Projective Geometry and Schemas Theory

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The search for the mathematics underlying Schemas Theory has been going on for some time. A few mathematical candidates have been considered. But it seems that the best candidate has only recently turned up which is generalized Projective Geometry. In this paper, we will explore how Projective Geometry (PG) in general relates to Schemas Theory. Some time ago it was realized that PG is a good model of the concept of Essence. More recently it was realized that the W-prime model for the world implies an alternative W-double-prime model for the essence of the world based on PG. But this led to an analysis of the relation of PG to system and meta-system schemas and then an expansion to modeling all the schemas in their series. By performing that analysis it became clear that the generic PG accounted for the full range of Schemas which was a surprising but none the less satisfying result. We say *generic* Projective Geometry because we do not tie it to a specific projective geometry but rather the overall structure of projective geometries as such. Once we understand that PGs are a model for the expansion of the hierarchy of Schemas then many disparate elements of the theory fall into place. For instance, we have always said that Schemas were a projection that was ontological, and PG gives us a specific model of that projectivity based on what Panofsky, following Cassirer's lead, calls the Symbolic Form of Perspective. Since Dasein of Heidegger is the projective element which schematizes which was taken from from Kant who in turn to the idea of projection from Hume[2], then we get an intersection of the thought of

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[1] http://independent.academia.edu/KentPalmer See also http://kentpalmer.name
[2] Kail, P.J.E. *Projection and Realism in Hume's Philosophy*. New York, N.Y: Oxford University Press, 2010.

Heidegger and Cassirer to underwrite this insight into the mathematical basis of Schemas Theory in PG.

We want to quickly review in what way Schemas Theory is modeled on PG. First, we notice that there is a duality between Form and System that can be seen in PG. Form can be seen in terms of lines as substances and points as properties. System on the other hand can be seen in terms of points as entities within the system and lines as the relations between the entities. These are representations of the duality between points and lines in PG. But what really piques our interest is the fact that in the PG there is a line added at infinity with a number of points. This line appears as the horizon of the Meta-system as Scape, i.e. everything that can be seen in panorama from a stake at the center of the landscape. Systems have boundaries and Meta-systems have horizons. From the boundary of the System to the horizon is the Meta-system (OpenScape). Thus, the nondual nature of the PG between finitude and infinity catches our attention. Taking away the line at infinity and its points gives us the Affine Geometry in which the finite points are connected by lines. But we must subtract a line and the points on the line at infinity to get the affine geometry as a symmetry breaking of the PG. Once we see that Form (pictures that are two dimensional represent three dimensional objects in a perspective grid with vanishing points) System (non-infinite lines) and Meta-system (line at infinity with vanishing points) are related to different features of the PG then that sets us in search of relations to the other schemas. Strangely it appears that the Generic PG does have features that can be associated with the other schemas. For instance, we think of the monad and facet schemas as Matroids and Matroids give us a picture of all possible Geometries including affine and projective geometries as well as non-Euclidian geometries. Pattern appears as the organization of points and lines within at least a two-dimensional surface in relation to the Projective Plane (PP). Or the pattern could be just the points on a line. Patterns (lines and points in grid of diacritical internal relations) are made up of either lines or surfaces. Monads are either zero dimensional points or one-dimensional strings or lines. These monads are combined to give a pattern of lines connected by points that form a grid which is at least two-dimensional. But the two-dimensional Picture of a form represents a three-dimensional object. Thus pattern of the grid of lines and points on the lines supports the representation of the Forms. This pattern is such that in the PP the lines and points balance each other. It is in some sense a perfect pattern akin to a perfect number only two dimensional. It is perfect in the sense that the lines and points perfectly match each other giving a duality in which they can be substituted for each other without changing the basic structure which is perfectly diacritical: the points define the lines and the lines define the points perfectly with no deficiency or excess. Deficiency is introduced if a line with its points is subtracted which produces an affine geometry. As far as I know there is no excessive state that it is possible to be produced by adding lines or points. This allows us to see how Spinoza's Adequate Ideas and Leibniz's Complete Ideas might be satisfied by the Projective Geometry mathematical structure that is a general model for Essence. In some sense Projective Geometries represent Perfect Ideas. And this is close to what Hegel means by his Notion and his critique of formalism in which he says that the form and the content need to be reconciled.

We have already said how the PG exemplifies the duality of the form and system, and how the line at infinity is like the horizon of the Meta-system. At the next level we have the Domain which are

coordinated perspectives and the World which are the sum of all possible perspectives. It is precisely Perspectives that Projective geometries define. The dynamics of perspectives are encompassed by PG as the underlying geometrical mechanism that gives them a possibility of being represented. When we draw perspectives, the underlying form is given by projective geometry. At the next level up we have Kosmos and Pluriverse. These correspond to the background which is defined by the projective geometry. In other words, the projective geometry defines the points and lines in the two-dimensional representation of a three-dimensional object seen against the horizon. The object which is portrayed has details other than the lines that make up its three-dimensional projection in two-dimensional space. These background objects being outlined by the projective lines can be seen as taken from the Kosmos, i.e. the Universe of things portrayed. The Pluriverse is the combinatoric expansion to all possible Kosmoses. The Pluriverse is all possible portrayals of objects beyond the grid while the Kosmos is a particular portrayal of an object outside the grid from a particular point of view going toward a particular vanishing point.

A thought that I have had reading Deleuze on Leibniz in The Fold[3] is that the Monads which are metaphysical living conscious solipsistic atoms, like the subjectivities of Husserl in Cartesian Meditations can be modeled by the groupoid relations between perspective points and vanishing points. Deleuze talks about adding to Heidegger's 'being-in-the-world' another relation which is 'being-for-the-world' of the Monads that is different from Dasein's 'Being There'. Groupoids of order two have two versions one is a pair of points with arrows that curl back to point at their origin. The other version is a single point with two arrows that together point back to their single origin. These two order two groupoids of the Category Theory (non-algebraic) variety make up the standard diagram of the simplest possible groupoid which has two points A and B. There are arrows that originate in A and B respectively and return to their origins which indicate their functional identity. There are two arrows that originate in one and go to the other point that are opposite each other signifying functional exchange between A and B. The key is that in this exchange the two points A and B become functionally the same, i.e. identified, while they are different with respect to their functional self-identity arrows. This means based on the combination of the two element groupoids we get a model of same and difference at the same time without these views interfering with each other which is in fact supra-rational. This reminds us of the end of the Sophist Dialogue where Plato's Stranger talks about the five basic sourceforms which are entity (on which is ens), rest, motion, sameness and otherness. So, it appears that the fundamental order two groupoid has been a part of our Western philosophical tradition for a long time. It shows up again in Hegel's *Introduction* to Phenomenology of Spirit[4] and in Kierkegaard[5]. The point is that if we use the groupoid structure to connect the perspective vantage point and the vanishing point then we can think of this as a model of the relation of Heidegger's Dasein to the Monad in Leibniz. In other words, the Perspective vantage point (the position of the observer viewing the world) can be seen as being-in-the-world with respect to its role as a projector of the projection of

[3] Deleuze, Gilles. *The Fold: Leibniz and the Baroque*. Minneapolis: University of Minnesota Press, 2012.
[4] Hegel, G W. F, A V. Miller, and J N. Findlay. *Phenomenology of Spirit*. Oxford [u.a.: Oxford Univ. Press, 2013. https://www.academia.edu/35992276/Hegels_Groupoids
[5] https://www.academia.edu/9911997/Kierkegaard_s_Synthesis_In_Relation_to_the_Foundational_Mathematical_Categories

the world which is the definition of Dasein. Here the paradox is that unlike in Cinema in which the projector and the viewer are two different things, in Heidegger's model of Dasein the projector is also the viewer within this strange twist on the normal cinema structure. Dasein has a view from nowhere upon which we build up our views of the mundane cogito ego of Descartes and the transcendental ego of apperception of Leibniz and Kant. In order to have the view the there must be a source prior to the differentiation of subject and object which Heidegger calls Dasein that is both projector of the world and also a finite entity that finds itself within the projection that it projected. Unconsciously as an ecstasy Dasein also projects the world that it then sees as an observer. Of course, Dasein as an individual is not alone it this he is an individual within a collective that together is projecting this world. But Heidegger focuses in on the individual who is differentiated from the mass of the Mitsein because each viewpoint is different within the collective that is projecting together. This collective called Mitsein gets reified by Heidegger into Das Mann or the They, sometimes called for instance by Lacan the Big Other. In truth the projection of the world is a communal project of the Mitsein which is unconscious and a shared ecstasy, and it is Dasein who finds himself consciously within this communally projected world. But when you simplify down to dasein as both projector and projected then this becomes a paradox. This is the paradox of Jesus as Son of God within the world being killed by Romans but who also at the same time is the Father of the Son who created the world for the son to be killed within. Hegel sidesteps this problem by concentrating on the third element of the trinity which is the Spirit, i.e. the community of the followers of Jesus purported to the Christian Church. The point is that Dasein is the setup that allows our viewing the world from a specific perspective from within the world, but which also at the same time is the projector of the world even if only partially and working with others. Dasein is being-in-the-world but as its finite source as well as being another object within the world for others and ourselves. But Deleuze in an interesting move in The Fold distinguishes the being-in-the-world of the perspective point from the being-for-the-world of the vanishing point. Using the groupoid we can bring these two points together as our A and B which are at the same time both different and the same. The vanishing point is where all the projective lines converge. If we think of those lines going through the point and out the other side then we it as a camera obscura and see that this opens up on an infinite horizon in which the lines continue to diverge just like the perspective point. The vanishing points are for-the-world in the sense that they exist only to receive all the perspective lines within the world that were projected by the perspective point. They exist there for the world as a sink into which all the projection is reabsorbed. The perspective vantage points are the source of all these lines of sight some of which may not be aligned with perspective lines. There may be a multitude of perspective points and a multitude of vanishing points. Lines of sight and perspective lines may cross within the representation of the world. But everything in the world is touched by perspective lines that are incident on the vanishing points. And everything in the world is visible from the perspective points even if they are not aligned with the perspective lines that vanish. It is the number of base lines and the number of points of both kinds defines the Projective Geometry that we are using. The smallest of these is the Fano Projective Plane which has seven points and seven lines.

A key point is that the space of the Projective Planes cannot fit into three-dimensional space without singularities and self-intersecting lines[6]. Three-dimensional space is not big enough to hold the projective space that allows it to be represented in two dimensions. This is a very interesting mathematical fact that we use to produce the aspectual field that extends the ideas of Lacan[7] and Zizek[8] about the anamorphic[9] objects and the registers[10] of Symbolic, Real and Imaginary. Basically, the aspectual field takes into account all the aspects of Being which include Real, True, Identity and Presence. This field has 18 anamorphic eventities and has six different triangles instead of just the one identified by Lacan and Zizek. The point is that the attempt to put the projective plane back into three-dimensional space which it is representing two dimensionally creates warpages and singularities that are irreconcilable and that produces the structure like what Merleau-Ponty and Deleuze call the 'Transcendental Field', i.e. the field of experience. So, something strange occurs in relation to the field when we try to reconcile it with normal Euclidian (affine) three-dimensional space of our world. But that is because the Fano Projective Plane is a model of the Octonion and that is the core structure of the Reflexive Social Special System. This means that an emergence occurs as we go up through the Special Systems[11] from the Dissipative Ordering Special System (Morphodyanmic 'Dissipative Structure' of Prigogine) that is negatively entropic to the Autopoietic Symbiotic Special System of Matarana and Varella[12] which is a (Teleodynamic) model of the viable existential living system. See Incomplete Nature[13] by Terrence Deacon for a similar picture of these two holonomic levels. These have various mathematical analogies that suggest that an autopoietic special system is just a conjunction of the dissipative special systems. But when we get to the Reflexive Social Special System we see that it is at the same time a conjunction of four dissipative special systems or two autopoietic special systems but it is also an opening of a space in which projective geometries appear such as the Fano Projective Plane, and this projective mechanism does not fit back into the three dimensional Euclidian space that it represents two dimensionally but rather produces a warpage which is the way that invisibilities hide within the field of visibilities within the Transcendental Field discussed by Merleau-Ponty in Phenomenology of Perception[14] and in The Visible and the Invisible[15]. This

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[6] https://www.academia.edu/9913285/Dreamtime_Structure_of_Inception

[7] Feldstein, Richard, Bruce Fink, and Maire Jaanus. *Reading Seminar XI: Lacan's Four Fundamental Concepts of Psychoanalysis : Including the First English Translation of "position of the Unconscious" by Jacques Lacan*. Albany: State University of New York Press, 1995. Lacan, Jacques, Jacques-Alain Miller, and Dennis Porter. *The Seminar of Jacques Lacan: Book Vii*. London: Routledge, 2008.

[8] Žižek, Slavoj. *The Sublime Object of Ideology*. London: Verso, 2009.

[9] Žizek, Slavoj. *The Parallax View*. Cambridge, Mass: MIT Press, 2009.

[10] Van, Pelt T. *The Other Side of Desire: Lacans Theory of the Registers*. Albany: State University of New York Press, 2000.

[11] https://osf.io/tw37d/ *Special Systems Theory papers archive*

[12] Maturana, Humberto R. *Autopoiesis and Cognition: The Realization of the Living*. Dordrecht : Reidel,, 1980.

[13] Deacon, Terrence W. *Incomplete Nature: How Mind Emerged from Matter*. New York: W.W. Norton & Co, 2013. Deacon uses the terms Morphodynamic and Teleodynamic.

[14] Merleau-Ponty, Maurice, and Donald A. Landes. *Phenomenology of Perception*. London : Routledge, 2014.

[15] Merleau-Ponty, Maurice, and Claude Lefort. *The Visible and the Invisible: Followed by Working Notes*. Brantford, Ont: W. Ross MacDonald School Resource Services Library, 2011. Low, Douglas B. *Merleau-ponty's Last Vision: A Proposal for the Completion of the Visible and the Invisible*. Brantford, Ont: W. Ross MacDonald School Resource Services Library, 2011. Barbaras, Renaud. *The Being of the Phenomenon: Merleau-ponty's Ontology*. Brantford, Ont: W. Ross MacDonald School Resource Services Library, 2012.

perspective on the transcendental field is then taken up and turned into Transcendental Empiricism of Immanence by Deleuze in <u>Logic of Sense</u>[16] and <u>Difference and Repetition</u>[17].

To return to our analogy we can see that if we connect though a groupoid a given perspective point and a given vanishing point and we call that the relation between being-for-the-world of Dasein and being-in-the-world of the Monad as a transcendental atom at infinity on the line that captures all the vanishing points then we have an interesting model using Leibniz and his <u>Monadology</u>[18] of the relation between the monad and dasein. Initially Husserl used the Monad to talk about the anonymous basis of subjectivity in <u>Cartesian Meditations</u>[19]. Then Heidegger took up this concept and called it Dasein using the existential terminology of Jaspers and related it to the projective process by which the world is thrown out as a singular horizon within which Dasein then finds itself. Merleau-Ponty then transforms this into the Transcendental Field[20] as he realizes that it must account for the implicit invisibilities within it. Deleuze takes over this project and continues to attempt to create a model of how we can have immanence that contains transcendences within it as part of it, without breaching the field itself. Deleuze follows Nietzsche[21] in this goal of achieving a philosophy of Immanence and uses Spinoza[22] as a basis for this approach. But then Deleuze appropriates Leibniz[23] again to offer a model for where these transcendences lie which is in the interior metaphysical realm of being-for-the-world which is the dual of being-in-the-world of Dasein. But actually, we realize that these two points, perspectival vantage and vanishing are tied together in a supra-rational way via the groupoid structure. The monad and dasein are duals of each other as the sink of the projection and its source. They are as seen in the groupoid structure from one point of view different and from another point of view the same. If they are interacting they are the same. Thus, for any given projective line that has its source in one and its sink in the other the two endpoints of the line are the same. But most projective lines are not the same as the lines of sight but rather these lines cross creating a grid within the world which is supported by the PG grid. But for points that do not share the same line they remain different. But this implies because PG is a perfectly diacritical system that we can produce a 2-groupoid (Groupod of groupoids) that synthesize all these paired points to produce a synthesis and this would be a model of the Mitsein. The groupoid is one of the few categories in mathematics that actually produces syntheses. That is why it is the basis of <u>Phenomenology of Spirit</u>[24] as given in the *Introduction*

[16] Deleuze, Gilles, Contantin V. Boundas, Mark Lester, and Charles J. Stivale. *Logic of Sense*. London : Bloomsbury Academic, 2015.

[17] Deleuze, Gilles, and Paul Patton. *Difference and Repetition*. London, UK : Bloomsbury, 2014. Hughes, Joe. *Deleuze's 'difference and Repetition': A Reader's Guide*. London [u.a.: Bloomsbury, 2013. Bryant, Levi R. *Difference and Givenness: Deleuze's Transcendental Empiricism and the Ontology of Immanence*. Evanston, Ill: Northwestern Univ. Press, 2008.

[18] Leibniz, Gottfried W, and Nicholas Rescher. *G.w. Leibniz's Monadology: An Edition for Students*. London : Routledge, Taylor & Francis Group,, 2015.

[19] Husserl, Edmund. *Cartesian Meditations: An Introduction to Phenomenology*. Lexington KY: Kluwer Academic Publishers, 2013.

[20] Smith, Daniel W. *Essays on Deleuze*. Edinburgh: Edinburgh University Press, 2012.

[21] Deleuze, Gilles. *Nietzsche and Philosophy*. London ; New York : Bloomsbury, 2013.

[22] Deleuze, Gilles, and Martin Joughin. *Expressionism in Philosophy: Spinoza*. New York: Zone Books, 2013.

[23] Deleuze, Gilles. *The Fold: Leibniz and the Baroque*. Minneapolis: University of Minnesota Press, 2012.

[24] Forster, Michael N. *Hegel's Idea of a Phenomenology of Spirit*. Chicago: University of Chicago Press, 1998. Taylor, Charles. *Hegel*. Cambridge: Cambridge University Press, 2006.

which is full of groupoid structures[25]. Using this model of the Projective Geometry we can reconcile Dasein as being-in-the-world as projective perspective vantage point with the Monad which is being-for-the-world as receptive sink for the projective lines. Because it is the sink for the projective lines at infinity it is metaphysical and it is also privy to all that is going on in the projected world via its pinhole camera. The projective lines go on past the monad as point and becomes the projection within its cave. The monad is the prisoner in Plato's Cave who never is torn out to experience the higher world of Plato outside the cave. Rather this prisoner goes deeper and deeper in the cave to visit the nooks and crannies and to see the cave art left there by former prisoners many millennia ago and who attempts to decipher the Signs in the Cave[26]. Pure Immanence implies that there are caves within caves within caves and instead of going outside into Transcendence we go deeper into Immanence. This is how we can think of the Anti-Platonism of Deleuze. And, sure enough Leibniz has Monads within Monads within Monads which are all windowless. But yet, within these windowless chambers behind their Baroque facades there is an inward projection of what is happening outside them. This is the indirect light that streams in through mirrors of the vanishing perspective lines from the outside that allow the monad some insight into what is happening on the outside from its own perspective. Leibniz appropriated the structure of perspective to produce his Monadology as an alternative to Spinoza's Monism instead exploring the possibility of a fundamental pluralism based on vanishing points. It should be noted that Leibniz was fascinated by China. And in Chinese paintings the perspective lines diverge rather than converge which is a dual with what we have established as the convention in the West. But we can see this as the view of the Emperor whose view of everything puts him at the center of everything, i.e. in the position of the highest monad. The Emperor is looking at things from the viewpoint of a vanishing point from which all the lines of the internal projection of what is happening outside diverge. The Emperor sits in the Celestial Palace and views everything that happens in China through a secret portal which means though his spies and his bureaucracy that acts for him and observes the nation for him. Because he was hidden he could be thought to have eyes everywhere. It was an interesting moment when the Emperor[27] actually was shown Films made in the West because that was a moment when there was actually a projection within a projection where the external world was seen in the Celestial Palace for the first time and the illusion that there was only China and the view from the camera obscura of the Celestial Palace of the Country was superseded by a view of the world outside China, just prior to its being overwhelmed by these outside powers that would divide up the spoils and impose opium[28] on China against it's will. In other words, in China we have a model in the Chinese State of what Leibniz is talking about in his Monadology in which the world is a synthesis of viewpoints and vanishing points. But this merely means that the Projective Geometry that became the standard for painting in the Renaissance that allowed three-dimensional things to be portrayed in two-dimensions became the standard for how everything was experienced which eventually led to the

[25] See "Hegel's Groupoids" by the author
[26] https://www.academia.edu/35046322/The_Signs_in_the_Cave
[27] Pu, Yi H, and Paul Kramer. *The Last Manchu: The Autobiography of Henry Pu Yi, Last Emperor of China*. New York: Skyhorse Publishing, Inc, 2010.
[28] Lovell, Julia. *The Opium War: Drugs, Dreams and the Making of China*. New York, NY : The Overlook Press,, 2015.

realization that Projective Geometry is an alternative to the Euclidian and the other Non-Euclidean Geometries. It just turns out that this type of Geometry can describe the Transcendental Field but also can provide the basis of Schemas Theory which is the projection of templates of understanding for the spacetime comprehension of things within the world but also gives us the basic structure of Language. The Logos upwells within us and it has a basic structure that can be captured by the hierarchy of the Schemas. But that same structure is the basis for schematizing all things encountered in the world through an a priori projection of templates of indelibility onto the things of the world. We need to phenomenologically establish what these various templates are, and we can look back at our tradition and see that various templates are specified. We advance the S-prime hypothesis which is that there are ten such templates for understanding the spacetime configuration of objects in our world. These are facets, monads, pattern, form, system, openscape (meta-system), domain, world, kosmos and pluriverse. The two on each end of this series are non-experiential, i.e. they are scaffolding and it is the central six schemas that describe experience directly. The S-prime hypothesis ties these two adjacent dimensions together in pairs going from the negative-first dimension to the ninth dimension. Each Schema can be a valid representation for two different dimensions. So, for instance, Form is seen as being two and three dimensional. Projective Geometries are a formalism for representing three dimensional things in a two dimensional medium as pictures and this is what appears in the Renaissance art that leads to realism in artistic portrayal of the world. Form is the fundamental Schema in our tradition. Only more recently has structures of Patterns and Systems become ubiquitous schemas as well which are formally used to understand things in the world. Recently, this has given rise to Systems Theory and Structuralism as two ways of attempting to understand the world that are different from Formalism that has dominated up until the twentieth century. With Schemas theory we begin to consider what all the schemas might be that are used within the Western tradition to characterize the organization of things in spacetime. We advance the S-prime hypothesis as a challenge to bootstrap this search for the fundamental set of schemas within our worldview. But even if the Schemas Theory based on the S-prime hypothesis is a rough guess it brings out all the questions that we will need to answer if Schemas Theory is to make progress. Since arriving at this theory I have been searching for a mathematical basis for it. The first example of such a basis was found in the realization that this schematic model could be generated using co-recursion within Pascal's Triangle as a basis for generating the schemas. But this was dissatisfying because it did not lead to a limit to the series of the Schemas. We know that limit must be there because the difference between inward and outward is lost in the ninth dimension and this is then where the schemas must breakdown because all schemas are whole and that wholeness distinguishes between what is inside and outside the whole of a given Schema. It is only with the realization that generalized Projective Geometries can provide a basis for Schemas theory that we get a mathematical definition of that limit. Kosmos and Pluriverse is what is outside the grid of the projective geometry. That is why they are scaffolding. Monad and Facet are also scaffolding because they give us the fundamental elements of the Projective Geometry itself. The first PG is Fano Projective Plane. It is made up of points and lines. But we know that Monads as schemas can either be points or lines. We know that the points and lines in the projective geometry are duals of each other in as much as points can be substituted for lines and vice versa. So, the monads stand within this duality as the thing that can either be a point

or a line as the basis of a projective space. These spaces are purely diacritical and thus they exemplify what Hegel and later Bradley call *internal relations*. When we see the PG as an essence then we can understand what facets mean because each line/point pair as part of the whole of the projective geometry is a facet of the whole. So, monad and facet schemas are the scaffolding on which the projective geometry is constructed. Then as we have already said, each feature of the projective geometry can be related to different schemas in their differentiated articulation up to what falls outside the Projective Geometry which appears in the kosmos and pluriverse schemas. Even what falls outside is defined by what appears inside as a whole that is different from the higher-level scaffolding schemas. Thus, we have said that the schemas are projected a priori on the things in spacetime in order to give us different types of ordering of those things as templates for their pre-understanding. And it turns out that the mathematical basis for projection in Geometry is Projective Geometry. Thus Projective Geometry is precisely the mathematical basis for the differentiation of the schemas themselves. So, we can say that the projection process is not just a homogeneous process but is itself differentiated and that differentiation is the basis for the articulation of the difference between the schemas themselves which is neat but unexpected, but very nice once we realize it, because the theory is grounding itself and its own differentiation through its mathematical basis which is a good reflexive property of the kind we can normally only wish for. Here it seems that this reflexive relation between the mathematical basis and the differentiation of the schemas themselves is realized to our surprise.

But this brings us to the question of the difference between *internal relations*[29] and *internal difference*[30] that Deleuze distinguishes from Hegel's views[31]. Deleuze goes back into Spinoza and Leibniz for his inspiration. He analyzes their anti-cartesian enlightenment philosophies and finds something that as abandoned in the history of the Western philosophical tradition that he wants to bring back (resuscitate). What he finds are what Spinoza calls 'Adequate Ideas'[32] and what Leibniz

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[29] Harris, Errol E. *Formal, Transcendental, and Dialectical Thinking: Logic and Reality*. New York: State University of New York Press, 1987.

[30] Rae, Gavin. *Ontology in Heidegger and Deleuze: A Comparative Analysis*. Basingstoke: Palgrave Macmillan, 2014. Willatt, Edward, and Matt Lee. *Thinking between Deleuze and Kant: A Strange Encounter*. London: Continuum, 2009. Williams, James. *Gilles Deleuze's Difference and Repetition: A Critical Introduction and Guide*. Edinburgh: Edinburgh University Press, 2013. Somers-Hall, Henry. *Deleuze's Difference and Repetition: An Edinburgh Philosophical Guide*. Edinburgh: Edinburgh University Press, 2014. Patton, Paul, and John Protevi. *Between Deleuze and Derrida*. New York, N.Y: Continuum, 2004. Parr, Adrian. *The Deleuze Dictionary Revised Edition*. Edinburgh: Edinburgh University Press, 2010.

[31] Somers-Hall, Henry. *Hegel, Deleuze, and the Critique of Representation: Dialectics of Negation and Difference*. Place of publication not identified: State Univ Of New York Press, 2013.

[32] https://earlymodernideas.wordpress.com/2015/11/05/adequate-vs-inadequate-ideas/ McAllister, Blake A. "Adequate and Inadequate Ideas in Spinoza." *History of Philosophy Quarterly*, vol. 31, no. 2, 2014, pp. 119–136. *JSTOR*, JSTOR, www.jstor.org/stable/43488092.

calls 'Complete Ideas'[33] that get turned into the concept of the 'Notion'[34] in Hegel. Deleuze seizes on the critique of Kant by Solomon Maimon[35] who basically uses these ideas to analyze Kant's Critical Philosophy and to find problems with it, because some of the distinctions that Kant makes like between sense and thought cannot be justified in his system. Adequate and Complete Ideas are two stages to the recognition of *internal differences* that also appear in Hegel's idea of the Notion[36]. But what it means is that the Projective Geometry model of the Essence is only part of the story. There is something beyond *internal relations* within the purely diacritical system that gives rise to the Essence.

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[33] https://maartens.home.xs4all.nl/philosophy/leibniz/NouveauxEssays/lb2ch31r.htm **On adequate, distinct, complete ideas**

"Leibniz starts by pointing out that a synonym for the intended sense of 'complete' is 'adequate' (as in the standard Latin formula for the correspondence theory of truth) and then continues with:

"I once defined 'adequate idea' (or 'perfect idea') as one which is so distinct that all its components are distinct; the idea of a number is pretty much like that. But even if an idea is distinct, and does contain the definition or criteria of the object, it can still be 'inadequate' or 'imperfect' - namely if these criteria or components are not all distinctly known as well. For example, gold is a metal which resists cupellation and is insoluble in aquafortis; that is a distinct idea for it gives the criterion or the definition of 'gold'. But it is not a perfect idea, because we know to little about the nature of cupellation and about how aquafortis operates. The result of having only an imperfect idea of something is that the same subject admits of several mutually independent definitions: we shall sometimes be unable to derive one from another, or see in advance that they must belong to a single subject, together. (...)
Whereas in geometry, where we do have perfect ideas, it is another matter. (...)
(..) it does not appear to me that confused ideas such as the idea of sweetness (..) deserve the name. For although they express the power which produces the sensation, they do not fully express it; or at any rate we cannot know that they do - if we understood the content of our idea of sweetness we could then judge whether the idea suffices to explain everything that experience shows us about sweetness." (p. 266-7)

First, The problem with 'adequate' as defined by Leibniz is that it makes it very doubtful whether - apart from mathematics - men can have adequate ideas at all, especially in a Leibnizian context, where in the end everything is infinite and mirrors everything else in its own way.

I also once defined adequacy, but with this difficulty in mind, and relative to some human purpose: An idea is adequate if it corresponds sufficiently much to the truth to enable humans realize some purpose they have. (Note that lies and falsehoods are not adequate in this sense, but that, on the other hand, one needs to know very little of the full truth about many things while knowing enough to suit one's purposes with them, which also includes the case that most that one does believe about things is in fact false, as long as these false beliefs have no mortal consequences for the believer.)

Second, "the idea of a number" is not a really good example, if only because Leibniz did not think of Peano's (Dedekind's) postulates for the natural numbers.

Third, the point about gold is not quite the same as mine about empiricism, though it is related, in that Leibniz in fact points out that there may be more to know about a thing than we know or believe.

Fourth, the existence of "several mutually independent definitions" or assumptions about or axiomatizations of - what is supposed to be - the same class of facts indeed does normally suggest that there are diverse opinions about what these facts really are.

A problem for Leibniz, in connection with the first point I just made, is that it becomes difficult to see how, on a Leibnizian metaphysics, opinions about empirical matters would ever need to converge, as there is infinitely much to know, and so infinite occasion for disagreement. (This was one of the reasons why I defined 'adequacy' relative to human ends: one may continue to disagree about the - ultimately real and complete - analysis of, say, wine while agreeing that it serves well for the purposes of quenching thirst or getting inebriated.)

Fifth, one immediately would like to know why humans have perfect ideas in geometry. The only plausible answer I can provide is that geometry is not about empirical facts, and its objects are merely ideal or imaginary, and exist by postulation or convention. The reason geometry applies to nature is that nature exhibits in fact kinds of structures that are only imagined as possible in geometry (and might not have existed in reality).

Sixth, "to explain everything that experience shows us about sweetness" it seems one must not only know about sugar and other sweet substances, but also about the human nervous system that reacts to them as sweet, which opens the large question of how experiences are related to their ostensible causes, and indeed what experience is, and whether it can be explained in terms of the interaction of the molecules and atoms that move between a human's ears. It is a bit curious Leibniz misses this point.

Also, to take up my third remark about the last quotation of Locke, Leibniz doesn't enter into the fact that the taste of sugar or honey is paradigmatic for sweetness, the taste of lemons or vinegar for sourness, a.s.o., which, firstly, gives to statements like "sugar is sweet" at least an apparent a priori aspect, and secondly involves the large assumption that what I taste when I taste sugar is the same as what you taste when you taste sugar, or at least much more similar to my experience of sugar than almost any other experience of any other things of yours. (Incidentally, there is good inductive evidence for this, as the art of cookery testifies. And tastes may differ, but unless there's broad agreement on kinds and relations of tastes, there simply is no taste to differ about.)" Maarten Maartensz
https://maartens.home.xs4all.nl/philosophy/Dictionary/Philosophical%20Dictionary%20Maarten%20Maartensz.htm

[34] Zambrana, Rocío. *Hegel's Theory of Intelligibility*. Chicago : The University of Chicago Press, 2016.
[35]35 Buzaglo, Meir. *Solomon Maimon: Monism, Skepticism, and Mathematics*. Pittsburgh: University of Pittsburgh Press, 2009. Maimon, Salomon, and John C. Murray. *The Autobiography of Solomon Maimon. with an Essay on Maimon's Philosophy by Hugo Bergman. (translated with Additions and Notes by J. Clark Murray.) [with Plates, Including a Portrait.]*. London: Horovitz Publishing Co, 1954. Lord, Beth. *Kant and Spinozism: Transcendental Idealism and Immanence from Jacobi to Deleuze*. Houndmills, Basingstoke, Hampshire: Palgrave Macmillan, 2011. Jones, Graham, and Jon Roffe. *Deleuze's Philosophical Heritage*. Edinburgh: Edinburgh University Press, 2009. Maimon, Salomon. *Essay on Transcendental Philosophy*. London Continuum, 2010.
[36] Longuenesse, Béatrice. *Hegel's Critique of Metaphysics*. Cambridge: Cambridge University Press, 2010.

The way we think about this derivation of *internal relations* is starting from the Foundational Mathematical Categories the center of which are Set and Mass. These are two nihilistic opposites one having too much identity (instances within the Mass) and the other too much difference (particulars in the Set). When we ask what is between these extremes then the answer is the ipsities (from ipseity) in a swarm, like flocks of birds and schools of fish or herds of mammals. And we see that the Emergent Meta-system is a model of this as a modal cycle of transformations of swarms. And Leibniz in his Monadology is approximating the structure of the Emergent Meta-system (EMS). In the EMS there are *pods of seeds* that turn by a creation operator into *swarms of monads* which through a mutual action operator turn into *constellations of viewpoints* (such as we get in a Projective Geometry) which then though a schematization operator gives us *candidates in a slate* that then through an annihilation operator turns again into seeds in a pod. A good model of the EMS is the game of Go (Wei Chi, Baduk) in Japan/China/Korea[37]. This model was described by Fa Tsang of Hua Yen Buddhism[38] in his commentary[39] on the Awakening of Faith[40] as the process by which Karma operates. It is a model of 'indirect causation' that occurs in a natural cycle such as the one that Hegel refers to in the *Preface* to Phenomenology of Spirit as his inspiration for Dialectics which is *seeds* of a plant that give rise to the *leaves* of the plant on their stems that then give rise to the *flowers* of the plant and eventually to the *fruits* of the plant that then provide the seeds for a new generation. Projective Geometry model of the Essence is a a good candidate if we ask what the dual of the EMS formation might be. Thus, EMS as a model of open transformations of swarms and Essence as a model of *internal relations* are both orthogonal to the Set and Mass Models. But then that opens up the question as to what it is that is at the intersection between these four orthogonal models. And our answer is *internal difference* which can be modeled by the Matroid. The Matroid is a Category Theory model of Orthogonality itself. But it is also the model for the production of all possible geometries. Its dual is the Greedoid which is the basis of algorithms that solve traveling salesmen like NP-complete problems by brute force. We have said previously that the Matroid is the basis for the relation between the Monads and the Facet Schemas. Monads are all orthogonal to each other, and the Facets of the Monad are orthogonal to each other. Orthogonal difference is *the differences that make a difference[41]* and establish independence they are discontinuities that open out into new dimensions and afford new vistas. This is the model of positive *internal difference* within the problematics of the 'Idea' that Deleuze would like to distinguish from the negative *internal relations* within the diacritical system of the essence.

One way to think of this is that we have external differences in the world. But how do we understand those. One way is that we apply Set and Mass models over against these external differences to try to come to terms with them. We see this in our language in the difference between count and non-count nouns. Abstractions are for the most part non-count. There are different logics

[37] https://www.academia.edu/35695508/The_Significance_of_the_Game_Wei_Chi_Go
[38] Cook, Francis H. *Hau-yen Buddhism. the Jewel Net of Indra*. Delhi: Sri Satguru, 1994.
[39] Fa, zang, and Dirck Vorenkamp. *An English Translation of Fa-Tsang's "commentary on the Awakening of Faith "*. Lewiston N.Y.: E. Mellen, 2004.
[40] Asvaghosa. *Awakening of Faith: The Classic Exposition of Mahayana Buddhism*. Dover Publications, 2012.
[41] Bateson, Gregory. *Steps to an Ecology of Mind*. Chicago : University of Chicago Press, 2010.

associated with Set and Mass. Set based logic is syllogistic. Mass based logic is about pervasion. And thus, most things we can handle by pushing to the extreme of identity (Mass) or to the extreme of difference (Set). But there are some things that these extreme models cannot capture and those are the relations of indirect causality and for that we need something like the Emergent Meta-system formation like that we see in Leibniz' Monadology. But when we want to comprehend the relations between sourceforms and their copies in the things of the world then we appeal to Essences which are perfectly diacritical and made up of internal relations based on negation of appearances and indiscernible differences. But to have Monads such as Leibniz posits and for them to become constellated points-of-view then we need a genetic vision of their unfolding and a vision of their destruction that forms a cycle that we see in the EMS. In a sense the EMS is the dynamic relation between Dasein and the Monad seen as perspective vantage point and vanishing point, or as being-in-the-world and being-for-the-world. It is for-the-world in the sense that there is needed a sink for the perspectives to vanish into in order for the world within the projection to exist between projector of the perspectives and the vanishing point in which the projective lines by which the world is articulated disappear. This point of disappearance is the pinhole of a camera obscura which the prisoner sees what is beyond his cell obliquely. Monads in a swarm are related to the Viewpoints in constellation seen as the Daseins that project the projection they are in. The Monads are metaphysical living unique atoms that appreciate the projection within themselves as they receive all the projection lines into their vanishing points. Dasein produces the transcendence of the world through projection. Monads are purely immanent within themselves but because they receive all the projective lines they get an internal view of what is going on outside from their own perspective that is seen on the wall of their windowless chamber separated from the world projected as it were on the wall like the prisoners in the cave. They are like the Emperor of China looking on to what is happening in his kingdom from within his palace through the eyes of his bureaucracy and spies. But the transform between the Monad back to the Viewpoint needs to be seen as a cycle and thus viewpoint schematizes or projects all the candidates that inhabit all the possible worlds. These possible worlds made up of the copies of the viewpoints cancel into the best of all possible worlds (which is not all that great[42]) that produces the seeds from which the next set of monads are created. This is what the EMS cycle says is the dynamic relations between the monads and dasein as proto-viewpoint must be like if we are to have a genetic view of the production of the world. Indirect causation is needed because the Monads are sealed. How do we have causation when there is no connection between the Monads. This is the same problem dealt with in Buddhism that has the paradox of believing in Karma when the basis of everything is empty and thus there is no transmission medium for Karmic causality. Monads transform into Viewpoints through the groupoid relationship between them. Then viewpoints through schematization produces the possible candidates which then cancel into seeds by an annihilation operation that are the side effects that thorough indirect causality produces the next set of Monads by a creation operation. Created Monads mutually interact which means they form a synthesis based on a 2-groupoid that brings together all their different perspectives on the world seen as internally projected within them as an immanent expression of the world. The blind mutual interaction of

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[42] Voltaire, Roger Pearson, and Jack Davenport. *Candide.* Chivers, 2008.

Monads through external action can be seen from different perspectives like when Atman looks through the eyes of the different humans. There are myriad facets to the eye of God and based on that the schematization occurs, i.e. the world is projected, and the things in the projected possible worlds are schematized. You get individual copies of things within the world which are the copies of the Ideas as in Plato. These copies then cancel out and the seeds are produced that are the karmic traces within the cycle that allows it to keep going in spite of the Emptiness of everything between the Monads within which the Maya of the external world of the Projection that is like the dream of Vishnu. This model by Leibniz is probably based on the concept of the Temporal Atoms that the Arabs created to save Aristotelian Philosophy from the idea of externalism that would allow miracles to occur and God to intervene in His creation[43]. Leibniz had the same goal which was to save Catholic Theology from Spinoza's Monism in which God and Nature were identified which had not room for miracles. The various phases of the EMS formation are associated with the modalities that Deleuze identifies in Bergsonism[44]. They are virtuality, possibility, actuality and reality. The Seeds in the pod are virtual. The Candidates in the slate are possibilities. The Monads in the swarm are actualities. The Views in the constellation are Real. This suggests that all the Aspects of Being, including Truth, Identity and Presence as well, are seen by the Views who are projecting Being. We have to combine what Deleuze says in Bergsonism with the model of the being-for-the-world of Monads from The Fold as different from the being-in-the-world of Dasein in order to get a complete picture.

Essence as *internal relations* are the dual of the external relations of the different facets of the Emergent Meta-system cycle of swarms going through different modalities. Sets as extremes of difference are the dual of Masses that are the extreme of identity. Between these orthogonal models appears *internal difference* of the Matroid, the source of the production of all geometries. Matroids establish dimensional orthogonal difference as the standard of independence for judging all other differences. That orthogonality can be seen as the difference between True and Right which are the second aspect of Being and the second nondual of Being. These are Seconds in terms of the Philosophical Principles of C.S. Peirce which concern relata. What is true is level, and what is right is orthogonal to that. Literally orthogonality is independence and this is the basis for discriminating between various illusions in the projections produced by the different viewpoints and vanishing points that underlie the world. *Internal difference* is seen by applying Adequate Ideas of Spinoza or the Complete Ideas of Leibniz which have more or less been forgotten except by Maimon in his Spinozist critique of Kant and by Hegel within our tradition. The measure of these Ideas is perfection. They attempt to approximate Perfect Ideas and we can see them worked out best if we look at the Chinese Sciences[45] that held that the immanent world was perfect and eschewed all transcendentals, even though they did allow for the fact that there were still invisibilities of Heaven as in the Transcendental Field. It is Adequate Ideas that see the discontinuities such as those between the stages of the EMS cycle as *internal differences*. When we look at nature these are the differences between the seeds, the leaves on the stems, the flowers

[43] https://plato.stanford.edu/entries/arabic-islamic-causation/
[44] Deleuze, Gilles, Barbara Habberjam, and Hugh Tomlinson. *Bergsonism*. New York: Zone Books, 2011.
[45] https://www.academia.edu/35789569/Perfect_Ideas

and the fruits in the natural cycle of plant life. Hegel holds this up as the perfect example of the Dialectic. These are internal discontinuities between the real, possible, actual and virtual phases of the EMS cycle. The discontinuities themselves are Empty (Buddhism Sunyata) or Void (Taoism Wu Ji). With respect to the Projective Geometry model of the Essence we see the discontinuity between point and line that have to be discriminated as two phases of the Monad schema that are the underlying basis for the production of the perfect diacritical system of the Essence. With respect to Set it is the difference between the empty and the null set that is the basis of Set theory. With respect to Mass it is the difference between the instances that is the structural basis for all the emergent properties that exist at the boundary of the Mass. Particulars are all orthogonally different from each other that exist as unique elements within the Set. Instances are all independent of each other, but it is their mutual action that adds up to the qualities of the mass of which they are a part. In other words, all the other models are dependent on *internal difference* to be articulated. These are seen in terms of the Adequate Ideas of Spinoza and the Complete Ideas of Leibniz which look at the models as if they were positive perfect representations of external differences which eschew all negation. Deleuze wants to take us back to the recognition of the importance of these Perfect Ideas. It is like a whole story of the edifice of Western Philosophy that was forgotten after it was abandoned after the Enlightenment. Deleuze is taking us back to the Enlightenment and the Anti-Cartesians Spinoza and Leibniz whose philosophies were dual ways of looking at the perfection of the world seen through the lens of complete rationality (sufficient reason). He sees this as an antidote for the current philosophies of Zizek and Badiou who are trying to usurp what was gained by Derrida and Deleuze and supplant them with Lacan and his dark view of the semiotic and structural unconscious[46], i.e. the habitus[47].

In this structure of orthogonal models Projective Geometry has a special place in as much as it is a model for the *internal relations*[48] of the Essence which is perfect in its diacritically.

> Although the philosophy of internal relations existed in primordial form in the work of Spinoza and Leibniz, the first systematic examination of the issues raised by these two thinkers was undertaken by G. W. F. Hegel at the beginning of the nineteenth century. Many reformulations and substantive applications of this viewpoint would follow Hegel's initial effort, most notably the work of Marx and Engels, the late nineteenth century philosophers (Bradley, Taylor, McTaggart, Whitehead), the systems theorists and the Gestalt psychologists; but it was Hegel who first outlined a coherent and complete "theory of internal relations." Because of Hegel's central role in the development of this philosophical system, his work will serve as a starting point for the present description of its basic features, although the ideas of other scholars will be included wherever they are pertinent.

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[46] Lacan, Jacques, and Jacques-Alain Miller. *Formations of the Unconscious: The Seminar of Jacques Lacan, Book V.* , 2017. MacCannell, Juliet Flower *Figuring Lacan: Criticism and the Unconscious*. Routledge, 2016. Parker, Ian. *Psychology After the Unconscious: From Freud to Lacan*. New York: Routledge, 2015.
[47] Bourdieu, Pierre, and Richard Nice. *The Logic of Practice*. Stanford, Calif: Stanford University Press, 2014.
[48] Lyng, Stephen. *Holistic Health and Biomedical Medicine: A Countersystem Analysis*. Albany, N.Y: State University of New York Press, 1990. p. 15.

Internal relations[49] must be brought back because they have gone out of fashion. Russell[50] hated the philosophy of Bradley[51] and the Neo-Hegelianism of England that he learned as a student. Russell banned *internal relations* from Analytic Philosophy and so it was forgotten for the most part. It lived on in Continental Philosophy but was never a major point of interest as philosophy after Hegel reacted to him. It is an insight that we need which is meaningful structures must be based on some sort of perfectly diacritical system. But that perfectly diacritical system does not have to encompass everything. What is needed is an island of perfect diactriciality that makes possible the systematicity[52] of thought, i.e. the ability to infer relations from other relations with certainty. Plato supported this idea and used the Greek alphabet as his example of a perfectly diacritical system. Saussure [53] saw diacriticality as covering all of language. Everything changed in relation to everything else in a semiotic system if anything changed. This is clearly a nihilistic description of pure flux. An alternative is to have an island of pure diacriticality in which Systmaticity is possible that is a basis for extending reason into less stable territory. There needs to be a small number of characters whose differences are all between themselves in order to bootstrap meaning and the Essence is the formation that has this quality in Plato as it mediates between the sourceforms and the actual copies of them that are the things. This mediation of the Essence[54] focuses the medium of the *ousia* and the participation of the copies in the sourceforms. Thus, Essence has always had an important place in Western philosophy since Plato and Aristotle. But it has not been realized by anyone I can find in the tradition that Projective Geometries are the perfect model of Essences. And it just turns out that Projective Geometry can be seen as the basis for Schemas Theory in mathematics. Schemas Theory has several connections to mathematics. It is based on Pascal's Triangle and can be seen as a part of the generation process by which Pascal's triangle is elaborated based on co-recursion. Schemas Theory is also based on dimension which is generated as Pascal's triangle unfolds. Schemas are related to two dimensions at a time, just as the dimensions are related to two schemas at a time. This is the S-prime hypothesis. From it we generate the schemas. The schemas are the inverse of the undefined geometrical objects for each dimension like point, line, surface, solid, hunk, etc. These are representative of their dimension. Schemas instead give us a transform between dimensions in which we can use either one schema or another to represent something of a given dimensionality. We can choose which schema we want to use, although the first choice is always unconscious. But we are given the freedom to switch to an alternative schema with which to view something of a particular dimension. This freedom means we can choose as an active synthesis after the fact of passive synthesis what kind of organization we want to project on the thing and we are not completely bound to a given organization with which to understand the phenomena that appears to us in spacetime. Another

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[49] Mácha, Jakub. *Wittgenstein on Internal and External Relations: Tracing All the Connections*. ew York : Bloomsbury Academic, 2015.
[50] Candlish, Stewart. *The Russell/bradley Dispute and Its Significance for Twentieth-Century Philosophy*. Basingstoke England: Palgrave Macmillan, 2009.
[51] Mander, W J. *An Introduction to Bradley's Metaphysics*. Oxford: Oxford University Press, 2011. Bradley, F H. *Appearance and Reality: A Metaphysical Essay*. London : Routledge, 2016. Eliot, T S. *Knowledge and Experience in the Philosophy of F.h. Bradley*. London: Faber and Faber, 1963.
[52] Aizawa, Kenneth. *The Systematicity Arguments*. Boston: Kluwer Academic, 2003.
[53] Saussure, Ferdinand , and Roy Harris. *Course in General Linguistics.* London [etc.: Bloomsbury, 2016.
[54] Silverman, Allan. *The Dialectic of Essence: A Study of Plato's Metaphysics*. Princeton: Princeton University Press, 2008.

type of Mathematics that is connected to Schemas Theory is Conformal Field Theory[55] which is the dual of the schemas and gives us a way to manipulate the hierarchy of the schemas to apply it to things in the world. The discovery of Conformal Field Theory as a dual to the Schemas is very exciting because they are scale free and determinate and thus they allow us through their operations to move up and down the hierarchy of the schemas and to apply them to things we find in existence. But interestingly there is a connection between Conformal Field Theory and Projective Planes and thus this brings us back to looking at the relation between Projective Planes and the Schemas which we are concerned with here in this paper.

What we see here is that the Projective Geometry (PG) generic template which is the structure of all specific PGs covers precisely the range of the Schemas, and gives definition to each schema along the way which appear in complementary pairs at each stage of unfolding. This is precisely what we have been looking for as a grounding of Schemas Theory in mathematics, something that articulates each schema, and gives the whole series, starting and stopping at the right point, i.e. with Facet and Pluriverse. Our previous mathematical foundation for Schemas Theory in the co-recursion within Pascal's triangle did not give us all these constraints on the Schemas as a set. The fact that the schemas are fully constrained by PG means that we can now safely say that the set of schemas that were initially hypothesized is a complete set, and their relations to each other are now established as Mathematical facts, rather than merely speculation as was the case up to this point. Schemas were empirically derived as a set from scientific literature of the Western tradition. A tutorial exists on Schemas theory given at INCOSE.org and ISSS.org conferences at http://schematheory.net. But I have been searching for the mathematical basis of this theory since it was formulated. I believe that there may be multiple mathematical models that are applicable to the definition of the theory, and a partial definition was found in the co-recursive model of Pascal's triangle previously. But this new model based on a generic view of Projective Geometry is an even better definition of schemas theory that gives more complete coverage of the entire set of schemas and their relation to each other which is very satisfying to have discovered.

Now the emphasis moves from searching for a mathematical definition of the Schemas Theory as a whole to an exploration of how the new mathematical basis helps us to understand Schemas Theory. The way that this new mathematical definition for Schemas Theory was discovered was an extremely roundabout route. Partly it came from the realization that each schema should have something like an essence, which led to the definition of Schematic Nerves. Then it was realized that Projective Geometry was a good model for Essences. General Schemas Theory[56] itself was developed in order to understand better Special Systems Theory[57]. In order to see the Special Systems it is necessary to have a good model of the difference between System and Meta-system[58]. But then the question arose as to what other schemas besides the System, Form, and Meta-system might exist. Thus, I formulated the set of schemas in order to have an ontological hierarchy of

[55] https://www.academia.edu/36026616/Conformal_Schemas_Theory
[56] https://www.academia.edu/34831626/General_Schemas_Theory
[57] https://www.academia.edu/3795281/Special_Systems_Theory
https://www.academia.edu/34804726/Reflexive_Autopoietic_Dissipative_Special_Systems_Theory
[58] https://www.academia.edu/3796373/Meta-systems_Engineering

templates of understanding of entities within spacetime with different organizations that nest and leave no gaps. This turned out to be a fundamental extension of Systems Theory into the broader range of Schemas Theory that provides a context by naming specific schemas and their relations to each other that are found in the Scientific literature but which, it appears, have never been systematized before. Wittgenstein in <u>Philosophical Grammar</u>[59] names quite a few schemas, and Umberto Eco [60] defines the "Mathematical and Geometrical Schemas" in relation to other meanings of the word schemas within the Western tradition. Once a set of schemas have been hypothesized then it is possible to explore their relations, and search for gaps and inconsistencies that suggest other schemas that might exist. However, no blatant inconsistencies that refuted the initial S-prime hypothesis which would discount the theory have as yet been found. We are still searching for a case that would constitute a refutation. S-prime hypothesis mentions a specific set of schemas: facet, monad, pattern, system, meta-system, domain, world, kosmos, and pluriverse as well as a rule which says that there are two schemas per dimension and two dimensions per schema. Variations of this rule have been explored, but the mathematical model of the schemas based on co-recursion within Pascal's triangle shows that the rule should relate just two schemas and not more. Rules that relate higher numbers of schemas were found to be too complex to explain so that it is necessary to start with two schemas per dimension anyway. The concept is that schemas are in some sense nondual in the way that they span pairs of dimensions and pairs of dimensions span them. They are Janus[61] like holons[62] that face each of their pair of dimensions. Here nondual[63] means that the schemas are Janus faced with one face toward each dimension. The schemas define transitions with definite organization between each pair of dimensions. The focus of previous research has been why they start where they do in the negative first dimension, and end where they do in the ninth dimension. Reasons have been found for this beginning and termination of the series of schemas. But no reason had been found that glued the entire series together previously.

Beyond the Schemas a Worldview structure model was also postulated in order to give the schemas a context. This Worldview model, called W-prime, was based on meta-dimensions and fibered rational knots. The concept was to understand how the ten schemas were related to other transcendental elements in higher meta-dimensions beyond the zeroth meta-dimension of spacetime where the Schemas appear. Recently it was realized that this Model had resonances with particular Projective Planes and could be transformed into a model of the Essence of the Worldview, and this lead to the generalization which provided another mathematical grounding of Schemas Theory. In short, instead of seeing transcendental levels rising over spacetime of the schemas we can instead think of the Essence of the Worldview as Projective Geometry constraining the Spacetime projection of the Schemas. We call this the W-double-prime model. The W-double-prime model is a transformation of the W-prime model revolving around the

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[59] Wittgenstein, Ludwig, and Rush Rhees. *Philosophical Grammar.* Oxford England: Blackwell, 1974

[60] In <u>Kant and the Platypus</u>

[61] Koestler, Arthur. *Janus: A Summing Up.* London: Pan, 1983.

[62] Stamps, Jeffrey S. *Holonomy: A Human Systems Theory.* Seaside Calif.: Intersystems Publications, 1980. Robinson, Simon, and Maria M. Robinson. *Holonomics: Business Where People and Planet Matter.* Edinburgh : Floris Books,, 2014.

[63] Loy, David. *Nonduality: A Study in Comparative Philosophy.* Amherst, NY: Humanity Books, 2014. Katz, Jerry. *One: Essential Writings on Nonduality.* New Delhi: Wisdom Tree, 2008.

numerology of PG(2,4). PG(2,2) which is the Fano Plane that is equivalent to the Octonion Imaginaries and is related therefore to the Reflexive Social Special System can be seen as a model of the Symbolic, Imaginary, Real registers of Lacan as interpreted by Zizek along with their anamorphic eventities. It can also be interpreted as a model of the moments of time including the fourth moment of the coNow. PG(2,4; 21 lines and points) has within it three copies of PG(2,2; 7 lines and points) and if we double it we get a model of the entire Aspectual Field[64]. Mediating between the individual flag of registers PG(2,2) and the entire field PG(2,4) there is PG(2,3) with 13 lines and 13 points which can be seen as a mnemonic pattern of Symbols in Places that breaks down into an Affine Geometry with 12 lines and 9 points which is analogous to the Axiomatic Platform. What we say is that the Worldview as essence appears as the specific relations between these three projective planes and this is constrained by the generic structure of Projective Geometry which gives us the structure of the Schemas. But if we fill in these specific Projective Planes then we get a model of the Essence of the Worldview. This essence of the worldview when take as the entire Aspectual Field PG(2,4) can be transformed into the transcendental model of the worldview based on Meta-dimensions and Fibered Rational knots. It was in the process of working out this transformation that it occurred to me to do the analysis to see if it was possible to see in the Generic Projective Geometry the traces of all the schemas and I was surprised when I found structure that I could interpret with regard to the specific set of Schemas that were part of my S-prime hypothesis.

What we want to do in this paper besides mentioning this new and better mathematical foundation of Schemas Theory, is to consider its implications. On the one hand, now everything related to Projective Geometries become significant as background information concerning the Schemas. Except we are interpreting this mathematical information through the tradition and the concept of Essence and noting how the Generic Projective Geometry strcture constrains Schemas Theory and unifies it. But it is only when we identify the series of specific projective planes PG(2,2), PG(2,3) and PG(2.4) that we get a model of the Essence of the Western worldview which is related to Schemas Theory as it articulates spacetime. Schemas are projected as ontological templates of understanding with particular possibilities of ordering on Spacetime. They are a priori modes of intuition as Kant says which participate in schematization which Cassirer uses to unify Kant's metaphysics. Cassirer studies the Philosophy of Symbolic Form[65]. But what we really need to do is study the philosophy of symbolic schematization of all the Schemas not just Form. And it is Panofsky [66] that identifies Perspective [67] as a Symbolic Form and notes its evolution in the Renaissance that underlies the articulation of the Modern in the Metaphysical Era. Projective Planes are the underlying mathematics supporting the projection of perspectives. Heidegger in Dasein has isolated the fundamental ecstasy of the human being which projects the world that it is

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[64][64] https://www.academia.edu/9913285/Dreamtime_Structure_of_Inception

[65] Cassirer, Ernst, John M. Krois, Donald P. Verene, and Ernst Cassirer. *The Philosophy of Symbolic Forms.* New Haven: Yale University Press, 1998. Cassirer, Ernst, Ralph Manheim, and Charles W. Hendel. *The Philosophy of Symbolic Forms: Vol. 2.* Milton Keynes: Lightning Source, 2011. Verene, Donald P. *The Origins of the Philosophy of Symbolic Forms: Kant, Hegel, and Cassirer.* Evanston, Ill: Northwestern University Press, 2011. Cassirer, Ernst, and Ernst Cassirer. *Substance and Function and Einstein's Theory of Relativity.* London: Forgotten Books, 2015. Cassirer, Ernst. Volume *3: the Phenomenology of Knowledge.* New Haven: Yale University Press, 1957.

[66] Panofsky, Erwin. *Perspective As Symbolic Form.* New York: Zone, 2002.

[67] Harries, Karsten. *Infinity and Perspective.* MIT Press, 2002.

part of as being-in-the-world. Dasein is *being there* as he finds himself within the world which s/he h*er/im*self (they) project. This is the fundamental paradox that appears in the trinity in which God creates the world but then appears in it as his avatar (son). Key here is the projection process which for Schemas Theory is merely the projection of different possible organizations of spacetime and it is projective planes that encapsulate this projection process mathematically. Projective Planes are the mathematical substrate for the establishment of perspectives within the world or as the rigor of disciplines with regard to specific domains. But, of course, these projective mechanisms are projecting on the screen of nature which is seen as Kosmos on the background of all possible universes encapsulated in the Pluriverse. Science thinks it can study the universe and get a view of it beyond human experience. But this is always filtered through human experience one way or another and thus realism is always subservient to idealism despite the pretensions of science of having an inhuman view called Objective from nowhere beyond all experience (as a headland above the world). Husserl discusses this problem in his Krisis[68]. What Schemas Theory posits is that spacetime from the human vantage point is not a homogeneous plenum. Rather there are various archetypal templates of organization of phenomena corresponding to the different Schemas. They are templates for understanding phenomena as they appear in spacetime that arise spontaneously produced by the unconscious and are therefore ubiquitous. The proof for that ubiquity is that we see the same schemas in dreams that we see in awake experience. They are received as Husserl says through the "passive synthesis" as the basis of all active synthesis[69]. Phenomena appears already organized (they are a priori) by these templates of intelligibility of phenomena. But mathematics comes into play because the schemas have an internal connection to dimensionality. There are two dimensions per schema and two schemas per dimension. This rule is part of the S-prime hypothesis which also specifies specific schemas and their order as a list. Notice that Spacetime is a four-dimensional mass. The Schemas are a set of particular templates of understanding the organization of anything that appears in spacetime. The specific schemas were taken from the scientific literature and forged into a hypothesis which attempted to find a set with no gaps that covered all experience. It is ultimately not claimed that these are all the schemas, but this is an example of a fundamental set that is needed to cover the whole range of experience at all possible scopes. Schemas are assigned to dimensions and schematizations that overflow into other schemas are called Ersatz[70]. In other words, Forms are two and three dimensions but if there was a fourth dimensional Form it would be *ersatz*, by which we mean ineffective and thus would from a phenomenological perspective collapse into the second and third dimensional form. In other words we can think of a four dimensional form as we do in geometry, but phenomenologically they are not viable and are unstable and will collapse into the standard dimensional expression of a particular given Schema, which for Form occurs at the second and third dimension.

It is strange that nothing like Schemas Theory has been developed previously. You would have thought either Art Criticism or Architectural disciplines would have formulated something like the

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[68] Husserl, Edmund. *The Crisis of European Sciences and Transcedental Phenomenlogy*. Evanston, Ill: Northwestern University Press, 1989.
[69] Husserl, Edmund, and Rudolf Bernet. *Collected Works: Lectures on Transcendental Logic*. Dordrecht: Kluwer Academic, 2001.
[70] Not genuine

Schemas but no examples of anything like Schemas Theory have been found yet in those or other disciplines. Idealism has the odd idea that it is projecting all of spacetime as a homogenous plenum. But instead it is fairly clear that we are actually projecting different schemas at different scopes and that these follow the differentiation of dimensionality from Mathematics. The question is precisely what are the schemas at each dimensional scope and the S-prime hypothesis provides a tentative answer. The most important thing is that there be no unschematized gaps between the schemas and the set that has been selected was picked in order to try to diminish the possibilities of gaps. And, so far no unschematized gaps have been found between this set of possible schemas. We have found ways to justify the beginning of the set of schemas with facets and the end of the schemas with Pluriverse. But it was impossible to consider the schemas a unified set prior to the discovery of their basis in generic Projective Geometry. Just as an Essence should, Projective Geometry delimits by constraint the Schemas without totally specifying them. This is very important because it gives a concrete example of the way that Husserl thinks of Essence as internal coherence based on constraints as opposed to the external coherence of the Noematic Nucleus.

Here Essence is thought of as being related to the whole set of Schemas. But we must distinguish that from the Nerves of each Schema where Form itself has an essence, but the equivalent to essence for System is its 'Nucleus' and for the Meta-system is its 'Nexus'. In other words, we have defined terms for essence of each Schema on the analogy of the essence of Form, but it is quite another thing to define the essence of the entire set of schemas which we associate with the generic Projective Geometry. Here Projective Geometry is the analogy for Essence at each level of its application. But here we are focusing on how the generic Projective Geometry acts as a model of the essence of all the Schemas Together as a Set as well as providing analogies for the essences of individual schemas. Of course, the problem here is the term "essence" is overworked. It is fairly clear that the so-called essences of the various schemas are different from each other and deserve their own term. These are what makes the particular Schematic template what it is as a whole. Every Schema is a whole in its own way. But also the Schemas as a Set is a whole and that wholeness is conferred its Schematic Essence which has the form of the generic Projective Geometry. But whatever their essential configuration different from each other they would represent *internal relations* within the elements of the schema itself that give it wholeness. But we are so used to only thinking about the Form Schema and its associated Essence that we do not have a generally accepted terminology for the 'Nerves' of the different schemas, which is unfortunate, and is a deficit we move to remedy. But it is a leap to then realize that there may be an essence like structure for the entire set of schemas, as well at a higher level of abstraction from each of the particular schemas. In fact, it is quite surprising that the Projective Geometry model scales to provide a higher order essence to constrain the entire set of Schemas. But once we realize this then that solves some problems of the grounding of Schemas Theory in Mathematics in an unexpected fashion. Schemas are a projection of multiple ordering templates of intelligibility onto spacetime via what Kant and Cassirer call Schematization, i.e. the expression of spatialized categories within temporality. This projection takes place based on points of view of the agents within the world. Projective Geometry is the underlying mathematical description of this projection process based on perspectives. Therefore, the description of the projective process serves to delimit the set of schemas that may be projected. This I think is a new realization that takes us beyond Projective

Geometry itself and shows how it is fit to differentially support the various Schemas which are all part of the substance of a unified and totalized projection process.

We realize all this through the application of Adequate and Complete Ideas of Spinoza and Leibniz. It is these ideas that allow us to understand *internal difference*, that is the differences that appear as discontinuities in phenomena. In this case it is the discontinuities between the schemas within the generalized formal structure of Projective Geometries taken as a whole that are being differentiated as *internal differences* in this case. Schemas include Monads which are the basis of any particular Projective Geometry because they provide the basis of both points and lines. Projective Geometry as a whole provides us with the Adequate Idea of the differentiation of the Schemas as a complete set. But it is only as we produce specific Projective Geometries that we get the Complete Idea that reconciles content with form and form with content and produces the in-itself and for-itself relations of both that allow us to realize their nature in-and-for-each-other. And thus, we return in the end to the Groupoid structure that was emphasized by Hegel in the *Introduction* to Phenomenology of Spirit where he developed this terminology of things in-themselves and for-each-other which then can combine into the synthesis of both of these which is supra-rational because it considers them same and different at the same time without interference. As Deleuze intimates it is by applying these perfect ideas to phenomena we see the significance of their discontinuous articulation within themselves for each other. The undefinable geometrical elements point, line, surface, solid, hunk, etc. are a series of these types of differentiation that we cannot justify that they merely appear phenomenologically as the way we see things and thus get incorporated into our geometrical theory. Similarly, we just see the various schemas a priori in our projections and we have to separate them out and build models of them to try to understand the various versions of wholeness that they represent for us as possible organizations of things in our world. Schemas too rise in a series through the unfolding of dimension. But unlike the undefined geometrical elements they are nondual between dimensions rather than tied to one particular dimension and thus they introduce a certain minimal freedom in our ways of looking at things. Through Schemas Theory we take advantage of that possibility of seeing things at the ontological level through different organizational lenses. And that theory is multiplied as we look at the various ontic thresholds of emergence which we can apply multiple schemas to in order to see them in very different ways. The freedom at the ontological level of projection of the schemas is very slight, just a choice between two schemas at any given dimension but the freedom that introduces when we look at ontic phenomena through several different schematic lenses is much greater. This ability to switch schemas by which we look at things is one of the fundamental bases of our freedom. It is a basis for a kind of freedom in our knowledge of things as regards their possible embeddings in spacetime.

But the Schemas provided a bridge to an even deeper reservoir of freedom. The Schemas can be folded so that it realizes the dualities between facet/pluriverse, monad/kosmos, pattern/world, form/domain, and finally system/meta-system. The dimensional interface between System and Meta-system is in the fourth dimension. This dimension is unique among all other dimensions in many different ways. But one of those ways is that it is the only dimension without a set topological

structure. This was discovered by Donaldson[71] who calls them infinite fake differential topologies that cover the fourth dimension[72] unlike every other dimension that has fixed topologies. This fact that there is no fixed differential topology in the fourth dimension is the ultimate source of our freedom. This is because all we have to do is to get something into the fourth dimension and we can then dream up any of the infinite fake topologies to cover it. It is in the fourth dimension that the Special Systems appear that give us Dissipative Ordering, Autopoietic Symbiotic, and Reflexive Social Special Systems. And it is these Special Systems plus the Normal System that gives us through their conjunction the Emergent Meta-system (EMS). The Emergent Meta-system has phases that Deleuze describes based on Bergson as Real, Possible, Actual and Virtual. But the distinction between the various modalities of the swarms in the EMS are pure discontinuities and thus must be discerned in terms of *internal differences* that distinguish what are analogous to the the seeds, from the leaves on the stem, to the flowers and the fruit. We note that this transformational cycle is like the quadralectic in Emergent Design[73]. The Essence is closed in on itself as a purely diacritical system that we see in Projective Geometry. Its opposite is the EMS formation which is open and transforming in a natural cycle that reduces energy as a type of least action process such as we see in Bubbles where the surface area is minimized[74]. The folded EMS hierarchy gives us a bridge to the fourth dimension and in it we find the fourth dimension which then gives rise to the Special Systems and the Emergent Meta-system formation. We note that the Fano Projective Plane is also based on Octonions which are the mathematical basis for the Reflexive Social Special System. So, the Essence appears as a structure within the social field that appears as an emergent property of the (sociodynamic) Reflexive Social Special System. And then the Reflexive Social Special System is also a moment in the EMS cycle. So both the Essence as Projective Geometry and the EMS formation are related to the Special Systems in different ways. One gives the fundamental matrix out of which semiotic and symbolic meaning can arise. The other gives us a model of indirect causation. They are orthogonal to the Set and Mass Categories that are the model for the Notion of Hegel. *Internal relations* of Hegel and the *internal difference* of Spinoza and Leibniz and their perfect ideas together give us a way to extend Hegel's Notion and apply it more widely through the use of Adequate and Complete Ideas as a basis for our analysis of self-segmenting phenomena. Schemas Theory seen in terms of Projective Geometry is just one way in which we can use Adequate Ideas, Complete Ideas and Notions to ground our understanding of our relation to Spacetime which is not to a homogeneous present-at-hand spacetime of physics. But rather we understand that we ourselves are part of the projection process by which that idealized homogeneous spacetime is produced a priori from within ourselves, and as part of that projection process we do not do it all at once but in stages, and those stages of schematization turn out to be related to the Schemas. The projection process is segmented, and the segments of the process relate directly to the segmentation of the homogenous plenum into different kinds of organization that appear from out of our projection onto and of things. This is

[71] Donaldson, S K. *Geometry of Four-Manifolds*. Providence, R.I.: American Mathematical Society,
[72] Scorpan, Alexandru. *The Wild World of 4-Manifolds*. Providence, R.I: American Mathematical Society, 2005.
[73] https://www.academia.edu/34831961/EMERGENT_DESIGN See http://emergentdesign.net
[74] https://www.academia.edu/36022714/Rewriting_and_Extension_of_the_Three_Systems_Concepts_of_David_Rousseau

similar to the ideas of Microgenesis[75] which studies the ways gestalts unfold and transform as the appear. We see the segments of the projection process and the different schemas that are projected as two sides of the same coin. The schemas all have something like an essence of Form which we call it's Nerve that gives them each a wholeness. For the System we call that the Nexus. But then again the Projective Geometry itself acts as an essence constraining the structure of the schemas themselves and giving them a mathematical underpinning that we can use to understand them better. We do not have a name for the Nerve of the entire set of Schemas. But we know that it is related to their duality with Conformal Field Theory and this deserves further study because there is a connection between Conformal Field Theory and Projective Geometries via Anti-de-sitter space[76].

It should be mentioned as well that we can use Gödel's Theorem in order to ground Special Systems Theory[77]. And this is because the Theorem contains recursion and so we can then use that recursion to build a Pascal Triangle instead of encoding. Pascal's Triangle is the basis of all coding as the information infrastructure. Building Pascal's Triangle is a dissipative ordering process. The coding goes back and forth between logical statements and numbers, encoding all the logical statements into Gödel Numbers. And thus, there are two realms which are those of logical statements about the numbers and the numbers themselves which then embody the logical statements. This is a case of embedding. Logical statements with meaning are embedded into Godel numbers by a clever trick through encoding. Gödel finds that logical paradoxes can be encoded and realized in the process of recursive enumeration in this way and that means that the firewall between logic and numbers as classes within the Higher Logical Type Theory with both classes and types can be breached. Thus contamination is possible in spite of the lengths we went to stamp out paradoxes by invoking Ramified Higher Logical Type Theory[78] in the first place. The conjunction of the two fields of the logical and the numeric is like an autopoietic symbiotic special system. The Pascal Triangle itself exemplifies the Dissipative Ordering as it is generated through co-recursion. And it is autopoietic in as much as it is self-generating. It is also reflexive in as much as the two sides of the triangle mirror each other. Pascal's triangle is the only known mathematical object with properties like those of the Special Systems. We used Gödel's mechanism which he creates to prove incompleteness to build the Pascal Triangle which is the Information infrastructure for all encoding schemes. Then we begin to recognize that the Theorem itself as a mechanism has some of the qualities of the Special Systems themselves that have been produced by that mechanism. Gödel uses his proof to show that it is ultimately impossible to keep paradox from leaking out of the classes in the Higher Logical Type Theory of Russell. Thus, the structure that Russell builds to deal with the paradox he found in Frege's logic itself has a leak and thus there

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[75] Abbey, Emily, and Rainer Diriwächter. *Innovation Genesis: Microgenesis and the Constructive Mind in Action*. Charlotte, N.C: Information Age Pub, 2008. Whitaker, Harry A, and Robert E. Hanlon. *Cognitive Microgenesis: A Neuropsychological Perspective*. New York: Springer New York, 1991. Öğmen, Haluk, and Bruno G. Breitmeyer. *The First Half Second: The Microgenesis and Temporal Dynamics of Unconscious and Conscious Visual Processes*. Cambridge, Mass: MIT Press, 2006. Bakhman, T. *Microgenetic Approach to the Conscious Mind*. Amsterdam: John Benjamins Pub. Co, 2000. I
[76] https://www.wikiwand.com/en/Anti-de_Sitter_space
[77] https://www.academia.edu/31038671/Foundations_of_Systems_Architecture_Design
[78] Copi, Irving M. *The Theory of Logical Types*. New York: Routledge, Taylor & Francis Group, 2011. Whitehead, Alfred N, and Bertrand Russell. *Principia Mathematica*. San Bernardio, CA: Rough Draft Printing, 2011.

are no Theoretical Formal Systems that are not liable to lapse into paradox. It is Russell's Higher Logical Type Theory that gives us our ability to define the different meta-levels of Being, as Being is the biggest paradox there is at the core of Indo-European Logos. Instead if we build Pascal's Triangle then we can derive the Schemas from the co-recursion operation. And so Gödel's Incompleteness Theorem after it has given up producing a purely isolated logical form can be used to instead give the logical genesis of Schemas Theory as a side effect of the building of Pascal's Triangle which is the information infrastructure that is the basis of all coding. As we said, the Pascal Triangle is the only mathematical object that combines essential properties from the three Special Systems. What we are producing is integral to the coding process because the numbers will be represented the bit level words that are used for encoding the numbers on computers. Instead of producing the Higher Logical Type Theory grid of classes and types we can instead build the grid of Projective Geometries within the open space of the internally mirroring tetrahedron of the Reflexive Special System. In other words, these are the bases of the production of representational spaces. Gödel's encoding is a representation. And a side effect of that is the discovery that the generalized Projective Geometry is the mathematical basis for defining the Schemas. Once we have all the levels of the Special Systems we can combine these with the System Schema to give rise to the Emergent Meta-system. And overall we can recognize that the Gödel Incompleteness Theorem itself has the structure of the Emergent Meta-system formation. Therefore, what fails to ground all other formal systems serves as a ground of Special Systems and they serve as a ground for the schemas. And the schemas serve as a ground for our experience of things in Spacetime and of the structure of Language.

This paper has considered the advance in Schemas Theory which sees generic Projective Geometries as its mathematical basis. It has mentioned that in the context of other recent advances like the discovery that Conformal Field Theory is the inverse of the Schemas Hierarchy and that the Godel Incompleteness Theorem can be repurposed to ground Special Systems Theory. It seems like this makes Schemas Theory a complete theory. Normally in Science if we show a mathematical basis for a theory then that means we are half way there in grounding that theory. The other half is empirical support which can only be had by applying the theory. The mathematics confirms that the basic architecture of the S-prime hypothesis is probably correct. This article gives some philosophical context for believing that Schemas Theory has the right type of elements and structure to make its usage more compelling as a foundation for Systems Engineering and for the extension of Systems Science into *Schemas Science* or "Schemology" as a context for what David Rouseau[79] calls "Systemology".

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[79] http://www.systemsphilosophy.org/david-rousseau.html