Mathematics of Chaos

2018

Abstract

This is an edited transcript of an interview by Jason Louv for his podcast, Ultraculture, on July 5th, 2018. Jason is the author of *John Dee and the Empire of Angels: Enochian Magick and the Occult Roots of the Modern World* (2018), a book which grealy impressed me. And this interview, I think, is one of my best.

Publication

The audio is available at Ultraculture with Jason Louv, Episode 28: https://podcast.magick.me

Jason Louv: Hey, what's up, it's Jason Louv. And this is the 28th episode of the ultra culture podcast bringing you radical conversations at the intersections and the edges of spirituality, technology and culture.

Man, I've got an awesome, awesome guest for you today. I'm talking to Dr. Ralph Abraham, the legendary chaos mathematician, and one of the founding theorists of both chaos math and Chaos science. You may have seen him in the movie DMT, *the Spirit Molecule*. He's written tons and tons of books, including *Chaos, Gaia Eros*, and you may know some of his collaborations with Terence McKenna and Rupert Sheldrake, including *Trialogue at the Edge of the West*. Dr. Abraham is just an incredibly cool guy, and was really, really enlightening to talk to. He's now in his 80s. And he has held teaching positions all over the world, including in the US at UC Santa Cruz, Berkeley, Columbia, and Princeton, and many other positions. And he is a rare individual who has combined spirituality with higher mathematics in an incredibly profound way. He credits his discovery of the drug DMT, in the 1960s, with new insights into mathematics, and then later computer graphics, which allowed him to model chaos theory and fractals. And as he put it, in his own words, swerving his career toward a search for the connections between mathematics, and the experience of the logos.

So while chaos mathematics and teaching math have been Dr. Abraham's primary professional pursuits, he's also developed deep interests and explorations into psychedelic space, as well as the occult. And he starting in the 1980s, started to develop a really deep interest in Dr. John Dee, who, of course, I have a great interest in as well, and was very interested in exploring magical space, magical rituals, and you know, in tandem with things like DMT. And so as you might imagine, you've got one hell of a conversation ahead

of you. Some of the things we talked about in this episode include chaos mathematics. And by the way, if you're allergic to math, don't worry, we open up with a conversation about mathematical topics. And, and bear with it, because will very quickly become apparent why all of this is so incredibly important, even if you don't have a mathematical background. And by the way, not only that, but even if, like me, you have had certain times in your life where you've been a little bit allergic to math, you may be seeing math in a totally new light by the end of this episode, and be incredibly excited to maybe even delve back into learning a little bit of math. I know that's a tall claim, but bear with the episode and you'll see exactly what I'm talking about. We also talked about the occult, John Dee and a Enochian magic, including some of Ralph Abraham's own experiences, witnessing physical manifestations of spiritual beings. Believe it or not, we talked about his DMT experiences and his extensive explorations of DMT hyperspace, we talked about the role of a shaman, the yogi and the psychenaut, in society, even modern society. And we talk even about how mathematics might just be the language that God or the universe uses to communicate. So I have a little bit of a confession here. I actually went to school at UC Santa Cruz, where Dr. Abraham taught and still teaches mathematics. And I never took a class with him. I think I was too, you know, caught up in my own, my own head and my own pursuits of occult material at that time, then, of course, I was a journalism student, and all of my time was spent editing the school newspaper and things like that. But there was Ralph Abraham right there kind of living master of the Western esoteric tradition, certainly somebody with some, you know, really profound insights on it. And I never even met him when I was there. All I had to do was walk probably about 30 or 40 feet out of my dorm and I could have had a

conversation with him. And isn't life like that sometimes we're what we're looking for is right in front of us and we're too stubborn, or setting our own ideas about how we should do things to pay attention. So I still feel guilty about that. And some of my friends definitely took classes with him and had a phenomenal experience. But luckily, I was able to connect with him as an adult, he was kind enough to provide a quote for my new John Dee book, John Dee and the empire of angels. And we got to have this amazing conversation, which will hopefully be just the first conversation. So you're gonna love this. So let's dive right into it. Definitely check out Ralph's work at ralph-abraham.org. And I will also put a link to his books in the show notes.

Okay, so quick plug. Today's episode of the podcast is brought to you by my new book, *John Dee and the Empire of Angels*, a nearly 600 page history and guide to the last 500 years of occult history. A guide to how magic and the occult and the western esoteric tradition have shaped history. And a real thorough look at the ideas of Dr. John Dee, a magician, mathematician and scientific adviser to Queen Elizabeth the first, who is, of course, a primary influence on Dr. Abraham, a kind of a modern, Dr. John Dee Phil, allow me to flatter him. I think it really is true. He comes up a lot in this conversation. And he should be a profound interest to anybody who's excited by this conversation. Because all this stuff we're talking about contact with extra dimensional beings, psychedelic space, mathematics as an occult method of talking to non human intelligences, all that stuff, it's all in that book, that's the master key, the master guide, the one book that will unlock the whole of the Western esoteric tradition to you. So definitely pick up a copy. If you haven't already, you can find it on Amazon, you can find it on its own dedicated site at johndee007.com. And if you're excited by this conversation

and left wanting more, worry not because that book is the free based full on version of everything that we're talking about in this conversation. So without further ado, please welcome Dr. Ralph Abraham.

Ralph Abraham: I've been reading your book I've just finished part one only. I'm very impressed with the breadth of the spectrum of integration.

JL: Thank you so much.

RA: You know, a lot of things that I have never known about John Dee. Most especially your main line about the evangelical angle, the founding of the Americas. The idea of the British Empire and so on. I have known little about all this.

JL: Thank you so much. Yeah, it was amazing to me, as I dug into Dee and started looking at the all of the research, that all of the writing about Dee was kind of in two camps. Or actually maybe three camps. There was the writing about the scientific and mathematical accomplishments, there was the writing about the geopolitical and imperial accomplishments. And then there was the writing, of course, about the occult stuff. Often hadn't been put all together. So it's amazing when it into focus.

RA: Well, yes, I think that's a great service, you've done for the entire Dee tradition is to integrate it so well. I look forward to reading the rest.

JL: I was thinking maybe a good way to start would be just if you could introduce yourself to the audience and talk a little bit about your career and the things that you have been

so interested in over the last several decades now and the incredible work that you've done.

RA: Yes. Well, I'm, you know, professor of mathematics at the University of California at Santa Cruz, and I began my first job at Berkeley and then Columbia and Princeton, the first 8 or 10 years of my career was all in the direction of pure mathematics, geometry, topology, differential topology of dynamical systems, also known as chaos theory, and so on.

After 1968 this took a drastic turn because we discovered chaotic behavior had been observed in computational work in Japan. And the results of these experiments were totally orthogonal to the pure mathematical work that we were doing. The entire community of people interested in the pure mathematics of dynamical systems was shocked and essentially destroyed. A new tradition began based on computation. This coincided with my accepting a position in California and coming to Santa Cruz from Princeton in 1968. At that time, this was an important influence on my own mathematical career. At that time, the hip culture was flourishing throughout California, and particularly in Santa Cruz, which was a kind of a crux or epicenter of the international hip community. So that affected my work. A the same time, I was open to completely new ideas, because of the unwanted transition, and catastrophe of my pure mathematical subject, and the emergence of computation as the essential method for making further progress in the field. Because Santa Cruz was adjacent to Silicon Valley, we had early on very adequate computational facilities, especially computer graphic equipment in Santa Cruz. So this transition, with the emergence of the visual feedback on abstract mathematical systems provided by the computer graphic revolution, coincided with the visual experience of

psychedelics that were so central to the emerging and evolving hip community.

JL: Was that really the point at which those things came together for you? You talked about the counterculture influencing you, and then the influence on chaos theory. And that's absolutely fascinating. Maybe you can talk more about what that period was like, What was going through your head? Did psychedelics play a central role in that?

RA: Oh, absolutely. And not only for me, but for many other mathematicians. I knew in this particular subculture, where computational work or let's say applied work was taking over. Since the pure mathematical program had failed, we were shopping for new ideas, we were looking under rocks everywhere for a new idea how to proceed toward an effective frontier, in this really crucial area of mathematics.

So the different members of the community migrated into different applied areas, looking for new concepts to pursue theoretically. And some of these individuals experienced psychedelics directly. And others more indirectly, we were all senses. The center of this activity was Berkeley, California. Everyone was affected by hip culture, whether you had friends who were hippies or not, that was everywhere — the music, the puppet performances, the hippie clothing, the social communities, and so on. So, the tendency, the emergence of the visual method in mathematics, empowered by computer graphics, affected everyone who was working on this particular frontier and also related areas of differential geometry, which required visualization of static or moving objects in three or more dimensions, objects that were not like a solid object like a cube or a sphere.

But something much more complicated, which had interior

structure essentially fractal and very difficult to understand. What the mathematicians working in this area were all from earliest times, like Einstein, and so on, they were all visual thinkers. So the visual aspect of psychedelic experience improved the visual capability of these people and that was essential to understand what was happening with the chaotic and fractal images that were so new, so completely novel. I think that the chaos revolution could not have happened without the psychedelic revolution. And the coincidence of these two major cultural transformations at the same time can't be unrelated.

JL: It's so now you're talking about this in retrospect, and it seems so obvious that this would have happened in hindsight, but I'm curious. At the time, was there pushback was this, like an underground or people being quiet about it? Was there resistance from particularly, you know, the mathematics departments or, mainstream, you know, mainstream academia? Was it like an outlaw culture? Or was it just completely straightforward?

RA: Well, it started out straightforward. But there was a serious complication, in that the significance of chaos theory, the basic idea of it was antithetical to the entire tradition and history of the sciences. Insofar as science depended on mathematical models, which is not everything, I mean, there's observations, classifications, experiments, and so on. But when it comes to making theory, making mathematical models, in physical science, in biological science, in social science, the models that have been the most successful in these applications, were all demoted because of chaos theory, which implied that the predictions could not be trusted. The models were good for improving intuition about physical,

biological, and social systems, making a kind of gymnasium for people to practice and improve their ability to understand. Looking at the models was useful for cognitive purposes, tremendously helpful. But in terms of prediction, chaos theory implies that the models, as far as they are complex dynamical systems, they are not predictive, they can't be predictive, because the slightest change of the data input to the model could make very drastic changes to the output of the model.

JL: Maybe you can give us just the elevator pitch on chaos theory, if you will, for people who are listening who may never have heard of it.

RA: Well, chaos theory is about dynamical systems, which are... They're made in the context of what you might call multivariable calculus. So, essentially, the data which a theoretician might construct as a model for, let us say, a projectile in a gravitational field, the orbit of Mars or whatever. The basic structure of this model is a vector field. And that means a geometrical space, to each point of which is attached a vector, something that has a direction and a magnitude, like velocity has a direction of motion, and the speed of the motion. We see this all the time in a weather report, where we see that the wind velocity at each point of a map of California, for example, is shown by a little arrow. That's the basic structure, we have the vector field. And what is constructed from the vector field that gives the output of the model is the so called trajectory. That means that you start at one point, and you move in the indicated direction of the arrow attached to that point, you move in the direction and the speed indicated by that arrow and in a jiffy, you are at a new point where there's a new velocity vector, a new wind, direction, and strength for example, and then you have to turn and you move

in the new direction and in another jiffy, you have another instruction so you keep turning and moving. So they are always following the directions given by this vector field. And eventually this makes a smooth curve that goes round and round. And the outcome, the output, the conclusion of the model is where this trajectory ends up. So in the community model for climate change, for example, then this direction might be toward increasing global temperature or decreasing global temperature, the melting of glaciers, or the growth of glaciers. And the prediction of the model depends on the vector field, which controls the evolution of these trajectories.

The catastrophic discovery in November of 1961 was that this trajectory needn't settle down on an equilibrium point, like slow down and stop in a favorite location, it could move around and around in a cycle, a loop, or something like a tangled spool of yarn, or a plate of spaghetti. That's called a chaotic attractor. The discovery of chaotic attractors meant that this kind of model, ubiquitous in the history of the sciences, physical, biological, and social, the predictions could not be trusted. And this was actually realized by the founder of chaos theory, Poincare, around the year 1880. So we have over a century of an understanding of knowing something, which was not widely known until it became visible, thanks to computer graphic revolution, and analog computers developed during World War II. That's chaos theory, bad news for the sciences, because the models that you trust cannot be trusted. Because of this very unwelcome implication of chaos theory, it became unpopular, and was rejected by orthodox science. And people gave it lip service, but did not really believed this conclusion. It was undesirable because it nullified so much of historical science, which required all of these theories in which predictions were made based on mathematical models, required all of them to be revised.

Now they weren't destroyed, but they needed updating with an appreciation of the new mathematics of chaos. So it was for this reason, not because we were involved with psychedelics, not because we were hippies, not because we'd grown our hair long, and so on. It was because of this very unwelcome implication of chaos theory, that chaos theory, and all the chaos people, the community of people studying, which numbered just in the hundreds worldwide, all of this was unpopular, was rejected. Although there was a brief wave of popularity of chaos theory, around 1985 to 1990 or so, the subject was essentially brushed under the rug. And, to this day, there are very few math departments in the world where chaos theory is taught, although it's extensively used in engineering, architecture, economics, and so on.

JL: What do you think the reason for that was? Why was it so threatening? Why was it swept under the rug? And where does that stand now? Was it completely ignored, or has it been incorporated in some way?

RA: Oh, no, it's been practically forgotten. During this wave of popularity I wrote a textbook, a pictorial textbook of chaos theory, *Dynamics, the Geometry of Behavior* published in the 1980s. It was widely read, and I received mail from hundreds of scientists and engineers, who had studied it and learned the subject. Because of this wave of popularity, many lay people could well understand the implication in the excitement of chaos theory. There's a popular book which tells this story called *Chaos, the Making of a New Science* by James Gleick. That book woke up a lot of people to the possibility of really new images, new thinking, new models, new theories. So for that to be forgotten, required a certain decision be made by world-leading scientists. And that was either to learn this

new mathematics and incorporate it and revise the subject, which history demanded, or to reject it and try to stick to the old models, and keep on pretending that predictions could be trusted. And this is a whole industry of prediction, basically, for scientists, getting large grants to make predictions, and so on. So the industry of prediction didn't want the mathematics underlying their predictions to be softened by new discoveries.

JL: So essentially, if it becomes widely understood that the prediction is not really possible, and the predictive models collapse, then nobody can get paid to predict things anymore.

RA: Great, they couldn't get paid to make precise numerical predictions for a long time into the future. Short term predictions are still okay, we can trust the weather forecast on the TV news for the next three, four or five days. But not for three, four or five weeks.

JL: Do you think that's true? Even with that, you know, increasing computing power and machine learning

RA: Absolutely true. Chaos theory says you can't predict from a chaotic model, because the trajectory that you're trying to predict, is getting caught in a so called homoclinic tangle, a chaotic attractor, this pile of spaghetti, and it rapidly moves around following this spaghetti over the size of the plate. So you can only predict within the size of the plate. And that's a ballpark prediction. So we know, from our experience with the weather forecast, that it's never reliable in terms of what's the minimum and maximum temperature gonna be a week or two weeks from today. There is a prediction, but it's not what happens.

JL: See, I find that very reassuring. I can see why people would be terrified by that. But I find it reassuring because it means that we can't know the future things can't be locked down things can't be. And whatever predictive model seems to be accurate at the time can change in the blink of an eye. I mean, I guess a very shocking and prescient example, just recently was all of the predictions for the election that Nate Silver was making. The ABS were just thrown out overnight, I guess would that would that be a good example of what you're talking about?

RA: Absolutely. So the unpredictable is still happening. And that's good, because we have willpower, we have freedom of choice. We have options in the future. And to get an intuition, the mathematical models are all about intuition. You can grok a certain situation, we know the temperature, the barometric pressure, the wind velocity, and so on, will go smoothly up and down. And every once in a while there'll be a bump. We have an intuitive feeling from our life history of what to expect, and to demote our intuition and replace it with somebody's prediction from an untrustworthy mathematical model, this is a kind of science religion. So science mystifies. Science and governments use mathematics to mystify and to fool people out of their intuitive understanding and to get them to rely on some orders from the central government.

JL: This is, this is a phenomenal thing to hear a mathematics Professor say about talking about raising up the value of intuition, even in a mathematical sense. And this seems like a good place to segue into the fact that, of course, one place that chaos theory has been had a huge impact is in spirituality in general and the idea of chaos magic, in specific

and I'm curious if this is something you've also been interested in? And I know you've been interested in John Dee, obviously. So I'm curious how that interest began?

RA: Yes. Well, it's all connected up. At the time that this popular book on chaos theory was published, somehow the book and the time were a good match, because the book was phenomenally successful. Hundreds of thousands of copies were sold, translated into 25 languages. It's really amazing.

Anyway, it was popular, and I was mentioned prominently in this book. So I began receiving telephone calls from journalists, asking, what is it all about? What is the significance of chaos theory? And then I was trying to say, more or less what I've just said, something came along, that suddenly made a big difference to the whole history of science.

The questions were more and more penetrating, and difficult as to not only what was the chaos revolution, but how did it come about? So I started researching this enough to answer the questions of callers, and eventually had the material for a book, which I published in 1994, called *Chaos Gaia, Eros*, about the Chaos Revolution, the Gaia revolution and Eros revolution. It is about the application those three things to the physical sciences, the biological sciences, and the social sciences.

My colleagues heard that I was working on this book around 1988, and asked me to teach a course in the history of mathematics. So I taught this course, that was to be repeated every year, at UC Santa Cruz. After teaching, of course, you get anonymous feedback from the students, with complaints and suggestions for the course. The first time, I taught the entire history of mathematics from Pythagoras to the present. And the feedback I got from students was that this is much too broad. Why not just focus on a few people? So I thought,

okay, I'll try the extreme opposite. I'll give a course on one mathematician. And I chose John Dee. So the following year, I gave this history of mathematics course at UC Santa Cruz, on John Dee's mathematics. People came from all over the Bay Area, people dressed in black who were practitioners of an arcane magic, and knew a lot more about John Dee than I did. And eventually we had seances in the classroom. And Madimi appeared. So that's how I started.

JL: I have to pause for a second when you say Madimi appeared. What do you mean by that? That's of course one of the spirits that Dee and Kelly communicated with a young girl what was what usually happened?

RA: Well, these people were having sequences in which they would conjure angels. They had the astrology down to the exact moment to do certain call. They knew all this. An arcane magic had evolved for these hundreds of years since John Dee. Of course, this is considered nonsense by scientists and practically everyone. Denial of magic is one of those things like denial of anything that the doctor says is nonsense or science says is non existent, like telepathy or what is all what is called paranormal and which is actually normal. Anyway, they went through this magic and for them, something actually happened.

So I thought, well, let's try it out in the classroom. We had about 100 students. And we'll see how many people have a successful experience. So they conjured in this particular procedure, they brought up Madimi, who I thought was particularly interesting, because she was this small female angel, it would run up and down the bookshelves in the library when John Dee and Kelly were doing the procedure, .

So for me, personally, in this conjuration, in the classroom,

which was all darkened, with locked doors, it was quite frightening. The procedure lasted longer than the normal class time. So people from the next class who wanted to enter the classroom were locked out. And in this experience, I personally saw something. I had an magical experience in which I believed that I understood what it means to conjure an angel.

JL: So when you say you saw something, do you mean in the room or in your behind closed eyes?

RA: Well, it seemed in the room, but the room was dark, and there was a play of light as it were. And of course, by this time, I have done hundreds of acid trips, and quite a large number of DMT trips. And so I was accustomed to a certain kind of visualization of the inner space. And the distinction faded between innerspace, I mean behind closed eyelids, and outer space, like in the classroom. That is a fictitious distinction, because it's all connected up in a series of layers, as it were, in which each layer illuminates by a process of emanation. Psychedelic visualization means that a skill is practiced at seeing part of this spectrum of different levels of consciousness. So I was, as it were, prepared by psychedelics, prepared by meditation and so on, to be a receptive subject for suggestive procedures.

And the all of this is only interesting if information is produced. And of course, John Dee was doing these angel sessions because he wanted to know the future of mathematics. He wanted to know the future of science, he want to know the future of world cultural history, he wanted to enlarge his understanding, by essentially asking questions of god: what's the intention, what's going on? what should we be doing?

And that kind of information is actually forthcoming through these procedures, whether it's psychedelic, or meditation, or magical calls and so on. We have spiritual experiences, all roads lead to Rome. And the amazing thing is that these different methods all kind of converge on a common kind of understanding that the acquisition of information. For example, with remote viewing, people do a certain kind of meditation, and then they can see what's going on at a remote place, on Pitcairn Island or Easter Island or something. See what's going on and give a report that can be checked out by somebody going there and checking it out. I mean, this is amazing. It's called paranormal, like telepathy, precognitive dreams and so on.

I see all of this as a spectrum about models of consciousness, which have been explored by the ancients, by Yogi's, by shamans and so on. Over thousands of years they explored these methods of getting knowledge of remote places, and remote times, knowledge which is useful knowledge, which may be essential for evolution. For evolution in the sense of Darwin for the survival of the fittest, the fittest being the most knowledgeable, the fittest being the best intuition, the most open mind the most open heart, the Shaman, like Terence McKenna, for example, travels out, receives the information and brings it back.

It's not everybody in the tribe that has to do this. It's very costly, it's expensive, it's difficult. It's dangerous for your health, for your family, for your life. It's a sacrifice for the community to do these very radical trips, being locked in a cave in the Himalaya for six months, getting a bowl of soup under the door once a day. You have to be tremendously altruistic or maybe insane to volunteer for such service. Yet people want to do these altruistic jobs and the shaman, the healer is one of the most radical and sacrificial, altruistic job's possible.

JL: I feel like that really brings up a lot of questions in my mind. And one of them is when you're talking about all roads leading to Rome and mentioning spiritual practices across different cultures. It makes me think of when Dee is talking about angels, a question that comes up a lot is the cultural specific nous of that form, the Christian nature of it, and I'm curious, what in that experience or other experiences, if you had a sense of is this a specifically, you know, Judeo Christian experience and practice when Dee was talking about angels? Was that because he was literally talking to angels? Or was that just the language that he happened to have? For what might be a cross cultural experience?

RA: Yes, exactly. Your question is the answer. We have an experience let us say, in a spiritual realm off the planet. It's like science fiction, space travel or something. And then, we come down from this experience, and then we're back home and the sun comes up, and our friends and family want to know what happened. Now, we try to explain a totally nonverbal experience in words, we try to make a drawing of something which is not even visible.

The effort of doing that requires a kind of poetic skill. Somebody with this poetic skill will be able to evoke an image, a drawing, or a description in words of a nonverbal experience which successfully communicates the transcendental idea into the mind of the person who's listening to this speech. Poetry succeeds in evoking an image. Even though the image is totally nonverbal, that the words when properly chosen, as in the bardic tradition. So whether about angels, or when people have a DMT trip and then they say they've seen robotic spiders, or elves, or the little people or something. I think that there's poetic license brings in an image, which is not faithful

to the experience that they are trying to represent.

I've seen poetic paintings. For example, with Fra Angelica you see the angel Gabriel, and he's got these big wings. Fra Angelica spent most of his life in a monastery, in meditation. And in these meditations, he had this kind of experience I'm talking about. And then he had the poetic, his poetic skill was as a painter, he could paint fantastically well. And he would try to represent his experience in an image so that when somebody is looking at his painting, they can kind of maybe intuitively grasp what the original experience was. I don't think that he saw a humanoid with wings. But he received a communication that seemed like it's coming from one of the entities that in his tradition is called Gabriel. And the painting shows Gabriel telling the Virgin Mary that she's going to have a child. And in the painting this message goes from Gabriel's mouth to Mary's womb, in a kind of ray, on which the words that Gabriel said are spelled out.

So I think that John Dee, brought up in the Christian tradition, where there was a long tradition and literature, Angelology, trying, in a consensual way to represent the entities of spiritual experience as angels.

In India, you have these gods and goddesses, they're humanoid, but they don't have wings. It's a kind of completely different representation of what I imagine is the very same spiritual experience. This is like the placebo effect in medicine, that the power of suggestion is so strong, that the suggestion can produce an interpretation of experience.

The suggestion of angelology is that there are the seven hierarchies of angels and the archangels, and these icons, and fallen angels, devils, and all this can be mapped from one culture to another, with a sufficiently rich translational apparatus. This is just a suggestion for research in the history of consciousness, let us say that we take the representation

of spiritual experience in different cultural traditions, I'm talking about mystical literature, and including paintings, prose, music, and so on. We try to reverse engineer the translation into languages in different traditions, cultural traditions, try to go backwards up to the original experience. And I believe that these roads all point to Rome, that there is a universal spiritual experience, which is described differently in different traditions. And when people are brought up in this traditions, then there will be the tendency to identify the spiritual experience with the traditional expression of it in their culture.

JL: And yet, I'm curious, you know, in that light, which seems so eminently sane and approachable, we then have to think about well, back in the real world, people have been killing each other to forming tribal groups and killing each other over, you know, my new, different, perhaps interpretations of the spiritual experience or different gods and religions and forums and that type of thing.

RA: Yeah, Terence McKenna was particularly adept at describing the benefit of the psychedelic experience, as busting out of these belief systems, where someone is born in a certain tradition and takes it all too literally, as in the fundamentalist interpretation of the Bible. And this leads to these wars as in, what I believe and what you believe are inconsistent, so one of us must be right. And I know, for me, this psychedelic experience separated me from my own culture that I had been brought up in. But there's a whole bunch of stuff that I believed and the psychedelic experience gave me a fresh look at that. Like when I traveled to India, I saw American culture completely differently because I was then in a different culture. The psychedelic trip and the trip to India had very similar

effects in busting out of the traces of belief systems of faith, busting faith, and replacing it with more of an appreciation of nature and the ambient universe, as it actually is, at this time, and at the nearby times in recent past and future.

JL: Well, I'm curious what your what your process through the psychedelic experience was like, particularly, I know that you've written a lot about the influence of DMT on you, and you've mentioned it a few times in the interview, I'm curious how you got interested in DMT. And maybe what some of your experiences were like with it, I mean, 100 times as a lot of times to do DMT, I can count the number of people I know that have done DMT that much on one hand, and it's not the whole hand. So what was what was that like for you?

RA: Well, I was fortunate. First, I had the preparation of my LSD trips, which were pretty radical, I don't recommend it to anyone. It's dangerous.

JL: What do you mean by that?

RA: Psychologically too much of a stretch, to have everything relativized. And your very perception of reality, somehow expanded consciousness, as they say, that can be difficult. I think that my mathematical work, and my interest in music in childhood, kind of prepared me, so that I had very pleasant and informative LSD experiences, and therefore, I repeated them because I felt I'd learned something and I wanted to learn more. So with each trip, I would go back to where I left off the last time and do further exploration, that was my fantasy about what I was doing. So then, when a friend gave me a sizable quantity of a very trustworthy and high quality DMT crystal, I just wanted to try it out. And what

happened was so amazing. I did this in a darkened room at night, sitting on the floor, and smoking crystal in a glass pipe. After one inhale, I would fall over. And I was like, instantly, in this other reality. I had a friend, and we would hold the pipe for each other, taking turns. And try to repeat a few times. But it's actually only the first time which is totally successful, then the kind of the battery has to be recharged for another experiment another day. But I had this intensely visual experience, which I felt I could interpret mathematically. It goes on, I don't know if it was 15 or 20 minutes, and then you come to and you can't really remember what happened because it was so different. And there were no metaphors visual or verbal or music or anything. So I repeated this experience in the course of several months. And then I was afraid it was might do brain damage or something and I didn't want to overdo it. And I also thought I had learned all I can learn. So that experience around 1969 I think it proceeded, by about five years, my exposure to computer graphics. And as I learned to do computer graphics in the course of my career, I also wanted to use computer graphics to compose some kind of abstract animation, which would be my version of Fra Angelica. Aided by computer technology, try to give an intuition or vague idea of a DMT experience to somebody else.

JL: I'm curious as to bring it back a few a few beats when you mentioned that you had the sense of coming to a point where you had learned what you needed to learn. And I think Terence McKenna said at one point, you know, when you get the message put down the phone, but with that much DMT I'm curious what it was. I mean, when you talked about your first DMT trip about it being you know, there were no metaphors. It was hard to process but when you had that

much experience with it, that's so much more experienced. And I mean, very few people even do DMT. But that's much more than most people have. So I would be really curious to know, and I'm sure the listeners would be to know what it was like, by the time you had done that much and what was it? What was the point? What was the turning point that led you to decide that you've learned what you had to learn? Was there a conclusion that you came to? What happened?

RA: Well, on the first DMT experience, it was just this wonderful thing happened. And in the next experience, I wanted to know if that would happen again, or it would never happen again. And after a couple of experiences, I noticed that I could return to a vision. And then I could notice something that I hadn't noticed before, like there would be a kind of a synchronous resonance, or harmony, between the higher-dimensional motions in different areas of the field. And I would imagine these as presenting a sort of intelligence, as if it was one entity, but it was not connected in the space of this field. So that would be kind of a new discovery. I know that phenomenon was probably happening before, but I hadn't noticed it. So what else hadn't I noticed? And I pursued these experiences until I didn't really notice anything new anymore. I thought, I'm spending my health and I'm not gaining intellectually sufficient bang for the buck. So I just stopped.

JL: So I know that, of course, you know, famously, Terence McKenna used the metaphor of self transforming machine elves, which never matched up with anything I saw on the DMT experience. But one thing I do have to ask, which I think is a question that everybody comes back from with DMT, or perhaps goes into the DMT experience trying to answer for themselves? Is the entities or beings that are

perceived in that space? Do you think they are psychologically or chemically generated by the brain in some way? And, and or all say, do you think that those are actual external entities or external dimensions that are being visited? Or is it just the brain doing stuff?

RA: Well, from all that I've said about the mystical literature, and the convergence of messages from higher consciousness over the millennia, and so on, obviously, I believe there's a universal validity to the experience. I don't believe in elves. I used to sometimes trip with Terence, and he would come back with a new description of his experience in terms of these multi dimensional elves. I thought that was just a description of common experience, a shared experience, but just a different style of representation, a different strategy of communication. So I imagine that my experience was the same as his experience. And my description of it was radically different from his description of it. But there is no way to prove this. It might be like this with the mystical literature of the ages, including all the writings of John Dee.

Especially his mathematical work, which might be a direct perception of a metamathematical universe as described by Plato. Some people think mathematics is a cultural creation, that people have created this mathematics, and out of that people created this other mathematics and so on. But to me it feels more discovering another reality where these things exist. Like the five platonic solids exist in some kind of mathematical universe that we perceive. They're the furniture on the deck of the boat, and we are discovering by going there, like archaeology, we dig deeper, and then we dig deeper, and then we report our discoveries with photographs and drawings and whatever. And then another generation of archaeologists will come along and they will dig deeper.

The Platonic or Pythagorean version of reality is that there is a universe in the sky of mathematical objects, and ordinary reality is built by sort of shining a bright light through a blueprint in Plato's mathematical universe. And the bright light shines through the blueprint, and gives a form in the material universe, around which material matter can condense, as it were, and create objects that are out of stone, that are pyramids, similar to a tetrahedron, you see. So it's a kind of religion, a Platonic or Pythagorean version of religion, in which it appears that things down here make sense, because something is making sense up there.

And a lot of these fantasies of reality, have something big at the top, like Plato called the Good or Plotinus called the One. And in India, maybe it's called Brahma or Shiva, or something. I don't think there's necessarily some sort of universal intelligence at the top. But there appears to be a closet full of mathematical models, which we are discovering, especially since Kepler and Galileo. We are discovering more and more of these mathematical tools that can be used to model nature amazingly well, because it almost seems as if nature is built upon these structures from the sky, like chaotic dynamical systems, catastrophic, bifurcations, and so on. The mathematics is useful, because somehow, different levels of reality, are all hanging together in an amazing way. And that's the only evidence I have for the Platonic idea.

JL: That's such a fascinating wait and direct way to put it, and I haven't fully thought about it in that way. But it makes perfect sense in the sense of, not only not just observationally, seeing mathematical constants expressed throughout nature everywhere, but, you know, for instance, when we're talking about psychedelics, you know, in LSD experience or other psychedelics, DMT you see, you know, like, you're saying

things that look like computer graphics, things that look like very precise, geometrical patterns and shapes. I mean, even if you push your eyes, your fingers on your eyes for too long, you'll see geometrical patterns.

And it's amazing to me, when you're when you're talking about that, you know, as Plato might suggest that we're uncovering a deeper world or a deeper architecture that's literally there. And certainly, I could relate that to Dee's ideas of for instance, his introduction to Euclid elements where he says that mathematics is the way to study God, you know, it's like if you want to understand God, and what reality is, mathematics is the only language or one of the best language that we have. And it's amazing to me that idea has been lost. And for instance, kids learning mathematics even when I was learning math, in high school, I, most kids become very bored with it, because they don't see the practical application. But when it's reframed in the sense of like, no, this is the language that you use to understand reality, when suddenly it becomes the most fascinating thing in the world, which is what happened to me when I was writing this book about John Dee I saw all of this in a totally new light. And all of a sudden math was like the most fascinating thing for me, you know, an English major.

RA: Wow, that's amazing. I'm so happy to hear that. Yes. I don't even want to get into this subject. But mathematics has been ruined in schools, the educational system, you know, people have had their natural mathematical intuition or capability or mathematical function destroyed in school so they don't even believe what they already know. And that's such a shame.

Dee's preface to Billingsley's Euclid was written in January 1572. That was approximately a generation before Galileo

wrote his version of this, where he said God has written us a book and this book is Nature. And if you want to be able to read God's book, then you have to learn mathematics. And he says, by mathematics, I mean the study of lines, circles, and spheres, things like this. So, Galileo did not know about fractal geometry which was discovered in 1975. As soon as fractal geometry was not only discovered, but maybe made visible to the entire world through marvelous computer graphic pictures, then people saw fractals wherever they looked, clouds are fractals waves are fractals, the detritus on the forest floor, all fractals see them everywhere. So Galileo didn't know that now, since we know that we see them everywhere. So, we are discovering the mathematical archetypes bit by bit over the long course of time, and many things are yet to be discovered. And many aspects of nature are yet to be seen or grokked. Because the mathematical equipment has not come forward.

If it's not taught in school, if the ability to think in this way and to understand and make the correlation, the resonance of metaphoric relationship, between the mathematical objects in this representation of Nature, then the knowledge is essentially wasted. So, in hhis mathematical preface, Dee has created this chart, at the end of the preface, called the ground plot. And the ground plot is a map of mathematics and not as was known as his time, but as he imagined it. And all his imagining turned out to be true, the applied mathematics in every field that he could think of: sociology, economics, psychotherapy, and so on. He laid out this structure for the gradual application of mathematical archetypes into the understanding of every aspect of human experience.

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