

# Mathematics and the Orphic Revival

talk by ralph abraham, ciis, 23 feb 1990

It's nice to be here in a city. I've been in the country for a long time and I guess it's difficult to come to a city when you've been living with deer and raccoons for a long while. I've been working on a job of archeology, of intellectual archeology. At the present time I'm still lost in myriad details of many fields in which I'm not a specialist, so I can't really give you a polished presentation or the definitive word on the subject. I put forward the title that was announced a long time ago, when I didn't have the responsibility to think of an actual talk on the subject. It's much too large to address, too large to organize, and too large to remember enough facts. It's easier to write a book about it than to organize a talk. But since our subject deals with chaos and I can stand in front of this wonderful painting to speak about it, I think you will have the patience for a kind of hologram on this subject. I might pare it down a little now that I have the feeling of the place we're meeting, and speak just about Orphism and the Family.

The Orphic trinity -- Chaos, Gaia, Eros -- is a kind of early model of the nuclear family derived from the abstract trinity, the number three, Trivea(?), the triple goddess of the paleolithic past. The first and most difficult part would be to share some idea of what I mean by the word *Orphism*. It's a personal meaning -- nothing you can find in the encyclopedia. The reason this is difficult to talk about is that I'm using Orphism as kind of a neutral word that encompasses the entire history of consciousness. That's why it's a tall order to make a map of this. My main idea, and the reason for going about this work of archeology, is that there is a certain symmetry between our past and our future.

Eric Voldowen, one of the leading historiographers of our century, presented a theory of the history of consciousness as it were, in which history, prehistory, future history and science fiction and so on, were equally arbitrary. According to him, the past and the future symmetrically unroll from the present. Each generation, each person and each year of thought must recreate, reinterpret the past and take seriously all possible past scenarios which are consistent with the data, if that's an important criterion for you. The data is changing on a daily basis as people discover new things in the dirt and also reinterpret old things.

My idea of Orphism is a personal reinterpretation of the past and the future, and the reason for being interested in the past is that we would like to have a future. Many of us feel that we're in sort of an evolutionary dead end at the moment. If this had a cause that was simply a mathematical principle and we could learn it, then we could participate in the creation of future. The mathematical law of evolution must be discovered in the past; not in any particular past but in the field of all possible pasts and the way in which this field interacts with our current consciousness and our actions and lives which are creating or de-creating our future. That's my motivation. One idea which has guided me is a mathematical one from the current frontier of chaos theory on bifurcation -- that there are mathematical laws, mathematical models, for abstract, evolutionary processes. One feature that these

mathematical models all have in common is their way of undergoing sudden change. At present, we seem to be faced with sudden change. The climatic record, for example. We have ice ages -- that's normal for Gaia -- and then we have interglacials which are kind of sporadic fevers. We are in such a fever now, the holocene(?) interglacial. When these interglacials, these fevers, come and go, they happen very suddenly in the scale of geological time. And they depart very suddenly. So we are not either at the beginning, in the middle, or at the end of an interglacial.

In our cultural evolution, we are also in a kind of fever, an interglacial. It started suddenly and may depart suddenly. Our best hope to gain some conscious awareness of these processes of sudden change in our global system - - grokking our life situation -- might be to look through history for such sudden changes, and try to understand them. In the '60s, for example, a massive and unprecedented social transformation took place, but the fever soon passed and the social organism regained its customary temperature. The renaissance, when suddenly the translation into vernacular languages of classic books and other miracles produced a situation of massive cultural change, has a certain resonance with the change we experienced in the '60s. The early Christians, the troubadors of the 12th century and so on, these were sudden changes. I believe that the most important sudden change we could try to understand is the one in which the patriarchal paradigm -- androcracy -- swept over the Gailany, the planetary society based on goddess religion which had existed for millennia.

This, as many people now believe, was the sudden change that put us on an evolutionary death track from which our escape requires the recovery of the Gailanic past. Unfortunately, the arrival of this patriarchal wave, the kergen(?) wave, coincided exactly with the beginning of written history. That makes the Gailanic past difficult to divine. You don't learn about it from books, but from pottery; not from hiroglyphs, but from cave paintings. There are people like Marija Gimbutus, for instance, who read it so well. Her book on the language of the Goddess is an example of this.

The process of trying to understand the past in order to interact better with the future is a personal process of growth through which everyone has to pass. Each person must participate in the discovery of their own past by digging, like an archeologist. You start with the most recent level. Then you dig that up, and underneath you find what went before. This is a temporal sequence in reverse order, but after discovery, the sequence must be played forward in order to reveal some kind of resonance with the pattern of history, the historionomy.

Some years ago I came across a book called *An Experiment With Time* by John Dunn. He said that we have precognitive dreams, and that he had actually experienced this himself. In case you think this unlikely, you can do an experiment yourself. Here are the instructions: keep a pen and paper by your bedside, and upon waking during the night or in the morning with a dream, jot it down as quickly as possible. Eventually you'll have a record of all these dreams, and the question is whether any of them actually occur later on. He said that if you read the sequence in the normal order, your mind will always play a trick on you. If the event was first dreamed and then later experienced, your mind will make you think that you first experienced it and then dreamed it. So he recommended the following experiment: write the

dreams down in the order in which you dream them, and don't look at them for several years. When you do look, read them in reverse order. This will trick your mind into admitting that as a matter of fact the event actually followed the dream. I tried this experiment, and it worked phenomenally well.

My strategy with this fictitious history is more or less the same. I have dug it up layer by layer going from the near past to the far past, and now I want to play back a little bit of my own historical fantasy in normal order to see if there's any resonance. You have to understand that this is not the last word on history or anything, it's just a personal experience, and I encourage you to do your own. I'd like to emphasize the bifurcation as an overall pattern which comes from my technical work in mathematics and geometry. Let me draw you a picture of what I call *Orphism* from the distant past into the present and beyond. Orphism, as an official word in the dictionary, refers to a period of less than a century, overlapping classical Greece where Orphism was the most important religion of classical antiquity. We could call it the Root Orphism. Then somewhere along the line it passed through Official Orphism. In India, there was the religion of Shiva, and at some point the East-West bifurcation occurred. I won't pay too much attention to it here. Then there was a kind of a split that had to do with the arrival of the patriarchy through the turgid waves, or as Riane Eisler calls it, *Androcracy*, the dominator society.

A lot of values associated with the Goddess had to be disposed of at that time, but they are not disposable, being universal truths. And so they ended up in the unconscious. This is what I mean by the split between conscious and unconscious. Maybe the bifurcation between the unconscious and the conscious existed always. If so, it would seem that at that certain time the unconscious grew enormously at the expense of the collective conscious, which shrunk an equivalent amount. All that is what I mean by Orphism. A long time ago, maybe in 20,000 B.C., there was a planetary society of the Goddess religion that produced the famous Graveti and Venus statuettes, sometimes called The Fat Woman statuettes, which covered the entire globe. I believe that the reason this female figure is so round is not because she is overweight or pregnant, but because she was a model for the earth, and that in the epipaleolithic times people knew that the earth was round the same way that we know it now.

This is distant prehistory. There's not that much evidence, but what there is has been much studied and is still controversial, most particularly cave paintings and sculptures. There are also handprints and footprints in caves which have been interpreted as being steps for a ritual dance. So there's a lot of speculation.

We can actually know a great deal about the epipaleolithic by putting ourselves in a paleolithic situation. I lived in a cave in India for some time, and through that experience I felt an affinity with cave people. The larger caves are very cold, they're good for rituals. The smaller caves are for living, they warm up quickly -- you need a small fire in order to keep the jungle cats out. The large caves that were used for ritual became the model for churches. Why do churches have domes? All these things occur to you if you spend a few days in a cave. I don't know if there's any validity to this, except for the feeling, the resonance of oneness with those people. They certainly had all the intelligence and knowledge that we have including social

graces, religious ideas, the capability of survival. In fact they were better than we were in their relation to ecology, and not just because they were not very numerous.

The beginning of the Neolithic, which is to say the agriculture revolution, was a peculiar social transformation which is not much understood. It happened in many places more or less simultaneously all over the planet, with different animals and different plants. According to one theory, it diffused from a certain point. People have tried to locate this point. There's an article in a recent issue of the Scientific American with a theory that it radiated simultaneously from three points that were close together in the ancient Near East. Anyway, it's hard to tell how this happened, but it seems to be that it's more like a phase transition where you have a bar of metal or mercury or something, and you heat it up and it begins to melt sort of all over, a little bit here and a little bit there, and then these melted traces grow and each one of them seems to be the center -- you just have to seed it like a cloud, and it begins to precipitate all over.

Phase transition is one of the events in the physical world that's a model for sudden transformation. It can help people who like physical models to understand social transformation. In Sumer, there were a couple of interesting aspects of Orphism that were part of the commonality of this entire history of consciousness wherever it occurred. One is the myth of Inana and Dimutsi. Here we have a kind of evidence, i.e., poems from, let's say, 4000 B.C. or thereabouts. The goddess or queen goes to the underworld -- not by dying, but by using her special powers. There she is killed by a kind of competitive or alternative goddess of the underworld, and then she's allowed to come back home again, but only on condition that someone is sent in her place. She sends her consort, a god or young king.

Later in Crete, in 2000 B.C., we have a similar story, the story of Orpheus, which gives its name to Orphism. He descends into the underworld. Analysts like Jung interpret this underworld as the unconscious, which is where it goes because conventional reality agrees that things like feelings, precognition and so on do not exist. They aren't logical, so they have to be repressed to the unconscious. That's one possible interpretation of the underworld in the Orpheus myth. The Orpheus myth is a little different from Inana and Dimutsi; Orpheus' lover dies, and he goes to the underworld to bring her back. He storms the portals of the underworld with his power as poet, bard and musician, and with the magic of music brings her back on condition that he must not look back, but he does, and so she's lost forever in the underworld. The theme is common.

One of the root concepts of Orphism which is carried by this myth is that there is an underworld and that there is a soul which persists after death. The soul transmigrates between bodies and the participation in this supernormal activity by animals, rocks, trees, plants and so on is basic to the habits and traditions of Orphism. Another thing common in Sumer is the sacred marriage. This, I think, is part of the transition from the Goddess to the God paradigm, in which a goddess and a god coexist at the same time. First there is a big goddess, then a big goddess and a god as small as a child, then the small god gets bigger and bigger until they're sort of equal size, and then they're a couple, and eventually the god kills the goddess. There are written records in cuniform poems of the sacred marriage, as it began in Sumer. The king is mortal, and the goddess is immortal. The king

obtains his power from the gift of the goddess so that the fields will be fertile and bring good fortune. The goddess's gift is arranged in the divine marriage. This divine marriage has to be renewed annually and takes place in a festival which is the original pagan new year's festival. In Babylon, around 2000 B.C., in fact from about 2000 B.C. to the time of Christ, there were 2000 years of the regular performance of a particular form of new year's festival called the Akitu(?). It included a divine marriage, the procession of gods and goddesses carried about the city, and most especially, the recital of the Creation Epoch.

The Akitu took 11 days in which everybody in town participated in this religious ritual. On the fourth day there was a recital of the creation myth about a couple living under the water. The main god and goddess thought of them as a couple and kind of a nuclear family because they had a child named Mumu. Different kinds of water mingled in the water. (??) The mother of this family became the dominant one, she was called Tiamat and is represented as a dragon. Later she became what in the Orphic trinity is represented by the word Chaos. So chaos, underwater, sea serpent, unconscious, you know, that's Tiamat. The two of them created everything in a certain sequence, which is very similar to our creation myth of Genesis. Among the created things were lesser gods and goddesses, the new gods, who, in political institutions like this school, have to question the authority of the older gods and goddesses and finally somehow dispose of them.

There was a revolution, and the revolution was led by the younger god, Marduk. Eventually there was a battle between Tiamat and the older gods and Marduk and the younger gods, and unfortunately for us, Marduk won. He cut Tiamat in half and opened her body like a clam shell, and from the two halves he made the heaven and the earth. In between there was a gap, which is more or less what we inhabit. So this was the actual creation myth of the Babylonian theogonomy recited for 2000 years on the fourth day of the Akitu festival. The god replaced the goddess, essentially. And this god, Marduk, was a god of law and order.

The goddess was not the female person in the sky, but an abstract, cosmogonical principle, the source of all creation, which is Chaos in Greek. In every culture there is a nuclear family of gods and goddesses involved in an evolutionary process, just like in our own society. Eventually in this evolutionary process there are catastrophic moments where one or the other faction in the family gains ascendancy. So these are the aspects of Orphism: the sacred marriage, the domination by the god of law and order, Crete as the place where the goddess persisted for the longest possible time. There is an extensive Greek literature that refers to these Cretan rituals. Later, what had been practiced openly in Crete was practiced secretly in Greece, giving rise to the Orphic and Eleusinian mystery schools.

In Crete, the first goddess was called Sumeli or Ritomartus. Then there was the little guy, her consort, whose name was Dionysus. Dionysus got bigger, they became the loving couple, and then there was a child, called Zeus. For generations afterwards he remained just another little boy. Eventually, this myth evolved and transformed so that Zeus and Dionysus were kind of combined and they became Zeus, and eventually they emerged as Yahweh of our day. That was almost 1000 B.C.

There was a definite underground by then. It was represented by little houses overground that were like an elevator down to the mystery schools. The underground mystery tradition of Orphism decreed the penalty of death for revealing the Eleusinian ritual, but fortunately there are some clues in the literature. It was like the Masonic Temple of our day.

A leading devotee and spokesperson of this extant tradition was Hipatia. Hipatia was the greatest Greek mathematician of her time. She had the audacity to speak openly of the goddess in an era when women weren't supposed to speak at all. However, her father was Theon of Smirna, whose version of the Euclidian elements has come down to us through Arabic translations and became the geometry textbook that many of us studied in high school. He was the rector of the University of Alexandria, which was called the museum, and here Hipatia became mathematics professor and loudmouth spokesperson on behalf of the essential principles of Orphism. She taught about the trinity of chaos, gaia, eros, for which she was punished around 425 A.D. by martyrdom. She was assassinated by a mob hired by the Catholic Bishop of the town who dismembered her alive with clamshells. In short, she was shelled to death. This act of terrorism pretty much put an end to Greek mathematics and to Orphism above and below ground. Within 200 years the Platonic academy was closed and all its professors fled to the Arabic world. Orphism and the Greek miracle was history. A lot of the precedents of Orphism are sort of a fictitious revision of history by myself on the basis of some reading I've done, and everything else [what?] is equally fictitious about Orphism in ancient Greek times. There's an excellent literature by well known and very capable scholars that anyone can read.

So now we come to the time between 425 A.D. and the present, and I want to talk a little about what happened to Orphism in the meanwhile. My discovery of this entire story started with my technical research in chaos theory when journalists from various magazines and television stations called me up and asked about the history of chaos and what does the word mean. In trying to find out about it I discovered this story, and I'm still trying to find out more.

The first time the word chaos occurs in literature is in Hesiod's Theogamy. I found out that this was a translation into Greek from an older Cretan tradition, so I went back there step by step and noticed that many elements in the Orphic story in both Eastern and Western versions are very resonant with my own experience in the 1960s. [PLEASE ELABORATE]That's how the concept of an Orphic revival arose in my mind.

The sacred goddess, the spirit that lives in the stones, the integrity of the planet, the cosmos and the universe -- all became submerged because they did not fit into the ordinary consensus reality of Marduk, the law and order god, and his cohorts like Yahweh and others. Throughout history there have been brief upwellings from the collective unconscious of these Orphic elements. When I first experienced this in the 1960s, I didn't recognize it -- I had never heard of Orphism. And then along came Riane Eisler's very interesting book, *The Chalice and the Blade*, where she gives a name to it: Gailanic Resurgence. It is a phrase that recurs throughout her book.

Eisler sees the time before the Kerigan Waves as a certain state, such as liquid, and everything up to the present moment as another state, such as

solid. Every once in a while she recognizes a little melting between early Christianity and Orphism. In the Troubadours -- Elenorof, Acuten, who gave rise to Petrarch and Dante and so on -- there were common elements which she identified with the original Gailanic culture as known through its latest and only historical remnant, Minoan Crete.

I eventually saw my own experience in this context as a Gailanic resurgence. And so I'm doing chaos research, and the chaos idea has caused a kind of revision of the whole science scene. Once you know that this classical Cretan version of Orphism was translated into Greek with a trinity of three principles -- abstract, so-called cosmogenic principles that are called Chaos, Gaia, Eros -- you can see that these three are somehow involved in a major evolution in the history of science at this particular time. Perhaps this is not a coincidence.

This brings us up to the present, maybe not just the '60s, but this whole century. Since Madame Blavatsky, Rudolph Steiner, Gurdjieff and so on, we have been feverishly involved in a Gailanic resurgence on a massive scale, and this historical accident or incident over which we had no control may represent some kind of opportunity if we can recognize and experience it correctly. An opportunity to have a future, thanks to the green perspective of ecology and feminism. We've had 6000 years of a certain type of social organization which appears to be an evolutionary dead end, and in order to change it, some people propose that we try to study Minoan Crete literature to learn exactly how this society worked.

Exactly how did the partnership of the genders work? Was there a king and a queen living in a castle? And how about the rituals that were celebrated openly -- should we resume them as we did in the '60s with full moon festivals on mountaintops and rituals in which the main elements are music, feelings of love, and sensitivity to the whole planet? Should these rituals be revived? Could we somehow go back to Minoan Crete? I reject this idea because once we were there, we soon ended up here. To somehow get back on that track isn't enough. We have to do more. We have to understand more. Our challenge now is to do something that's never been done before.

Law and order, and the reason why Marduk had to kill Tiamat in order to create the world, has something to do with the patrilineal concept. Although the man and the woman were supposedly partners, as a matter of fact one of them, namely the man, owned everything. In the next generation, everything had to be given to the son upon death. Therefore it was very important to know if you were the father of the son. Of course it's a whole lot easier to know who the mother is than who is the father, and the rituals of the '60s, the Orphic rituals of Minoan Crete, the Pagan rituals of the Druids and so on, all involved certain sexual libertinage at the full moon and New Year's Eve celebrations, and that was incompatible with the patrilineal strategy for passing down the ownership of the property.

So along with patriarchy came the necessity to know the father as well as the necessity for the monogamous contract which, in mythology, is evident in the sacred marriage. The nuclear family was born of the patrilineal concept, and along with it, a certain competitive aspect having to do with being manly. This may not necessarily be a genetic heritage. In the Gailanic period up to 6000 years ago, cities stood for thousands of years before they experienced

any war, as suggested by the fact that the walls of cities are intact instead of knocked down.

I think that besides our fatal interaction with the biosphere that has lasted for the past 6000 years, one of the chief characteristics of our time is the nuclear family, which begets sexual jealousy and violence. Another chief characteristic is the repression of everything Orphic like sexual rituals, prognostication, cooperation, and a sacred relationship with the planet.

[Side B]I have to end there, because I do not know how to map Chaos, Gaia and Eros, the sacred trinity of Orphic times, into the nuclear family. The word Chaos is feminine in the Greek of the period of Hesiod. And so is Gaia. She is not necessarily just planet Earth, but the entire mundane world of matter and energy. Chaos is the realm of all possibility, out of which all creation arose. There was an Orphic Bible, the Orphic Canon. It had its Genesis, which was called the Rhapsodic Cosmogony, and the Rhapsodic Cosmogony makes it clear that chaos is the source of creativity. Everything is created from chaos and will end in chaos. Gaia is the matter that all possible forms are made of. Here are all possible forms, and here is the matter, and putting it together is the role of Eros. That is the meaning of these three words as they appear in Hesiod's Theogony of 800 B.C. Two of them are feminine and the third is bisexual. Any kind of map of these three, the sacred trinity of Orphism or of the triune Goddess, or any other trinity in a nuclear family would have to create inequities, hierarchical relations which are intrinsic to the biology of the nuclear family, but which are not necessary on the level of cosmogonies. So what we might want to avoid in the future is the anthropomorphic projection of images onto abstract concepts, the projection of images carrying hierarchical order.

The idea of disorder was not attached to the word Chaos until about 400 years after Hesiod. It took that long to develop some images of it. I'm not sure whether there is a gain or a loss when you attach a whole lot of images to an idea. Artists represent Eros as a little guy with wings, you know, a little cherub with wings. Tiamat was represented as a tremendous seamonster with the head of a dog and a really long neck and four little legs. I personally find that I have abstract ideas which strongly connect to feelings and to things that have no words and no visual images but that are really important to me. I can intellectualize about them with myself, but not with you because I don't know how -- do you know what I mean?

There seems to be a progressive order from Chaos to Eros because Eros implies sexuality and the unification of the male and female principle, and Gaia, like the earth spirit, is intermediate. If we think of Gaia as the whole nature of the planet, we see it as a being, a consciousness, like a cyclic interactive system, but at this time it hasn't really yet personalized itself into male and female forms, so it's still sort of asexual. Out of that Eros derived, creating genetic combinations among individual beings running around on the planet and interacting with each other .

We're at a time in history and a place in evolution where we must talk about gender. We must have a feminist revision of history and we must question everything we've been taught and everything we thought. I don't think that gender in the mammalian species is the ultimate meaning of two. That's just one dichotomy. Somehow biology actually helped form the planet in the first

place, so it's like which came first, the Gaian or the whole complex?

[PLEASE ELABORATE]

It's said that every society begins with a cosmogamy. It starts with a theogamy which is the creation of the older gods and is followed by a cosmogamy which is the creation of the newer gods. Then matter and light and forms and breath arise, and then form emerges from the void. I don't really know if we need a cosmogamy to go on. I don't see the point of the Big Bang Theory and trying to resolve the Chicken and the Egg problem, because I don't really care. Once I was teaching calculus at the time of the high Jewish holidays and came to know a Hasidic rabbi who was a student in the class. He had to come to me after he missed the class, and he gave me instruction in Genesis. He said, "People think that the world could have been created in 4700 B.C. because of all these fossils, but it could have been created all at once, complete with its history."

It's impossible to distinguish different models which don't have any implications for your experience in the present. It's important to construct models of history, scenarios, stories, myths, but we don't necessarily have to take them very seriously. The whole purpose of this research is to somehow increase our understanding so that we don't go around killing ourselves and everything else.

The Chaos revolution is a mathematical development enabled by the computer revolution. It is similar to the telescope and the microscope with their effects on astronomy and biology. The computer revolution manifests in the mathematical world as Chaos Theory. It provides a certain instrument, a way of looking that I call the Chaoscope. Take what anybody would consider to be chaotic data like EEG, Stock Market data and so on, and put it in front of this chaoscope and you can see that there is order there. That is, its disorder is translated into a more recognizable form of order. It had this order all along, but it's not really ordered in the sense of Marduk and of law and order, because it's just as messy as it appears to you. There's an amplification of our ability to understand things when we can look at messier things and understand them. Intelligence is enhanced through the intervention of mathematics and the computer revolution.

That means, in practical terms, that we can understand complex systems that have behaviors for the first time. We couldn't name anything, we couldn't say that it changed into more or less of something than it was until the moment in 1961 when the chaos revolution happened. That's when we were given this tool, the chaoscope. Now any fool can take this tool and understand all kinds of forms that were invisible before. And this is happening in all the sciences. First in fluid dynamics; later, in the early 1970s, in astronomy; still later, in the biological sciences; and now in the social sciences. The systems that we live in are too complex to behave in a way that could be understood in Marduk's time, where things were either still, or they oscillated periodically. The planets were supposed to go around the sun in Plato's time, or they were a mess -- you couldn't understand them.

And now we are extending our intelligence so as to be able to understand the behavior of complex systems like the ecological systems and the social systems that we live in. That's the chaos revolution. Around 1971 the sciences began to be tentatively effected by this mathematical development. Jim Lovelock's Gaia hypothesis was reluctantly accepted by the scientific community. One

reason why it was difficult to accept it is that the concept lives on the level of wholeness, which is beyond any scientific specialty. A person working in the scientific community and subject to the sociology of science has a certain amount of trust for colleagues in the same discipline if they studied with the same professor, less if they studied with another professor, and none at all if they're in another discipline. Since they couldn't believe each other, there was no way to combine the knowledge they had.

Then along comes Lovelock, Margulies and a few other people who say that if you take atmospheric chemistry in one hand and geobotany in the other and put them together, you get -- suddenly it's simple. A lot of understanding can go forward very well without mathematical models. Take acupuncture and herbal medicine: they do not have a mathematical branch in the university. However, in global systems with population density of animal species and viruses and so on, the observations are very numerical. You count the number of people, it's on the increase, it's 5.2 billion and it's going to double in 20 years, oh my God, why are we even talking about these ideas?

Frankly, I cheated a little with Eros, but don't tell anybody. I just took that name for the work I was doing in making mathematical models for the social sciences. It needed a name and I thought Eros was appropriate due to the fact that what we're modeling mostly is love, or sometimes war. The same mathematical models apply to love and war. They apply equally well to a lot of different complex situations. One of the earliest works in erodynamics is a model for international stability involving two nations by a Russian systems theorist. It's a model for the arms race, actually. Arms race modeling has been going on longer than biological modeling. It started in 1917. Its great champion, Louis Fry Richardson, who ironically is also a hero of the Gaia revolution, started as a physicist. He invented a mathematical model for the climate that allows accurate meteorological predictions up to three days, if that's of any use. In 1917 he was the head of the weather prediction department in England and then he was drafted into WWI. He was a Quaker, so he became an ambulance driver. Seeing all this gore in the trenches he decided to devote his life to the prevention of another war. So he made a mathematical model. He had succeeded with the weather for up to three days, so why not the political weather?

This mathematical model was immortalized by Gregory Bateson under the name of the Richardsonian Model for Schizogenesis. He tried to have it published and it was rejected, but he kept trying to bring it to the attention of the public, because by then the war clouds were gathering over Europe for WWII. He felt that if the world could see this model people would understand that an arms race, once begun, inevitably leads to war. But nobody would publish it, and so WWII happened. His work was finally published posthumously in 1965, called *The Theory of Deadly Quarrels*.

So since 1917 we have a useful model for arms races, a linear model. In 1980 it was enormously improved by Kadiroff, a Russian, and I'm calling this whole development Eroynamics. Some people like mathematical models. To me, mathematics is as natural as walking. It's wonderful stuff. You can't really get anywhere without some triangles and circles and stuff, and it's very helpful in understanding relationships. Our model implies that you essentially have an outcome or a group of outcomes in mind as you're making the model. A few years ago most of us thought that the nuclear situation was

so intractable that it created a deadlock. Everything was so enmeshed that there seemed to be no way to move it, like a frozen Rubic's cube. And yet today the situation is quite different. At present, a group of things are happening in Eastern Europe and South Africa. (PLEASE ELABORATE)

The word model does not mean that you can foresee the future. Conventional scientists have used models since the time of Newton in the hope of an actual prediction, the so-called Laposian Determinism. But since the advent of chaos theory it's known that those models, even Newtonian models, do not have that kind of Laposian Determinism, and there's no way to tell the future just because you have a model. The purpose of the model is simply to further your understanding, or to give you some kind of illusion of understanding, and so surprise is always possible. I don't think that modeling can ever preclude surprise. It might help you get ready for some alternatives of the future, and when the future came -- you know, when you woke up the next morning -- you might either find it fits one of your anticipations or it doesn't. Models are really not very good. The best models are not very good because they have no certainty of what the past or the future hold. It's more a matter of luck, I guess. If you go to the parking lot and find your car, that's luck, because you could have forgotten where you put it, or somebody could've taken it. The fact that you have a model of the parking lot in your mind and register in your brain where you always put the coordinates of your parked car doesn't really mean that you can find it.

I work at a very abstract level. I was just assigned this level to work on, though I sometimes express a profound dissatisfaction with this role to my friends. I think it's necessary to go out in the street and take action. The problem is that we don't know exactly what action to take. Some of the difficulty may actually live on the level of mythology and paradigm and so on. We all of us must keep on working on all levels. The concern is that we don't have much time to figure it out. The easy time of evolution is over. The last ice age started in a span of 20 years. Even the most serious scientists concerned with the greenhouse effect are still talking about global warming on the scale of one degree per century or something. But the fossil record is clear on this point. I'm not very concerned about the ice age, although it would be serious if the polar ice cap grew in 20 years so that Oslo became uninhabitable. What seems more urgent to me is to promote a rapid social transformation, a change of consciousness of sorts. People say that it's happening; the talk about the Aquarian conspiracy is very heartening, but as a matter of fact nothing seems to be happening except the rise of population density on the planet. The habitats of many other species have been destroyed, numerous species have been destroyed, they are extinct forever, never to return -- all of these dismal numbers are continually growing exponentially.

This is a challenge on a scale to which nothing we have done in the past can compare. I believe that in order to meet it, we need a radical increase of our intelligence. We actually need to become a different species. The chances of our reaching this point in history were zero, but nevertheless we did, so it's not hopeless. In the meanwhile, we must try to do everything we can to promote our own evolution.

There were times in the past when my political efforts were much more down to earth. I'm a civil war veteran. But at this point in time I believe that the

best thing that I can do is somehow try to illuminate the past. It's not enough to go back there, we cannot simply replace gods with goddesses as they replaced goddesses with gods in Ancient Greece. We have to learn a way of conscious interaction with our evolution. We have to learn partnership. We have to learn not to waste our resources, and we must do it in our own lifetime. Each one of us will see the working out of this challenge in this lifetime. Everything we are doing now, and everything we did last year, either helps or aggravates the situation we're in. The trash is still piling up. A transformation of consciousness in, say, the next 20 years is not in sight.

I don't really feel that any sane person thinks they have the answer. It's just another form of denial to think the solution is at hand. In the '60s we had the same problems -- all the illegal activity by governments all around the world. We were trying to change it and failed miserably, but still, we must keep trying to change history. There's a sort of a revival of that attempt happening now, but it's going to be different this time. The '60s were a youth movement, but some of the people who were part of it have now reached the age where they're not adolescents anymore, and this time it might include everyone because everyone is fed up.

Each generation starts from exactly the same place, but it seems to me there's something wrong with that. How can we have an evolution that begins all over again with each generation? I'm wondering if the nuclear family is the right model, because it doesn't work on any level. I have a wonderful family. My mother and father were very happy together and it was as good as a nuclear family can be, but I think that there was a complete failure of the transmission of wisdom from one generation to the next. Maybe it was my fault, but not completely. I think the model is wrong.

In the '60s we experimented extensively with alternative family models and they failed, because the revision didn't go far enough back to the root. It was still patrilineal. There was no way to get rid of the jealousy, and most of the extended families I knew broke up over the issue of sexual jealousy. The question is, are you willing, in your lifetime, to do an experiment with a different structure than the nuclear family? It takes a lot of courage to break that mold, because suppose you're wrong?

We can't have too much confidence in what we're doing now, because we're screwing up. The nuclear family probably died about 20 years ago. The fact is that the number of new births to single mothers is very large. The kids grow up with the realization that the nuclear family is defunct, and that's part of the problem: everything is fragmenting.