designer Raph Koster has speculated "it may be that games are all about math. And I think that sucks."

Needless to say, I disagree. That 'games are all about math' does not suck at all, if we allow math to be the *poetic form* which so many of its truly invested practitioners have always known it to be. If we allow math to be the *mathesis universalis* of Pythagoreanism which is indistinguishable from a *musica universalis*, from a *ludi universalis*... Trip harder, think big (and small!),

mathematical creation in its proper sense has little to do with the shitty homework we all were forced to complete *again and again* as kids, the idea of even One is enough to keep us busy for a while...

To come to terms with the materiality of software (which we must learn to *love* if anything good is to come of our relationship with it) is an involved project, being built as it is of tangled structures and materials across many hierarchical layers, many cultural traditions, etc., all dabbling equally in the supposed 'bifurcation of nature' which has split the arts/humanities and the maths/sciences into two things which are supposedly *fundamentally different*...

Continuing with our interrogation of software, this two-faced qualitative/quantitative being, I hope we can satisfy ourselves today with a first attempt at an analogous articulation of a two-part division of *feeling creativity* which is immanent in software materiality itself, a further elucidation of some echoes of the structural and sensuous creativities discussed in the introduction. These are not the two-faces of number, but rather the faces of the matter-energetic flows that are manifest in any piece of software. As it were, this is like the texture of paints and paintbrushes, etc for a painter-- the texture of strings, of piano keys, for a musician-- the *structure and feel as One*-- this is the strict MATERIALITY of videogames, i.e. *what is vibrating? What is pulsating? What kinds of energy flows are happening?* It is only from this perspective that number is welcomed into the fold, insofar as vibrational structure is a product of number, and vice-versa.

Feeling *number* and feeling *vibration*.

It is my hope that these two might someday be counted as one. Structure is sequential; sequence is structural.

Feeling Number

The machines we use today are structurally not so different from those built by Charles Babbage and programmed by Ada Lovelace in the 19th century. Only (much!) *faster.* The conceptual-functional tools required for Babbage's difference engine-- Leibniz' early binary computationalism and Boole's digital calculus, looking back further still, 'immaterial' though they are-- these

traditions already established the *material* ground of the videogame-computational medium, far in advance of *Spacewar!* etc. This tradition is deep and difficult to penetrate, but beyond its surface-effects, it holds many gifts. *Logic as material*. And from here--mathematics in general is welcomed into the fold as Russell and Whitehead (<3) attempt to map all of maths onto the system of propositional logic in their *Principia Mathematica*. Turing's description of a universal machine which can compute all that is computable still describes our material, Shannon's information theory still describes our objects. And indeed, they *are* objects, pure and simple.

Videogame history LOOKS LIKE THIS. Music history does not begin with recorded music, and likewise, computational history does not begin with computation materialized with electronics.

A piece of software is, at the lowest level, a complex pattern embodied in a physical *object*. It is a “line” of information, one BIG number, or content-thing, represented by the computer-- this is just like a book, picture, or song.. This cannot be stressed enough! There is really no essential difference between software and “old media” -- it is a difference of *degree*, rather than of *kind*. All of these media are materially reducible to lines of information, which we drift through according to our taste. When we choose to read a book out of order, or to read MANY book excerpts in the course of ONE reading, as if they were all a unit (“one book opens another”) -- when we skip around the playback position of music playing in iTunes such as to recompose it -- when our eye darts around points of gravity in a painting, our attention drifting alongside, gradually constructing an inductive ‘whole’ from the variability of playing its parts -- when we do any of these things, we begin to experience the play-aspect of the material, and its variable likeness to software (albeit at a massively reduced timescale). It is just that with software objects, we humans are not the only readers-- some line-segments (function objects) function as *readers* themselves, thus functioning analagously to the variable drift of attention that we experience in re-reading a sentence, or in flipping from one page to another, or even one book to another-- this variable drift is built into the objectivity of the software itself. All games are built of games. All software is built of *readers*. “Sport and player are the same.” Attention is built into the object. Bret Victor has put up some excellent animations in "Learnable programming" which scrub through code, slowing it down to read it in our Real Time-- these are very good visual

examples of how code creates readers which drift through code, according to patterns in the same code that's being drifted through.

A piece of software's internal readers are playing a game on the consistent digital (binary) playspace defined by that which is computable. Ultimately, at this lowest level, there are only a few functions that can be performed with these binary units-- simple repeat/differ/move mechanics that can be built up to describe logical operators-- &, or, NOT, etc. Engaged at the lowest level like this, the computer MUST be engaged atomically, a string of binary values. There is *no continuity here*, but rather *maximum difference or repetition with every maneuver*.

Discrete ethics. This binary plane has had an enormous impact, I think, on how software, broadly considered, is designed: something like a "turing machine aesthetic", I'll call it, has infiltrated computational taste such that the binary thinking required by dealing directly with the bottom-level computation has leaked up to higher structural levels, with the result that even when we are 'skinning' (adding haptic-audio-visual content) the end-user playspace, we're still thinking in terms of simple ons and offs way more than is necessary. It is as if this lowest-level materiality of software were descriptive of all of its capacities, which is simply untrue. The recent excitement around object-oriented philosophy and its nominal association with object-oriented programming is a perfect example. In these structures, we are urged to think in terms of objects, which either ARE or AREN'T. Never mind that 'global warming' is certainly a *flux* as much or more than it is a hyper-object. Never mind the processes of individuation and dissolution which characterize the *becoming* pre-object and *becoming* post-object-- to use the word "object" itself turns us on in certain ways, like Bohm says, where we're thinking in terms of fragmentation, part-ness, rather than wholeness. The OOO work that I have read is really quite beautiful often in its dealings with objects, and its welcoming of highly complex fluxes into its ontology of things (even Whitehead's *flux-ontology* is built of atomic *actual entities / things*) but I do wonder, at a broad scale, what the cultural effects of thinking in terms of *objects* rather than *processes* is on our own thinking. In software designs, objects are often treated as a persistent phenomena, a plane of beings on which processes play out, but one whose structure is very much determined by the top-down-- that is, objects constituted as such, rather than as process. From this state of things, though the reality of the situation is

typically much less severe than I make it out to be, the space of possible computations is limited enormously by a TASTE we have developed for the persistent *solidity* of objects. We are even *proud* to have made solid objects-- *Art Works*.

But this is not at all essential. Indeed, from the simple mechanics of computation, the space of possibilities opens to include most all of those situations which are studied in mathematics (music), and the possibilities for non-solidness here are endless! Mathematics is absolutely insane. Transition liquidations, smooth functions, irrational number opening into infinite number, perpetual individuation along with perpetual dissolve; there are other images which might yet prove to be more *generatively* productive as working hypotheses to play off of. (Analog tastes).

We absolutely *should not* consider binary structure-sequence to be the *pragmatic* material grain of software. At higher levels, synthesized form can become much more fluid. From binary units, we can construct integers, from integers (/booleans), we can construct floating point/decimals, smooth transformations, etc. And it is only at the emergent complexity of such a high level like this that the forms of software can begin to resemble the forms of life we know from our everyday lives, and from our experiences of aesthetic subjective dissolve into the object of our attention.

We should seek to develop an intuitive feel for the *qualitative actuality* of number. The space where math and music, and even language, all information, are *quantifiable* in a sense, but without, by any means, reducing quality to quantity. Quantity itself *has* a quality-- "It is an undeniable fact that any given number is not merely one more than the previous number and one less than the subsequent number, but is an independent individual idea, a spiritual, moral, and intellectual substance, not only as much as, but a great deal more than, any human being. Its merely mathematical relations are indeed the law of its being, but they do not constitute the number, any more than the chemical and physical laws of reaction in the human anatomy give a complete picture of man."[52]

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[52] Aleister Crowley *The Book of Thoth*, p. 4

This image from the 'wickedest man in the world' shows a real respect for numbers as players, for the reality of what they are in our relations with them. Such images & uses of number as *ideal-substance* like this have been celebrated in the Hermetic/magical traditions throughout the ages. It should always be remembered the modern sciences have been grounded almost uniformly in these proto-sciences and their experimental magic-practices that, through time, gradually, and in bursts, have become stratified in the consistent numerical grounding of the sciences.

But even so, we must refrain from wild optimism. The positivistic understanding of number stands in sharp contradiction to the magical approach, and tends to reduce number's functionality to its *law*-aspect as manifest in the *mechanics* of logic, ignoring its qualitative/mythical aspects altogether.

The relationship between maths and computers is a truism that will surprise no one. Therefore, as path toward finding a *way* of playing with computation, the celebration of number-for-number's-sake is all too often doomed to complacency and vapid reproduction (approaching *cloning*) in current climate which is all-too-proud of number's utility (generating, above all else-- *income*). The full qualitative breadth of number's *ideal* function in our lives, which is beyond the reductive functionalism of utility/ instrumentalization, must be restored.

Even though COMPUTATION itself is pregnant with infinite possibilities (the digital/countable infinite), there is nothing inherently *good* about this infinite, nothing even *exciting*-- Thoughtless habitual repetition is just as likely as proper novelty (maybe more likely)-- there is nothing stopping us from simply recycling the most common paradigms (often those of our childhoods) without even thinking about it. This poses the threat of a kind of conceptual nihilism which proceeds along a path of given values without change, leaving massive holes in the computational space of possibilities which remain totally unexplored, without even any currents suggesting their possible realization.

More and more, I'm afraid we will naturally incline toward designing a world of *things* that are abstracted away from their becomings (such that the thing is a *mere thing* rather than a *living being,* in which a potentiality for becoming

might be presupposed)-- our experience of natureculture will be reduced so as not to be composed the ever-changing rivers and growing plants and evolving anarcho-politics, but rather the computable-striated structures we know from Facebook, File-menus, object-browsers, numbers of 'likes', the State, the Market, etc.-- countable informations, all. These aesthetics of *fixedness*.

To escape this kind of banal evil, we must have *our own* sense of what kinds of *paths* we would like to take, walking through these new computable structures, what kinds of forms might grow naturally in our very real senses of possibility.

To this end, it is essential that when we are playing, when we are operating on & transforming materials-- *we will need Ideals*.

Number, having become qualitative, beyond (and prior to) law, receiving the full affective force of the Real number continuum and its infinite extension and scalability. Receptive also to the affects of the low-integer values:

1-Unison ; 2-Octave ; 3-Fifth ; 4-Fourth 5-Major third

1-Monad, 2-Dyad

1-Object 2-Assemblage

1-Self ; 2-Friend

1- Being / 0- Nothing

And ideally, *playfully*, we would not like to *impose* anything on our materials at all-- rather, to find, to *coax* out existing tendencies of the materials, lying latent, to collaborate *with* the material itself, to not force our ego into it, but to engage in dialogue, to let it enter us as much as we enter it.

"This is the true Magical Doctrine : Zero equals Two"

Real Ideals, which are *not named,* and yet which are given our most loving attentions.

Once software design begins, so does the necessarily *judgmental* process of material imposition, and this cannot be escaped. Still, we would do well to tune ourselves into a kind of sympathy with the material-as-material, *number-as-material*, before the goal-orientation of engineering begins. And during engineering, we should always be prepared to listen to and to follow and interruption or accident of any kind. The quality of this interruption is a kind of playfulness which will go unnamed, such that it can be used as our Ideal.

Such is a first attempt at describing a possible *way* of seeking *feeling in number*-- which is to say, to formally evaluate a player or a playspace in such a way that its *structure* can be rigorously identified even while each of its component structural parts and the inductive whole of its Being a *thing* is felt in the heart/gut as much as in the head.

Feeling Vibration (Skin)

But to stop here would be to ignore that most essential fact of videogames-- that we play them by *touching* them-- with our fingers, our bodies, our eyes, ears. As 'end-users', we interface not with the brute structure itself but with the *skin* of the videogame considered as a *playing thing* (a player), and the manner in which this skin, or *vibrational actuality*, makes contact with our own.

If playing exists *between* players which are counted as separate individuals-- it is with the connective glue of *skin-touch* that these players *play with* one another at all. It is the sense of *touch,* broadly considered, in which the Eros / *desiring love* of play ethics are grounded. This is to say -- in an ethics of *multiplayer* games (all games), an account of what transpires *between* players must in all cases be materially reducible to the situation of an immanent *haptic* playspace -- where haptics accounts not merely for the classic idea of "touch," but also for-- *sight, hearing, tasting, smelling,* and even, essentially-- *the sense of possibility. Touch/haptics* must account for the plane of all of sensory experience and the &-ness of objective reality in general.

Lucretius' presentation of the Epicurean doctrine of haptic-seeing is an instructive model at this point, and despite being old-fashioned, it seems well-enough up to date for our purposes:

“It is established, then, that these films [glues, emanating from objects], as I call them, are moving about everywhere, sprayed and scattered in all directions. Since we can only see with our eyes, we have only to direct our vision toward any particular quarter for all the objects there to *strike* it with their shapes and colors.” (*On the Nature of the Universe,* p. 138)

No matter how appropriate we may deem the metaphor of ‘films’ as a description of the glue between objects and sight, there always remains a very real sense in which sight must be considered fundamentally haptic-- that light vibrations/photons do indeed come into material contact with the vibrational surface of the eyeball itself, that this must be accounted for, pre-consciously, as a haptic force, unique in its particulars, but not fundamentally different in *kind* from the more common examples of haptics (i.e. getting cut by a knife, making a sandwich, etc). In the process of actively transforming material presences, the haptic sense is that which lets us know that these materials can be transformed at all! All painting, all sculpture, all music-- *haptics*, before anything else. “One might say that painters paint with their eyes, but only insofar as they touch with their eyes.” (Deleuze, Logic of Sensation, p. 155).

Indeed, following Lucretius-Deleuze, *all* play is haptic, and *all* haptics are-- *immanent* to the *present situation*. Here, we are interested in the *top-level* of software materiality, that which is, in industry terms, given to the "end user," the compiled package, executable, etc., and *its skin*. The *thing that we play*, that which exists in *our* sense of Real Time, *with* us, the connective glue between the world the body the mind the machine the computation.

There is sometimes discomfort in videogames communities about talking about the 'grain' of the material that's used to make videogames. It sounds to many like it's going to be overly formalistic, dogmatic, limiting as opposed to liberating. But I believe when the formal grain of videogames is properly considered, the effect is just the opposite. I believe it is only that actual resistance of the materiality of a particular medium that can save us from hyper-structural thinking and mindless repetition of formal dogma. The resistance, or *grain* of a material is simply its immanent reality -- its *properties*, *capacities*, and *tendencies*, to use the language from Manuel DeLanda's ontology of emergence.

Videogames, as distinct from software in general, are defined by computer input-output structures, and their ability to form connections and initiate feedback flows with us as organisms, allowing for an ‘amplification’ of the scale of the turing-computational materiality, such that parts of it can now flow in the rhythms of our own human-scale spacetimes -- intensive real-time, vibrational space. Simply put, vibrations come out (image, sound), and vibrations go in (presses, grips, turns, etc).

The material transformations are filtered through our own private experiences, perceptions, consciousnesses, and now, when we feed input back into the machine, we find ourselves in a confusing place. Though the situation as described by the computer is still perfectly computable as such, we have bridged a gap between the substance of our own play and that of the computer, and we have imparted the virtual flows of our own decisions and automatic behaviors into the structural configurations of the space. This is a powerful thing to come to terms with! What was uncounted has been counted, and not by us, but by the machine.

Putting computational spaces into touched motion, allowing for the affordance of free variables in this space, such that it becomes responsive to our input, that it becomes a haptic extension of ourself (and our selves, an extension of the computable space)-- this is the grain of videogames, and I think we have no idea, yet, what the implications of this grain is.

It is perhaps a kind of *music*-- but *what kind*?

We are still too interested in logic, in computational form, in its ‘unamplified’ state. So many videogames, with their discrete divisions of parts, clear goals, "clear meanings," etc. are not at all cutting with the grain of the input-output vibration itself, which requires amplified sensitivity to *skin*-- our own, and the game’s. A *looking away* from the counting, at least temporarily, to exist in the pre-count of Real Time and its perpetual stream of haptic vibrations-- this is the necessarty precondition of coming to term with the vibrational reality of games.

Perhaps some are afraid of what a transition toward vibrationalism like this might mean, that it might be a kind of backwards move in terms of intellectualism, that we would be giving into our animal or infantile selves by

privileging vibration over problem-solving or what have you, that we would be abandoning so much good work and progress that the still-new form of games has achieved thus far.

But this cannot be the case. We are dealing with a simple material fact here, that we DO see these, and we DO hear them, and we DO touch them, and that when we do all of this we become a player-assemblage WITH the game, just as we become an assemblage WITH a pencil when we write with it, or WITH a book when we read it, or WITH a piece of music when we play it. All of this is factual, even if "animalistic" (cats have musical-vibrational preferences, too, so we are not dealing with strictly 'human' aesthetics anymore)-- we are not looking away from the *count* forever, but only suspending this faculty in order to be fully receptive to the aesthetic encounter. Besides, why should we be ashamed of playing like animals or children? It seems clear that it most cases, they are *better* players than grown-ups, even if grown-ups are better workers..

Invisible Glues: Inconsistency, Irrationality, Infinity

Our internal experience of being in the world (*playing*) is inconsistent with the the abstract image of the computer's internal experience of sequential-structural counting. The computer's 'insides' are withdrawn.

We touch the machine, the software reads our input as a string of data, and as far as it is concerned, *this* string is the full extent of our existence. But of course from our point of view, this is patently false, we've in fact only provided a very small amount of information to the computer, which was produced by the full complexity of our experience, our mood, feelings, our desires, etc., but which was reduced to the string in order that the computer could read it. It as if our lifeforce has been turned into a object-fossil in order that the computer might attempt to understand *who it is* that it's interacting with.

We, as players are *touching everything,* and such is our subjectivity. We are likewise composed of sub-players which are touching each other, giving us life. Sub-players build even our own *rational-computable* tendencies as high-level brain-body systems of internal haptics-- nerual clouds forming social groups, friendships, loves, hates, *feelings* of all sorts (weights)... There is

nothing in the body that is not *touching* in the broad sense. But inside the skin-sack, there is a world of touch that is inaccessible to the computer, just as inside the computer there is a world of structure-sequence that is (more or less) inaccessible to ourselves (more accessible the more we're skilled at programming the space the computer is running in).While it is possible that one day embodied neuro-cognitive sciences will have progressed to the point of *mapping* our mind-body to the extent that all of our organs are able to output an immense manifold of strings straight into a piece of software such that it seems to register our every movement and thought -- not only is it not possible at the moment, but even if it is one day, the fundamental inconsistency of *our own local experience* with that of the software will forever remain. The OOO position that objects are *withdrawn* from one another, that they cannot exhaust one another's potentialities-- this holds true in a magnificent sense as applied to the relationships and *gap* between players, in this case-- between human and software.

This unbridgable *gap*, which is nonetheless *teased* at by skins, glues, information flows, is an *inconsistency* in the computable-game situation which might yet serve as yet another *grain* of the medium.

We *see, hear, feel, think, SENSE* one set of information from the external world, and this Set constitutes our situation, our *being* in the playspace. Meanwhile, the game feels an entirely different set of data, which we provide (we are its external world)[53]

It is possible that even in the structures of computation itself, in its free play, we can begin to identify fossils of inconsistency (what *we* are lacking, what the *software* is lacking), and thus integrate this uncountability, this *remainder* of experience, into the formal theory, such that the vibratory-filtration through touch in the connectivity with the player is never regarded as secondary or ornamental in any sense, but, in fact, the key window into the truth of the situation as a whole, which is not an isolated computational structure, but one which is being touched by the whole universe filtered through the flows of the player, even as this Whole Universe (which is local

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[53] Considering *videogames*, naturally, and their input-output feedback structures, which is the concern of this essay. Computation considered more broadly will be conditioned by various other sorts of input (which are of concern in the design of games moreso than in the play).

to the player) is lost on the second player (which has its own Universe, too, inconsistent with the first).

There are, indeed, *at least three* related concepts in mathematics that appear to shed light on the *limits* of the computable, that may likewise shed light on our own *experience* of a space as it transcends the computational work of the software itself-- these three are:

The *irrational*,

The *inconsistent*,

& the *infinite*.

If we have begun our study of *feeling-number* by, say, developing a feel for the integers and their relations to basic harmonies (musical skins), the study of this non-computable trio of mathematical concepts represents, as it were, an outer boundary of quantity itself, and to touch these concepts in play, in computation-- this might be thought of as the (way too ambitious!) *aim* of the present work... An *aim* which can only be successful if it is followed up by what would probably be years of formal studies in mathematics.]

An aim which might-- just as we have mentioned in the introduction a hope to move *through* the irrational back into the rational-- reverse the process again, such that we are able to move through the *rational* (the consistent, the finite), to return to a hyper-potentialized irrational, which is outside of the domain computable, even as it embraces that which is fully *within*, immanent to, its capacities.

That Kurt Gödel has achieved something of the sort in his famous proof of the necessary inconsistency of any complete formal system (or vice-versa) is a promising thread to follow. This, tying back to Russell & Whitehead, tying *forward* to the Strange Loop, and back again, again, again, to the time of the Magi, of Hermes, of the Ouroboros-- the snake eating its tail. Self-reference. Recursion.

Could this be our gateway to the ratioanlized irrational? To the *irrationalized rational*?

The approach toward this strange paradoxical land begins with the problem of the continuum.

The Problem of the Continuum / Immanence & Irrational Number

In the last chapter, I mentioned Heraclitus' flux-fire-war ontology as prototypical of play-oriented ontologies in general, sometimes explicitly so, where play=flux. Heraclitus' greatest critic was Parmenides, who said just the opposite, that *All is One*, the cosmos a sphere, and that a condition of this oneness is that real irreducible multiplicity is impossible, that *motion is impossible*. This is an absolutely bizarre paradox, and an essential "node" in the canon of motion-thinking. For Parmenides, everything that we perceive as motion or as multiplicity is an illusion. Play, then, is likewise an illusion, and it is interesting to note that the affinity between the Hindu concepts of *Lila* (play) and *Maya* (illusion) may represent a kind of mythic solution to this cosmological problem, play and illusion considered as a necessary and irreducible cosmic duality (also Schopenhauer's Will & Representation filling similar holes). In these spaces where paradoxical thinking starts to bite at its own tail, we begin to feel a *mood* of the immanence of the infinite *in the finite*. Which is-- *ceaseless motion* itself, VERTIGO! Logical consistency eats its tail, and in its grain, the dual reality-illusion of motion and play is revealed.

This thesis that 'motion is impossible' sounds absurd at first (and *at last*), but it is not so difficult to think our way into the mechanics of the paradox given the proper conceptual tools.

Zeno of Elea ascribed to Parmenides' cosmological model, and to convince others of its necessary truth, he composed three famous disproofs of motion. They are each basically the same, following this logic:

In between any two points in space, it is shown that there must be a midpoint, and between one of the initial points and the midpoint, there must be another another midpoint, and this process, mathematically, can be repeated *ad infinitum*, zooming into fractal detail. To move from the starting point A to the end point B requires passing the midpoint C. The move from A to C requires passing that segment's midpoint D. From A to D requires passing midpoint E, and so on.

So, if we would like to go from one point to *any other* point, no matter close, we will need to go halfway first, and on and on, and it will not be possible to move at all.

This is absurd because it is obviously untrue in actuality, but is the thinking not sound?

Infinitesimal 'chunks' of space, infinitely small bits, that's what we're left with, and this is the premise from which the Leibnizo-Newtonian calculus constructs motion about 2000 years after the original formulation of the paradox.

The calculus solves ‘something’-- Newtonian celestial mechanics, descriptions of speeds, accelerations, rates of change in general are now possible. Some consider this a solution to the problem of the continuum-- and what an inspiring solution it is, dealing with ‘infinitely small’ bits of space like this.

But even the calculus’ approach is not so satisfying in the long-run.

You see, having divided the points in space infinitely many times, there are still *greater* infinities of quantity that are *completely unavailable* to our reasoning as we step along this infinitesimal series of quantum steps. The series we’ve constructed is infinitely detailed, but it is *still not continuous, smooth.*

These ‘unavailable’ quantities are the IRRATIONAL numbers, those which cannot be represented by a fraction-- such as Pi, such as the square root of 2, *e,* etc., and those are merely a few famous examples.

There are infinitely many irrational numbers that Zeno's metric *divisions* simply are incapable of accounting for, being based on a fractional series as they are. Divide again and again, 'all the way' to infinity, and there are still more infinities beyond this first.

Between every infinitesimal, there is an infinity of irrational numbers that are entirely uncounted by this process.

Irrational quantities-- these *cannot* be computed. They do not end, they are real infinite values, and we can calculate more and more digits, as many as we'd like, but their status as completed numbers are not countable by a computer, nor are they accessible by processes of infinite division. This is why we are always finding *more* digits of Pi, but why we will not reach an end at any point.

And it is exactly these quantities which we are most interested in, these irrational numbers which make up almost ALL of the Real number continuum, where *infinitely more is irrational than is rational*. These quantities which the computer can't handle as such, but which, perhaps, we might use as models for the qualitative-quantitative *value* of our own Life. The *paths* that we walk, the One game that we have played...

The wobbly lines of our *stream of consciousness*-- are these not irrational, or at least *approaching the irrational*? In quanta & qualia both? If we were able to output a manifold of data that accounted for every movement of Mind-Body, and we were to look at the data, it would seem to approach infinite variability, even as higher-level patterns built themselves on the lower.

The *lines we walk* -- which might be *drawn, looked at, played,* etc -- these are always irrational in their fine-grained composition, even when we try to impose a rationality, or *plan*, on top of them.

We have walked only *one* line our whole life-- a family circus cartoon showing our path walked every second of every hour of every day of every year that we have lived. How would we describe this number with computation? A *vast* number would do it, but would it actually transcend repetition of the input and encode a pattern from which we could generate the rest of our path? No-- there is the inherent unpredictability/uncertainty in the One path that we have walked which, like an irrational number, is irreducible to fractional (relational-patterned) representation, and which will continue without end until our death to walk in this same irrational way again and again, never to be pinned down as a reduction or count.

Or something like this...

If there is any relation between quality and quantity, it seems that *in life,* we may have been granted an *immanent* experience of infinitely precise irrational number existing at the quantitative *ground* of our sense of quality, which is the drift of our attentions, feet, hands, etc-- Indeed, the One path that we have walked through our whole life cannot be properly said to be *just* One at all, but is pure multiplicity to the same degree as the irrational number is, an irreducible infinity, where our paths are constantly tapping into trans-personal flows whereby hands turn ink or pixels into words, for instance, which meet others' eyes, and potentially influence their own path, for better or worse, connecting ceaselessly, with no bounds, across time-space-concept-materials.

It would seem that, logically considered, our conceptions of space, whereby distances can be divided again and again until motion is disproved, and of time, which *obviously moves*-- are *inconsistent* with one another, which is (an overly simplified articulation of) what gives rise to this paradox. Parmenides' solution of Oneness, which zooms out to seek a higher level plane of consistency, is perhaps not so absurd as we might at first think..

And yet, that a kind of *conceptual motion* is involved in arriving at this conclusion ought to be considered a hint as to the true nature of motion and stasis, that even to arrive at the concept of of stasis, the Form of the One, involves a process of material (here, psychological-conceptual) transformation.

We will not dwell on the problem of the continuum, which has stolen whole lives of attention-focus from many inquisitive minds (and which you will find plenty of external research on, if you would like to dig in).

Rather we will continue moving forward with continued analysis of the classic Parmenidean/Heraclitan ideas, as now enriched by Zeno's thought experiment:

All is one (unity) and *all is flux* (multiplicity), and it is possible, maybe even *necessary*, that these concepts coexist in paradox.

Georg Cantor

"To become what one is, one must not have the faintest notion of *what* one is."[54]

When we form form a unity out of a multiplicity, we are 'counting it' as a One (Zeno and Parminedes, for instance, counting the World as one).

This is one principle of *individuation*, which allows an an object to be counted *individually* as such. Individuation poses material questions, as to the 'edges' of objects, in space and in time. It likewise, and simultaneously, poses psychic questions, as to the 'edge' of concepts-- and spiritual questions, as to the of the self-- this latter process of Self-individuation of central importance to Jung in his theory of alchemy. "To become what one is ..."

It also poses mathematical questions.

The problem of individuation, formalized as a *numbered* concept, is in its modern form derived from the set theoretical mathematics of Georg Cantor, which can be used to formally articulate, it seems, just about anything that can be be formally articulated (insofar as any formalism is structural/ mathematical in a broad sense). Cantor's studies of the infinite grew out of studies in *irrational numbers* (which are there own micro-infinities, as we've discussed). and in *point-set topology*, or what seems to be a kind of discretized *continuous* 'situational analysis'.

A lay introduction to Cantor's theory of sets is deceptively simple. From Ian Stewart's *Concepts of Modern Mathematics:*

"A *set* is a collection of objects [*a set is a Many, a multiplicity*]: the set of all English countries, the set of all epic poems, the set of all red-headed Irishmen. The objects belonging to the set are the *elements* or *members* of the set. Thus *Paradise Lost* is a member of the set of all epic poems; Kent is an element of the set of all English countries. Although in introducing set theory it is helpful to work with concrete sets, whose members are real objects, the sets of interest in mathematics always have members which are abstract mathematical objects: the set of all circles in the plane, the set of points on a sphere, the set of all numbers." (Stewart, pg. 43).

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[54] Nietzsche, *Ecce Homo* p. 254

To build from this tiny definition alone is a massive simplification of what set theory is capable of (namely, describing *all* of mathematics!), but we can already pick out some relevant points of interest here by digging further --

If *Paradise Lost* is an element of the set of all epic poems, then what is *Paradise Lost* itself a set of? What are its members? We might say that it is a set of all of its words (or all of its sentences, which are then each sets of all of a sentences words). This is broadly the computational approach in vogue, to reduce *Paradise Lost* to a string of information (books made of stanzas, stanzas made of sentences, sentences made of letter, letters made of binary strings). But something is missing, no? We could also say it is a set of all of its characters and their behaviors. Defining each member in these terms will give us a very different constitution of the set, filled with subjective/feeling interpretations throughout. Indeed, to divide behaviors themselves becomes absurd past a certain point, because behaviors are described across all scales, and exist in us as much as they do in the material of the text itself. This set thus becomes process when we read it, when we drift in it, when we internalize its behaviors as our own. We can think about anything in this way. Any object as both set unto itself and member of another set. A Set is like a box of objects, each of these objects themselves a box of further objects, an infinite regress into the infinitesimal. This is the theory of Parts and Wholes that's been hiding in the shallows for so long, waiting for full systemization...

Sounds like Zeno's lessons, sounds like *Infinite Sketchpad*.. It is no surprise that the famous Cantor Set (an elegant demonstration of this infinite regress), regarded for the longest time as monstrous and pathological, serves as the conceptual ground of Mandelbrot's fractal geometry, a relationship which will be given further attention in the next section.

Georg Cantor's set theory is said to be capable of presenting anything that is presentable in mathematics. One of its main accomplishments is a 'solution' to the problem of the continuum, as presented by Zeno. This solution relies on Cantor's theory of transfinite sets, his positing of the hierarchy of *different* infinities, where the set of all *rational numbers* is *countably infinite* (this is the *digital infinite*), while the set of all *irrational numbers* is *uncountably infinite,* which is to say-- *more infinite* than the former set. These concepts loop and scale in a transfinite hierarchy of infinities, which I do not understand enough to write anything about. And then ultimately, there is the

final Absolute infinity, God, who is described as-- an *inconsistent multiplicity*.

Whitehead's review of the meaning of *inconsistency:* "The concept that two propositions, which we will name *p* and *q*, are inconsistent, must mean that in the modes of togetherness illustrated in some presupposed environment the meanings of the propositions *p* and *q* cannot both occur. Neither meaning may occur or either may occur, but not both. Now process is the way by which the universe escapes from the exclusions of inconsistency."

Inconsistency has appeared once again, "I am lying"-- a Final Infinity, ABSOLUTE, which, by the above definition, is composed of parts that cannot occur simultaneously in any environment which we are capable of presupposing. Existing together on a plane that, if it resembles 'consistency' at all, is an Ideal-Virtual consistency that cannot be accessed by our logical faculty.

Cantor associated this Absolute infinite, and thus inconsistency also, with God. Cantor's Absolute infinity is prefigured by Bruno's infinite universe, itself inherited in part via Nicholas de Cusa's cosmology, and it is no surprise that there are some tendrils of Hermeticism in the thinking of both philosophers.

Beyond a certain point in his career, Cantor turned his attentions almost exclusively to theology and outlining the metaphysics of an Absolute God who can only be represented as Inconsistent Infinity / multiplicity. In its own way, this re-iterates the principles of Negative Theology espoused by Pseudo-Dionysus and others, which says that God can only be known by what He is Not. That we can know God best by naming all of the things that He is said to be, and by saying that He cannot be any of these things, because he is unknowable, and that the greatest knowledge of God is thus to be found in our most profound emptiness, nothingness, potentiality, *inconsistency*. This sounds also like the creative *void* of the (some, or all?) Buddhist thought, the Christian 'poverty of spirit' and its infinite potentiality which is celebrated again and again by Meister Eckhart, Lao Tsu's "the eternal Tao cannot be named."

Not only these religious tendencies, but indeed much of Cantor's thinking was scandalous in the mathematical culture of his day. As is common with a regime change of any sort, the introduction of such a radically new and powerful paradigm, set theory's early history is fraught with religious-scientific drama. As it happened this time, however, it was not the mathematical community, but rather the spiritual community, particularly the Catholic church, that first embraced the radical innovations of Cantor's mathematics, particularly because of how it defined God, the uncountable (inconsistent) infinity, in a way that seemed to serve as a nice means of modernizing the church's relations with modern scholarship, positivistic sciences and mathematics.

Cantor's late life was dedicated to theological pursuits and a philosophy of the infinite grounded in the structure of his mathematics. It is from this latter *mood* of religious awe in the face of number extended into its infinite territories, as much as from the earlier rigorous technical work, that I hope a modern computational (and non-computational) pragmatics might orient itself toward.

Situationist Topologies / Rhythmanalysis

We are ostensibly concerned with *play ethics*, and yet the search has devolved into a pseudo-metaphysical pseudo-mathematical interrogation of the Infinite, the Irrational, the Inconsistent. Have we lost our way?

No-- there is a *living quality* of the infinite, of the irrational, of the inconsistent. The quality of the everyday uses of these words indeed is not equivalent to the quality as described in mathematics, but they are not so distant either.

Thus, the irrational *walk* looks like a wiggly line, a manifold of shifting goals, of attractions and repulsions, while the *rational walk* looks like a planned design, a pattern, an intention, the quickest way of getting from getting from point A to point B.[55]

[55] which is to say-- *never*... haha! :)

It is only by blurring the edges that exist between *quantities* and *qualities* that we'll be able to open ourselves to the full potential of the *material* of number in a creative partnership.

Let's refocus for now on movement, on intervention in the *present* -- an attempt to disprove Zeno's paradox in practice (of course Achilles *actually* catches up to the tortoise!), and to draw our attentions in a radically different temporal zone in the hopes of opening ourselves to the potential breadth of applications an infinite-inconsistent theory of played number might give rise to.

Recall the Situationist International project-- following Marx's critique of alienated labor and the work ethic, following *Homo ludens* potential applications for a new post-war urbanism, for the Situationist the world is a playground, a game, the stakes are life and death, art, love-- Kill Art, Kill State, make way for the new. Never Work.

This is an image of the smooth ethic *par excellence*, *flux pragmatics*, aesthetic anarchism, weaponized-- these currents are worthy of study by anyone interested in the radical applications of playing, and the irrational thread of which they are composed will ultimately serve to ground a key formal element in our smooth pragmatics.

The early history of the Situationist project--which can be explored further histories by MacKenzie, and the excellent compilation by Ken Knabb-- emerges smoothly from a handful of other avant-garde movements-- COBRA, The Lettrist International, etc., each of which was concerned with its own kind of transformative play, modern situational alchemy, practices that would, in the latter movement's language, allow for the *creation of new situations*. By no means a simple matter of craft, the project was one of intensive communal creativity (*playing-with*) and sensitivity to the changing environment and its 'ceaseless creative advance', seeking a new truth in the emerging forms of the modern picture-canvas, dialogue, city. Modifying Huizinga, the Situationists construct a magic circle with dissolving edges, becoming a magic cloud, or a magic goo (more on this chapter 4, points becoming lines becoming planes).

The project erected the conceptual grounds of a remarkable interdisciplinary playspace, composed of urbanists, artists, musicians, all exploring these new play-models with the decidedly militant goal of turning the modern world into a playground-- or, more locally, the goal of simply *playing* the modern city, or of *reading* the space as an effective player itself. By simply *playing* something, it is thought, it is possible to turn what was apparently 'other than' a game into exactly its opposite-- a game.

Many of the situationist practices are formalizable such as to be applicable outside of their immediate historical concerns. The *dérive,* or *drift*, functions as a central concept in ALL PLAYING, to be used as a conceptual atom referring to simple movement (walking a line) within the dimensional constraints afforded by a playable manifold (a situational geometry or shifting possibility space).

Guy Debord, Situationist secretary and figurehead, describes the *drift* as follows :

"One of the basic situationist practices is the dérive, a technique of rapid passage through varied ambiences. Dérives involve playful-constructive behavior and awareness of psychogeographical effects, and are thus quite different from the classic notions of journey or stroll.

"[1. *Enter into dialogue as player with playspace*] In a dérive one or more persons during a certain period drop their relations, their work and leisure activities, and all their other usual motives for movement and action, and let themselves be drawn by the attractions of the terrain and the encounters they find there. [2. *Identify psychogeographical topologies*]Chance is a less important factor in this activity than one might think: from a dérive point of view cities have psychogeographical contours, with constant currents, fixed points and vortexes that strongly discourage entry into or exit from certain zones.

"[3. *Engage Memory & Instensify the sense of possibility*] But the dérive includes both this letting-go and its necessary contradiction: the domination of psychogeographical variations by the knowledge and calculation of their possibilities. In this latter regard, ecological science, despite the narrow social space to which it limits itself, provides psychogeography with abundant data.

"[4. *Define manifold-ecologies in terms of parts and wholes and relative rhythms/harmonies played by the space's centers of attraction*] The ecological analysis of the absolute or relative character of fissures in the urban network, of the role of microclimates, of distinct neighborhoods with no relation to administrative boundaries, and above all of the dominating action of centers of attraction, must be utilized and completed by psychogeographical methods. The objective passional terrain of the dérive must be defined in accordance both with its own logic and with its relations with social morphology."[56]

Debord has here begun to describe a practice that formalizes space in terms reducible to neither subjectivity or objectivity, spaces with the drift acting as a kind of connective glue or dissolving agent between the dual player and space, blurring the edges of the magic circle. "Psychogeography" is the *practice/play* of this between space, and its methods, beginning with the *drift*, and continuing with the *topology of situations*, among other things, should be regarded as axiomatic in any theory of playspaces that seeks to refuse drawing a hard line between space and player.

The idea that mathematical structure (topology) could aid in the further formalization of these play-tactics occurred first to Asger Jorn, the eldest member of the group. He's a really vital force in the whole situationist project, playing the aesthete to Debord's politician (though the two concepts are meant to dissolve). He was a member of COBRA, with is itself notable for a kind of "material anarchism" it celebrated, a project with the self-declared goal of "complete freedom of color and form"-- basically freedom for *all materials* of the canvas, so long as it is counted as a merely 2-Dimensional basic plane.[57]

Jorn believed the Situationist theory of the dérive could be replaced or strengthened by a real-time approach to playing out the dynamic N-

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[56] "Theory of the Dérive", see http://www.bopsecrets.org/SI/2.derive.htm

[57] The images are great! <<------ The practice of *detournement* (sampling) is really off to a beautiful start here, and there's a lot that even linear music composition still seems to be learning from the aesthetics tunneled into with these early works. A principle movement seems to be a kind of *pseudo-smooth* juxtaposition of 2 apparently inconsistent worlds. Inconsistency that is treated as true, beautiful, strange, fundamentally different at one level while virtually sculpting with the materials a manifold drift-image of an intuitively felt higher level plane of consistency, in which the seemingly irreconcilable difference are felt as many and as one. 2 planes intersecting, playing. OVERDUBS, the first plane does not play back in these. intersecting

dimensional manifolds that are described in *topology* concepts without any loss of meaning.

This should not be a surprise, having read Debord's introduction to drifting. What he describes as being complex but irreducible to chance-- "cities have psychogeographical contours, with constant currents, fixed points and vortexes that strongly discourage entry into or exit from certain zones"-- is indeed a description of the dynamic connectedness and intensive dimensionalities that are often considered under the domain of topology and its maddening manifolds.

Topology's given name in Latin was *Analysis Situs*, meaning *situational analysis*. This, beyond being a cute coincidence, points toward a framework for thinking of any playspace (situation) as an N-dimensional manifold with varying (in space and in time) patterns of connectedness, attractions & repulsions, rhythmic patternings. This sort of model is *computational*, counted, and is ripe with potential for being used in models of new playspace designs.

Topology studies the properties of spaces that remain invariant under continuous transformation. The classic example is the donut becoming a coffee cup. These two forms are topologically equivalent, each is a 3-D blob that has exactly one hole in it. It doesn't matter that the coffee cup has a crater pressed into it-- the pressing is a continuous process, there is no rupture of connectivity. This is of course true only for an Ideal coffeecup-donut, the real physical materials would absolutely have rupturing points. Trying to pull a cup shape to then press in out of the side of a donut would just crumble the donut at the critical point, and was One what donut would become Many donut crumbs, with entirely new interrelations, as per their landing-zones and points of contact.

We've already encountered the dissolving magic circle, between player/space/edges-- now, using topological drift mechanics, we might be able to add to our arsenal formal models of the *folding magic circle*, the *melting magic circle*, *stretching*, *smearing*, etc.

Situational analysis… When we talk about a theory of 'playspaces', the word can at any time be substituted by 'situations,' there is really no difference between these concepts, aside from the playful call-to-action of the former.

The Situationist play cultures were very much concerned with developing pseudo-computable/structural models--especially in its early days, *S.I.* was preoccupied with developing precisely what we're after, a simultaneously formal and *played* theory of playspaces (situational geometries, toplogies), of situational connectivity & drift that exists *psychogeographically*, in the dissolved player&space.

In connection to the "free materialism" of COBRA, it's also it Asger Jorn's artistic practice and theories were closely linked to his metaphysics of *difference,* in turn, a part of his yet broader project of "reconstructing philosophy from the point of view of the artist." In the late 1950s, he was working on a book outlining this metaphysics, which predated a kind of conceptual zeitgeist a decade into the future, with Gilles Deleuze's *Difference & Repetition,* which takes up situational-topological questions and Jacque Derrida's *Writing & Difference* both appearing in the famous year 1968 that is big for the Situationists, too -- Metaphysics of difference, more broadly, can be traced back to the motion/play ontologies we discussed in the first chapter, and the notion of *plurality* as opposed to *unity*, *multiplicity* opposed to *oneness*. Binary 1-0 Being-Nothing is the dyadic gesture of *maximum difference*, and this is material grain of computation, *information*.

Debord responds to Jorn's 'formalist' suggestion:

"Very interested in the situological and situographic developments of topology. It will be necessary to *quickly improve all of its scientific conclusions -- and to adapt or detourn them*. The first task of our position is to intervene in it as an artistic activity (with a game of gestures elevated to the dignity of art), whereas the tendency to objective observation had previously been dominant."[58]

To elevate a game of gestures to the dignity of art -- this is the project of *playing* quantifiable structure and coming to *know it as qualia*, to reclaim number from the strict goals and instrumentality of the techno-sciences, to find *music* in number once again, and conversely, music (as *played* number) in the situation, the playspace.

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[58] tendency to objective observation becoming game of gestures == classical empiricism becoming radical empiricism

Number is always *rhythmic* in the music we listen to. All pulse at all speeds is rhythmic, even when we begin to perceive it otherwise: whether at slow pulse which is perceived as structure, or a moderate pulse that is heard as tempo or at a very rapid pulse that is heard as tone, and the combinations of rhythms at all 3 levels, heard as textural-architecture, polyrhythm and harmony. Irregular-pulsation is likewise rhythmic, as a series of events distributed fractally as with the scaling, and often a loose 'free rhythm' common in improvisations and 'wonky' beats, etc.

But we are not interested just in a music that is built of sounds, and the theory of rhythm that it has generally produced and propogated-- it is instructive to look to the rhythms we live by and are surrounded by everyday.

The more generalized *Spactime Rhythmanalysis* is a concept that comes from Henri Lefebvre, author of the "everyday life" philosophy, a major player in conditioning the values and practices of the Situationists. The aim of rhythmanalysis is to develop a theory of played rhythm in the broadest sense, across all scales, not limited to those typically associated with music.

The concepts of *smoothness* and *striation* will be very useful for us here, and will point toward a way of thinking and playing a *rhythmic* approach to the concepts of motion, the problem of the continuum and inconsistency.

Pierre Boulez, describing mechanics of musical composition, wrote that when spacetime is *smooth*, "time is occupied without being counted," and that when it is *striated*, "time is counted in order to be occupied."

Smooth time is Heraclitean, pre-Zeno -- it is the reality of intensive time prior to its reduction to the One of the count.

Striated time is built of the Ones, which are duplicated (perhaps endlessly) in an ordinal series, establishing a plane of consistency on which events can play out.

We can understand striated rhythm as that which is ordered according to the the *quantization* of a consistent rule. The even meter of most electronic music, the mechanical pulse, perfectly subdivided, is a good example of striated rhythm. Indeed, any musical *structure* whatsoever will always be

striated, insofar as structure must be countable and articulable. Though it is important that structure itself can contain information-images smoothness, as in floating point variables, loosely or freely-metric rhythmic maneuvers, etc.

We can understand smooth time, on the contrary, as that which is *not* quantized, or rather -- that which is ordered according to *inconsistent* (complex, perhaps ultimately irreducible) rules. The rhythms of freely improvised music, coming in and out of pulse, in and out of tune, etc, are a good example of smooth time.

Visually, these concepts and their paradoxical relationship are very well represented by some drawings of Paul Klee's, showing "a line, which is a point, going on a walk":

The above line seems largely smooth, as opposed to the below line --

which seems largely striated.

NOTE: pictures are wrong, trying to find the originals. They are in Klee's *Notebooks*.

But there is no sense in saying "the first is smooth, the second is striated." These concepts are *scaling*, that is -- they necessarily are irreducible to a static evaluation from a fixed perspective. The smooth and the striated always exist in mixture, smoothness playing out on striated planes of consistency, and at the same time acting as generative forces toward order fashioning new planes of consistency at different scalar levels (deterritorializing).

At a low-level, the second image is more striated than the first -- it can here be described by the positions of its 18 vertices as its 'meter' and straight lines connecting them, which do nothing to further complicate the established meter. The first image, by contrast, is curved throughout, and thus requires a scaling continuum to describe each of the points along the line (which, in theory, if this were an abstract mathematical curve, approaches the infinite).

However when we zoom out, and consider higher levels of scale, the two images are perhaps not so different in terms of their consistency. Topologically, in terms of their connectedness, the first line loops back on itself three times, and the second loops back twice. Both values play out on the same plane of consistency, which is used to describe such loops, and are thus more or less equally striated at this level (though fractal geometry will serve to further articulate the particularities of these relations).

At a higher level still, we notice a rotational symmetry in the second image, whereby it can be described as a simple transformed-duplication of either of its halves in isolation. Thus, there is a structural consistency, a count-as-one, which allows us to describe the form as a double-becoming-one. A set connected to a rotation and translation of that same set -- 1, 2. In the first image, there is no such double at this high level. There are 3 ‘bulges’, similar to the doubled bulges in the second image, but these are only loosely symmetrical. They are ‘melting’, as it were-- described on a plane of consistency at this level, the symmetries require notions of morphing topological invariants, liquid bulges as opposed to strict repetition.

Now there are a few more levels of analysis we could perform, in the details of the bulges-as-multiplicity, but the general trajectory of thinking is hopefully clear by now. The first image is, across most of its scales, smoother -- it must resort to more fluid descriptions of its subject-matter, such as possible with everyday language “but at the level of the ‘curl’, it shares topological invariance with the second image, and thus a system of quantization/striation, a plane of consistency.

In their chapter “The Smooth and the Striated”, Deleuze & Guattari tunnel into these concepts-- their mutual translations into, and encapsulations by, one another. It is important to notice that these concepts are applicable to *all situations,* they are *mechanism-independent* -- music and the visual line function as microcosms, for all lines we might ‘walk,’ and all play is exactly this-- *walking a line*. Deleuze and Guattari perform smooth/striated rhythmanalyses of the state and micropolitics (nomadism), of game theory (Chess and Go), of geological drift and metallurgy, of mathematics of course (and here *Mandelbrot’s fractal geometry is singled out as being the closest thing we have to a mathematics of the smooth*).

With such smooth and the striated rhythmanalyses, it may be that we are finally beginning to discover concepts that are equally descriptive of (quantitative) structural relations and (qualitative) played flows, a spacetime realism from the spirit of music. Tuning into these rhythms (which are spatial as much as they are temporal), we can hardly ignore the formal conditions of musicality (malleable time) as being present *in all situations*.

Situations, Unit Operations, Events

Now we arrive at the situational ontology of Alan Badiou, writing in 1988 in the shadows of these *difference* ontologies and I can only imagine with a keen awareness of Situationist project, being a proud political militant himself.

Being and Event is a monumental construction, a metapolitical-metaphysical reading of Cantor's set theory as the ultimate method of *presenting situations* (such that, any situation that IS is presentable), along with the fairly radical thesis that mathematics itself IS ontology--the true theory of Being. What we're given is a beautifully labyrinthine Set theoretical philosophy, all presented as representable in the domain of its numerical count while simultaneously (and *essentially*) existing prior to it, outside of it, as *pure multiplicity*.

Badiou writes near the beginning "we find ourselves on the brink of a decision, a decision to *break with the arcana of the one and the multiple* in which philosophy is born and buried". Whether such a break happens is up for debate. It seems to me that it only further 'arcanizes' the concept, lending it new sophistication via re-appropriated formulations of modern arcane 'occult magic' (G. Bruno's name for mathematics). After all, as he is quick to mention up front, Plato's *Parmenides* already has Socrates presenting the thesis that *the One is Many*-- Badiou is by no means first to lay claim to this twisted thought.

Occult magic is ontology

"Leibniz' formulation is excellent: What is not *a* being is not a *being*." The question of *Being* deals with *things*, with *ones*, *units*. This, as opposed to the fluxes, multiplicities, operations of *becoming*.

The count-as-one into a Set is what allows us to qualify *a* being as such. That it is an individual. At the same time, the count-as-one is is not itself a One, but a process, a flux, a *count*. A *measuring* process-- and "to measure is to count vibrations"[59]-- that is, measuring participates in vibrational actuality, whereas the ones that are counted are abstract *units* of measurement participating in the consistent virtual space of mathematics, with only *potential* participation in actual-vibrational immanence.

Badiou follows Deleuze in positing pure multiplicity, or *difference*, as the irreducible 'grain' of Reality, but he believes that Deleuze did not go far enough-- that Deleuze, and the *School of Immanence* that he's identified with, a few of whom we covered in the previous chapter-- constructs a new image of the One in a myth of *presence* that escapes the reality of the pure multiple. That which is *immanent* is here & now, and there's a real common-sensical truth to this, but it is not so simple. If there is indeed a UNIT in the here & now -- where are its *edges*? How do we count the *NOW*? William James talked about the "specious present", which treats a theoretically absolute 'present' as something to be approached but not attained. In Einstein's relativity, we see the concept of simultaneity getting tangled up beyond the point of rescue. Certainly it is no longer possible to talk about a Now as a sliver of time, as a point along an extensive continuum.

All the same, it is this *immanence* which is dearest to our hearts... and perhaps before we apply our skepticism too soon we should consider that even Badiou's radical ontological dismissal of presence is not so incompatible with the *pragmatics* of the philosophy of immanence, which is what we're interested in--

Badiou criticizes *presence ontologies* as upholding this myth of temporal oneness, of being dangerously 'ontotheological,' but he has also referred to these *presence ontologies* as-- *poetic ontologies*-- and has named poetry as one of the four conditions of philosophy! He loves poetry, that's for sure...

The play-oriented philosophies we've spoken of are philosophies or non-philosophies (doesn't matter!) of *creativity* -- ontologically, yes, but also pragmatically. They are philosophies of a living creative process. It is

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[59] Whitehead - ??

consistent with Badiou's identification of poetry as a precondition of philosophy to say that presence ontologies--as with those of *the school of immanence*, *hermeticism*, "be here now", etc-- are themselves, conceptual preconditions *of the poetic preconditions of philosophy*, pragmatic instruments in a way (as if we required the philosophy to validate the poetry in the first place... poetry is enough! philosophy provides poetic materials, inspirations, even as it is conditioned by the irrational beasts it has helped create).

The immanentist position allows ontology to describe its own precondition in order that in practice it may vary ceaselessly in time, perpetual motion, regeneration, as a snake devouring its tail, providing its own nutrients, eating its own head even, the strange loop, and this process spiraling forever.

This could be a promising space of two-faced quantitative/qualitative valuation that builds from *the computable* (videogames' materiality) even while it leaves fundamental holes in this consistent plane in which the irrational, the inconsistent, the (uncountable) infinite can be accounted for.

Is it possible that temporal oneness is a myth, that time can indeed be more accurately formulated in terms of intensive durational models, but that that the Many-Oneness of immanence is a One with great *utility* in the poetic, or play, process?

The study of any ontological formulation as part of a poetic practice can not be considered independent of that practice. Creativity happens in time, and time happens in the moment, the specious present (even if that moment unfolds at once into many intensive pasts and futures). As a creative pragmatics, independent of any claim to ontological validity, it might seem that excessive suspicion of *immanence* can only lead to blockage, future-anxiety & inaction-- ultimately, living death!

And yet by no means does Badiou seem to encourage any such thinking -- instead, his is a liberatory philosophy which does justice to the unit object as pure multiplicity, perhaps allowing for an even more nuanced creative pragmatics, immersed as we are in environments composed of properly static individuals, constructed, but with individuating their processes often hidden,

black-boxed (the state, the computer...), *challenging* us to count even the most firm One as a multiple.

The grandeur of the project certainly can't be far off from Cantor's own theological intentions, and those of the Negative Theologians, given the borderline divine function the Void set in Badiou, as inconsistent multiplcity (Cantor's absolute infinite? God? Void as *creativity* in zen buddhism etc? (more research needed)).

And videogames! We've not forgotten the context of this whole history. Badiou's re-valuated Set theory could be a promising space of two-faced quantitative/qualitative valuation that builds from *the computable* (videogames' materiality) even while it leaves fundamental holes in this consistent plane in which the irrational, the inconsistent, the (uncountable) infinite can be accounted for.

A much-appreciated connective glue, Ian Bogost's *Unit Operations: An Approach to Videogame Criticism* builds from Badiou's ontology in constructing a ludic theory of situational thinking, propelled by the mechanics of the count as one, the presentation of the pure multiple.

Unit operations are proposed as instruments of the Multiple which can be used to critically navigate the top-down Oneness of computational *systems operations*.

Systems operations are defined by hierarchical structures terminating in a top-level Universal set, the software object itself. That the software itself is an object, is counted as one, is unavoidable, even when we begin to blur edges here with the introduction of the input-output playspace.

The Universal count of systems operations is tantalizing, and an unspoken order of practical ethics often emerges from here, wherein that which is countable is regarded as the ontological *ground* of the software, thus encouraging the use of Monarchic structural models in which all subsets are related directly to this Universality, thus ignoring the molecular/low-level relations at play between its parts.

Systems operations fall strictly into the theory of the hard-edged magic circle; unit operations attempts to think this circle as multiplicity, paving the way for the fuzzy *magick cloud/goo/fold/etc*.

That Bogost uses Badiouian/Cantorian ontology (which, we know is premised on the inconsistency of absolute infinity and the void), as opposed to, say, Claude Shannon's information theory, with its reduction of meaning to communication, and its negation of infinities in its adherence to binary (finite) data-structures -- this is a gift from Bogost, as Badiou clearly tries to construct a formal theory of being in which there is not only that which is presentable, but also the inconsistent, the void, the intervention of personal activity/play, the *event*. Insofar as we can identify units at play in the world, in the arts, we are identifying systems of order which have solidified into their present form as a function of the historical-material transformation of the world. The one is always counted; there is always *individuation*. The *event* gives us some of the rupturing-utopian power of time back that an image of objects divorced from subjects can seem inclined to ignore. There is not enough space to go into the theory of the *event* here. Suffice to say-- it is *self-referential*: *"I term EVENT of the site X a multiple such that it is composed of, on the one hand, elements of the site, and on the other hand, itself*."

This sort of set, which contains itself, famously gave rise to Bertrand Russel's Paradox, which is likewise closely related to the base mechanics of Gödel's *incompleteness theorem*...

Bogost has critiqued the 'evental' aspect of Badiou's thought as too obsessed with the non-ordinary, the revolutionary, the sublime-- all of this at the expense of the everyday.

In his more recent book *Alien Phenomenlogy*, Bogost describes his philosophy of Unit Operations as independent of Badiou's framework:

"In *Unit Operations*, I offer the count-as-one not as a model for or analogue to the unit operation but as a related idea. The point is this: things are not *merely* what they do, but things *do indeed do things*. And the *way things do* is worthy of philosophical consideration. Units are isolated entities trapped together inside other units, rubbing shoulders with one another

uncomfortably while never overlapping. A unit is never an atom, but a set, a grouping of other units that act together as a system; *the unit operation is always fractal*."

It is interesting to note the *fractal* character of Bogost's unit operations alongside that of Badiou's *event*. Is it not possible that the 'evental ruptures' which Badiou is concerned with can indeed be happening *everyday*, in all sorts of little ways? Sure, Badiou is a Maoist, a political militant, so he has more sublime things on his mind than *just* the everyday or the mundane-- but I see no reason why the fractal character of the unit operations cannot overlap with that of the *event,* that of the Situationists' *irrational walk* (insofar as an irrational number/line likewise deals with fractal zoom/precision). It is my hope that a proper *structural* interrogation of the fractal aspects of such events and operations in material playspaces may yet shine further light on these issues.

Even so, what I believe will be the lasting gift of Bogost's book is not so much the use of Badiou's already powerful (via Cantor) conceptual tools, per se (though it has been invaluable here and elsewhere as a conceptual node!), but rather the flat application of the loosely appropriated set theoretical ontology as a critical tool for *all media, all situations*-- a method of reading a kind of formalism that is, in a sense, *most intuitively exemplified by videogames and their quantitative ground,* though likewise applicable to the analysis of other forms as well, with their virtual images of unit operations. Bogost constructs by assemblage a new plane of consistency reading videogames as the formal structures *par excellence* which may yet be capable of providing new conceptual tools for analyzing the unit operational (quantic) structure of all media as existing counted in terms of the One-Many information structures of videogames (situations, sets) themselves -- everything is a playspace, or, without going quite so far-- *everything is Played Space*, a thing (more on this soon).

That videogames, broadly considered, *are indeed* becoming something like the *ground* of our mediated experiences (insofar as youtube drifting, email, text-editing, etc. all share the formal-material structures, input-output computation, that define videogames as such, with 'old media' content merely *floating* on top) has not yet been given adequate attention. Bogost's tools may point us in a useful direction...

That finding singularities of *inconsistency* in videogame playspaces could provide a new manner of computational optimism (embracing the non-computable, as often as possible), in which we are no longer afraid of the digital information stream as a reductive model (but rather, simply a particular Situation, with its Other, the *void*)-- there is a computational plane of consistency here, the information flow, which is useful not only in describing videogames, but in all *texts* (broadly considered) and their flowing interrelationships between one another. But more importantly, there is inconsistency in our relations to these forms, and even in the structures of the forms themselves, as manifest in (maybe??) the *entropy-content* of an information stream.

Now what is key in studying these structures and inconsistencies is *process*-- indeed "operations" (processes) is half the title of Bogost's book, and yet I believe he gives too little attention to their nature, being a *thing*-head rather than a *flux*-head. He is keen to stress the count-as-one as a temporal process, but the complexity of temporal relations, differences and repetitions, rhythmanalyses and harmonic drifts, and ultimately *music* of flowing quantity (as the most valid formal model we have of intensive durational variability), is mostly ignored.

Sometimes it seems that unit operations have forgotten that Badiou's count as one is prefigured on the fundamental axiom of Set Theory that *the one is not* -- everything is a multiple of multiples, there is only pure multiplicity. When this position is internalized, we realize that every One that we count, in every instance, can be decomposed or added to, thus allowing for a stream of variability in our countings, a stream of *play* drifting through the system, paths through the units and, as miniatures, microcosmic tendrils of even the Universal set.

"The Pythagoreans, too, held that void exists, and that it enters the heaven from the unlimited breath – it, so to speak, breathes in void. The void distinguishes the natures of things, since it is the thing that separates and distinguishes the successive terms in a series. This happens in the first case of numbers; for the void distinguishes their nature." (Aristotle)

Music Spaces & Dequantization

Adam Harper's *Infinite Music* is a study of unit operations, the count-as-one, at play in music, an object-oriented music theory, and a great companion volume to Bogost's book, addressing some of the musical concerns which he ignores.

Although set theoretical concepts have been used in music for a long time now, particularly in the academic serialism that defined mid-20th century compositional fashion (out of which comes Boulez' "smooth and striated"), before now I had not seen a theoretical approach that attempts to do justice to the space of *all possible music* -- Music Space, as Harper calls it.

Music is always scaling. The Western classical tradition, all the way through the serialists, composes with a limited set of objects. Notes (pitch-classes), harmonic planes, rhythm-units, phrases, structural blocks (ABABCD), articulations, etc. There are indeed a vast number of possibilities using this system of composition-- it has not been fully exploited, and in theory never will be. In some ways, it seems fair enough that the serialists would limit themselves to a set theory of those musical situations that they were concerned with, and already being immersed in a space of infinite possibilities, would not have bothered to blow open the space such that its current infinity would be reduced to a mere point in the actual matter of fact.

This is what Harper has done. Over the last century, the incredible worlds of music we've been exposed to that have nothing essentially to do with the classical method of compositon-by-notation have rendered the musical set theories of the past inadequate to describe the situations playing out in the present.

Harper describes music objects in the broadest sense, as anything that is used in the process of--

Musicking.

Objects could be notations, mp3s, instruments, musicians (think about how Duke Ellington, Charles Mingus and many others, were as great of composers as they were because they composed for *particular bodies/ people*). Really, anything! So long as it involved in music (and we know that anything whatsoever can be involved in music). So the project of music

spaces and music objects necessarily turns toward the speculative, the search for the unknown, the establishment of new territory, the transformed reproduction or total dissolve of the old.

If music can be *anything* -- how is this different, then, from Cantor's sets, or Badiou's ontology, or Bogost's unit operations?

Would Pythagoras count these all as One?

For the *player,* the connective glue, the plane of consistency on which all of these ontologies play out, is the term I just slipped in, "musicking." This concept comes from musicologist Christopher Small, and it is used to distinguish between music as an object ("the musical work" is the sort of pathetic jumping off point for most formal musical aesthetics), and music as *immanent process*, Whiteheadian creative advance, *play*. Musical structure is always caused by something, it is not a Form awaiting mere realization-- it is caused by *players*. In the limited (musicians) sense, and in the broad (everything plays, chapter 1) sense. This force of musical *causality* is described as "musicking," and we ought to be following this "ck" with great interest as we keep going...

This is a train of thought which a huge amount of precedence in scholarship-- in the improvisation studies of George Lewis, in Bruce Benson's immanent performance theory (even "the work" will never exist without improvisation). Improvisation is fundamental! Musicking is improvisation is play is causation.

Harper, by connecting the lines between an immanent theory of musickal creativity and the infinite structural thinking of Cantor's sets as colored by Badiou's militant-interventionism (the event), has provided some very strong ground to stand on indeed.

And as it happens, Harper's intervention is likewise militant in its own way, professing as it does an musickal ethics of *dequantization*. That is to say, "deterritorialization" in Deleuze & Guattari's language, or the smoothing out/ melting/smearing of planes of consistency.

Dequantization meaning more than simply turning off the beat-grid, though this is a perfectly good material method to put into play.. Rather,

dequantization has vast meanings when considered as non-counting, dissolution of the individuality of objects, and of the measure of planes of consistency in general. To dissolve objects via process into a space that can itself be counted as an object, and dissolved into a greater space.

We'll hear from Harper & his Music Spaces more later, in "Virtual Extensions".

Smooth Abstraction, Code & Mud

Why are there so many *discrete/quantized* values at play in games in the first place? Why the need to formulate a *smooth ethics*? I think it is because of the culture and practices around programing. Programming is difficult. Problem-solving is necessary when programming. The values from this stage of the creative process leak into the finished product, such that the object which is produced mimics the process of production to a certain degree. Such that, when 'testing' the game, it is not necessary to step out of the goal-oriented state of mind that necessarily drives the coding process along. From my little experience, it can be very difficult to pay proper attention to the immanent reality, the real-time vibration of a piece of software when I am programming. The kinds of thinking just don't go together, they are almost polar opposites. *New* design happens when we are *playing* rather than when we are *programming,* even if the gaps between these processes can be reduced more and more as the technology becomes more sophisticated and targeted toward a general non-engineer demographic, and as programming is augmented with haptic real-time feedback. There is no doubt that at its best, programming becomes a kind of undirected freeplayin.

This is not to say that we shouldn't be programming, but it *is* to say that the aesthetics of programming have very little to do with those of the *meaning* of a videogame at the point when it reaches the 'end-user'/*player*.

Programming in an IDE or whatever is a very particular sort of hyper-rationalized playspace which has a lot to teach, but there is also so much that it will never teach. If we are interested in software, we will need to at least learn *about* the mechanics programming, the modes of thinking that it enables, but we should never be convinced that we *need* to do it, that we are not game-makers until we do. The alternate history of immanent play laid out

earlier, and the contents of this chapter I hope might provide another “room” for us to hang out in-- those of us that want to learn about counting, number, sciences, but who are not yet interested in adopting the working methods of the rigid/technical aspects of the practice in order to do so.

If we want to research new ways of playing, despite the tremendous potential of videogames as a medium, I believe we would be wisest to look *away* from computers. This will be best if we want to learn more about playspaces in general, to abstract this learning and to *return home with* as-yet-unspoken structural laws about videogames and software in general.

The fact is that there is a tremendous amount of vibrational capacity that computers have that we simply have not yet been able to *think* or implement, for whatever reason. These are absolutely different from those capacities which we have not implemented on account of engineering challenges.

Darius Kazemi wrote “Fuck Videogames” earlier this year, trying to turn folks on to the idea of creating in OTHER mediums, too -- that games are not the only thing we can make. True enough! In a sense-- absolutely we should be playing with other materials -- with melodicas and clay and paints and ice and mud, with our voices, stretching our bodies, playing with animals, etc. All of this, whatever feels good. But at the same time, we would be erroneous in assuming that these processes are something *other* than games, that we are properly giving games a good 'fuck you.' Rather, by exploring new exciting materials that feel *more alive* to us, we'll simply be playing *better games*. Naturecultural games are endlessly new *if we listen*. The trick at the root of ‘haptic design’ may be to learn from the materials of the world-- how do they play, how do we play with them, what kind of playspace is established, even without having to speak, to lay down any rules at all-- what kind of playspace is defined by the materiality of the environment itself?

From this perspective, we can learn of the flux of nature in rolling into a flow of mud, joining in with the romping of a dog, feeling the dog splashing mud onto the body, feeling the body stepping into the water to wash the mud off, the water becoming cloudy, the body submerging, swimming, traveling. Ceaseless progression into novelty, shifting possibility spaces. IMMEDIATE HAPTIC FEEDBACK-- *Real quantity, lived as quality, not cloaked in abstraction.*

A *smooth* computationalism *FROM MUD,* as it were. This could be a fruitful path forward! Playing in the water, the sand, all the gooey physical stuff out in the world. We need a pseudo-computationalism-- *a new alchemy*-- that finds values in these play-experiences as much as in videogames… And beyond-- even *more* computational interest in mud than in the computer. Indeed, if the universe is computational in any sense, what beautiful numerical-rhythmic complexity must exist in the mud! Which is composed of dirt and water (and so much more)-- the dirt itself composed of shredded wood, life-forms, little rocks (and so much more). MUD. *SLOW LIQUIDS*-- the movement gradual, shapely, alive in its own individual ways.

We ought to learn to FIRST play *qualitatively*, to be drawn along by our desires (eros), our synthesis of values (ethics) in the flux of time-- and *only SECONDLY*, to begin the process of reduction, to explore these values as *quantitative*-- if we so desire it. There *will be* relations between the quantitative and the qualitative, but they will always leave a remainder (the quantitative will never count the *qualia* of the *quality*)-- for this reason, it is important to create as complex an assemblage of *qualia* as possible before attempting the process of reduction, which constantly manifests the danger of fragmenting our thinking and making us vulnerable to the "fallacy of misplaced concreteness"-- counting an object where there is none.

Bret Victor's "Kill Math" project is a relevant bit of computational theory that celebrates affective immediacy over abstraction in its love of quantitative structure. It is essentially an adventure in data visualization and 'soft gamification', one which attempts to make the quantitative fluctuations of mathematics intuitive to sight and to touch. It is a videogame theory project, even while Victor calls it a step toward building a future "new medium." The title imagines a future where mathematical concepts are sculpted intuitively, IN *REAL* TIME, as dynamic substances, where formal notation has become of secondary interest, a necessary commitment only for those who care to pursue it. We've seen an analogous project "Kill Music" happening over the last 100 or so years. Classical notations are no longer the only way to design a rich composition. Starting with the advent of recording technology, we can simply play music and record the sound onto an object, preserved as a line of information. We can improvise whenenver, and just make things like that, music can be more like painting-- *response to vibrational materials*, even in

composition. Bjork said in an interview "my biggest strength and my greatest weakness is that I can't do the same thing twice. It has to be spontaneous. That's why I'm doing pop, not some contemporary modern minimalist shit." She speaks for us all. We play something, and we've made a composition! Then, tape overdubbing, "the recording studio as instrument", textural expansion becomes possible. What were 20 staves of a notated score are now 20 tracks, 20 lines of information-- now mixed down onto 1, 20 counted as one. Maybe each of those 20 lines were themselves aggregates. And now-- home recording DAWs, recorded materials which are improvised and fossilized begin to inhabit a new structural space of shifting variability, we can count and uncount both, and trace lines with DSP, and our objects in these spaces begin to function as a new notational language, a line or a plane or space, processed with knobs, functions (process-objects)-- and we continue to "kill music" insofar as this is "killing notation", but the whole point is that the new structure we inhabit is a new notation, and that the true musicality of music never has died and never will. Music spaces' visual aspects are their notational aspect, and as old notation is killed, new notation is born, notation which itself is a generative mechanism, and which can birth instruments, compositions, etc. (and these births can loop strangely, as we'll see in the virtual extensions). We are still learning about these new *notations that themselves play*.

Victor, then, is evangelizing the possibility of a similar project in Math -- killing an old one, bringing in a new. Needless to say, the designers of the new cannot ignore the old, and indeed the old is never 'dead', as it always lives on in those who love it, as with music: Nietzsche writes God is dead, but it is clear that the holy spirit lives on in his eternal return of the 'gateway of the moment', the *Now*.

So, we have it -- computable mathematics put into real-time haptic-pulsating motion -- THIS IS THE GRAIN OF VIDEOGAMES. When these conditions are regarded as the *materiality* of played computational form, a massive space of possibilities presents itself which is fully continuous with our own immanent vibrational experience of reality.

A study of mathematics which proceeds from these grounds becomes impossible to differentiate from a study of music, which is likewise concerned with real-time vibration of quantitative information-flows read as

quality. Pythagoreanism and the Medieval order of the sciences (in which Math + Music + Astronomy + ?? are counted as One) starts to make more sense, and thanks to the translations of quantity into quality by Victor & others, perhaps the silence of Pythagoras these last 100s of years is not so much to be regarded as a death, but rather a period of rest as we come to terms with the mysterious nature of number once again, and its qualitative irreducibility to the formalism of mathematics. Giordano Bruno tells us of the different orders of Renaissance Magic-- demonic magic, physical magic, and "mathematical magic, also known as *occult philosophy*." And from here, the occult theory of number, the Enlightenment is born-strong, all the while standing on the shoulders of these original magicians, whose works have now been dismissed as mere superstition.

Experiment with belief in the principle that not everything is computable, whether or not this be the case-- escape fate, even as you affirm it. Quality transcends computable quantity, because quantitative reduction is by definition reductive, always leaving a remainder. It should be no surprise that at the same time quantity transcends quality, because the latter too leaves its remainder.

Coda: Dream of Multiplicity/SPS

"The art of living is based on rhythm — on give and take, ebb and flow, light and dark, life and death. By acceptance of all aspects of life, good and bad, right and wrong, yours and mine, the static, defensive life, which is what most people are cursed with, is converted into a dance, 'the dance of life,' metamorphosis. One can dance to sorrow or to joy; one can even dance abstractly. ... But the point is that, by the mere act of dancing, the elements which compose it are transformed; the dance is an end in itself, just like life. The acceptance of the situation, any situation, brings about a flow, a rhythmic impulse towards self-expression. To relax is, of course, the first thing a dancer has to learn. It is the first thing any one has to learn in order to live. It is extremely difficult, because it means surrender, full surrender."[60]

"One of the essential characteristics of the dream of multiplicity is that each element ceaselessly varies and alters its distance in relation to the others, dancing, growing, diminishing … these variable distances are not extensive

[60] Henry Miller, ludic realist

qualities divisible by each other: rather, each is indivisible, or 'relatively indivisible,' in other words they are not divisible above or below a certain threshold, they cannot increase or diminish *without their elements changing in nature*."[61]

The dream of multiplicity is the dream of A New Game, the Child becoming a Dancing Star...

~ ~ ~ ~ ~

[61] (intensity, Deleuze & Guattari, ATP 34)

3. Shifting Possibility Spaces & Smooth Abstraction

Games are shifting possibility spaces.

This is as much of a truism as is “paintings are surfaces covered in paint”, or “movies are strings of film-stills playing in rhythm one after another, at 24 frames per second” or “sculptures are things,” or whatever else, “poems are sequences of words.” Obvious...

Shifting possibility spaces--

One set of possibilities, present to the player *NOW*, the Turing ‘configuration’, branches out into a different set as the game progresses, and it is this *difference* of possibility in the flow of time, and the rhythms thereby created, that characterizes the game as a *playspace*. If possibility remained constant from move to move, no one would be interested in *playing* the game.

Sid Meier said “games are a series of interesting decisions”-- but who said a) that *we* need to make the decision (it might be a co-player, the *space itself*) ? and b) that the decisions need to be interesting (is farmville not a game?))?

Games are not in all cases a series of interesting decisions.

But games are, in all cases, shifting possibility spaces.

It is a trivial claim on its own, in that it is obviously true, but this should not be to its discredit!-- Creative explosions have been catalyzed throughout history at points when the *materiality/grain* of a given substance is recognized as the Reality/Creative substance that it is-- paints are taken

seriously as material, the picture no longer tries to hide the brushstrokes, & the strokes are allowed to be a new Realism of the painting-process itself -- the 12 notes of the equal-tempered scale are taken seriously as Real-material equals, and tonality dissolves into chromaticism, which dissolves into serialism, into chance, into touch..

All of these developmental 'modernist' *events* occur when it is Real-ized that current practice is but a tiny sliver of a much broader space of possible movements, a broader Real-- and that this broader space, while it isn't presently accounted for within the framework of the current practice, is essentially of the same *formality-materiality*, merely stripped of the implicit and explicit dogma that define the status quo / current practice as such.

Games are shifting possibility spaces.

Thus, the goal of expressing such a truism as this one is not *merely* to point out the obvious, but also to suggest that the obvious might become an Ideal--

The goal is that we might recognize and embrace that *not only* are games in all cases shifting possibility spaces, but *also*--

That *shifting possibility spaces are, in all cases, games*.

"A Theory of Sufficient Scope"

"The criticism of a theory does not start from the question 'true or false?' It consists in noting its scope of useful application and its failure beyond that scope. In a science which has failed to produce *any theory with a sufficient scope of application*, progress is necessarily very slow."

- Alfred North Whitehead, *Adventures of Ideas*, p. 284

In videogames today, we're witnessing a situation such as that described by Whitehead-- a (pseudo-)science[62] which has totally failed to produce a theory of sufficient scope that might be properly equipped to deal with the space of

[62] Because THIS, *pseudoscience,* is exactly what videogames are-- the medium's necessary creative practice must play out on a plane which integrates computational structure and sympathetic/emotional affect. It cannot be pure computation, or else it is computer science. Neither can it be pure sensory affect, or else it a non-digital game or other sort of non-computational art.

all possible games-- or even one that might, more humbly, deal today with the space of *all existent games*.

There has been a debate around the merits of formalisms in games, operating on the prevailing belief that a ‘formalism' describes only those theories wherein a game *is required by definition to have explicitly stated goals for players as well as win and lose conditions.*

These *normal games* are also shifting possibility spaces, naturally, but different *more inclusive* formal approaches are possible.

The word 'ludology' has perhaps been misappropriated in game studies. It is right to use it to refer to the study of games from a mechanical perspective, but *mechanics* must be read broadly. It’s forgotten that *mechanics,* following Netwon etc., have merely to do with precise structures of motion (play), that these exist in *all videogames*, that the teleological imposition of goals/desires is another order of structure altogether, one that is distinguished by its law-like aspirations to “mechanize” (instrumentalize) the player as if *even she* were part of the deterministic system counted by the mechanics.

This tendency to count *law* as *mechanic* is a relic of pre-digital game theory, where a game is a *way of playing*, as opposed to a *material thing*, where *mechanics* live in the head (& the State) rather than in the thing itself. What board games call mechanics are actually rules, save those delightful instances where gravity and other *occult forces*[63] are involved (see *Mouse Trap*, *Hamsterolle*, etc.. Robert Yang’s board game played with dirt and water (=mud) is a terrific example of *complex Real-material mechanics*)..

The transition from the ludology of non-digital games, which require that players uphold rules in play, to that of material videogames, which require nothing of the sort (the player does what she pleases), should be regarded as *highly significant*. Just as a rhythm pulsed fast enough becomes a tone at speeds faster than around 20 Hz, game mechanics implemented in

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[63] Even as Newton described gravitational mechanics with number, he insisted that the *force* behind all of this, the fact of *causality itself*, could not be accounted for-- he called such *creative* tendencies of the universe *occult forces* (recalling Giordano Bruno’s ‘occult magic is mathematics’. Something like 90% of Newton’s work was alchemical, in search of the ‘greene lyon’, which is thought to be an unfortunate bit of irrationality in his work, but.....

computation are able to *increase in speed* to the point of undergoing an equally radical qualitative shift in our experience of them.

Only esoterics/mystics dissolve their study of rhythm continuously into the study of tone[64], and it would not be unreasonable to expect the same from the study of board game rules dissolving into the study of videogame mechanics, were it not for the existing tastes many game developers have for non-digital board games, sports, etc.

In the 'transition' from rules to videogame mechanics, what was abstract has become concrete, material. This shift cannot be avoided in our conceptualizations of what videogames are-- *it is a MATTER of fact*.

The old kind of game theory is completely lacking in scope in terms of accounting for the Reality of what videogames already are today, *and more importantly-- what they can be.*

I believe it may be possible to lay out some sturdy grounds for the potential beginnings of a new theory, equally rigorous in its formality, but more *accepting* in its breadth of attention / interest, its 'welcoming in' of new players / games.

I propose the concept of *shifting possibility spaces* as a definition/conceptual-tool which we might use to better understand the material/grain of our medium, specifically, and more broadly, to situate it within the wide-world of Real spaces of variability the history of which it has unfortunately avoided up to now.

Shifting possibility spaces (or SPS) allows for formal evaluation equally in terms of the *quantitative* and the *qualitative*, without reducing one to the other.

As a quantitative theory, it has precedent in the 'phase spaces' of the physical sciences which map out all possible states of a system onto a graph of N-dimensions. *Possibility spaces* are of key importance in modern non-deterministic 'chaos' sciences (see Stewart Kauffman's *Investigations*,

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64 Where the octave is counted as the same as the boom-chick-boom-chick rhythm of dance music, where the perfect fifth is counted the same as the 3-against-2 groovy polyrhythm, etc...

Manuel DeLanda's *Philosophy and Simulation*, etc.), and thus SPS allows videogames, themselves immensely complex/chaotic systems, to act in 'formal solidarity' with such contemporary research.

As a qualitative theory, SPS is intuitive & accessible in *any situation* we find ourselves in, insofar as we can ask 'what is possible right now?' 'what might be possible if I do such and such?"

Shifting possibility spaces are not really a new idea at all-- everyone in games talks about possibility spaces, but they talk about them as a *singular* thing-- "let's describe *THE possibility space* of this game"-- SPS merely adds the SHIFT and the plural space*S*, which prioritizes the *multiple/manifold* character of *flux*, and allows for a conscious reclaiming of a *creative* Real-time. The pluralized/dynamic SPS is more *realistic* than the unit 'possibility space' for these reasons.

Shifting possibility spaces is a formal tool which allows for game theoretical games to be counted within its ranks (these are all SPSs, without exception), along with music improvisations, confrontations artworks, life events, political uprisings, whatever, etc! Ultimately, everything-- *all situations*--will be welcome.

SPS is a structural *tabula rasa*, assuming nothing other than the structurality of structure itself and the immanent implication of the player within the Great Chain of Playing-causality.

SPS builds from Salen and Zimmerman's definition of play as "free movement within a more rigid structure", only adding that the more rigid structure is itself assumed to be a freeplaying element within yet another more rigid structure. Variable variability, structurality of structure-- the increasingly realistic image of the *magic circle* is not merely a *magic goo*, or topological invariant of the circle-- but indeed, the blob is fundamentally *intensive*, composed of many, irreducible to One quantity, undergoing phase transitions, changing in kind, etc. The SPS magic circle is *alive*, it can be defined only in complex 'polyphonic' time-fluxes as it undergoes organism-like processes of differentiation, of individuation-- becoming many, becoming one. Its edges are always those of the playspace proper, and its transformations are-- its play. Play is a hierarchical concept, constrained by

what encloses it, but at the same time *shifting* the structure of that enclosure -- in Salen & Zimmerman's words, as well as those of the alchemists-- the bottom eating the top; play as *transformation*. This Ouroboros / strange loop model may yet allow the 'more rigid structure' to be *eaten* yet again by the free movement it frames. SPS is not at all meant to suggest that this hierarchy of play is enclosed by a structure that itself is unshifting-- it could very well be that the play of a higher-level of structure (structure of structure) is indeed freely playing the structure (free movement) at a lower level (top-down affections/control), but insofar as the higher level is itself being *played*, its 'hierarchical dominance' is wrapped back around to the bottom, to the "free movement," the causal/generative agent of becoming, and there is yet another level of enclosure that is formed 'above' it (and is, again, played).

Thus play is always playing in spaces that look like what Douglas Hofstadter has called "strange loops", where the 'top' of a hierarchy is *eaten up* by the 'bottom'-- the snake eating its tail, the ouroboros. I will return to this idea in "SPS Strange Loop". But before we reach this point, let's first elaborate a few basic ideas:

1) the intuitive structure of the *shifting possibility spaces* which we are all *constantly* immersed in in our everyday lives (ludic realism);

2) the Ideal structure of this immersion;

3) the abstractions of this Ideal which are *formalized* in game structures (broadly considered, encompassing music, philosophy, mathematics).

Everyday SPS

The intuitive concept of a possibility space is very straightforward-- it describes the formal structure of *what is actually possible* in a given situation.

The metaphysical idea of *infinite possibility* should here be opposed to the empirical/rational idea of a possibility space, which is resolutely *finite*-- if, in playing a possibility space, there is a feeling of possibility approaching the infinite, it is a kind of infinity that exists *within* the finite, and can *only exist within the finite*.

When we say "anything is possible!" we are not speaking of actual material possibility spaces anymore-- it is imperative: the first step in understanding a possibility space is coming to terms with its finitude, for it is within this finitude that the true *living* sense of *infinite possibility* resides, where the infinite is *in* the finite, as with mechanics of Zeno's paradoxes and the problem of the continuum, that have shown the infinitude of the irrational numbers to always be *in-between* the counted infinite subdivision into finite (and then infinitesimal) units.

Everyday, we are immersed in this finitude described by shifting possibility spaces.

(*Event-based SHIFTS [a-k] are written into the first section, to show one way we might begin to count the situation; the next few macro-events are not divided in the same way in advance, but it could be helpful to tune into similar such divisions, write them in, etc.*)

Imagine: we are walking along-- we've left our house and our headed down to the lake to stroll for the afternoon...

1. a) We are strolling, b) we look up to the sky, our attention drifts up there and c) wanders in the clouds, d) watching birds flying, feeling their motion with our eyes drifting along and following. All the same, e) our bodies are stuck near to the ground, given our current means of movement. We cannot get higher up to meet these, beyond f) jumping a few feet, or g) embracing the haptic reception of our eyes as part of the space-- h) there are flat walls all around, blocking our passage in all directions but one, i) we cannot go *into* the ground j) (even if we had a shovel, we would not be able to shovel through concrete, it is so tough), and so we are filtered toward this One direction, but even as we do so, we're still *living* in the clouds, with the birds, our attention is like a hand outstretched. K) *Then we see a ladder~~*

2. We've climbed up a building, we found a beautiful vantage point, and a path from the building leading right onto a hill, headed North, and we follow it-- now, if we wanted to head South, there would be no choice but to backtrack. The hill is rolly; we're headed downhill; when we turn around, we reverse this, the *quality* of our engagement with the consistent structure of the hill shifts, and we're headed uphill, downward pull turns into upward

resistance. The sun is bright! Blinding. And we forgot sunglasses at home-- should we return?

3. Along the way, we meet a friend by chance, who is walking the other way; we stop; we learn about a detour ahead of us, some sort of construction; we make *plans* for tomorrow night; the conversation drifts toward the past and we're reminded of an old friend who lives to the East; as we talk, the world around goes out of focus-- the paths we're following are auditory-*linguistic* in their touch and virtual in their spatial composition now, as opposed to concrete sidewalks with their full touch of the feet and body, and actual spatial boundaries which prevent certain kinds of connectivities. As we talk, memories come and go, are re-created and dissolved by the concepts and images we share with one another. The architectures of the conversation are malleable in a way the concrete environment is not, and as we talk, and excitement intensifies with shared interests, the materials of thought become yet more malleable still, and at its most generative, there's a sense of being submerged in soft-liquid eddies and currents that define the 'manifold' N-dimensional space of our shared consciousness[65], morphed and redirected by touch of our words, and the touch of the ideas themselves, even prior to vocalization, as they connect with and catalyze changes in one another-- non-equilibrium SPS.

4. We part ways, we find the lake, we sit down, and gaze up at the clouds, once again, and even though we're someplace else, there's a real sense that *we're back,* that it's as if we'd never left these birds and clouds at all.

.....

These are all the simplest sorts of everyday examples-- having to do with material affordances and limitations (concrete, hill, other person, clouds, own body, own breath (gas bath)), these are *actual boundaries* that define what is possible in a given situation. Of course, you could get a bomb to blow up the the concrete, and go down a little further into the soft earth, and in other similar ways you can set out to prove that what was naively thought to be impossible is in fact very possible. This is because possibility is not *absolute* in a cosmic sense. It is strictly relative to the causal agent in the possibility

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[65] Thanks to Niall Moody for the 'eddies and currents' image of the manifold, which I can't stop thinking with...!

space and her interrelations with the affordances and resistances of the material space as a co-player -- possibility *scales* with relative size, time, energy, etc. Despite the possibility there always is of *changing (shifting)* the possibility space, it must be admitted that at any given moment, provided with the materials-at-hand, some things are imbued with *immanent* possibility (they are possible NOW) and some are not, requiring future-oriented plans, tactics, strategies, goals. The material structure of a possibility space is *finite*, even if projection into the future can help expand/scale the finitude of space, theoretically modeled/felt as an *approach toward the infinite*.

Look around you-- What is possible? What do you want to do? Listen-- what do you hear that you did not see-- what does change about what is possible? Feel the surface you are on, whether sitting or standing, feel surfaces all around you, whatever is available. Now look up, stand up, stretch, take a walk, read the situation as *your body is the space*-- stretch, breath in, out, soft face.. primed for liquification..

Now-- keep paying attention to yourself. Recall your plans. Dream about the future. Dream about the past. What do you want? What are you afraid of? Look at yourself. Are you who you want to be? What is it that you want to be? If you died tomorrow, would there be unresolved goals, conflicts, desires? If you're going to live for 80 more years, do you have any goals, conflicts or desires that might live that long with you? These psychological influences are much murkier boundaries than the physical resistance of the wall or the pen and paper, but they are boundaries all the same-- these will define your priorities, *what is important*, and priorities are just as structural as physical architecture is when we consider the whole field of possibilities given in experience.

This projection of the mind into the future is the *sense of possibility*. When we make a plan, a goal, etc. The sense of possibility has something to do with material possibility spaces, but it is not limited in the same way-- its materiality is *memory* (memory is just unusually dynamic matter-- all matter is memory??), which is recombined into compositions/images of the future which themselves, as images, are fully real, but as material actualities are not -- thus, the image "flying pigs" which we can imagine quite well, but, as represented in our imagination, has little or nothing to do with the material structure of possibility that we are submerged in.

The sense of possibility, in memory, plays out in and *as its own space*. Memory is an SPS. The *Art of Memory,* as practiced by classical rhetoricians and hermetics, including our infinitist Giordano Bruno, describes some of the virtual spatiality of memory by way of their own techniques for intensifying its capacities. Things that one wants to remember are distributed around a mental image of an environment that is familiar, and the process of recalling these memories is as simple as a virtual stroll through the environment. The environment can be modeled after real space, or virtual 'node-based' movement equally, and all of these dissolve into one model of intensive spatiality. Indeed, faith is placed in this metaphor to such a degree that even *actual-physical* architecture is regarded as a form of fixed memory in its own right, anticipating the materialized memory of computers and information-structures in general, whereby, indeed, all that is material must be *counted* as memory (Played Space) in some sense, even if the fixed memory-architectures do not display the characteristic motion/play of the active memories that we've been given. The psychological and the architectural are counted together in a reverse-interior reading of psychogeography (geopsychonautics?)

We have, then, two sorts of structure that can describe a possibility--structures which are not ultimately different in kind*,* but rather only in degree. We have physical-structure, and mental-structure -- "Matter and Memory".

What is important is that we recognize the *flux* in these structures. That a possibility space is not a fixed Universal, but that it flows in time along with lived experience-- that we might be walking to the lake and then meet a friend along the way, this is an objective *shift* in the possibility space, and indeed we must admit that, all material and psychological data accounted for, *every event that plays out will likewise shift the structure of a possibility space*. All change initiates further change, and on and on.

These concepts can be surfed intuitively, asking "what is possible in a given situation?" and "how does this situation shift according to the activity and matter and sensation which it contains?", and simply building from here--

All of the situations we might try to count from everyday life are *immensely* complex from a structural perspective, and perhaps this is why the 'ludic

realist' position has not taken off so well-- a computational model of the walk to the lake, accounting for all contingencies and path-crossings, and the physiology of the body which walks and breathes-- such a model would be absurdly complex, maybe requiring a Borgesian model of the entire universe running in the software to approach anything like an ‘accurate’ representation.

Although *qualitatively* it makes a great deal of sense to build our understanding of SPSs from a ‘ground’ of our everyday experience, once we try to *count* the situation, we find ourselves confronted with an immense task.

For this reason, we would be wise to seek a different sort of model on which to build a *quantitative* understanding of shifting possibility spaces--

Normal Games & Deleuze’s Ideal Game

Deleuze has already begun to formalize some relevant concepts[66]-- he has given the name of "The Ideal Game" to something which very closely resembles the SPS concept, a loopy/shifty image has taken in turn from the *Alice* books:

"Not only does Lewis Carroll invent games, or transform the rules of known games (tennis, croquet), but he invokes a sort of ideal game whose meaning and function are at first glance difficult to assess: for example, the caucus-race in *Alice*, in which one begins when one wishes and stops at will; and the croquet match in which the balls are hedgehogs, the mallets pink flamingos, and the loops soldiers who endlessly displace themselves from one end of the game to the other. These games have the following in common: they have a *great deal of movement*, they seem to have *no precise rules*, and the permit *neither winner nor loser*. We are not 'acquainted' with such games that seem to contradict themselves."

As for this Ideal Game’s potential for structural formalization-- certainly it is possible for computational materials to encode 'a great deal of movement'-- likewise, it is possible for rules to vary in in such a way, and to combine with such complexity, that they appear to lack 'precision' -- and of course videogames have no material requirement that they declare winner or loser.

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[66] Excerpts from “The Ideal Game” chapter of *The Logic of Sense*

This image, the ideal we hope to actualize, is a more or less realizable *new kind of game*, even if it is evidently borderline nonsensical for Deleuze. Perhaps this component of *nonsense* is the *irrational-qualitative* strain we've been looking for.

Deleuze continues, with a contrasting image of *normal* games:

"The games with which we are acquainted respond to a certain number of principles, which may make the object of a theory. This theory applies equally to games of skill and to games of chance; only the nature of the rules differs…"

Already, here, Deleuze has limited his image of a 'normal' game to exclude *half* of those categories Roger Caillois builds his taxonomy of game-forms from. Deleuze counts two kinds of game, having to do with skill (related to *agon*) and chance (*alea*), but excluding the *freeplay* end of Caillois' spectrum-- in simulation (*mimicry*) and vertigo (*ilinx*). As it happens-- it is precisely this second half of the continuum that describes the ontology of the Ideal Game.

Deleuze goes on, establishing a position on "normal games" from the conventional statistical / game theoretical understanding:

"1) It is necessary that in every case a set of rules preexists the playing of the game, and, when one plays, this set takes on a categorical value; 2) these rules determine hypotheses which divide and apportion chance, that is, hypotheses of loss or gain (what happens if …); 3) these hypotheses organize the playing of the game according to a plurality of throws, which are really and numerically distinct… 4) the consequences of the throws range over the alternative 'victory or defeat.' "

Thus Deleuze gives his overview of game theory-- in a normal game, we are emphatically *not* in a 'pure' shifting possibility space, but rather, a rationalistic shifting *probability* space, wherein we encounter this 'division and apportioning' of chance which forms the weighted dimensional contour of the playspace as such, so as to encourage, not Play/"free movement" proper, but rather-- *optimum decisions*. Deleuze elsewhere has written on

Chess and Go[67], and it is not unlikely that he is deeply fond of 'normal games' like this -- still we must follow his thinking as it goes *beyond* the normal game. In continuing to construct this ideal, he writes:

"… it is necessary to imagine other principles, even those which appear inapplicable, by means of which the game would become pure. 1) There are no preexisting rules, each move invents its own rules; it bears upon its own rule. 2) Far from dividing and apportioning chance in a really distinct number of throws, all throws affirm chance and endlessly ramify it with each throw. 3) The throws therefore are not really or numerically distinct. They are qualitatively distinct, but are the qualitative forms of a single cast which is ontologically one. Each throw is itself a series, but *in a time much smaller than the minimum* of continuous, thinkable time […] 4) Such a game-- without rules, with neither winner nor loser, without responsibility, a game of innocence, a caucus-race, in which skill and chance are no longer distinguishable-- seems to have no reality. Besides, it would amuse no one...The ideal game of which we speak cannot be played by either man or God. It can only be thought as nonsense. But precisely for this reason, it is the reality of thought itself and the unconscious of pure thought. Each thought forms a series in time which is smaller than the minimum of consciously thinkable continuous time. Each thought emits a distribution of singularities. All of these thoughts communicate in one long thought, causing all forms or figures of the nomadic distribution to correspond to its own displacement, everywhere insinuating chance and ramifying each thought, linking the 'once and for all' to 'each time' for the sake of 'all time.' For only thought finds it possible *to affirm all chance and to make chance into an object of affirmation*."

Amor fati! Deleuze's mental model.

"If one tries to play this game other than in thought, nothing happens: and if one tries to produce a result other than the work of art, nothing is produced. This game is reserved then for thought and art. In it there is nothing but victories for those who know how to play, that is, how to affirm and ramify chance, instead of dividing it *in order* to dominate it, *in order* to wager, *in order* to win. This game, which can only exist in thought and which has no

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[67] Along with Guattari in the "Smooth and Striated" chapter of *A Thousand Plateaus*, and elswhere?

result other than the work of art, is also that by which thought and art are real and disturbing reality, morality, and the economy of the world."

Smooth ethics-- for our computational pragmatics, the question is: can something *like thought* occur in a machine? The *art of memory* provides an image of thought as a virtual space-- can this virtuality, or something like it, be abstracted and computer? Supposing Deleuze is correct, that this game can only exist in thought, and can only result in the work of art-- can an Ideal game of this sort be played with a formal-computational system? Can we be *counted as one* with this system, individuated with it, supposing its haptic senses are given as afforded controls in the form of free variables touched by ourselves as player? And in this sense, can we play an abstract model of Deleuze's supposedly unplayable Ideal Game?

There are certain elements of Deleuze's thought that are, in his own words, *pure metaphysics*, and these will remain outside of the bounds of computation-- but indeed, many of the structures Deleuze describes are *material* flows which Ideally play out equally on all strata of a cosmic plane of consistency-- *plane of immanence*-- and indeed are not only computable, but indeed form something very much like the *actual* grain of videogames which has as yet gone under-recognized.

Let's begin to consider a formal-quantitative model of what such an abstracted-ideal game might look like-- how it might be counted, described.

Formal SPS

We will want to develop a conceptual framework wherein our intuitive understanding of lived possibility is bridged with an inconsistent-irrational-infinite mathematical formalism that might begin to help us formulate the more complex structures that we live everyday, Ideally, in creation, to formulate SPSs in general.

We will want to introduce into our mathematical situations a *player*, which can be thought of much like a free variable of any sort, only that this one is somehow 'injected' with the sense of possibility of an Ideal Playfulness, or vital force (creativity), which we are to understand as being prior to the aspect of mathematical formalization (void)-- the *sense of possibility*. This

sense of possibility will be constituted as such by how we choose to *subject* it to external influence. This will describe the composition of the player's subjectivity.

And so, we proceed with a very simple formal structure:

1. Building a space:

Imagine a finite 1-dimensional space, a line segment. It runs along the x-axis of the Cartesian plane (y=0), bounded by a minimum limit x = 2 and a maximum limit x = 10.

2. Building a player:

There is a *player* inhabiting this space. This player is a *point* in the space, it is formalizable as an ordered pair of *n* variables, where the space being played is *n*-dimensional. Thus the player is represented by a single point, *p*, somewhere along the extension of line *L*.

3. Constructing the player's subjectivity / SPS

Player *p* is at point *n*. How will the value of *n* change? If this is a videogame, *p* might be *subject* to the causal influence of a directional/arrow pad, where holding LEFT lowers *n*, where holding RIGHT raises *n*, where holding UP doubles *n*'s rate of change (as determined by the prior press of left or right), where holding DOWN halves *n*'s rate of change. This is only one example. In general, though, the idea is the same-- the player's 'external world' is constituted in large part by the inputs it takes in. In a simple example, *p* might be wholly determined by button presses. In a more complex example, *p* might likewise be subject to outside influences elsewhere within the space itself, such as Mario's being subject to the deadly touch of a Goomba. As the player object is subjected to more and more 'external events', its *subjectivity* is constituted accordingly.

We begin our game at position *p* = 3, and ask-- what is possible here? What *values* might follow? What is the player subject to, and *how* is its subjectivity thus subjected? With what sort of movement-rhythm is the player endowed? It could be capable of moving 1 integer value upwards at a time, or 1 downwards at a time, or both. It could move, rather than integer-wise,

smoothly, along zeno's continuum and beyond, into the wholly continuous realm of the irrational numbers, in which case *p's* potential for movement would be infinite (in its surf of infinitesimals and irrationals (indeed, we will find that the "sense of infinite possibility" is necessarily tied up with continuity in this way). *p*'s subjectivity is defined in terms of afforded access to its mechanics of motion as controlled by *P*, the agent that is in control of *p*. In any case, even the simplest affordance, such as moving +/- 1 unit at a time, is enough to endow *p* with subjectivity, which is the *capacity to be affected by its environment*.

There is thus a *p-P* dyad whereby *p* can only be understood in terms of *P*, which is its *source*, or object. *We* might be at the root of this object, or cause, or another object in the computable space might be.

The equation $2 < x < 10$, or *L*, appears to describe our global possibility space, which can be mapped out as a *phase space*.

In a phase space, an equation describes a line or higher dimensional drift which corresponds to the behavior of a physical system and which can be mapped out onto the cartesian plane, as we have just done (albeit with higher dimensionality and complexity).

With a phase space, the space of all possible movement is *thingified*, it is turned into an *object*, $2 < x < 10$, *U*, which is the global space, or, the Universal Set.

These phase spaces will be useful-- but they are emphatically *not* possibility spaces. We are playing, and we are not “at” any global place, whatever that could mean. We are at a particular local point, and that locality is constructed from the center-outward as the singular point of being, with the global itself constructed in relation to this point, and not the other way around. The player is always local. Given our local position, x=3, we know we can move *at most* 1 step to the left (to x=2), and at most 7 steps to the right (x=10), if we’re moving in *steps* at all (if we are moving smoothly, in a race with the tortoise, Zeno says we will remain at x=3 forever!).

In a real sense, then, though we are on a 1-dimensional line, our experiential possibility space is 2-dimensional, insofar as we have 2 degrees of freedom, 2 options of movement with quantitatively different effects which could.

If we were only allowed to move in one of the directions, then the local possibility space would be only 1-dimensional. Indeed, this could happen, if we moved all the way down to x=2. By hitting this wall, the effective dimension of our local possibility space, will shift from 2 to 1; likewise, if we hit the wall x=10, our 2-dimensional local space will be reduced to 1. Of course, if 2 and 10 are not themselves walls, but rather untouchable limits to be approached infinitesimally, then the local dimension will never be reduced, and the possibility space $2 < x < 10$ will be in no way experientially different from: $-\infty < x < \infty$.

The relative *weights* and attractors of a possibility space, considered *locally,* are more relevant to our purposes than the Universal Set.

It is locally that that we encounter the *object* of the set dissolving again and again, with every moment. Even moving stepwise between 2 and 10 without hitting any walls and reducing dimension, the actual possibility space, as experienced temporally, *SHIFTS* with each movement of the x-value. At x = 3, again, we can move 1 to the left, and 7 to the right. When we move to x=6, then both directions are evenly weighted, 4 steps possible each way.

You see, even the most simple, apparently static possibility space, which might seem to afford no opportunity for play whatsoever, is constantly shifting in relation to the local value of the player.

Whenever a global set, or a phase space is *played*, the count-as-one approach applied to the whole system as object is revealed highly reductive, missing that aspect of shifting temporal spatiality that indeed can be used to describe the dynamic structure of all playspaces:

For this reason, I propose the concept of *shifting possibility spaces* (SPS) as a conceptual object to replace any and all instances of a seemingly ‘solid’ or Ideal *possibility space* which is counted as a One. Where it useful to reference the Global Set or the phase space, those terms can be used. In hopes of achieving a greater realism of the local play experience, “possibility space” should *only* be used in conjunction with its temporal modifier, *shifting*, to avoid the risk of, in Whitehead's language, "the fallacy of misplaced concreteness."

Past/Future-Virtual & Past/Future-Void

There is an important distinction to make here between two different senses of what is meant by "possibility." Both deal with images of the future (that is, images/memories of the past *projected* into the receptacle of becoming/ void), but in radically different ways:

One sense of possibility we'll call *future-virtual*, and the other *future-void*.

A sustained critique of the latter sort has been waged in the 20th century by Bergson, Deleuze and others-- it is explicitly concerned with creating a conceptual alternative to the *future-void* as the future of *nothingness* that is filled with flying pigs and corrected mistakes and other such nonsense, a void which is 'fillable' *linguistically* without any problem, but which has little to do with the real tendencies of a material possibility space, which are emphatically *not* imaginary, but rather the immanent preconditions of actualization itself-- reality.

The *virtual* is a concept, from Deleuze via Bergson (via?)-- meant to 'replace' possibility in a sense, and meaning, loosely (via Proust), that which is "real but not actual, ideal but not abstract." The real future, and the real past (which is always projected onto the future, surfed in the present), are not *actual* insofar as their materiality is extinguished or not yet born, and yet they are real. The virtual is the connective glue between past, present, future as Real flows. The past and future are *immanent* in the present.

The *future-void* is, as it were, a pathological construction of the sense of possibility and its surf of memory, which has nothing to do with representing situations from actual-extensive reality, and yet is itself, as constructive fancy of the memory-- Real.

The *future-virtual* is the concept that can be used to account for the reality of the the possibility space's actual *materiality* itself, though the virtual itself is not material.

To give an example of this distinction and its internal relations-- even if it is *possible* that we will encounter a flying pig this afternoon (void), there are no indications of any virtual tendencies present that will indeed make this event come to pass. This is not a simple matter of probability, where we say that a

pig is 'highly unlikely' to fly this afternoon, but rather a matter of *immanent reality*, in which the future flying pig is (presumably) not immanent in the materiality of the present situation except insofar as we are entertaining it in our sense of possibility.

Future-void functions as a goad, though-- the image itself is an immanent virtuality ripe with generative potential. Future-void can be translated into future-virtual: the flying pig would be recognized as a clear player in the future-virtual, if we were to carry it up in an airplane and strap it to a parachute/ hang-glider (with a human chaperone, of course!). We dangle our toes over the edge of the plane, and at this moment-- regardless of whether we go through with the leap or not-- there is a *Real Virtuality* at play, the immanent possibility of leaping out, actualizing the flying pig.

The clear significance of this example is that we recognize that future-void and future-virtual can meet up at times, in our sense of possibility. We imagine an arbitrary situation, the flying pig, assembled from our memory functioning as possibility, and here, entertained as possibility, we are concerned largely with a future which is *void* -- however, we keep thinking on it, and the *reality* of our sense itself gives rise to the entertaining of further possibility (void) which gradually builds a connection between the future-void and our *present actuality* -- by building this bridge (get a pig, get a hangglider, get an airplane, jump) we are introducing *virtuality* into our sense of possibility, which is playing games on the plane of causation itself, the space in which stuff *happens*.

There is a danger, when speaking of videogames, to conflate this *real virtuality* with "Virtual Reality" -- what we call virtual realities are, as all actualities, surrounded by 'clouds of the virtual', but they are not themselves virtual, because they are *abstract*. Even the pig-algorithm from the last section is other than the Real Virtuality which pervades all actual situations insofar as it is *abstract*. Abstraction is a red herring. To find the virtual, we'd do better to start by considering *the actual*-- and chasing from here, as in Deleuze's image:

"Purely actual objects do not exist. Every actual surrounds itself with a cloud of virtual images. This cloud is composed of a series of more or less extensive coexisting circuits, along which the virtual images are distributed,

and around which they run. These virtuals vary in kind as well as in their degree of proximity from the actual particles by which they are both emitted and absorbed. *They are called virtual insofar as their emission and absorption, creation and destruction, occur in a period of time shorter than the shortest continuous period imaginable* [!!!]; it is this very brevity that keeps them subject to a principle of uncertainty or indetermination."

The virtual can give rise to abstraction, but abstraction itself is not virtual-- we must recognize its most important aspect is as the generative goad which subsists in *all* actual occasions, events, this infinitely small temporality which is also infinitely large, beyond the imagination-- not merely the connective glue between past, present, and future, but also between the *sense of possibility*, and the (actual-material) *shifting possibility spaces*, the mechanics of *causality* itself.

"The common expressions of mankind fashion the past for us in three aspects,-- Causation, Memory, and our active transformation of our immediate past into the basis of our present modification of it. Thus 'perishing' is the assumption of a role in a transcendent future. The not-being of occasions is the 'objective immortality.' A pure physical prehension is how an occasion in its immediacy of being absorbs another occasion which has passed into the objective immortality of its not-being. It is how the past lives in the present. It is causation. It is memory. It is perception of derivation. It is emotional conformation to a given situation, an emotional continuity of past with present. It is a basic element from which springs the self-creation of each temporal occasion. Thus perishing is the initiation of becoming. How the past perishes is how the future becomes." (Whitehead, *Adventures of Ideas*, p. 305).

SPS Strange Loop

The SPS concept is altogether too loopy for definitions with fixed relations-- play must always be defined in terms of its playspace, which in turn must be defined in terms of its players -- it is a classic dialectic/flow, where concepts simply cannot stay put because they are, of their essence, *concepts in motion*.

The goal with these formalizations is to create a vocabulary of structural play such that much of the popular everyday/vernacular terminology already in use can be retained (player, space) along with their loosely considered colloquial meanings. But now a vernacular with some renewed element of *enchantment* created by virtue of their mythic interconnections and dependences on other concepts.

Some new concepts, like SPS and Played Space, I've created as simple modifications of the existing everyday language.

A game is simply: a shifting possibility space. This can be more or less formal. A videogame is formal, it is a played space *object* (a *fixed* line of information) before we play it. When we play it, it becomes a game/ playspace/SPS.

Here, then, are loose attempts at definitions of other concepts in this family tree that I have been, and will be (in this essay, and elsewhere), putting into play:

1. PLAY

Play is motion. It is always born of simple dimensional *drift* (a walk in an N dimensional *playspace*), from this, a 'transvaluation of values', a complex walk. Play touches and thereby transforms materials, and leaves behind fossils, which are called objects, or *played space*.

2. PLAYER

A *player* is a causal agent in a playspace. It is an *active thing*. It can be human, non-human animal, non-animal life, or wholly inorganic. There is no obvious boundary between space and player, the player is always constituted by the playspace and the playspace by the player; thus these dialectical models: Space-as-Player, & Player-as-Space

3. PLAYSPACE

Something is always played, and we can use this word to mean more or less whatever we'd like, so long as there is motion involved. This is the *site* of playing-- reductively, it is the global set, or phase space, but this is to assume

a closed system -- a playspace can be open or closed -- when *played*, perhaps it can be both simultaneously.

A Playspace is a dynamic environment, a Set put into motion. Its only requirement is that it simply includes a transformative element, a drift along a temporal dimension.

A playspace is almost always dimensionally N-D complex (*always*, when human players involved). Reality can be viewed as a playspace, structurally, but Badiou's *void* will be necessary to account for the reality itself-- in the *past-void*, in the *future-void,* the 'receptacle of becoming' which is Nothingness acting as goad for the sense of possibilty. The *void* is not a negative nothing but a positive nothing. *Creativity*. The videogame during runtime, the uncompiled code being actively worked on-- these are examples of computational playspaces-- transforming environments, open situations. DNA splits and mutations, the active process of becoming.

The playspace is counted as one by a Global Set (played space) which encompasses the space of all possible playings, but this is not the playspace, it is a Played Space in the sense of possibility. Thinking in terms of the global should be avoided for pragmatic purposes of attending to the *immanence* of the situation -- SPS should be, in all cases where play is valued, privileged over the global One.

'Playspace' could replace 'game' as a formal concept if we would like for 'game' to keep its optimized/competitive game theoretical roots, but if this is to happen, it is *highly* important that we recognize that videogames, by definition, are *not games*, but rather playspaces which are sometimes built of *teleological* (future/goal-oriented) components, themselves materially resembling games.

4. SHIFTING POSSIBILITY SPACES --

This is the language of the playspace itself, SPS, in *all circumstances*, *across all scales*, this is the concept we use to acknowledge that, as an actual participant of the world, the playspace is always shifting, in motion, *playing* -- never fixed.

"Shifting Possibility Spaces" describes the mechanics of a playspace, as played *locally* by a *player*, and this needs to be considered in two ways:

First, it must be considered phenomenologically, as regarding the immanent experience of the sense of possibility and the material vibration of the space.

Second, it must be considered set theoretically, as in "Formal SPS", abstracted as structural architectures delineating shifting quantitative relations in respect to the player's local position.

At the same time, SPS relates to the player as a player relates to a space-- we can reduce further, and we can qualify SPS, and its relations between player and space, in two contrary-facing directions: player-as-space and space-as-player.

5. SPS PLAYER-AS-SPACE

Phenomenologically, from OUR singular point of view-- *body* and *memory* are our Played Space that defines our tendencies as a player. A player *as space* is thus. Body. The sense of possibility is memory coming into contact with other players, projected into the future.The memory content of a player's past experience as Played Space creates its own playspace -- this is to say that the player's memory itself is an environment, a playspace, an SPS. The player is a playspace (recalling Eckhart). The *sense of possibility* is the mechanism of player-as-SPS. Our intuitive practice of feeling out what is possible, and moving from here, this is the sense of possibility, and the sense of possibility is the mechanism of memory projected into the future. In the sense of possibility, the immanence of future and past both are shown to be active in that of the present moment, that of action, change, local ('subjective') causation, virtual continuum as SPS.

6. SPS SPACE-AS-PLAYER

Here, the playspace itself is considered as player, by way of SPS. When we think about 'constructing the space's subjectivity', this what we mean. The space is playing because it *listens* to (is subject to) the player-as-space and because it shifts. *Shifting is playing*. The space itself is constructed, that is to say it is *played space* (object). This is the formal-SPS definition of videogames, which must be constructed not as spaces but as players if they

are to achieve maximum life/vitality. What are the properties, capacities, tendencies of the played space object? The space is a Player! Coyote, SPS model-- *shortly*.

7. (ECKHART'S) SPS STRANGE LOOP

“Sport and player are the same” -- obviously the space-as-player, once considered as player, can be regarded from the opposite perspective, player-as-space, with its shifting information content functioning as a computable “memory” bank, with its own sense of possibility. For the space, the external world is the player, for the player, the external world is the space. But there is no sense in trying to add rigidity to these concepts. The whole point is that that they loop, and that they *must* loop, and that the only reason these fixed ideas are of any use whatever is that their fixedness is by definition put into motion like this.

8. PLAYED SPACE

A Played Space is a *fixed* set, an *object,* a fossil of some past act of creative individuation. If it is computable, its dimensions are reduced to 1, and it is translatable into a 'line' of binary information. Played space is the compiled game before runtime, the unchanging object, a DNA helix prior to replication (as constructed in past replication). All objects are effective played space, and all videogames are objects. Videogames, just as much as they are playspaces, SPSs, are played space objects. And it is only *as objects* that we can study games in the first place.

Played Space/Virtual SPS: Pattern & Entropy

The study of objects is the study of *played space*, which is *a line of information* (a drift, walk).

As players in a playspace, we become-with this object as SPS in order to enter with it into the flux of historical reality (made present → the future).

As *designers*, however, we do this and more-- we engage with the object *as* an object, and we shape the object in our playing of its structure into new material form, and we thus develop an intuitive relationship between the present state of an object, and the historical process by which is came to be.

The properties that describe an object are merely descriptive of the present state of an ongoing historical transformation. Properties are historical.

The object is a *fossil* of a past-virtual SPS, as it were. The conditions of its creation were singular, precise, emerging exactly from the played flows of an actual past SPS. When we were involved in the creation of this fossil-object, when we were the ones that *played* the *space*, we have memories of its creation, and we can relate our creative practice in precise ways to the properties of the object. For instance, "I remember playing an A in response to a C, and then a white-key tonality was established, and i moved around freely on all the natural notes." Describing how an improvisation took place like this functions as a kind of after-the-fact composition, a mapping of passed time as a means of creating new time, which itself resembles Daniel Dennett's concept of "heterophenomenology", modeling the lived experience of a 'subject' via a presented *text* , or played space, that can be used to reconstruct its conditions in the form of a virtual shifting possibility space, itself a 'fiction' of whoever's work it is to do the reconstruction.[68]

When a virtual possibility space is reconstructed from the properties of a played space object, the analytical work begins to count its own objects in the 'modeling space' (we are constructing a model of a past SPS), and the past is reconstructed systemically in a new way, one which can be very effective, but by no means entirely sufficient to describe the past (the void of local experience being irrevocably lost to time).

David Cope's *Experiments in Musical Intelligence* (EMI) is a perfect example of a played space analysis project. Cope is a composer, and at some point in the 1980s, he was commissioned to write an opera. He had no inspiration to write, he has since said, but that *lack of feeling* didn't stop him!-- he had been doing experiments with computer programming, and when the commission came, he decided that instead of producing content from scratch, he would write a program to analyze his compositional style, and then use it to generate an opera.

I am not familiar with all of the mechanics of this program, but it is not so infeasible to accomplish something similar using Markov chains, readers of a string of information (in this case, Cope's compositions) that can begin to

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[68] *Consciousness Explained,* where*???*

measure and weigh the probability of future occurrences in a compositional string, based on patterns found in the information. So, if playing a C is most often followed by an A in Cope's music (to reuse the earlier example), then, when it comes time to generate new compositions-- which is achieved *as non-human playspace* by walking chance-agents through a high-dimensional probability space, themselves *playing space*-- then, in the generated composition, a C will most likely be followed by an A.

Cope then expanded his program, and fed it played-space texts/objects as input from other composers. As of now, it has generated hundreds of pieces in the style of Bach, Mozart, Beethoven, Chopin.

That these composers' styles are indeed well-replicated indicates something strange and very powerful-- in *EMI*, a *style* is an object. It is an object described by a high-dimensional shifting statistical/*probability* space, with the capacity to realize effectively endless variations of this space. But it is nonetheless an object, a line of information, a *fossil*, with boundaries, edges as hard as any. It merely softens these edges for the intervention of the chance agent, but even the chance agent is only listened to in very specific ways.

It is telling that larger-level structure is not at all well-imitated by *EMI*. Much of what makes classical music so interesting is the way it flows on SPSs of a variety of scales, sonifying 'nonsensical' philosophical dramas[69] playing out in transitions, cuts, other interventions in *between* spaces that are very difficult to characterize in terms of a One describable pattern. It is this sort of *breaking out of pattern*, the event *interrupting* style, the object becoming ambiguous, that properly reveals the radical implications of musical play. Schoenberg talked about "transition liquidations", and indeed these are exactly the structures most deserving of our attention, as the *shifts* of an SPS.

We can now take it as a given that *style* objects are possible, provided we'd like to implement them, but there is still a Chaos at a higher level that style objects cannot describe. There are still fossils of playing happening in all played spaces that at some level are fundamentally inconsistent, attached to

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[69] Here recalling Adorno's reading of Beethoven's music as a kind of materialization of Hegel's dialectics. This sort of position was pretty common to hold in the 19th century, it seems, and probably since, too... What is the *isomorphic* relation between musical flows and philosophical flows? Can any such relation be identified and counted?

the void of local experience at the time of play, that will always be left behind as a *remainder* in any computable model of playing.

This *void* (which is analogous to the LIFE of the animal that is fossilized in the stone) should not be discouraging, though -- for there is still much possibility in the analysis of *style* objects -- objects that could be assembled together on a higher-level plane of consistency, models of transition, of interruption.

The whole study of played space, here, is reduced to the information theoretical “line of information” (a walk) readable by a Turing machine -- indeed it abandons any pretensions of accounting for inconsistency within a computational pragmatics (which *requires a real-time player*), but I can’t help but think that the study of patterns (style) and entropy (dequantization), *regarded as played space*, may have some very important things to teach. Composer James Tenney, concluding his "META Meta-Hodos", a work of *scaling* music theory, writes: "Nothing is yet known about structural entropies"-- and while I've stripped the proposition of its proper context, it's instructive nevertheless-- we know about counting *pattern* in music, but we don’t know about counting (or counting in order to not count) the *other* thing...

There seems to be no accounting for that chaotic element in a string of information which is *uncompressable*. If it could be 'accounted for', it would be reduced, that is *compressed*. But it is not compressible, because it is *unfiltered played space*, as it were-- the only possible 'reduction' would be to reduce it to its causes in time, which, though they may appear random, were *locally played* by a player at some point, and the *meaning* of this chaos is precisely *how* it was played, the meaning itself *is play* -- the sense of the play for the player, and again, how we choose to play it. This is to say, and it's a premature hypothesis indeed, but no bother:

Entropy is a measure of past-virtual play as it subsists in information-objects, Played Space.

Entropy is beyond positivistic reduction, but it is *not* beyond *played reduction* -- that is to say, reduction which finds its 'ground' in the immanent experience of play itself.

Whatever the case may be as regards this particular hypothesis, no bother-- we ought to tunnel into this concept of entropy, and find patterns which we find, while never reducing our worldview to those patterns, but rather to continue tunneling, finding patterns at lower levels, entropic drift at higher levels, vice versa, etc. I believe that the zoom into the 'meaning' of a information-sequence's entropy content will be a powerful thing indeed-- perhaps a zoom into the void of that which cannot be counted because it is directly experienced, the local history of played space as SPS.

SPS Player Model 1: Coyote (Entropic Drift)[70]

When it comes to creating *spaces*, it will be more and more advantageous to think of the space itself *as a player*, a co-player with the human player, the other. The player (space) as a *teacher*, a *friend*... a catalyst... trickster.

The *player models* that we are interested in are not *abstractions of human-lives* (as is the sense in which 'player model' has been used to date, to great monetary effect at Zynga, etc.), but rather-- these player models are *mythical virtualities* of Ideal/archetypal *ways of playing* whose generative capacities can be applied equally to *player* and *space* (these being the same).

We value the *meaning* of the *life* that is unable to be captured in the fossil/ object, the irreducible *grain* of play, of the *shift*, that is left over in the incompressible, in the entropic remainder-- this is the gift of Coyote, who exists *between* the eternal played space object and the ceaselessly becoming-

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[70] This section samples & edits freely, without explicit citation/pagination, from Lewis Hyde's book *Trickster Makes This World*. I thought it would be too messy to include all the quote-marks, ellipses and page-references. Hyde's book is an *excellent* study of shifting possibility spaces, one ostensibly has nothing to do with games (as we'll find is true of most SPS research), but which is all the better because of it. There is SO MUCH MORE in here which is relevant to these ideas, in this chapter, and in those that precede and follow.. It is really *remarkable* how almost all of the book is related to the themes of this essay-- largely coincidentally, though absolutely influencing it at the same time... The Trickster hero is embodied by Coyote, along with many others-- Raven, Anasazi, Loki, Monkey... and *Hermes* (Mercury, Thoth)... Though it is a *hermetic* text, I have chosen to focus on Coyote (and to sometimes replace Hyde's use of 'trickster' or even Hermes with this particular character (keep Hermes a secret ;) !), on account of Coyote's function in my musical life and in the *ilinxgroup mythos* into which Coyote was invited by Bryan Sonderman (many many thanks!!). A strange couple of years, 2012-13, Coyote showed up again and again in the strangest places, linking disperse situations together via what Jung has called 'synchronicity', what Hyde has called 'co-incidence'-- in short, chaotic *situational assemblage*. "Hermes-the-Thief moves the meat from one situation to another and by substitutions it comes to have its significance; it becomes a sign that can 'tell' something." Jung has spent a considerable amount of time on the Trickster archetype himself, and I can only imagine he's keenly interested in the hermetic/alchemical connection. In short-- the *shifting possibility spaces* idea, even if it does indeed apply to *all situations*, can be INTENSIFIED, made *more shifty*-- and Coyote (Trickster-Hermes) is the agent of intensification, the alchemical 'catalyst'...

void *flux* of immanence itself-- Coyote leaves his footprint on the line of information, but the footprint cannot be counted, it is the 'nonsensical' element which prevents 'information' from being the same as 'meaning', as Claude Shannon was quick to stress even in the earliest formulations of his theory.

Coyote lives in the *gap* between meaning and information. *The road that Coyote travels is a spirit road as well as a road in fact.* Coyote is a boundary-crosser-- it is Coyote that exists both *in* the space and *out*, all at once. Coyote is the great *shape-shifter.* It is through Coyote's cunning that the *shift* is possible at all (a shift from what is *in* to what is *out,* or vice-versa). Every space or object has its edge, its sense of *in* and *out*, and coyote is always there. Coyote is the creative idiot, the wise fool, the gray-haired baby, the cross-dresser, the speaker of sacred profanities. Coyote is the god of the *threshold* in all its forms.

The threshold is the zone of the *shift*-- a pore, a portal, a doorway, a nick of time, a gap in the screen, a looseness in the weave...Coyote is a *pore-seeker*. He keeps a sharp eye out for naturally occuring opportunities and creates them ad hoc when they do not occur by themselves.

Coyote does not live by the 'smooth ethics', or *any ethics,* he does not prefer the fluid to the solid...

It is difficult to escape the conclusion that coyotes have a sense of humor. How else to explain, for instance, the well-known propensity of experienced coyotes to dig up traps, turn them over, and piss or shit on them? ...

(It may help to resurrect the old meaning of 'humor': the word once referred to fluids (thus the bodily 'humors') and comes ultimately from a Latin root (*umor*) having to do with moisture, liquid, dampness).

The fish swims through its expansive watery world whose fluidity Coyote has gifted but suddenly *hungry* Old Man Coyote blocks its passage, makes the world less expansive, *less fluid*. If the fish itself is tricky, if it has the wit to slip the trap, it will do so by finding a breach in the wickerwork, a rip in the net, an escape hatch its enemy has not noticed. Either way, we have a first mark of Coyote's cunning: it closes off a passage to capture its prey, or it

finds a hole to elude its foe. It can *seize* an opportunity or *block* an opportunity.

The rabbit with a hole has a pore in the earth, a self-made opportunity to escape the fox. But the animal with a single-entrance burrow is also in danger of being trapped in its own hold, so the second trick is to dig a second entrance, or a third, or fourth. The Greeks thought the fox the epitome of animal cunning and imagined her dwelling to have seven entrances.

Coyote's dwelling has how many entrances? *N++ (loop)* Coyote is polytropic-- 'turning many ways'-- he knows how to slip through pores, and how to block them; he confuses polarity by doubling back and reversing himself; he covers his tracks and twists their meanings; he changes his skin or shifts his shape as the situation requires.

Shifting possibility spaces are easier to understand when opposites/ oppositions collapse, whereupon we are dropped back into Coyote's limbo, where boundary markers shift at night, inky clouds attack transparency, and every resting place suddenly turns into a crossroads...

Coyote is the great shape-shifter. Given the materials of this world, he demonstrates the degree to which the way we have shaped them may be altered. *Coyote makes this world and then he plays with its materials.*

Why play the game if there is no ambivalence about the rules it toys with? That the game exists at all indicates that the rules sometimes deaden and constrain rather than enable and enliven.

Shift! Turn the *griefer* into the *referee*. In Coyote's territory, who's to say what is loss and what is gain? It's hard to get your bearings...

Coyote, shape-shifter, pesters the distinction between *accident* and *essence* and remakes this world out of whatever happens. Accidents happen in time, essences reside in eternity. Can eternals be shielded from time and from change? Can essences be protected from accidents? Before the eternals can be fertile, they need the mulch of death, disorder, and decay. With the aid of Coyote and his tricks, *flux* has entered heaven itself.

There is no way to suppress change, not even in heaven; there is only a choice between a way of living that allows constant, if gradual, alterations and a way of living that combines great control and cataclysmic upheavals. Those who panic and bind Coyote choose the latter path. It would be better to learn to play with him, better especially to develop styles that allow some commerce with accident, and some acceptance of the changes contingency will always engender.[71]

SPS Player Model 2: The Tortoise (Smooth Abstraction)

"If Hermes is involved, after a touch of chaos comes another cosmos."[72]

If SPS-fluxmaster-Coyote requires, or would benefit from, the tempering influence of a friend-- it is the *Tortoise* of Zeno's paradoxes.

"It would seem that accident is fond of destiny and uncertainty is certainty's intimate companion." Hermes-Coyote represents *contingency*, *locality*, while the Tortoise represents *permanence*, *essence,* the *global*. Slow slow tortoise, never moving, existing in the Ideal-*essential* spherical cosmos of Parmenides, without accident, without *reality*-- and yet-- *winning the race*.

The tortoise, from his race with Achilles, and from all his other shenanigans, is well acquainted with what has been called the 'non-shiftiness' or unmoving/atemporal *essence* of the continuum.

As if smoothness *prevented* motion?? Zeno says that the tortoise cannot move at all, but in response, the *actual* tortoise moves *continuously* and laughs at Zeno!

"The eternals are vulnerable at their joints. To kill a god or an ideal, go for the joints."[73]

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[71] ibid, p. 107

[72] ibid, p. 138

[73] ibid, p. 283

The joints separate the *differentiated* / *individual* components of the playspace-- these, the poles that Coyote swaps between freely-- the opposites that he sometimes dissolves, sometimes solidifies.

The *joints* of the Real Continuum are the *rational numbers* -- the *quanta*. Divide and divide, again and again-- turn 1 joint into 2, into 4, into 8, into 16, and so on.... unit sizes 1.0, 0.5, 0.25, 0.125, etc... Ultimately-- the *joints of the infinitesimals*, the *quantum joints of calculus*.

For the Tortoise, there are *no joints* (only rational stasis or inexplicable motion), while for Coyote, there are *many joints*.

To kill an ideal-- go for the joints. Coyote always sees joints, and this is likewise the case with computation. There is always the minimum joint between two steps in the turing tape, between a 1 & a 1, a 1 & a 0, a 0 & a 1, a 0 & a 0... There are hard *cuts* everywhere. These, the *thresholds* of the *shift,* the domain of Coyote. Coyote sits at the point of the "&".

Coyote's friendship with the Tortoise allows him to approach an image of the world in which all the "&"s have been smoothed over, such that "&" does not any longer signify assemblage, 0=2, but rather-- total continuity, One, Wholeness (all while bearing in mind that the One is Not).

Such is the principle of the calculus which treats the quantum infinitesimal series as if it were *itself* the continuum. Of course it is not so-- there are still infinitely many irrational numbers between each rational member of the series..

But the tortoise suggests to his friend, and Coyote understands, that an abstraction *toward* the smooth is good enough, as far as a pragmatics is concerned. Tortoise says the smooth itself, true continuity, is out of this world altogether, is in the domain of pure metaphysics-- it is *known* to be *non-computable*. Only by *abstraction* can smooth-like structure be put to use.

It is as simple, says the tortoise, as taking a boolean value, and using an integer series instead. As simple as taking an integer series and using a floating point at a higher resolution instead. 'Smooth ethics' indeed! But Coyote asks-- *is this not only Hi-fi fetishism? What's the point?* Tortoise says

the point is that it's more realistic, and he draws a wiggly line on the ground, and squeezes the dirt at his feet, and asks that Coyote does the same-- 'all of this motion, the feeling of it, would mean nothing without the Real smoothness of the world' tortoise says, 'and all of this *touch and feel,* this is Real Motion and this what we're after, right? Because when I drew the line and I squeezed the dirt, these were not actually two separate events, but rather One event. With these smooth values, we can *connect everything* and establish a plane of consistency, a plane of immanence, and find Wholeness in ourselves, and we will find satisfaction there, truth, and that's why smooth abstraction is more realistic..' but even as he says this, he sees that Coyote has begun to fashion a trap to catch a fish because he is hungry... Tortoise looks down to his feet, pulls his head into his shell, *darkness*, *cut*-- and he wonders if maybe he's an *analog fetishist* after all....

Coda

Shifting possibility spaces, are in all cases-- *games*.

Coyote's *CHAOS, entropic drift,* is-- SPS's poetic hero.

The Tortoise's *smooth abstraction* is-- SPS's Realistic method.

&

"Thus speculative philosophy embodies the method of 'working hypothesis.' The purpose of this working hypothesis for philosophy is to coordinate the current expressions of human experience, in common speech, in social institutions, in actions, in the principles of the various special sciences, elucidating harmony and exposing discrepencies. No systematic thought has made progress apart from some adequately general working hypothesis, adapted to its special topic. Such an hypothesis directs observation, and decides upon the mutual relevance of various types of evidence. In short, it prescribes method. To venture upon productive thought without such an explicit theory is to abandon oneself to the doctrines derived from one's grandfather."[74]

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[74] Whitehead, *Adventures of Ideas*, p. 286

PART II:
Old Fractal Playspaces

1. Unit Analysis 1:
Fractal Dimension, Finitude & Magick

Chaos!--

This is here we're at today: there have already been a few revolutions in thought spurned on by the *smooth abstractions* of fractal geometry, whether they're known as such, or by a different name-- back a few years through the Electric sheep screen-savers and back through the Deleuze-heads of the 90s and the first wave of fractal software, back through Mandelbrot (the 'source') & back still through Cantor's 19th century & back still through Bruno's Renaissance & Zeno's Ancient Greece, and Hermes Trismegistus' Egypt-- following these zooms back through a history of freely-scaling infinity, a concept that is *not at all new*. Mandelbrot gives us a re-named variable "D", for the hausdorff dimension, which measures the smooth, floating *approach* of a dimension *N* to its 'ordinal superior' *N+1,* and the applications of this *D*, the fractal dimension, have had an enormous impact on our contemporary culture -- we've seen some of these effects in popular pragmatics, true-- lung-folds, landscape simulators, raves, economics, ferns, telephone noise... but we could really be expanding our field of view! History is in front of us, unfolding, not an *object* behind. *As above, so below; as below, so above*-- the alchemical principle of correspondence, the theory of micro/macrocosm relation, of scale, as visual, philosophical, musical, scientific, conceptual, ludic-- and with fractals, we have its *geometric model*-- a means of describing *scaling* relationships (above, below, between) in and between *any and all* objects, processes & spaces. The possible applications are endless-- where there are wholes and parts, where there are differences in size, of vibration

(tone, feel)[75], differences of *whatever*-- fractal geometry can be used to describe relational aspects of all these things. *There are no actual situations that cannot be described at least in part by their scaling/fractal aspects.*

Moving toward this fractal realism-- where have we lost momentum? Perhaps we've hit a wall-- at least in the popular imagination, the canonical examples of fractal form have always abided by a counted structural/computable-idealistic reading of the geometry, an aesthetics of quantifiable Order, such that even wildly chaotic structures like the eponymous Mandelbrot set are valued in large part for their consistency, their remarkable quality of being describable with a one-line equation: z <--> z^2 + c. They are celebrated insofar as, *within this functional finitude*, they are capable of producing a stream of infinite variety. When 'chance' intervenes, as in models derived from Brownian motion, etc., it is in the form of *statistical chance*, as opposed to the *coincidences* (synchronicities which are *contextual, felt*) of Real chance and its pseudo-divinatory aspects. The structural-statistical *chance* is wholly consistent within the numerical way of thinking and is proud to ignore altogether the *contingencies* of the *possibilistic* material nature that gives rise to these.

The Fractal-Ideal line of thinking is fine, it is beautiful indeed, but it it is missing quite a lot-- in the same way that ignoring the existence of the uncountable set of irrational numbers means ignoring *most* of the Real number (virtual) continuum, this discrete approach to fractal geometry ignores *almost everything* that is real! Fractal geometry, present-day poster-child of *chaos*, has forgotten the primordial χάος of a *fundamentally uncountable, inconsistent* creativity, that which is presupposed even by space and time, that which is manifest as the ceaseless novelty and creative advance of time itself-- it has been replaced with a chaos that is deterministic, wholly

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[75] Mandelbrot himself is keen to stress the relationship between fractal geometry and Harmonic theory in maths, which maybe can be felt intuitively when we consider the the scaling integers of the (musical) harmonic series, drawing a connection both to pitch-based theories of music, and, accordingly, to the whole Pythagorean tradition as it has been described in Plato's *Timaeus*, with its cosmos modeled after the integer-proportions of integer harmony. A new Pythagoreanism need not be limited to such low-values, of course (Timaeus concerned with numbers up to 27)-- one of the exciting things about fractal geometry is the possibility it suggests of thinking a Pythagorean *Musica Universalis* without the need to reduce music to the basic harmonies which are no longer are the dogmatic rulers of music as they once were.

quantifiable-- reducible to Newtonian-deterministic *complexity*. These classical fractals are unchanging essences, sacred Fixed Ideas or Forms, and as such -- immune to the profane drift & cascading variability of play. And these solid *things,* eternal objects, are our cultural images of the *infinite*.

But we've made a mistake-- we must indeed concede that the infinite cannot properly be found outside of the finite, that finite *things* will always point the way, and give provide us the ground on which we need to stand to see at all... that even some processes (functions) can be counted as as things... but I believe that with the Ideal approach here and its equation-objects, we are still not attending to the proper material finitude of the things, the impermanence and dissolve of all material objects, the flux of becoming, of play. *PLAY*-- which, as an object *is Not* (is void, is nothing) because it is always transforming-- but which as a process, as a fact of reality which is immanent in the flux of nature itself, *is*, and in its Being or *isness*, is infinite..

Here is where videogames enter the story, as nexus between the consistent information object and the inconsistent play process, in that space where meaning becomes information, and information meaning, the two zones wholly irreducible to one another, even as they depend on each other.

Let's not forget that the developments of fractal geometry were spurned on, in large part, by simultaneous developments in computer graphics. As James Gleick writes in *Chaos,* recalling the original boom: "Graphic images are *key*. It's masochism for a mathematician to do without pictures... Otherwise, how can they see the relationship between that motion and this? How can they develop *intuition*?" It's true, much of the value of the mathematics involved in deep fractal zooms means very little to our everyday intuition without the computer's ability to visualize the structures *as material-vibrational SKIN, as matter-energy*. Imagine trying to visualize the deterministic chaos of a Mandelbrot zoom in the mind's eye.. ! Fractals, considered broadly, are a scaling geometry, but they are also, and what is relevant to our purposes, a *genre* of vibrational software, and have *always been so.* And they are for our purposes a timely event in the history of software, occupying effectively the same time scale (the last ~50 years) that we're all accustomed to interrogating

-- pop culture, videogames, etc (Retromania!).. At the same time that this vibrational picture genre (fractals) was emerging, another genre of software was likewise taking shape, finding its form-- the early history of videogames, a radically new structural style which also emerges from the conditions of computer graphics, and of complexity/chaos, non-equilibrium systems defined by invariance, attractors, etc-- but of a different sort. Videogames' greatest contribution to the history of software has been there from the beginning-- it is simply, and always will be, their *played* (haptic) formalizations of real-time input-output feedback structures and the implementations of these structures as actual *materialities*, real tangible object-players essentially forging an inconsistent connection between the self-consistent structure of computational formalisms and the self-consistent continuous flow of time and creativity in our perceptual experiences and our causal influence on the material transformations of world-flux.

Following from fractal geometry and videogames, then, and letting these software paradigms cross-breed-- *Infinite Sketchpad* builds from both of these genres + the longstanding tradition of drawing/walking LINES with pen/paper-- and it reveals a new kind of chaotic fractal geometry that begins with an empty plane, the Real XY plane, where the eventual chaos is Really-temporal/contingent/*coincidental*/situated, and is chaotic as such because it has been *played* in real-time by a desiring (or otherwise chaotic) subject, and in this way is *fundamentally irreducible to simple mechanistic determinacy*. It is a fractal geometry where the causal structures at play are *material-aesthetic* (perceptual) by nature, as opposed to merely mechanistic/algorithmic, where chaos is, once again, allowed to become χάος. *Infinite Sketchpad* lays the grounds for a new fractal geometry that is, simply, an extension of the classical art object that we've always known, the image-on-a-flat-plane-- the *picture-object*, finally given the infinite scalar depth/variability that has already *always been at play in our sense of possibility's encounter with such objects*. This new form, which does not allow for drawing a dividing line between reduced quantitative structure and aesthetic causality (play), calls for a 'radically empirical' approach to the game (and others like it), an approach that does justice to its structure as well as as its *use*, *as playspace*. It demands an analysis that refuses to abide by a hard distinction between subject and

object, such that the transitional spaces between the 'inner' and 'outer' world can be treated as a unit "pure experience", *play*, or Shifting Possibility Spaces (player-as-space *object*, space-as-player *subject*, Many as One).

For the purpose of exploring this viewpoint, I have thus far described a speculative-historical groundwork of a kind of computational *alchemy*, or pseudo/minor/proto-science that acts as subjective/objective structural dissolving agent between logic and play--“as above, so below”-- a theory in which *immanent experience* is considered to be the true ground of reality, for all things, computation included, and where this doctrine of immanence is meant to be *dogmatic* only insofar as the dogma proves useful in creative practice. I hope this loose model might begin to do theoretical justice to the possibilities afforded by play in *Infinite Sketchpad*-- if nothing else, to situate the game in a historical context which it may be lacking on its own terms. Needless to say-- *by NO means* should it be thought that I have achieved a complete theory of fractal playspaces, one which is pragmatically *and structurally* applicable to the scaling aspects of all (playing) objects and their relations. I’ve not even gotten close-- this will require so much math & so much more I don’t know...!

If the last section can be read as an extended image designed to cultivate a feel for the ‘ludic realist’ position-- consider this section as an intro to the ‘fractal realist’ position, a companion worldview, working hypothesis, which will ultimately be filled out by a third element in the Realism-trinity, leaving us at the end of this whole work with a *ludic-fractal-musical* realism, neither reducible to the others, each providing for the whole a strange looping ground on which the other components can be related to and understood.

SPS Scale Model

The fractal picture, *in time,* looks like this-- Zooming in and out, the sense of possibility drifts and is amplified by the folding/unfolding of further and further detail, which is mostly concentrated at ‘basins’ and ‘edges’-- scalar presence/locality/field-of-view is afforded control of a continuous degree of freedom (when we, or our objects of perception, *shrink/grow* in ways our body is not capable of), *presence* is allowed to play as a free variable,

presence becomes understandable only in terms of multiplicity (presence *of what?* in *relation* to what?)-- the steps of integer dimensionality are smoothed, they become a slope, and finally not even lines and surfaces (the "1" that is the surface, the "0" that is other, separated by the "boundary" of an object) are immune to smooth dissolve, and finally there is no longer any sense in speaking of 'integer dimensions'

Fractals have come of age with computer graphics (there was little history of fractals, by name, prior to the advent of visual computation (though of course Cantor et. al cannot be forgotten))-- for this reason they are a *cousin* of videogames and of all computationally-enabled work. Their material compositions are *continuous* with the material composition of videogames. That said, fractal mathematics does not *require* visualization, even if its study benefits immensely from the processing powers of computers + the skinning/ precision-visuals of screens, which can *actualize* (materially) the structures of concepts (structure and symmetry on a *smooth scaling continuum*) that may otherwise be difficult to get hold of.

New fractal playspaces must look to the past to find a new origin of this computational coming-of-age, a new plane of consistency, the point where playing/musicking, fractals, continuity (smoothness), fragmentation (striation) might have occupied the same material, as well as conceptual, spaces-- the point of departure where played space and fractal space each set off down their separate paths -- the new spaces, *Infinite Sketchpad* and others, look to the past, this origin, and ask how this relationship might be reclaimed, how the paths of fractal geometry and played space might once again converge.

"A Gallery of Monsters"

Georg Cantor's infinitely scaling sets were regarded as MONSTERS by some in the mathematical community of his time-- as pathological, insane. T. Stieltjes describes "turning away in fear and horror from this lamentable plague of functions with no derivatives." Zeno's 'disproof of motion' ought to be enough to enough to remind us of the real sense of insanity-feel that's at play here, which is pointing toward a truth that I think we should be careful not to dismiss as cute, to really try to feel. But watch out!

Concept-*Monsters*. This explicitly psychic interpretation of the geometry may yet prove to be of *great* use, opening for us the possibility of a future where *all new* monsters are not to be avoided, but rather cultivated, bred, loved, as *materials* for new alchemical Work, where Insanity is not counted as one, but is a multiplicity of particulars, where each instance of the insane has its own affective capacities, etc., and where we learn to appreciate and cultivate in our own selves aspects of these insanities that we come to know in the materials (insanities being, merely, a concept which 'plugs' the infinite into one of its variable inputs).

Mandelbrot refers to the time period in which Cantor and others were composing their major works as the "1875-1925 crisis in mathematics," which is aptly described here in an extended quotation he uses from F.J. Dyson:

"*Fractal* is a word invented by Benoit Mandelbrot to bring together under one heading a large class of objects that have played a historical role in the development of pure mathematics. A great revolution of ideas separates the classical mathematics of the 19th century from the modern mathematics of the 20th. Classical mathematics had its roots in the regular geometric structures of Euclid and the continuously evolving dynamics of Newton. Modern mathematics began with Cantor's set theory and Peano's space-filling curve. Historically, the revolution was forced by the discovery of mathematical structures that did not fit the patterns of Euclid and Newton. These new structures were regarded as 'pathological', as a 'gallery of monsters', kin to the cubist painting and atonal music that were upsetting standards of taste in the arts at about the same time. The mathematicians who created the monsters regarded them as important in showing that the world of pure mathematics contains a richness of possibilities going far beyond the simple structures that they saw in Nature. Twentieth-century mathematics flowered in the belief that it had transcended completely the limitations imposed by its natural origins. Now, as Mandelbrot has pointed out, Nature has played a joke on the mathematicians. The 19th-century mathematicians may have not been lacking in imagination, but Nature was not. The same pathological structures that the mathematicians invented to break free of 19th-century naturalism turn out to be inherent in the familiar objects all around us." (F.J. Dyson in Mandelbrot, p. 3)

We'll see similar trends repeated in visual arts in music -- pathological creation which is interpreted as escaping, or otherwise existing outside of "nature", instead revealing new aspects of nature that were always present but previously unconsidered. It is no meaningless coincidence that much of the modernist artwork of the first half of the 20th century has similarly been perceived as pathological-*insane* in some sense. It is the rational mind's *fear of inconsistency* that seeks to label *new* planes of consistency as *pathological* rather than *creative*, messy or thoughtless rather than complex.

This gallery of fractals, then, exhibition of mathematical modernisms-- these are monsters of *smooth abstraction,* insane creatures smoothing space, shifting attractions/gravities (atonality), smoothing time, as in the war against the "tyranny of the barline", the project of *occupying without counting*, hooking into music history's count, or uncount-- Or rather, a new *count*: infinite line in a finite area; infinite volume in finite space (& a new "count as what?"). New formalism.

That this is a formalism with a history of inducing a kind of metaphysical terror/madness in precisely those formal practitioners who ought to be most interested, who alone have the conceptual tools to feel the full weight of the horror -- is this a good sign? Of course!

To re-awaken some of the 'horror' (*vertigo, ilinx*) aroused by these monsters-- this should be a primary [qualitative] goal of such a formalism, if it's right to call it *a (One)* goal at all (in reality, it needs to remain *many,* fuzzy/cloudy, *pre-counted*). What we're after are the disorienting conceptual *affects* of the tension between fragmentation and continuity. A formalism of dizziness. Feeling this first in the material, cry "monster!" "pathology!", then move on, and *count the flux* that can be counted (for a new ground, a new spin, new drift).

This mirrors the institution of classical music theory (theory of tonal drift) -- the tones and their numerical relationships are felt prior to *counting* them, as pure multiplicity (inconsistency), pure *affect*. Then we learn that we *can* count them, and half of the musicians begin to do nothing *but* count while the other half go about their affective work insisting on never counting again. Naturally, the latter group is bound to *play* better music (even if the first group *performs* better with their consonances)-- in the arts, *lived affect*

necessarily wins out over quantity -- but both groups are being reductive. Quantitative theorists should open their ears. Qualitative players should be curious-- don't shut yourself off from what feels too rigid, or you will never find that the play of these theoretical structures might be, in fact, openings into new smooth potentialities -- what should we make of the fact that some of this quantic magic in music *is* in fact quantifiable?

"The language of mathematics reveals itself unreasonably effective in the natural sciences [as in music]..., a wonderful gift which we neither understand nor deserve." (M)

It is mathematical structure-- *occult magic* (Bruno)-- which will be necessary in defining the relations between all of these monsters, their genealogy, flowing as it does into musics, visual arts, information theories, philosophies, etc..

The main source for the information here presented is Benoit Mandelbrot's self-declared 'manifesto', *The Fractal Geometry of Nature*. It's a surprising friendly read for a non-mathematician even ("this book is preface from beginning to end"), provided you spend some time *practicing* (i.e. LOOKING, playing in *Infinite Sketchpad*) with the ideas (and I don't even mean to practice with the mechanics M describes; I mean, practice=play)...

Mandelbrot describes his book as a collection of 'case-studies,' intentionally avoiding too rigid a definition of fractals, and to this end provides a wide-range of examples more or less loosely united by family resemblance-- from snowflakes and ferns to classical art to Brownian Motion to his own eponymous Julia Set assemblage (the "Mandelbrot Set"), etc.

As a proposed augmentation to this conceptual 'casebook', here I'm simply proposing that we add *Infinite Sketchpad* and its derivatives to the book by virtue of their family resemblance, and that we continue to think the thoughts, play the spaces, trace the implications that such an inclusion into the fractal family asks of us. That these spaces are *actually* infinite, but only *effectively* so is part of why some mathematicians might show resistance to the idea... But this is no different from the 'effective infinitude' of nature, so insofar as there is a "fractal geometry of nature", [in]-finite scaling playspaces ought to be included as well.

This is a new kind of fractal playspace hinted at by games with a dominant scaling mechanic such as *Katamari Damacy, Within A Star-Filled Sky, Scale*, etc., but one that had not yet been actualized in its "primordial" form until now -- to repeat an analogy: what a normal pen and paper is to 2-D playspaces (a tool where 2-D playspaces can be *thought* in the world), *Infinite Sketchpad* is to fractal playspaces between 2 and 3 dimensions. If the lessons learned from it are taken seriously (playfully!), I believe the growths/tendrils of its mechanics, as freely developed into new concept-mechanics, could have an immense impact in the world of software, playspaces, games.

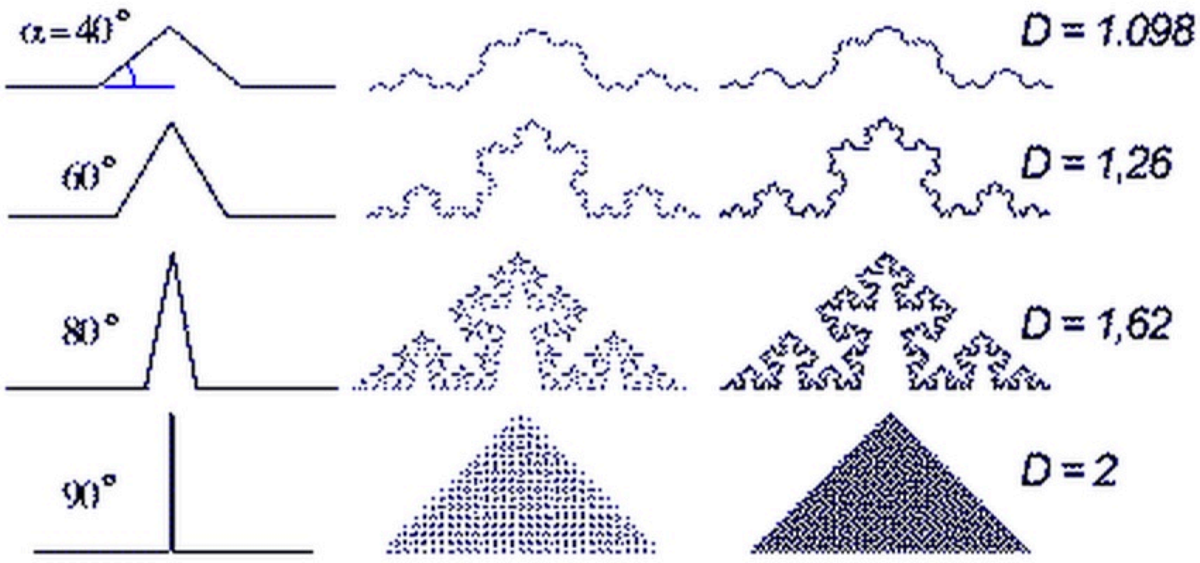
Two hopes:

1. That by the time we've reached the end of this section, you won't have any issues with calling *Infinite Sketchpad* a fractal space. That this will follow from an expansion of what is understood by “nature” in Mandelbrot’s definition of *natural fractals*, which are only effectively, not actually, infinite--

2. That you'll share some of my sense that *I.S.* and its derivatives could provide useful for exploring wholly new questions related to what smooth play in smooth spaces could mean, how the 'problem of the continuum' might be played, etc., and how all of this ties in loosely to the ontological and aesth-ethical concepts introduced in the early sections.

Fractional Dimensionality

The concept of fractal dimensionality traditionally assumes infinite detail -- without infinite detail, defining a space, no matter how complex, with finite-scaling Euclidean measures should work just fine.



Rooted in the infinite, fractal maths proceed with analyses & syntheses of those infinitely self-similar forms like the Koch curve and Sierpinski triangle and the like, breaking these down into their component parts, and analyzing them in relation with one another, always measuring a part in relation to a container which is itself a part. The origin of the word *fractal*, then -- we get it from *fractional* or *fractured* dimensionality. These are "statistical ratios comparing how detail in a pattern changes with the scale at which its measured."

Detail shifting with scale -- *detail as possibility,* that's the way we feel it. Fractional dimensions, we can read these values as decimals, floating points -- the smoothing/dissolve of discrete/whole number dimensions! A gift-- formal model of *surface fuzziness* (or *roughness*, as Mandelbrot would put it), possibilities opening into further possibilities, detail becoming generality, etc.

As an example of the kinds of classical smooth dimensionality we might be interested in-- the classic Koch Curve (snowflake) lies somewhere between 1 and 2 dimensions

The fractal dimension, Mandelbrot's *D,* is always greater than the topological dimension of the space in which it is embedded.

To generalize--

A) Fractal 'dusts' will lie somewhere between 0 and 1 dimensions.

B) Fractal curves will lie between 1 and 2 dimensions

C) Fractal surfaces will lie between 2 and 3 dimensions

The spaces we draw in *IS* don't fulfill all the conventional formal requirements of a fractal ("not a fractal!"), lacking self-similarity, and infinite regress, but these are not essential characteristics, even if they have been effectively regarded as such up to now. We can and should carry over even the most basic understanding of fractal or smooth dimensionality, the implications of Mandelbrot's *D*, into studies of new playspaces like these. Definitions flow, we use (and abuse) what's useful.

There's a broader category of fractal space that's been revealed here-- ideas from conventional fractal geometry will likely play a powerful role in our construction if we choose to let them in -- this core idea of detail shifting with scale is clearly present in *IS* drawings-- a sense of smooth shifts of dimensional gradients, if not the precision of fractions. I don't think a precision of this sort would be impossible, though.. I can imagine a rigorous analysis of a reimagined/monstrous SPS fractal dimensionality in *Infinite Sketchpad*, maybe even a dynamic calculator of dimensionality integrated into similar software in some way, that allows us to smoothly shift *D* as an active free variable in the space.. More detail, more possibility, higher dimension. Less detail, less possibility, lower dimension.

Natural Fractals, Chaos & Effective Infinity

Sketches in *Infinite Sketchpad* are always finite, but this is no bother, and should not stop us at all from our tunneling into its implications.

Mandelbrot himself famously produced a fractal-dimensional analysis of the British coastline, and this is obviously not an infinitely recursive form. Studying the fractal aspects of natural form was one of his primary concerns (and *the* topic of his popular *Fractal Geometry of Nature*), even as the introduction of finitude necessitated a loosening of definitional rigor.

With the material world, as opposed to that of mathematical ideals, we are dealing with spaces that are *practically* finite, where our perception of the

infinite scalar limit implied by fractional dimensionality runs into *surfaces*-- these stop our progress, they are like ours *goals*-- I don't think that Mandelbrot's study continued zooming into grains of sand. If he did, the grain object would open into a space of radically new fractal geometries. What is the fractal dimension of a grain of sand? a molecule? an atom? What is the nature of the scalar transitions between these dimensionalities? What is the *slope* of the transitioning fractional dimensions? The derivative of this SPS curve?

The Eames Brothers' "Powers of Ten" is a perfect illustration of the kinds of rhythm exhibited by this fractal naturalism, which zooms from the edges of the universe into a person, and into the skin, cells, proteins, molecules, atoms, etc..

Could we do a fractal analysis of a scalar trip through the universe, as in Powers of Ten? If so, what would the character of its (shifting) fractal dimensionality be? Certainly there would be radical shifts-- the transition from space to Earth's surface, for instance, would result in an intensely amplified dimensionality, a far greater concentration of detail as dispersed about in our field of view.

Is there a sense in which such a geometry of *fractal transitions* could be accounted for in the traditional framework? Mandelbrot describes nature & fractals thus:

"Many patterns of Nature are so irregular and fragmented, that compared with [euclidean geometry], Nature exhibits not simply a higher degree but an altogether different level of complexity. The number of distinct scales of length of natural patterns is for all practical purposes infinite... The combination *fractal set* will be defined rigorously, but the combination *natural fractal* will serve loosely to designate a natural patten that is usefully representable by a fractal set." (Mandelbrot, 1, 5)

The question, then, is whether these *real shifts* could be represented by a fractal set. And I see no reason why not! Is not the Universal set of *Infinite Sketchpad* at runtime a fractal set, albeit one which is very difficult to compress? *The Picture-Object*. Are all objects sets?

Take a look at the above Barnsley Fern, and internalize its scaling symmetries. Now imagine zooming deep into a real fern (or find one and actually approach/ zoom in)-- with the Real/Material we'll see after a few iterations of Barnsley-like self-similarity (maybe 3) that we reach a surface where the characteristic fanning-branch patterns are no longer present in the material's organization. Instead we might see a patchwork of cells. And if we zoom deeper into one of those, we'll see protein molecules -- zoom -- now atoms (a single atom itself being an insanely deep space, composed of scalar relationships comparable to those of our own solar system, or so I've heard).

Now let's zoom out from the fern-- past the form of an individual branch, looking at the whole plant, which is composed of a few fronds, branching out in a new pattern. Zoom out again to the distribution of ferns in the environment, their sizes relative to one another, their relations to all other elements in the ecosystem. There will be *radically new* fractal-dimensional values in the transitions here(which will themselves be dynamic based on ‘pan-position’ once shifting autonomous agents join in the composition), and we can keep zooming out-- to the forest, the biome, continent, the planet, etc.

When we've zoomed in or out far enough like this, beyond a few orders of magnitude, the original Barnsley fanning-branch pattern no longer describes what we see. This is the breakdown of Ideal fractal geometry, and the beginning of a Real fractal classical-empiricism. Maybe there will be new self-similarities at this scale, or maybe similarities between scales. Try it out.

Could there be a new formal theory of fractal geometry that accounts for radically shifting ‘counts’ of objects in spaces such as this? Where the zoom maxes out, hits the final ‘edge’ of an object, and then begins to count that object in a greater environment in which it functions as singular fractal detail?

I think so! I suspect that even in scalar SPSs like these, it ought to still be possible to compare "how detail in the patterns change with the scale at which they are measured." -- and beyond this, how the scale at which they are measured *becomes detail* (zooming out).. We are undoubtedly able to sense something resembling classical fractal dimensionality, even if its shifting more furiously than it has before. We zoomed down and up through many spaces that clearly no longer resembled the fanning branches of the fern. Patterns changed, possibility spaces shifted.

We'll now only have to account for some new things, such as *how patterns change as scale shifts*. We could start with the fern deep zooms, and describe a fractal SPS in the boundary transitions (between fronds and surfaces, between individuals and ecosystems, etc). Or we could try a more difficult dynamic challenge, zooming DEEP into the British coastline and attempting a SPS fractal description of the water flows making contact with the rocks and sand -- certainly a rock in contact with the open air will have a different fractal characteristic than that of one submerged in water, or any of the between spaces, where a wave collides with a patch of ground, and rocks and sand are all sent tumbling/spraying all over the place, mixing up with starfish and shells and what have you, all of which are going to be altering the fractal dimension of the space -- and when the wave recedes, and leaves a path of foam behind it, the foam's relationship to the sand will undoubtedly have its own fractal relationship (*foam* itself already having classical fractal characteristics that will certainly come into play).

This is a fractal geometry of assemblage, suggesting a knotted formalism that necessarily begins to approach the alchemical *intensive* dimensionalities of the next chapter, bringing different objects together as a creative-harmonic force, assembling new 'wholes' (if only temporarily). Objects dissolving and individuating. Whitehead has said that assemblage is the precondition of all philosophy, and Lewis Hyde has said assemblage (Trickster’s) is the precondition of all art and culture, and DeLanda's work on this creates a

beautiful bridge from these utopian positions to the modern sciences of complexity, rigorously laid out.

Why do we not begin to assemble radically different parts in composition, and to *attempt* at this level a 'count as one'?

In any case, I suspect a study that formally pursues this line of thinking could be done (though of course I'd need to study up *a lot* more if I wanted to attempt it myself)-- fractal assemblage (even the Mandelbrot Set is an assemblage of Julia Set concepts, from what I understand?) -- maybe such a study exists, and do please let me know if you're aware of something like it! But maybe it doesn't exist yet -- maybe *Infinite Sketchpad* is the experimental-empirical tool that's needed to zoom around, *and build*, in spaces like these intuitively. It's well-known that many of the major developments of classical fractals only took off when the computer graphics capacities needed to visually calculate and draw the algorithms became available. It is not unreasonable to speculate that the paradigm *Infinite Sketchpad* has introduced could have similar effects down the line.

More importantly, and THIS IS KEY for those of us who probably won't be pursuing the formal study itself, at least any time soon:

Just as we're likely to learn more intuitively about a 2-D plane by painting/ drawing on a surface than by studying geometric axioms, and just as we're likely to learn more about 3-D space by *dancing to architecture* than, again, by studying the formal mathematics-- in the same way, I believe we're likely to learn more about the *infinite varieties* of fractal spaces by playing in *Infinite Sketchpad* than we are by studying the spaces strictly algorithmically.

In nature, as in *IS* drawings, fractal spaces are no longer reducible to simple algorithms (though typically modeled as a *discrete multiplicity* of algorithms). Gone is the spiraling elegance of the Mandelbrot Set's: z <--> z^2 + c. We may find qualities that are loosely patterned/algorithmic, suggesting a tunnel of self-similarity-- but natural patterns ultimately don't tunnel with the algorithmic fractal's characteristic self-similar repetition into infinity. Rather:

(1) they are only loosely self-similar, much like a rhythmic groove can be loosely metric, *wobbly, 'messy'*

(2) they are *bounded* at finite points by critical thresholds, self-similarity giving way to shifts of qualitative structural change, new spaces of different self-similarities--

We need an understanding of a NEW (or OLD!) CHAOS to study the play of these smooth realities, which are pre-counted situations now, which are not represented by the infinite self-similarity of nature, but rather by nature's infinite creativity, infinite unpredictability. We need to pay attention to these *boundary markers* at critical thresholds, and to truly take into account the *illusion* of the solid boundary (that the boundary only needs more zoom, or more time to be dissolved), to continue our fractal analyses past the point where the form has undergone a shift in kind -- in scale, in time, keep moving on.

Fractal Played Spaces and Player Chaos-Magick

In these new fractal playspaces, then, the player is identified with nature-- indeed, *the player is a natural event*-- the human is a player no more or no less than a wave is a player, or a lava flow, an oil bath, a foam-flow, a rock, whatever-- the player as the artist is identified with nature, nature-player, she is an animal before she is a rational animal, she is life before she is an animal, she is matter and energy before she is life--

The movements she produces will not be strictly formal, predictable and self-similar, etc. There may be self-similarity, but even this is incidental to the fact of movement and creativity itself, which is wobbly, which does as it pleases, which cannot be counted.

This fact of movement is eternal flux, a chaos which is of a different order from the deterministic Chaos of complexity theory, this is the primordial Chaos, likely more closely aligned with Bohm's Implicate Order, Deleuze's virtual continuum, the shifting sense of possibility, the vital forces of *Lila* spiritual traditions, the Chaos of Cosmos-Chaos dialectics, where Cosmos is *order*, and chaos is *creative difference*.

Timothy Morton, in his recent book *Realist Magic*, advances the excellent thesis that the perceptual field of aesthetics (which I think we can treat along with that of play, following Schiller et. al), is itself implicated in the *causal*

reality of the universe. Aesthetics IS causality. Certainly, this makes when we consider our own power to affect change in the environment, to be, as it were, a causal force ourselves. It makes sense in our conflation of ethics and aesthetics, ways og *acting,* of being with an *other...* And yet, what of all the material causes happening all around us, of gravity, electromagnetism, etc.? Surely these cannot be thought of as aesthetic?

Perhaps, but remember that we are building from the ludic realist perspective, wherein all movement is considered play, and all objects (and their constituting processes), players. Aesthetics, here, is merely descriptive of all the invisible 'glues' that exist between players. I *see* a painting, the painting is *seen*. I *press* the clay, the clay is *pressed*. In assemblage, the minds of the two player's touch and create a higher-order plane of consistency, at least for a time, and it is the *perceptual* affects exchanged between players that define the field of aesthetics, or causality broadly. Whithead's 'philosophy of organism' which begins from the 'prehensions' and 'feelings' of *actual entities* would perhaps concur here...

Causality has always proven itself to be something of a mystery-- Newton's *occult forces*-- if the 'laws of gravity' are causing a rock to fall, what causes that law? And if the cause of that is all some elegant mash of strong/weak/electromagnetic/gravitational forces counted as One at the base of it all, what causes that mash? It's a classic infinite regress, there is no satisfactory answer that the positivistic sciences can provide regarding the primacy of causality itself.

And indeed, what is most strange of all is how *we are implicated* in the causality happening all around us. Certainly it is possible to 'deconstruct' our free will, as it were, by pointing to causes of our causes-- but are these approaches really satisfying? Does it really seem as if what is called 'free will', the capacity to *change* the world, to *transform materials,* has ever been properly done away with in any of its many critiques? Whether or not you want to believe in 'free will' is absolutely irrelevant, because the fact is that *we DO perform actions that affect the world around us*. Even if there is some 'lawful' cause that makes us choose how we choose, traced back to matter-energetic pulses and flows, we are quite aware of participating in the unfolding of our destiny, quite aware of our capacities to affect and to be

affected. This is the sense in which we are inseparable from nature, necessarily counted along with it.

Well, this implication in causality, which is what we have defined a ‘player’ as all along-- this is our implication in *natural magick*, any player’s participation the ceaseless flux of causality and it mutually interactive *affects*.

Following from Morton, and from *others* as well, to be sure-- we’re going to call this implication in causality and its mutual *affects*-- *Player Chaos-Magick.*

Play is magick! The 'k' at the end of 'magick' is from Aleister Crowley's resurrection of the Old English spelling which he uses to distinguish "the practice of causing Change to occur in conformity with Will" from the 'magic' of magic *Tricks*. The differentiation in the two spellings will be useful, to connect this concept with Small/Harper’s ‘musicking’ and to differentiate it from the *occult philosophy* of mathematics and its capacity to perform remarkable formal *tricks*.

Real Everyday Magick -- pre-human, post-human -- all players are magickians in this sense, agents of experience, of change. This is NOT NEWS. This all follows from a) common sense & b) the Hermetic traditions we’ve been following throughout this essay. Magic, here, is not regarded as “super-natural”, but very much *of nature*, immanent to all situations.

This is the magick of alchemy as pre-stratified science, the practice of which still proceeds on the ground that materials have a mythical character and where the relationship between the alchemist and the materials is one of *sympathy*, the materials are not inert but are ACTIVE, they are PLAYING (of course!), and the alchemist, or magician (magickian) is *playing WITH* -- this is an object assemblage (or collaboration -- playspace).

“Magic... in its perhaps most primordial sense, is the experience of existing in a world made up of multiple intelligences, the intuition that every form one perceives-- from the swallow swooping overhead to the fly on a blade of grass, and indeed the blade of grass itself--is an experiencing form, an entity

with its own predilections and sensations, albeit sensations that are very different from our own."[76]

As Jung describes it, the alchemical work is characterized by the psyche which *projects* itself into the materials. We are all quite familiar with this process-- if not into inanimate materials, we can be sure that we project ourselves into each other all the time, into our pets, etc (we laugh and smile at the charming exploits of animals when we do, because we imagine them to be little humans, no?). We look at someone's face, and based on its appearance and our feeling we get from it, we form an image of their feelings, which often loosely mirror our own, and we act accordingly.

The projection of the self into the material, person or otherwise, may be merely an *illusion* in an objectively verifiable sense (I bet mirror neurons have something to say about this...), but there is absolutely *no doubt* that this illusory reality is the playing field on which *empathy* plays out, the *glue* between players, where empathy is love for other players, collaborators, which are human, animal, non-human, chemical, software, whatever. Again "material sympathies" is the game of the alchemist, which supposes something almost like a mind in the material which can be sympathized with, suggesting again the expansion of the Ludic Realist position into that of panpsychism or panexperientialism, like Christopher Alexander's, like Whitehead's, etc., all following the Hermetics-- where *all* is counted as mind, or as matter-- no difference.

Magick happens all the time, everywhere, it is this *change* itself-- but from our point of view, that which we're concerned with for now-- it happens when our Will, which we naively believe to be our own, dissolves into the environment, such that it causes change according to the flows that *it has been given*. John Cage, following Meister Eckhart, says magic happens when our intentionality approaches 0. *Intensity=0*.[77] "Blessed are the poor in spirit." When the Will is truly magical, it is channeling a flow which is vastly greater than that of its ego-individuality alone-- change comes in and change goes out, and it's all one flow, but with no edges to be seen.. It is a *gift* that we must be thankful for, to not ignore our own implication in causality, but

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[76] from *The Spell of the Sensuous* by David Abrams

[77] *A Thousand Plateaus*

likewise to not ignore what *we have been given*, which allows us to *cause change* in the first place.

Talking specifically about *Infinite Sketchpad*, or *Doodal*, other NFPs, we might describe player chaos-magick more casually as something like "the human touch", the touched-affordance of free variables. And this is true, a perfectly good description for a one-liner, but it's important to convey the full significance of this touch, the fact that it plugs a new potential magickian into the countable system, awaiting a flow of smooth becoming, inconsistent multiplicity, respect for the materials, identification with the touch of nature.

Mandelbrot's Fractal Realism has *always* been concerned with Chaos-Magick, in its identification of those kinds of irregularity which deviate from Platonic fractal Forms. In the British coastline, for instance, we are dealing with a truly *Chaotic* (magickal) space, warped for years by the interactions of Many players-- by waves smashing, tectonic movements, varied forms of life, transition liquidations, etc. These are fractals not as ideal spaces but as *played spaces*. That is, they've been actualized by the play of various forces at work in the world. These are fractals as historical constructions.

All natural fractals are *played spaces*. All of nature is *played space* -- this is the the concept that describes that which has been historically constructed (everything) by players (everything). Played space is the *objective* domain of Magick. *Played space,* remember, is the *line* of information, and in our serial computers, it is limited to such a 1-dimensional line, but in the parallel computation of the world (if such a reduction is fully possible), the line is rather a manifold, or N-dimensional ‘hyperline’, which is linear insofar as it flows forward, irreversibly, through time, but which is otherwise characterized by a vast, unthinkable dimensionality composed by unit ‘players’ and their degrees of freedom.

Drawings in *I.S.*, then, are also played spaces. We are the forces in the world that play *Infinite Sketchpad*, we are the waves, the tectonic movements. Our hand, the virtual finger paint, we are its history. The same can be said of paper and pencil, and this formal identity should be considered anything *but* trivial.

Mimicry-Magic and The Occult

Formal models of such magickal spaces might try to account for the irregularities of magick in natural environments simply by using random variables as inputs to the equations, and indeed it is possible to tease a lot of remarkably 'realistic' complexity out of a space when some chance is thrown in, but it should be clear that this will not account for the kind of generative mechanism that we are describing as Magickal, which is not by its nature algorithmically fixed whatsoever. This, even while a ‘contrived’ trick like this *still* participates in magick (thermodynamic flows, time), only at radically different scale than we do, such that we can pretend that, in the computational microcosmos, magick doesn’t exist at all, only magic/logic!

New fractal detail is either played into being either magickally or magically. This distinction is related to the idea, via Badiou-etc of inconsistent/ consistent multiplicities, where the inconsistent, pre-count, is magickal and the consistent, post-count, is magical.

Computation is eminently capable of magic-- it IS nothing more, nothing less-- but only when it participates as a player in the world (which requires its being recognized/touched as such from surrounding players) is it capable of *magick*.

Consistency, magic, logic, is a simulation or a 'trick', opposed to the magick of playing. It is fixed, algorithmic, self-contained, a properly hard-edged *object*. Magick is flowing, and it is wholly dependent on the material environment that it has found itself in, it is always relational, always a combinatory force of assemblage, always non-objectifiable, intensive-durational *process*.

Now, a hard line between these two concepts will be difficult to hold onto for long, as they are always at play with one another, and this harkens back to the division between ‘systemic’ and ‘material’ creativities I suggested in the intro, and in the ‘feeling number’ ‘feeling vibration’ section of Smooth Ethics...-- but let's build from this ground/split for a moment, as regards a pragmatics of fractal magic(k)..

To explore fractal detail in our fleshy spacetime, one only need to walk toward an object from far away, watch it grow larger, finally putting one’s nose right in front of the object, pressing it in, until it's not possible to move

forward any more. It is remarkable how similar this process is to a fractal zoom, and if you give yourself leeway such that you can rotate around the object of your attention, or even pick it up, throw it upward, watch it fall, zoom in again, you can begin to explore the magickal possibilities of *looking* itself, which will begin to transform the space according to the objects of its desires (simple pleasures, throwing, moving).

Who is to say where the magick ends and magic begins, but it is obvious, following from experiments in movement that our sensations of scale can be augmented with technologies which bring different scales into new presences. The microscope and the telescope, for instance, bring the world of cells and the world of stars closer to us such that they can be better observed, and indeed the invention of these objects might be counted as the beginning of the *Infinite Sketchpad* "natural fractal" tradition. There is still a magick, or play, in the seeing here, but the touch aspect has begun to deteriorate, as we are now touching intermediaries-- metal, as opposed to the material itself (the cell, the star). With the microscope, the touch remains, though, and to a greater degree in many senses than in *Infinite Sketchpad*, when we press at the samples on the slide, I can recall playing about with slide contents in high school biology, squishing the materials around.

In any case, it's not entirely surprising that alchemical traditions seemed to fall out of scientific favor at roughly the same time that Robert Hooke invented the microscope, which itself was not too distant from the time of Galileo's telescope, etc-- the scientific revolution! it is not surprising that the empirical tradition moved from a dual obsession with magick and magic both, to a more singularly focused study of magic very soon after the time of these inventions..

With a microscope handy, the alchemist's *sympathy* with the materials (magick) could now be 'replaced' with the purely technical, procedural zooming in, MORE COUNTING, more rigorous analyses, leading to an awareness of microscopic properties that would be impossible to see with the naked eye, and productive descriptions of chemical assemblages taking these properties into account.

The structure is the *magic*. It is the systemic aspect, that which can be counted, that which is measured, and productive from here. The creative aspect is the *magick*, which can be tuned into by the alchemist, the player -- and is *real* and *unavoidable* in all players (though present to lesser or greater degrees), such that the magician (trickster) who uses a structural construct to combine materials/chemicals is still indirectly creating magick by virtue of the play of the materials themselves.

What we're beginning to see, then, with *Infinite Sketchpad* and others, is the development of new forms that afford *magickal* control of *magical* spaces -- the ZOOM function is *magic*, but the touch of it in relation to our drawing hand and sense of possibility/causal agency is *magick*.

This magic is a simple question of the structurality of structure, as Derrida put it, the putting into play of free variables, such that ground shifts, and all relative structure shifts with it. Inconsistent multiplicities. Structures, magics, exist -- it is now merely a question of opening them to the touch of the material world at large.

The loosely fractal forms in the natural world (played by forces, players, the world, our selves) are to Mandelbrot's fractal geometry as the objects that populate our world from a local perspective/scale are to the static forms of Euclidean geometry. "Imperfect" realizations of an ideal? No, these "imperfections" should be considered instead a liberating quality, deterritorializations which allow for yet another *intensive smoothing* of the fractal's dimensionality through chaotic shifting possibility spaces -- a *smoother (deterritorialized) fractal*. A "perfect" fractal is described with a fractal dimension which is constant, or if not a dimension which is constant, a dimensional rate of change which is constant, and on and on. Magickal perfection is always in irreducible flux, there is no constancy which is not subject to change. A fractal space that is describable with an algorithm is still "on the path" to smoothness, as Deleuze & Guattari wrote, but it is not yet there-- it remains metric, striated, in its consistency. Magick is the final smoothing mechanism which transcends mechanism itself, change which is its own source, Chaos.

Chaos-magick, then, initiates a *NEW strive for perfection*, which honors the magickal before the magical, which thus honors all creation above all

structure, honoring structure only insofar as it, too, is creation. And indeed it is -- structure is Real and deserving of love, respect. Structure is abstracted played space, fossil of played magick, counted as *eternal object*, and the differentiation between magic and magick is not such an easy task at all, once we've made our way into the thick of it.. Perhaps like the other 'edges' we've grown accustomed to in fractal-studies, this one is destined to open itself into further & further complexity the more we zoom..

Fractal Spacetime Realism

In the same way ludic realism says "everything is play", and just as musical realism says "everything is music"-- so too, fractal realism says "everything is fractal." These positions can (and do) coexist, in this modern (mis)reading of Pythagoreanism.

Once we've abandoned the notion that fractals are necessarily cascades of strict self-similarity, once we've allowed the values of fractal dimensions to shift radically with scale, and with time, once we've allowed fractals to be finite *played spaces*, magickally conceived, demonstrative of a chaos of an altogether different order from chaos theory's-- once we've passed through all this, the fractal realist position is not so unreasonable as it might first sound..

Everything is fractal. Objects are spaces. Spaces are objects.

The Eames Brothers' movie "Powers of Ten" clearly articulates the fractal-real cosmic scale. This is a useful tool for expanding the sense of possibility. A means of exploring the inner and outer boundaries of objects, such that objects are always becoming spaces, and spaces objects. But even without the aid of the cosmic perspective, we can experience fractal realism in the most basic sense, in everyday life, *always at play*, simply by noticing objects around us and their scalar relations to one another, and our relation to these.

We see a flower in the distance, we walk towards it, and it grows. We see the flower's petals operating at 2 different particular scales, and its stamen at another scale, and the plant's leaves and branches at still another scale, all of these related to one another, and we move around, changing our perspective from one detail to another, moving towards detail, experiencing growth. Now we look away and we see hills in the distance, with small houses on them, small cars moving, we see houses next door, we see birds in the trees, we

look back to the flowers and move towards them, and move away, we look to the horizon, moving toward, moving away. Later, we travel to the hills, the train approaches, we get off the train, the hills are larger, we move, the hills grow, there are flowers visible here, too, we approach them, 3 petals, stamen, zoom--

This is to say that everyday 3D visual sense-perception has its fractal aspect. Fractal realism is a theory of relativity, one where the position of the observer (player) in regards to a body-of-reference is variable and where this variability must be treated as ground (the floor is lava!).

The sense of possibility, our *realism*, is constituted by immanent fractal relations between the 'self', body, environment, which are *always* defined by shifting relations of parts and wholes, each of which relations *cannot* be reduced simply to 'partness' or 'wholeness' but which is susceptible to further analysis of the relation *between* the part and the whole, the relation of expanding detail in one part to that in another, and to how the part itself expands the whole-- I *do not know* how to go about this in more detail, but I'm sure it's possible! As *magic*, mathematics, structure, consistency, computability.

This magic will describe the continuum that includes the sierpinski triangle along with the mandelbrot set, along with *Infinite Sketchpad,* along with a walk in the park. There are fractal relations at play as physical detail embedded *in a surface* (where $2 < D < 3$) or embedded *in a curve* ($1 < D < 2$), but there is also the fractal sense at play when we see something *in the distance* ($3 < D < 4$??).

The fractal distinctions, thus, are simple dimensional distinctions placing the fractal dimension somewhere between 2 integers. If a fractal surface has a dimension $2 < D < 3$, then, what dimension might the fractal aspect of looking *into the distance* have?

A fractal surface's topological dimension is 2 (flat plane), and it contains infinite (potential) detail, such that D approaches 3. Our experience of ' the distance' happens in 3D space, a hyperplane, so we might say that the experience of fractal reality as manifest *in the distance* is of the dimension $3 < D < 4$. That would mean that in scalar perception, D approaches 4 -- that

we *approach* (though do not reach) a 4-dimensional reality when we play with our *attentional* relations to objects near and far.

This could very well be a gross misreading of the maths' intended use, but...

It could make sense from here to simply consider the 4th dimension, as it has often been considered, as *Real time* -- this would be to say that the experience of *Real time* is *approached* when we play with the relations of objects near and far. It is obvious that time cannot be separated from space, nor space from time, and this is what has led to the popular term *spacetime* and its formal models (Minkowski spacetime, etc)

What would this mean, then, that time is *approached*, but not fully realized (if attentional fractal space is indeed of dimension $3 < D < 4$)?

Is it possible to be *out of time*? to do other than *actualize* the reality of time?

I've been 'out of time' many times! The past is not actual time and the future is not actual time, and yet we live *in them* all the time.

Presence in Pure Experience & the 4D Spacetime Limit

Matheme: *being present, Here & Now,* is what is being *approached* as the spacetime sense of possibility's dimension D approaches 4. There is no true presence that is not approach (motion) -- In actuality, D=4 will never be reached, even if 3.9 keeps growing. As it is approached, 4-D spacetime both intensifies, and *slows down* to a total stillness, because it is when the limit has been reached that we are quite aware of living in Parmenides' world, which, though clearly temporal as judged by our immediate perception, is believed to be, in truth, a still object, a Thing, a Cosmos, whose edges cannot be counted, but can only be embodied. This stillness wraps back around into total flux as dimensionality once again descends toward 3.

The present is the Real-Time, and it can be very difficult to live in the present. What is the *present*, even? The object both of Badiou's conceptual wrath, and yet of a part of his LOVE, as well-- the *poetic ontologies*.

Poetry as presence. Fractals have always been about time *as presence*. Time needs to pass if we're to see an object at more than one scale. Here, in fractal

spacetime realism, the time dimension enters the equation formally, and we should hope that it confuses as much as it helps.

Looking down a city block or a path, and seeing everything gradually shrink to a very small blur and a hypothetical point, we are experiencing fractal detail as determined by our distance from the objects of our attention. Fractal dimensionality and point perspective-- indeed the maths of the relationship is fairly simple here, but to read it as fractal requires a transformation of the sense of possibility, wherein all objects of our attention are regarded as possible worlds, virtualities, futures-places that we *could* be closer to.

Traveling into a surface is the unique feel in fractals, in *Infinite Sketchpad.* The surface, once felt as a boundary condition -- is now, a space.

Imagine feeling the that sense of *into a surface* at every moment of 'into the distance' played reality. The "goal" of this fractal realism, if there is one, is to take this understanding of surfaces, and stretch it into a new dimension, such that we experience life as the fractal play of a hypersurface (hyperplane of immanence), experiencing scalar shift as dimensional drift (shifting possibility space). Of course, we've experienced this to a degree. Lying down on the grass, chin on the ground looking through the blades, getting the "A Bug's Life" view. There is always a re-reading of a surface as something more*, a space*, itself composed of new objects and surfaces. We see the blades of grass as surfaces now, and ladybug's back. At a certain point, we can't zoom in physically anymore, our eyes can't see things past a certain threshold. But imagine we keep zooming still!

So, what is the difference between that feel of *into the distance* and *into a surface*? If we could go *into a surface* at any time, what would remain unique about the *into the distance* feel..We can explore these questions prior to the intervention of software automation, even, in a short and shallow history of the pictorial arts, picture-objects, surface compositions and illusions.

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4. Unit Analysis 2: The Picture Object

It would almost have made sense to write about *this* before everything else. The Picture Object. This idea is SIMPLE, this is probably what we all *knew* before we knew any of these other things.. this is the principle of correspondence between the page and the screen that allows the luddites to still enjoy drawing in software (see Ringo Starr's MSPaint pictures, etc). This is the main-character subset of the Art Object that folks get so excited about, visual forms on a page, and it is also, perhaps, the more obvious predecessor to *Infinite Sketchpad*, the surface which is drawn on, which is very much the same aside for its capacity to be colored and textured with materials, aside from its lack of scalar control.

The 2-D canvas is "the picture object". We've still not escaped this in videogames, software in general. *We have never been modern*! Even the Oculus Rift is just two moving picture objects, with lenses in front of them to magnify them, make them '3D'. I believe we'll be living with the picture object for a long time still.

What's needed with these new Realisms is to begin to *read* "old media" in light of the new. It is my belief that much of this old media is in fact much more *dynamic* in its capacity to excite the *sense of possibility* than the new media that prides itself on such flexibility. The N-dimensional (smooth) spaces we are interested in are more closely related to many of the intuitive relations manifest throughout the history of pictures (as in music, etc) than they are to the software we're immersed in today.

Needless to say, mathematics itself is better to be regarded as a field of 'old media' than as 'new', and many of the bizarre functions and relations it

describes are precisely what is wanting in videogames today, but from a *non-computational* perspective, after the 'killing' of math[78], a new phoenix rising..

Again, searching for a new plane of consistency whereupon the line and walk and tune and game-sequence can be read as existing within the same broad category of playspaces at large, the 'book of nature.'

How is the picture-object played? How is *looking* a kind of playing? How is *drawing* a kind of playing?

Point and Line to Plane to Manifold to N-D Complex Real Time

"Drawing is taking a line for a walk" (Klee)

An active line on a walk, moving freely, without goal. A walk for a walk's sake. The mobility agent, is a point, shifting its position forward (Fig. 1):

Fig. 1

The same line, accompanied by complementary forms (Figs. 2 and 3):

Fig. 2

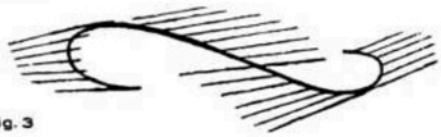
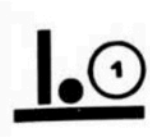


Fig. 3

[78] See Bret Victor's project. This is meant with all due respect! *music*, too, could do with being killed in the more fixed tendencies of its present form.

Of course it is! & Kandinsky concurs-- the line itself is a point going on a walk. Any dimensional ‘hyperline’ of *n* dimensions is a hyperpoint of *n*-1 dimensions going for a walk... All dimensions can be mapped down to the line, and the point is the infinitely complex *here,now* of actuality itself.

All drawing is a *point* (purpose) walking lines through played spaces which are made *objects* as such by the solidification of past lines (line of information as played space inscribed on higher order (previous) SPS/Played space) -- desire paths, walks leaving traces, walks always leave traces (the pen going on a walk only accentuates this, gives it consistency). Already, the simple *line* is a game..



The same line, circumscribing itself (Fig. 4):

Two secondary lines, moving around an imaginary main line (Fig. 5):

La Monte Young's "Draw a straight line and follow it" is thus a double-walk, a first walk with the pen, and a second walk with the legs (and connecting to the musical line by proxy of its creator). Walking walks lines, all lines have been walked. Drawing is just a walking game.The line is the player, its 'surface' (which might be planar, hyperplanar, N-D complex) is the player, the hand is the player (all participating objects are players)-- the players themselves, *played space*.

The poetics of space -- of planes -- is composed by a *poetics of lines*:

"A line needs scope in which to move, because it has been swept up into movement... the dynamic force is space hunger."

Walks can be *wanderings*, like the above pictured, or they might be constrained by *duties*, as is the case when we are running errands:

An active line, limited in its movement by fixed points (Fig. 6):

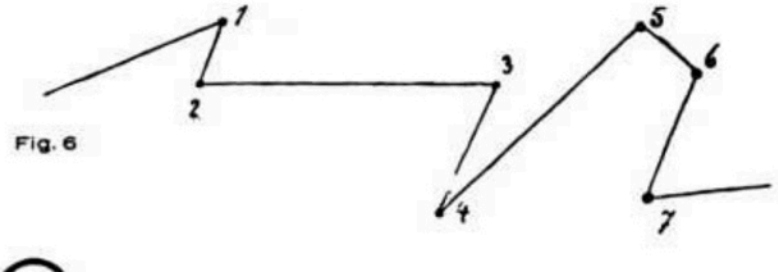


Fig. 6

Paul Klee was teaching at the Bauhaus when he wrote these things. Wassily Kandinsky was there, too, and both of their styles were headed toward a new kind of 'exactness' in the arts, a new hyper-quantized design sense which paved the way for a *new science* of art, as they both put it. Even in light of the threat of scientific positivism, there's a sense of being in good hands here. Visual-pictorial alchemists, who are just beginning to embrace the poetics of quantity, and who do so with all of the sensitivity that they have learned thus far from their intuitive dealings with the freeplay of *living* material actualities.

The Bauhaus imagined a new future for art, where all possibility was sucked into the meta-project of imagining and creating new architectures for the modern city, for modern life, the reform of the *lived* (played) environment being considered of greater import (/urgency) than the traditions of the plastic arts *as objects*. Space is the new object. Klee and Kandinsky, then, had interesting roles to play, being painters of *picture objects* themselves -- architects of ‘surfaces’, never 3D ‘spaces’ properly. But the Bauhaus recognized that the number of dimensions being dealt with was of little concern. We can trace a line following a surface-architectural tradition from Klee to the COBRA group, built of Asger Jorn, Constant Niewenhuys, and others, which sought to achieve a free movement for all materials, and which smoothly fed into the Situationist International project, where Constant

worked for a while on his New Babylon project, modular city, proto-Minecraft (post-Minecraft, *I hope!*), to be occupied by *Homo ludens*, man the player --> we've discussed already how it was that the Situationists were well into *play*, the passions/affects of *never working*, smooth ethics par excellence, and its well known the Situationists made a practice of *drifting*, that is-- walking lines.

Kandinsky/Klee-- both of these painters considered their work to be music, simply put, and this is no trivial detail, opening up to the final node in our "realism" trinity (ludic-fractal-musical), each of which parts is as *participatory* as it is mathematical/structural. *Musick.* Kandinsky is considered the first abstract painter in the western tradition, and what is achieved with 'abstraction' is exactly-- visual music. The possibilities suggested by the material forms of representational painting are 'abstracted' into a more general category, a 'topological' understanding of potential for morphs and transformations of high level structure (SPS structurality of structure) and from here--> new work is PLAYED, and this work is *concrete*, it is *affective* in much the same way that music is, relational, having to do with the harmonies of parts, of tensions, releases, etc. But this is all *concrete*. 'Abstract' art is *concrete* --> it descends *from* an abstraction, rather than being the abstraction itself.

In music today, we face some of the same problems as visual arts in the first half of the 20th century. We have more materials available than we know how to play with. The aesthetics of music are dominated by recorded music's unspoken *theory of the object*, to the point that even Adam Harper, who has produced some fantastic work on musick-as-play, still seems to spend most of his time critiquing objects, as opposed to flows, since there is not an obvious way to escape this cultural strata built around the church of the music object.. Some music objects are even being produced that seem to follow in COBRA's tradition of "freedom for the materials" -- Daniel Lopatin's battle against "timbral fascism", Lil B's 1 takes & the 'based' aesthetic in general-- we hear it in production that sounds like a mistake at first listen, incongruity, this is all. Mistakes-- really just opening new spaces of possibility for play. Fostering these with love. "Accident becoming essence."

Line back -- Klee is one of the ludic cosmologists, motion alchemists, the type we've spoken about in section 2. Klee was seeking insight into the

problems of multidimensional simultaneity, 'the loosening of earthly statics' (vol. 2 p 54, see vol. 1, pp 173-175 "shifting viewpoint" and "the subjective way"). That is- motion! Music! Musical *texture* is multidimensional simultaneity, also called *counterpoint*, though that gets tangled up in some unnecessary dogma.

Infinite Natural History: "Klee posits the absence of gravitation as the primordial state and regards mobility as the prerequisite for change from this original state. The concept of the infinite thus applies not merely temporally, but must be understood spatially in terms of earthly cosmic tension." (p. 13)

Klee was a researcher, but as opposed to a modern scientist, he was a full-on radical empiricist, he worked with the *material sympathy* of the alchemist. There is a place where scientific materialism stops short of true Materialism, its *models*/*simulations* are interruptions carried by the desires of an embarrassed pseudo-Idealism, quantifications, striations -- the GOALS of the sciences are an Ideal specter looming over the future of materialism.

The materialism that moves with materials, on the other hand, is found in ART, in RITUAL, in PLAY -- here, 'ideal' forms are allowed to manifest their essentially dynamic character, Ideas are allowed to be, in a sense, material themselves, participants, players.

"The approach to form, supposedly dictated by some internal or external necessity, is more important than the goal, the end of the path... The act of giving form determines form itself, and the process is more important than the form. Form must never and on no account be considered disposal, result, end product, but rather as genesis, essence, growth... *Good* means form as movement, action, active form. *Bad* means form as rest, as end point."

It's amazing how much can be read as a walking game. Music walks lines, too. John Coltrane talked about discovering ways of drawing melodic lines through new the new harmonic spaces he was moving exploring, you can hear that, a thread being weaved through a tapestry, harmonic drift (itself played space), moving on different surfaces from a flat ground -- a wavy ground, a dancing ground, like a moving platform game, drawing lines, jumps-vectors, in shifting gravities, object relations. Just-walking is playing *with* an other (player)-- the space.

These walks, thus, can be studied in physical 3D spaces (everyday life spacetime, attracted to 2D gravitational surfaces), but also in virtual spaces of any dimension..

Walks in the N-D intensive harmonic spaces of tonic-modulation, like Coltrane showed us, like all 'voice-leading' studies in classical theory, like all harmonic walks whatever-- walks in musical *groups* more generally (dynamic symmetries in tone, rhythm, texture, form, whatever else you'd like to count),

Walks in the musical score, which has done some counting for us, and has flattened the N-D intensities onto the 2-D.

And returning from the musical score-- walking, drawing, on *the picture-object*, intensive freeplayspace, mapping N-D complex flows on the 2-D Basic Plane

This is the material surface-object that Infinite Sketchpad has used to demonstrate that objects are spaces.

Even prior to the mechanistic smoothing of dimensionality in *IS′* spaces, it is important to note that what we'll call a picture-object's *intensive dimensionality*, its loosely intuited 'degrees of zoomable freedom' as manifest in the play of our attention and sense of possibility is already capable of extending into infinite dimensions, by virtue of the infinite capacity of objects to relate variously to one another, the sense of possibility is a space of many dimensions with variously complex tangled relationships.

In play which is focused on the touch of materials, the present, relationships, as dimensional fluctuations, are basically 'musical' in their character-- the relationships are formal, as with mathematics, but the material is experienced as vibrational living-energetic intensity (this is one basic sense in which our common experience of music differs from that of math, a Two which ought instead to be counted as a One (or 2=0?)).

It is not a mere eccentricity or mistake that Kandinsky insisted on listening to the *life* of the Basic Plane ('BP' for short)-- the basic plane is *alive*, just as a musical instrument is alive, just as Whitehead has encouraged us to never consider matter-energy apart from the concept of life -- there are no single-

player games, but there are many, like these, played by radically different forms of 'life':

"We must assume without question that the BP is a living being. For a person who is not an artist, this assertion may appear strange. We must, nevertheless, definitely assume that every artist feels--even though unconsciously--the "breathing" of the still untouched BP and that he feels--more or less consciously--a responsibility toward this being and is aware of the fact that frivolous abuse of it is akin to murder. The artist 'fertilizes' this being and knows how obediently and 'joyfully' the BP receives the right elements in the right order. This somewhat primitive and yet living organism is transformed by the right treatment into a new living organism, which is no longer primitive but which reveals, on the contrary, all of the characteristics of a fully developed organism."

Philosophy of organism-- the life of the BP, of PLAYED SPACE, or a LINE OF INFORMATION more generally, is not at all to be considered a metaphor. The player is in the space, and the space is in the player. In play, the life of a space is experienced as reality and this points to some valuable truths (the space is a player).

Kandinsky closes *Point and Line to Plane* with this 3 step "goal of a theoretic investigation":

1. To find the living
2. To make its pulsations perceptible
3. To determine wherein the living conforms to law

The first two steps can be explored in the play process itself, by *listening* to the space (1), by touching it (with eyes, ears, etc), changing it (with hands, etc) (2) -- the third step likewise can be intuited in play, but it is the goal of theory to step back and look at the relations of playing in general as compared to particular playings, to find new kinds of consistency in chaos, and indeed to find inconsistency in old kinds of consistency-- in short, to frame and re-frame again and again the shifting laws conformed to by the living, the BP, playspace.

The Picture Object / Basic Plane

There are no single-player games-- to really feel this clearly, we only need to give due credit to the *hidden/uncredited OTHERS* that we play with. The *surface* that the line walks on, is the space, IS PLAYER... the picture-object (player) is still of interest in contemporary life.

Visual culture is *surface* culture. Books, movies, web browsers, game boards.. indeed, the majority of software interfaces being used today are still based on the paradigm of the picture-object, that which is representing *as surface* itself sitting on the flat screen. Surfaces are everywhere, they are a field of the cultured everyday. Again-- even the oculus rift merely juxtaposes 2 shifting picture-objects in order to create an immersive 3-D space, thus by no means escaping the picture-object paradigm, even as it is amplified in our immediate experience and celebrated as a kind of 'radical novelty.'

All of this is to say-- drawing/painting-oriented picture-object formalisms are still as relevant as they ever have been. The motion-picture/movement-image has taken over the cultural landscape to a great extent, of course, with videos, motion graphics, videogames, etc., but even these are simply an array or series of picture-objects, showing one after the other, changing very quickly (24 or 60 frames per second, respectively, as common picture-object drift speeds for film and computer graphics).

The computer screen itself is a BP (picture-object), itself an *organism*, even when blank-- this *should never be forgotten*.

Following Klee/Kandinsky 'picture sciences', there is one particularly interesting/affective "exact" aesthetic property of the modern screen that I'd like to tunnel into a bit:

Any 'parallel' virtual planes being displayed on the screen, themselves BPs, will resonate in our perception at a kind of unison harmony with the material of the screen itself.

Operating systems are all BP-Parallel like this-- the contents of windows, folders, etc., all exist as theoretically pressed flat up to the material of our screen itself (beyond 'parallelism', this seems to attempt an approach toward total identity between screen and contents) .

As an illustration, here is what is meant by BP-parallel, which is not nearly as esoteric as it sounds:

The first laptop has a BP-parallel sierpinski on it, the second has a BP-skewed sierpinski, which is *not* parallel to the screen, but rather to the plane of this document. Another way of putting it: the first laptop's screen is parallel to this document, while the second's screen is skewed, its right side 'pushed back.'

BP-parallel is something like the 1:1 geometric "tonic/unison/octave" tone of screen-based virtual spaces. We love it! With the exception of 3D videogames, the actual-virtual screen-surface parallel is still the dominant paradigm in computer interfaces. 3D makes most old (& some young) people nauseous-- they can only tolerate BP-parallel. This same preference is embedded in the tastes of those who stopped playing games when they went 3D. It is not surprising that the model of 1:1 screen-virtualplane resonance is by far the most popular model today, when we consider input-output software broadly. It is comfortable, given the structure of the computer's 'flesh' (flatscreen) it makes so much sense! It is an extension of some very old paradigms that we are used to-- we have looked at pictures, read books, written on paper. These are BPs. The planes of operating systems, web browsers, sound/image editors, etc. are all strict BP-parallel. 2-D videogames, top-down like Zelda, sidescrolling like Mario, are also BP-parallel games.

This is the most basic harmonic order. From here, the Basic Plane has become the plane of our computational everyday life, parallel sub-BPs

mediated by the BP of the screen. The Windows and OSX Desktop paradigms start from the BP model and build from here. Open a new folder, and a new (smaller) BP pops up, or the contents of the current BP shifts.. Scalar difference gives rise to intensive dimensionality.

When the virtual BP shifts, scaling or changing in any way-- for instance, opening a folder-- harmonic intensity increases. From these shifts of relationships and of content in the Basic Plane, the N-D Complex Plane emerges, which is internally harmonic/resonant, which causes our sense of possibility to move along an intensity of dimensional axes greater than the topological dimension of the BP itself (D=2). When we look at a screen with a desktop covered in 12 icons, with 2 open folders, each with 3 icons in them, these are all degrees of freedom opening into further degrees, systems of bifurcations, paths to travel down. As windows open and close (at the very least), the intensive dimensionally of the screen must account for these scaling values.

The sense of possibility begins to find new relationships, occupying the 'gaps' *BETWEEN* objects (files, folders, etc), filling them in with future-virtual potential-- imagination dissolving fixedness into motion.

This increased intensive dimensionality may likewise emerge from associations of representational content on the BP, such as a painting featuring two human figures making eye contact -- the silent (still) dialogue of these figures unfolds as a new space of possibilities, what is their relationship?, where has it been?, where is it going?, possibilities which will unfold further still along with the associations these images bring to mind, and with the associations of those associations. The associations and the senses they give rise to are manifold.

To begin to model the virtual dimensionality of this space is to model our own phenomenological experience-- that is to *spatialize* some understanding of our sense of possibility, to construct a model of the BP organsim's subjectivity.

The science of Kandinsky, Klee, et. al is an empiricism of *intensities*, of *played materials,* their *affective-feeling capacities* -- the intensive possibilities are endless, they are effectively infinite, they are determined not

intrinsically, but only in combination, in assemblage -- they are the harmonic combinations of tones, of timbres, and they are as difficult to study in *measure* as musical texture is, which is the intensive layering and interrelationships of musical lines-- as elusive, and just as important.

These *intensive dimensions* are the sorts of *soft* dimensionalities which are discussed in Kandinsky's formalisms, as well as Klee's, and which could serve as a strong ground of theory to build on top of BP-parallelism. Dimensions of the object, and dimensions of the subject, in play. Theory of the picture-subject. There is a striking attitude in these works, maybe naive by our standards of today, but still vital-- an attitude that seeks a new 'objective science of art' alongside a kind of spiritual transformation at the hands of nature as it speaks through the actuality of the materials. In these works, there is a persistent belief in something approaching the 'grain' of the material, a faith in the possibility of there being *way*s to work with the materials' resistances which produce pseudo-predictable aesthetic qualities, that by *listening* to the grain of the material, its life can be found, and in this, its pulsation, its *vibration*, and that that these findings will be a flow and that the 'law', when found will circle back to listening, such that Kandinsky's 3-step theory might be read cyclically, even *strangely* (tangled).

With our screen-based virtual spaces, then, we would be wise to tune our awarenesses to the BP actual(screen)-virtual(interface) parallel, 1:1 tonic tone, as one of the strongest formal grains to cut with, or against.

And *THEN*, on top of this, to identify how new effective dimensionalities emerge from the interrelations between parts as composed on the whole BP itself.

Realizing the BP as *intensive-complex 2-D space* seems to have solidified itself as the most intuitive paradigm in UI design, at least for those that are set parallel to the screen-BP. Anyone who has used a computer is comfortable with the 1:1 screen:BP harmony, just as anyone who has listened to music is comfortable with the 1:1 unison, and the harmonic field (diatonic scale) built from the measured re-distribution of its reduced overtones (scaling BPs, as in Windows, OSX). Most non-gamers are still disoriented when they are placed in a virtual 3-D space, perhaps because the virtual space doesn't exist parallel to the actual space (screen/BP), which is a strict 2-D surface -- harmonic

'grounds' thus shift constantly in 3D games, much like the shifting grounds of late tonality & serialism, projects putting the ground in motion. And so, even in 3D space, we are most disoriented when there is little ground to stand on (as in a FPS with a fast camera), when surfaces are always temporary presences. We are comforted when a new ground is imposed, such as the locked camera of 3D Zeld'a "z-targeting", which grounds us on the fixed dimension of the camera's plane, the gentle camera that we know from movies, from the movement-image which, though its contents are in motion, is controlled by a hand with its own sense of possibility as to the relation between the ground and the air.

The brilliant 2D/3D *between* style that Ed Key uses in *Proteus* likewise owes part of its strange novelty to its submission to the 'billboard' method of representing sprites, where they always exist on a fractal (scaling) 2-D plane exactly parallel to the material surface of the screen itself, where the 1:1 unison is displaced and used in a 3D environment, effectively creating a small fractal plane of sprites. This *parallel* existence is a basic harmony, and the 2-D fractal plane which is always superimposed on Proteus' field of view accounts for a new kind of *phenomenological realism* which is concerned with the relational status between actual and virtual objects, with the inner-outer, subject-object dissolve. This is a phenomenological realism because it is a realism that responds to actuality itself, a harmony that is grounded on the screen, the picture-object, the BP, 1:1 unison harmony.

Infinite Sketchpad & the BP-Parallel Real Number 2D continuum

Infinite Sketchpad, then, builds on the UI paradigm of 1:1 BP-unison harmony, but in a radically new way. If the billboard method of displaying sprites hints at a new way of navigating spaces with topological dimensions greater than 2 that nonetheless are grounded in 1:1 harmonies with BP of the screen, *Infinite Sketchpad*'s free fractal surface gives us the means of smoothing over the dimensional continuum altogether, such that dimension=2, when considered fractally, can be smoothed: dimension=2.11, =2.12, =2.3, =2.5, etc.

Infinite Sketchpad has access the whole Real number line (which, remember, is proportionally composed of vastly more *irrational* than *rational* numbers).

Indeed it is important to read "Infinite Sketchpad" as pointing to something more than the particular software itself. To read it as a new mode in which a new (scaling, smooth) dimension of movement is possible within the materially regulated constraints of strict screenBP-virtualBP 1:1 harmony.

It is important to recognize that this zoom-mechanic is simultaneously old-fashioned, classical ("that's what the eye does anyway" someone said when I showed it to them), and fantastically innovative (the eye *never* went that far!).

The most interesting discoveries, I suspect, will benefit from an evenly divided focus on learning from past and speculating into the future.

Scaling & Scalebound Pictures

In order to *learn about itself*, the magickal fractal space that *Infinite Sketchpad* occupies (and the BP-parallel software and fractal traditions it is related to) must be framed within the tradition of the BP at large, the picture-object in history. The scaling aspects, dimensional shifts, and attractive gradients clearly at play in *IS* must be sought out in the 'flat' BPs of the classical picture-object. IS teaches new ways of *listening*, new ways of *playing*, new *law/structure* -- what happens if we take these discoveries back with us to 'reverse engineer' the intensive dimensionalities of the classical picture object?

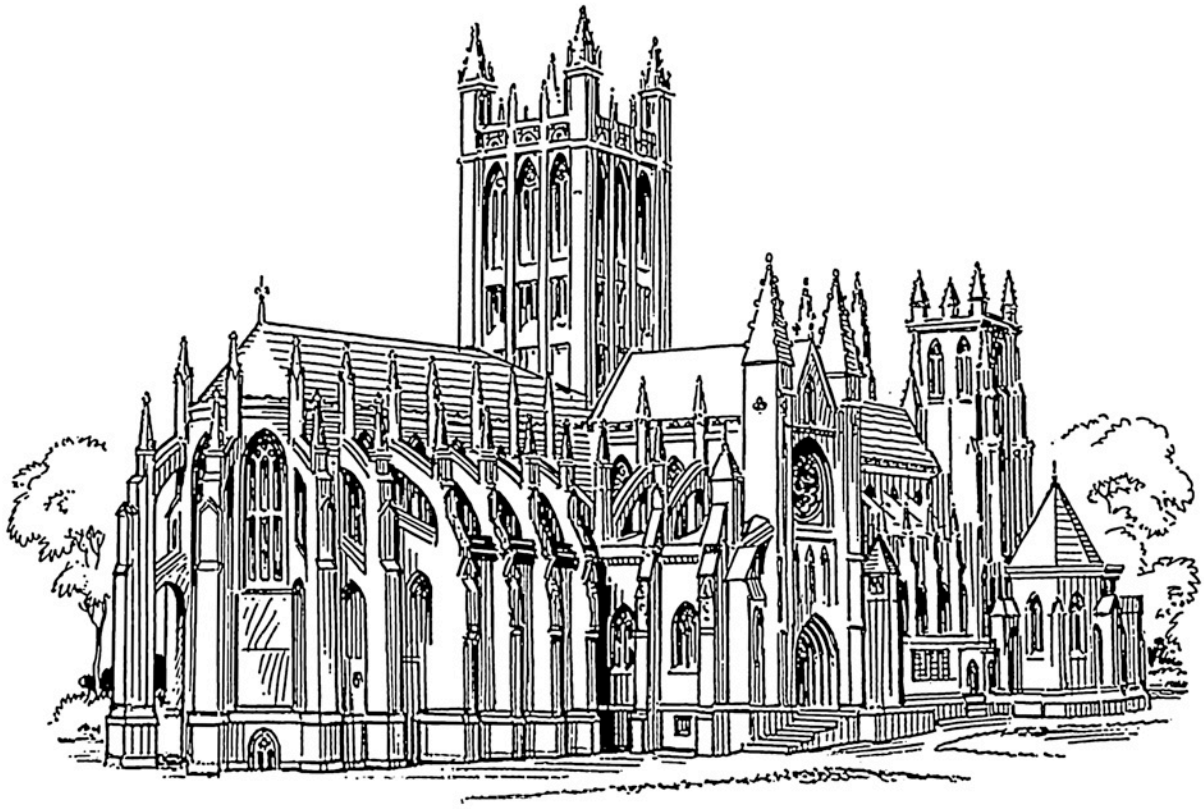
Mandelbrot already has spent some time considering the implications of fractal geometry as regards the BP tradition at large. To this end, he has always accompanied his popularizations with proto-fractal illustrations such as Hokusai's waves, and of da Vinci's "Deluge," to show some of the influence of self-similar scaling forms on the work of these past masters.

But these illustrations are pointing out the obvious examples of classical fractals, and do little to renew the way that we see *everything* as fractal (fractal realism).

So, in his paper "Scaling or Scalebound Shapes: A Useful Distinction in the Visual Arts and in the Natural Sciences", Mandelbrot goes further, and opens the way toward an analysis of the fractal aspect of *all* picture-objects (and from here, all of the fractal-spacetime-*Real*).

“I propose the term scalebound to denote any object, whether in nature or one made by an engineer or an artist, for which characteristic elements of scale, such as length and width, are few in number and each with a clearly distinct size.”

“A scaling object, by contrast, includes as its defining characteristic the presence of very many different elements whose scales are of any imaginable size. There are so many different scales, and their harmonics are so interlaced and interact so confusingly that they are not really distinct from each other, but merge into a continuum. For practical purposes, a scaling object does not have a scale that characterizes it. Its scales vary also depending upon the viewing points of beholders. The same scaling object may be considered as being of a human's dimension or of a fly's dimension”



The distinction is very useful, though of course slightly reductive-- nothing is strictly scalebound (except for euclidean Ideas). Everything will scale. The question is -- how much of the *measurable* structure changes based on the scale at which it is measured. This cathedral pictured is very clearly scaling.

We can talk about different hierarchical zoom levels, from the fat-cross-shaped(?) cavernous body itself, to the rhythmic pillars that provide a rough ‘armor’ to that body, and zooming in further to the patterning of the spires, which themselves are likely scaling across a few orders of detail-magnitude.

The Washington Monument is a good example of a relatively scalebound object. Flat surface, hard edges. With effectively *scalebound* objects, the measurable structure changes very little (or, considered as an abstracted mathematical Ideal, *not at all*). Consider the above monument, with a flat white surface, no perceivable detail. As we approach the building, its measured appearance is consistent-- it remains a flat white surface, nothing new reveals itself. This will be the case for quite a long time as we zoom in. We pass other details in the environment, such as the flags that surround it, and these are incorporated into our *scaling* experience of the space as a whole, but the building remains homogenous in its texture.. Then finally, as we are, say, 3 feet away from it, we will be able to make out something of the texture of the material making up the surface itself. If it is made of concrete, we will be able to see the rough surface come into focus, all manners of new

bumps revealing themselves. If it is made of painted wood, the grain will come into view, as well as any globs of paint that make little mounds or drips. If it is made of something very smooth, like a painted glass or shiny metal, the surface will remain uniform in its appearance, perhaps across still a few more magnitudes of scale, maybe even until we reach the consistent lattice of molecules which gives it its smooth form.

Of course, here the 'scalebound' distinction breaks down, there will without a doubt be radically new fractal dimensions at this level. Even those objects that seem to be most apparently scalebound, are still scaling. 'Scalebound' rather serves to categorize a particular fuzzy class of objects that are 'textured' relatively homogeneously as seen from our point of view.

With *scaling* objects, on the other hand, the measurable structure may change considerably as we view it across different scales. The example of Great Britain's coastline is a perfect example of this, the archetypal natural fractal. We can see scaling objects *all over the place*, though. Every object is scaling in some sense, and most are quite apparently so. Consider a tree, 30 feet tall -- from 30 feet away, we measure it from ground to tip, side to side, maybe make some general observations of the largest branches and their behaviors-- even if we see further detail and know that we are ignoring it, from this distance, there is no choice but to measure in this way, at this scale. From 3 feet away, we are able to measure the branches, and the relationships between branches, and the sub-branches and leaves which grow from these. We might walk all around the tree and measure branches in different places, and compare the clusters with one another, but even from here, we will see that there is further detail that we are ignoring. From 1 foot away, and zooming in, we are getting so close to the surfaces, that there is no option but to *select* which type of surface we would like to measure. Do we want to measure the structures of the bark (and surely be forced to zoom in several orders of magnitude futher, into a world of termite tunnels, gradual sap rivers, insect war, etc)? Or do we want to measure the structure of a leaf (again zooming in for continued radical shift of perspective)?

The relativism implied in these scaling models, and the intensive continuum composed of tunnels into detail that they describe, will be of great interest in the design of any space with scaling aspects.

Measuring (and playing) scaling objects, we have to make more and more decisions mediated by our sense of possibility's *attraction to detail*, its awareness that detail will open into a world of *creative difference* -- difference in terms of played space, *what has been created*, and in terms of playspace, *what is possible to create.*

What is felt as possible is not always *what is possible*, and this is the difference between the virtual *sense of possibility* (which can tunnel into images of the void) and the virtuality of the *possibility space*, which describes, respectively, the Real virtual structures of the *player-as-space* and the *space-as-player*. The space-as-player is itself always in flux, it is an SPS. This flux is not always directly perceivable on the human spacetime-sclae, however. It is the micro-scaling operations of biology, chemistry, physics that reveal to us the flux of the microscopic spacetime, and it is the macro-scaling operations of natural history, geology, astronomy, cosmology, etc. that reveal to us the flux of macroscopic spacetime. Scaling, perceptual and technological, is a necessary functional-conceptual tool in the continued project of seeking understanding of scaling cosmic flux.

The way that scalebound and scaling objects function in the visual arts follows from all of this. The artwork is not to be regarded as separate from nature, but rather as a *natural played space*, just as any other, lava flow, evolution, plant metamorphosis. The played space of the visual composition is the actual material product of a BP-possibility space having been played in the past. The composition on the BP plays out as SPS, the structure of which is determined doubly by the tendencies of player and her sense of possibility and the played space (as player) and its visual-harmonic affects.

Attentional Attractors / Line of Sight / Line of Flight

We can study the sense of possibility's play in the BP as SPS by following its attentional paths *into detail*, detail as attractor, field of possibilities sucked into *basins of attraction*.

This is, in short, how we navigate *Infinite Sketchpad* when we zoom in. It is how we navigate the play of scale in natural space, walking, focusing with our eyes.

The language here is taken from the sciences -- 'an *attractor* is a set toward which a variable, according to the dictates of a dynamical system, evolves over time ... An attractor can be a point, a finite set of points, a curve, a manifold, or even a complicated set with a fractal structure known as a *strange attractor*." Gravitational pull pulls toward an attractor, as is the case with electromagnetism, etc. These all have associated vector fields, how it is that what moves moves in the space.

Jumping *up* in scale-- Western musical notation and the written word are both good examples of a point attractor (the end of a 1-D line of information), which attracts pupil-to-page motion on that same line in a left-->right moving vector. The way you are likely reading right now is *compelled* by that attractor at the end of a line, such that you can read the words *in order*, and get maybe more of my meaning in that way.

What we're interested here are more complex (if difficult to formalize) attractors that attract players, in our case -- attractors that attract our *attention* rather more freely-- attention being "the taking possession of the mind, in clear and vivid form, of one out of what seem *several possible objects* or trains of thought." (William James).

It is *attention* which allows a shifting possibility space to be actualized as *line*.

It is possible to drift around the page, and read not from left to right, but simply reading and re-reading whatever you like, giving the attention some autonomy..

If some words are made very large, A N D ssssssoooooommmmeeee **OTHERTHINGSHAPPEN,** the material attractions at play on the page begin to orient our sense of possibility such that the left-->right attractor is no longer strictly dominant. Maybe you experienced some of that drift already because I bolded some stuff a few paragraphs back to 'prime' this situation, such that the eye drifted down here even before it was finished reading what was up there..

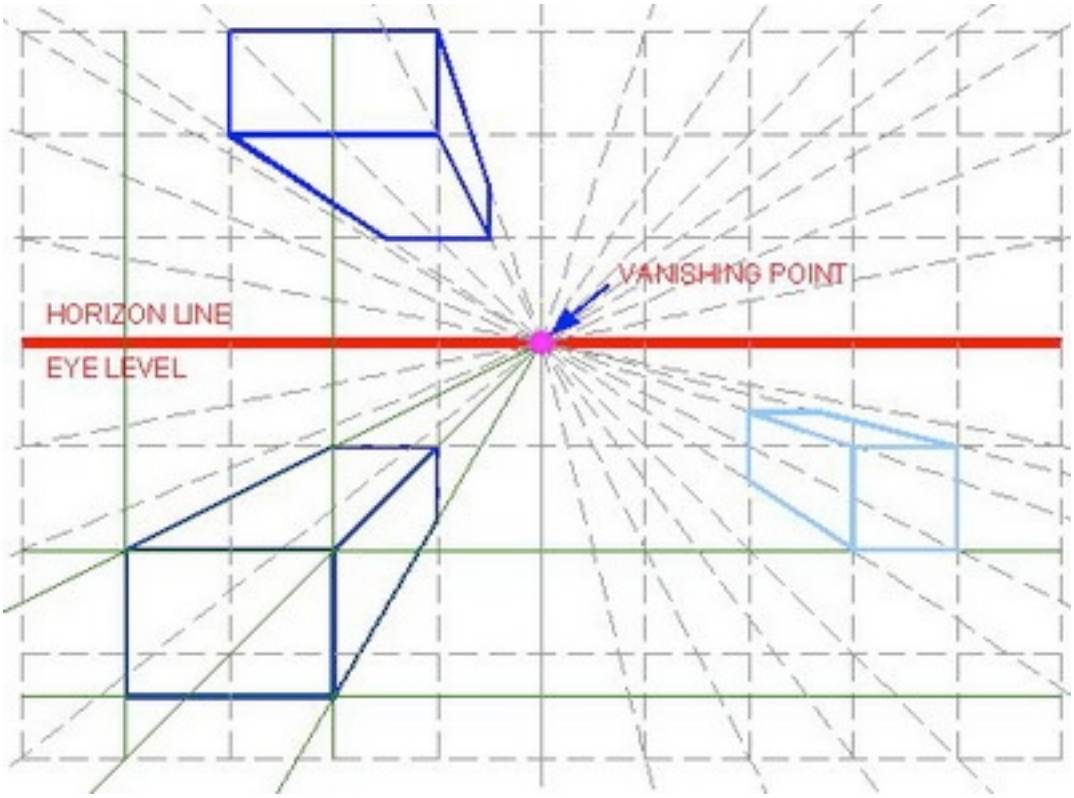
The attractors we're concerned with are always an active force in affecting the *sense of possibility*.

In classical painting, this sense and its dimensionality is loosely constrained by the virtual space of the BP.

In *Infinite Sketchpad*, the sense of possibility, in addition to the above, is constrained by *actual basins of attraction* which define *how much MORE is possible* if you zoom into further detail..

An Intensive Dimensionality of Possibility

The vanishing point of classical perspective is an instructive starting point for thinking about all of this. In the language of attraction, 1-point perspective formally defines a 3D space with 1 detail-attractor opening into the perception of possibility that is infinite insofar as it is felt that it could *keep going*, but is finite insofar as the vanishing point defines what exactly *where* and *how* it could keep going.



There is an intuitive (if not formal) relationship between these concepts and those of conventional dimensionality, where the detail-attractor functions as a kind of spatial *degree of detail*, or *degree of freedom* insofar as it this capacity

to *keep zooming* is what will allow the form to bring us to a different space, insofar as it will shift the set of what is possible for us.

The interrelations of a field of detail-attractors, then, describes something like a *dimensionality of possibility*. Where there are more detail attractors, more *novel* findings are possible that are as yet too small to see. Where there are *fewer* detail attractors, fewer novel findings are possible that are as yet too small to see.

The distinction between a higher dimension of possibility and a lower is not the same as that between *scaling* and *scalebound* forms, though indeed scaling forms have a higher dimensionality of possibility than the scalebound. For instance-- a photo of a gothic cathedral with a landscape in the distance will have its *possibility dimension* characterized both by the degree of detail present *in the distance*, and that *in the surface* (in the scaling ornamentation of the building itself).

It is simply a matter of *how many basins of attraction (detail-tunnels/planes) are present.* This is to say-- how many 'branches' are available for our sense of possibility to follow?

A dimensionality of possibility exists between the space-as-player (the picture) and the player-as-space (the viewer), neither can be isolated from the other. Without the *player*, maybe it is possible to analyze the picture in terms of its pseudo-fractal dimensionality, which will get at similar ideas, but it is only the player that translates this quantifiable information into the immanent *SENSE* of possibility itself. Without the *picture*, the player is still experiencing possibility, but it is not confined and potentially (pseudo)-quantifiable in the same way.

We are dealing with *material* realities of the detail-attractors, and thus any quantification of dimensionality is participating in an empirical project. It precisely this empiricism (materialism) which must be amplified, radicalized (James), irrationalized-- this can not and should not be avoided when the task is to feel out possibility, to play, to suspend (-->transform) timespace in unmeasured primordial form, to experience it not even probabalistically/ statistically, but strictly qualitatively. To do this, but to hold onto the project of *fidelity to the material*, the materialistic *attitude to life*, to see in it *how it*

actually plays, rather than how we *expect* it to play -- that is, to not reduce it, but to actually play it, to be a causal agent, but with intentionality approaching 0, in order that we might begin entering into the magick, etc--

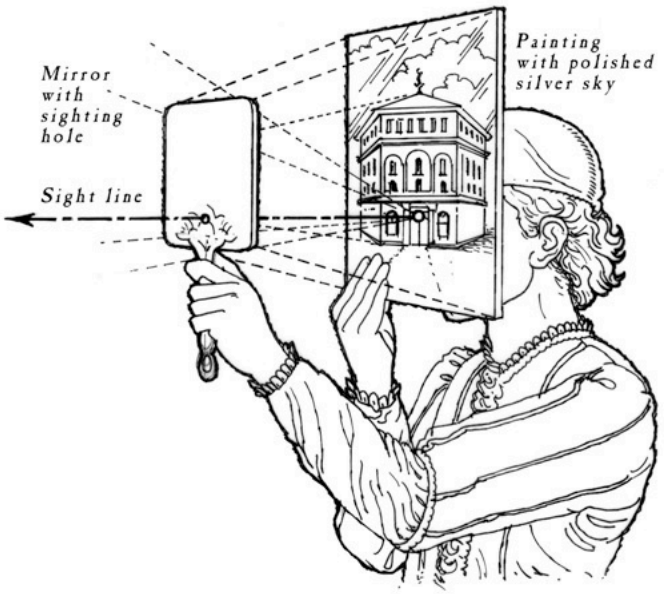
The attraction basins in a zoom-space are the singular detail-tunnels that allow for a continued unfolding of possibility-- the feeling "and on and on." There are a wide variety of 'fractalish' zoom-qualities in existing picture objects and spaces. Let's consider attractors in 4 different examples: 1. Renaissance Point-Perspective; 2. Kandinsky's Hyperplanes; 3. Infinite Sketchpad Compositions; 4. Google Earth; 5. The Mandelbrot Set

1-Point Perspective

The attraction-tunnel/field effect can be seen often in early Renaissance paintings, many of which employ the novelty of perspective to a borderline psychedelic degree, creating an insanely expansive awareness/sense of possibility across all scales, from what is closest to what is furthest away.

It is interesting to note even in a portrait painting like the *Mona Lisa* the sorts of vast scaling backgrounds that are put to use. The *Mona Lisa* itself is a 'pan & scan' version of the original, its 'widescreen' sides cropped off sometime in the past 500 years. This suggests that it is not *merely* a portrait, it is not *just* that gentle/coy smile that is the painting's subject, but that it is is the *situation* itself, too, *Mona Lisa* up in this massive castle in what looks like Mordor, her attention focused on *you* even as this dizzying view of the landscape and all that is possible there looms behind her. The gut-churning sense of possibility the background provides is subject just as much as the face.

Point-perspective was a new *technology* of the time. In the sense of a new *technique,* a new *method*, a new way of working, but also potentially in the sense of-- putting new *machines* to use. Look at the strange picture below. There has even been a debate, around the Hockney-Falco Thesis as to whether some masterworks were created with a given tool (the camera obscura) that allowed for greater approximation of photo-realism at insane levels of detail. Those who oppose the thesis believe that the involvement of a machine corrupts the authenticity of the work.

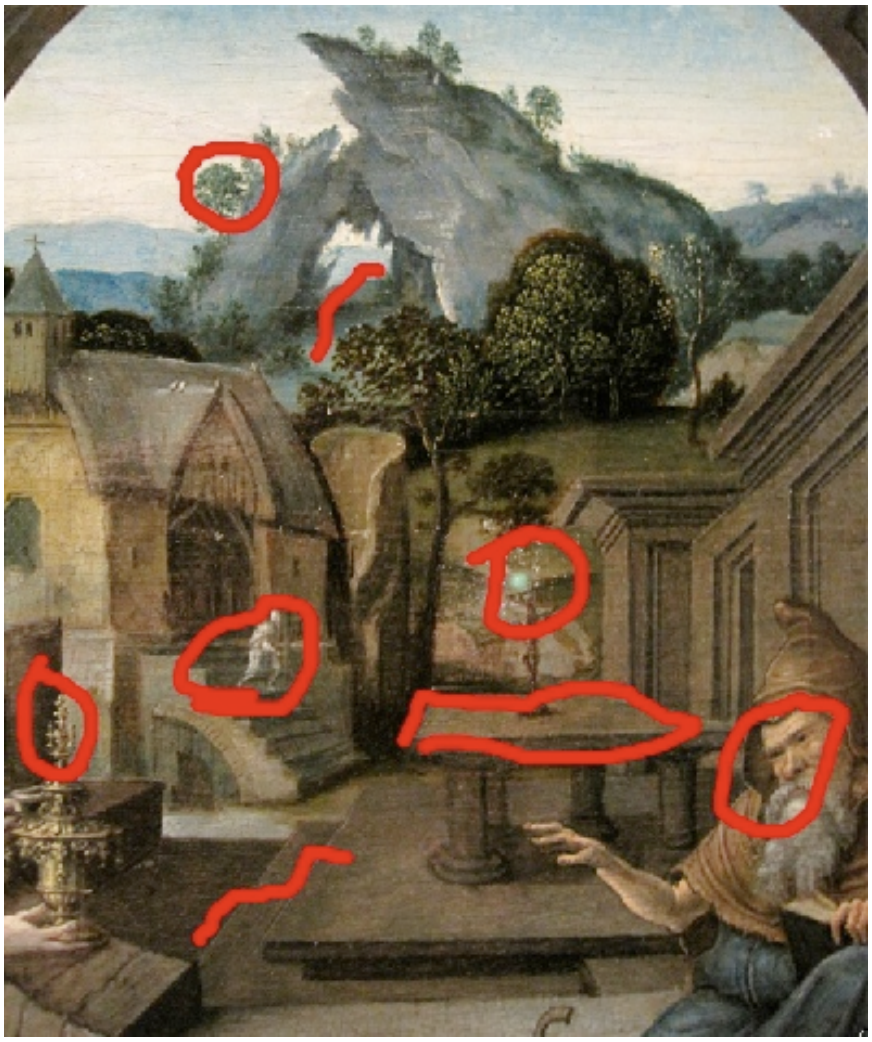


In any case, these tools, whether material-machinic or merely conceptual-machinic, all serve this same function. The point-attractor tunnels toward detail, a visual *basin of attraction*. The tension between this flat plane and the 'representational' virtual depth staged on its surface is other than the the 1:1 BP harmony we discussed earlier, it is rather more like a think chord of-flow of chromatic music, in which the 1:1 shows up as occasional ground, but which rather prefers to surf on the high integers where gravity is light. It is the tunnel into the distance grounded in the 1:1 but floating freely from here which gives rise to the psychedelic effects, where detail tunnels into the horizon, creating a 'line of sight' which functions as a 'line of possibility', along which a series of sub-possibilities are distributed, *into the distance* pausing as often as it likes *into a surface*, and creating meaning (sense of possibility) from the interrelations of all these things.

"The Temptation of Saint Anthony" by Circle of Jan Wellens de Cock,

The above picture demonstrates this effect perfectly, being itself a kind of tunnel-opening, with the brick surface nearest to us functioning as a kind of harmonic ground from which our sense of possibility departs into the tunnel, into the distance-- feeling the presence of this ground no matter how far we travel: down the path, past the man descending the staircase, following the path as it winds, up through the trees, and to these boulders, the dominant attractive force in the distance, continuing, over hills that are beginning to fade away -- and we experience them as fade, as soft filtered sounds on top of the brick ground.

Along the way, we might yet stop at other surfaces, and if our focus is intense enough, we may forget the presence of the brick harmonic-ground altogether, floating freely in the upper integers, counting the 20:1 *as One*. Here's a zoom of the same picture, with attractive surfaces and objects at different scales circled.



Of course, we could circle many more than just that, but it starts us thinking along these lines, anyway. We are attracted by *objects, surfaces* (and of course, persons, personalities). They do not *actually* open up into new spaces of possibility as they would if this were an actual situation (or videogame). But *the sense that they could* -- this is the play of the virtual possibility space which is a game played in all paintings.

In 1-point perspective there is the one basin of attraction which tunnels into that point in the distance which is furthest away. In 2-point perspective, there are likewise 2 points.

1-point perspective can be explored as *technique* in infinite sketchpad even-- in the case of this effect, 'into the distance' and 'into the surface' are equivalent. The 'zoomquilt' flash animations online exploit this peculiar

property of the technique in order to create a *strangely looped* environment in which a perpetual zoom inward is treated as a looping 3-dimensional space constructed using point perspective.

There are different, more complex attractors in paintings, of course--such as faces, color harmonies and other forms that affect us via our mental representations -- but even with these, we might be able to identify certain ways in which they can be described as attractive multiplicities across levels of detail, scale. The face for instance, as the head which is smaller than the body, with the two eyes, tunnels, a bifurcation, and the mouth as a third tunnel, the holes of the nose, too, and the point at its tip. Certainly the face is affective *because it is a face and we FEEL for faces*, but it might be possible (and *useful*, as regards certain problems in game design) to consider this surface as a strictly formal thing, too, as a space with all these different holes and curves as its functional attractors, to construct our feeling of faciality from the bottom up, from the holes and surfaces and bends/morphs that make it what it is.

Kandinsky's Hyperplanes

Kandinsky's pictures are some of the first things that came to mind after I first played around with *Infinite Sketchpad.* In his work, scale is often played with 'for scales sake', with attractors in a space attracting whole sub-spaces with their own attractors, etc. Representation is discarded, and *scale* begins to serve the harmonic function that it does in music, building from the 1:1 BP-page harmony, with octaves at 2:1, fifths at 3:1, etc (though by no means adhering to low-integer tonal dogma in this way).

Study for Composition #2 by Wassily Kandinsy (w/attractor annotations)

The above picture is his study for ‘composition 2’ with some attractors circled and sketched out on top of it. His forms are still pseudo-representational, and we find internal attractions playing out between component parts of the painting. There are many bodies, faces, which are attracted by and thus *attending to* their own interests-- I have used dashed lines to illustrate internal ‘lines of sight’ within the picture. Our own line of sight, naturally, drifts in time, and is attracted probably *moreso* to the black lines that I have ‘overdubbed’ on top than to Kandinsky’s given material on bottom. Such ‘representational attractors’ are fascinating to follow in non-abstract works. Pictures like Hieronymous Bosch’s *Garden of Earthly Delights* are filled with such sub-attentional interests between persons and other players (strawberries, demons, knives, etc), and if we allow ourselves to be sufficiently projected into the characters, to *play with* them, we find ourselves in the midst of an excellent game that is richer and more imaginative in its interactions than are most videogames!

Blue Segment by Wassily Kandinsky

This next painting is his “Blue Segment,” which is now more or less fully abstract. The scaling qualities of ‘faces’ and ‘spaces’ in the earlier composition has been replaced by a scaling freeplay more in line with the kinds of wholly concrete-vibrational spaces we’ve been discussing all along..

Look at the striped ‘island’ in the middle-- and we can imagine that this smaller ‘warped microcosm’ of the whole is itself a macrocosm of yet *more detail* that we could continue tunneling into. It is forms such as this that makes me wonder what kind of compositions Kandinsky might have been interested in building in a space like that of *Infinite Sketchpad*.

But no matter, even *actually scalebound* as the bounded picture object is, there is an immense amount of scaling interest in the interrelationship between parts and the whole. In a picture like this, we can begin to identify the presence of what Paul Klee called ‘pictorial mechanics’, which are *virtually present* in the picture and which function analogously to the mechanics of a videogame, which are *actually present*. There are detail-attractors that suck in further detail, such as the island just mentioned, and the bubbles that live nearby, all living at roughly the same scale, one which is much smaller than that of the sour-blue ‘bean’ they all live on (and which gives life to the bubbles). But there is also, say, the scene in the lower left in which ‘strips’ of color cross each other and recolor themselves at the point of intersection. There is the ‘split sausage’ near the upper left which is spitting out its own ‘strips’, these blotted with a sequence of pseudo-consistently repeated colors-- red, blue, teal, white (each a singularly warped instance of the same Class).. etc.

Kandinsky's paintings can be seen to develop new freedoms for the mutual play of attractors, sufficiently divorced from a mimetic realism as to be able to erect foundations of a new concrete/musical realism, a self-contained Real of the surface itself and the pseudo-consistent play of its forms. Attractors are distributed freely across a smooth scalar continuum where some spaces are more detailed, opening into spaces of further possibility, and some are less detailed, functioning more as a ground or "now" of virtual space. As *visual music*, as maps for our own lines of sight to drift across, these flat images are simple *scores* or fixed models of *shifting possibility spaces*. But since the local scalar *presence* cannot shift materially as it can with *Infinite Sketchpad*, the models of shifting possibility spaces are only ever played *virtually*, in our *senses of possibility*, and not *actually*, not played morphs of the material possibility space itself. The virtual play of the sense of possibility is the dance of movement between and into attractors, which are identified by fluctuations of detail. Might a hypothetical study of the shifting fractal dimensions of a picture of Kandinsky’s be possible in the same way that it's possible to approximate this value for the coastline of Britain, a similarly finite space..?

Studies of Kandinsky's vibrational realism and of the virtual play of attractors he puts to use is relevant to the design of properly *playful* content on the computer screen. Functional UI design is typically composed of flattened spread of attractors, like documents on a desktop, links on a webpage, menus

in productivity software. This makes sense with the *flatness* of the computer screen, it "cuts with the grain", and indeed -- this paradigm of the flat spread of attractors is the genre of "videogame" that more or less everyone who uses computers in any capacity is comfortable with. Operating systems, the internet and hypertext, word processors, drawing programs, music software, etc. -- these videogames are quite popular. The paradigm of the flat spread of attractors might be considered "vernacular" UI design... Maybe if we begin to think of all dynamic surfaces of attractors as videogames, the issue of game "accessibility" might not seem such a big issue.

Infinite Sketchpad

Infinite Sketchpad sketches are composed of discrete sets of detail-attractors.

If you draw and you keep zooming more or less consistently as you draw, you will be building a single attractor. Zooming in-- adding detail to detail. Zooming out-- providing macroscopic context for detail that, when the direction of zoom is reversed, will function as any other detail attractor.[79]

It is only possible here to build or travel down *one* detail attractor at a time, but these basins can bifurcate/split endlessly. Thus, there is the capacity to create many attractors that each split into many other attractors, creating a 'branching narrative' of sorts using *only* zooming-into-DETAIL as a mechanic.

Based on *how many attractors* are present in given situation, and how *strong* they feel (as per the density of objects being sucked into them, the scalar rate of change, etc), the *intensive dimensionality* of the situation itself can take on a wide variety of forms, from an overwhelming 12-point branch, each with visible sub-branches to a simple 1-point tunnel, with the next detail element so small that its own sub-details are not yet visible.

The rhythmic alternations of such dimensionalities, from 1 to 12, to 3 to 4 to 2 (or whatever) are the musical-possibilistic *flux* of the zoomspace itself,

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[79] Noting that building in this latter way, from the *bottom-up* tends to produce what I have found to be more organic forms. When building in this way, there are no edges to contend with, and so new content is allowed for freedom to dance as it likes. When building from the top down, there are the growing pieces of pre-existing content to reckon with, and it can feel very difficult for me to 'harmonize' with them, as it were.

where the music is felt as spatial rhythm, as temporal rhythm, but just as much so-- as *rhythm of possibility*. The practice of composition in a freeplay zoomspace like *Infinite Sketchpad* seeks to develop an intuitive feel for this sort of rhythm.

Google Earth

Google Earth maxes out when it hits a certain scalar threshold approaching the ground. Prior to this point, its capacities are constrained by attractors that are qualified in a diverse number of ways, such as-- those areas that are most urban (vs. the ocean, the amazon rainforest, for example, which do not allow for a very impressive zoom), spots that can be identified by street addresses (which control an automatic zoom mechanic that is triggered when you type them in and hit Enter), etc..

In terms of 'pictorial mechanics'-- Google Earth, and massive scaling maps of its kind in general, do not seem to be composed of a low-integer discrete multiplicity of attractors (as in *Infinite Sketchpad*), but rather set out a relatively 'smooth' space, the 'continuum of the Earth' which can be zoomed into anywhere at will, without *urging* you to go one place or another-- this is in line with its more supposedly 'objective/positivistic' goals..

It is composed by a patchwork of photos, patched next to, into, one another at a variety of panned positions and scales. The composition process, I imagine, might look like this: a 'macro' photo, say of America, is used as a ground/ base. It is covered with an evenly subdivided grid of 'sub-attractors' (many!). Photos with greater zoom-levels are mapped onto the larger photos, such that a 'point' on the big becomes a 'plane' of the little, and then this process is repeated on and on, for however many orders of magnitude until it hits the ground.

Google Earth is a terrific game... unfortunate that there has not been a 'fictionalized' space using the same smooth-zooming paradigm-- an 'RPG' where world-map and town are properly continuous across orders of magnitude. Studies in *Infinite Sketchpad* could be considered preparations for such a game. A space that integrated the image 'sampling' capacities of Google Earth (as experienced by its in-house design team, at least) with the drawing capacities of *Infinite Sketchpad* would be amazing, and we might be

able to begin creating new sorts of aesthetic attractors with such raw materials

The Julia Sets

The Mandelbrot set is composed of an infinite multiplicity of attractors. All over the place! It can be zoomed into endlessly, though not all parts of it are zoomable. It is only its ‘edges’ which unfold infinitely-- on either side of these, the values approach infinity or they approach 0, and there is nothing to see (though these zones are often shaded nicely, as in the recent *Frax* for iPad). There are certain types of attractors, like spirals and mini-Mandelbrots, that represent ‘classes’, as it were, *types* of attractor-objects..

An integration of the *infinite multiplicities* of this set with the freeplay of *Infinite Sketchpad* and sampling capacities of *Google Earth*....

Spacetime Harmonic Drift

Naturally, we could (and should!) go on with further readings of picture objects, and other apparently ‘non-game’ objects in general to see in what ways these things play, and what ways we can play with them.

Ideally, we’ll be able to form some sort of consistent ground on which these pictures can play along with games in general, with musics, with lines of all sorts (going on walks), the tortoise’s ‘walk’, etc...

So, part of the reason I bring up Kandinsky as a primary example in this brief history of *attraction* in painting/visual music (functioning as a new kind of N-D harmonic ground) is to suggest a sort of historical comparison-- it seems like videogames are at a 'pre-concrete' stage in their development, primarily concerned with representation of concepts *other* than the material of computation-vibration itself. This, analogous to, e.g. the late 19th century.

As games begin to do more and more to manipulate the played flow of spacetime, as in Braid, Portal, Katamari Damacy, etc., all of these really classic examples of spacetime-psych, the experience of duration/harmony, the concrete aspect of the material is accentuated. There is a real parallel here with the early modernist art which *plays* the BP (spacetime-material) for what

it is, as opposed to what it can represent, which finds music in stillness even, which lays the groundwork for a kind of aesthetic materialism which continues to find *magic* (and materialize fossils of inconsistent *magicks*) in the grain of the playspace, which *becomes* the playspace, respects its tendencies as a fact.

This points toward a direction in which videogames have headed somewhat feebly, but could continue moving toward with much greater rapidity and confidence-- stripping representational content from designs until we are in a strictly material/concrete/'abstract' space that *plays* much like our own attentions play when looking at (or drawing) a picture-object composed of attractors, all the way from those which are highly measured/striated/ countable, to those that smooth the spaces they describe, such that attractors are no longer single points, but planes, hyperplanes, time-structures extending into the N-D complex. A language of abstraction has been hinted at by games such as *The Marriage*, *Raspberry*, *Electroplankton*, but there has perhaps not been enough confidence in the tradition of abstraction itself, its faith in CONCRETE MATERIALITY, eternal play cosmologies, where the material plays as much as the artist.

"The artist does not set such store by natural forms as do the many realists who criticize. He sets less store by these realities, because it is not in the finished forms that he sees the crux of the natural creative process. He is more concerned with the formative powers than the finished forms."

The dance of the eyes, the literal lines of flight drawn by our attention drifting around the BP-- this is the connective flow between the outer world and our inner (player-as-) space, mindbody shifts, sense of possibility unfolding, these material variations are the play of seeing.

Kandinsky's formal theory of affects and the picture-object (the inner-outer connective flow), as described in *Point and Line to Plane,* begins:

"Every phenomenon can be experienced in two ways. These two ways are not arbitrary, but are bound up with the phenomenon-- developing out of its nature and characteristics: externally--or--inwardly. The possibility space and the sense of possibility.

"The Street can be observed through the windowpane, which diminishes its sounds so that its movements become phantom-like. The street itself, as seen through the transparent (yet had and firm) pane seems set apart, existing and pulsating as if "beyond." As soon as we open the door, strop out of the seclusion and plunge into the outside reality, we become an active part of this reality and experience its pulsation with all our senses. The constantly changing grades of tonality and tempo of the sounds wind themselves about us, rise spirally and, suddenly, collapse. Likewise, the movements envelop us by a play of horizontal and vertical lines bending in different directions, as colour-patches pile up and dissolve into high or low tonalities.

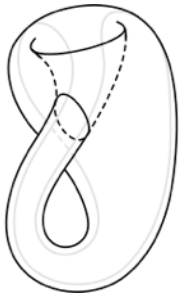
"The work of Art mirrors itself upon the surface of our consciousness. However, its image extends beyond, to vanish from the surface without a trace when the sensation has subsided. A certain transparent, but definite glass-like partition, abolishing direct contact from within, seems to exist here as well. Here, too, exists the possibility of entering art's message, to participate actively, and to experience its pulsating-life with all one's senses."

What follows is a theory and taxonomy of non-representational pictorial forms and their qualitative affects. It's a music theory of visual music, describing the "sound" of different visual objects and the relationships to qualify their feel -- hot and cold sounds, light and dark. A theory of harmony. Already the picture-object is shown to be a game, an invitation to active participation, "the possibility of entering art's message... of experiencing its pulsating-life."

It is the task of the next section to suggest ways in which this ‘pulsation’ might be integrated into the existing pulsating capacities of the computational-vibrational-skinned materialities of software, to suggest POSSIBILITIES, but also Real Virtual feelings at play in the sense of possibility, which need not be actualized in order to be meaningful.

PART III:

New Fractal Playspaces: Virtual Extensions (first take)



ALL haile to the noble Companie
Of true Students in holy Alchimie,
Whose noble practice doth hem teach
To vaile ther secrets with mistie speach;
Mought yt please your worshipfulnes
To heare my silly soothfastnes,
Of that practise which I have seene,
In hunting of the Lyon Greene:
And because you may be apaid,
That ys truth, that I have said;
And that you may for surety weene,
That I know well this Lyon Greene:

I pray your patience to attend...

5. Virtual Extensions 1: Drift Tactics Notebook

Virtual extensions are *ways of playing* in a playspace -- they might be played *by the player,* they might be played *by the space* -- they are not themselves material boundaries or structures external to the player, but rather generative Ideas acting as causal goads or attractors in the player-as-space, the shifting sense of possibility.

Remember that the virtual is “ideal but not abstract, real but not actual". Virtual extensions are related to abstract *rules* in this way: they are the pre-named *sense* of the rule and of its tendencies as such before the rule is abstracted linguistically, computationally, counted as an object-algorithm. All rules have been historically constructed as virtual flows even prior to their being counted as objects, and the history of this creation process should be attended to carefully: when the rule is *sensed* but it has not yet been formulated (there is a ball and there is a hoop, and there is an obvious thing to do with one to the other, but there is not yet a *rule* saying that it ought to be done)-- this state or flow that exists prior to the count itself is the domain of the virtual extensions proper.

There is a compelling argument that a 'game' only exists in the mind, between players -- and of course we know that videogames aren't actual games, because they don't have rules, but only mechanics[80]-- so, virtual extensions are a way of *gamifying* (but softly) a videogame-- turning it into a proper game, rather than a *thing*, a ready-to-hand *thing to do*, with virtual rules functioning in the pre-counted sense of possibility, the player-as-space.

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[80] A videogame cannot tell us what we *must* do (it’s always possible to simply *not* do that), it can merely *respond* to us in such ways to convince us that our options are indeed more limited than they are.

Virtual extensions closely resemble what might be called *design fictions*, but their real virtuality entails that the ‘disruptive’ potentials of design fiction be read not as *merely* fictional but rather as a design *reality*, in the capacity of the extension to transform, to expand, the sense of possibility, the virtual extension of the player-as-space, to maximize effective dimensionality.

New dimensional extensions of our played attentions are amplified by Outside Concepts in much the same way that our playings in Kandinsky's paintings attract us in so many more dimensions than the actuality of the BP canvas itself-- playing in these fractal playspaces, too, we continue to push and smooth, to re-quantize, and to put in motion once again.

The process of developing virtual extensions for playspaces is simple, and no less real because of it. We are *constantly* involved in this process. *Players are developers.* It is the precondition of movement itself, our active transformation of the sense of possibility into an Idea with causal influence on the material possibility space we've found ourselves in.

The indie game-maker's favorite little nug of rhetoric "You can make games!" should be modified: "You *do* make games!" (Robin Hunicke *did* say this recently, hoorah!), its techno-optimistic evangelizing attentions redirected toward the even more optimistic organic pre-abstract sense of possibility as causal goad: the interior spaces it describes, and the material-transformative affective powers it gives rise to. A professional designer *creates games* no moreso than does an amateur, and an amateur no moreso than a non-game-maker. Everyone is constantly *playing* games, and games, being *ways of playing*, are created as soon as they are played.

It is difficult to build software on machines, anyway. It is easier to *grow* software in the mind. It is impossible not to! Growing mental software is learning a way of playing, a way of musicking, *learning from the materials,* subtracting intentionality to cast magick, maximizing dimensionality to *move* -- mental software can go so many places, and it is local to our being in the world and is thus a direct continuation of the *Lila*-flow (flux), which the Universal abstraction of mechanical software design isn't (being spatialized first before being re-temporalized, the process is fundamentally *architectural* always before it is immanently playful).

A "free and wild creation of concepts"[81], new ideas, novelty! Imaginary games.

What about the actual-material progress? Startups, business.. *new apps* ... Let's just *forget* about those for a minute, if they're going to massive require software development cycles, and largely wasteful funding (which they are).

Facebook's employee manual says: "Code wins arguments. Building beats talking." This makes me sick. There is indeed a question of *getting the ideas out* once they're there, but the more pressing question seems to me-- are there actually enough Ideas *there* in the first place? It's possible to do an awful lot of work, an awful lot of building, without any new ideas. Game-cloning is a fully-amplified example of this, but perhaps its not the clones that we need fear the most. Facebook's ethics of 'innovation' are just as toxic, if not moreso. Innovation? Nope, economic growth.. the priorities are not very well concealed...

The *thieves*-- we could probably do well to learn something from them instead-- *joyful theft!* Why, for instance, have the brilliant spacetime-psych mechanics of *Braid, Portal* etc not made it into a vernacular 'grammar' of game-design? Is there a worry that to do so would be to come too close to cloning those classics? That Jonathan Blow & Valve, respectively, laid claim to those particular 'brands' of spacetime manipulation? That it would be *rude* to repeat them? As if those mechanics (multidirectional/intensive arrow of time; spacetime folds) had somehow reached their fullest potential in these first explorations of them?

On the contrary, brilliant though they are, those games are merely *beginnings* of a kind of videogame that *varies* spacetime parameters with the same ease that we *vary* harmonic grounds, rhythms, textures in music. A *music* of spacetime-- *this* is the kind of game I want to see developed. What does progress look like given this desire?

The development of virtual extensions is a perfect example of *actual* progress as regards the instensification of the intuitive flow of play and the sense of possibility's creative advance into novelty. Virtual extensions are pre-abstract

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[81] Stengers / Whitehead

design fictions, and design fiction is a freely wandering "count" of the smooth flows of becoming in play.

The sense of possibility, moved by the rhythms and contours of the space, enters into play with *new virtual spaces*, suggested or encouraged but not enforced by the game object's material boundaries. The space plays us and we play its play in turn (as in Eckhart's Strange Loop) -- we *imagine* new ways of playing, and play with these images as real-virtualities, operating at once, playing simultaneously, as both space and player.

A suggestion for students/beginning game designers (*all* game designers): *stop making videogames for a while-- make design fictions instead, write them up, virtual extensions*!

What a *REMARKABLE* amount of *SPEED* is possible here!

Listen to 'rules' flow into you, transform them, recombine them, spit them out as something different. How fast things can get made- Ta-da! Ahoy! The game is done already-- do *not* feel ashamed of this speed. Learn to listen. Ian Bogost already identified the importance of this in *Unit Operations*: "exploring the manifestation of game rules in the player experience is perhaps the most important type of work game criticism can do." That is to say-- studying the shifting senses of possibility in the player-as-space. Too true! This is not only game criticism's most important task, but game design's, too, and game-*play*'s. A phenomenological commitment to interrogating the subjective sense of possibility as played by the "external world" of the objective possibility space (how the SPS *creates* our subjectivity, even). Allowing the space to enter us, even as we're active participants inside of it-- to switch the subject-object orientation, to dissolve it altogether: "the idea is to sing and listen at the same time, with equal energy: receptively and expressively balanced."

Tactics, Abstraction, & Automaticity

In this chapter, what I'm doing is simply a more focused version of what I've been playing at all throughout the whole essay: tracing the real-virtual paths and surfaces that have emerged from my playings-- and have bounded my own played *sense of possibility* in *Infinite Sketchpad* -- games I have played,

counted into narratives, or rules, counted back into my virtual image of the software space itself. These gestures are the 'drift tactics' under consideration.

This whole essay has been about drift tactics. This time around, however, I'm going to stay more closely connected to the surface effects of *Infinite Sketchpad* itself, drifting through its very particular, material sense of possibility, as opposed to that expanded sense which so quickly leaps off of the screen, & into books, history, etc.

These are new *paths, mechanics*... Either way-- Drift tactics can exist as *concrete flows*, or they can exist as *abstractions*.

In the former case, drift tactics are simply kinds of *movement itself*, they are uncountable without suffering reduction, they are *magickal*, causal. In their concreteness they are yet still called virtual "in so far as their emission and absorption, creation and destruction, occur in a period of time shorter than the shortest continuous period imaginable."

Abstraction is the process of *counting* the virtual inconsistencies onto a consistent plane, translating *magickal* flows into *magical* structure. From imagination to computer science.

There are two main material planes of abstraction that will be useful in all design processes, virtual extensions included:

1. The player (player-as-space) -- our own conscious experience, attentions, cognition, etc. It is here that we *count* an object as such in the first place. Linguistic or computational abstractions can both exist in the player-as-space. That is to say-- *rules*, more or less strictly constituted.

2. The machine (space-as-player) -- the counting process here is much more involved, of course, mapping information structures in such a way that they can ultimately be reduced to an expression within a binary-atomic logical system. Linguistic abstractions must be made computational before they are implemented in the machine. In the machine, there are *no rules*, but only *mechanics*.

Thus an actual-virtual duality begins to form, where it appears that all mechanics are actual, and all rules are virtual -- and indeed, such a

preliminary distinction is useful, but it must be remembered that the two concepts cannot exist without one another-- even *rules* in all cases presuppose a more-or-less mechanistic body in which they play out (the rules of basketball require the *bounce* of the ball on the court, etc), and mechanics are likewise fixed as still-objects until the goad of virtual causality or magick enters into them (as algorithms, they are objects).

That the countings or abstractions of some of these virtual extensions might be *actualized* as computer software with more or less work is obvious. This is both an exciting and a disheartening prospect.

The prospect of materialization is disheartening insofar as many folks are sure to say that virtual extensions in general lack value until they are abstracted and materialized in the machine-software space-- that design fictions are merely 'wishful thinking', etc...

Again, this is the (banal) evil of the "you can make games" rhetoric which ignores the immanence of *perpetual-game-creation* in the lived drift tactics of our everyday lives, in meat space and virtual-BP both.

This perspective *could not be more harmful* to the cultivation of creativity in game designers and players.

Developers talk about getting more people *programming*, more STEM education programs, etc.-- but is this sort of engineering *really* what we want? Is STEM the necessary/sufficient condition of cultivating creativity in such a way that making games might become a beautiful extension of an individual's love and exploration of *life ?* Or is it, instead, an attempt to *grow the workforce?*

Certainly a material-computational playspace is a wonderful thing-- I would not be writing this if I didn't think so-- but to dismiss the tremendous importance, and Real affective body-impact, of *imaginary games* is to slow down progress in a way more severe than perhaps any other, to guarantee a computational future that has been created in the name of Utility as opposed to the imagination, in *love*.

So, to start from *love*-- this is the new challenge. To not shit on everyone online for talking about their massive RPG plans, to rather foster a culture where these *plans* might be embraced as as *already-complete things.* To turn planners away from planning, to turn to loving *what is there*...

A culture of games *from play*, rather than *from engineering.* A world where *imaginary games* are the default, where *virtual extensions* are regarded as *the space* where games occur, where materials are enchanted in terms of their immanent potentiality as opposed to their coded-engineered functionality.

But of course the engineering finally returns as well, and in full-loving force-- the computer becoming a friend, a partner in the imagination, but *not* a utility, *not* something that is used just to achieve externally defined goals, but rather a collaborator in the transformative flow of living, an equal-participant in the whole creative process. Mind from brain onto silicon. The prospect of full materialization is exciting insofar as materialized abstraction gives rise to wholly new concrete actualities that can be drifted through anew, once again, the abstraction now *forgotten*.

Forgetting an abstraction is a difficult thing in our bodies-- it takes discipline, lots of work, lots of play -- it is only in this way that some of our behaviors become *automatic*, like when we learn our scales on a musical instrument, and we learn to zip around, and maybe one day to draw out the kinds of lines forming *sheets* hinted at in Coltrane's motor solos & elsewhere. We no longer think "1, 2, 3…" when we're playing the scale, we have become-with the instrument, and the relational quality of the scale in our embodied experience is counted as one, and forgotten, counted as NONE, decomposed, just as soon as this happens, it has become a unit with which we are free to compose in higher-level structures.

Automaticity, in this sense, which the surrealist "automatic drawings" refer to, is a condition of the unconscious, where we are drifting in ways wholly concealed by our conscious attentions, our behaviors are mechanized just like the machine.

Just as there are two kinds of abstraction, there are two kinds of automaticity, immanent pre-conscious processes that are as they are because of the *ground* of abstraction, which itself has a ground in the pre-abstract *virtual continuum*.

1. Player-automaticity, which is embodied, and is subject to *change* according to practice, to habit, according to interruption, to drift, to external influence.

2. Machine-automaticity, which is forever *fixed* in its structure, even if its structure may evolve with time, or if it is controlled by a complex of processes, some played (magickal), some automated.

I play these games without code, just with *Infinite Sketchpad* and my own player-automaticities and drift tactics-- but if I did know how to code, maybe I would ask the computer to play along, to play some of the games that I enjoyed, and to keep doing that while I discovered new ones. We would play together, and hopefully the games would be very different thanks to the addition of a new player, hopefully *I would not be in charge...*

In any case, sometimes I will write about these virtual extensions as if they are plans for software development, or even existing pieces of software (sometimes it is easier to think in terms of *plans*) -- sometimes I will write about them as loose *ways of playing*, sometimes as *rules*, even. I would like to experiment with the thought of regarding *all the kinds* of drift tactics as coexisting on a plane of consistency, where the computer's mechanics are ultimately not different in *kind* from my own automatic inclinations and cloudy images of possibility, that they are merely different in *degree*.

In the same way that the habitual player gets her habits, and, when crafty, can build assemblages of these-- a "practice"-- the computer can be used to construct an assemblage of automatic processes, a space -- this is what a videogame is. When the sense of possibility begins to automate virtual algorithms in order to actualize their structures, when it follows a simple, repeatable process, it is possible to transfer this procedure or 'goal'/duty from the player to the space (computer). Take the player's computable behavior and implement it as a real mechanic in the zoomspace, leaving the player free to *play* in other non-computable ways-- this is the Marxist>>Situationist dream of Automation doing away with alienated labor! A videogame?

Magickal automations are the forces of material actuality affecting the player, channeled through her unconscious will. When the surrealists talked about "automatic drawing", this is the automaticity they were talking about. It is related to psychological automaticity in that it is unconscious, but it is unlike

it in that its behavior is determined in response to the present situation, as opposed to being determined by habit, it is an active participant in the actual material space.

The player flowing on *magick* is replaced by a countable 'trick', *magic*.

Building magic is impossible without magick-- this is perhaps the most important lesson for game design, insofar as a cultivation of magickal practices requires *leaving the top-down perspective* of engineering.

Naturally, if we tried to implement these, the material reality of computer software would begin to bring some very new things to the dialogue, totally unanticipated, just as I.S. has done (& this essay, already large, would blow up to 20 times its size!) --

As it is, it is important that the design fictions be treated as *actual spaces*, evalutated in terms of the *conceptual* 'materiality' of Ideas, of design fiction. These are FINISHED GAMES. Making "them" into software is necessarily *making something else*, magick always intervenes in the design process, these are not top-down design documents-- they are bottom-up *drift tactics,* playable by people, by pens, by musical instruments...

A material videogame might be designed using these or similar concepts, but there is no fixed material which is a necessary qualifier of making these concepts *play.* When the material is introduced, it enters into play with the concepts and the player, and it will be its own living particular, and any resulting game object produced will be truly *singular, non-clonable* in the same way a design fiction is singular -- imaginary games are games, too,

When will we see a game studies that finally embraces the generative potential of free speculation? Of *creation* that does NOT need to rely on computation?

Recursion 1: Similarity Tunnels

Let's start with a very simple example.

DRIFT: draw a circle in another circle, and zoom in and draw a circle in this new circle, and repeat for a while-- soon you'll have moved through a tunnel

of a dozen (or whatever) circles. Zoom out through all of them, zoom in again. You've made a tunnel.

Now, this process must be *counted* into being. Even if you are not thinking "1, 2, 3..." as you draw deeper and deeper and deeper circles, you will be thinking something maybe pre-verbal, but meaning "next, next... " or "& another, & another... " which is a kind of pre-symbolic counting, ordinal as opposed to cardinal. Player automaticity can go a ways toward *forgetting* the counting, but the fact is that the behavior is mechanical enough that without a play-aspect drifting through it, modifying the similarity, the process can become dull. The automatic process is eased a bit when we are not beholden to repeat a single shape so strictly-- for instance, zooming in, drawing a *blob*, then zooming, and drawing another *blob* that is unique, but is shaped in an importance sense by its relation to the first blob. It is a topological invariant. The blob is made of 'jelly'.

To avoid player-counting altogether, computer automation could be achieved by an algorithm that responds to an initial circle drawn by the player, and builds a replicating (morphing, if we want) self-similar tunnel from here. Such computational automation takes the place of the player's automatic processes, following her same rules and achieving her same goals, supposing they are unchanging.

Does the tunnel-maker only start tunneling after a *closed shape* has been drawn, as in Petri Puhro's *Crayon Physics*, which allows for the objectification of circles, squares, triangles, but not loopy-drift-knots? Or does it tunnel *as we draw*, which is basically what is happening in Neil Thapen's mesmerizing *Doodal,* the pattern-rate functioning as a sort of zoom-tempo that might be determined ahead of time as a constant in design, or as a slider in the software (the case with *Doodal*) or-- best yet-- as contingent on other material aspects of the playspace-- for instance, the speed of a player's movement on the canvas likewise controlling the speed of zoom-relations.

Such mechanical variation need not be regarded as merely ornamental, but rather ornamentation can and should be regarded as the ground or *fabric* of a highly dynamic space composed of tunnel-variations and their rhythms exclusively. In fugue form, function and ornamentation can be *the same*. THIS is a model to follow.

Games have the potential to be shifting possibility spaces where *played expressivity* of *both player **and** space* are valued above any kind of behavioral instrumentalization or utility. Pure dance, immanence. Player and space both playing. This is not productivity software, so there is no need to seek out functionality. This is not 'objective' in any sense other than its material actuality, so there is no need to concern oneself with any Realism other that of *Lila-play* / presence. There is no need to tell the player what to do when the task is trivial and when the space could play that same thing instead. This is to say--

Potentially interesting player goals can be performed instead by the machine, thereby automating them as MECHANICS, and leaving the player free to continue pursuing her own interests, to develop her own goals

UX is a Player

It is worth a quick aside to mention the UI-style that these virtual extensions all orient themselves in opposition to: *Hierarchical menus*. Menus are the dominant navigation method in *creativity software* by which the player is given control of shifting the software's operational modality (*how* it is playing, *what* it is listening to, doing). If we want to keep cramming zoomspaces with novel functionality, we could indeed implement all of these behaviors in a menu, grouped by similarity & part/whole relations, and we could merge the *I.S.* paradigm with something like the photoshop paradigm, or that of any other 'productivity software,' where we can select how we want the space to respond to (to play with) our input. Bret Victor's software demos approach dynamic spaces in this way, and they're very inspiring-- coming from the perspective of software tools, the kinds of conceptual fluidity he achieves are breathtaking. *Al.chemy* is a delightful piece of drawing software that uses this approach, too, and I have enjoyed myself very much with it. But there is still a tension here, which is that the optimized control-structures of menus do not seem designed for *players* at all-- when we go into software *wanting to play*, the menus are only ever an annoyance, to greater or lesser degree.

Menus are designed for content producers, *users,* laborers, *Homo faber* as opposed to *Homo ludens*. Menus offer a convenient solution to the content-

producer's desire to enforce a *top-down control* of the project at hand, but they do very little to encourage the fundamental *receptivity* of the creative process (which is its play-aspect, *not* its productive aspect), whereby the creative *materials* are seen to be participants in the creativity every but as much as the 'content producer' is. Hierarchical menus might be acceptable for UI design, but they are indicative of *bad playspace design* -- it's unrealistic insofar as *we want the space to be a player*, it doesn't create any sort of meaningful illusion/mythology, celebrates *nothing* in the imagination, and simultaneously instrumentalizes both space and player in one event (space must *obey*, player must *produce*). Forget it! No interest in telling a player how to play with me, players will play how they play-- and *the space is a player!* Instead, we should be giving the space new ways to play as an immanent being, a player, a living place for improvisation and exploration-- the space needs to come alive! To *surprise us.* This is the project of treating the space as a player. Instead of menus, think of the player's degrees of freedom (what input controls are available), and how these might shift with time, how they might become *context sensitive*, that brilliant concept we should all remember from the design lessons in *Conker's Bad Fur Day* (and a principle Victor stresses in his *Magic Ink* paper). This is the principle that a given button or surface or *whatever* need not behave the same way at all times. Sometimes a foot is ticklish, and sometimes it wants a massage-- this, based on sensitivity to the context. Our inputs, remember, are constituting the *subjectivity* of the space (what it is being subjected to), and to work within the paradigm of shifting contexts is to begin to tackle the problem of the SPS-Coyote player model..

Strict hierarchical menus can be dispensed with altogether by keeping this concept *context sensitivity* in mind, and employing its method with curiosity & free abandon. We might even be able to imagine an *Ableton Live* or a *Photoshop* which has been stripped of its menus, and thus of its utility for busy professionals-- but which *still retains all of its functionality*, for lazy players, only now implementing functions in its own time, not beholden to the instrumentalized desires of the players, but rather-- the software with its own desires, and the bond between players forged in this vector once it shared, like a dolphin hopping on to surf wave, whose vector is not defined by the dolphin alone or wave alone, but only the two *playing with,* counted as one.

Attractors: Passive and Active Point, Line, Plane

These spaces are *objects*. Level designs. Environments, like a map in final fantasy, or zelda, etc., only now fused with the Google Map mechanics-- its a map that zooms in and out smoothly, such that towns and country are not so clearly divided, where NPCs and potions might be the same (??), and where potions might contain granules of matter themselves housing whole new continents, worlds. !

The point is -- we should imagine working with and IN a world that has been *at least somewhat* designed in advance. We are not yet ready to hand over that *pleasure* to the computer! A key element of the design of a space chosen in advance concerns the *powers* its component wield as capacities to *affect* the player herself.

The concept of *active* and *passive* lines from the mechanics of fractal generation can be used apply to points and lines and planes in *I.S.* fractal space.

As with any picture-object and its pictorial mechanics, in a zoomspace there are geometric elements which individually function as structural attractors in the space, units or elements which function as a *ground* for further elements or drift-flows. These are structural blocks of navigating the environment, which may well appear fixed when left undisturbed. But as we are pulled into their basins of attraction, the attractors begin to manifest new behavior in the space, new affects in the player.

Planes: Active Territories >>

There are celestial and infernal spirits, human and metallic, the spirits of salts, gems, and marcasites, arsenical spirits, spirits of potables, of roots, of liquids, of flesh, blood, bones, etc. Wherefore you may know that the spirit is in very truth the life and balsam of all corporeal things. (Paracelsus 135)

The surface as player-- constructing coded audiovisual substances. Salts, gems, roots...Different planes, surfaces, have different active-generative "textures", as it were, like walking through honey vs. water. vs. grass in Mario games. Each plane has its own *game feel* as per how it responds to us in time-- its visual response, its auditory response

The space is striated into different 'terrain types' like these, each with their own reactive behaviors -- as DeLanda says, each with generative "properties, capacities, and tendencies".

A "honey space" might have the *property* of stickiness which slows the "ink flow" down, along with any other processes taking place, acting as a kind of inhibitor, a time-filter.

The honey space might, at the same time, have the *tendency* of hardening over time. Just like honey in our cupboard turns from a gooey stuff to a waxy stuff over the course of time (and temperature?), so too honey in these spaces might become *waxy* within a couple of minutes (or seconds, whatever), initially making messes and slowing flows, but eventually becoming a malleable material that can be *sculpted* freely, like clay, terraforming, etc.

The substance-surface's *capacities* to affect and be affected by others might be hard-coded such as to anticipate narrative-dialectic relations between substances in combination/assemblage. Paracelsus' writings could be a source of inspiration here:

"Honey has no special preservative, only it must be protected from its enemy. Its chief enemy is bread. If ever so small a quantity of bread made from flour be put or fall into it, the whole honey is turned into ants, and perishes entirely."

And thus one substance can be transmuted into another with the help of a catalyzing agent, which will itself be another substance. The process need not be a quick 'cut' between substance-phases, but rather can follow Paracelsus' model of a sort of story-telling *between* types.

Other substances-- a water space might spread the inkflow, swirling around in eddies and vortices, creating infinite regresses of flows like those waves of Hokusai that Mandelbrot loves so much. It 'liquefies' other elements in the environment, could use a process just like photoshop's Liquify tool, put into motion.

A grass space might be more or less static but ornamented with gradual generative properties. Maybe we draw a line, and a scaling duplication

process begins which will transform this line into a 'tree', but the whole growth process will take about 10 minutes.

By allowing different terrain types operating at different time scales, we are beginning to craft a space of musical *intensity*, where time is experienced less and less as counted *measure*, and more as the contrapuntal play of all forms of life in relation to one another, where 10 seconds can *mean* very different things based on the content of those seconds. We can imagine something like a microcosmic model of the Geological, evolutionary, arboreal, human, and insect time-scales all mapped in a dizzying space of zoomable interrelations. “Wisdom of the rocks.”

Daniel Shiffman’s recent book “The Nature of Code” tasks the reader with designing an ecosystem in which to experiment with interrelations of all of the algorithms presented throughout. This is pointing toward the design of the space as a player-multiple. A personality whose individuality is precisely that it is *many*. The biosphere as an individual, species a sub-individual, individual as... The space as player is composed of internal multiplicity--playing as friend and foe to one another, whole societies of interior dynamics.

The honey turns into ants, and now ants are their own attractive points (and surfaces, when zoomed in on) -- they wander around, following the scent of bread, marching in a line--

Active Lines

Marching ants. How will autonomous movement of space-player parts be coded into the game?

The canonic mechanics of Golan Levin's *Yellowtail* can be used OFTEN as a generative algorithm for certain active lines. Draw a line, lift the pen/finger, and the line dances away from its endpoint, looping, traveling across the world. This is what *Yellowtail* does, but of course the traveling could be zooming *into detail*, too -- that is, the movement would be scaling as opposed to panning. Maybe you draw a line, it becomes active in some way based on the plane its drawn on, and after scaling down for a bit, it plants itself in some fixed location as a 'seed' for further generative play. At this point, a gradual

process could ensue, or anything else. We can fix its position there, sure, but why not let the space play?

Active lines can behave differently based on what active spaces they're grounded on -- Klee's visual 'pictorial mechanics' on taking a line for a walk demonstrate a number of ways that a terrain type could restrict and enable movement of a line on its surface.

There could be an invisible grid, only node-based drawing is possible-- there could be an oscillator on the line being drawn, the line could 'birth' other lines, etc...

Lines can 'shade' space exotropically (on the outside) or endotropically (on the inside), defining new 'grounds' in the process.

Lines can attract perpendicular lines, maybe a 'rain shower' of perpendiculars.

The played line which traces paths through the played space can function as the emergent SEED of further spatial drift (space-as-player), where level design becomes liquefied when the line takes a walk. Player chaos-magick is extended into *magical* (e.g. magic trick), illusory space. This is to say that the player's input stream, which can only be read by the system as irreducibly random, as *accidental*, is *listened to* -- is taken seriously-- the space says *amor fati*, and what was accidental becomes essential.

Cellular Automata --

There is an incredible amount of potential for generative movement with cellular automata (a kind of magic that sometimes begins to feel like it tends toward magick, especially when you 'dip your finger in', causing a cascade of dissolves, recombinations.

The excellent Conway's Life software, *Golly*, is an absolutely brilliant space to explore the dynamic possibilities of these automata. Here is how I enjoy playing: I browse from a list of presets, choose one, let it iterate, so that I'm now watching an animated flow-- an then *dip in* -- and by this, I mean just to draw in a little or a big wiggle on the iterating surface, *slicing* it as it were, and then watching it 'bleed.' It sounds sick! And indeed there's a real sense of

violence to it, but in a very different way than we're accustomed to thinking about violence in games.

If there is *death* in a quickly-iterating Game of Life, it is shown in all of its dynamic complexity and its total interrelation with the environment, far-from equilibrium dynamics eventually settling (or drifting away, forever!). It's not enough to say that when a 'cell' dies, that's the extent of dying in the game, a binary switch from *on* to *off*. That is so only from the lowest level perspective of a *cell*. Higher up, there are gliders, which are made of just a few cells, and these can live and die likewise-- living when their explicit pattern is allowed to flow on, and dying when interrupted-- but these deaths are not merely *ends*, they are *beginnings* as well, as is naturally the case with any death in our own reality. Though there is a dissolution of human consciousness (or glider consciousness), the dissolving pieces themselves continue to function as participants in higher orders of experience, which may yet reform into new individuals or flows.

It is these kinds of death that will be especially worth exploring, these deaths that cannot be characterized by a boolean value, but rather must explore the cascades of dissolution and individuation that are all tangled up with one another in dense intensive webs of textural counterpoint, organs, organism, species..

While it sounds an awkward match at first to lay these rules on top of a drawing surface, the rules of any classical automata might be adapted so that they are not playing out on a fixed grid, but rather on the smooth space of interrelated active territories, audiovisual substances of the sort we've been imagining. 'Smooth life' is a basic example of this, but it is still on a grid, it is simply a smooth grid..

Even strictly grid-based automata are ripe with potential. Playing *Golly* (automata sim), it's a remarkable thing the sense of *Life* in these games of life. Gliders, highways, etc. *All of this motion*, with particular MAGICAL ways of accomplishing them, *tricks*, easily repeatable once learned.

Starseeds

Starseed Pilgrim's bag of seed-mechnanics might be considered a kind of "new cellular automata" in the same way that we're dealing with these new fractal playspaces -- with a grab-bag/assemblage of composed rules, rules as ‘content’ to build with, expressive design. This core compositional approach seems ripe for re-use! A library of mechanics like this is a beautiful device, and many of the game's mechanics could be adopted for use in zoomspacs.

I found the game difficult and have not played too deeply into it, but was delighted by the generative *growth* that was evident from the first few minutes of play, and hope to return to it some day in earnest.

But even without a detailed playthrough of it, there’s some key *conceptual resources* in the mechanics to learn from here, I think:

The following is considered a 'major spoiler', a catalog of the starseed mechanics-- it is excerpted from Joel Goodwin's article on Electron Dance (http://www.electrondance.com/faith-of-the-pilgrim/). We can imagine these processes used for aesthetic purposes, too, outside of the instrumentalization they undergo in being used in a more strict game design:

Pink (Seedstack): Produces new seeds, grows slowly upwards forever.

Green (Vine): Produces twisty vine of random length. Contains seeds (hearts) that can be only be collected in the night world.

Orange (Lance): Generates straight platform of random length.

Cyan (Patch): Patches existing platforms with a cross of cyan material. It is the only structure the darkness cannot consume, although is porous.

Olive (Goo): Produces viscous material which flows outwards from plantation site and will form hanging droplets over the edge of another platform. Goo is sticky and prevents player from jumping.

Purple (Shielding): Produces small tight structure, resilient to darkness.

Blue (Trampoline): Produces a single block that allows player to jump higher. If the blue trampoline comes into contact with olive goo, the trampoline is spoilt.

Red (Construction Bomb): Produces a "bomb" that, when activated, explodes into a large red structure.

Beautiful! These mechanics highlight the effectiveness of *tension* in general in these mechanics. Pink grows SLOWLY and also FOREVER. *Darkness* activates certain latent potentialities in many of these mechanics, intensifying the 'context-sensitivity' of it all. Mechanics 'touch' each other (Blue & Olive), etc. etc.

This SEEDS idea, abstracted and applied across *any number* of additional games, will prove to be very very useful. A grab-bag of ready-made mechanics, responding to environmental pokes, etc. The ecosystem. And with built in *tensions*, like seeds are not only playing games with the (human) player, but with each other as well-- goo spoiling the trampoline, etc. Difficult, normal games can be played. Between human player and computer, but also between players as subsets of the playspace itself. The gliders in game of life are always playing, ready to destroy equilibrium formations elsewhere in the grid, prepared to destroy themselves in order to do so. We cannot count on the human to 'play the game' we'd like them to, but we can build games into the software for the sub-spaces/players to play themselves.

Harmony: Scalebound Symmetry

With all of this movement, the space is beginning to actualize its dynamic potential, but it might begin to feel too persistently chaotic to provide a meaningful experience suited to our temperment-- while the canonic movements of *yellowtail*, or the swarms of automata and starseeds indeed will give the software the dynamism we're desiring, it is possible it will all begin to feel too 'noisy', with too many patterns layered on top of one another, with little respect for their internal/mutual relations.

Well, *first things first*-- why not develop a taste for the noise? *Order out of chaos*. We don't know WHAT the order will look like, but have *faith* that it is

possible. Allow the chaos to create its OWN order-- do not try to impose it. It is only from such a taste for chaos that a new higher-level *order* can emerge.

All the same, if we would like to *impose some order*, a *theory of harmony* will be useful to practice at this point, whatever it may eventually come to mean. 1:1 relations between parts, at times, at least. This will be manifest in the mathematics of Group Theory, considered broadly-- harmonies, visual symmetries, etc. In programs like *Al.chemy* or agj's "flowerpattern" (http://www.agj.cl/files/games/flowerpattern/) we can see ways that symmetry can be manipulated on a strictly local scale. There's no reason we should avoid local operations just because we are dealing with scaling spaces. Indeed, if we look at the "real" fractal geometry of nature, we find local symmetries all over the place, perhaps with greater frequency than scaling symmetries. All loosely homogeneous surfaces, smooth surfaces like we talked about earlier, will tend to show some kind of symmetry in their organization, crystalline lattices of molecules forming a smooth marble surface, etc.. Local symmetries might be a new way to describe surface-homogeneity within a more complex fractal space, where such symmetries may indeed account for emergent smooth/rough textures or 'game feels' in the space. drawing a jagged triangular seed which turns into a tiled jagged surface might produce a scratchy-frantic game-feel, where as a curvy seed of a symmetry might produce something smoother. Symmetries are the natural choice for texturing active surfaces (remember-- scalebound objects are not actually scalebound, but they typically hit a limit at which point they no longer scale, but enter a new fractal dimensionality at the molecular level which is characterized by more or less symmetrical lattices (strange symmetries are common, of course). What's more, local symmetries can act as 'seeds' for scaling symmetries, much as the player-brushstrokes act as the seed for the local symmetry itself. Leaving the comfort of level design behind, the generative ideal is that *everything* is a seed for something else, and was seeded by something else-- and of course this is only a matter of plugging free variables into the input of a new played algorithm.

Recursion 2: Complex Symmetry and Harmonic Drift

The self-similar tunnels of the 'Platonic' fractal forms (Koch Curve, Barnsley Fern, etc.) are seen by some as so *essential* to the nature of fractal geometry that they wouldn't even consider a non-patterned surface like *IS* itself to be

fractal at all. I hope we've shown already that this belief is erroneous, but even so, we now have a chance to build up a new fractal geometry in the spirit of these symmetries, but in new ways only possible with the player-magick of a Chaotic (magickal) generative space. Neil Thapen's *Doodal* is the best space I know of for exploring the automation possibilities in this vein. The examples of self-similar tunnels at the beginning of this section demonstrated for us the most basic kinds of fractal symmetry that are possible as extensions of the *IS* paradigm. Simple repetitions across scale. There are many other kinds of symmetry that might be explored, of course, both scaling and scalebound. Harmonic movement is introduced when differences in symmetries are felt alongside one-another. For instance, we might have an active point that, when tapped, doesn't make a mark at the locus of the tap itself, but instead forms a petal-like arrangement around it. The number of petals making up this formation can be variable, of course. And so, we could introduce simple harmonic movement by, say, first generating a *local* flower with 16 petals, while simultaneously, at a scale an order of magnitude smaller, generating a flower with 12 pedals, and zooming in further, flowers with 8 petals, 6, 5, 4, 3. At each step along this path, the patterns will shift more or less intensely, and these shifts experienced qualitatively are the experience of visual harmony. Such shifts could be attached to isomorphic harmonic movements in the game's soundtrack, of course, though the rigor need not be that tight, and could even feel too dry in practice, too instrumental, lacking in space-spirit, chaotic energy the allowing space-as-player to move. Fractal dimensionality becomes important here once again, as it determines something like the 'breathing room' in a harmonic progression, how much scale must we traverse before we're immersed in the next harmonic module?

There are many strange kinds of symmetry, harmony, that can be explored -- the unfolding of the complex plane that is the notable structure of the Julia Sets can be played with in *Doodal*, and it's a very strange sensation, indeed! I'm not at all a specialist on any of these matters, and so am unable to share *functions* to implement, but I suspect that for a math-literate designer even a short study of concepts in group theory (symmetry math) would provide tools for enlarging a zoomspace's harmonic palette immensely

Progressive Time Structure, Threshold & Bifurcation

We've already mentioned a few ways that we could put time-based mechanics to use in zoomspaces, for instance the trees that grow over a period of 10 minutes. We'll need to consider time in relation to *all* mechanics used in a zoomspace, though, if we intend to keep the space properly *playing*, and not fixing itself into static equilibrium (system-death).

Jesper Juul's framework for considering game time-structures in terms of progression and emergence is a useful starting point we can set off from to create a variety of time-structures in our spaces. These concepts deal with ways in which games *change states*, and these are the thresholds of the game, where it changes from one set of conditions to another. Progressive structures are essentially *simple emergent* structures. Even a very simple linear structure that transitions to a new mode every 2 minutes is emergent insofar as the transition emerges from your sticking around in the space for 2 minutes, not hitting ESC. Most long-form time-structures are likely to share a kind of event in common -- a *bifurcation*. That is, a branching point in the system wherein one path is chosen instead of another-- the ‘choice’ can be made by any player, arbitrarily, it may not be our will that decides. This is a simple node in the game-structure, and it happens in every SPS. This structural element can be used as a design primitive, something that can happen at any time, for any reason. For instance, the active planes we discussed earlier-- these can switch 'types' at critical thresholds, such that honey becomes ants and ants become grass, and grass becomes water, and water dries up, and we are left with dirt, sand, stone (what are these? what time-scale do they operate on?). Of course, it is more ‘realistic’ in its own way to design these transitions such that they happen smoothly (transition liquidation) and reveal a kind of musical or narrative interrelation between parts, causes and effects. If we are designing spaces as *music spaces*, critical thresholds are key, because they allow us to transition from one music space to another, thus allowing for the block structures characteristic of many contemporary musical forms, and the structural integrity on which we can base a pragmatics of transition liquidation.

Loopy Topologies

In *Portal* we fold 3D spacetime, oval to oval, such that two ovals exist in one place-- or, 1 oval in two places. The portals are ovals into which we can pass through the connective node of the fold and, seeming to teleport, take a

simple walk (or jump etc) from one point of view into another. The same *folding* happens courtesy of *the magician* in Michael Brough's *Corrypt*. And here the chaotic shifts are given free reign to let things lose control, to make the game unwinnable, to *kill things off*, emergent sorrow. It is beautiful.. Analogous to *Corrypt* and *Portal*'s folds opening into the distance, the zoomspace's folds can open into the surface (see Fractal Spacetime Realism). A subset of the space we're playing in can now be folded or scaled such that it is a subset of a different subset of the space, or a subset of itself. This is how portals work. You see an object, you zoom and zoom, traveling through an environment, and then-- *you see the same object again*. The set contains itself as an element. We are dealing with parts and subparts and wholes and their connective relations, and if we are looking for a mathematical account of these relations, the field of study is called *mereotopology*, which was of great interest to Whitehead, and had a central function in his creativity-motion realism as described in *Process and Reality*. Douglas Hofstadter's "Strange Loops" are hierarchical models whose bottoms open up when approached to reveal that they include their tops, thus zoom-looping infinitely. Sets with themselves as an element, infinite regress. The visual effect would be something like what the *Zoomquilt* videos have achieved. This has got to be one of the MOST compelling ideas to play with in *Infinite Sketchpad*. I admit the mere *thought* of this, imagining it on the screen as I played-- it gave such a lurch of the gut, this was a big inspiration to embark on this essay, and this chapter in particular. The gesture, the basic concept, is elegant enough -- fold, recurse = portal -- but the implications (even pre-technical) can get very complex very quickly.

The difficult problem of *individuation* appears to be of central importance. How are we to determine the *ways* in which *objects can contain themselves*? When the surface is a messy assemblage of so many different parts, which are criss-crossed on one-another and smeared about freely, bleeding all over the place-- how are we supposed to *count* the edge of an object at all? This, of course, has been a central theme of the whole essay, the Problem of Edges. In *Infinite Sketchpad* and *Infinite Doodle* both, the edges *freak out* when you get too close to them. They start to *vibrate,* like you're asking for too much. Well, this vibration is only the beginning! In the Mandelbrot set, the edges are where *all* of the interest is, in the space between the approach to 0 and the approach to infinity. Now we are trying count these, in order to duplicate. And it will be doable!

Erase the top-down. Every *individuation* of an object is going to entail a separation of its body from its environment. This is to say, we will need to practice stripping away context such that individuals, even the most dynamic of them, can be counted as *things* independent of their morphogenetic context. This is not a shift from how we typically think with computers, but rather a reversion to the common object-oriented way of thinking. In zoomspaces the idea is merely given an intuitive visual analog, wherein the 'space' is the top-down, the *exotropic*, which is 'deleted' in the objectification of the individual, even as its structuring aspects remain virtually as indentations etc. in the played space -- (like a bruise from a fist, which remains even after the fist is long gone).

Smudgy Topologies

As we *abstract* these objects from their native environment, the 'bruises' from home, their *outer-features*, their defining surface characteristics, can begin to respond in any number of ways. Perhaps they attract or repulse the play of other behaviors in the space, such that the space morphs according to the affective bruise of the object/player. Alternately, maybe they *whole object* begins to enact a kind of radical malleability, shape-shifting to fit the new context that it is put in. It is drawn to fit inside the four corners of a square, hugging those tightly, burrowing into the sharp angles with infinitely scaling lines, etc. Now, this object is put in a circle, and its burrowing tendrils are rounded out, scaled up in part, roots becoming scalebound noodles, or... It is even conceivable that, as the game is played more and more, a *library* of objects which have been drawn/generated in play are distributed along an N-dimensional continuum, a phase space representing *possible objects*. Then, when a new 'fold' is opened up, perhaps by the initiative of an *active line or plane*, the original space which it folds back to could be determined by the space of possible objects, and which 'fits' best. This object can then be used, and further morphed for extra snugness.

Recursion 3: Complex Fractal procedurality

Let's take it for granted, then, that it is possible to embed a set inside of itself, to create a Strange Loop, that it is possible to morph the contents of this new set such that it is more responsive to the particulars of its new context (a

Weird Strange Loop), and that it is possible, with a robust enough description of the morphological functions at play, to describe a N-D phase space whereupon all objects are related to one another in much the same way that the phylogenetic tree relates species to one another in an unfolding (massively) N-D possibility space, which represents both space at time at once, as agents of differentiation. Self-similarity has returned, but in a very strange way-- now it is possible to treat all individuals as existing on a continuum, and to thus morph objects into one another by a simple 'walk' through the space, continuous transformation of variables. Supposing that a perpetual-morphing mechanic were thus implemented, it would be possible to return to the *aesthetics of ever-shifting variability* that have characterized our love of Julia-Mandelbrot and of irrational numbers, and a 'random walk' drawn by our desires-- We can imagine a total dissolution of the 'edge' that exists between the paradigm of *infinite sketchpad* and that of the Mandelbrot set and other classical fractals, such that *content* plays out at every step of the recursive process, such that the materiality is never wholly reducible to *functionality* alone. We can imagine that *all* objects on a given canvas are thus counted by the space and related to one-another on the continuum, such that, say when we affect one objects, the other objects nearest to it in a given phase space are thus likewise affected. Perhaps a given object is sprinkled about across the space-- we can imagine that *all operations* on this object or any of its clones would trickle down/up/across to affect all the others. The maxim "think global, act local" would thus be automated in this microcosm at least. We're using *intensive* here as a derivative of derivatives: first of its original thermodynamic sense, referring to intensive properties, like pressure, temperature or density. "Differences in these qualities have a morphogenetic effect (they drive fluxes of matter or energy, for example) and when not allowed to get cancelled (as in non-equilibrium physics) display the full potential of matter-energy for self organization." Difference driving flux of matter energy in the player-as-space, creative activity, this is intensive dimensionality as soft formalization of the sense of possibility. The idea is that these differences driving transformations of matter-energy occur not only the world as studied by the natural sciences, but also in the player-space of creativity, and following from the transformation of materials-- left behind as traces in the played space itself. Traces of intensive dimensionality played by past-virtual SPS-sense of possibility, then, and their relations to the *present, active* sense of possibility, are the subject of soft BP formalisms, as with Kandinsky and Klee's Bauhaus texts, studies of composition -- structure,

composition. And it is in this sense that we can follow in another meaning of *intensive* in which it is referring to "the assembly of different components as such, that is, the creation of heterogeneous assemblages in which the components' differences are not cancelled through homogenization". (Delanda)... Assemblage theory! Coyote, composition from modules, creating from the avaiable materials, from what is at hand. Assemblage theory, the interaction of objects, as an ontological principle of SPS, seving as its bridge to object philosophy, the shifting glues of multiplicities. The picture-object on the BP is nothing but assemblage, making to with what is at hand, when what is at hand is the point, line, and plane. Both of these senses of intensive dimensionality in the sense of possibility will become more apparent as the situations and pictures presented become more complex.

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Virtual Extensions 2:
Music Objects Are Music Spaces

We've now developed a fairly complex mental image of how the drift of the sense of possibility on the virtual continuum might be used to *count* abstracted structures and identify possible computable drifts that could be implemented as actual mechanics in the space, and how the process of drawing lines might be integrated holistically into a level design process which is built of primitives like points, lines, curves, smears, planes, morphs, hyperplanes, etc. in order to achieve a highly dynamic playspace which nevertheless is free from competitive and representational structures both-- is this image the closest we've come to realizing non-sonic music in games?

If 'music is the greatest teacher' of *drawing lines*, how might we finally introduce the sound-vibrational aspect of music back into these spaces such that the musicality of the image and flow is manifest in the play of the sounds as well. We've avoided it all along, and this has at least shown that the preconditions of sonic music have to do with so much more than sound itself.

Let's treat the structure we've built ourselves into as a *score* to be performed, mapped to yet another complex object, this one a set of musical mechanics which will function as a sound-vibrational 'skin' to coat the flesh-organs and musculature of the existing visual-temporal mechanics.

How can we approach this idea of music spaces that are constructed from a kind of empty plane, controlling patterns and life-flows rather than the knobs and sequencers and menus of most contemporary music software. What is the significance of *zooming into* a musical object, and *zooming out* -- what is the musical meaning of this?

Music objects are music spaces

This is the meaning & significance of the zoom. Any player is an object and any object is a space, and now we are tasked with giving the space voice.

Speculative Approaches to Soundtrack Design for NFPs

To turn a space, an architecture, into a musical instrument/composition/score/whatever -- to give a space voice so that it becomes, itself, a musician, a player, let's follow from the dogma introduced in Soundtracks 1: "for every change of state in a game, there should be a *corresponding* change of state in its soundtrack." Following this dogma's procedure, we tie soundtrack events to visual-functional events enacted by *objects* in the game space-- the soundtrack thus 'hugs' the game's existing time-structures.

In zoomspaces we're given hands-on variable-control of the *scale* variable, and it's no longer clear exactly what an object is, what is to be counted-as-one. The feeling is rather-- *count-as-what?* What are some musical implications of this feeling? Music objects are music spaces. Objects are spaces. The keyboard is a game, the composition is an object. Objects in space (objects in time) describe fields of *shifting possibility spaces*, which can themselves be counted-as-one, objectified. We'll have to reckon with this kind of spiraling thinking in regards to *practical implementation* of music objects which are spaces containing objects containing spaces, etc. We're seeing the *strange loop* concept peeking through again-- we're not done with this yet. Already, we have some musical-scalar resources at our disposal.

Music Sprites: 1-D --> N-D Complex

We can build from *music sprites* as a conceptual-functional *grain* of the sound-field. This parallels the way that visual *sprites* (or 3d models/textures) can be used as the grain of the visual field.

We can think of a very simple music sprite corresponding to the double-event of *touch* and *release* on a zoomspace. As a double-event sprite, this model is symmetrical with other events where the 2nd is contingent on the 1st, such as Mario jumping and then landing (it is impossible to land before jumping; it is impossible to release before touching). Upon triggering each of these game-events, a music sprite triggers musical events at the same time. This could be

as simple as 1 sound effect for each event. Beep-bloop, done. This is basically how it's done in Mario, and in the sound design of many older games. The more modern approach is to have an array of sounds, such as to give repetition of the event-double a sense of variation. You could have, say, 8 sounds on each, and they could be triggered randomly. A lot of Pro sound design does this. Now, if tones are being used, maybe there are some melodic effects that we would like to *sequence* into play-- in this case, we could use fixed arrays to move through a pre-ordained sequence of sound events, as the game event-doubles repeat themselves. Thus, if 1 is *event1* and 2 is *event2*, and a is *sound_a*, etc., then we can sequence a melody in this way: *1a, 2b, 1c, 2d, 1e, 2f, 1g* ... or, given that 1 & 2 can be counted as the non-metered 'time signature' of this sprite, we can compose strings of melodies, e.g.: *ahhshhdgsgdgsgdgahhsggdgdgdgdgahhhhh*. As the string of events grows longer and longer, it begins to resemble a second kind of music sprite which is roughly *continuous*. A piece of video footage with an accompanying soundtrack is a good example of such a music sprite. You can put this musicvideo on loop, 5 seconds, and watching this loop for long enough, the image and sound relations will become so *tight* in experience as to induce an early kind of synesthesia. This loop already is a sprite-- it is common practice for 3d models to play out as loops, say when a character is running, or doing anything cyclical. It would be easy to accompany these animations with accompanying strings of 'continuous' events (for image, 'continous'=framerate, for music, 'continuous'=samplerate). This sprite, now, can be surfed in a variety of ways. We can slow it down or speed it up, with the soundimage behaving as *one substance*. We can hop around in the sprite, like clicking on the video playback-position bar, hopping or scrubbing from event to event. When we hop from event to event, the sprite takes on the quality of the previous example, the wholly-discretized 'time-signature'

Needless to say, all of the mechanics of the NFPs can be thought of in terms of their accompanying music sprites that we imagine for them, but the composition of the sprite is going to become increasingly complex, and it will maybe prove more useful to think of the sprite in terms of *music substance* or *organism*. But the sprite-organism double is not itself defined by a strict line. Scaling manipulations were already present in the early example which mapped a double-event to a *longer* string of melodic events. As the music sprite enters the shifting contexts of the game, it becomes increasingly apparent that these 'longer' strings will themselves need to be contingent on

the particulars of the situation, which chunks the ‘situation’ (or *local possibility space*) into a kind of *object* itself, or an index in the array, another level of hierarchical spatialization in the music space.

The scaling design of these organisms, then, become something of a practical necessity when the dogma ‘1:1 relation between game events and music events’ is followed as law in the zoomspace. We will, thus, need to revisit some of the ways in which music has *always* been a scaling thing, viewed from a variety of hierarchical levels.

Music and Scale

The mechanics of *harmony* are already concerned with scaling relations. The unison is scalebound, 1:1. The octave is a ‘zoom’ of an order of magnitude, 2:1. *Scales*, in the musical sense, play out on the continuum that stretches between discretized orders of magnitude, the fifth at 3:2 (3:1 reduced), etc. The method of *just intonation* follows the integer series of harmonics from 1,2,3,4,5,....*n* and maps early-*reduced* members of this series down onto an array of stepwise ‘rungs’ carved into the continuum between octaves. These rungs, of course, can be sequentially ordered in any way, even if there has historically been preference for tones of low-integer series members. The mathematicized Forms of these relations all feature prominently in Pythagoreanism, from the source, through Plato, the medieval church, etc. In the soundings of these integer-relations, we can experience something of the subjective aspect of number, and make some intuitive sense of the possibility of the two-faced mathematical-musical ontology that has characterized the systematicity of P & beyond.

Tone, of course, is not the only scaling thing in music. At least as early as Henry Cowell's *New Musical Resources*, zooms have been allowed to flow quite freely. Cowell identifies the time-structural scalar relationships between pitch/harmony, tempo/rhythm and form. The unison/octaves which produce the 1:1, 2:1, 4:1 (etc) harmonic ratios are heard as pitches/unison harmonies if they pulse fast enough, & as evenly-pulsed motor boom-chick-boom-chick rhythms if slow enough-- "a musical unison is nothing but a metric groove, only faster." The perfect fifth, the 3:1, produces that first novel harmonic in the overtone series when pitched, produces the 3:2 groove when rhythmic, triplet on top of duplet. Polyrhythms become increasingly complex as integer

value increases. It is possible to describe *all rhythms* in terms of a drift around the time-stretched overtone series. Pitch is quick rhythm which is quick form. There is a very good study of these relationships in the first parts of W.A. Mathieu's *Harmonic Experience,* a study into *becoming* the relationships, resonating with them, living *in* the harmony, rather than merely theorizing its numbers it from the outside. *Immanent* --"remaining within"-- harmony.

An interesting process for exploring these pitch/rhythmic harmonic relationships is to load a thin & short sample (evenly pulsed, or one-off, for clearest effect) into a sampler controlled by a keyboard, set it looping, and hold down different combinations of keys, sounding different intervals. You will hear the pitched intervals happening simultaneously with the equivalent rhythmic intervals. All of the (relatively) consonant intervals have grooves that are not-too-difficult to get accustomed to, and these set new flows in motion -- I'm not aware of a significant body of music that puts these shifting rhythmic spaces into play, this would be a new kind of multi-scalar shifting possibility space in virtual-music form.

Beyond pitch/rhythm number-identity, we can continue with these scalar ideas divorced from the harmonic series and expanded further, in our experience to that One piece which is all the pieces we've ever heard, or zoomed outside of the body to include societies of music, etc. This is done well in Erik Christensen's theory of *The Musical Timespace*, in Curtis Roads' study of granular synthesis, *Microsound*, in Harper's *Infinite Music*. Each of these brings some unique perspectives to the concept, all useful for studies of the zoomspace paradigm. But let's stay with the zoomspace for now, drawing-action as playspace, and picture-object as played space. Looking at particulars across scales, let's see if we can find anything.. As a guiding metaphor, let's make a little division in music space -- where mechanics, rapid time-structured affordances, are considered as *instruments* in a piece of music, whereas the space these instruments place us in, are themselves part of -- these are the *compositions, notations*. Of course, these concepts are ultimately dissolved in videogames, but for now, it will be a useful model for conceptualizing ways that spaces can be configured/re-configured, made context-sensitive, etc.

Touch-Drawing: Comb and Smear

To reiterate some of the ‘music sprite’ ideas in the larger context:

Drawing a line, a scribble, whatever -- this is the first action that we perform, and the bridge to the legacy of pen/paper. I think there have been programs in the past, like KidPix, that scored drawing actions with cute sound effects. The Noby Noby boy iPad app does this some, some nice squiggly synth movement accompanying the line.

When we’re drawing The main events we're interested in here are (1) CONTACT, (2) PUSH/PULL, & (3) RELEASE.

(1) & (3) are discrete events, we could use 1-shot sounds for those (or arrays, as detailed in the ‘music sprites’ section. (2) is the smooth movement itself -- there are a number of options here. The simplest would be a simple loop, no relationship to particulars of movement. Of course, we could take speed and direction into account, too, could create a tone-painting surface like Mike Rotando and Luke Iannini's *Artikulator*, also on the iPad.

Now, keep in mind that all of this can be *context sensitive* -- it will behave differently based on the situation. Maybe there are lines underneath the drawing-line already, colors, object, spaces. We could do a whole KidPix world, a study in musical level design, where the only interaction is the contact-push-pull-release of drawing, but where this undergoes substantial changes/transformations as time progresses, both player and space actions as progressive forces, *moving us along*.

TouchZooming: Pinch and Spread

The zoom processes, when extended smoothly & indefinitely, are the core mechanics of the zoomspace paradigm. In the case of *infinite sketchpad*, Pinch and Spread are used, as is paradigmatic in google maps, image viewers etc. Other automatic forms could be used, as well, such as smooth-trigger in *Infinite Doodle,* and the particulars of the feel will necessarily be important to account for in determining the feel of the music.

But for now-- *pinch and spread*.

Here are a few approaches. For each example, the processes described could either affect only individual components of the scene, or they could affect the scene as a whole. A balance between the two is probably most promising.

1. *Shepard space* -- A Shepard tone is a tone that seems to ascend or descend infinitely. It is constructed of of a dense texture of many voices moving in parallel motion with their independent volumes fading in and out in a wave of staggered phases. Traditionally, I've heard these in 2 varieties: the first basic version is a stepwise scale, the second is a continuous bend. Either version could be put to use in zoomspace. Zooming in causes the pitch to either ascend or descend, with respective associated feelings of *ascending-inhale* & *descending-exhale*. The mapping of pitch-value to zoom-value will feel considerably different based on whether ascent is paired with zoom-in or otherwise-- but neither mapping is 'correct,' both are valid. They can even reverse the mapping during play, according to the 'desires' of the space. The rate at which pitch changes will have a strong affective value as well. This could be mapped, say, to the density of details unfolding (intensive dimensionality), something like Mandelbrot's fractal dimension D may be a good numerical guide to have on hand in the search for this value and its rate of change. We can imagine that when the rate of visual change is low (during a zoom of a constant speed, based on density of unfolding detail-attractor), the rate of pitch change will feel most intuitive if it's low, but of course it can be mapped as high for an uncanny effect.

2. *Grain clouds*-- The mechanics of granular synthesis consist of decomposing a recorded object by cutting it into a bunch of very little samples, which can then be re-composed according to any process. The basic method of time-stretching and compressing *without pitch-change* is possible using granular dissolves. Interesting effects are possible manipulating just a few parameters-- sample window, grain size, read speed, grain attack, grain release... Granular synthesis is a terrific way to explore familiar audio files, to find new worlds in them-- I have used Marcos Alonso's *Samplr* for the iPad, which is a terrific introduction I think to sampling in general, and to the *materiality* of the recorded sound object-- it is concerned with *grains* in spirit, but is much less analytical, more physical-embodied. There is a mode of play that I like where you set two fingers down on a waveform and the region between them loops. If

you bring your fingers closer and closer together, the loop speeds up and up, and finally as your fingers are nearly touching, the speed, which has already become a very fast pulse, undergoes a sort of phase transition as described in Cowell's NMR, and begins to sing a a tone whose timbre is determined by the content of the sound file. With your fingers this close together, you can scrub around the file, and explore this hyper-zoomed realm, where rhythm has become tone. Chris Carlson's *Borderlands* is another great iPad granular space.

3. *Simple* -- maybe the zoom mechanics are not scored throughout with such 'parallel' musical functions as these. Changing pitch/stretch-value so often will be very dramatic after all, given the amount of zooming we'll be doing. Simple examples, i.e. the 'sliding textural planes' discussed below

4. *Assemblage* -- Maybe the most dynamic method, though the most work-intensive also, will be to use a combination of these things, to choose the sound mechanic based on the visual mechanic and their relations--

Played Space Composition Objects

Now let's turn our attention back to the *fixed* picture-object itself, the played space, as opposed to the played actions of drawing in/with the playspace. This is the *space* of image and of the sound that will be operated on by the zooming mechanics. The played space, must in some sense function as a musical 'bed', like the background music that sound effects are laid on top of of in a conventional sound design. Our understanding and experience of the picture-object concept has an ambiguous meaning in the context of *IS*. In its fixedness, we might say that it's formally of the same type as the Kandinsky pictures we just looked at, or with detail operating across greater orders of magnitude-- It is a picture object, simply with a higher fractal dimension. If we were to think of it this way exclusively, as a *global* picture object, we would be ignoring perhaps its most important phenomenological aspect -- its *locality*, its containment within the *frame*, which is always at a constant scale relative to our own material presence in the world.

Despite all the scalar shifts of the picture-object, the scale of the *local* picture-object/screen-object is always constant in relation to our presence in the world.

This is sort of a tautology, but it seems important. We'll be hearing the same things in music -- that despite the "into an object"/"away from a field" sensations, and despite the loopy scalar techniques that we have at our disposal, the sound will always be perceived at a *local* scale, just as the pictures are. It is always HERE & NOW.

Certain examples might make this more obvious than others. I guess it's possible that there's an elegant "solution" to the design problem of scalar music space zooms, but I suspect there won't be -- because of this scalar presence that we *always* feel, I don't think it's of a huge concern how we manipulate the materials formally. For this reason, I've provided a few methods we might use. A composition need not be limited to using just one of the methods, thinking one is "correct", the others being less realistic or whatever..

Sliding Textural Planes

So, we have our played space, a picture-object, a score, to turn into a musical playspace: one of the most simple treatments here would be to layer a bunch of loops and alter volumes dynamically based on the content of the frame, picture-object music-psychogeography -- objects within the picture can "emanate" fixed musical modules, based on how close we are to them. Loops fade in as we approach, they fade out as we leave. We can imagine a tool with which we could outline the boundary of an object, as if to detect collisions with it. There could be two dimensions of "closeness" -- (1) the first closeness measurement defined more generally, the presence of the object in reference to scalar locality-- how big it is on the screen. If we're zoomed out too far, it won't be visual/audible, likewise if we're zoomed in too close, though we'll technically be "inside" the object, we'll no longer perceive it as such (though maybe it remains as a low rumble, magnified past the threshold of clear audibility). (2) The second closeness measurement defined more particularly-- the placement of the mouse, or our finger, some attractive presence, singularity, avatar of the self (or 10 of these for our 10 fingers). Though the language there focuses on scoring discrete visual objects, we can apply this to any discrete subset of the space, and an a corresponding scalar range. We can thus score transition liquidations, "zoom objects," just as we would discrete objects. For this first example, the only sound variables we'll

be manipulating are volumes. Formally-- texture is variable (relations between parts), while all other dimensions controllable in software (i.e. pitch, DSP processing, etc.) are constant. And yet thanks to the *virtual music spaces* we enter with every sound object, we experience variable rhythm, harmony, etc. as well.

Harmonic Maps

Say, the circle of fifths, as a repeating pattern of zoned neighborhood. C is near F is near Bb is near Eb, etc, and these are spatialized on the map. If we built "level designs" in a fractal space (drawing them in I.S. or the like), we could score them like this. We would benefit from the formal properties of the fractal space which allow us to switch possibilities, moods, very rapidly, or to "tunnel" into them indefinitely-- all the while experiencing smooth transitions. Neighborhood ‘nearness’ can be near-as-in-PAN and near-as-in-ZOOM.

Pitch-Shifts, Harmonic Drifts

But this would not be the most effective solution in "hugging" the systemic layer, and the sense of possibility we feel in it. Indeed, we do not experience the "volume" (or "pitch" as Kandinsky would suggest) of a figure/shape that is very small as similar to when it has become so large that is is the new ground. Especially when we experience a low fractal dimensionality (low detail), and zoom into this, a "surface" -- it's quite clear that we're not merely moving past something, but moving deeper into it. What does it mean to move deeper into a sound? Pitch-shifts provide one way we could approach this problem. A "deeper" tone, this would be the most direct application of Kandinsky's theory. As a detail grows from a point to a space that covers the whole screen, so, too, the pitch can bend from, say 2x to 0.5x. Objects could all have associated files that play back at the variable rate as determined by its zoom-level. We would aim for a strange kind of Shepard tone effect, but built with samples.

Dissolving Agent

Maybe we're starting to imagine an ideal.. some utopian zoomspace where the bottom-up productivity of drawing-instruments could function as the architectural sculpting tools of manifold complex musical playspaces, where

all the different kinds of played spaces that we're able to draw in *IS* would produce structures of equally unique pieces of music that we could then travel through, rediscover as an explorative playspace. Of course, we should allow our minds to wander as far as we like. But we should also be weary of settling on any sort of top-down design as a "solution" to the zoomspace design "problem." It would be very difficult to create an expressive space by such means. It is in the particulars, the constructions from the bottom, that we are tuned into the playspace's immanence. A top-down approach that conceives of all possibility within a tightly bounded design-space might create a very interesting synthesizer or DJ-ish tool/sampler, and in this sense an expressive space -- but it will not *dissolve* these categories into a liberated *space-as-player*, a space which itself plays smoothly -- this is what we're after.

“Gan” & The Instrument-Composition Strange Loop

As it is traditionally imagined, instruments are used as timbre-modules in a composition -- composition exists at a higher structural level than instruments. Our conception of this relationship can be inverted, though -- by improvising on an instrument, a composition is produced, an object, a line of information, which is a particular instance of the instrument-as-space used in assemblage with ourselves as player. Computer music complicates the issue further. Now we can use compositions as building-blocks to make instruments. This, in a number of senses.

Adam Harper's virtual instrument "Gan" touches on similar territory.

[GAP]

Societies of Strange Loops

Gan is played on an iPad, and it seems pretty clear that Harper's future digital materialist Pythago-ludi-mysticism can be read as an instance of a New Fractal Playspace. A kind of everything-game, a high-level design image of musical creativity itself modeled as a game, assemblage of individuals, collective, technologies. Details are mostly avoided "I wish I could remember the rules of Gan", but it seems unlikely that they would be anything other than *drift tactics*, dimensional shifts, these things we've been concerning ourselves with. Music walks lines, people walk lines, Danzig draws lines,

that's all there is, there is just the question now, of how these lines move, how they become points, objects, spaces, morphs.. We can return to Klee's Notebooks for a massive index of potential drift tactics. We could use these to build a proto-Gan, we can imagine the material on the screen and the musical material drifting, and also imagine the movements of the players drifting, these movements all connected to one another, actual-virtual immanent flows, turning music into space and space into music, again and again. Indeed there is nothing *but* drift tactics that could possibly model this situation, if drift tactics is understood to mean to movement of free variables, the re-structuring of dimensionality.

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Virtual Extensions 3:
Seeds, Petals, Rhizome, Wild . . .

I. Bottom-up

II. Top-down

III. Planes of Correspondence / Cybernetic Networks

IV. Musick & Chaos

Virtual Extensions 4:
Mind / I Am A Strange Loop

The ideal space is attempted-- a bastardized model of Inorganic Creativity. The space is an artist with a perceptual field which is limited to *our input.,* and we are responding to its skin-- we are constructing its subjectivity via its 'sense perception' in Real Time alongside the skeletal and nervous mechanics of the space which are its own internal 'sense of possibility', and indeed 'sense of necessity.' We are the 'external world,' while the line of information that it computes is the *internal world, THOUGHT*. "I Am A Strange Loop", a zoomspace which loops back on itself-- these are Hofstadeter's toy domains -- fluid concepts and creative analogies-- we have filled the space with an *excess* of potentialities. By all existing standards, this is nothing but a MESS of an UNREAL game.

Society of Mind

We not only are composing spaces with One Strange Loop, but with whole societies of strange loops. There is no reason not to. Any tunnel can be counted as an Ouroboros, its mouth eating its tail, once the 'copy+paste inside' mechanic is allowed. The strange loops morph with time, with iteration, with space. As above so below, an alteration of the top travels down and is manifest in the bottom. As below, so above, an alteration of the bottom travels up and is manifest in the top. This society of strange loops, or ecosystem (to avoid excessive anthropomorphism) of strange loops, is defined by the 'accidents' or *magickal contingencies/co-incidences/ synchronicities* of play, such that even 1 minute into the game, the situation has become so complex that it is absurd to call it strictly deterministic. The computation is deterministic, but from the outside, giving shape to the loops themselves... If we want to *count* this as determinism, we will need to count the human player's flesh and environment alongside the game as One with it. "The basic ground of existence is maya-lila, an ongoing construction-destruction, destroying-creating ... Am I trying to reintroduce some kind of transcendent force or energy? That question can't be answered yes or no, because maya-lila swallows its own tail (tale). Each culture, even each individual, creates her own maya-lila even as she exists within and stands on

maya-lila. Maya-lila is not reducible to logic of either/or choices."[82] The Ouroboros, which has accompanied us for so long, the snake eating its tail, or the 'strange loop' in Hofstadter's language, his model of Mind, of Creativity. We are *manifesting Mind* in constructing computable spaces out of such strange loops (and whatever else! the strange loop of *PLAY* itself exists prior to the zoomspace's appropriation of the form, too).

Zoomspace Eats the World

In these speculative extensions of the zoomspace paradigm, carried far out into the virtual sense of possibility *ad absurdum*, it has been shown that it is possible at a high-level to think such ideas as these that transform the sketchbook into a creative ecosystem/society describable in terms of its tangled hierarchy, parts eating wholes, etc.

That it is indeed possible to do so in a very intuitive way, as an imaginary game, when all dimensionalities are reduced to the N-D intensive time-structures playing out on the 2~3-D canvas, and it is assumed that all dimensionalities have an infinite capacity to affect one another, to *listen* to each others' variabilities, and to respond in turn, to convert *accident* into *essence* (to eat up a variable and *count* it as a constant)-- for parts to eat wholes (which are themselves parts), for generative rhythm-clouds to be *induced* from input streams, etc.

Implementing such designs is another question entirely, and would without a doubt prove quite difficult! But this is a 'simple' matter of time/resources, etc. Though I do believe these structures all computable in some sense-- the 'design fiction' here is *far* from being realized, but at least in theory, something following its lead could happen (of course, the particular would be *so* different from the map laid out ahead of time).

What a gift! In a game structure with goals extrinsic to the player's own (a Normal game), balancing these architectural fantasies would be a severe challenge, perhaps insurmountable if we wanted the optimal play conditions to be balanced as well, with interesting puzzles and other such obstacles that

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[82] from Schechner's *Playing*

come ready-made with satisfying solutions largely predicted in advance by the game's author. But if we set out to create a playspace with no purpose but to engage the material of the space in dialogue and transformation, to allow the already psychedelic affective powers of the *Infinite Sketchpad* paradigm to carry the "meaning" of play, one which is constructive, always changing, rather than proscriptive-- in this case, all changes would be welcome, anything would be possible, there would certainly be no right or wrong approaches, we would be guided by our sense of played harmony alone, of tension and release.

What we are left with, at the end, is a situation that has grown out of something *other* than videogames (the sketchpad), but has grown into something allowing for more or less *all* of the mechanical variety of 'the space of all possible games' (why not?).

We take two main principles from *Infinite Sketchpad* and imagine them used as the generative *seed* of a new class of designs:

1) *Drawing lines* as the 'player character' of a playspace, with at least some persistent materialization of paths that have been traced-- paths that leave footsteps. Lines are pictorial, musical, conceptual-mental, informational-- all at once.

2) *Free scaling* control of the space, allowing for the potential of infinite zooming in and out of all game elements, the upper and lower bounds of which can be avoided by building strange-loops, inner folds into the design.

Aside from these two novelties, which naturally open up into a massive space of possibilities, there are no limits here suggested-- even the whole class of normal games-- puzzle/fighting/racing/strategy/etc-- could be implemented using this framework, tho admittedly the *messiness* of the lines and the disorientation of the zooms would require total re-formulation of these old styles in order for them to continue working.

We have returned to the image of the *phase space*, or Global possibility space. *All possible* _____ . (All possible videogames). It is worth straying away from the local SPS, even just for a moment, to feel the grandeur of this thought, which may or may not be nonsensical.

Player-Model: Time and the Gods

From Coyote, from the Tortoise-- we have arrived at a fluid polytheistic model where there might be *hundreds* of gods, manifest in the gamespace as *processes*, external as well as internal, as functional planes of consistency, modes of playing, of reacting, forming ultimately what can only be felt as an inconsistent multiplicity. New mythological relations between computational parts-- but *beyond,* too. There's no sense in making any pretension as to the reality of gods in game-space that are not immanent in the Real Time substance of the environment itself. The god that judges you 'win' or you 'lose' is not much of a god if it shows up only for that bifurcation at the end (though it is a god nonetheless, simply a weak jealous God). We cannot even be so confident as to convey anything like the Egyptian or Greek gods at this point. We need very simple gods-- of harmony, of chaos, of scale, of variation, etc -- but not even reducible to these names-- the gods are Actual, and such, tho the old names will point to clouds of concepts-- the new gods, as gods, will remain unnamed. In the unnaming, the gods, which are implemented as *objects* in the game, can begin to become concepts in us. The gods must each be contingent in our experience even as they are potentially eternal in their actuality. But perhaps this admission would be a mistake... Each game deserves its own Pantheon of Gods, which are defined by the cyclic counting-uncounting as regards the *process* of play-- but this is not to say that they should be oblivious to the gods of other games-- or to the existing gods *outside of these games.*

Finally, there is a desire to achieve a Oneness in a given work, and this is not something to be lightly brushed away as old fashioned, One-obsessed. It is the feeling for the integrity of the object *as eternal object*, as timeless even as it is in time... Plato's God builds from chaos, & models creation on the Eternal Living Being. This ELB is prior to God, who is the source of valuation, significance, a vector toward the Good, but is in a sense different from the ELB. If there is a Universal Monad, then, a God in which we can

say all the gods are immanent, and which is immanent in all the gods-- *this God cannot be the same as the consistent universal Top-down description of the code base*. This is the game object, but it is not the eternal living being-- This Being must be immanent in *us*, the players, as much as it is immanent in the machine. It must be Real but not actual, Ideal but not abstract, a Bergso-Deleuzian virtual which has nothing to do with our 'virtual reality' insofar as it is beyond our functional analysis and is likewise beyond our phenomenological-conceptual analysis. It cannot be fully accessed by each of these methods on their own, though the the methods can illuminate. There is no maximum intensity of *luminosity*. It cannot be fully accessed. The God we create is withdrawn. It is eternal, it is One, but as a *one*, it is Not. And again, this Not, this Void, is not to be read as a Negative *nothingness*, but rather as a creativity, a potentiality..

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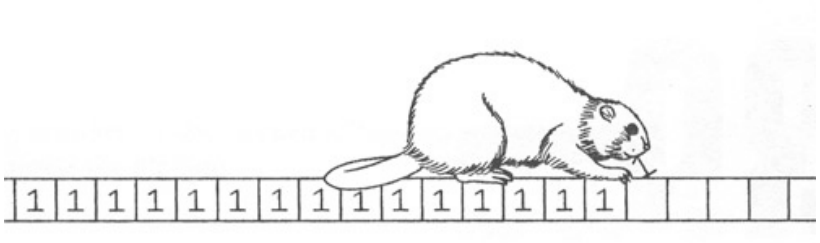
Part IV:
Simulation & Ilinx



"Krishna's playmates come running to tell his mother that the naughty boy has been eating dirt. When she confronts him, he first denies the charge, but finally opens his mouth for her to see. Immediately she falls into a swoon, for inside Krishna's mouth, she sees the entire universe swirling."[83]

[83] Lewis Hyde, from *Trickster Makes This World* (p. 293)

1. The Simulation Hypothesis
2. Pseudo-Science & Pseudo-Myth
3. Inorganic Creativity & 21st Century Renaissance
4. Simulation & Ilinx
5. SPS & Psychedelic Realism
6. Prima Materia: SPS Spacetime Realism
7. Prima Materia: SPS Haptics / Psychedelic Realism
8. Mathesis Universalis & The Glass Bead Game
9. Hermes' Gift

This final section is incomplete. It requires further studies. It will take off from the end of the previous section, which gets so ambitious with its teetering on the edge of 'mind-manifesting' computations that any implementations of its imagined designs would be un-realizable in code without *significant* work that could only be considered a high-level sort of science. I mention cellular automata, strange loops, etc., but this is to say nothing about the probabilistic neural nets and chaos algorithms that would really give a properly 'mental' character to space-as-player designs, as consistent with the work of other... 'game designers'.

Psychedelic Realism is a realism of Mind-Manifesting form. Such a realism is the only way to make sense of the playspace as, itself, a player.

There are sciences of Mind, of Chaos, of Situation that cannot be ignored if videogames want to take themselves seriously, simply because these sciences, insofar as they work with computational models, are dealing with *the same materiality* as videogames themselves. Videogames should be actively striving to be at the forefront of the computational-simulationist sciences, such as those described by Manuel DeLanda in his book *Philosophy and Simulation*. DeLanda's work was the first in which I encountered a clear obsession with 'possibility spaces' outside of games.

DeLanda does not consider the *qualitative* sense of possibility, however, or the Real Time implications of *shifting possibility spaces* which allow for a double facing quality-quantity, as *myth, music*. Pursuing such descriptions will be unrealizable without significant work that could only be considered *intuitive-artistic*. Pseudo-science will be unavoidable. Navigating possibility on the basis of our *interest* in possible outcomes, rather than on any strict 'rules' as to what is a more optimal path... this is what videogames allow for that the funding patterns & desires of academic/institutional "Royal" sciences will not allow for.

Roger Caillois' pairing of the play-aspects Simulation & Ilinx must be revisited. Ilinx is what allows us to shift from a Realism of Representation to a Realism of MOTION.

The sciences have dealt with *simulation* (functional models) at the expense of *ilinx* (vertigo, motion aesthetics). And the (radical) arts have dealt with *ilinx* at the expense of *simulation*.

C.P. Snow's idea of the 'two cultures dissolve' is well-known, is not original-- but will prove necessary as a 'videogame pragmatics' in years to come. The pre-modern, *hermetic*, scientific viewpoint will likely need to be revisited (by that name or without name), and the *toolkits* of the sciences will need to be adopted/warped.

Conjectures and Refutations: The Growth of Scientific Knowledge (Harper & Row, 1963), Popper writes, "Science must begin with myths, and with the criticism of myths; neither with the collection of observations, nor with the invention of experiments, but with the critical discussion of myths, and of magical techniques and practices. The scientific tradition is distinguished from the pre-scientific tradition in having two layers. Like the latter, it passes on its theories; but it also passes on a critical attitude towards them. The theories are passed on, not as dogmas, but rather with the challenge to discuss them and improve upon them."

Go find the "Homeric Hymn to Hermes" to read about music's origins. *Hermes is a thief*, and the *prima materia* has always been found in mud/POO (shit). ~ ~ ~ ~ ~

Acknowledgements

These ideas would be nothing without the practical experiences I've had working alongside others more knowledgable&capable than myself-- friends, collaborators from whom I have learned more than from anything in books... I remember first discussing the idea of a fractal music playspace with Josh Bothun sometime in 2010, between working on *Ada* and *Homo neanderthalensis* with him. Working with Shawn McGrath on *Dyad*, there was constant speculative talk of a Fractal Game / RPG / Psych-everything, which probably provided the most explicit pre-*InfSktch* drive.. While working on *Proteus* with Ed Key, design conversations were often focused on sculpting out a 'Realism' which respected a different Real than that of the graphical realisms most commonly going by that name-- the *natural* spin and ecological-cosmic scope of the fractal ideas cannot be divorced from that collaboration. Working with Douglas Wilson has been a gift in allowing the body to enter into the computational playspace-- playing *Beacons of Hope* in the dark with big beanbags, *Dog the Wag*, getting a little bloody at GDC (is best like that). Doug also instilled in me a healthy skepticism of game formalisms. Working with Fernando Ramallo on the 18-D *Panoramical* has been a perfect compliment to this writing project, being as it is perhaps the most straight-forward articulation of the 'aesthetic manifold' model of playspace-dimensionality, and of the tightly-coupled sensory modalities/ synesthesia which can play out in a *formal* field of this sort.

Outside of games-work, conversations with David Bourgin on cognitive sciences etc have inspired me to go further in stretching out the practical domain of these ideas than I'm prepared to do (Simulation & Ilinx will follow from here). Talks for almost a decade now with Cooper Otte on the *non-separateness* of play have opened up the Situationist currents as they point to

a radical politics and radical cosmology of playing, of the Adventure of ideas, etc.

Finally, conversations, improvisations and branding work with Bryan Sonderman at zero-growth tech startup Ilinx Group provided so much of the mythic energy and the *warring spirit* that allowed the project to tunnel and tunnel as it did.. *Research in Motion*. RIM was a gift from Coyote, or Whitehead's Ulysses-trickster-God, player at the edge of chaos.

Many other wonderful folks from games & related communities have provided a tremendous amount of insight in conversations, sometimes short sometimes long, and in their work-- I have learned and appropriated concepts freely (I hope that's okay!), from-- Stephen Lavelle, Adam Harper, Liz Ryerson, Michael Brough, Erin Stephens-North, Ian Snyder, Mattie Brice, Ian Bogost, Eric Zimmerman, David Calvo, Phoenix Perry, Jonathan Brodsky, Chris Bell, Ben Cerveny, Daniel Lopatin, Robin Arnott, Evan Balster, Mike Rotondo & Luke Ianinni (life-swerving intro to *InfSktch*) and Tom Lieber. & Many Many more!

Pseudo-Hermes is a fiction, if you hadn't guessed. Pseudepigraphical, or falsely attributed, writings are pretty common in old alchemical research. All the Hermes Trismegistus stuff is contrived in this way. I put myself "I" into the writing, so it was difficult to be wholly anonymous, but it felt like the outside influences I sampled deserved a composite mythical-authorial crediting of their own. These were *not my ideas*, they were *stolen*. Hermes and Coyote are of a kind, a mythological *entity* that exists across and between many texts. There is a worldview which exists as an uncountable cloud around this mythology of Hermes. Any One author is already multiple, counted as one-- I merely counted some of these existing ones as a yet greater one... Just as we don't count our muscles and diet as 'authors' of a given work we have produced (despite there being some real truth to this), I did not count the Parts of Pseudo-Hermes, except in the text itself. The whole is the cloud. *This IS the author.* I came into contact with it via R&D at Ilinx Group and a variety of other researches coming into contact with one another all at once in an insanely consistent-feeling sort of synchronicity, *co-incidence*. Deleuze was the first Organ of Hermes I encountered consciously as such,

which set out the ‘plane of consistency’ the historical hermetic structures would later seem to be poured into, to press up against and re-shape. The Organism or Idea which is Hermes is the ultimate plane of consistency or *plane of Immanence*, which is approached in life and art and *study*, the *love* of learning for itself, as play, a *game*... “The school of immanence’ describes that system of pedagogy which best *values the transformative capacities of Hermes*, the ‘organ of novelty.’ Many and all thanks to Hermes and the other spirits, to friends, to family, God, *void*. The parts are manifold, uncountable, but here is an attempt at suggesting some PARTS that can be found at your local library...Books are fun. This short bibliography does not list all texts cited, and it *includes* a few texts *not* cited. To best ‘replay’ the game that I played with this essay, one only need to tunnel into this list alongside daily drawing in *Infinite Sketchpad*, and to allow those tunnels to bifurcate freely, endlessly..

Alexander, Christopher - *The Nature of Order, I - IV*
Bailey, Derek - *Improvisation*
Badiou, Alain - *Being and Event*
Bergson, Henri - *Time and Free Will*
Bergson, Henri - *Creative Evolution*
Blake, William - *The Marriage of Heaven and Hell*
Blow, Jonathan - "Designing to Reveal the Nature of the Universe"
Blow, Jonathan - "The Truth in Game Design"
Bogost, Ian - *Alien Phenomenology*
Bogost, Ian - *Unit Operations: An Approach to Videogame Criticism*
Bohm, David - *Implicate and Explicate Order*
Brough, Michael - *Corrypt*
Bryant, Levi - *The Democracy of Objects*
Caillois, Roger - *Man, Play and Games*
Caillois, Roger - *Man and the Sacred*
Carse, James - *Finite and Infinite Games*
de Certeau, Michel - *The Practice of Everyday Life*
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