

# Intentions: Logical and Subversive The Art of Marcel Duchamp, Concept Visualization, and Immersive Experience

## Abstract

*This paper examines the intersection of symbolic logic, immersive experience [VR] and concept visualization in the interpretation of the oeuvre of Marcel Duchamp. Influenced by the mathematicians Henri Poincaré and Élie Jouffret as well as his own intense practice of chess and logic, Duchamp sought to merge the poetic and visceral nature of the aesthetic experience with the logical and systematic character of science. This convolution of elements as disparate as chance, 3d and 4d space-time, linguistics, logic and authorship does not allow for comfortable definitive explanation but rather one, like his work itself, that engages simultaneous multi-dimensional thinking.*

*Duchamp questioned the purpose of 'retinal art', art which is merely visually beautiful, and examined the limitations of science as a singular method of interpreting and communicating experience. The body of his work stands as a systematic yet playful critique of deterministic reasoning. Using symbolic logic to characterize the most common interpretations of Duchamp's work, the author suggests that Concept Visualization in 3d immersive experience offers a unique method for exploring and introducing the complex lattices of interpretation, intention and concept in the work of Marcel Duchamp.*

## Introduction

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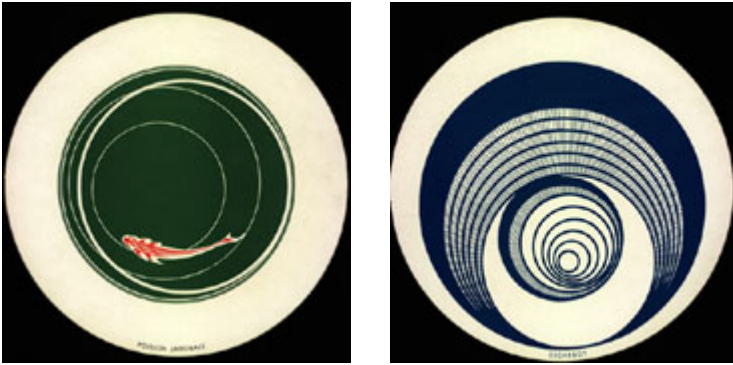


Figure 1

Marcel Duchamp, *Rotorelief (Optical Disks)*, 1935

Marcel Duchamp perhaps more than any other artist in history challenged the definition of art. Throughout his life Duchamp maintained an interest in science, mathematics, optics and art and more than any other eminent artist of the twentieth century understood and researched non-Euclidean geometry and the mathematics of higher dimensionality. Born in 1887 in Blainville (Seine-Inférieure) in Normandy to a notary's family with a history of art, love of music literature and chess, Marcel as well as his brothers Jacques Villon, Raymond (Duchamp-Villon) and his sister Suzanne became artists. Among his scientific ventures included the development of the illusionistic *Rotorelief*, (Fig. 1) spinning circular geometric patterns. Although Italian optical scientist discovered and named this optical phenomenon "the stereo-kinetic effect" in 1924, it is clear that Duchamp had discovered the phenomena in early 1920. It is clear that Duchamp understood the mathematics of this method of producing the illusion of volume. He wrote, " I only had to use two circumferences—eccentric—and make them turn on a third center".

click to enlarge



Figure 2

Leonardo da Vinci, *La Gioconda* [*Mona Lisa*],  
1503-05, Musée du Louvre, Paris.

Figure 3

Marcel Duchamp, *L.H.O.O.Q.*, 1919

The history of art is filled with artists whose discoveries and research were labeled or advocated as *objet d'art* and whose scientific utility was not discovered until many years often centuries later. However, it is the supposition of this author, that no other artist cloaked his or her intentions in deception as a tactic to subvert conventional interpretation. Noted and controversial Duchamp scholar Rhonda Shearer has garnered attention by a stunning hypothesis about the many realms of Duchamp's work. In 1919 Duchamp drew a supposed impromptu mustache on a reproduction of Leonardo da Vinci's *Mona Lisa* (Fig. 2) and titled it *L.H.O.O.Q.* (Fig. 3) When these letters are read aloud they say "Elle a chaud au cul" or "She has a hot ass" in French. Having created this work of art Duchamp stated that it revealed a truth about his noted foregoer.

Duchamp championed the "ready-made", a manufactured object transformed into art merely by its selection and placement in an aesthetic gallery or museum context. In so doing, Duchamp altered the significance of the *objet d'art* as a precious commodity created by the artist. Duchamp often maintained complex documentation of the purchase or discovery of his "found-objects". In the case of *L.H.O.O.Q.*, Duchamp asserts that it was purchased in a postcard shop on Paris' rue de Rivoli. This notion that the art object is defined and given

value by its context not by an empirical judgement of aesthetic value would transform the art of the twentieth century, greatly influencing Conceptual Art and Postmodern movements. Duchamp's assertion that art is a matter of selection and context was perhaps a precursor to Baudrillard's *Second Order of Simulacra*.

According to Shearer, Duchamp had another more subversive objective. She asserts that Duchamp's *L.H.O.O.Q.* was in fact a creation of Duchamp—a composite photograph of himself taken in 1912 and a reproduction of Leonardo Da Vinci's *Mona Lisa*. Shearer's research suggests that not only was *L.H.O.O.Q.* created by Duchamp or fabricated to his specifications but so was the snow shovel in *In Advance of the Broken Arm* (Fig. 4), the bird cage in *Why Not Sneeze Rose Sélavy* (Fig. 5), the ampoule in *Ampoule Contenant 50cc d'air Paris* (*Ampoule containing 50cc of Paris air*) (Fig. 6), and the urinal in *Fountain* (Fig. 7) signed R. Mutt (the famous object refused exhibition in the Society of Independent Artists show in 1917). This controversial theory is gaining greater attention in recent years, although not without significant turmoil. The notion of the "ready-made", would remain safe according to Arthur Danto, art critic for the Nation, and Thierry di Duve, author of Kant After Duchamp, as this concept of "art object in context" has been an accepted convention of art making and interpretation for three quarters of a century. However if Shearer proves to be correct in her assertions both Danto and the Immanent Duchamp scholar and author Francis Nauman (Marcel Duchamp: The Art of Making Art in the Age of Mechanical Reproduction) would find this a "grand act of deception."

click images to enlarge



Figure 4  
Marcel Duchamp, *In Advance of the Broken Arm*, 1915/64



Figure 5  
Marcel Duchamp, *Why Not Sneeze Rose Sélvey?*, 1921

click images to enlarge



Figure 6  
Marcel Duchamp, *Paris Air*, 1919/49



Figure 7

Marcel Duchamp, *Fountain*, 1917/64

Duchamp's work, particularly that which displays his keen interest in science and mathematics is also garnering attention outside of the disciplines of art history and art criticism. New York University Physicist Jonathan Williams postulates that Duchamp's deep play with physics or what Duchamp and the playwright Alfred Jarry referred to as "pataphysics", was a systematic way of satirizing early 20th century deterministic systems of scientific thinking. Duchamp, according to Williams, began this direction through his investigations of non-Euclidean geometry, fourth dimensional space-time, electromagnetism, and radiation. Duchamp's playful explorations of these areas seems to be a harbinger, of sorts, for some of the foundations of quantum mechanical theory such as Heisenberg uncertainty principle and the Erwin Schrodinger equations.

Duchamp's systematic critiques were not limited to the scientific thinking of the day but also confronted modes of artistic production. Duchamp's disinterest in what he referred to as "retinal art" or art which solely engaged the reproduction of visual experience was methodically deconstructed and supplanted by an art which focused on the grey matter or existed in the realm of pure intellect. "All through the nineteenth century the phrase 'bête comme un peintre' or 'as stupid as a painter'", Duchamp said. "And it was true- that kind of painter who just puts down what he sees

is stupid." For Duchamp, traditional art making merely copied itself in kind of mobius strip of mimesis and self-reflection simply cloning itself over and over again

As the myth goes, Duchamp gave up art in favor of playing chess throughout the world. "All chess players are artists but not all artists are chess players." Duchamp used chess as a kind of model for much of his work, using it in his explorations of physics, mathematics and logic. This does not mean that he solely engaged in a form of sublime mathematically derived art. He continued his love of semantics, word games and humor throughout his life one sees this in *L.H.O.O.Q.* as well as his frequent use of the alter ego Rose Sélavy (Eros is Life). Any complete and singular interpretation of Marcel Duchamp's work is quite impossible as it is a lattice manifesting complex interweaving of intentions; mathematics, science, logic, art, consumer critique word play and alter ego.

### **Parsing the Oeuvre**

The human propensity for binary oppositional thinking has been studied by psychologists and linguist and is evident in a great portion of western philosophy from Diogenes Laertus 200AD (lives and Opinions of Eminent Philosophers) to the present. Nowhere is this more apparent than in the discipline of art history, particularly as practiced in the first half of the twentieth century. Often art history has been essentially a historiography of connoisseurship, determining why one body of work by one artist is necessarily better than another body of work by another artist. This reasoning was held together by the supposition of progress, in the inevitable evolution of one mode of artistic production to another. Though not the subject of this study it is notable that when one examines art historiography (or any historiography for that matter) events, intentions and outcomes are often limited to singular reasoning. The academy, when confronted by opposing singular reasoning on any particular individual or subject matter,

results in imbroglia. Critical interpretation of Duchamp's body of work and his intentions is vested in this sort of competition between singular theories.

Duchamp consistently plays with these battles often examining them through his own prism. As Duchamp advocates the value of the "ready-made" he simultaneously describes his intent to define existence "through slightly distending the laws of physics and chemistry." By using his own form of "absurd mathematics" he simultaneously critiques scientific thinking, logic, the definition of art, the artistic mode of production and aesthetic interpretation. Duchamp writes:

Calcul par l'absurde mathématique algébrique –

Si A=intention 10.

B=Crainte 5

C=Desir-

on a une première équation

$C=a-b$

et une 2<sup>e</sup> équation

$C=A \times B$

Math ces 2 éq. Sont absurdes

$C=50 / C = 5 / 2C = 55 / 2=27.5$

Si  $A = 10 / B = 5 / c = 27.5$

Si  $A = a = 9 / B=a/ 3 =3/ C +33/ 2=16.5$

This formula demonstrates the limits of scientific reasoning by illustrating its inability to explicate immeasurable, highly personalized, data. By inserting variable equivalencies for intention, dread (crainte) and desir (desire) Duchamp demonstrates the limits of deterministic mathematics and hints at his attempts to demonstrate the breakdown of rational models of examining reality. Jonathan Williams in his article *Pata or Quantum the End of Deterministic Physics*, likens this propensity in Duchamp's work to the Schrodinger equations which demonstrated that the behaviors, qualities and position of quantum particles needed to be expressed in terms of statistical probabilities thus rendering vacant the



possibility of determining that a subatomic particle had any fixed quality at any given point in time. Duchamp's continued fascination with illustrating this notion also points out his interest in expressing the difficulty that systems of logic have in making distinct calculations of human emotional variables. As one can see when examining the diversity of Duchamp's work and intentions, traditional art historical and art critical interpreters were and in many cases remain befuddled.

## **Symbolic Logic and Visualizing Concept in the Work of Marcel Duchamp**

The seemingly innate propensity of the human mind to binary, "this not that thinking" may be fruitfully illustrated by using symbolic logic in an interpretation of the intentions of Marcel Duchamp. With symbolic logic as a form of information or concept visualization one can demonstrate the difficulty and visual complexity of examining Duchamp's work using a deterministic system of equivalencies.

First let us use the most oft cited interpretations of Duchamp's oeuvre and their corresponding significances and assign to each a variable. The following is by no means an exhaustive codification of the many interpretations of Marcel Duchamp's works it is essentially a categorization of a few of the major theories.

A. The use of the "ready-made" or "found object" asserts that by altering the context of a commonplace object it can become art.

D. The statement A allows that Duchamp in challenging the definition of the art object by exalting the primacy of the idea over the creative act he subverted the modernist convention of the artist/object and viewer relationships

B. The work was an exploration of the mathematics of uncertainty pioneered by Henri Poincaré and the study of the fourth dimensional space theorized by Élie Jouffret (*Traité Élémentaire de Géométrie à Quatre Dimensions* 1903).

H. The statement B allows that Duchamp called into question the discipline boundaries between art and science and destroys the notion of the artist as creator of 'retinal art' or the aesthetic object.

C. The work was engineered to be reassembled by the patron or viewer, who followed complex, often informed by chance, instructions. This process is evident in Duchamp's assemblage book works such as *La Boîte Verte*.

P. The statement C allows that Duchamp transformed the boundaries between producer and consumer in the art market and engaged the artist/manufacturer and viewer in the process of creation.

We will next make a formula that contextualizes more precisely the relationship between the upper level referent variables A, B and C (in this case those variables that refer to the condition of Duchamp's work rather than his intentions). Supplanting a corresponding lower case Greek letters, A becoming a(alpha), B becoming b(beta), and C becomes g(gamma) the following is the rule, universal quantifier or binding of variables governing their relationships. (Fig. 8)

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$$[\neg(\alpha\wedge\beta) \wedge (\neg(\alpha\wedge\gamma) \wedge \neg(\beta\wedge\gamma))] \quad \forall x$$

Figure 8

The above statement allows that there can only be a single interpretation of the work of Duchamp. In accordance with the current highly polarized arguments about his work the equation illustrates that, of the contemporary hypothesis, only one can be correct. The next equations maintain that there can only be a single derived intention from the overall statement of the condition of Duchamp's work. In other words the statement: "The work is an exploration of the mathematics of uncertainty pioneered by Henri Poincaré and the study of the fourth dimensional space theorized by Élie Jouffret" may only be linked to the intention, "Duchamp calls into question the

discipline boundaries between art and science and destroys the notion of the artist as creator of 'retinal art' or the aesthetic object". We may express this with symbolic logic in the following: (Fig. 9)

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$$\left\{ \begin{array}{l} A \leftrightarrow D \\ A \leftrightarrow \neg(D \wedge H) \\ A \leftrightarrow \neg(D \wedge P) \end{array} \right\}$$

$$\left\{ \begin{array}{l} B \leftrightarrow H \\ B \leftrightarrow \neg(H \wedge D) \\ B \leftrightarrow \neg(H \wedge P) \end{array} \right\}$$

$$\left\{ \begin{array}{l} C \leftrightarrow P \\ C \leftrightarrow \neg(P \wedge D) \\ C \leftrightarrow \neg(P \wedge H) \end{array} \right\}$$

Figure 9

The next section of this exploration of the work of Marcel Duchamp through symbolic logic will determine the consistency of each of the condition/intention hypotheses. First we will examine the consistency of the argument A, if and only if, D:(Fig. 10)

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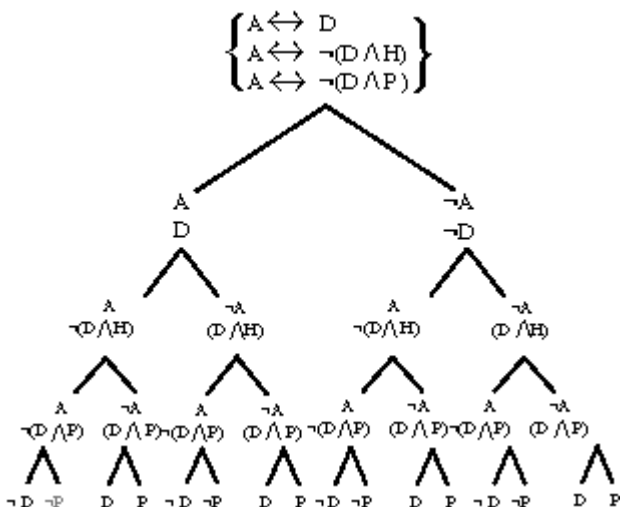


Figure 10

The statement A if and only if D proves logically consistent.

Next we have the hypothesis B, if and only if, H: (Fig. 11)

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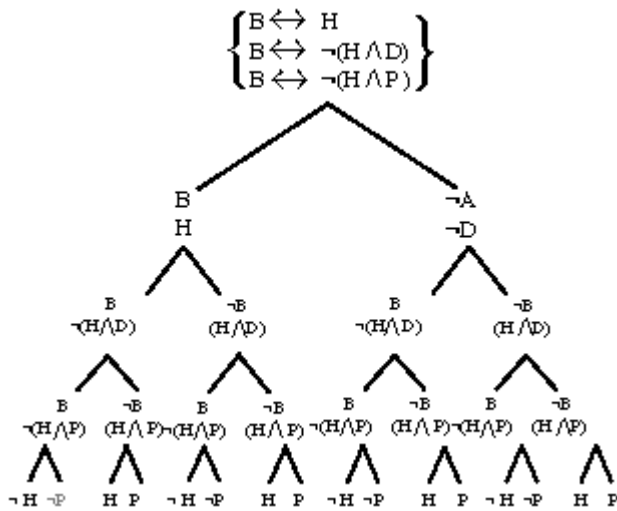


Figure 11

Having proved the statement B if and only if H consistent we address the theory C if and only if P:(Fig. 12)

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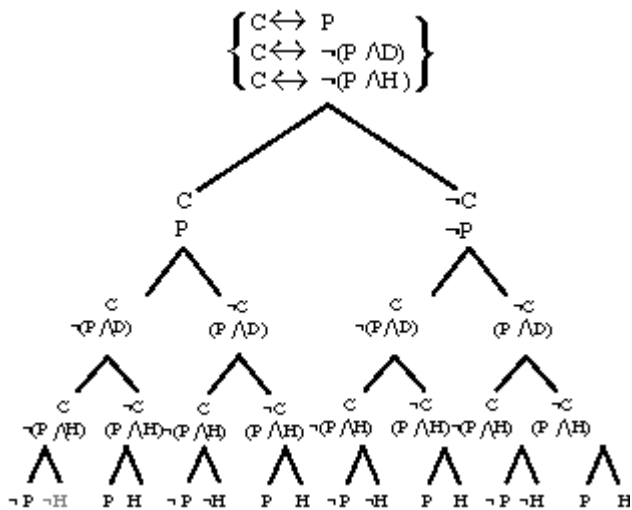


Figure 12

Having proved the consistency of all three hypotheses given the *a priori* context that only one of them is correct where are we left in this complex visual analysis of Duchamp's intentions? His intimate knowledge of Henri Poincaré's theories and his use of chance in the construction of many of

his key works would seem to indicate that Duchamp had been quietly challenging the notion of deterministic reasoning in both the interpretation of art and physical and experiential phenomena. As Poincaré suggests in 1895;

Experiment has revealed a multitude of facts which can be summed up in the following statement: it is impossible to detect the absolute motion of matter, or rather the relative motion of ponderable matter with respect to the ether; all that one can exhibit is the motion of ponderable matter with respect to ponderable matter.

In short, Poincaré asserts that all quantifiable and qualifiable information pertaining to any phenomena can only be measured relative to other qualified and quantified data. As the first to elucidate this “principle of relativity” Poincaré discerned that all explicit information about any physical phenomena in motions is best expressed in the form of a probability. Poincaré’s critique of determinism extends to other disciplines as well as he states, “The science of history is built out of bricks; but an accumulation of historical facts is no more a science than a pile of bricks is a house.” This kind of reasoning is the bedrock of semiotics (meaning in language is ascertain through the relationship between the symbol and its meaning relative to the culture that produced it). It has also been used to critique symbolic logic. The discipline itself relies on abstract patterns, its meaning determined not from the symbols themselves but from the relationship between the marks and other patterns and more significantly cultural meanings.

click to enlarge



## Figure 13

Marcel Duchamp, *Three Standard Stoppages*, 1913-14

Duchamp's connection to logic is most clearly noted in two of his most significant areas of concern: chance and chess. As a chess master Duchamp was, on several occasions, a member of the French championship chess team. For Duchamp chess was an organized, integrated and ordered whole, composed of rule based interactions wherein outcomes were as influenced by unquantifiable elements such as guile or desire as by systematic reasoning. This led Duchamp to assert that complexity in any system was inherently non-deterministic. We see this questioning of aggregation, perhaps more clearly, in his use of chance in aesthetic production.

### **Le Penseur Multi-Dimensionnelle**

Duchamp's work *Nude Descending a Staircase* (1912) was first displayed at the Cubist Exhibition at the Damau Gallery in Barcelona and later at the Armory Show (New York, 1913). This painting took the observational cubist penchant of displaying an object from multiple spatial vantagepoints and added a temporal element by rendering a nude figure in motion. This work explored the conceptual possibility of 2d painting, which displayed and illustrates a 3 dimensional figure traversing time. The piece arrives at a visceral form of multi-dimensional cognition. Partial inspired by his interest in chronophotography and the mathematics of Henri Poincaré *Nude Descending a Staircase* is perhaps his last clear attempt to use a traditional modality of retinal art to express a conceptual or gray matter art. It is also his first widely exhibited work to express his interest in the merger of science and art.

His continued interest in multiple dimensions, though I cannot prove this, is probably where we may find the solution or at least a map to a clear understanding of his work. Though we

may never have a concise definition of “what his work was about” Duchamp may have left us clues as to how we may begin to “make sense” of his intentions.

click to enlarge



Figure 14

Front view of the postcard in  
the *White Box*, 1967

Rhonda Shearer and Stephen J. Gould In their article *Boats and Deckchairs* present the most profound example of Duchamp’s trickery and play with the multi-dimensional mathematics of Henri Poincaré and Élie Jouffret. Inside Duchamp’s 1967 piece *White Box* Francis Nauman discovered a “commercial” postcard (1914) (Fig. 14). The postcard displays on its front three boats floating on a placid lake or river and on the reverse some writing. Nauman categorized this discovery as a “random notation” written on a “found object” citing that “on the verso of a postcard, Duchamp notes ‘a possible means by which the fourth dimension could be visually established through the optical illusion of two deck chairs’.” This note was accompanied by an illustration of parallel lines bisected by a perpendicular. The true nature of this object has never been addressed by art historians as the work could be safely categorized as one of Duchamp’s “ready-mades.”

The piece is in fact, an original painting not a commercial postcard. The curious parallel and perpendicular lines on the back are in fact obscure instructions. Duchamp’s fascination with rotation and relative vantagepoints indicates that a new dimension may be experienced through altering ones position

relative to an object. When the postcard is turned 90° to the right the boats become an orthogonal rendering of deckchairs viewed from a bird's eye vantagepoint. The mysterious "random note" on the verso is a plea to adjust your perspective when viewing the postcard but also, when correlated with the image from the front the piece becomes a profound statement about the relationship between the second, third and fourth dimensions.

Like E. A. Abbot's famous book *Flatland* (1885) whose main character, a square, is shockingly introduced to the third dimension, Duchamp has demonstrated for us that one can examine from a three dimensional vantage point all sides of a two dimensional object. In turning the postcard we are taking a clearly two-dimensional image and viewing it from the third dimension wherein the objects in question become something entirely different. In *postcard* he begs the analogy: that when viewed from the fourth dimension a three-dimensional object may be seen from all sides. From years of singular interpretations of Duchamp's oeuvre art historians have safely ignored Duchamp's multiple interpretations: one obvious and the others subversive. When the work is proclaimed (by the artist himself) and interpreted as a "ready-made" the hidden intention with all of its possible significance is obscured.

Duchamp disavowed models of reasoning, which relied on singular definitions. This kind of one or two-dimensional interpretation is inherently flawed when attempting to ascertain his intentions. With this in mind, Duchamp's work requires that any conceptual model of his intentions necessitates three-dimensional thinking and thusly is well suited to three-dimensional visualization.

### **Immersive Experience and Concept Visualization**

As demonstrated, the use of symbolic logic as a means to visualizing concept in the work of Marcel Duchamp is extremely difficult. Though I have not examined the use of more advanced



forms of symbolic logic (I am not a logician) it is apparent that the data, as envisaged, is not of the highest utility.

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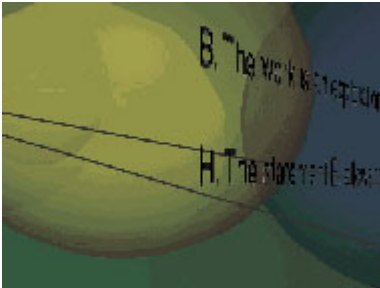


Figure. 15

Screen still from the author's *Immersive Duchamp Concept World* an interactive virtual reality computer art piece.

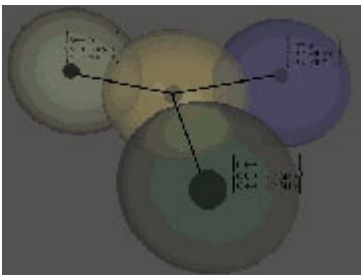


Figure. 16

Screen still from the author's *Immersive Duchamp Concept World* an interactive virtual reality computer art piece.

Clearly, Duchamp had multiple intentions and the existence of seemingly inconsistent hypotheses about his work point more to the human propensity for dualistic thinking rather than to grasping a more pluralistic possibility. Engaging data that is not quantifiable and highly subjective is difficult to manage logically and exceedingly difficult to graph. However if we create a 3d cartographic form of the logic equations introduced earlier in this paper, we make the data more intuitive and thus cognitively manageable. (Figs. 15 & 16) Using interactive virtual reality software [the software we use in this example is the Glass Virtual Reality Engine,

created by the author] one can have an immersive experience of the main theories about Duchamp's work.

The virtual reality computer art piece *Immersive Duchamp Concept World*, presents the theories concerning the artist's work. At the center of the virtual space is the entrance point to the world. The immersant or viewer may follow the map which branches off to various nodal points. Each of these nodal points represents a single theory. From the vantagepoint of the theory the immersant sees the other possible theories through a fog and translucent sheets, they are barely visible, as the immersant/viewer has chosen an alternate path (Fig. 15). In *Immersive Duchamp Concept World* the immersant is also introduced to various interactive media; readings of Duchamp's Notes as well as to still images and animations of his work and to the writings of Henri Poincaré. If the immersant chooses to fly above the object it is from this vantagepoint the viewer sees all of the theories as a totality (Fig. 16). This totality, is essentially a relativistic rather than a fixed deterministic system as the viewer governs the experience. This model for information visualization does not stand in opposition to symbolic logic, however it does allow a form of concept visualization that merges reason quantification, qualification and the visceral.

## **Conclusion**

The body of work produced by Marcel Duchamp was a programmatic, if playful, undermining of deterministic thinking. He demolished arbitrary discipline boundaries between artist, scientist and mathematician. His clues to altering our perspective were equally pertinent to viewing and understanding his oeuvre as they were to viewing individual works of art. His implicit and explicit call for altering our vantagepoint relative to his intentions inherently calls into question modernist singular interpretations. Yet, through the use of concept visualization, we can create more exploratory modes of information visualization; modes which allow for

simultaneous multiple dimensional thinking. In an immersive environment the viewer can experience a panorama of Duchamp's intentions, one that does not enforce strict rules of consistency, but nonetheless leads us to comprehension of a poly-dynamic yet visceral logic.

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Figs. 1, 3~7, 13, 14

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