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Roger H. Anderson
Seattle Pacific University

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"Disorder in Science and Religion:
A Pedestrian Theology of Irony"

by
Roger H. Anderson, Ph.D.
Professor of Physics,
Seattle Pacific University

Respondent
David J. Thouless, Ph.D.
Professor of Physics,
University of Washington

Seattle Pacific Univesity
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Introduction

The two dominant, nurturing influences of European civilization as we know it, Christianity and western science, have held tenaciously to a confidence in an ordered universe. The former maintains that a divine plan has guided the destiny of human beings toward an ultimate purpose regardless of all of the discouraging evidence to the contrary. The latter holds that there are patterns to be discovered in the processes of the natural world that one could perhaps quantify with mathematical formulas. After teaching elementary physics for over a third of a century--an experience that induces torpor in the most indomitable spirit--I am still amazed at Newton's laws of motion. As simple as they appear mathematically, they describe in principle the falling apple, the swirling clouds, and the splashing surf. Clearly this obsession with order in western science, which may have its roots in the Hebrew-Jewish-Christian monotheism as well as in Greek philosophy has proved to be highly rewarding.

Starting with the development of the science of thermodynamics in the mid-nineteenth century, western science has developed an interest in disorder until in contemporary science topics such as chaos and complexity have attracted the fascination of many of the intellectually curious. Although not entirely absent,[1] the concern with disorder is not nearly as prominent in Christian thought. Certainly the question of theodicy, i.e. of a just God presiding over a world beset by imperfection and evil, we have with us always, and it seems as robust as ever, but there seems to be little influence of the burgeoning of

scientific ideas on the role of disorder in the natural world on such theological endeavors.

From a personal perspective my teenage conversion from agnosticism to evangelical Christianity delivered me into the realm of Augustinian theology, a fact to which I was to remain oblivious for some time. In this theological tradition death and disorder were not present in the original creation but were part of the sentence imposed upon us as a result of the disobedience of our corporate representatives in the Garden of Eden: the event commonly referred to as the Fall. Elaine Pagels, in the last chapter of her book Adam, Eve, and The Serpent,[2] discusses the struggle within the church of the fifth century to formulate a view of nature out of the clash of views on sin, human free will, and consequences of the Fall held by Augustine of Hippo on one side and Pelagius, John Chrysostom, and Julian of Eclanum on the other. Even though two synods in Palestine around the year 415 declared Pelagius as orthodox, the political influence of Augustine eventually prevailed, and Pope Innocent I censured Pelagius. Pope Zosimus, Innocent's successor, at first declared Pelagius orthodox, but then yielded to pressure and declared him heretical and finally excommunicated him. The history is quite important in this context because Pelagius held views of death and disorder in nature which are far closer to those of modern science than were the views of Augustine and these views were not uncontested at that time. It is also important to state that Pelagianism as a heresy involved more than the issues mentioned in this context. There is,

however, a real integrity in Augustine's views in spite of the Platonic and Manichaean trappings. If death is the consequence of Eve's and Adam's disobedience, how can death suddenly befall the human race without there being an entirely new physics of the universe? How can there be life without death? If in one draconian penalty God suddenly imposed the second law of thermodynamics on us with all of its nasty consequences, then there must have been two creations: one of Genesis 1, another of Genesis 3.

Let me state the issue in the common sense voice of a physical scientist who is also a Christian. Disorder, decay, and death are a part of the very nature of things-- so much so that life itself seems to depend on disorder, even though life and disorder are ultimately in conflict. I do not wish to denigrate the attempt to intellectually construct an image of a perfect God behind the disorder. That may well be important to the human spirit, but perhaps it is time to learn of less perfectly articulated aspects of God through an investigation of disorder. In this lecture I will attempt to do just that. In the first section I will outline the persistent questions of my life as a member of the subcultures of physics and of American evangelical Christianity. I will then trace a brief history of concepts of disorder in the physical sciences and will in the third section point in the direction that I would go in response to the challenges of the questions and concepts of the first two sections. This inchoate theology is pedestrian at the very best and is in need of development by those sophisticated in philosophy, theology, and biblical literature.

I. The Persistent Questions

My life-long attempt to maintain dual citizenship in the realms of physics and of Christianity has produced inevitable tensions and has left me with persistent questions concerning the nature of divine revelation, the contrasting conceptions of reality held by the two subcultures, and incongruities of the views of the human being as seen by the two. Reflections on the doctrines of disorder in nature as presented by modern physics have influenced my attempts to come to terms with these questions. I call the meager results of this process a theology of irony and, in the case of the human being, I might call it an anthropology of irony.

The first of these questions grew out of my frustration with the arguments for the existence of God. Since most of my friends were agnostics or atheists, such arguments fascinated me as a student but now seem singularly futile. For example, Anselm's ontological argument gets heavily involved in the mysteries of the verb "to be", which is complicated enough even in the purely human context. Arguments of design and logical ordering may prove the neat, tidy God of Aristotle but may not transfer to the comparatively unkempt Yahweh. Furthermore, there is the question of the primacy of belief. Why should gullibility be rewarded above honest suspension of judgment? In my childhood the greatest atrocities against humanity were committed by the most fervent of believers. The standard retort to this is that it is the object of one's faith that

validates the belief. But that is certainly what is under debate in arguments of this type.

There is another form in which this kind of inquiry might be cast. It could be given a sophisticated name such as theophany, but let me state it in common-sense language. Although admittedly many phenomena remain unintelligible; we look out on the universe and see an amazingly intelligible organization. Let us pose these questions: Does this organization have behind it something like the intelligent consciousness of human beings? Would it be aware of the human situation? Would it attempt to communicate with us? If so, in what epoch of human culture would it most likely attempt a communication: A mythical era? A legendary era? A time of cultural expansion? A time of cultural decadence? All of the above?

From personal experience many seem to argue that such an organizing source would be too intelligent to afflict itself with conscious awareness, or if there is a contradiction in terms in that view it would simply choose not to look our way so as to behold our suffering. Others seem to argue that consciousness of the human species is what provides the cosmic awareness of such a source of organization. As I have received it, The Hebrew-Jewish-Christian tradition holds firmly that there is such a totally other consciousness which is the source of cosmic organization and which has chosen repeatedly to get mixed up in human affairs. It is this view that will inform the remainder of this lecture.

When the question of divine presence is viewed from this perspective, the nature of the communication assumes prominence, and that is where the emphasis ought to lie. The contemporary Christian fundamentalist sees a literal description of natural history as an essential element of divine communication. Those of a deistic bent seem to argue that the intricacies of the structure of the universe are in and of themselves a sufficient communication to instill reverence in any who will attend to them. Clearly one's expectations for a divine communication depend strongly on his or her notions of religious reality, and none comes to this question innocently.

If religious reality is perceived as it is in the Hebrew-Jewish-Christian tradition, I wish to argue against the possibility of a natural theology and will use arguments of Michael Polanyi to explicate this view. Polanyi's concept of levels of reality--sometimes referred to as his stratified ontology--which is a foundation stone of his anti-reductionist philosophy, sheds light on the point before us. Polanyi argues that clocks, typewriters or telephones depend for their operation on the principles of physics and chemistry, but there are additional operational principles involved that can never be reduced to those of physics and chemistry. On the animate and human levels the principles of rightness come from even higher levels. In part II of his book Personal Knowledge, based on his Gifford lectures of 1951-52 delivered at the University of Aberdeen, Polanyi says:

I shall use the following key argument in a number of variants and elaborations. Our comprehension of a living individual entails a subsidiary awareness of its parts which is not wholly specifiable in more detached terms. This understanding acknowledges a particular comprehensive, i.e. 'molar' achievement of the individual itself. Since our knowledge of this molar function is not specifiable in molecular terms, the function itself is not reducible to molecular particulars; it must be acknowledged therefore as a higher form of being not determined by these particulars. We can reach this conclusion directly by recalling that the understanding of a whole appreciates the coherence of its subject matter and thus acknowledges the existence of a value that is absent from the constituent particulars.[3]

He imagines the Lilliputian like scenario of a team of exotic physicists and chemists examining a grandfather clock. Without some concept of time keeping within their culture they could see it run but have no sense of proper function or purpose.

Stated briefly, the study of the physical world can be carried on at an elemental observational level, but the perception of religious reality is linguistically constituted in a far more complicated way than is that of physical reality and must be negotiated at a more comprehensive ontological level.

Ultimately there is a fundamental difference in the subject matter of theologians, sociologists and psychologists on one hand, and physicists on the other. People talk back but electrons do not. Language makes a fundamental difference. An often quoted aphorism from Wittgenstein's <u>Philosophical Investigations</u>[4] is, "If a lion could talk, we could not understand him." The best repartee to this that I have ever heard is, "If a lioness could talk, she would no longer be a lioness." Perhaps each of these statements is true. The upshot of all of this is that, however a divine communication is initially experienced, it will most likely end up as a text. It is what we will do with that text which will ultimately count. Posing the question in this way shifts the discourse from the topic of the nature of God, for which human language may be deficient to the topics of the nature of texts, for which human language should be quite adequate.

My second persistent question is that of the artificiality versus the reality of the respective worlds viewed by the scientific and by the Christian communities. This question involves most of the important problems of the philosophy of science and of the philosophy of religion, but it remains an important one. In the case of science the question can be simply stated with a contemporary ring. Do scientists gain a more precise representation of the external world as scientific knowledge accumulates, or do they socially construct models of nature and then select out those experiments which support these models? Could the answer to both questions be yes?

Several comments are appropriate. First of all, science is not the work of an individual mind but of a community of scientists who monitor their own ranks, and who referee scientific work in order to judge its worthiness for publication. Lacking any omniscient referees, we do the next best thing and use scientists. Clearly there is a social factor on what is made public as a scientific discovery. Secondly, as both Thomas Kuhn[5] and Juergen Habermas[6] stress, the socially reinforced interpretive framework of a scientific community is active in the choice of acceptable instrumentation in an experiment. This argument is similar to those used by leading church figures such as Cardinal Roberto Bellarmine against Galileo that instruments, observations, and conclusions involve hypotheses of the scientists and that saving the appearances by hypotheses is not the same as proving that the earth really moves around the sun.[7] Finally, there is the allegation that political endorsement of the pragmatic benefits of science produces the illusion throughout the culture that science successfully manipulates reality. Certainly the pragmatic success of science is a base for the scientists belief in a transcendence of subjectivity. Arguments of scientists against social constructionists often degenerate into something like this: "Look, just how many viable airlines hire members of the Flat Earth Society to plot their great circle routes?"

It is the vulnerability of science to frustration by experiment that convinces me that the social nature of scientific explanations are not equivalent to arbitrariness. If the intellectual construction of quarks were very arbitrary it

should not have taken nearly as long to have detected the so-called top quark as it has. The reproducibility of scientific results in altered circumstances also points toward a successful representation of ultimate reality.

Certainly none of us can transcend our perceptions so as to see unprocessed reality. We have developed a system of intersubjective testing in the context of a community of observers whose integrity is respected. It is just such a rich cultural tradition that would be lost if science were rejected.

The problem of religious reality has similarities with and differences from that of scientific reality. It is almost the nature of religious faith to insulate itself from frustration and disappointment. Consequently, faith is often unstable toward resignation. Søren Kierkegaard contrasts faith and resignation in <u>Fear and Trembling</u> through the perspective of the imagined author Johannes DE SILENTIO. [8] This is an important book for anyone who sees the tension between faith and resignation to be an important part of the religious life. Perhaps increasing the vulnerability of faith to frustration and negation would enrich it rather than weaken it. This question will recur in the final section of the lecture.

My last persisting question, which has been induced by the contrasting views of the scientific and Christian communities, has to do with philosophical anthropology or the question of human nature. Put simply the scientific community has held to the optimistic anthropology of the enlightenment, while

the Christian community pessimistically doubts whether human beings can effect a future that is in their ultimate interest.

A writer that has provoked my thinking on human nature is Hannah Arendt. In <u>The Human Condition</u>[9] she analyzes the evolution of modern western consciousness from ancient Greek culture to the twentieth century.

She classifies human activity into three broad categories: labor is the activity which maintains the life cycle through the production of food or consumable goods and services in general; work is the activity which produces a world of relatively permanent artificial things which serve as the matrix for human presence; and action which is exemplified by the political activity in the poleis of the ancient Greek city-states. The essential characteristic of action is that one's humanity can appear in public and one's distinctiveness can be expressed before equals.

Arendt sees this action as the acme of human significance and denies that we have any roles corresponding to it in our modern political systems, which are overburdened with housekeeping tasks. She described the public arena of the ancient polis as a "space of appearance." It was a space in which one could appear as the 'who' of a person rather than the 'what' of a performer. She insists that in order to appear through speech and action there must be no prior constraints due to party loyalty or other responsibilities. The results of action are unpredictable unlike the results of labor or work. The body politic relinquishes control over the determination of his or her 'who' in the sense that

the community gets to tell the story of the individual. One cannot usurp the authorship of his or her own story.

After a long analysis of human activity in the worlds of late antiquity, of the middle ages, then of the Renaissance, Arendt further analyzes the corresponding influences of science and of Christianity in the modern world. Her main thesis is that Christianity and enlightenment ideals have liberated labor from the privacy of the household into the public realm with the concomitant absorption of the appearance of the person into the private realm of the intimacy of a small circle of friends where it no longer has appearance in the ancient political sense.

She also sees science and Christianity to have alienated humanity from its traditionally more integrated role with the natural earth and the cultural world. Science, through the Copernican revolution, separated humans from their earth based consciousness to a perspective from space. To check her assertion, try a free association with the words "solar system," and then ask yourself where your eye and body were located in order to observe that view. The Christian reformation alienated humans from the world of cultural objects. She sees this world alienation as being the foundation of capitalism in the sense that pietistic detachment from the intrinsic worth of objects is the requisite condition for viewing them as exchangeable goods. Faithful stewards of God then value worldly goods for their investment potential and use them in the ever-ending

cycles of the production of wealth. Clearly, work thereby degenerated into labor in such circumstances.

Arendt credits science for initially reviving work and action. Galileo's telescope epitomized the product of work. The experimental scientist exemplified action in beginning adventures of unpredictable consequences and reporting these before peers in the scientific societies. This revival of work, however, led to a technology that also degenerated into the cyclic pattern of labor. The instrumentalization of the world obscured the means-end distinction which characterizes work so that the end of a process of work simply became the means for another in an unending concatenation of cycles characteristic of the laboring process. Cartesian doubt reinforced this instrumental relationship of humans to things so that we could trust only what we made ourselves whether an instrument or mathematics. The result of this was a widespread acceptance of the Cartesian dualism of subject over and against object.

But she also finds in Christianity an accessory role through its endorsement of life as the highest good. From the resurrection of the body to the immortality of the human soul, the survival of the individual is paramount. It is as if individual survival supersedes the survival of the body politic, as if the significance of the person before others has been displaced by that of the condition of one's soul before God.

Her prognosis is definitely gloomy. In the concluding pages she writes:

Meanwhile, we have proved ingenious enough to find ways to ease

the toil and trouble of living to the point where elimination of

laboring from the range of human activities can no longer be

regarded as utopian. For even now, laboring is too lofty, too

ambitious a word for what we are doing in the world we have come

to live in. The last stage of the laboring society, the society of

jobholders, demands of its members a sheer automatic functioning

as though individual life had actually been submersed in the over-

all process of the species and the only active decision still required

of the individual were to let go...., and acquiesce in a dazed

'tranquilized,' functional type of behavior. The trouble with modern

theories of behaviorism is not that they are wrong but that they

could become true, that they actually are the best possible

conceptualization of certain obvious trends in modern society. It is

quite conceivable that the modern age, which began with such an

unprecedented and promising outburst of human activity, may end

in the deadliest, most sterile passivity history has ever known.[10]

Frankly there are many problems with her analyses, yet she sees the

phenomena of our present age just as I see them, and as some of you might

surmise by looking at me I have seen a fair piece of the twentieth century. Or in

the language of contemporary science, she has the right phenomenology

whether she has the right theory or not. This view presented me with a persisting question because there is no aspect of our universe that is richer and more intricate nor more valued by me than the human person. Clearly science and Christianity have shaped a society in which we are primarily functionaries to be judged by our competence. Ironically enough, Hannah Arendt on the penultimate page of her book, identifies the scientific community as the only one remaining within which a vestige of action is still practiced.[11] It does seem that a religious community would be an ideal one in which the 'who' of a person might appear. The Pauline epistles, however, seem to contain corporate and household metaphors parallel to the functioning of Arendt's laboring process. Yet references to spiritual gifts in the epistles do not preclude those which correspond to speaking and acting. This question will arise again in the last section.

Jacob Bronowski analyzes the history of the relation between western science and human values in his essays The Heart of Truth and The Sense of Human Dignity[12] He argues that in order for science to be practiced there had to be scrupulous honesty so that those who did the experiment or calculation could be trusted to truly have done and to have observed what they reported. There also had to be respect for the integrity of the individual irrespective of gender, social class, race, religion, or politics. There had to be a tolerance of dissent and an open arena of discourse between conflicting viewpoints. A scientific community cannot operate without strong commitments, freedom, justice, honor,

a sense of human dignity, a sense of self-respect. These worked so well within the scientific community he argues that they have been finally adopted by political leaders in their search for a workable society.

It is well worth noting that, having spent a full life in both the scientific community and the evangelical Christian communities, I find more respect for dissent and human dignity in the scientific community. After more than a third of a century on the faculty at a Christian university, it is fair to generalize that dissent, whether through a student publication or on the floor of a faculty meeting, is usually viewed as contentious. In the scientific community dissent is the grist for the mill, but if one flaunts the received view of the subject and experiments prove him or her wrong, he or she lives with that forever after. This happens because scientists are listened to and taken seriously by their community. Perhaps the Christian community could learn from the scientific community in these matters.

At this point it seems as though I have fully accepted Bronowski's analysis. In the last section I will return to this question. Perhaps Bronowski's view of the human being is incomplete and there is a dimension of human presence which is in tension with the honest seeker of well-being that he posits. More of that later.

II. Disorder: A Brief History

Definitions of disorder, randomness, and chaos may be in order, even though

the notions from ordinary language may be sufficient for what will be said.

Randomness of a sequence might be defined by the complexity of the algorithm

which is required to express it. For example, consider the sequence 1, 1, 1, ...

ad infinitum. This pattern is easily described, but think of trying to communicate

information to an extra-terrestrial friend with an electromagnetically transmitted

sequence of such digits. The sequence 0, 1, 0, 1 ... may seem slightly more

complex, but again only if the sequence were pulsed so as to have a beginning

and an end could four bits of information be conveyed.   This communication

analogy should not be pushed too far in that information is measured by a

formula very close to that for entropy and is quite different from the algorithm in

the sequence. Now suppose that a set of twenty digits that appeared quite

random were given, but then we found out that they were the 30th through the

49th digits in a decimal expression of pi. These examples have lessening

degrees of algorithmic compression in the order given. If we came to a

sequence in which all attempts at algorithmic compression fail we say that we

have a random sequence. The term "disorder" will always be contrasted with

order for a physical system as gauged by an order parameter, e.g., the

magnetization of a magnetic system or the density in a gas-liquid phase

transition. Roughly speaking, when the order parameter vanishes, the system is

disordered, but then there are finer details to attend to such as correlation

functions of various physical parameters. Finally, the term "chaos" will be reserved for the loss of predictability in dynamical systems.

Those of us who have been acculturated into the community of physics in the Anglo-centric American tradition tend to see Isaac Newton as the one who gave simple order to the complex motions of the physical world with his three laws of motion. Apparently on the continent of Europe there were those of an atomist persuasion who, like their intellectual ancestors of the classical world saw a far more unruly nature than did Newton. Descartes and Gassendi before Newton and D'Alembert and even, for a while, Lagrange after Newton saw exceptions that required a more complicated analysis of motion.[13]

Perhaps a quick entry into the long-standing conflict between the ordered microscopic world of Newton and the disordered macroscopic world dramatically characterized by the second law of thermodynamics is this: consider a person tossing a compact object such as a golf ball into the air and catching it while being filmed by a high-speed motion picture camera. Let us assume that the person is so gifted with muscular coordination that she tosses and catches it with exactly the *opposite* motion. If the film were projected backwards the event would appear to be identical to the original. Of course the descent in the actual event would be seen as the ascent in the reversed showing, but the speeding up during the fall in the actual event would appear as a slowing down during the ascent in the reversed time sequence. It is acceleration, not velocity, that enters into Newton's second law of motion, and slowing down while rising and speeding

up while falling are both negative or downward accelerations. At any rate, Newton's law and the description of the event are invariant under the reversal of time. If we numbered the frames and rolled the film backwards, indeed velocity would be reversed, but acceleration would not. Under more precise observation, however, we would find that we had deceived ourselves. Air resistance would lead to a slight asymmetry between ascent and descent. The force of resistance opposes the direction of the velocity which changes from positive (up) to negative (down) during the two halves of the journey. This example reveals more than a casual paradox. To dramatize the conflict let us take a nineteenth-century view of the molecules, suspending all concerns about limitations due to optical precision and visual acuity. Why should molecules appear to behave in the same way in the time reversed sequence as in the original while the golf ball does not? Are not the golf ball and the atmosphere made up of molecules, and is not air resistance just a name for the collective effect of collisions between these two types of molecules? In elementary physics classes we say that the organized initial condition of motion of the ball accounts for this, but under time reversal initial conditions become final conditions, so that a further explanation must be sought.

This most fundamental question, which involves time and disorder, did not begin to get addressed seriously until late in the nineteenth century after the science of thermodynamics had formulated the second law of thermodynamics, and Rudolf Clausius introduced the concept of entropy in 1865. Clausius

expressed the second law as the tendency of the entropy of an isolated system to increase under spontaneous transformations. There is no benefit to be accrued from this increase in that the higher the entropy the less useful is the heat energy that might be available from that system. The second law had already been stated in a crude intuitive form by Sadi Carnot as early as 1821 and by William Thomson (Lord Kelvin) in 1851. From a Newtonian perspective, what was startling about this law was that nature tended to go in one direction toward the increase of entropy rather than displaying the indifference to the direction of time that characterized Newtonian physics. Thus we have the famous arrow of time according to the description of Sir Arthur Eddington.

Ludwig Boltzmann, an Austrian physicist, then took up the concept of entropy and interpreted it as a measure of disorder[14] or more specifically as proportional to the logarithm of the number of ways in which microscopically distinct states correspond to a given macroscopic state, i.e. that which is observed on the scale of the laboratory. Of course this correspondence requires a particular criterion of distinctness and identity. The relative probability of a particular macroscopic state is taken as proportional to the number of ways in which it can be realized. Boltzmann thus proclaimed that the tendency of systems to assume the most probable configuration is reflected in the tendency of the entropy of an isolated system to increase. This follows because the logarithm is a monotonically increasing function of its argument, the number of microscopic states. Actually, Boltzmann's argument was considerably more

complicated than this description. He introduced his famous H function--actually designated by an upper case Greek eta, which came to be identified by its graphic twin, the upper case Latin H--which was related to the logarithm of the probability distribution in six dimensional phase space, and he proved that this eventually approaches its equilibrium value as time increases. This ultimately failed to reconcile microscopic dynamic reversibility with thermodynamic irreversibility ultimately because the analysis of collision processes in the dynamics of H involved a probability calculus which is time oriented.

In a sense entropy is a measure of ignorance. But we must not infer from this assertion that a more careful specification of the state of our system would obviate any need for the concept of entropy. After all, the concept came to us from the science of thermodynamics, which deals with energy transfers as heat and work, so that we might suspect that entropy has a meaning quite independent of how accurately we choose to specify the system. That is the case. Indeed one might say that the ignorance of which entropy is a measure is essential in the sense that it is indispensable and in the sense that it is of the essence of the description of the system.

These statements anticipate the concerns of those in the audience who with disgruntled musings object to all this talk about disorder. Why not just talk about order since that can be described with a quantified essence? That of which the physicist cannot so speak let the physicist thereof remain silent. But the issue is certainly more subtle than that.

A development of the last two decades that has again emphasized our ineluctable involvement with disorder is that of nonlinear dynamics, more popularly knows as "chaos theory." One of the sensational results flowing from these theories is the inherent non-predictability of non-linear systems. This flew in the face of one of the most glibly attested doctrines of Newtonian physics – that since Newton's equations of motion are deterministic, the future of a physical system could be predicted to an accuracy limited only by the technical precision of the determination of the initial position and velocities of the particles which constitute the system. To put it another way, if God did the measurements and computations, absolute determinism of the future of the universe would be consistent with Newton's laws.

Rather than arrogate to ourselves divine capacities, as mere mortals we can only calculate the dynamics of a limited physical system with the data and computational capacity at hand. Such modesty has not deterred many philosopher kings of the mind's realm and so we have the philosophy of determinism. From the more modest perspective the emergence of "chaos theory" is both expected and startling: a true indication of a wonderful scientific development.

When the equations of motion of a system assume a nonlinear form, small changes in system parameters lead to drastic losses of predictability. But first a word of explanation of nonlinearity. When a bob on the end of a linear spring is set into oscillation the subsequent motion will be quite regular. Linear

simply means that the force of the spring that pulls the bob back to the equilibrium point is proportional to the distance that the bob is displaced from equilibrium. Thus, "linearity" is synonymous with "proportionality." A pendulum also appears to undergo regular oscillatory motion even though it is nonlinear, i.e. the restoring torque is proportional to the sine of the angle of displacement rather than to the angle itself. When these two devices are subjected to certain oscillatory driving forces and to attenuation forces, the pendulum begins to exhibit unpredictable chaotic motion in a way that the spring does not.

A simpler and more dramatic, though more abstract, example is the famous logistic equation which was introduced as a mathematical model for populations of insect species in consecutive generations[15]. It appears as

$$X_{n+1} = M X_n (1 - X_n)$$

where the subscript n indicates the population of the nth generation. One simply chooses an initial population, calculates the next one and reiterates the process. For some values of the parameter M the population settles down to a steady population, but for higher values the population oscillates between alternate populations. In one generation the population is excessive, leaving a diminished population for the next generation, then followed by the larger population. This is called bifurcation. What is surprising is that if we plot these limiting populations against the parameter M there are not only bifurcations but bifurcations of the bifurcations, followed by further bifurcations. Then suddenly chaotic conditions prevail (figure 1). Notice the windows that occur within the

chaotic regime as stability conditions are recovered for a certain number of cycles of iteration. One of the most amazing results of the study of the equation is that, as the edge of chaos is approached, the ratio of consecutive bifurcations approach a universal number dependent only on the bifurcation structure, the so-called Feigenbaum number.

Another example is that of a driven pendulum. A graph of the velocity against the angle of the string of the pendulum would look like an ellipse (figure 2) if it neither gained nor lost energy. If it loses energy due to friction it settles down to rest at its equilibrium position, the central point of the graph (figure 3). It is called an attractor since all orbits are attracted to this point. But when an oscillating driving force is applied we see the emergence of a strange attractor where orbits frequent a region of space but do not converge to a certain point or orbit (figure 4). As time proceeds initial points which are arbitrarily close can end up very far apart and the loss of predictability becomes apparent. Some of the marvelous properties of these strange attractors is that, when they are periodically sampled and a graph is constructed--which is called a Poincaré section--they are fractals, i.e. have fractional dimension.[16] These graphs also display self similarity, i.e. when viewed on many different size scales they have very similar structures.

Presently, there are many investigations underway in the physical and life sciences which make frequent use of terms such as "self-organized criticality," "adaptive complex structures," or "dissipative states far from equilibrium."

Although these investigations have some themes in common with chaos theory, they are often referred to generically as complexity theory.

It is physicists however, who seem to be most famous in this particular field for the study of sand piles[17]. This is literally the physical system constructed by slowly releasing sand over the center of a circular base and letting the conical pile build up until avalanches develop with the addition of more sand. Indeed, there is a critical slope at which the pile is stabilized. When one determines the time distribution of the sand flow due to avalanches, it is found to correspond to the so-called 1/f noise, which is almost ubiquitous in the fluctuating systems of nature. The f in 1/f is the frequency, and one can say that the distribution of activity as a function of frequency is a power law in the reciprocal of the frequency with the exponent in the power law being one. This noise is a signature of self-organized criticality and indicates the presence of signals of all sizes and all time durations.

Interestingly, the results of these studies of sand piles suggest that the Gutenberg-Richter power law distribution of the size of earthquakes indicates that the crust of the earth may have reached self-organized criticality in the stick-slip process of the motion of tectonic plates. In this power law the exponent is about 1.5.[18]

This study of complexity is a widely proclaimed field of science and is supposed to be relevant to such things as stock market stability, ecosystems,

and biological evolution. Paul Davies, the popular writer on contemporary

physics, promotes it to a lofty role in science by saying:

> True scientific revolutions amount to more than new discoveries;
> they alter the concepts on which science is based. Historians will
> distinguish three levels of inquiry in the study of matter. The first is
> Newtonian mechanics - the triumph of necessity. The second is
> equilibrium thermodynamics - the triumph of change. Now there is
> a third level, emerging from the study of far-from equilibrium
> systems.[19]

Pregogine and Stengers similarly stress the importance of fluctuations in

processes far from equilibrium in the statement:

> We have repeatedly emphasized the role of fluctuations. Let us
> summarize here some of the more striking features. Whenever we
> reach a bifurcation point, deterministic description breaks down.
> The type of fluctuation present in the system will lead to the choice
> of the branch it will follow. Crossing a bifurcation is a stochastic
> process, such as the tossing of a coin.[20]

They go on to point out how systems on the human scale can be random yet almost deterministic because the statistical error is very low considering the high number of atoms in any such system. They continue to contrast the far-from-equilibrium process:

> However, in nonequilibrium processes we may find just the opposite situation. Fluctuations determine the global outcome. ..For this reason we would like to introduce a neologism and call situations resulting from 'fluctuation' order through fluctuations.[21]

They develop this argument through a long discussion of biochemical reactions in biological systems. When the stable graph of a reaction in its parameter space bifurcates, there is no clock-work mechanism to select the viable branch. A random fluctuation is awaited by the system for the proper transition. If none arrives the disappointment may be fatal.

After this tedious discussion a brief mention of a more sensational topic in complex systems may be appropriate: that of Stuart Kauffman's computer simulations of random Boolean networks.[22] Soon after Jacob and Monod published their work on the regulation of gene activity, Kauffman, as a young medical student, became obsessed with the question of how nature got from the 100,000 genes in the human genome with its number of possible activity states, approximately the number one followed by thirty thousand zeros to only 254

actual cell types in the human body. Could random encounter sample the myriad of such possibilities and select the workable ones that we have? His idea was to model the genes as a network of elements, each of which can exist in either an off or an on state at a given time--hence the name "Boolean" from Boole's two class logic. Each element was interconnected with other elements, and the next state of the element of interest is determined by the present state of each element with which it is connected according to a preassigned logical function. For example, if it were interconnected with only two other elements the logical "and" or "or" functions would work. One chooses an initial set of states and proceeds through a sequence of successive states. Since the network is finite there is a finite number of states so that when the system reenters a preexisting state it will continue through that cycle once again. These repeating cycles of states are the dynamical attractors of the Boolean network.

Kauffman discovered that the number of attractors vary roughly as the square root of the number of elements. For the 100,000 elements which is roughly the number of genes in the human genome he found 370 attractors, close enough to the 254 human cells to commend the idea that genetic cybernetic principles may be working along with natural selection in the emergence of the cellular patterns we now observe.

At the end of a chapter on self-organization and adaptation in complex systems, Kauffman states:

All the results of this chapter indicate that a phase boundary separates networks that exhibit frozen, orderly dynamics from those that exhibit chaotic dynamics. The existence of this boundary leads us to a very general and potentially very important hypothesis: parallel-processing systems lying in this interface region between order and chaos may be those best able to adapt and evolve.[23]

It seems requisite to mention two other topics in even so brief a discussion of order and disorder: symmetry breaking and frustration. One might think that symmetry would be a measure of order in a physical system, but one of a more ancient bent of mind might say the symmetry deals with potentiality and ordered structure with actuality, so that the two play antithetical roles in a physical system. An example will help clarify this contrast. In the nonmagnetic state of a ferromagnetic material, the atomic magnetic depoles, which are like minute bar magnets, point with equal probabilities in all directions and thus experience spherical symmetry, in the sense that a sphere has the same appearance if we proceed in any direction from the center. But when the temperature is lowered, a direction of magnetization develops and the spherical symmetry is lost as the system becomes ordered. The symmetry of the system is then reduced from spherical to axial as the system becomes ordered. "Frustration," on the other hand, is the name given to the phenomenon which

occurs when disorder or geometrical constraints deny the nearby constituents of a system mutually compatible configurations for the achievement of the lowest energy of the system.

Thus we see that disorder, which is ever present in the universe, is necessary for our well-being. The second law of thermodynamics seems to be an oppressive task master driving us up the entropy hill away from nonequilibrium, which is so essential to life, toward equilibrium which is inhospitable toward life. On the other hand, there is security in equilibrium. Imagine a world without the restrictions of the second law in which random heat energy in the ocean could convert into the more ordered motion of the surface waves in complete accord with the energy conservation of the first law of thermodynamics. Soon the surface would freeze into craggy mountain ranges of ice. In this sense the second law is protective.

Murray Gell-Mann puts it concisely in <u>The Quark and the Jaguar</u>: "Conditions in between order and disorder characterize not only the environment in which we live, but also life itself, with its high effective complexity and great depth."[24]

We have also seen that order has emerged out of disorder with the chaotic and the complex. It appears as though that border country between the ordered and the disordered realms is particularly conducive to systems capable of organizing themselves and adapting to new conditions.

III. Theology of Irony

Even to suggest an expansion of Christian theology in the directions of irony and ambiguity seems untimely when many at our end of the Protestant theological spectrum cry stridently for a reaffirmation of the old certitudes of belief and morality. Does not irony weaken the steadfastness of a commitment? Has not the preoccupation with diversity led us to a cacophony of voices that shatter social and political solidarity? Is it not wiser in troublesome times to impose a fancied order on the randomness of our world so that we can cling to some semblance of structure, than to drown in the turbulent seas of modern life? These are not my rhetorical questions, but they come from sources that must not be discounted.

Indeed, my proposed theology of irony is quite inappropriate at this time unless there is the slight possibility that Christian spirituality may be like some of those proposed structures of life that show their greatest capacity to adapt in the border country at the edge of order and chaos. It is just this possibility that I wish to explore.

The religious irony which I wish to discuss is the tension experienced by a person occupying a position along a spectrum of qualities terminated by two opposing poles so that if the position is too close to one pole the situation becomes so absurd that the significance of the opposite pole is enhanced. The poles need not be fundamentally opposite but only contrasted within a particular context. In the Christian context it is really a reflected irony in which I am

interested. The ironic emphasis of the opposite does not negate the original doctrine but reflects back, mirroring and thereby enriching it. But, an abstract discussion will not illuminate such an inchoate theology. Three examples may explain my intentions more successfully: The irony of the Garden of Eden, the irony of the Incarnation, and the irony of the Eucharist.

The Garden of Eden account of chapters 2 and 3 of Genesis is fundamental to the Christian doctrine of the sinfulness of humanity. Although this is enunciated by Paul in Romans 5:12-14, it does not follow from the old Jewish heritage. Elie Wiesel states this succinctly in his collection of biblical portraits, Messengers of God:

> Adam thus bequeathed us his death - his death but not his sin. The concept of original sin is alien to Jewish tradition. We do not inherit the sins of our Fathers, even though we may be made to endure their punishment. Guilt cannot be transmitted.[25]

The Genesis passage contains many ironies. Eve and Adam partook of the forbidden fruit of the tree of the knowledge of good and evil because the serpent told Eve that if she ate of it her eyes would be opened. They then experienced the opening of their eyes to see differences (in their sex) and alienation (from God). One of the glaring ironies is that the serpent seems to tell the story more straightforward than the Lord God. In chapter 2 verse 17 the

prohibition to eat of the tree is followed by the threat "for in the day that you eat of it you shall die."[26] Not only did they survive the day of disobedience, but it was only the draconian measure of eviction of the primordial pair that kept them from the tree of life and a reprieve from even an eventual death sentence. But, of course, even the most committed literalist is not against making a few words figurative.

Now one acculturated in the modern scientific view holds that life and death, as well as order and disorder, are a basic part of the scheme of things. It seems incredible that a second creation should have taken place upon the event of Adam and Eve's expulsion from the garden in order to curse us. To the faith of Christians who are scientifically educated it seems far more plausible to see this as a divine communication on the emergence of spiritual consciousness--of its possibilities, losses, and need for redemption. Speaking purely out of my own life-long search on this issue, it appears to me that the special prohibition of the tree of the knowledge of good and evil in Genesis 2:17 is a "set up" for any intelligent being that has a trace of curiosity and from a view of the modern world as we know it at the end of the twentieth century our life circumstances also appear as a "set up!" We understand much better than we did fifty years ago how things are genetically wired into our bodies. When we hear that our mental moods may be shaped by our DNA we cannot help but wonder about these mortal coils of the flesh that soul has fallen heir to.

Two questions arise immediately. How can a human be a fully developed person while remaining under moral supervision, and how so without a full encounter with the difference between one's self and another and between God and one's self? Any preference between the state of innocence and the state of conscious self-assertion is heavily laden with values and perspective. If the purpose of life is unencumbered survival under divine aegis, then nothing can improve upon the garden. I too, like any Christian, often long to rest under the staff of the divine shepherd. If, however, this is a divine communication to a species which acquired spiritual consciousness through persisting physical, biological, and cultural disorder, there may be more of an ironic tension between these two states.

Though secure, the state of innocence may be conducive to passivity, dependence, and reticence. The state of conscious self assertion may offer innovation and discovery while it threatens us with destructive egocentricity. It can produce a Galileo, an Einstein, a Napoleon Bonaparte, or an Adolf Hitler. It is as though the psychic drive which leads us to discovery also has the possibility of destroying us. This state which is the one we now occupy is in need of redemption, and we must accept the tension between it and the ironic pole of innocence.

If this view seems too heterodox, the views of Irenaeus, Bishop of Lyon, who wrote in the late-second century are worth mentioning. The Jesuit patristic scholar Patout Burns summarizes his view as follows:

To be truly good, Irenaeus reasoned, human beings must be free; the love of good has value only when a choice of the contrary evil has been rejected. Instead of giving humanity immortality and beatitude at the outset and risking their loss through free choice, therefore, God devised a strategy to foster a firm commitment to good which would then treasure and preserve full goodness once he had finally bestowed it. First he made human beings immature, capable of learning and development through enjoying the fruits of good choices and suffering the consequences of evil ones. By experiencing the contrast between virtue and sin, human beings can come to appreciate, prefer, and preserve the good; they can build a strong commitment which stabilizes them in the preference of good. God then gives immortality and beatitude to such a mature person, who will not neglect and lose his perfection. Although the sufferings of the present age actually result from sinful choices which should be avoided, God uses them as an educational instrument to move human beings to a full and stable happiness.

Some aspects of Irenaeus' theological anthropology are almost commonplaces in the ancient church, such as the assertion that the possibility of sin is essential to the practice of true virtue.

He was singular, however, in claiming that humanity was actually created in an immature condition and has progressed through the experience of good and evil. This aspect of his theory was, of course, directed against the Gnostic evaluation of the present human condition as contrary to the divine will, a situation to be escaped rather than accepted and lived as the way to perfection.[27]

At the risk of taking all of this too seriously, let me emphasize what I am not intending. This is not a fortunate but a tragic fall. Every tragic thing that can be said about the fallen state of humanity can be applied here. It is not a Jungian antinomy nor dualism, Gnostic or otherwise. The closest concept is frustration. We humans crave innocence, which is like those ordered states of random systems that are inaccessible in the remote past, and yet we crave self-assertion. Finally, I intend no philosophic essentialism here. There is no reason that a Christ figure could not maintain the state of innocence and yet acquire the benefits of self-assertion. It just has not happened to any of us.

Another fundamental doctrine of the Christian faith that is replete with irony is that of the incarnation of God as Jesus of Nazareth. As Christians we equate the coming of the Messiah and the divine visitation. From a Jewish perspective there does not seem to be any expectation that the Messiah should be anything but fully human. In this sense the Christian doctrine is radical, and over two millennia we as Christians have normalized it to the extent that we have

lost contact with how bizarre that doctrine may seem to the older traditions.

Suppose that we had a scenario as in the divine court of the second chapter of

Job. Imagine this conversation between the Lord God and Satan:

THE LORD GOD: (interrogating Satan) Whence have you come?

SATAN: From walking to and fro on the earth.

THE LORD GOD: Have you considered my people, the Jews?

SATAN: Yes, they have suffered under the Macedonians and now under

the Romans. When are you going to send them their Messiah?

THE LORD GOD: I have decided not to send anyone but to go myself and

will soon appear as a religious criminal. Then my people will have the

choice of judging me by my law and putting me to death or tolerating me

and violating my law.

SATAN: And you call that redemption?

THE LORD GOD: It is my way.

SATAN: (Who always tries to get the last word in). I am glad that you

have not redeemed me.

When we strike off the insulation of Trinitarian theology, which Jews do not

have, the scene is perplexing.

It has become increasingly clear over the years why my Jewish friends

see the Christian doctrine of the incarnation as a serious compromise of

monotheism and a retreat from a conception of God as wholly other. But however radical the doctrine of the incarnation may or may not be, this doctrine of the heroic deliverer becoming a suffering victim, is fundamentally ironical.

A quick entry into ironical aspects of the incarnation is through the 'grand inquisitor" scene in Dostoevsky's The Brothers Karamazov. Although this passage is overworked, the approach is far more direct than through the explicitly ironical writings of Søren Kierkegaard where the pseudonymous authorship of his ironical writings present difficult problems of interpretation.

The scene in which the parable is narrated unfolds in a tavern in the Karamozov's village, in which Alyosha meets his older brother Ivan, his only full brother. Barely emerging from adolescence, the innocent Alyosha is dressed in the cassock of a Russian orthodox monk and has been traipsing through the village streets on a rescue mission to intercept Dmitri, his impetuous and unruly older brother, with the hope to dissuade him from executing a self-destructive threat. The incarnational imagery has already begun with the visit of Alyosha to Lise, a young woman to whom he reports his attempt to compensate a victim of one of Dmitri's acts of violence. He tried to give 200 rubles to a retired captain whom Dmitri has violently humiliated in a village street in front of a group of schoolboys, including the captain's son. Now the hypersensitive son suffers the jibes of his schoolmates and painful embarrassment for his father. Initially responsive to Alyosha, the captain became enraged at the implications of the buy-off, threw the notes onto the ground, and trampled them under his heels.

Alyosha ponders the event while he relates the story to Lise. He could see that the captain had appreciated the gift at the same time that he was incensed by the humiliation of being put into the role of the dependent victim. Alyosha then reflects on whether the captain could find the gift more acceptable if it came from equals rather than superiors. Yet he acknowledges how the captain in his defiant refusal was desperately holding on to the last shred of dignity left for him in that situation.

The brothers take a table at the very fringe of an upper room of the tavern. Ivan, who already is a seasoned cynic in his early twenties, warmly greets his younger brother. However, the two are habitually at odds, between Ivan's skepticism and Alyosha's innocence. Ivan broaches the subject by announcing that he accepts God, but it is only God's creation that remains a problem. What Ivan cannot rationalize in this world is the suffering of innocent children. Whereupon Ivan describes gruesome accounts of child abuse in imperial Russia which before the innocent Alyosha is ironically an act of child abuse itself. Then Ivan says:

> The second reason why I won't speak of grown up people is that besides being disgusting and unworthy of love, they have a compensation - they've eaten of the apple and know good and evil and they have become like god. They go on eating still. But

children haven't eaten anything and are innocent. Are you fond of children, Alyosha? I know you are.[28]

If we who are confirmed in the tradition of Western Christianity can suspend our stock rebuttal to Ivan's premises, we can begin to empathize with the direction of his parable! Our contemporary awareness of how formative childhood experience may be to lifelong attitudes can surely cause us to sympathize with Ivan's concerns.

He then narrates his parable. It takes place in the cathedral square of Seville in the sixteenth century. Christ once again as Jesus appears in the square where almost a hundred heretics had been burned the day before. He moves quietly among the mass of people. Then recognition disseminates through the crowd with their attendant gossip, and their spontaneous adoration becomes evident to the grand inquisitor who also moves quietly around the site of his official duties on the preceding day. Jesus heals a blind man and resurrects a seven-year-old child from her coffin, and now the grand inquisitor is left with no doubt as to the identity of the visitor. He moves his retinue of guards toward Jesus, arrests him and imprisons him in the palace of the holy inquisition. Holding a light in his hand, the cardinal himself visits Jesus in the black of the night, and as in the similar scene in the gospels, the worldly authority does most of the talking. He pursues a central theme, sometimes tediously, at other times eloquently. Jesus preached freedom to humanity but left the church with the

burden of their care. After centuries of struggle the church recognized that people want security more than freedom--a truth epitomized in the earthly temptation of Jesus by Satan at the close of his 40 days of fasting: bread, a certainty of worship, and the miraculous. "But what happened?" asked the Grand Inquisitor:

> Instead of taking men's freedom from them, thou didst make it greater than ever. Didst thou forget that man prefers peace, and even death to freedom of choice in the knowledge of good and evil. Nothing is more seductive for man than his freedom of conscience, but nothing is a greater cause of suffering. And behold, instead of giving a firm foundation for setting the conscience of man at rest forever, thou didst choose all that is exceptional, vague, and puzzling.

For the purposes of our discussion the remainder of the parable and Dostoevsky's attempt to resolve the tension is not that relevant. For my purposes it is this ironic tension between caring for others and nurturing their freedom that lies at the heart of the Gospels, where I find no easy answers. It is present with us daily in the American politics of 1995, where we are in the process of rushing to the opposite pole where many believe the answers lie. Indeed the linkage of child abuse to social control to a social oppression which

could conceivably squelch the freedom of the child is a full circle of irony which confronts Ivan and his Grand Inquisitor as well as conservative and liberal political ideololgists of today.

Other ironies of the incarnation appear, not the least of which is Alyosha's attempt to compensate the humiliated ex-soldier. Alyosha's argument that it must be seen as a gift of a peer rather than that of a superior is certainly reminiscent of God in Christ assuming human status to render the act of redemption more effectual. Alyosha and Lise face the inherent conflict between the compassionate grace of redemption and the release of an individual in order that he or she might maintain their own dignity. Alyosha begins to realize that the compensation could be an attempt to buy off the only thing that the poor soldier has left: his own anger. Conventional Christian wisdom seems to say that anger is just what he must be willing to give up in order to experience redemption. But some psychological positions hold that anger can be given up only after it has been owned and felt rather than bought off at the most attractive social price.

The Christian doctrine of the incarnation of God is replete with such ironies. The tension between the incompatible thrusts of justice and mercy has been with the Christian tradition since its inception. From the Gospels it appears that Christ is compassionate but also intrusive, protective but also patronizing.

To some the foregoing might represent the incarnation as too paradoxical to be rational, but to me it is just the kind of epiphany that I would expect from the creator of the subtle universe as we now know it.

As a final and brief illustration, let us consider how a theology of irony might enrich our Christian worship as well as thought by a reflection on the Eucharist or Christian communion. If we sweep aside the many theological embellishments and view the original scene of the last supper in the gospels, we see a Jew with his followers bringing to a close a meal which celebrates the great deliverance of Israel, but all fear no deliverance for Jesus because he will not have it otherwise. In an act which has a hint of a desperate attempt to make communal that which is his ultimate experience of privacy and deprivation, his own death, he blesses the most common items of food and drink, bread and wine. Then he passes each to them with an almost cannibalistic metaphor which must have been somewhat grating to their Jewish sensibilities: take, this is my body, this is my blood of the covenant. In the Pauline account of I Corinthians II there is added, "Do this in remembrance of me." From death to dust, to grain and grapes, to bread and wine, to the sustenance of life the tension between death and life is drawn. If we took the Pauline injunction seriously we would in imagination visit one who affirmed death in no casual way, an institutionalized death with all of the cultural weapons of shame, disgrace, and brutality that help distance us from our collective cruelty. But then we would move from the edge of death to celebrate the renewal of life as it is received again in the resurrection

story. Perhaps a weekly experience of this kind could cultivate a compassion within us for those who are marginalized to the brink of destruction, as well as provide a re-experienced new birth when our death grip is released and we receive life again fresh and anew.

The final objective of this lecture is to relate the proposed theology to the questions formulated in the first section. The relevance of an ironic theology will first of all be discussed for the question of the nature of a divine communication, then secondly for the nature of religious reality, then finally for the development of a Christian anthropology.

In order to gain a sense of the importance of the question of divine communication, we might begin by asking ourselves how many of the innovative and influential ideas in human culture are driven by questions or perspectives of biblical origin. My guess is that in most of our fields the answer is not very many. Yet, if the biblical documents are of divine origin, it seems that they should be such a source. Perhaps our need then is for a broader hermeneutic principle that would elicit more possibilities through a broader interpretation of the scriptures. The intention behind the theology of irony is that it produce new issues and insights by a development of the tensions between a doctrine and the principles excluded by that doctrine so that the doctrine is further enriched by that interaction. Of course, there remains the possibility that there is no divine concern for the state of human culture--that Tertullian's chasm between Athens and Jerusalem is of cosmic proportions. It is difficult to accept that a message

from such a cosmic source has no greater implications than that of the ethnocentric setting of its historical origin. The depth psychologists see more in the Greek myths than the original tellers consciously intended. It is difficult to expect less of the biblical documents. My guess is that in the inevitably pluralistic world of the future, Christian apologists will increasingly bear the burden of convincing humanity that the biblical documents display the signature of cosmic authorship.

There is the additional question of whether God would intend irony. Both the question and the answer must be anthropomorphic. Perhaps a quotation from Wayne C. Booth's book A Rhetoric of Irony might suggest a divine parallel:

> The author I infer ...[Booth writes] is my kind of man, because he enjoys playing with irony, because he assumes my capacity for dealing with it, and most important because he does not have to spell out the shared and secret truths on which my reconstruction is built.[29]

As for the second question, a primary aspect of religious reality in the Christian context is relational -- with God and with others. A theology of irony would then develop the tension that would exist between the ideals of divine and human relationships and the principles that conflict with these ideals so that the tension would enrich and further articulate those ideals. But again an abstract

discussion will not be nearly as informative as a concrete example. The Grand Inquisitor and Alyosha saw the conflict between redemptive grace and regard for the autonomy and integrity of the individual. While the Grand Inquisitor came to a clear resolution in favor of one pole over the other, Alyosha lives in the tension between the two and simply maintains an ongoing relationship with the captain and his family.

This theology intends to expand the comprehensiveness of truth. The intention is to draw parallels with the concepts of order and disorder in the scientific understanding of the natural world. The ironic interplay of a doctrine with its exclusion could be compared with that of order and disorder of a physical system. A hopeful but perhaps exaggerated speculation is that the psychological and aesthetic power of irony might bear some analogy to the exotic structures in the borderland between order and chaos in complex systems. Language might just be complex enough to hold that promise.

Finally we come to the implications of a theology of irony for a Christian anthropology. First and foremost, we need a mature and respectful view of the human being within the household of faith. If we were to express in Christian terms Arendt's assertion of her prime human value, we might say that the greatest gift that believers can give to the community of faith is an expression of the distinctiveness of their own persons. From my experience the greatest detriment to this process is that the image and role of Christian righteousness is prescribed too zealously by the community. This results in the community failing

to relinquish sufficient control, so that we might act in freedom and assume full responsibility for our acts. A rhetoric of irony within the community could give a proper place for the negative to interact with the positive so that the release of prior constraints can occur more easily. In most Christian communities misdeeds are handled in the privacy of the offices, and leaving the community with little but gossip. A respectful anthropology must begin at home.

Bronowski's analysis is difficult for me to criticize in that I hold such high regard for his values of upright honesty. If this modest theology of irony affords me any insight, however, the third chapter of Genesis suggests that unworkableness as well as workableness must be acknowledged in the choice of values by a society. Eve's act is characterized by genuine curiosity and by forewarned self-destructiveness. Human values of a workable society ought to accommodate both of these possibilities--not in a punitive, but in a redeeming and elevating sense. The Wesleyan tradition, of which our institution is a beneficiary, seems to have handled that ambiguity well in viewing the human being as broken but redeemable and perfectible. A commendable discussion of this point is given in the first chapter of Robert Coles Irony in the Mind's Life.[30] Starting with a commentary on the second and third chapters of Genesis, Coles traces the themes of the ambiguity of pessimistic and optimistic views of humanity through the modern philosophers of human nature ending with Freud. He clearly sees a connection between the pessimistic side of Christian

anthropology and Freud's doctrine of the death instinct. Yet we must not ignore those who prove to be neither redeemable nor perfectible.

Some explanation is appropriate for the heavy involvement of the post-critical thinkers in my analysis. I borrow the term "post-critical" from Polanyi, who stresses that in order to acquire knowledge we must have a tacit base of knowledge from which we make our judgments of what we know but which in itself is not directly verifiable. From this perspective knowing is not the Cartesian project of an autonomous consciousness operating on an objective world but rather of fully embodied knowers interacting intersubjectively to pass judgment on knowledge of the world while gradually revising their tacit base. This view is certainly contrary to the ideals of clear and objective knowledge. It is then apparent that the ironic use of language, which resists the closure and clarity of a religious doctrine, is akin to post-critical thought.

It would be ingenuous of me to imply that the Christian intelligentsia is not practicing sophisticated irony. By no means is irony and the irresolvable absent from biblical scholarship. [31] What I wish for is more use of irony as a tool of deep exegesis and exposition for radically new ideas. The theology that I have outlined is only the best thing that I have been able to come up with during the later years of my career. I would be delighted if a colleague could show me a better direction to take that still meets my concerns. What would truly amaze me is if someone could do so without an uprooting of the Cartesian metaphysics of modernity. If we divide things up into the realms of consciousness and of the

objective world, religious reality is likely to be relegated to the realm of consciousness. The emancipation of faith from such subjectivity will very likely involve something similar to Arendt's analysis of the human condition in modernity or Polanyi's attempt at epistemological delivery from modernity. This is a difficult matter to articulate in that consciousness is something that we see through rather than look at. These are important areas of discussion on a Christian campus.

In the seventeenth century another fruit was severed from another tree, this time an apple, picked not by a woman but by an act of God. A young Englishman who was a witness to this simple event glanced toward the moon and launched humanity on a great adventure that would eventually take them to that moon. Once again their consciousness was shifted and further innocence was lost. As science continued to develop in a very complex way, its clear and orderly achievements became romanticized to a prominence that overshadowed the more disorderly aspects of knowledge. Fortunately, the scientific community never complied with the proprieties prescribed for it by those who tried to codify scientific methods. This community followed its own tortuous path looking within its own self for affirmation and correction. Could a community of religious explorers do the same even though they have to face far more difficult questions?

After all of this tedious talk about irony it is time to ask: what is in ironic tension with irony? Could it be clarity and simplicity? We all now deserve to go

out and experience the beauty of a spring sunset without one contrary thought

and in purity of heart to will one thing.

ENDNOTES

1. John Polkinghorne, <u>Science and Creation</u>, (Boston: New Science Library, 1989). chapters 3 & 4.

2. Elaine Pagels, <u>Adam, Eve and the Serpent</u>, (New York: Vintage Books, Random House, Inc., 1988), 126-145.

3. Michael Polanyi, <u>Personal Knowledge</u>, (New York: Harper Torchbook, Harper & Row, 1964), 327.

4. Ludwig Wittgenstein, <u>Philosophical Investigation</u>, Third Edition, (New York, The MacMillan Company, 1970), 233.

5. Thomas S. Kuhn, <u>The Structure of Scientific Revolution</u> (Chicago: The University of Chicago Press, 1962), 58-62.

6. Juergen Habermas, <u>Knowledge and Human Interests</u>, (Boston: Beacon Press, 1971), 191-192.
    Thomas McCarthy, <u>The Critical Theory of Juergen Habermas</u>, (Cambridge, Massachusetts, MIT Press, 1985), 63-64.

7. Pietro Redundi, <u>Galileo: Heretic</u>, (Princeton: Princeton University Press, 1987), 274-286.

8. Soren Kierkegaard, <u>Fear and Trembling and Sickness Unto Death</u>, (Princeton: Princeton University Press, 1954), 45-64.

9. Hannah Arendt, <u>The Human Condition</u>, (Chicago: The University of Chicago Press, 1958).

10. Ibid. 322.

11. Ibid. 324.

12. Jacob Bronowski, <u>Science and Human Values</u>, (New York, Harper & Row Publishers, 1965), 27, 51.

13. Ilya Prigogine and Isabelle Stengers, <u>Order Out of Chaos: Man's Dialogue with Nature</u>, (New York: Bantam Books, 1964), 62, 63.

14. Ibid. Chapter VIII.

15. Gregory L. Baker and Jerry P. Gollub, <u>Chaotic Dynamics</u>, (Cambridge U.K.: Cambridge University Press, 1990), 77-85.

16. Ibid. 111-115.

17. Per Bok and Kan Chen, "Self Organized Criticality," <u>Scientific American</u>, January 1991, 46.

18. Ibid 49.

[19]   Paul Davies, The Cosmic Blueprint, (New York: Simon and Schuster, 1988), 83.

[20]   Prigogine and Stengers, op. cit. 177.

[21]   Prigogine and Stengers, op. cit. 178.

[22]   Roger Lewin, Complexity, (New York: MacMillan Publishing Company, 1992), 25-32, 40-43, 44-46.
         Stuart A. Kauffman, The Origins of Order, (Oxford: Oxford University Press, 1993), 188-209.

[23]   Stuart Kauffman, op. cit. 218.

[24]   Murray Gell-Mann, The Quark and the Jaguar, (New York: W. H. Freeman and Company, 1994), 116.

[25]   Elie Wiesel, Messengers of God, (New York: Simon & Schuster, 1976), 30.

[26]   Quotation from Holy Bible, Revised Standard Version (New York: Thomas Nelson & Sons, 1952).

[27]   Patout Burns S.J, Theological Anthropology, (Philadelphia: Fortress Press, 1981), Chapter II.
         Henry Bettenson Ed., The Early Christian Fathers, (London: Oxford University Press, 1956), 72-74.

[28]   Fyodor Dostoyevsky, The Brothers Karamozov, Book V section 5, Signet Classic (New York: New American Library, 1957), 217.

[29]   Wayne C. Booth, A Rhetoric of Irony, (Chicago: University of Chicago Press, 1974), 28.

[30]   Robert Coles, Irony in the Mind's Life, (Charlottesville: University Press of Virginia, 1973), 24.

[31]   Frank A. Spina, Zeitschrift fur die Alttestamentliche Wissenschaft 104, 319 (1992). See also Edwin M. Good, Irony in the Old Testament, Philadelphia: The Westminister Press, 1965), 81-86, 89.
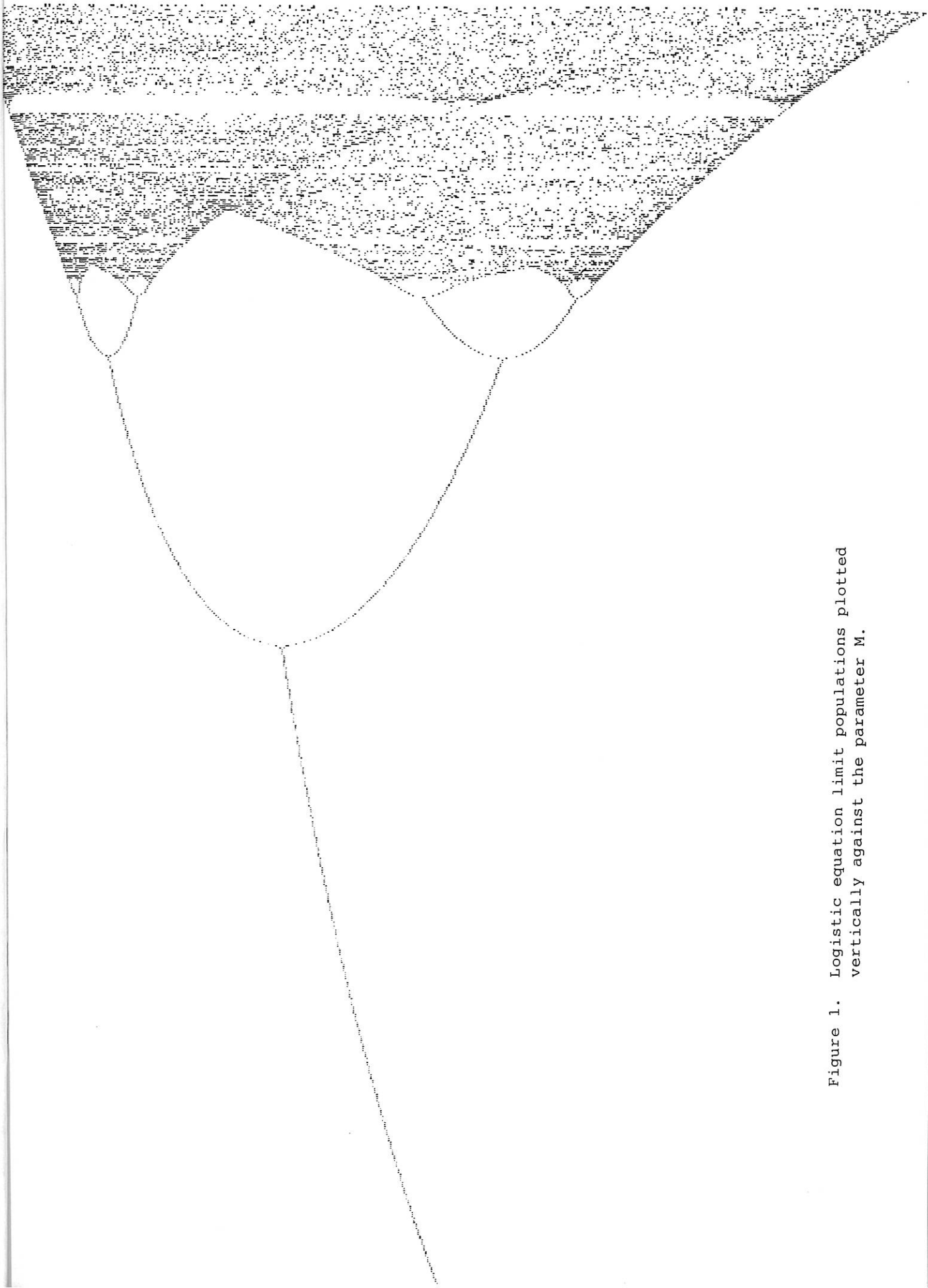
Figure 1. Logistic equation limit populations plotted vertically against the parameter M.
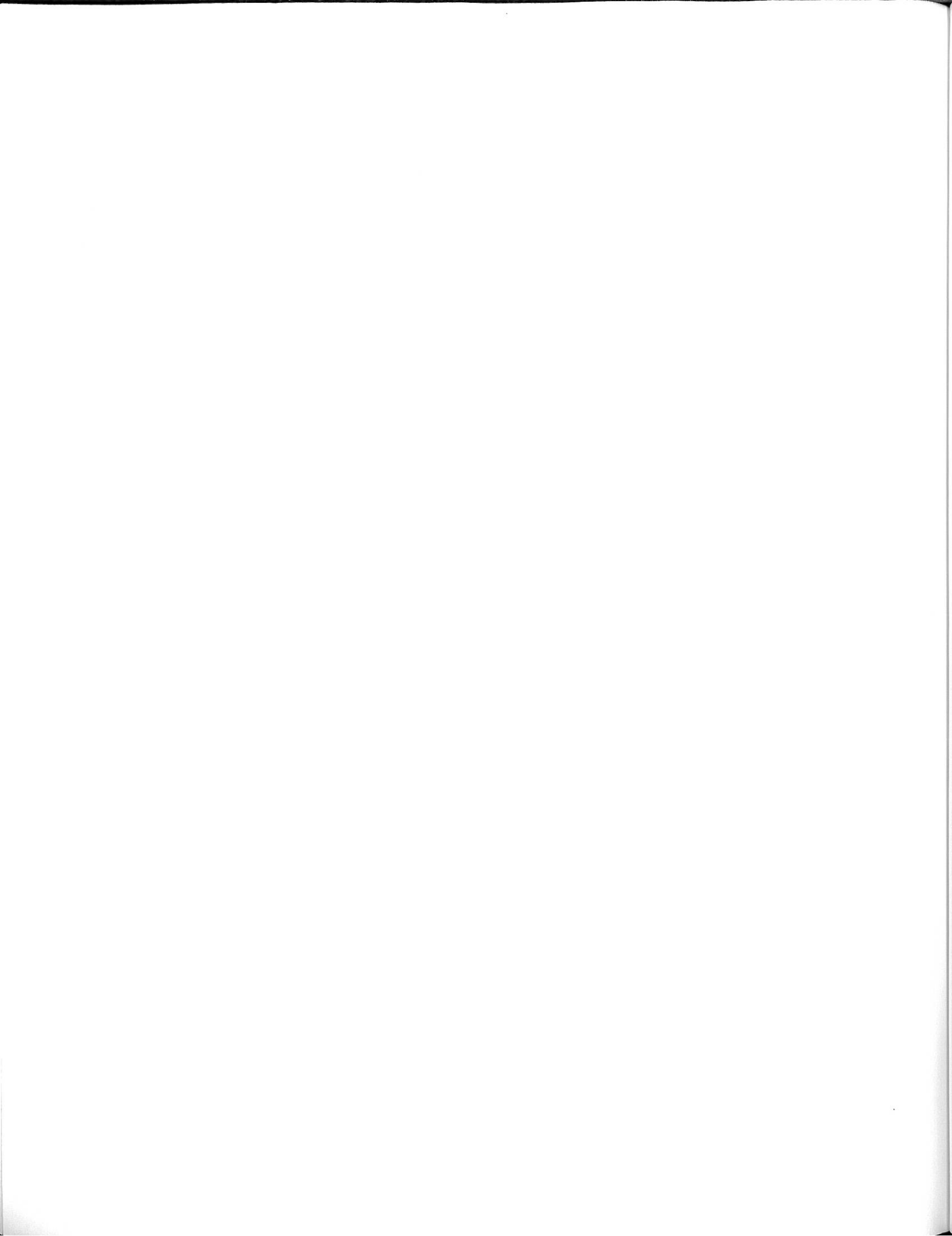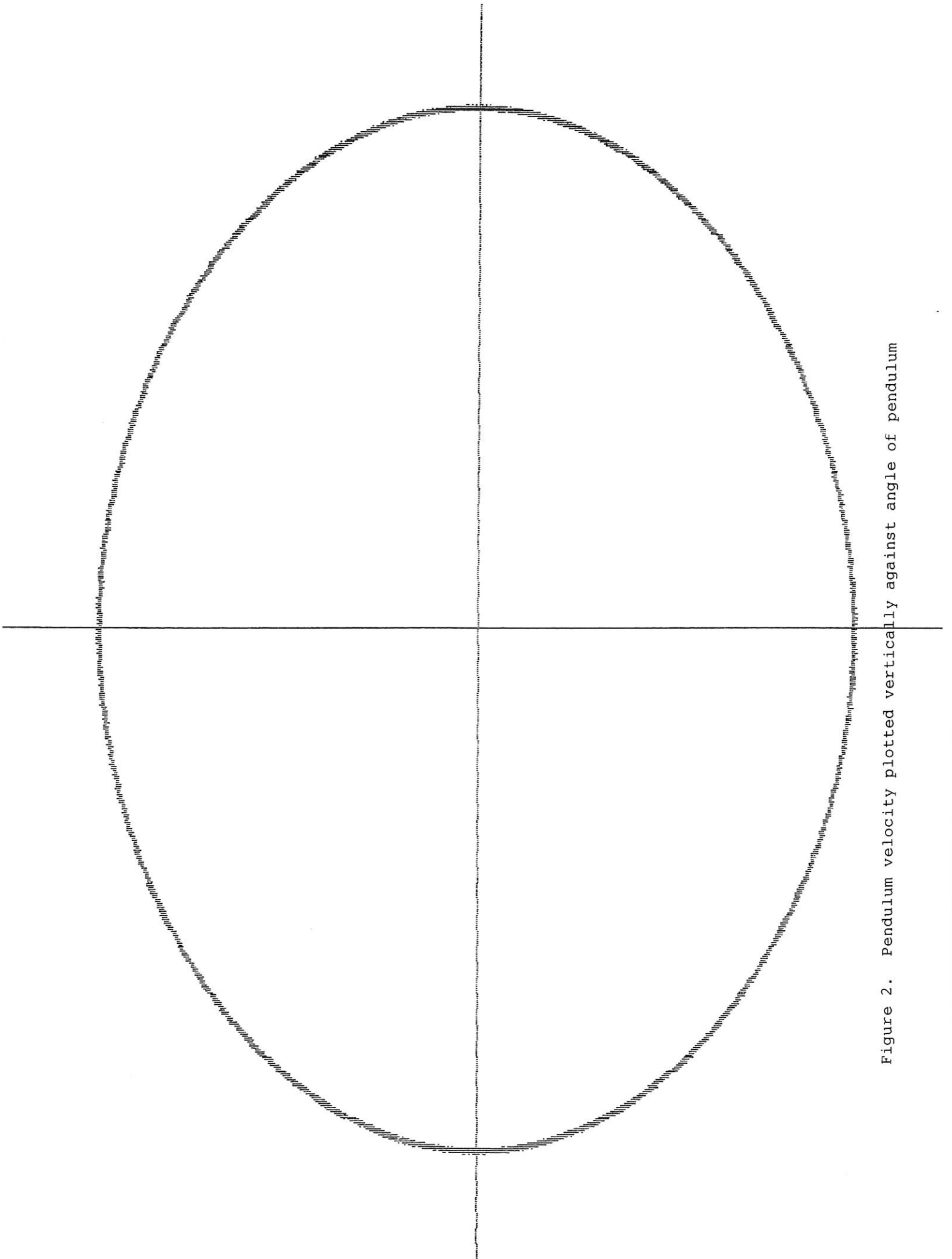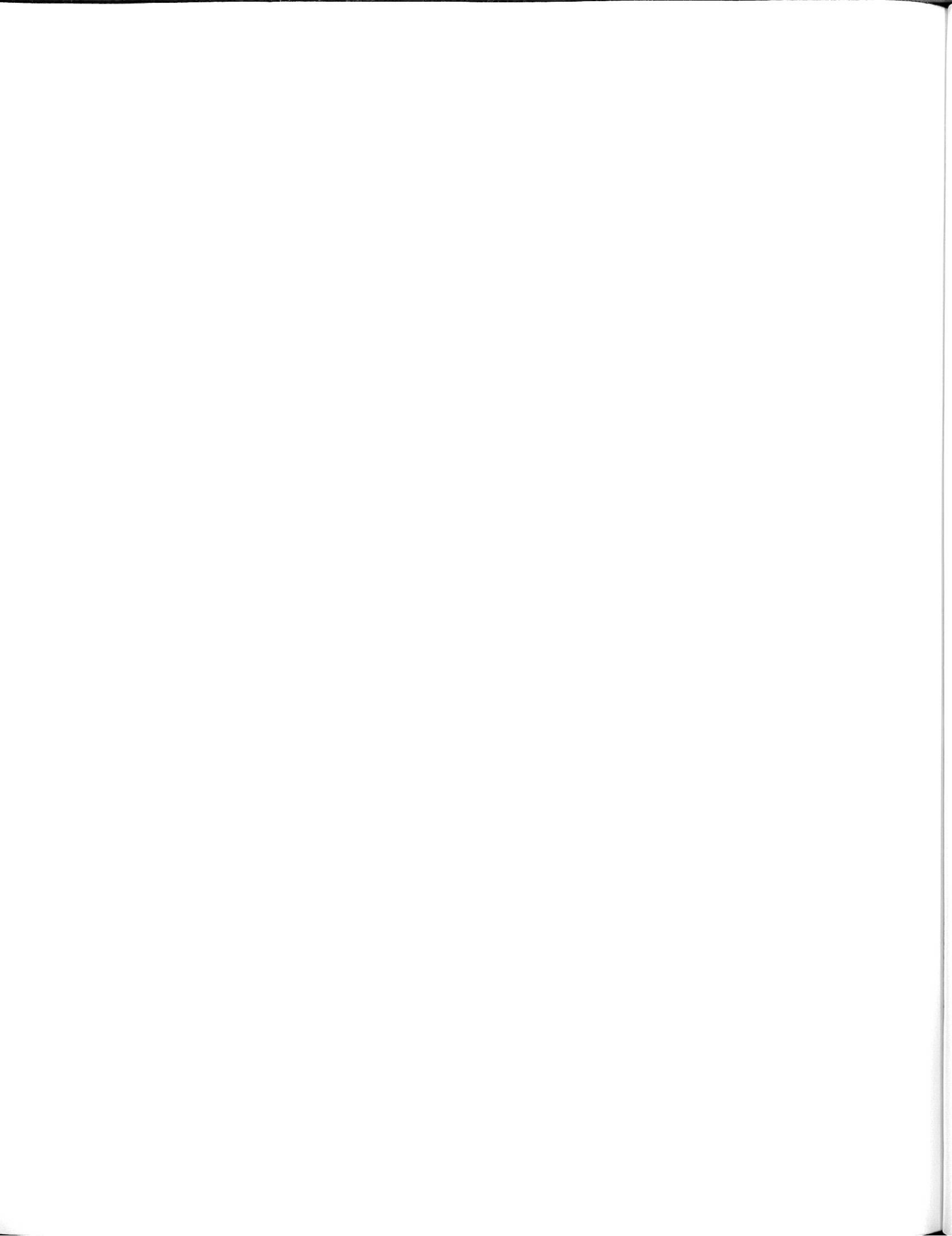
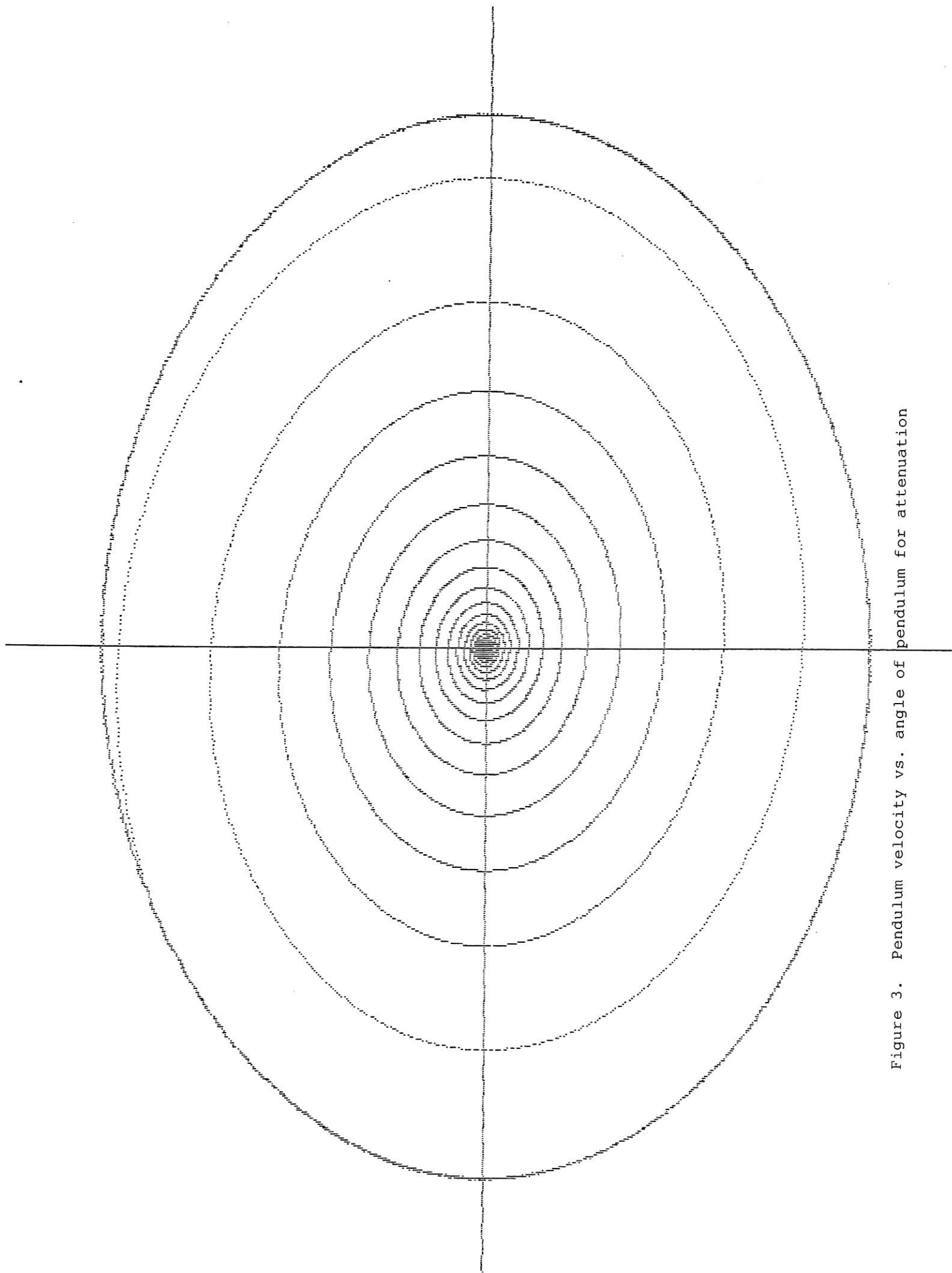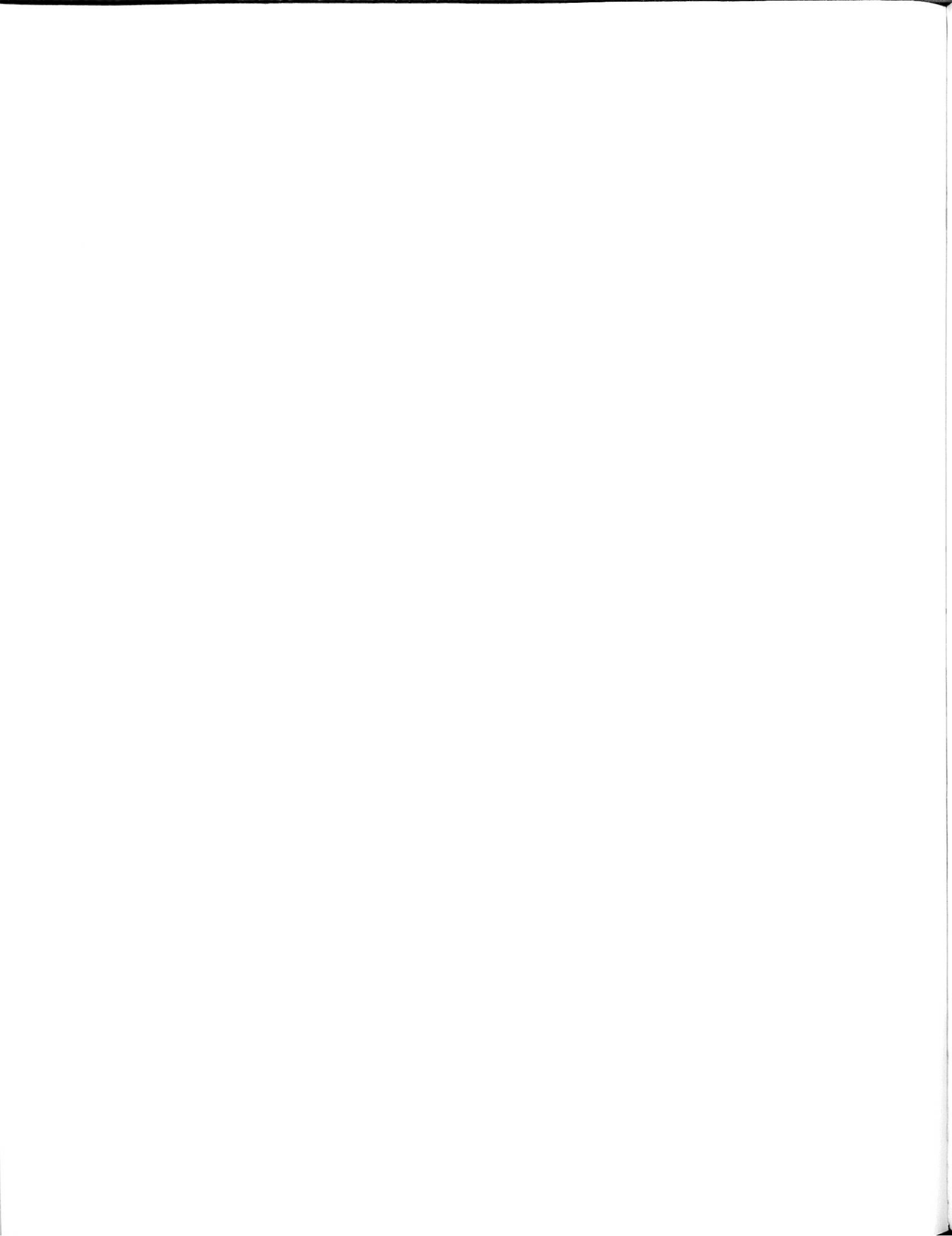Figure 2. Pendulum velocity plotted vertically against angle of pendulum

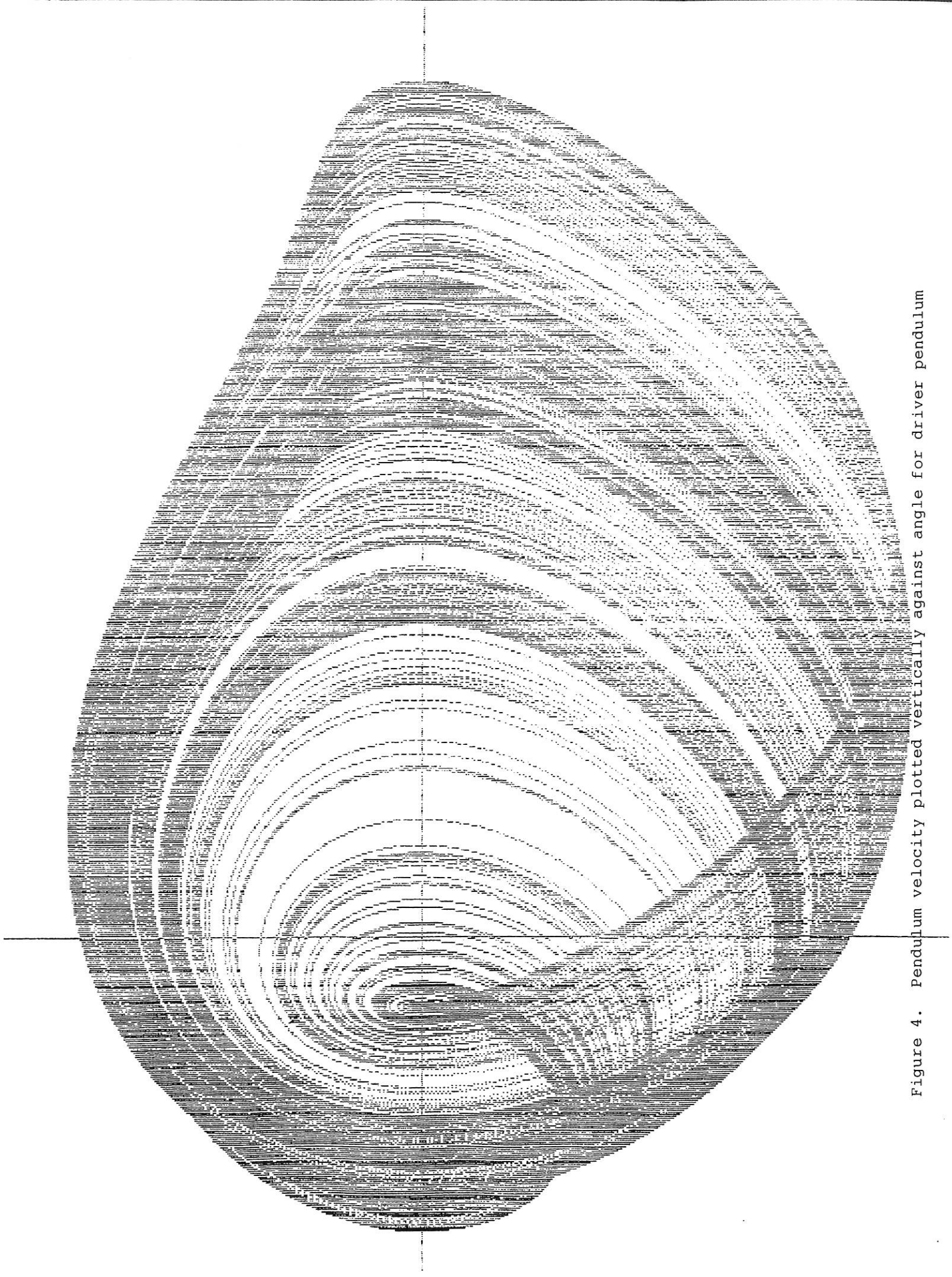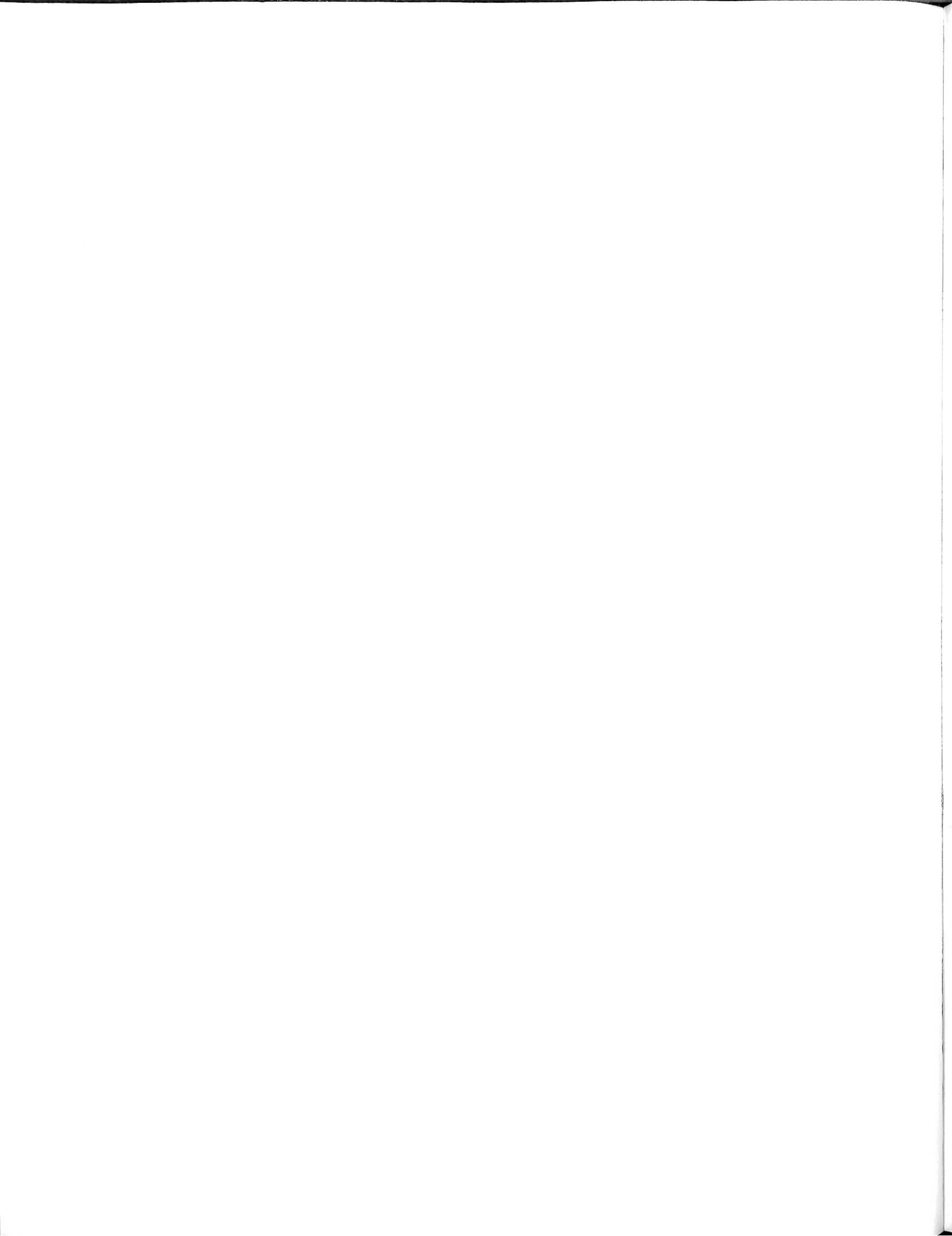Figure 3. Pendulum velocity vs. angle of pendulum for attenuation

Figure 4. Pendulum velocity plotted vertically against angle for driver pendulum

ACKNOWLEDGMENTS