SEMOITICS OF FILM: AN INVESTIGATION OF SOME INFLUENCES ON THE LANGUAGE OF FILM

Keyan Gray Tomaselli

CS Peirce's theory of signs is shown to be more and have a wider application than de Saussure's linguistic based approach. The study is couched within a cybernetic framework which evaluates art and entertainment in relation to entropy and synergy. Reality considered as a system of signs shows how a society's existential perceptions are directly related to different classes of sign. Neurophysiological influences which distort perception are taken into account. Technology mediates an increased awareness of reality through a rapprochement between art and science. A model of synaesthetic cinema is proposed based on the concepts of modern physics. The conclusion shows that Peirce's theory is best equipped to account for all types of visual communication including non-narrative cinema. This represents a major advance in the study of film languages.
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ABSTRACT

This dissertation sets out to study in detail C.S. Peirce's theory of signs as it relates to a study of film language. This paradigm is shown to be more flexible and to have a wider application than the better known, linguistically based de Saussurean approach.

The first section sets out to combine Peirce's theory of signs with the more general theory of cybernetics. This entails an evaluation of the concepts of art and entertainment in relation to the notions of entropy and synergy.

The next section considers the concept of reality as a system of signs and demonstrates how a society's existential perceptions are directly related to their understanding of different classes of sign.

Important to the process of perception are neurophysiological influences which produce distortions in the reception of information. These distortions need to be taken account of within the semiotic framework.

The rapprochement between art and science is discussed and it is shown how technology provides a potentially increased awareness of different orders of reality.

The third stage of the analysis deals with some of the major film theories and develops the concept of synaesthetic cinema which models itself on concepts of modern physics where the artist's function is to find rather than to impose.

Finally, it is shown that Peirce's theory is best equipped to account for all types of visual communication including non-narrative cinema. This represents a major advance in the study of film languages.
PREFACE

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CHAPTER I

INTRODUCTION

At any time, the evolution of any sector of a discipline is to a large extent dependent upon the interests and orientations of its students and their respective interactions with researchers in allied fields. Central themes which are of some considered importance when first mooted become outmoded or superceded as the years pass. In some disciplines change is smooth, continuous and chronological. Other fields exhibit a series of apparently unrelated progressions and shifts which seem independent of unifying concepts or frameworks. Not solely part of any one academic field and not unified enough to constitute a recognized discipline within itself, these advances remain under utilized, and largely non-integrated into a general body of knowledge. One such discipline is communications science which has developed enormously during the 1970's. Specific works have led to the creation of particular paradigms, which researchers have utilized in their pursuit of normal scientific activity. The three basic approaches which have to some extent fused the discipline of communications are widely differing, though complementary in the ideas presented.

The writings of Norbert Wiener (1948, 1954) on cybernetics laid the foundation for a theory of communication between machine and machine, man and machine and man and man. Writing at the same time, Claude E Shannon and Warren Weaver (1949) utilized the theory of thermodynamics to enunciate a mathematical theory of communication. These studies represent the basic transformation which led to the recognition of communications as an emerging science.

A second transformation was initiated by Marshall McLuhan (1966, 1968, 1969) whose somewhat loose sociology redefined the media in terms of means of expression and explored the relations between the media and society.
The third approach, semiotics or semiology, which deals with the connection between meaning, experience and signification has a long and complicated history. References to this area of study can be traced back to Plato's writings in *Phaedo*, *Symposium* and *Cratylus*. Later mention is found in St. Augustine's (354-430AD) *The Teacher*, after which few coherent statements can be found. The late 1800's saw a revised interest in the study of signs. This discipline was heralded by Edmund Husserl (1859-1938), the founder of phenomenology. The term 'semiology', however, was coined by Ferdinand de Saussure (1857-1913) who laid the foundation of much modern linguistics at the University of Geneva. Across the Atlantic, the American pragmatists, Charles Sanders Peirce (1839-1914) and Charles Morris (1938, 1946, 1971) wrote of a 'semiotic' and offered a more flexible and comprehensive paradigm than did de Saussure. Morris, a disciple of Peirce, was guilty, however, of contaminating his semiotic with an uncompromising form of Behaviourism. Within this emerging discipline occurred an internal transformation which was stimulated by Roman Jacobson (1960, 1963) during the 1920's. He introduced a complex communication model which subsumed the study of semiotics within its general structure.

The posthumous publication of Peirce's work during the 1930's (see Hartshorne, Weiss and Burks, 1931-1935) generated much activity during the following decade involving such eminent scholars as John Dewey (1916, 1925, 1946), R.B. Braithwaite (1934) and W.O. Quine (1935). The work of de Saussure too, was only published in 1916, three years after his death.

Elements of the ideas of both Peirce and de Saussure were followed through many years later by Umberto Eco (1976, 1977) and Roland Barthes (1968, 1973, 1977). The postulates of semiology were later applied to a study of film by Peter Wollen (1969), Christian Metz (1974a, 1974b), Jan Mukarovsky (1978) and many others. These studies generated a new interest in the study of film as a sign system resulting in a world wide diffusion of the subject. Some articles simply accept existing paradigms and have sought merely to
apply them to an evaluative study of film (see, for example, Lawson, 1979; Wollen, 1975). Such writers use semiology to perform criticism. A larger group of students such as van Zyl (1977), Harman (1977), Andrew (1977), James (1978) and Frederickson (1979) have questioned existing paradigms and have sought to develop the theory of semiology from its disparate roots, or to seek for more sophisticated paradigms. John Fiske and John Hartley (1978) have extended the general application of semiology to a study of television and television genre paradigms.

The past century has witnessed an increasing array of new media ranging from the zoetrope to laser light. In terms of the mainstream of existing theory, the advent of each new medium calls for a simultaneous study of its concomitant language, sign or semantic system, and an assessment of whether any existing semiological paradigms can account for the new sign systems which are utilized in the new communication channel. The proliferation of new communications technologies have created a host of new language systems (i.e. signs, sign-systems, codes and sub-codes) which remain unaccounted for within the bounds of present theoretical knowledge.

Questions as to the nature of a visual language abound. What is the relationship between static and moving images? How do the physical properties of different media affect what is being communicated? How are audiences affected by the construction of messages? And most important, what approach should be adopted in the study of visual phenomena? Film theorists have looked to semiology to assist in the construction of a language of film since they found existing approaches to be deficient in their explanatory capacities. What has resulted, however, appears to be an academic log-jam coupled with a taxonomic nightmare. The assumption that the film code, for example, should be based on a linguistic foundation may be shortsighted and consequently exclude other dimensions of language, or indeed, new paradigms altogether. The confusion of the differing bases of semiotics on the one hand and semiology of the other, is a further factor which must be eradicated. The difficulties
encountered in the identification and construction of a theory of signs in film and television will serve to delay and consequently restrict humankind's consciousness to within the limits defined by his existing languages and conceptual sign systems.

The potential of a new medium is not always immediately exploited because the new language it brings with it must first be assimilated by both the communicator and the receiver. Weiner (1954) argues that society can only be understood through a study of the messages and communications systems which belong to it. The sophistication of any society, therefore, depends primarily on that group's ability to comprehend and understand communication processes together with the language systems which serve the different media. The study of language or semiotics, cannot be divorced from an examination of the properties of the medium (form) or the process of communication. In other words, inseparable from the notions of code and message are the properties of the communication medium and the way it communicates to a receiver in a cultural context.

**The Function of Film Theory**

Theories - even fragments of partially developed theory - provide an important guide for the direction of research by highlighting potentially fruitful areas - that is, where meaningful relationships are likely to be found (Seltiz et al., 1965, p.487). Merton (1957, p.96) places the interaction of empirical and theoretical research in perspective:

... if concepts are selected such that no relationships between them obtain, the research will be sterile, no matter how meticulous the subsequent observations and inferences. The importance of this truism lies in its implication that truly trial-and-error procedures in empirical inquiry are likely to be comparatively unfruitful, since the number of variables which are not significantly connected is infinitely large.

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Theory points to salient avenues of enquiry, provides the mechanisms by which the investigator can relate apparent contradictions and sets out frameworks for observed relationships. At any one time a number of film theories exist in order to account for the varying types of films produced. Complementary theories and various methods of analysis have been formulated to evaluate particular examples of films which have not traditionally fitted into established theoretical constructs. Most of these approaches are of an inductive ampliative nature based on a posteriori reasoning where discovery and justification of particular facts leads the researcher to pass general statements which comprehend them. Basic to this formulary of reasoning is an essential trust in evidence derived from the senses, and consequently about the simple observational statements which put that evidence on record (Medawar, 1969, p.27). This empirical method is found in auteur theory and the styles of the Nouvelle Vague, German expressionism and the Italian neorealism, Colonial cinema and Third World cinema. These approaches represent systems of classification which aim at identifying common characteristics unique to each area of study and to generalize these to other observed occurrences. Not always based even on rigorous inductive argument, such formulations are questionable, for not all knowledge is transmitted purely from the senses, and taxonomics are arbitrarily based on the systems postulated.

In contrast, semiotics is grounded on the hypothetico-deductive scheme of thought which assumes that if our hypotheses, axioms and assumptions are true, then logically, so are the inferences drawn from them. This in turn regulates the universe of observables, removes the investigation from the simple apprehension of facts and places the enquiry into the realm of provable and disprovable hypotheses.

In more than six decades of research since the appearance of the first comprehensive film study, The Photoplay: A Psychological Study by Hugo Munsterberg (1916), the dom-
inart problem still confronting film theorists is that of a fragmented approach and apparent inability to relate observed relationships into a unified theory. Technological developments are already superceding what theory has been formulated, which, if it is to continue to be relevant, involves a redefinition of film to incorporate new visual communications technologies (eg. television, computer movies, electro-videographic images etc.) as well as a revised paradigm capable of exploring new elements and new semiotic components introduced by such non-chemically based technological innovations.

Objectives

It is against such a background that this dissertation will attempt:

1. To locate the study of film within a systemic metatheoretical framework which will synthesise the postulates of cybernetics and semiotics into a unified theory;

2. To reassess the contribution of established semioticians who have as yet ignored the visual communications media other than conventional chemical based film; and

3. To propose the basis for a modified film and television semiotic which has a validity beyond conventional or narrative-based film language.
CHAPTER 2

CYBERNETICS AND SEMIOTICS: A SYNTHESIS

Cybernetics: Problems and Prospects

Cybernetics is the science of control and communication in an organism or organization, natural or technological. It incorporates the study of messages as a means of controlling society. Control is achieved through the reception and interpretation of messages. An ensuing response will not occur unless the code embodied in the message is socially agreed upon and is admitted by the receiver.

The science of cybernetics has made great inroads into the methodologies of a wide spectrum of disciplines, but its inherent potential to span an interdisciplinary field of investigation from the intuitions of art to the apparently precise mechanics of science has yet to be fully tapped. The interdisciplinary nature of the cybernetic approach is a direct consequence of its historical background which is drawn from mathematics, physiology, electrical engineering, computer engineering, psychology, theoretical biology and sociology. Cybernetics is probably the only method of analysis which can subsume all fields of study into one integrated approach. This property, however, poses many conceptual difficulties since it challenges the specialized institutional nature of much academic research where specialists prefer to plough narrow furrows rather than to cut across accepted scientific boundaries. The scepticism with which interdisciplinary investigation is greeted is because the specialist is wary of the more superficial enquiries which may result from this wider approach. It is, however, the contention of this study that an understanding of communication in all its complexity depends upon an appreciation of process in relation to the medium and language-system employed. The methodological problems which lie at the interface of these three variables need a set of concepts and techniques to weld them together, to eliminate unwanted factors and to identify the role of each individual variable.
in complex interacting non-experimental situations. The lack of adequate experimental design procedures which characterises present communications and semiotic research precludes the use of experiment for empirical measurement may lead to a number of acute inferential problems: the confounding of one variable with another, causes with effects and functional relationships with causal relationships. What is needed then, is an analytical tool such as cybernetics which is capable of integrating the disparate research directions of film and communications theory into a common framework to encompass the behaviour of all the components which should constitute the discipline of a film semiotics. At this level, the cybernetician faces similar problems as the philosopher of science who realizes that he is no longer dealing in absolutes which can be measured in terms of hypothesis-experiments-results procedures.

Semiotics

Cybernetics is concerned with the control and flow of communication embodied in messages. The construction of a visual message relies on the use of signs which stand for something else. A basic system of signs employed in a particular medium is called a code. A code is a system of signification. That is, the sign stands for its referent or absent correlate. The science which deals with the study of sign systems and their respective codes is known as semiotics or semiology. This discipline includes the study of linguistic, para-linguistic and extra-linguistic forms of discourse. It is concerned with the explication of codes, and aims to isolate each code, discern its code on a scale of specificity, to measure its degree of generality, and to investigate how it interacts with other codes. In other words, semiology is the aggregate of all the codes and sub-codes which combine to generate signification or meaning in the expressive constituents of a visual medium. This discipline was first propounded by Ferdinand de Saussure (1916, p.33):

A science that studies the life of signs within society is conceivable; it would be part of
social psychology and consequently of general psychology; I shall call it semiology (from the Greek semelion 'sign'). Semiology would show what constitutes signs, what laws govern them. Since the science does not yet exist, no one can say what it would be; but it has a right to existence, a place staked out in advance. Linguistics is only a part of the general science of semiology; the laws discovered by semiology will be applicable to linguistics, and the latter will circumscribe a well-defined area within the mass of anthropological facts.

According to de Saussure, a linguistic sign is a binary or dyadic relation between the signifier (or sign-vehicle) and what is signified (the referent or meaning). The notion of a sign as a two-fold entity perforce constrains his paradigm to a social rather than a cultural context. In this, de Saussure was greatly influenced by the work of Emile Durkheim (1858-1917) in sociology and emphasised that the study of signs could not be divorced from a social viewpoint. Language as a social institution involves the study of rites and customs as signs. Although de Saussure clearly located the study of semiology within the confines of social psychology, according to Eco (1976, pp.14-15) de Saussure did not define the signified clearly, leaving it half way between a mental image, a concept and a psychological reality; but he did clearly stress the fact that the signified is something which has to do with the mental activity of anybody receiving a signifier. De Saussure was mainly concerned with the arbitrary nature of the sign: "I mean that it is unmotivated, i.e. arbitrary in that it actually has no connection with the signified" (de Saussure, 1972, p.73). De Saussure (1972, p.73) states further:

Signs that are wholly arbitrary realize better than the others (i.e. natural signs) the ideal of the semiological process; that is why language, the most complex and universal of all systems of expression, is also the most characteristic; in this sense linguistics can become the master pattern for all branches of semiology although language is only one particular semiological system.
Thus, in terms of de Saussure's approach, the sign is intrinsically defined as a communicative device occurring between two human beings intentionally intending to express or communicate something. Against this background, it is logical that all the examples of semiological systems offered by de Saussure do not deviate in any way from strictly conventional systems of arbitrary signs such as polite formulas, military signals, rules of etiquette and visual alphabets.

**Semiotics**

Working at more or less the same time, the American logician, Charles Sanders Peirce, provided a much more precise taxonomy of different classes of signs and formally introduced a third element into the dyad. The sign, according to Peirce, should be conceived of as a triad - i.e. the relation between the signifier, the signified, and also, the mind of the interpreter. Peirce (5.488) defined his approach in the following terms:

I am, as far as I know, a pioneer, or rather a backwoodsman, in the work of clearing and opening up what I call a semiotic, that is the doctrine of the essential nature and fundamental varieties of possible semiosis ... By semiosis I mean an action, an influence, which is, or involves, a cooperation of three subjects, such as a sign, its object and its interpretant, this tri-relative influence not being in any way resolvable into actions between pairs (5.484).

In terms of Peirce's (I.339) formulation:

A sign stands **for** something to the idea which it produces or modifies **for** that which it stands for is called its object; that which it conveys, its meaning; and the idea to which it gives rise, its interpretant.

Thus a sign can stand for something else to the receiver because the 'standing for' relation is mediated by an interpretant. The sign is an irreducible triadic relative, with
the sign determining the interpretant.

Phaneroscopy

In order to fully understand Peirce's semiotic it is necessary to discuss his notion of phaneroscopy, a philosophical pursuit which has hitherto been ignored by semioticians. What has been written, generally by philosophers is vague, confusing and very often, contradictory (see, eg., Burks, I948-I949; Feibleman, I940-I94I; Dewey, I946; Buchler, I939). The clearest exposition of Peirce's doctrine of phaneroscopy is offered by Fitzgerald (I966) on whom this study draws.

Peirce divides the study of philosophy into three sections: phenomenology, logic and metaphysics (Fig.I). He distinguishes his notion of the phaneron from the more usual category of the phenomenon, that which is directly perceived by the senses, in the following definition:

Phaneroscopy is the description of the phaneron, and by the phaneron I mean the collective total of all that is in any or in any sense present to the mind, quite regardless of whether it corresponds to any real thing or not (I.284)

Phanerons are distinct from phenomena in the following ways. Firstly, they do not need to be verifiable. This means that the phaneron can include fantastical situations, fictions, dreams and misapprehensions. Secondly, the smallest unit of a phaneron is the totality of what appears at any one time. In a Western movie, for example, a phaneron could be a clean shaven man wearing a white hat riding a horse in a blistering hot desert. The white hat is not a phaneron, though it may be a sign (signifying 'good'). The phaneron is rather a collection or bundle of signs. It is a context, a scene or a scenario.

Peirce develops his concept of the phaneron by analysing three pervasive categories to be found in it. All phenomena are classifiable within this triadic set. All three are elements of any one phaneron, although in each case one would outweigh the other two. In what follows, the phaneron of the ballroom scene in Orson Welles' The Magnificent Ambersons
Figure 1: Schematic Representation of Peirce's Division of Science

The dotted line delineates the subject area covered in this dissertation.
is schematically analysed in terms of these categories, that is, firstness, secondness and thirdness.

The most elementary concept that may be extracted from a phaneron is called a first. It is the central idea of the phaneron and corresponds to Hegel's use of 'essence'. It must be autonomous; that is, it holds its reality without having to be compared to anything else. It is something in itself. In the phaneron of the ballroom scene, the elements of firstness would include self-satisfaction, opulence, respectfulness, etc.

A second or secondness implies a relative autonomy. The phenomenon exists in a dyadic relation to something else. According to Fitzgerald (1966, p.31):

Secondness is not ... purely opposition to others, but it is also the intrinsic feature by means of which an individual is able to retain its identity in the face of others. The identity does not result from the opposition, but is manifested in the opposition.

In the same scene as above, each character has an element of secondness. Each character stands apart from the other and has characteristics which distinguish them from one another.

A third or thirdness is a medium of connection between a first and a second: it is a mode of relations - a method of combining various elements. Prominent among thirds would be those elements involving representation, generality, continuity and the law. In the ballroom scene, the hero wishes to impress the heroine. His wish to impress is a general idea and therefore a first. He has chosen to impress one particular girl, the heroine, who is thus a second. His way of integrating his 'desire to impress' with the element of the 'particular girl' is through the social convention of asking her to dance, which is a third.

The First Trichotomy of Signs

A triadically determined object exemplifies all three categories (Peirce, 2.238). A sign is defined as "something which stands to somebody for something in some respect or
capacity (Peirce, 2.228), and is therefore triadic in nature. Through the application of these two principles, that is, phaneroscopy and the sign, three divisions of signs are generated: the sign in itself, the sign as related to its object, and the sign as interpreted to represent an object. These divisions are given in Table I, below.

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<th>(A) Signs in themselves</th>
<th>(B) Signs in relation to objects</th>
<th>(C) Signs interpreted to represent</th>
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<td>1. First</td>
<td>Qualisign</td>
<td>Icon</td>
<td>Rheme</td>
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<tr>
<td>2. Second</td>
<td>Sinsign</td>
<td>Index</td>
<td>Proposition</td>
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<tr>
<td>3. Third</td>
<td>Legisign</td>
<td>Symbol</td>
<td>Argument</td>
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Each subdivision is subject to all three categories (Peirce, 2.243). Accordingly, each division is trichotomous. The sign, for example, as related to its object may be similar to, may be existentially connected with, or may be referred by means of a law to, it object. Hence Peirce is able to obtain his three trichotomies listed in Table I (Weiss and Burks, 1945, p. 384). This study is concerned only with the second trichotomy.

The Second Trichotomy of Signs

The second of Peirce's philosophical "orders" is normative science and logic which he divides into speculative grammar, critic and methodetic (see Fig.I). Fundamental to the notion of speculative grammar is the division of signs into icon, index and symbol. This classification is called "The Second Trichotomy of Signs".

Peirce (2.247) defines the icon as follows:

An Icon is a sign which refers to the Object that it denotes merely by virtue of characters of its own, and which it possesses, just the same whether any such Object exists or not.
At this stage it is necessary to distinguish between two kinds of objects, the immediate and the dynamical object. The immediate object is synonomous with connotation and is the object as the sign itself represents it. The dynamical object is denotive, the external meaning, the reality itself. Icons are, however, of limited value for they offer no knowledge about actual relationships and are not empirically verifiable. An icon is a first, but implies secondness since the concepts embodied in a first are not possible without previous experience of seconds. There are no pure icons since it would be impossible to conceptualise signs that consist of disembodied qualities. The closest analogue is therefore an idea or first. In short, an icon is a sign which represents its object mainly by its similarity to it. The relationship between the signifier and signified is not arbitrary (as with de Saussure), but one of likeness.

An index is a sign by virtue of an existential bond between itself and an object. This connection makes it an appropriate sign for calling attention to the existence of the object. A weather cock, for example, is an index of wind direction. An index is a second for it "forces the attention to the particular object intended without describing it" (I.369). Or, more broadly, "Anything which focuses the attention is an index" (2.285).

The third category, the symbol, requires neither a resemblance to its object, nor an existential bond with it. It is conventional and culture bound and is related to its object by virtue of a habit of association. The reality of the habit or law exists because individual interpreters will conform to the law. Peirce divides his concept of symbol into "type" or "symbol" and "token" or "replica". The former is the symbol itself and the latter is a specific instance of the symbol. Thus, for instance, a photograph of a motor car is a symbol or type of a materialist; industrial footloose society, whereas an individual copy of that photograph is merely a token or replica. It is this category of sign which corresponds most closely with de Saussure's definition of an arbitrary sign. A generic difference does, however, distinguish between these two categories. For
Peirce, a symbol is a third, founded upon a triadic relationship. De Saussure's definition of a symbol, in contrast, is analysable in terms of a complexus of separate dyadic relations. Peirce further divides his irreducible triads into genuine and degenerate signs. A genuine sign is one which requires a cognitive act to complete the triadic relationship. A degenerate sign is one whose relationship with the signified or referent is independent of any cognitive act. These categories are not mutually exclusive. The same sign can function on different levels as icon, index and symbol. An icon of a weathercock is a weathercock. As an index, the weathercock indicates wind direction regardless of whether it is observed or not. When it is observed and the observer is able to interpret the position of the weathercock as being the direction of the wind, then it is acting as a symbol. Thus, unlike de Saussure's formulation, Peirce's trichotomy may fulfill both an unmotivated and motivated function at the same time depending on interpreter. The key difference between Peirce and de Saussure's respective theories lies in the cognitive role of the interpreter.

Peirce's trichotomy has elsewhere been termed "orders of signification" (see Barthes, 1968, 1973; Fiske and Hartley, 1978). By generalizing the postulates of these scholars with those of Peirce, three orders of signification may be defined. These correspond with the categories of icon, index and symbol:

1. A self-contained sign (e.g. a photograph) of a motor car, for example, means that only the car itself is of significance. In such motivated or iconic signs a natural relation exists between the signifier and signified;

2. At the second level, the simple motivated meaning intercepts a whole range of cultural meanings not derived from the sign itself, but from the way society uses and values both the signifier and signified. For example, in Western society the motor car (or sign of the car) often signifies virility and/or freedom. The sign and signifier relate to its signified by convention. That is, meaning is predicated upon an agreement among its users that the sign embodies a common meaning. Such
signs are indexical, are less motivated and more arbitrary than first order self-contained signs. The range of cultural meanings coalesce into the third order:

3. This level of signification accounts for a comprehensive cultural image of the world, a coherent and organized view of the reality which confronts a society. At this level, a motor car can form part of the imagery of an individualistic, material, industrial and rootless society.

In terms of Peirce's classification of two kinds of objects or referents, the first order of signification corresponds with the dynamical object, while the second and third orders relate to the immediate object.

Outline and Division of Interpretants

We have previously referred to the interpretant as the idea to which the sign gives rise in the interpreter. This section will explore this notion further. Peirce (6.347) gives the following description: "That determination of which the immediate cause, or determinant, is the Sign of which the mediate cause is the Object may be termed the Interpretant". Peirce divides interpretants into three kinds - the immediate, the dynamical and the final (Fig.2).

According to Peirce (Letters, p.36), "My Immediate Interpretant is implied in the fact that each sign must have its own peculiar Interpretability before it gets to any Interpreter". The immediate interpretant is the logical potential or possibility of a sign to be interpreted.

The dynamical interpretant is "the direct effect actually produced by a sign upon an interpreter of it" (4.536). This interpretant must be divided according to the different kinds of responses within the interpreter of which Peirce identifies three: the emotional, the energetic and the logical. The emotional is the feeling in the interpreter invoked by the sign. It may be one of recognition or may be elevated to a much higher emotional level which is itself "the only proper significate effect that the sign produces" (5.475). The energetic interpretant is that which involves an effort which
Figure 2: Outline of Interpretants and the Process of Unlimited Semiosis
may either be physical or mental.

The logical interpretant concerns itself with interpretants which are in the category of thirdness and are triadically produced effects of a sign. This accounts for intellectual concepts which may, however, produce a mental sign. At this point Peirce introduces the notion of an ultimate logical interpretant which is necessary in order to break the cycle of interpretants producing signs which themselves need interpretants. This is the first time the necessity of an ultimate interpretant is introduced by Peirce into his argument. Up to this stage he was content to allow for the process of unlimited semiosis. Thus the logical interpretant is broken into two: the non-ultimate and the ultimate logical interpretant. The ultimate logical interpretant will act as an explanation which must be in terms of something other than what is to be explained. Thus a concept which produces as its interpretant another concept must be ruled out. Peirce argues that the only instance of ultimate logical interpretants, which would need to have a general application, is that of a habit-change:

... meaning by a habit-change a modification of a person's tendencies toward action, resulting from previous experiences or from previous exertions of his will or acts, or from a complexus of both kinds of causes (5.476).

The final interpretant is "that which would finally be decided to be the true interpretant if consideration of the matter were carried so far that an ultimate opinion were reached" (8.184). By this Peirce means the interpretation of the sign which would be made by the community of scientists if they understood completely the laws which regulate the effects of the sign.

The immediate interpretant is the concept of the sign itself and so is an analogue of firstness. The dynamical interpretant is the effect produced on the interpreter, and is therefore mediated through the the triadic process. It is the triadic nature of the dynamical interpretant which allows Peirce to equate it with the sign itself. This makes
the dynamical interpretant an analogue of secondness. The final interpretant is that which "would be" if one understood the laws of connection which structure the posited phaneron or sign.

Of the three interpretants, the immediate, the dynamical and the final, only the dynamical is an interpretant in the narrow sense, since Peirce defines the interpretant as the effect that the sign has on the interpreter, and it is only the dynamical which completes this triadic process. The immediate interpretant is not an interpretant in the narrow sense, since it only establishes the interpretability of a sign. The final interpretant is also only a quasi-interpretant since it is an ideal.

This discussion leads us directly to Peirce's notion of 'the ultimate opinion'. A clue to this can be found in the following quotation from Peirce (8.315): "The Dynamical Interpretant approaches the character of the (Final Immediate) Interpretant". That is to say, that as the scientific community develops its knowledge of scientific regulation or scientific laws, the closer they approach the ideal. The closer too, does the final interpretant approach the immediate interpretability of the sign. When the immediate interpretant coincides with the final interpretant then we have achieved the ultimate opinion.

Paradigms and Syntagms

Basic to the organization of any system of signs is the structural relationship between the paradigmatic and the syntagmatic elements of communication. These can be likened to a set of axes, one vertical and the other horizontal (Fig. 3).

selective/associative/paradigmatic dimension (metaphor)

\[ \begin{align*}
\text{combinative/syntagmatic dimension} \\
(\text{metonymy})
\end{align*} \]

Figure 3: Paradigmatic/syntagmatic axis
The content of a narrative movie, or indeed, any message may be graphically likened to a set of axes, one vertical 
\( (v_1, v_n) \), the other horizontal \( (h_i, h_n) \) which dynamically intersect anywhere between \( h_{1...n} \) and \( v_{1...n} \) (Fig. 4). The horizontal flow of messages organized in sequence in the linear chain in the text is known as syntagmatic signification. A sign enters into syntagmatic relations with all the other signs which may possibly occur on the same axis but not at the same time - an either/or basis. A syntagm governs the laws of combination of signs and how these laws confer meanings to messages according to agreed rules and conventions. Narrative cinema falls into this syntagmatic schema seeking a sequential signification in terms of content. A narrative according to Christian Metz (1974a, p.24) is the sum of events which are ordered in sequence. It is a closed discourse which proceeds by unrealising a temporal sequence of events. An event is the basic minimum unit of the narrative.

The vertical axis of possible selective connections is termed the paradigmatic dimension of signification. In semiotics, a paradigm evokes meaning through the association of the elements which make up the image. A sign enters into paradigmatic relations with all other signs on the same axis concurrently in a chain of discourse. In other words, a paradigm may be likened to a universe of vertical units (words or signs) from which one of the alternatives is selected. Although the paradigmatic axis only appears during the unfolding of a film it is independent of the temporal narrative syntagmatic sequence. Where the two axes intersect, meaning will be deciphered. In other words, the coalescence of the two axes at the point of intersection creates a meaningful whole. A message only becomes meaningful when the semiotic codes in question interlock with the cultural awareness of the viewer. The signs created at the locus of intersection can offer meaning in a number of different ways. Signs may refer back to a code which in turn confers meaning to the signs generated. Sometimes the sign produced is a code in itself which then becomes a stylistic or characteristic code-type in the sequence of a given
FIGURE 4: Syntagmatic / Paradigmatic Structure of a Narrative
director's work. In other words, the signs generated may be idiosyncratic to a given director's own idio-code. In this case there is no back reference to a code at all, rather a new code is created peculiar to an individual director. Since semiotics is concerned with the internal workings of cinema and not with individual films or directors, it is necessary for the theorist to generalize this new idiosyncratic code with other codes already known to exist. The codes spawned by syntagmatic and paradigmatic interaction, by definition, transcend individual films and can only be studied across a body of films or systems.

In terms of a Peircean framework, the paradigmatic axis is an analogue of secondness because it refers to the specificity of a sign which is chosen from amongst a spectrum of alternative signs. The syntagm is an analogue of thirdness because it is concerned with the methods of combination of single discrete signs into a unified whole.

This basic structure may be further developed through the use of Roman Jacobson's communication model. Although originally developed for literary analyses, its property of universality allows it to be applied across verbal, non-verbal and pictorial messages including art and entertainment (Fig.5).

![Diagram of Jakobson's model for the analysis of messages](After Peters, 1977, p.41)
In this model, the structure of any message consists of the following elements: the referential function is the basis of all communication. It defines the relations between the message and the object to which it refers. It is denotative in character and refers to the dynamical object. The expressive function identifies the way the communicator expresses his attitude towards the referent. That is, it defines message-emitter relations. This function has connotative properties and is analogous to the immediate object. The referential and emotive functions while complementary are also simultaneously competitive. This contradiction is described as the double function of language where the same object has different meanings, the one cognitive and objective (a first order sign), and the other affective and subjective (a second or third order sign). The conative function defines message-receiver relations and accounts for the process whereby the message contained in the text is accessible to and receivable by the receiver. The phatic or contact function can be described as the attention getter which makes the receiver more receptive to the message. The metalinguistic function is revealed through a verbal explanation of content. The poetic function accounts for the form of the picture or message; it is the relation between the message and itself. The referent is the message and therefore ceases to be the instrument of communication for it becomes its own object. These message-objects carry their own meaning and often the signs generated refer back to the creator's own idio-code. Any message-object formulated requires the use of a system of signs which in turn is dependent upon the process of paradigmatic selection and syntagmatic combination. It is the poetic function which defines the parameters of art. Jakobson was concerned with the question of what makes a verbal message a work of art. Since his communications model can be generalized to include all types of messages, this question may be redefined to consider art in general. The basis of his identification of a work of art rests on the notion of equivalence which describes a reflexive, symmetric, and transitive relation between elements of a set that establishes any two elements in the set as equivalent.
or non-equivalent: similarity and dissimilarity, synonymity and antonymy etc. and which operates on the axis of selection. The build up of sequence, the combination, however, is based on contiguity. In terms of this model, art is the projection of equivalence from the axis of selection to the axis of combination. In other words, the process of equivalence provides the bridge between mediated and unmediated experience which may then be conceptualised as art.

This brings the discussion to a consideration of how these messages and codes are disseminated through the media, with particular reference to film and television.

A Cybernetic Analysis of Communication

The following section deals with art and entertainment as a communications system and its control by the application of cybernetic principles. A system is a set of interconnected parts, each part a system in itself, each system contained within a larger system, and so on (Fig.6). Control may be defined as intervention which restricts deviations from system objectives or goals to within acceptable limits. Cybernetics involves the study of the science of control and communication in an organism or organization and incorporates the study of messages as a means of controlling society with special reference to self-adapting systems. This general definition can be applied to any control situation in both the human and physical sciences, whether or not the system is simple and determinate or probabilistic and highly complex.

There is a tendency for studies which embrace cybernetics to shy away from a clear definition of the processes and applications within the system under investigation, and to jump directly into a discussion of both, a procedure which may tend to confuse the reader. The following analysis attempts to identify the components and interactions of a cybernetic system and will define the system in question.

The control process is based on a feedback loop through which the output of a system is linked to its input in such a way that variations in output from some pre-set norm or
Figure 6: A Communications system  
(After Tomaselli, I977, p.6)
goal results in compensating behaviour that tends to restore system output to that goal. Control on the basis of actual performance, rather than expected performance, is known as error-controlled regulation or feedback, and involves sensory mechanisms which monitor and indicate performance. The actual performance of the system is compared with the intended performance (or goal) and information is returned to the decision-making point, so that the inputs can be modified to correct the system output to within the limits set. Information is communicated by signalling systems. A signal differs from a sign in terms of both function and purpose. On the one hand, a signal could be a physical electrical impulse which has no semiotic purpose. In this role, the signal is studied by information theory and has little relevance for the present discussion. At another level of analysis a signal is a pertinent unit of a system that may be an expression ordered to a content and when used as the recognized antecedent of a foreseen consequent it may be viewed as a sign, in as much as it stands for its consequent as far as the sender is concerned (Eco, 1976, p.48). In order to understand this more clearly, we shall have to consider the notions of bit and hubit.

Shannon's (1948) contribution to the study of communication was the establishment of a universal model of communication systems. The elements of his model consist of an information source, a transmitter, a communication channel, a noise source which is an unpredictable interfering signal that alters or mutilates the desired signal, a receiver and a message destination. These six elements constitute the basis of any communication system, no matter how complex. Shannon was able to quantify both the information rate of the message source (a speaker, output of a television camera, a person writing etc.) and the capacity of communication channels by introducing a measuring unit called a bit. This term, derived from 'binary digit', is a unit of uncertainty or choice; the uncertainty between "yes" or "no" when both are equally likely, or the choice a person exercises in selecting unpredictably "left" or "right". The numbers 0 and 1 can specify yes or no, right or left. The
bits per message or bits per second establish a measure of the complexity of the message sources and the capability of the channel. Telephone wire (speech), for example, has a capacity of 60 000 bits per second, FM radio 250 000, and commercial TV, 90 million (Pierce, I972, p.33). In this physical transmission, the signal has no power to signify, although there is a passage of information. Where the destination is a human being, a process of signification occurs. It is not axiomatic that the source or transmitter be human, only that the system incorporates a system of rules known by the addressee, and provided that the signal is not merely a stimulus but has a capacity to arouse an interpretive response in the receiver. This process is made possible through the existence of a code and can be measured in terms of hubits which account for the quantity and variety of information bits received per hour, multiplied by the number of man-hours devoted to their reception. According to Melvin Webber (I967, p.I2I) who enunciated the term, a hubit is a measure of social accounting and represents a basis for the computation of the cultural value of information receipts. Hubits measure potential information available in a message and is therefore an index of the system's performance. Whether all the information is utilized by the receiver or not, is not, however, measured by hubits, but is accounted for by Peirce's notion of interprets. A survey of television performances of Hamlet and Colombo, for example, would show that Hamlet transmits more content per minute than does Colombo. Successive episodes of Colombo become highly redundant, whereas repeated viewing of Hamlet would continue to reveal content that was not previously absorbed. Thus a signal (measured in bits) is communicative and informative (measured in hubits) if it expands the receiver's awareness or introduces him to something new. Whereas communication means 'meaningful for the sender', informative denotes 'meaningful for the receiver'. If the signal divulges to the recipient something he already knows, or conveys nothing, it is uninformative.

A cybernetic system monitors and controls the flow of information by means of a sensory mechanism which continuously assesses performance. This device must have the capacity to
anticipate and measure disturbances which may arise from the system's environment. The decision-making apparatus will specify action which will effectively deal with the disturbances to keep the system viable and enable it to produce an output which is within acceptable limits.

For effective regulation in any system, the variety in the decision-making device must at least be equal to that of the disturbances. This mechanism functions to control the natural tendency of closed systems to deteriorate (according to the Second Law of Thermodynamics) and to become disordered by adjusting the system's parts to within narrow, pre-established limits.

Purposeful behaviour is the final condition in which the behaving system reaches a definite correlation in time or space with respect to a relatively specific goal (Wiener et. al., 1943). Cybernetic systems then, require perception of deviation from the intended performance or goal, decision-making and action to correct the deviation (Fig.7).

Entropy

The central notion which underlies the concept of entropy is the extent to which solutions offered to questions about one set of systems are probable among a larger set of systems. In physical terms, entropy defines the quantity of energy reversibly exchanged between one system in the universe and another. According to the Law of Entropy (or Second Law of Thermodynamics), the probability of energy exchange increases as the universe grows older. Entropy is a measure of this probability. The Law of Entropy states that as entropy increases, the universe and the order existing within all closed systems tend naturally to deteriorate and lose their distinctiveness. They move from a state of organization and differentiation to a state of sameness, of dedifferentiation of components and conditions in a system, or, a state of least order. This process is, however, not valid for contiguous parts of the universe in which local and temporary enclaves of decreasing entropy or increasing organization exist. This counter process is due to the exchange of information from the smaller system to the larger system. Information is the content of what is exchanged with the larger system as the
(After Tomassetti, 1977, p. 7.)

In a cybernetic system, negative feedback is introduced to stabilize a system when feedback is introduced to stabilize a system. In any system, the input signal is positive.

**Figure 7.** A cybernetic system.
smaller system adjusts to it, and makes its adjustment felt upon it. To exist effectively is to exist with adequate information. According to Eco (1976, p.42), information is a measure of freedom of choice and is the probability of an event occurring within an equi-probable system. The probability is the ratio between the number of cases that turn out to be realized and the total number of possible cases. The relationship between a series of events and the series of possibilities connected to it is the relationship between an arithmetical progression and a geometrical one, the latter representing the binary opposition of the former. Thus, given an event to be realized among \( n \) different probabilities of realization, the amount of information represented by the occurrence of that event, once it has been selected, is given by:

\[
\log n = x
\]

In order to isolate that event, \( x \) binary choices are necessary and the realization of the event is worth \( x \) bits of information. This formula does not identify information with content but rather with the universe of alternatives required to define the occurrence without ambiguity (Eco, 1976, p.42). In this sense, information is the value of equi-probability among an array of combinational possibilities, a value which increases along with the number of possible choices: the greater the number of equi-probable events, the more highly informative the system. Since information measures the equi-probability of a uniform statistical distribution at the source, information is directly proportional to the entropy of a system (Shannon and Weaver, 1949), since the entropy of a system is the state of equi-probability to which its elements tend (Eco, 1976, p.42). That is, information may be defined as being inversely proportional to entropy, or negentropic.

In order to transmit this information in a finished message form, a reductionist argument must be applied to generate a new type of source imbued with particular informational properties which may be subject to a semiotic analysis. This is done by imposing upon an equi-probable
event a system of constraints which specify the possibility of certain combinations over alternatives. As the universe of original information diminishes, the possibility of transmitting unambiguous messages increases (Eco, 1976, p.44).

Shannon (1949) offers the following formula of information (I) which implies N choices among h symbols:

\[ I = N \log_2 h \]

Messages can be formed and transmitted by reducing the values of N and h. This results in the transmission of a message which provides information about a system of elements whose combinations are governed by a system of rules. The fewer the alternatives, the easier the communication and the more probable the message. This reduction in choice in terms of the notion of equivalence restricts the universe of selection and combination thereby limiting and possibly even excluding the process of art which is, by definition, highly informative, low in probability and negentropic. Entropy then, not only measures the disorder of a system, but also the lack of information about the structure of the system. An adequately informed system generates sufficient energy to facilitate change and assert progress. Energy is defined as "the capacity to re-arrange elemental order" (Youngblood, 1970, p.63) and runs counter to entropy which has no such capacity as no new information is returned through the input channels. The amount of energy generated is directly proportional to the quantity of information available about the system.

Norbert Wiener, the father of cybernetic science, in expanding the above concept of entropy to include human communication, writes:

... it is possible to treat sets of messages as having an entropy - like sets of states of the external world ... the information carried by a set of messages is a measure of organization. In fact, it is possible to interpret the messages as essentially the negative of its entropy ... (1954, p.21).

That is, the less anticipated the message, the more information it gives. Cliché's, for example, are less illuminating than great poems. In other words, choice is a condition of
meaningfulness or habit potential. If the sender is constrained to one path of behaviour and unable to choose between alternatives, nothing will be transmitted.

The phenomenon of man and his process of interaction with other men and communications media, should, if he is to progress, involve a regenerative negentropy relationship which is brought about by the generation of new information to offset the natural tendency for messages to become entirely probable and predictable. This negentropic condition results from the feedback process since the sub-parts of the system feed energy back into one another resulting in cumulative reactions.
CHAPTER 3

ENTROPY, FILM AND TELEVISION

Following Youngblood (1970), film, art and entertainment constitute a cybernetic system in the following terms: "structure of the system", measured in hubits and which is an index of the performance which may be expected from it refers to the human condition. The human condition in this context may be precisely defined in terms of the variety and amount of information received and decoded by an individual or society. The degree of perception of incoming information measures the state of the human condition. It will be remembered that the amount of information is directly proportional to the degree of available choice. Where choice is limited, information is restricted and the individual's perception is constrained to within the limits set by the system. Entropy refers to the degree of man's ignorance about his condition. Ignorance is a state of increasing chaos due to misinformation or lack of information about the structure of the system. Chaos is a state of least order, dedifferentiation and increased sameness. Plot, story, drama and convention are the decision making and control devices which restrict choice, and thereby information, and enable the commercial entertainer to adjust the inputs (signs ordered to a content) and so manipulate the output (information) in terms of pre-conditioned audience needs. The potential for manipulation depends on the receiver's recognition of the sender's communicative intention and upon his making an appropriate behavioural response to it.

In terms of film, the purpose of cybernetic analysis is to determine what inputs (Success formulas, genres or codes) are required to achieve pre-determined outputs (profits, understanding or ideological response) given a set of goals. Within such a framework, the concepts of art and entertainment can be classified into three processes:

I. System-maintaining or homeostatic;
2. evolutionary; and
3. revolutionary.
I. System Maintaining

This involves repetitive action which eliminates deviationist tendencies through negative feedback and serves to maintain steady state patterns. This self-adapting process provides complex closed systems that tend to suppress change in both system and code structure. These systems (e.g., entertainment) tend for a time to maintain this stable level of organization, as a local island in a general stream of increasing entropy (society at large). After a while, the system degenerates unless new information communicated by new systems of codification is fed in to counteract disturbances. When and if change does occur, it follows a chain-like pattern and is imperceptibly slow.

One rather shallow definition of art, offered by Stephenson and Debnix (1970, p.17), falls into this category:

... art is a process in which the artist makes use of his experience, intuition or inspiration, selecting and arranging it to create beautiful and true artistic objects which to a greater or lesser extent imitate reality and through these objects he communicates his experience to an audience.

Three issues concern us here:

a) "... beautiful and true ..." suggest a steady state maintenance of a passive mode of indulgence on the part of the spectator. The aesthetic code is neither extended nor broken and the signs remain highly motivated and iconic and therefore degenerate. The signs have no external meaning or immediate object, since according to Peirce (8.II9), iconic signs do not represent anything, for if they did there would be a manner of signifying its object not consisting in merely resembling it. The effect produced in the interpreter of "beautiful and true" signs corresponds to Peirce's concept of immediate interpretant which simply re-reveals correct understanding of the sign itself. It does not produce a reaction in the interpreter since it satisfies the conditioned expectations of the audience whose interpretation is controlled by the feedback of memory or past
performance. In cybernetic terms, if art communicates the human condition, and this condition is not necessarily beautiful or conform to the prevailing perception of reality, the negative feedback will eliminate such unwanted information.

b) "... imitate reality ..." Imitation is the result of inadequate information and is repetitive and stable in that no attempt is made to reassess or extend human experience, to expand choice or to develop new signs and codes with which to arrive at a new and complete understanding of old facts. The conceptual design of this type of 'art' restricts the quantity and variety of information obtainable from it. Consequently, no new information is returned via the feedback loop. Signs remain highly codified and conventional and are in constant danger of degenerating into cliche. No cogniscance is taken of outside disturbances and no change in system behaviour results. The system, both the structure and its codes which give its information form in terms of content, is unable to develop or match the variety of disturbances which may occur.

c) This definition excludes many films or works of art which occur outside of "imitated reality", or what Peirce calls the final interpretant which accounts for that "which would finally be decided to be the true representation if consideration of the matter were carried so far that an ultimate opinion would be reached" (8.184). An image is not necessarily inexorably tied to antecedent reality. Art can create a different kind of reality by a richer application of the trichotomy of signs in relation to their interpretants. The 'reality' created stands autonomously as a rival codified totality to the "imitated reality" or the physical nature of the real world. To imitate reality even through the artist's "use of his experience, intuition or inspiration" is to deny the coherence of the reality within the mind of the artist, to ignore the capacity of icons to act as sign vehicles (anything fit to be a sign) or to acknowledge Peirce's irreducible triadic relative where the sign determines the interpretant (the idea to which the sign
gives rise). Signification is therefore restricted to first order iconic self-contained signs and little potential exists for the use of second and third order signs. Imitation further confines the process of unlimited semiosis through which signification continually shifts by referring signs back to other signs where the interpretant which initially determines something else becomes itself a sign, and so on ad infinitum. This disturbing influence is therefore eliminated from the communication process (or 'art') process. However, the nature of the disturbances which may impinge on the system may cause it to decay at a greater rate than it can reconstitute itself, eg., it became evident that the silent movie, as constructed by the Russian school, had evolved toward a dead end, its capacity for adaption and mutation declined through its strict adherence to over-specialized norms (or stability or codes) and an inability to cope with a new disturbance (a different type of code), that of sound (Fig.8).

Youngblood (1970) has argued that commercial entertainment is non-creative, destroys the audience's ability to appreciate and participate in the creative process and works against art since it is a closed system where the feedback process is dominated by a lack of new information. For example, a frequently used sign becomes conventionalized and the probability that it will be decoded similarly by different receivers is greatly increased. Metz (1974a) shows how the white hat gradually became codified into the signifier of the good cowboy, but then became a cliché and lost its power. This process is caused by the over use of a sign. That is, its signifier becomes removed from reality and determined entirely by convention. At this point in the life of a sign, it loses its effectiveness and behaves like a cliché. In cybernetic terms, the error-controlled regulation or feedback signal contains information which is highly repetitive and highly probable. In other words, the signs and codes which give the information a content have a low value of equi-probability. In terms of entertainment, to satisfy the profit motive the commercial entertainer must give the audience what it expects (he must speak a
common language) which is conditional upon what this audience previously received. The fatuous arguments of movie executives that they are merely pandering to public taste has encapsulated them in an incestuous homeostatic argument which confuses cause with effect. This attitude is epitomized in the viewpoint of Adolf Zukor, one of the founders of Paramount Pictures who tailored his company's productions to the conviction that "The public is never wrong" (Fadiman, 1972, p.12). That commercial survival is dependent upon homeostatic formulas and the correct interpretation of the immediate interpretant only is further substantiated by Leo Rosten. First published in 1941, they remain equally relevant for a modern analysis:

The very success of Hollywood lies in the skill with which it reflects the assumptions, fallacies, and the aspirations of an entire culture. The movie producers, the movie directors, the movie writers and the movie actors work with stereotypes which are current in our society... (they) reinforce our typologies on an enormous scale with overpowering repetitiveness. Whether the movies imitate life or whether life imitates the movies is for others to decide... Some critics say that audiences complain about the movies because they do not reflect reality; it is this writer's suspicion that more people lament the fact that reality does not reflect the movies.

This reiteration and imitation which is deliberately encoded into the genre film, can, according to Youngblood (1970, p.64), be compared to a level of probability: "The content of westerns, gangster movies, romances etc., is probable in that it can be identified and comprehended simply by classification". In other words, probability (or equiprobabilility) is intrinsic to a definition of the term "genre". Andrew Tudor (1974, pp.180-182) comments that genre movies are only rarely disturbing, innovative or openly deviant. The accepted set of conventional genre parameters constrain movies towards a norm and thereby determine their level of probability. Tudor then links this observation to culture and explains why the audience prefers to pre-monitor levels of probability. This is because film fulfills a stable
function since it a relatively fixed culture pattern which defines the moral and social world as well as the physical and historical environment. The genre movie, by its familiarity, inclines towards reassurance. This involves a feedforward relationship where alternatives are acted out before they occur. For example, appropriate music superimposed on a two shot of a man and a woman presupposes a love scene even before they act out love-type gestures such as kissing etc. Feedforward is a method of controlling a system by inserting into it the expectations of future performance in terms of its past performance where choice, and hence change is prevented.

It will be remembered that plot, story and drama are control devices by which the entertainer manipulates the audience. Youngblood (1970, p.64) argues that the phenomenon of drama is the most universal and archetypal of all genres. Drama deals with a progression of events which create suspense. Suspense is dependent upon a range of known alternatives which create expectations in the mind of the viewer. Expectation measures a level of probability for one cannot expect the unknown. Where information is both expected and probable, the transmission signal is low in equi-probable value. Expectancy is dependent upon prior knowledge and is determined by the relative frequency with which the viewer has decoded such signals in the past. In other words, one of the components of an equi-probable system may be defined in terms of the knowledge that the spectator has gained from seeing other genre movies. Drama, suspense and expectation therefore are measurable probabilities and as such are non-informative since there is no feedback which is a precondition of negentropy. That is, the greater the signal's probability of occurrence, the less the information it contains. Where the incidence of a particular signal is totally predictable and carries no signal information it has a probability of 1 (one). The sign which transforms the bit information into hubits is demotivated through repetition while the arbitrary, conventional dimension increases. The weaker the motivation, the more determining is the convention. Convention, therefore,
contributes to a genre's probability level.

Drama in film works through plot and its narrative codes and through the process of signification forces the viewer to make culturally pre-determined observations about the film he is watching. The plot restricts the free paradigmatic association of ideas and constrains the choice of syntagmatic combinations to within acceptable limits. This in turn cybernetically controls the art-process of equivalence and forces it to stay within set limits. This low value of equi-probable information ensures a passive audience which is hostile to thematic, structural or semiotic innovation. This "I am here to be entertained" attitude effectively cuts off the feedback process, the channel along which negentropy must flow if it is to be effective. Wiener (1954, p.13) defines feedback as a method of controlling a system by inserting into it the results of its past performance. Where no feedback occurs no learning results, or conversely, in Wiener's words, "... if the information which proceeds backward from the performance is to change the general method and pattern of performance, we have a process which may well be called learning". Where the viewer or interpreter has learned something new or discovered a new dimension to an old reality, he has benefitted from negative feedback. Where the receiver learns nothing new, information is redundant (or low in equi-probability), entropic and soley dependent on reassurance of past experience, past performance and the conventional interpretation of signs and codes at the level of the immediate interpretant.

The genre, as a system of low equi-probability, is a synchronic closed system which can be frozen in one moment of time and revived in such a way as to obtain a total description of its operation and internal relationships. These can in turn be analysed in terms of audience response, that is, what changes in the system (i.e. the film-audience-society system) cause changes of the system (i.e. the genre, its probability level and its semiotic components which are ordered to it content).

Opposed to change, the entertainer who is only a crafts-
man, tries not to alienate his audience by employing a new language (i.e. changes of the system) even if were capable of it. The entertainment system is therefore a closed system where entropy dominates the feedback process. Boultenhouse (1967, p. 35) provides an example and comments on the attitude of the American film director:

The Hollywood director is usually surprised to discover that his art has been taken seriously ... (He) is a craftsman using all his skills to protect an investment by making as much profit as possible. If his skills are repeated and developed to the point where they can be identified, this does not make him an artist.

Even directors who have set out with an artistic intention have fallen prey to the Second Law of Thermodynamics which has restricted the choices allowed in an equi-probable system. A pertinent example is Alfred Hitchcock's (1966, p.61) statement:

In recent years ... I have become more commercially minded, afraid that anything at all subtle may be missed. I have learned from experience how easily small touches are overlooked ... the art of directing is to know just how far you can go.

Thus Hitchcock is only utilizing a convention of dramatic manipulation in order to supply the temporary gratification that commercial entertainment offers the audience. The information contained in such systems of signification and its codes is static, repetitive, non-informative and stable. The internal systemic workings of the genre are entrenched, repeated and refined, often to the point of cliché.

2. Evolutionary

Some systems exhibit an ability to increase their level of organization. Events in this category transcend, to a small extent, pre-conditioned response formulas to produce growth and progressive change by amplifying negative feedback in
the system. This process has a capacity for self-transformation into new and different styles and semiotic components through introducing a variety which permits constructive change. This evolutionary growth extends beyond the meaning of the sign as embodied in the immediate interpretant and is mediated through the dynamical interpretant which is the "... actual effect which the Sign as a Sign really determines" (Peirce, 4.536); that is, the direct effect actually produced by a sign upon an interpreter of it. Signs at this level of organization produce new interpretants, new representations which refer to the same object. Such signs can be indexical and operate at the second and third orders of signification. They are able to move beyond a merely iconic representaion from the dynamical object to the immediate and from denotation to connotation. This occurs through the process of unlimited semiosis where in order to establish what the interpretant of a sign is, it is necessary to name it by means of another sign which in turn has another interpretant to be named by another sign, and so on. Fiske and Hartley (1978, pp.59-60) discuss the idea of semiotic growth in the following manner:

Most codes are dynamic systems, continually evolving to meet the changing needs and practices of their users. The English language, our most sophisticated code, is constantly evolving. New words are added (paradigmatic change) as are new conventions and rules by which we combine them (syntagmatic change). So in any dynamic or evolving code, there is a constant tension between tradition and innovation or between convention and originality.

As mentioned earlier, dynamical interpretants are of three kinds - emotional, energetic and logical. This sub-division derives from the fact that a sign can leave the interpreter with a mere feeling or it can perform an external or internal action. The emotional interpretant accounts for the feeling produced by the sign and can range from the first feeling of comprehension of linguistic or semiotic signs to the feeling that is generated by viewing a Hitchcock movie. In the latter case, the emotional interpretant is normally the
only effect of a sign, although in terms of negentropy Hitchcock (1966, p.61) can say, "I am freer now to do what I want than I was just a few years ago". Implied in this statement is the acknowledgement that where more is intended by the sign there should be a further interpretant mediated via the emotional interpretant. This second dynamical interpretant, the energetic, involves an inner mental effort. It is not concerned with the meaning of an intellectual concept but rather with single acts like the filming or editing of a scene. Physical action is not necessary, an act of imagination is sufficient effort to bring the energetic interpretant into play. This explains the process that allows Hitchcock to state that he is freer now than he was in the past. It also explains why films which seem incomprehensible on first release are understood better some years afterwards by the same audiences who have, in the interim, benefitted from the regenerative negative and cumulative feedback. This implies also that the interpreter has advanced beyond the quality of impression produced by signs of the immediate interpretant, through the first proper effect of a sign accounted for by the emotional interpretant, to the inner or external action or act of imagination described by the energetic interpretant, the latter two being sub-divisions of the dynamical interpretant. In other words, the audience has increased in film literacy, and new signs and codes, meaningless at first, eventually become widely employed and recognized. The signs contained in the new code eventually become conventionalized and are more easily decoded by a greater number of people. The variety of disturbances (cultural, semiotic etc.) in the real world are matched by the variety in the decision-making device and the system (entertainment) learns to predict from the feedback process and make compensating adjustments. Fadiman (1972, p.81), for example, comments that, "Should American audiences change ... Hollywood will promptly change as well!"

Communication, whether by film or any other means, is subject to the inexorable tendency for entropy to increase, for codes to become conventionalized and for information to leak or distort in transit unless certain external devices
are programmed to control and monitor its transfer. The popular genres (including drama) perform this function. Their set of codes, conventions, narratives and images are extended by means of addition, selective emphasis and re-emphasis on a simple trial and error basis. But sometimes this self-adapting system is unable to match the changes occurring in the encompassing system (society) and consequently becomes redundant. Tudor (1974, p.223) offers an example of the horror movie. Universal Studio's elementary formula was sufficient for most of the thirties: simple seek and destroy narratives featuring Dracula, Frankenstein Werewolf or a Mummy. But after a while familiarity breeds contempt, information becomes entropic and the disruption of homeostasis is rapidly reflected in declining box office returns. The film maker consequently becomes subject to commercial and aesthetic pressures which demand the introduction on new information, new signs and new codes. The new information, signs, codes etc. are tested over a period of time and are either subsumed into the genre (which is measured in terms of probability) which consequently elevates itself to a higher level of order and purpose, or it is discarded and the genre remains at a lower level of organization and a higher degree of probability and redundancy. Alternatively, notes Tudor (1974, p.170), some development occurs through the normal unguided process of evolution, a response to a combination of social pressures, belief, whim and personal preferences which leads to a continuous process of amendment, re-emphasis and alteration. Even then, unless the receiver has an interpreting structure (or set of interpretants) capable of decoding incoming information, a loss of meaning or rejection may work against any action (mediated by the dynamical interpretant) on the part of the recipient or interpreter. That is, the interpreter must be able to make a distinction between information processed at the immediate interpretant level, that which is fed into the system (genre), and the information that is left once the narrative has worked itself out. This leftover information (measured in hubits) when further filtered by the dynamical interpretant produces an effect on the
interpreter where the remaining information can be effectively acted upon by the interpreter. According to Weiner (1954, pp.93-94) it is not the quantity of information sent that is important for action, but rather the quantity of information which can penetrate into a communication and storage apparatus sufficiently to serve as the trigger for action. To a pre-literate Bushman, for example, a genre film (eg., a Western) has no meaning, but for a person who has seen more than one Western, the genre becomes an interpreting structure (or interpretant) which measures the level of probability that a film will be understood. Weiner (1954, p.94) calls this process the Cybernetics of semantics and offers the following example:

When I hear a passage of music, the greater part of the sound gets to my sense organs and reaches my brain. However, if I lack the perception and training necessary for the aesthetic understanding for musical structure, the information will meet a block, whereas if I were a trained musician it would meet an interpreting structure (or set of interpretants) which would exhibit the pattern in a significant form which can lead to aesthetic appreciation and further understanding ... From the point of view of Cybernetics, semantics defines the extent of meaning and controls its loss in a communications system.

Semantically significant information is brought about by the triadic process where a sign is only a sign if its signifier is an interpretant, where one thing is brought about for the sake of another. Semantically significant information operates at the level of the dynamical interpretant, is negentropic, leads to growth, change and extension in a system.

A cybernetic investigation of the film Rollerball (1976), directed by Norman Jewison, will demonstrate how the film sub-system of criticism can use the semantically significant information concept (or the notion of interpretants) to explain how information is exchanged from the smaller to the larger system. In the Rollerball society of the year 2018, rigid social control is effected through an
equilibrium maintaining system. By the year 2000, hunger, pollution, over-population, militant nationalism, crime and political corruption will have been eliminated, while material comfort for all will be achieved through a well ordered and managed society dominated by the major conglomerate corporations which control the food, energy, luxury, commodities, transport and communications. Rollerball is an institutional sport of brutal physical contact, and functions to provide the masses with a vicarious outlet for violence and hostility. The sensory mechanism is of sufficient variety to cope with and sublimate any disturbances which may impinge upon the social system and works to maintain a state of uniformity and sameness in Rollerball society. The theme of hope or sign of hope is activated when Jonathan E who has become a national folk hero, defies the management or control mechanism's order to retire before he becomes too famous. His stubborn independence is a threat to their carefully controlled comfort-oriented society. He survives and turns to his advantage the ultimate institutional attempt to have him killed during a ruleless rollerball game. Consequently, he introduced a disturbance which the control mechanism (operating at the level of the immediate interpretant) cannot handle and which leads to the re-introduction of some diversity (the identification of a sports hero and all that this signifies in terms of the dynamical interpretant) in an otherwise undifferentiated society. In other words, the sign of the sports hero, as a sign produced an effect upon its interpreter, the Rollerball society. In this film, the interpretant of the sign, the sports hero, stands for the idea of freedom and individuality. Jonathan E (the smaller system) had exchanged semantically significant information with his society (the larger system) which adjusted its behaviour accordingly through the mediation of the dynamical interpretant.

Similarly, an exchange of information between the outer environment (film in general) and the sub-system of the genre can lead to its use in unusual and striking ways. Established rules and semiotic components may be redefined, extended or even broken by introducing new interpretations.
of traditional characters. Sam Peckinpah's Westerns have utilized such techniques in *The Wild Bunch* (1969) and *Ride the High Country* (1962). If these films which explore new ideas, new signs and new codes meet with box office success, then the information introduced is semantically significant. The new signs and codes are less conventional and less constraining than those they have surplanted and the quality of impression is designed to produce both an emotional and an energetic effect in the interpreter. Where the new information finds rapport with the interpreting structure or receiver (i.e. a set of interpretants) the message will be understood and acted upon despite man and/or nature's attempt to subvert it in terms of the Second Law of Thermodynamics. Jonathan E's behaviour was semantically significant. Sam Peckinpah's new interpretation of traditional conventions was semantically significant.

This brings the discussion to the consideration of the third component of Peirce's definition of the dynamical interpretant, the logical interpretant. This third kind of dynamical interpretant is a sign (or habit) which allows for future translations and for future development, whereas a feeling or actual activity do not. Peirce divides the logical interpretant into two further sub-divisions, the non-ultimate and the ultimate:

Shall we say this effect (the logical interpretant) may be a thought, that is to say, a mental sign? No doubt, it may be so; only, if this sign be of an intellectual kind - as it would have to be - it must itself have a logical interpretant; so that it cannot be the ultimate logical interpretant of the concept. It can be proved that the only mental effect that can be so produced and that it is not a sign but is of a general application is a habit-change ... (5.476).

An effect which is itself a sign is a non-ultimate effect, since it would itself require an interpretant. The ultimate logical interpretant is a resting place, which allows for the natural termination of the process of unlimited semiosis; it is not in itself a source for a further state of flux.
Peirce asserts that a habit-change is the non-ultimate logical interpretant and covers variations of any kind in a person's habits. A response to the sign need not create a wholly new habit. A habit is a disposition to act or react in a certain manner under specific conditions. A habit is conditional, the exercise of a habit being conditioned by the presence of a proper stimulus. If certain conditions are given, and if a result of a particular kind is desired, the habit functions. Habits have to do with the activity of thought. This is linked up with what Peirce (5.48I) calls mental experiments in which: "We imagine ourselves in various situations and animated by various motives; and we proceed to trace out the alternative lines of conduct which the conjectures would leave open to us". In other words, the habit governs the activities in the attainment of some goal or effect. It is the process of habit-change which accounts for films which disregard genre conventions altogether and which create an audience response conducive to change and innovation. Such change is of an intellectual nature. It is based on conditionality, the 'would be' species of future tense of the logical interpretant. The non-ultimate logical interpretant or habit-change is conditional upon the triadic process; is the result of an act of enquiry and the interpretant produced is assumed to be a modification of consciousness. This notion of a habit is comparable to the cybernetic concept of control where change is brought about to attain desired goals under certain conditions. It will be remembered that a habit functions where conditions are given and where a certain result is required.

Perhaps the most stunning example of the upper limit of the evolutionary form of negentropy in film applies to the response of critics to Orson Welles' Citizen Kane (1941). Although this film was released in 1941, three decades later, Ronald Gottesman (197I, p.1) has commented:

... it is only in the past decade that anything like genuine analysis and criticism has begun to acknowledge and try to come to terms with the heft, complexity, and resonance of this extraordinary act of imagination. This is not to say ... that Citizen Kane is now fully - or even adequately - accounted for. This film
... still contains many mysteries ... we
we have got beyond its first "No tres-
passing" sign.

Although this example may be a little strong for inclusion
under the evolutionary category, it does nevertheless clearly
explain the concept of self-transformation facilitated
through the effect of the dynamical interpretant and in
particular its logical dimension. Films which are nogen-
tropic explore and enquire. They seek to cause a habit-
change, particularly where intellectual concepts are con-
cerned. Enquiry through film (or television or drama or
science etc.) must be through icons, indices and symbols.
In addition, such films must be capable of bringing about
the formation of a habit. The habit created is the spring-
board to progress and change and provides the basis of
another dimension of the semiotic process.

In cybernetic terms, the more information that the
artist is able to transmit, the greater the negentropy.
This is made possible through the extension of the semiotic
system and may be directly linked to the second and third
orders of signification by means of which signs convey
meaning. According to Roland Barthes (1968, 1973) signs in
the second order of signification operate in two distinct
ways: (I) as myth-makers, and (2) as connotative agents.

Second-order signs I: Myths

Second order signs carry cultural meanings unlike first
order signs which are merely representational and denotative.
The movement between layers of signification causes a change
in the role played by the sign. The sign of a particular
soldier (denotative and representational, the dynamical
object) in a newsfilm of troop activity in Vietnam becomes
the signifier of cultural values he embodies in this news-
film (e.g., monopoly capitalism). Barthes defines this
cultural meaning as myth. The myth obtains its validity
firstly from the specificity and iconic accuracy of the
first order sign, and secondly, from the extent to which
the second order sign meets audience needs. The first order
sign stands for an individual soldier. This sign becomes a second order signifier or index when the first order sign or icon is robbed of its specific signified. The signified, the individual soldier G.I. Paul Carter loses his specificity and becomes 'one-of-us - well equipped - defending the free world'. The sign in this second order activates the mental myth chain by which a society apprehends the reality of the United States Army in Vietnam. The cultural needs met by the second order sign require the myth to relate accurately to the reality out-there, and also to bring that reality into line with appropriate cultural values (Fiske and Hartley, 1978, p.42). The first and second order signs cohere in the third order of signification or symbol into a comprehensive cultural picture of the world, a coherent reality where the soldier forms part of the imagery of an imperialist, aggressive and capitalist society which values the freedom of the individual over the forces of communism. The sign which initiates the viewers responses along this chain is functioning like a metonym where the part stands for the whole. That is, in metonymy, signification depends on the ability of the sign to act as a part which can signify the whole. One U.S. soldier, for example, stands for the entire American army, or, the idea of 'hands' signifying wage-labourers.

2. Second-order signs II: Connotation

In connotation, signs signify values, emotions and attitudes. First order signs, a general's uniform, for example, denotes his rank but connotes the authority and respect accorded to it in terms of the second order sign. Barthes (1977) asserts that in photography the denoted meaning is conveyed soley through the mechanical action of reproduction (denotation is visual transfer), while connotation is the result of human intervention in the process - camera, angle, focus, lighting etc. Connotation is expressive or affective and involves subjective rather than objective experience and is essentially the way in which the encoder transmits his feelings or judgement about the subject of the message. Metz
(1974, p.97) offers the following example:

In American gangster movies, where, for example, the slick pavement of the waterfront distills an impression of anxiety and hardness ... the scene represented (dimly lit, deserted wharves, with stacks of crates and overhead cranes) ... and the technique of the shooting, which is dependent on the effects of lighting in order to produce a certain picture of the docks ... converge to form the signifier of connotation. The same scene filmed in a different light would produce a different impression; so would the same technique used on a different subject (for example, a child's smiling face).

By moving from denotation to connotation the artist is able to construct messages beyond the bounds of convention, both social and semiotic. Coupled with semantically significant information (i.e. meaningful to the recipient), the result is an audience more able to accept change of the system. Such change is conditional upon the effect of the ultimate logical interpretant which causes a habit-change. The evolutionary kind of film operates at a higher value of equi-probability than the genre, and unlike the synchronic closed system of relationships which characterizes the genre at a fixed point in time, evolutionary movies may be subjected to diachronic analysis which traces the development of a system through time. It emphasises the changes that elements of the system undergo. Film movements, for example, lend themselves to a diachronic analysis.

The phenomenon of a film movement is a sociological manifestation of a habit-change where changes in the system cause changes of the system. These enclaves of increasing organization nest within the larger system of society which is itself undergoing change. Following anthropologist Anthony Wallace (1966, pp.143-144), a movement is a deliberate, self-conscious and organized attempt by some members of a society to construct "a more satisfying culture" by means of a rapid acceptance of multiple innovations.

Andrew Tudor (1974, pp.167-172) has isolated six factors which assist in an identification of a film movement in any
particular society:

1. A movement originates in a specific society;
2. That society usually, though not always, experiences some form of socio-cultural trauma immediately prior to the rise of the movement;
3. A film movement represents a sub-culture, the members of which are conscious of their position and goals;
4. The artifacts rendered by a film movement are respected as art, that is, the articulation of important themes by intellectuals;
5. The concept of a film movement embodies the process of innovation, not simply piecemeal diffusion; and
6. The phenomenon occurs in distinct temporal clusters.

A film movement then, constitutes an aesthetic departure, is a response to changing social, economic, political and ideological pressures, and is the result of an overt and ecumenical action on the part of the film makers, critics and theorists involved. Individuals comprising a movement are not organized along formal lines like a club or an association, but a sense of belonging and solidarity among members is a pre-requisite for successful functioning of the movement. The collective behaviour which binds the participating film makers, critics, theorists and spectators is usually identified by a spontaneous emergence of new forms of organization which contradict or reinterpret the existing norms, values and organizational structures of the group. New styles and new forms of film production may, for example, replace older methods which in turn may lead to the emergence and development of a new kind of cinema embodying new and more sophisticated codes and sign systems. A successful movement is one in which the new norms and values introduced become established as new cultural patterns in the new society. At this level of film making, the signs produced have moved away from the concept that they exist as an independent entity and have entered the realm of subjective response in the third order of signification. Common responses are invoked by signs and are shared by most members of a culture. The myths which operate as organizing
structures within this area of shared cultural agreement are themselves organized into a coherence termed a mythology or an ideology. Films made by members of a movement subsist in the third order of signification and reflect the broad principles by which the sub-culture organizes and interprets the reality with which it has to cope. Unlike genre movies which operate at the level of the immediate interpretant, rarely question existing values and owe their existence to the status quo, a movement exists by virtue of its deviation and its artifacts work through the dynamical interpretant (i.e. the ultimate logical interpretant or habit-change). For example, *Lilies of the Field* (directed by Ralph Nelson, 1960) vested in convention and traditional values, oozes stability and exhibits a low value of equi-probability, while *Hiroshima Mon Amour* (Resnais, 1959) in contrast, explores new territory, new codes and sign systems, new paradigmatic and syntagmatic elements, and is openly defiant of established genres. A movement, generally subject to the pressures of evolutionary change, might develop by degrees or in a random manner. Alternatively, a movement may embody a pre-determined collective consciousness or cultural membership postulating definitive goals and objectives. Some movements can be identified as mixtures of both evolutionary and goal oriented processes.

The Russian school of montage apostles, for example, were seeking to cause a habit-change in the direction of "a more satisfying culture" in terms of the goals of the 1917 Bolshevik revolution. The most influential film director, Sergei Eisenstein, used film to deconstruct, fragment and then reconstruct a particular ideologically filtered reality. Eisenstein approached the creative process by determining his ends first and then deciding on the most effective means of obtaining his objectives. His signifiers are highly motivated, iconic and indexical and closely reproduced a shared cultural experience.

In contrast, the German expressionist movement grew and developed in a random and haphazard manner. Propelled by the success of *The Cabinet of Dr Caligari* (Weine, 1919) they produced a host of movies which affirmed traditional
culture in the face of socio-cultural disintegration. Although these films sought to support the existing status quo, the production methods used represented innovations in organization aimed at producing messages which would help in allaying systemic decay in German society which subsequently proved unable to reconstitute itself faster than its rate of social decay.

The Italian neorealists recognized the need to create a socially responsive cinema that transcended their moribound tradition of dated epics and cliche' ridden romanzas. Their slice of life approach based on a preference for natural signs and icons replaced the conventional plot-formula and led to the production of negentropic non-drama constrained films with a high value of equi-probability. The neorealist movement was more formally articulated than was the German case, but less so than the Russian experience.

The French New Wave movement had been building up for about ten years and spontaneously broke when a new style of production replaced the fixed camera legacy and sought to use the camera to explore a cerebral reality, rather than merely recording a linear objective reality. The New Wave films derived their negentropic state from the choices offered in a system of high value equi-probability and thereby rewrote the language and conventions of cinema. The entrenched convention (or predictable probability level) of the plot was questioned and discarded as not being intrinsic to the derivation of meaning. Meaning was rather defined in terms of choices available in a highly informative system.

Film movements represent one component of social change (or habit-change) and can therefore be interpreted as a direct challenge to the standard commercial or system-maintaining (or homeostatic) film of the time. Although film movements are born out of a need for change, some movements have an external need for stability and therefore come to resist change. The Soviet films, for example, unlike the French and Italian offerings which were predicated upon continuing change and open ended objectives, eventually lost their inner dynamic for change due to the absoluteness of their objectives. The process of unlimited semiosis was
constrained in terms of Soviet ideology and negentropy gave way to entropy as a regression backwards from the ultimate logical interpretant to the basic immediate interpretant progressively restricted the habit flow of content which in turn narrowed the consciousness of Soviet society.

**Revolutionary**

This category defines the nature of art in that sequences are set in motion which transform the system by redefining its languages, limits, styles and types of interactions. Whereas the immediate interpretant is really the sign itself, the dynamical interpretant is the actual effect produced and the third category of interpretant, the final interpretant, is that "which would finally be decided to be the true interpretation if consideration of the matter were carried so far that an ultimate opinion were reached" (8.184). It is the "effect the sign would produce upon any mind which circumstances should permit it to work out its full effect" (Fitzgerald, 1966, pp. 79-80). The final interpretant is reached through the working of the dynamical interpretant. According to Peirce (8.315), "the Dynamical Interpretant indefinately approaches the character of the (Final Immediate) Interpretant". Peirce is not concerned with what does happen as a result of the sign, but rather with the sign as law and with what is destined because of the sign. This final interpretant is concerned with an ideal, that which would be produced, the legisign.

The freedom of art to break its own codes is made possible through the process of unlimited semiosis, the continuous production of interpretants. Sometimes a new artform or style appears meaningless when first produced. This occurs because some signs which are capable of producing an ultimate logical interpretant do not do so because the conditions of the interpreter who may not be prepared to carry the semiotic process far enough to establish or change of habit. Code switching or extension occurs in conjunction with interpretant production and reaches its highest value of equi-probability in the final interpretant. This freedom of art to break its own codes is explained by
Culler (1976, pp.100-101):

... aesthetic expression aims to communicate notions, subtleties, complexities which have not yet been formulated, and therefore, as soon as an aesthetic code comes to be generally perceived as a code ... then works of art tend to move beyond this code. They question, parody, and generally undermine the code while exploring its possible mutations and extensions. One might even say that much of the interest of works of art lies in the way in which they explore and modify the codes which they seem to be using; and this makes semiological investigation of these systems both highly relevant and extremely difficult.

Here the artist, a visionary, a catalyst of change, is always engaged in writing a detailed history of the future (that which would be, the legisign) because he is one of the few people aware of the nature of the present (i.e. the law which acts as a guiding principle). He often produces new signs, new codes and new structures in his attempt at diagnosis, definition and rationale of the human condition. The extension of a code is possible because the highly motivated nature of the aesthetic sign imposes a necessary relationship between the signified and the signifier, where the signified is of a subjective, interior order of reality. At issue here is the difference between aesthetic signs and conventional signs. A television director, for example, is constrained by the conventional nature of his medium and the expectation of his audience. His paradigmatic and syntagmatic choices have been pre-established by the medium which exhibits a low value of equi-probability, almost to the point of cliche'. Television relies heavily on the use of conventional signs which are low in information and dominated by entropy. In contrast, aesthetic signs are less conventional, rich in information and consequently, negentropic. Such signs have recourse to the final interpretant through the immediate and dynamical and the choices available are determined by a high value equi-probable system. Under these circumstances negentropy is at its highest, and
the potential for change is at its greatest. Or as Youngblood (1970, p.65) expresses it: "The notion of experimental art ... is meaningless. All art is experimental or it isn't art. Art is research". This dynamic conception of art may be compared with Peirce's notion of science as a living thing, a process of enquiry whose purpose is to develop new habits, to work for progress and not merely to hold on to what has already been attained. Habits and attitudes are important in the pursuit of truth and since growth is attained through the acquisition of new habits, it is the framing and testing of new hypotheses which serves as the goal of enquiry rather than the reworking of what has already been settled.

Just as sculpture is the art of space and music the art of time, so the space-time movements of film in terms of light, object and camera yield infinite varieties of plastic form. Read (1966, p.165) has asserted that the true plasticity of film ... is a plasticity of light. An essential film would be an abstract film, a "pure" creation of light and darkness, just as an essential painting is an abstract painting. But Read curtails the life of the cinematic sign and undervalues his own thesis in his statement, "But such films are for the purists". His argument is reductionist and predicated upon stasis. New technological extensions have led to the birth of new cinematic forms and semiotic signs which must include videotronics, computers and laser light. The first generation of electrovideographic artists have emerged and people such as Jordan Belson, the Whitney brothers, John Stehura, Jerry Riley and many others are redefining the limits, styles and codes of film far beyond the accepted conventional and traditional styles found in homeostatic and evolutionary cinema. In terms of Kantian aesthetics, computer artists now have techniques which are literally able to redefine the existing rules of visual perception. They have the keyboard at their fingertips with which they are able to manipulate and direct the human individual consciousness in the paradigmatic/syntagmatic association of hitherto unexplored images and ideas, in ways that allow for unlimited semiosis to operate from the
immediate, through the dynamical to the final interpretant. New communication technologies generate new signs and codes which offer a range of new expressive and communicational horizons which assist the process of enquiry in the pursuit of the ultimate opinion.

At this stage of the analysis it is necessary to examine in more detail Peirce's second trichotomy of signs in relation to the cybernetic elements of film. The notions of icon and index taken together are able to account for most of the content which is seen in homeostatic and evolutionary film, both feature and documentary. In revolutionary film, however, the abstract, the non-realistic, the non-representational, both within the narrative and outside it must be accounted for. While the images projected may be neither indexical nor iconic, they may nevertheless have clear relationships to both. Forms, colours, shapes, set design etc. may acquire significance during the unfolding of the film which transport the viewer beyond the basic iconic/indexical interaction or narrative relevance. It is at this level that the third kind of sign, the symbol, dominates. According to Peirce (3.360), "Such signs are always abstract and general, because habits are general rules to which the organism has become subjected". In other words, the symbol functions to bring generality to the sign process. Elsewhere Peirce (4.464) states:

Every symbol is \textit{ens rationis}, because it consists in a habit, in a regularity; now every regularity consists in the future conditional occurrence of facts not themselves that regularity.

That is, the facts that will be influenced are the images, the concepts and the action of the interpreter. Or, as Peirce (4.464) expresses it:

The being of a symbol consists in the fact that something surely will be experienced if certain conditions be satisfied. Namely, it will influence the thought and conduct of the interpreter.
Peirce also defines the symbol as law, or regularity of the indefinite future. Fitzgerald (1966, pp.63-64) explains the future conditional effect of the symbol as follows:

The law, which is the primary meaning of the symbol, operates in such a way that upon the hearing or seeing of a token of the symbol, the interpreter will associate a mental icon with the objects which are denoted by the context in which the symbol is used. It is this habit of association which is the symbol. Peirce makes this point in the following passage: "Any ordinary word as 'give', 'bird', 'marriage', is an example of a symbol. It is applicable to whatever may be found to realize the idea connected with the word: it does not, in itself, identify those things. It does not show us a bird, nor enact before our eyes a giving in marriage, but supposes that we are able to imagine those things, and have associated the word with them" (2,298).... The generality, then, lies neither with the Icon itself, nor in the token, but rather in the habit of association in the speaker or hearer.

Symbolism in film occurs whenever an image or sound or both stand for more than and other than their immediate indexical referents or references.

Where new communications technologies are concerned, the context of communication must be studied in relation to the new signs and codes produced. The advertiser's television and film advertisements cannot, however, be considered as art for his intention is to establish a finite habit or reinforce and conventionalize tastes at the level of the dynamical interpretant and not to allow for the kind of habit-change which may act as a vehicle towards the semiosis of the final interpretant which offers an expansion of human experience. In advertising, the referential content of the message is subservient to signs designed to motivate the receiver, either by repetitive conditioning or by triggering a subconscious affective reaction. This is effected through the conative function of language which defines message-receiver relations. Where the advertiser does seek to cause a habit-change, it is not in the pursuance of the final
interpretant, but rather a backward linkage which enhances the emotional, energetic and logical interpretants in the pursuit of a pre-determined, cybernetically controlled goal. It will be remembered that a habit-change is not itself a sign, but rather a modification of consciousness in terms of the goals of the advertiser. Whatever habit actually results from the use of signs applied by the advertiser, it comes to rest at the level of the ultimate logical interpretant. The end result of such messages is homeostasis and a predilection for iconic and indexical signs only. The use of the symbolic is limited and secondary.

In order for a system to develop, the sensory mechanisms must be able to sense threatened disturbances, estimate and anticipate their effects and deal appropriately with them. Action must be specified to take advantage of perceived real world situations. The revolutionary process initially tends towards conflict because it has to break through an already established stable system, but eventually settles down at a higher level of order and purpose (Fig.9).

As the system ages, changes in the system (in a dia-chronic sense) lead to changes of the system. That is, the newly secured level of higher order is subject to the law of diminishing returns and the negentropy decreases until eventually it subsists at a system-maintaining level or even generates into an entropic condition. What started out as art, for example, may end as a cliché or genre as the signs become overused.

Nevertheless, through the initial impulse the hierarchy of levels of order and purpose are constantly upgraded with respect to the isolated closed systems which characterize the notions of art and entertainment. What was initially expressed through the final interpretant utilizing a rich and well balanced triple functioning of signs degenerates backward to the immediate interpretant where the images are iconic and self-referring. This regression is assisted by the interference of profit oriented entertainers who utilize the structures, signs and codes since discarded by the artist in his search for new visions. American reaction to Antonioni's *Blow Up* (1966) provides an example of this kind
Figure 9: Entropy and Negentropy (After Tomaselli, 1977, p.13)
of process.

Antonioni had anticipated a lessening of restrictions with regard to previously censorable material. He reacted with unexpected boldness in the rendering of some nude sex scenes to take advantage of the expected introduction of the X-rated category in American cinemas.

Probably no other film made in the early 1960's stimulated as wide a range of responses. Reaction, ranging from banning demands, strong disapproval, being upheld as a moral lesson by a protestant church to taking of the best film of the year award, charted the film's initial contradictory interpretations.

Since 1966 the release of far more sexually explicit films such as I Am Curious (Yellow), Censorship in Denmark etc. have appeared on American screens, each in turn displaying less content but more explicit sex, each film becoming less distinctive as the curve becomes entropic, and so on down the entropy curve until it flattened out with a technically and thematically poor production in the form of Deep Throat (Fig.10).

William Fadiman (1972, p.140) describes this kind of film as "... contemporary variations of earlier 'stag' or 'nudie' films" which are proliferating so rapidly that they are fast becoming imitative and cliché, and as standardised and stereotyped as the slick glossy pictures that preceded them in the days of strict censorship. Because these films are carbon copies of each other, they have become commonplace and banal, and their audience appeal is markedly declining.

On the other hand, the higher level of order established by films which fall into the revolutionary category provide the foundation from which the next leap is taken. D.W. Griffith was possibly the first film artist, his film The Birth of a Nation (1915) being a watershed because:

I. It initiated an era of cinematic propaganda;
2. It heralded an age of film as a socio-political commentary;
3. Public reaction, violent controversy, censorship
demands and riots elevated the popular image of the cinema from crude entertainment to that of a significant and semantically powerful means of expression.

Society is subject to the Second Law of Thermodynamics: confusion increases and order decreases. Although the three systems described above (the homeostatic, evolutionary and revolutionary) are potentially stable or negentropic and regenerative when studied in isolation; in terms of the larger system of life, they are but enclaves in a deteriorating entropic world. Griffith had revealed the human condition of his time and his audience responded variously. Amongst the Whites the pervading habit of prejudice was reinforced. President Woodrow Wilson accepted the film's implicit ideology, "It was like writing history with lightning". The film implied bluntly that the South was "right" about the Negro, that the North was "right" about preserving the Union, that Reconstruction which elevated Negroes and some poor Whites was a shameful thing, that the virtue of Southern White womanhood had to be protected from "Negro brutes", and when all seemed lost, the Ku Klux Klan heroically rushed in to save the day. Until that time public opinion had been indifferent to the abuse of the Negro and the elementary rights denied him (Maynard, 1974, p.8 ). The mental effect produced by Birth of a Nation on White audiences proceeded to the level of the ultimate logical interpretant where it came to rest and the process of semiosis curtailed. At this stage of semiotic development the real world disturbances which impinge upon the system are matched by a habit which results from a perceived unity of the outer world and the result of mental experiments of the inner world.

Black Negro reaction, in contrast, resulted in a habit-change which was a source for further flux and development. The film heightened Black awareness and identity. Their newspapers raged at cinematic racism and demanded censorship. Black public reaction was led by the National Association for the Advancement of Coloured People which also demanded censorship, filed criminal proceedings against
Griffith, circulated newspapers with copies of a caustic review published in Post, appealed to city mayors and set about organizing their own Black cinema. Although the signs contained in Griffith's film produced an ultimate logical interpretant in White audiences, they did not do so among Black audiences because of the conditions determined by the interpreter. In other words, the White interpreter was not prepared to carry the semiotic process far enough to change a habit whereas the Black interpreter underwent a habit-change and was able to make the transition to the final interpretant, the true interpretation of the ultimate opinion. In the words of Thomas Cripps (1977, p.69):

... the campaign against The Birth of a Nation had been the dawn of a new day. It provided the first occasion on which black men, long organized into local groups, stretched their muscles across the nation. It reminded them that the "progressive era" had been for whites only and had ended in Jim Crow government, lynching, and the seedtime of a new Ku Klux Klan. It provided a model against which to test white racism. It turned the attention of a few Afro-Americans toward cinema as a means of expression.

For Whites, The Birth of a Nation reinforced their pre-conditioned race prejudices, while for Blacks, the accuracy of what they saw on screen led them to seek refuge and escape by calling for the institution of more sensitive sensory and control mechanisms such as censorship and other regulatory devices to match the variety of disturbances operating in the real world. That is, the amount of energy or information reversibly exchanged from the smaller (the film) to the larger system (society) was reduced to acceptable societal limits (in terms of Black aspirations), and the potential for change in the larger system slightly diminished.

There are, however, other processes operating which, interlinking with the progressive language of vision, have led to different media obtaining full art status. The pace of change in our society is such that "... different
generations living side by side may now ... live in essentially different (but overlapping) cultural epochs" (Gerbner, 1972, p. 72). Cinema and television are basically two historically distinct media which function side by side serving overlapping audiences. The consequences are that every medium explores its potential in terms of the medium it is in the process of superceding historically. Marshall McLuhan calls this process "rearview mirrorism" which he argues is a consequence of a literary oriented society. Fiske and Hartley (1978, p.15) aver further that Western society is one where literacy and its associated skills and modes of thought are highly valued. Despite the fact that different media employ different codes and signs, the prescriptions of literacy to such media is not the result of intellectual confusion but rather a reflection of dominant cultural values instilled during five hundred years of print literacy. The result is that the controllers and encoders of the media perpetuate the habit of preserving literate values within any medium. Thus books (particularly novels) become the content of film and film becomes the content of television. The nature of the signs and codes which structure the television image continue to degenerate in an incestuous entropic system, since according to Fiske and Hartley (1978, p.15), the codes of television are much more like those of speech than of writing. On the other hand, new technological innovations have liberated specific media from their homeostatic predispositions. Photography, for example, has freed Western painting from its obsession with realism (Bazin, 1967, p.16) and allowed it to find its semiotic autonomy. Similarly, television is the major cause for the emergence of the art movie, since the small electronic screen has usurped many of the journalistic functions previously performed by film. Each of the above media is a semiotic system initself, while interacting and contained within a larger system. Certain of the parts or enclaves may exhibit a direction opposed to that of the universe at large. Progress and innovation find their home in some of these enclaves. Painting, sculpture, film, television, photography etc. may be regarded as islands of increasing or decreasing
organization nested within the larger system of steady state conventional entertainment, itself enclosed within the system of human society (see Fig.4).

Traditionally, the artist's artifacts mirror his discoveries of his environment and reflect his search for order from chaos. Semiotic systems, classificatory methods, artistic modes, myths and legends all represent attempts to gain an insight into the conditions governing the artist's order. That is, a sign carries cultural meanings rather than merely representational ones. In this context it has moved to the second order of signification (or index). Its role changes and the sign becomes the signifier of cultural values. It will be remembered from our earlier discussion on second order signs that the resultant cultural meaning is known as a myth.

The source of the artist's order is dual: it is understood either as an inherent part of nature, requiring discovery by man, or it is argued that order comes from within man, that is, he imposes order on the world around him. No man made system can avoid the arbitrary; no system of analysis will ever be conclusive because man does not know the ultimate cause of events. The artist ranks his facts and integrates his vision according to the structures important to him. Fundamental in the search for relationship and order is the acknowledgement:

It is not true that man must supply the world with an organizing principle. It already exists ... Nature works according to laws, but man acts according to his idea of laws (Losch, 1954, p.94).

In other words, whether or not order exists in the external world, man's perception of that order is of his own creating, a consequence of his language and other code systems. The significance of this conclusion has been succinctly stated by Youngblood (1970, p.76):

The new artist, like the new scientist, does not 'wrest order from chaos'. Both realize that supreme order lies in nature and traditionally
we have only made chaos out of it. The new artist and the new scientist recognize that chaos is order on another level, and they have set out to find the rules of structuring by which nature has achieved it. That's why the scientist has abandoned absolutes and the film maker has abandoned montage.

Youngblood labels this approach synaesthetic cinema and compares its relation to traditional cinema in terms of the science of bionics in relation to previous notions of biology and chemistry. That is, bionics models itself on the patterns of nature, rather than attempting to "explain" or conform nature in terms of its own structure. Pablo Picasso has a similar rationale, "The important thing in art is not to seek but to find" (Coutts-Smith, 1970, p.65). By this, Picasso means not to mould but to discover.

For Peirce, this is the meaning of 'living science'. Peirce shifts his emphasis in the definition of science from being a body of organized knowledge to 'a mode of life'. For him, the scientist is defined not by the subject matter of his work, but rather by the way he carries out his endeavors. Science is "a pursuit of living men" (I.232). Thus Peirce(I.234) writes:

Let us look upon science - the science of today - as a living thing. What characterizes it generally, from this point of view, is that the thoroughly established truths are labelled and put upon the shelves of each scientist's mind, where they can be at hand when there is occasion to use things - arranged, therefore, to suit his special convenience - while science itself, the living process, is busied mainly with conjectures, which are either getting framed or getting tested.

That is to say, the scientist is differentiated from other men by his habits which must be in a constant state of flux. It is important that what has been attained does not become self-sealing and incestuous. This point is amply made in John Boorman's film Zardoz (1973). Zardoz deals with the chaos created when its vortex people try to arrest
and control some elements of the natural order. Most of the action occurs in a technological commune whose members have discovered the secret of eternal life. This innovation, however, only succeeds in providing the means whereby this future "vortex community" unwittingly imprisons itself in a homeostatic self-perpetuating deathless physical and social state from which a natural desire and longing for death arose. The consequent release from the sterile constraints of immortality brings with death a welcome sense of peace and inner release.

According to the director, John Boorman, the moral of this film is aimed at scientific determinism often employed by futurologists:

Too often it seems to me, they ignore the power of evolution itself to upset the equation. Some new mutation, something we encounter along the way, some unimagined factor can change the course ahead. Science and logic are not infallibles. Paradox has a poetry of its own ... My vortex people have forgotten what death is like and, as a result life has lost its vital savor. It is a psalm to paradox, a knee bent to the cruel majesty of nature.

In Zardoz, the reality of life degenerated into an unreality of non-death. The "living process" of science stagnated and prevented the development of new habits and habit-change while that which had already been attained was entrenched forever. Despite technology, the new reality remains conditional upon the natural process of death. The vortex society, through technology, substituted one type of reality for another. Eco (1976, p.27) argues that culture should be studied as a communicative phenomenon based on signification systems. Therefore systems of meanings are organized as paradigmatic and syntagmatic structures which follow the same semiotic rules as were set out for the structures of the sign vehicle. In terms of Zardoz, laws of signification governed the life and culture of the vortex society. Their societal responses were codified in terms of culturally
determined modes of perception which in turn governed their interpretant production. The consequence was a homeostatic society low in equi-probable information and resistant to habit-change. The reality which the vortex people had created for themselves was effected through the operation of the final interpretant where the potential of the sign was developed to its ultimate state. This state is an analogue of thirdness, and the laws of connection discovered represented the ultimate reality. This state of thirdness, however, succumbed to the process of entropy and consequently degenerated to the level of secondness where the vortex community no longer understood the laws of connection which structured their reality.

This brings the analysis to a discussion of different concepts of reality mediated by the different semiotic systems residing in the different cultures.

CONCEPTS OF REALITY

Through the medium of scientific discovery, aided by an extension of linguistic and semiotic codes and sign systems, the concept of reality has assumed a dynamic equilibrium and has located itself outside the individual's immediate conception of physical reality. This has not always been the case. A definition of reality depends upon a symbiosis between social evolution, linguistics and semiotics and information exchange. Fiske and Hartley (1978, p.66) approach a definition of reality in the following terms:

Reality is itself a complex system of signs interpreted by members of a culture in exactly the same way as are films or television programmes. Perception of this reality is always mediated through the codes with which our culture organizes it, categorizes its significant elements or semes into paradigms, and relates them significantly into syntagms. Our response to nature is codified, and our perception of a sunset, a stag-beetle or a man's eye movements relies on an encoding process that is isospecific to our culture as our language is. The signified is as arbitrary as the signifier, because its form is culturally determined.
The content of signs is information. Semantically significant information is measured in terms of hubits and is disseminated via the media. The media represent one kind of reality, while the culture to which we belong is another. The location of codes on the entropic/negentropic continuum is a determining factor in the arbitrariness of the signified and signifier. The codes of television, for example, are more conventional (i.e. entropic) than those found in an art film because they relate more closely to normal codes of perception. That is, both are perceived in a similar way which leads to a blurring between real-life and codified reality found in the media. Levi-Strauss (1973, p.70) has suggested that "understanding consists in reducing one type of reality to another". Thus, television 'reduces' cultural experience to another form of reality: that of a semiotic system of signs and codes. The following analysis on concepts of reality will couch itself within the paradigm that reality can be reduced to a semiotic system.

Margret Mead (1970) has postulated three categories of cultural development which may account for the diversity of cultures found on this planet - the postfigurative, configurative and the prefigurative.

At the pre-literate end of the time-reality continuum are postfigurative cultures where children learn primarily from their parents and older generations. Change is slow and imperceptible, so much so, that grandparents cannot conceive of any other future for their grandchildren than their own past lives. Such societies, if seen as consisting of semantic units, are susceptible to synchronic analysis where events are primarily of a syntagmatic nature since the selection of alternatives (the paradigmatic dimension) are extremely limited. The society survives because of its strict adherence to rules, codes and conventions. Too many alternatives or choices could lead to breakdown and death.

On the passing of traditional society, Daniel Lerner (1967, p.306) writes:

... inertia was the modal principle of personality for most people. Is not that
traditional people did nothing, on the contrary, many of them worked as hard and as long as their oxen. It is rather that they did nothing new. What sustained traditional society ... was the routinization of life-patterns in a self-sealing system that required no ingenuity and rewarded no initiative from its population. Rooted in their pride and place, traditional mankind lived by their constraints - unaware of them as constraints, because no communications alerted them to alternatives. Modernization reversed all this.

In other words, the low value equi-probable and homeostatic propensity of traditional society was disturbed by one or a combination of modernizing influences resulting in change from inertia to one of experimentation. The statement, "We have always done it this way" developed in an evolutionary and sometimes revolutionary direction to "There must be an easier and more efficient way". Traditional social systems usually exhibit a built-in resistance to change, have low literacy, poor understanding of scientific methods and remain relatively isolated because of poor communication links. Often communication in support of change has no common ground or semantic basis of understanding with the receiving culture. The last two centuries have shown only too often that there are limits to the rate of cultural change, and that beyond a certain point the pressure of an alien culture results in internal collapse of the native life without the assimilation of the new (Forde, 1967). These limitations are usually of a structural kind which places the 'receiving' culture at a disadvantage vis-a-vis the 'modernizing influences'. If the delicate cultural balance is upset, societal decay will proceed faster than adaption or reconstruction. A classic example is Sharp's (1967) account of the indiscriminate supply by missionaries of steel axes to stone age Australians.

The stone axe was a fundamental piece of cultural equipment in that it helped relate men, women and children to nature and technological behaviour; it served the purpose of transforming natural into cultural equipment; it defined
person to person contact and was a status symbol of male importance. In short, the semiotic properties of the stone axe constituted the pivotal mythical structure around which Yir Yorant culture was organized. The uncontrolled diffusion of steel axes, operating in conjunction with other elements also being introduced from the White man's several subcultures, undermined the realm of traditional ideas, sentiments and values without defining new conceptions to replace them. The result was a mental and moral void, and semiotic confusion, which foreshadowed the collapse of all Yir Yorant culture, if not, indeed the extinction of the biological group itself. The Yir Yorant society, once a local enclave of stability maintained by the process of homeostasis, became subject to a reversible information transfer from the general stream of increasing entropy, was unable to adapt to such disturbances and consequently degenerated into a state of increasing chaos and societal de-differentiation. In other words, the error control signal was unable to prevent the communication of disturbances or regulate the breakdown of codes and conventions, and the variety in the decision-making or controlling mechanism could not match up to the alien influences communicated by the missionaries. For them, the axe was nothing more than a degenerate iconical object recognized only at the level of the immediate interpretant. This interpretation falls into the area of firstness, the general. The Yir Yorants, on the other hand, interpreted the axe as a sign grounded on a genuine triadic relationship. That is to say, the Yir Yorants regarded the axe as a symbol, where the fitness of the sign to stand for its object depends on its reality on the interpretant or interpreter. Unlike the missionaries, the Yir Yorant had worked the genuine sign of the axe through to the final interpretant, the ultimate opinion. The axe did not function as a symbol for the missionaries for their reality differed from that of the Yir Yorant. The social connections regulated by the axe in Yir Yorant society is an analogue of thirdness. An individual's wish to interact with another, for example, is a first; his choice of a particular person is a second and his way of achieving this through the social
conventions prescribed by the axe is a third. This process consequently influences the Yir Yorant’s perception of reality. Where the final interpretant approaches the immediate interpretability of the sign the ultimate opinion or reality is achieved. The missionaries disturbed this reality by upsetting the cultural meanings defined by the axe as symbol even though they had no idea of the reality that the Yir Yorant had constructed for themselves.

Postfigurative cultures generally overlap with configurative cultures which are the development of new forms of technology in which the old are not expert and where the experience of the younger generation is radically different from that of their parents, grandparents and other older members of their immediate community. The young have to develop new styles and codes based on their own experience and thereby provide models for their peers. Such societies have a diachronic orientation and are subject to a mixture of paradigmatic and syntagmatic orders: those defining semantic units in their traditional social system and those of the new modernizing society. The individual is exposed to new channels of communication and new semiotic systems and relationships. The laws of signification operating in both the traditional and new society cohere into revised codes of behaviour and communication. The mode of relations, embodied in thirdness, adjusts itself to take cognizance of a new dimension of seconds and firsts. Thus, the concept of reality assumes a dynamic relationship as the final interpretant indefinitely approaches the immediate interpretant, itself in a state of change due to the reception of new information and novel experiences. Configuration occurs mainly in developing or modernizing societies and the demands on communications are proportionately greater than at any other stage of social growth. Communication is exhorted to help survey a new environment, raise people’s aspirations, guide and control a dynamic process, teach new skills and socialize citizens to a new and different society that is still only in the process of becoming.

In prefigurative cultures the future of society is no longer seen as an extension of the past. The high level
exchange of information from one social system to another has increased the rate of change or negentropy to a level where parents are also learning from their children. Distinct paradigmatic and syntagmatic axes are overlaid, one upon the other, all occurring simultaneously at different levels as the individual adheres to interacting systems of signification, plays different roles and communicates through different media. Modes of relationships (thirds) are in a continual state of flux as new firsts and seconds are continually introduced to the individual in modern society, itself subject to changes in the content of the phaneron, the collective total of all that is present to the mind at any given time. Jeremy Shapiro (1972, p.153), in discussing Herbert Marcuse's concept of one-dimensional man, writes:

Two dimensional civilization was based ... on the external quality of the confrontation of man and nature, form and matter, and on the corresponding irreducibility of the lower level to the higher, of the individual to the universal ... What broke down two-dimensional into one-dimensional civilization was the process of technological mediation, in which the world is transformed operationally so that subject and object, form and matter, are mediated through action, operation and function ... at the same time the machine, as mediator between man and nature, creates continuity not only between technology and nature but also between technology and man, whose structure is assimilated to that of machines and technologically shaped natural objects.

It will be remembered that phaneroscopy is concerned with what positively appears without enquiring further into the truth or falsity of its conceptions and includes the interpretations commonly placed by the individual on his experiences. The implication is that reality is relative. Each person paints his own perception of reality based on those experiences which are important to him. In other words, the same generations living at the same time live in essentially different but overlapping cultural epochs, all of which represent different interpretations of overlapping
realities. Reality and future assume a symbiotic relationship, and definition depends upon a given society's location on the postfigurative-prefigurative continuum in relation to the respective systems of signification, codes and communications systems. For as Daniel Bell (1973, p.318) asserts, for most of human history reality was nature - to find shelter from the elements and to wrest food and sustenance from the soil, the waters and the creatures. Then reality became technics. The Industrial Revolution was an effort to substitute a technical order for the natural order. In the industrial society the cosmological vision was the game against fabricated nature. The post-industrial society is not concerned with either nature or technics. Reality is primarily the social world where men live more and more outside nature, and less and less within the machinery of things; they live with and encounter one another. This process is made possible by what Shapiro (1972, p.149) calls "the universal semiotic of technological experience" where technological mediation between the inherent dualisms of Western society has led to a semiotic in which language and functional sign and symbol system have become integrated. John van Zyl (1977, p.47) expands this theme as follows:

An important feature of this (semiotic) is the blurring of the distinction between the conscious and the unconscious, through the attainability of unconscious desires. Objects such as motorcars are transformed into signs, symbols are manufactured to order, and function and beauty become one. Technology succeeds in deconstructing the unconscious, and then reconstructing it in forms that constitute the external world, and the consumer ethic of the capitalist world facilitates this process.

Similarly, other definitions of reality will change depending on a society's position on the reality matrix. Architecture, for example, originally a response to the need for adequate shelter, was broadened to include other aspects such as religion, status, protection, functional specialization and aesthetics. The central thesis of Youngblood's
(I970, p.41) exposition is a redefinition of cinema to mean "a process of becoming, man's ongoing historical drive to manifest his consciousness outside his mind, in front of his eyes".

According to Mead (I970, p.II9), the paths by which man entered the present can never be traversed again. Coming by different roads out of the past, all the peoples of the earth are now arriving in the new world community:

The freeing of man's imagination from the past depends ... on the development of a new kind of communication with those most deeply involved with the future - the young who were born in the new world ... the development of prefigurational cultures will depend on the existence of a continuing dialogue in which the young, free to act on their own initiative, can lead their elders in the direction of the unknown ... we must recognize that we have no descendants as our children have no forebears ... The Future is Now!

The path towards one-dimensionality operating as a universal semiotic of technological experience is, according to Shapiro (I970, p.II8), the ground for all future and social development. As such, it defines the parameters of a society's perceived reality as a function of the interaction between technology and semiotics.

Language and Reality

Concepts of reality are mediated through the production of interpretants. When the immediate interpretant coincides with the final interpretant, then, according to Peirce, we have achieved the ultimate opinion. If reality is dependent upon an interpretant or interpreter then modes of perceiving reality will obviously differ between different cultures. A message is meaningful only at the moment when the semiotic codes interlock with the cultural awareness provided by the viewer whose own context (eg. class, religion etc.) in turn shapes his interpretation. Thus reality
is never experienced in an unprocessed manner. According to Fiske and Hartley (1978, p.161):

> Whether the reality in question is the brute force of nature, or man's relations with other men, it is always experienced through the mediating structures of language. And this mediation is not a distortion or even a reflection of the real, it is rather the active process through which the real is made. In other words, we can say that not only are signifiers (like words) arbitrary in relation to their referents, the signifieds themselves, are equally arbitrary.

Thus language mediates reality. The nature of this reality is dependent upon the kind of language employed and the significations and codes which govern that language.

If language is the means by which men enter into society to produce reality, then the media (art, film, television etc.) must mirror conceptual models of interpretation. Man devises models of the real world which range from icons (photographs, realist painting, sculpture etc.) through less motivated indices (e.g. a weathercock) and unmotivated arbitrary signs of language to the logical codes of mathematics. In terms of Peirce's notion of unlimited semiosis, it can be argued that the degree of sophistication of any individual or society may be judged from the complexity of the model he creates to represent his perception of the environment. Such models are an analogue of thirdness and work at the level of the final interpretant. In the course of evolutionary and revolutionary development, however, it does happen that such models have to be periodically or continuously revised. Thomas Kuhn (1970) provides an explanation of this phenomenon as it occurs in the normal sciences. Most scientific activity operates within the confines of particular paradigms. Kuhn's use of this term should not be confused with the meaning generally applied in semiotics (see p.20). A paradigm in this sense is a set of concepts, categories, relationships and methods which are generally accepted by a community of scientists at a given time. Normal scientific activity investigates all
facets of a specific paradigm currently in use. In the course of application through time certain anomalies, observations and paradoxes, which cannot be resolved within the existing paradigm, will arise. These become the focus of increasing attention until science is plunged into a period of crisis in which speculative attempts are made to solve the problems posed by the anomalies. From these attempts there emerges a new set of concepts, categories, relationships, and methods which both resolves the existing dilemmas and subsumes relevant elements of the old paradigm. The result is the birth of a new paradigm followed again by the onset of normal scientific activity in a further articulation and specification under revised and more stringent conditions. Paradigmatic innovation represents an extension of scientific reality and so modifies man’s perception of his environment and demands an updated mental model of reality. When, for example, physicists discovered that they had confused process with form and that matter which appeared to be solid was, in fact, a manifestation of waves or particles, the conception of an objectively perceived environment began to be questioned. For the first time the basis of language as a signifier of reality could be doubted. The vocabulary of language is predicated upon the identification of solid object matter. Since science has discarded the notion of absolutes and if matter is no longer identified in terms of sensual information, how can language which has evolved on the basis of man’s imperfect perceptual faculties represent such phenomena? The problem is succinctly stated by Melvyn Siff (1977a, p.85):

Not only do our senses admit the passage of highly selected information to the brain, but they are unable to respond to most of the information arising from our environment. Our eyes limit our sight to the narrow visible spectrum of electro-magnetic radiation, while our ears limit our hearing to sound waves which vibrate at a frequency of between 20 and 20,000 cycles per second. Our bodies are unable to sense radio waves, cosmic radiation, ultrasonic sound waves, X-rays and magnetic fields. Our coarse
sense of vision does not permit us to see cells, molecules, atoms, electrons and other microscopic particles. If it did, we would experience the apparent solidity of our environment as a vast expanse of space interrupted by whirling vortices of scintillating energy matter. Our experience of the universe is indeed determined by the constraints imposed by our sensory mechanisms and brains.

On a psychological level, this view of perception and the universe is paralleled by Gestalt psychology and the concepts of modern physics. Both of these disciplines are concerned with the whole rather than with the analysis of the separate parts. Film theorist Rudolf Arnheim (1957), for example, argues that film art is based on the manipulation of the technically visible, not the humanly (i.e. sensory) visible. In other words, film may mechanically record the sensations which the retina gathers, but it does so mindlessly and consequently, non-representationally. Further, our vision is not the simple result of retinal stimulation, but involves, in addition, a whole field of perceptions, associations and memory. Film art, according to Arnheim, is the self-conscious use not of something in the world (sound, story, gesture etc.) but of a process we use to represent the world. Implicit in this argument is the assumption that cinema is not a medium of reality, not even a displacement of the real. In terms of the postulates of Gestalt psychology, film is rather an individual's experience of the real.

Although Arnheim's arguments are consistent and concise, his absolute adherence to the Gestalt paradigm leads him to reject different kinds of cinema, which show up anomalies in his approach. No room for paradigm innovation exists within the confines of Arnheim's theory and therefore it can be concluded that the Gestalt view of perception has little relevance to this analysis which is grounded in revolutionary theory. Unlike Arnheim's paradigm which is grounded in the reality it seeks to portray and which results in the perpetuation of the status quo, revolutionary theory, in contrast, is grounded in the reality it seeks to represent and is open to paradigm innovation, growth,
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choice and further articulation.

Working within this revolutionary paradigm, the question of reality becomes even more complex, for the notion of reality is no longer bound to the manipulation of the technically visible or the humanly visible. The exploration of a molecular reality is now feasible since film and other media are able to produce genuine signs which in turn can be correctly interpreted as standing for abstract notions involving a molecular reality. The discovery of non-Euclidean geometry, for example, has led to the development of a paradigm which can account for more than three dimensions in spatial relationships. Space and time, matter and energy are no longer regarded as separate entities. A single 'particle' like an electron can pass through several coplanar holes simultaneously, so that particles sometimes behave more like waves. In other words, a single entity can appear in several different places at the same time.

Einstein's theory of relativity has superseded Newtonian concepts of absolute space and time, since mass, length and time vary with the motion of the observer. Gravitation influences the passage of both light and time, and force may be seen as the interchange of certain visible particles (Siff, I977a, p.86). These observations have significant implications for semiotics, and consequently, for perceptions of reality. Siff (I977a, p.87) concludes:

\[
\text{Space, time, matter and a host of other basic concepts of our environment have to be seen as convenient language symbols which we use to describe certain phenomena. "Reality" seems to be more unattainable to man than it has ever been, so it is not unexpected to find humans disagreeing violently on their distorted images of the same event.}
\]

Shapiro (I970), by investigating the relations of technology to art, biology and the senses within the confines of his notion of the universal semiotic of technological experience, offers the following thoughts on our perceptions of the external world:
Traditionally the dichotomies of two-dimensional civilization came to expression in the separation of the realms of the useful and the beautiful in such a way that aesthetic experience was the stimulus to and the token of the experience of critically transcending the realm of necessity and function. Art seemed to provide an immediate sensuous experience of what lay (metaphysically or historically) beyond the world of unfreedom. This manifested itself at the poles of experience: in the connection of the beautiful with the divine (as in Plato) and to morality (in Kant), and the resistance of sensuality to the reality-principle in ordinary life, expressed in countless taboos that were intended to control it. This capacity of art derived ... from its ability to synthesize the universal and the particular, form and content, in a manner that that was impossible in other realms of experience, owing to the conflict between form and content derived from the backward state of technical development. From this conflict came as well the down-grading of the senses as sources of knowledge.

Perception is dependent upon the receipt of information transmitted via the senses. These biological filtering devices control incoming information which is then further filtered by the language of the receiver. In other words, differences in the perception of reality are further exacerbated by the semiotic process of interpretant production. The dyadic relation between signifier and signified as found in icons and indexes is altogether more complicated in the triadic sign of the symbol (which is also a third) which stands for abstract notions ranging from written language to the representation of molecular behaviour. A sign depends for its reality on an interpretant or interpreter. Where the sign is a degenerate triad, the object does not depend for its existence on a mental association. In such instances, the sign is not fit to stand for its object since no interpretant is produced. In other words, where even in the event of perception of an object, but where no cognition occurs to complete the triadic relative,
no interpretant will be produced and the event will not be understood. It is this process which explains why modern abstract art continues to meet with resistance from non-visualy literate spectators: they are unable to complete the triadic relative because they reject signs or images which their imperfect senses tell them are incorrect.

The Neurophysiological Determinants of Reality

Apart from the mental processes described above, Siff (I977a, I977b, I979) would further argue that neurophysiological principles are equally important in the generation of language and calls for a deeper understanding of the brain/mind system and human consciousness as it relates to interpersonal communication. Adey (I972), for example, claims that the brain is a "noisy processor", but nevertheless employs noise usefully in its normal information-processing functioning. It could therefore be argued that signs may be generated out of this background noise. In all transactions with the environment the brain employs a language of abstract neural modelling and it is natural, and therefore expected that human language, as a product of the human brain, must involve an even more approximate modelling of "reality" (Siff, I977a, pp.84-85). Benjamin Lee Whorf (I940) states that "language is an organ of the mind" and acts like the sensory organs in filtering and distorting environmental data. Jerrison (I976) has put forward a theory which argues that language is a by-product in the construction of reality. He holds that language as a non-physical organ of the developing mind, evolved as a further aid to providing an adequate model to the sensory events experienced by the human organism. Jerrison's (I976, p.IOI) conclusions suggest that the production of signs may be partly biologically induced. He states:

We need language more to tell us stories than to direct actions. In the telling we create mental images in our listeners that might normally be produced only by the memory of events as recorded and integrated by the sensory and perceptual
systems of the brain.

Or again, Thass-Thienemann (1973, p.40), in researching the origin of human language, has concluded that:

All vocal language, in a general sense, is somatic expression. The psychosomatic identity of body and mind is still rooted in the biological needs and their subjective perception, out of which all higher, and more abstract, forms of symbolization developed ... The body symbolism of the vocal language cannot be deciphered any more, in most cases because its origins lie in the prehistoric past. It appears in our mental apparatus, as unconscious, and for this reason it is open to analytical interpretation ... man perceives, thinks and speaks in terms of his own body and bodily functions.

In the light of such knowledge about human sensory perceptors and language systems, Siff (1977a, p.85) offers a summary in the form of a Communications Uncertainty Principle:

The observer and the observed interact with one another in such a way that the state of the observed may not be defined precisely at any instant in any language by the observer.

It is to these imponderables that the pure artist addresses his efforts. He manufactures signs, icons, indices and symbols, orders of signification and codes. The artist creates a semiotic to reflect his perception of reality. He uses technology to push back the limits of translation. Technology fragments the unconscious, reorganizes it and reconstitutes it in forms that match the 'external' world. According to Siff (1977a), Ornstein (1972), Sperry (1971), Delgado (1971) and Korzybski (1941) experience of any event is relative to the consciousness of the observing creature. Siff (1979) argues that consciousness is not a non-physical object occupying a specific place somewhere within the human head. Rather, the location of consciousness during various
altered states of consciousness induced by, for example, drugs or sensory deprivation, may appear to lie outside the body. Consciousness, its location and functions, are anthropomorphic metaphors constructed by the mind from deficient or highly filtered information reaching the individual via his limited sensory systems. Jaynes (1976, p.65) argues that man is mostly unconscious:

Conscious mind is a spatial analogue of the world and mental acts are analogues of bodily acts ... (and) ... there is nothing in consciousness that is not an analogue of something that was in behaviour first.

That is to say, although the individual cannot be conscious when he is not conscious, he is conscious of consciousness through the bioelectrical events associated with activation of his brain (Siff, 1979, p.1). Sperry (1951) goes so far as to state that consciousness depends solely on neural output, irrespective of the type of stimulus that elicits a given response. Delgado (1971) defines the mind as "the intracerebral elaboration of extracerebral information". Much of the intracerebral information is stored in the subconscious in the form of language and emotional feelings towards many words, thereby determining our attitudes and behaviour towards ourselves and others. Since most information reaches the human neocortex after the passage through the emotion-related limbic system, feelings generally precede intellect. The human organism's innate defence mechanisms channel much of an individual's stress-associated information into the subconscious in such a way that "feelings become more diverted, symbolic and complex with successive gating." (Janov and Holen, 1977) (See Fig 11.)

This neurologically based paradigm generally correlates with Peirce's schema for interpretants, particularly the dynamical. In this category, the emotions too precede intellect, the effect of the logical interpretant. It can therefore be argued that the production of interpretants owe their origin, not only to cultural and social mechanisms,
(After Janov and Holden, 1977, p. 201)

Figure 11: Janov's concept of gating of input information

GATE 1

SOMATOSENSORY

GATE 2

AFFECITIVE

GATE 3

COGNITIVE
but to neurological functions as well. Jung's (1970, 1968, 1969, 1974) psychological theory of archetypal symbols which form part of man's fundamental inner language system, supports this conclusion. Certain recurring motifs and symbols appearing in myths, fairytales, dreams and art seem to be common to all mankind and most of man's externalized language is apparently based on this subconscious encyclopaedia of neurologically induced mental hieroglyphs (Siff, 1977a, p.94). The idea of archetype predates the work of St.Augustine and was synonymous with Plato's notion of "idea". Jung's interpretation of archetype derives its properties from Kant's (see Jung, 1968, pp.75-80) postulates "that there can be no empirical knowledge that is not already caught and limited by the a priori structure of cognition". Jung (1970, p.449) identifies evidence pointing to such a deep structure within the unconscious:

The concept of archetype ... is derived from the repeated observation that, for instance, the myths and fairytales of world literature contain definite motifs which crop up everywhere. We meet these same motifs in the fantasies, deliria, and delusions of individuals living today. These typical images and associations are what I call archetypal ideas. The more vivid they are, the more they will be coloured by particularly strong feeling tones ... They impress, influence, and fascinate us. They have their origin in the archetype, which in itself is an irrepressible, unconscious, pre-existent form that seems to be part of the inherited structure of psyche and can therefore manifest itself spontaneously anywhere at any time.

This conclusion has been born out by the work of Thass-Thienemann (1973) and a host of other researchers. Richards (1972), for example, offers corroborative evidence for the occurrence of innate mental symbols. For instance, migraines, pressure on the eye-balls, and blows to the head (seeing stars) can cause vivid visual displays even in a person whose eyes are closed. These patterns, termed phosphenes, may also be elicited by electrical or magnetic stimulation of the optic pathways or other parts of the brain. Oster
(I970) has gone further and noted the correlation between the most often recurring phosphenes and the basic geometric shapes of both primitive and modern art, thereby suggesting a physiological basis for archetypal images. Hubel (I963) has revealed that parts of the brain associated with vision are structurally and functionally organized in regular columns of nervous tissue. The implication of the work done by Richards and Hubel and others is that visual perception of the environment involves the neurological processing of incoming information in straight parallel lines. It therefore appears that planar straight-line geometry is eminently compatible with the human neural apparatus. According to Stent (I972, pp.50-51):

... neurobiology has now shown why it is human to hold Euclidean geometry and its non-intersecting coplanar parallel lines to be a self-evident truth. Non-Euclidean geometries of convex or concave surfaces, although our brain is evidently capable of conceiving them, are more alien to our built-in spatial-perception processes.

The human experience of the environment and its response to it is consequently determined by the constraints imposed upon the individual by his body-brain system. Not only do our senses admit but a narrow spectrum of external energy forms, but the behaviour of our entire sensory system depends on preceding levels of activation. Siff (I977a, p.87) has summarized the above observations in a Communications Uncertainty Principle:

Experience of any event is relative to the state of activation of the sensory and neural apparatus of the observer at the instant of observation.

The above neurological innovations have important implications for the discipline of semiotics. First, it removes the discussion inexorably away from the ambit of a de Saussurian dyadically derived semiology. A sign only becomes a sign through the mediation of a cognitive act, however it
is limited neurologically and/or semiotically. Second, Peirce's notion of interpretant is neurologically verified, the greatest degree of correlation to be found with his dynamical interpretant. Third, the process of semiosis, the unlimited production of interpretants, will allow the individual to develop his perception beyond the constraints imposed upon him by his physiological structure. While certain representations or things may appear alien at first glance, our brains will nevertheless be able to comprehend them. This takes the individual into the realm of abstraction, the modelling of processes beyond his field of vision. Peirce's classification of interpretants is ideally suited to account for this potential extension in human consciousness. Thus, while it is accepted that language behaves like an organ of the mind (Whorf, 1940) to restrict man's experience of the universe to approximate models of reality, the process of semiosis allows such models to be of a dynamic nature. This, together with the development of language itself, allows a continuous updating of these mental models of reality. The fourth implication for semiotics arises out of this renewal process and involves the production of signs to represent and stand for models of reality which may no longer be tied to an antecedent or solid object matter based reality. Fifth, the relationship of the background noise generated by the information processing functions of the brain, the recall of archetypes and the production of phosphenes to perception can be accounted for by Jung's concept of the symbol. Don Fredericksen (1979) has drawn attention to Jung's typology and shown that while Peirce's definition of "symbol" is characterized by the absence of an "existential connection with the user", the Jungian interpretation is characterized by the presence of such a connection. Thus Jung's "symbol" is similar in this respect to Peirce's "index". These two definitions are further distinct in that whereas in Peirce's semiotic where one entity "stands for" another we have an instance of one known thing standing for another known thing, in the Jungian framework the symbol is "the best possible description or formulation of a relatively unknown fact". Jung (1971, pp.473-476) distinguishes his concept of a
symbol from that of a sign because of its "relatively unknown" quality. Archetypal imagery is symbolic because it connects the individual with a living, although relatively unknown, realm. This unknown factor occurs, not because the individual represses it, but because the human consciousness has not or cannot reach that far. It would appear that this missing factor could be accounted for and described in the Peircean paradigm as a sub-division of the index, the archetypal index. Thus, whereas Jung (1971, p.473) argues that

The concept of a symbol should ... be strictly distinguished from that of a sign. Symbolic and semiotic meanings are entirely different things ... A symbol always presupposes that the chosen expression is the best possible description or formulation of a relatively unknown fact, which is none the less known to exist or is postulated as existing ... Every view which interprets the symbolic expression as an analogue or an abbreviated designation for a known thing is semiotic.

the mediation of the symbol through the brain-mind system can convert this expression (i.e. the symbol) to a sign with semiotic properties. This sign, however, remains hazy given the present level of neurophysiological research.

It is now necessary to place the functions of the artist and the scientist in perspective and to ascertain the symbolic purpose of their respective abstract semiotics.

**Art, Science and Reality**

Peirce's theory of signs as a foundation for pragmatism is predicated upon what he calls "a community of scientists" who are concerned with an ideal, the ultimate opinion. In keeping with Peirce's shift away from a view of science as an organized body of knowledge to a method of approach, his description of the scientist pivots around the habits of the scientist, that is, his desire to learn for the sake of knowledge and not for the practical application to which
that knowledge can be put. Peirce (I.43) divides people into three classes:

The first consists of those for whom the chief thing is the qualities of feelings. These men create art. The second consists of the practical men, who carry on the business of the world. They respect nothing but power, and respect power only insofar as it is exercised. The third class consists of men to whom nothing seems great but reason. If force interests them, it is not in its exertion, but in that it has a reason and a law. For men of the first class, nature is a picture; for men of the second class, it is an opportunity; for men of the third class, it is a cosmos, so admirable, that to penetrate its ways seems to them to be the only thing that makes life worth living.

From this quotation certain salient points about scientists can be identified: firstly, the scientist is defined through his acquisition and use of certain habits; secondly, these habits underline the necessity to explore the universe and to continuously go beyond the present state of knowledge; and, thirdly, new knowledge, in turn, leads to the formation of new habits.

Opposed to this dynamic paradigm of the scientist is the artist who is defined as one who is concerned with "the quality of feelings". For Peirce, the artist's role is to reproduce nature as an icon: "for men of the first class nature is a picture".

Peirce's conception of art is extremely limited, for art, even in its most representational state, has never been purely decorative or denotative. Art is essentially creative. It goes beyond mere feelings or immediate perceptions; it explores, it attempts to find rules of structuring, it is research. Art exists primarily in the area of thirdness, of connection, of modes of relations. Peirce underestimates the universality of his own theory of signs by confining discovery to the realm of the scientist. The trivialization of the function of the artist limits their role in the
extension of human knowledge. It is difficult to know why Peirce had this attitude to artists when even in his own time there had been significant breakaways from purely pictorial art.

It has been argued that art is an expression of our perceptual faculties. The spurious reliance on sense-data for our objective reality has been questioned by modern physics which showed that matter is not what is appears to be and that space and time occupy more than three dimensions. Artists have realized these implications for some time and it will be seen from the following quotation that Leo Steinberg's (1953, p. II) conception of art has much in common with Peirce's notion of science:

... the very conceptions of twentieth science are finding expression in modern abstract art ... not because painters illustrate scientific concepts, but because an awareness of nature in its latest undisguise seems to be held in common by science and art ... Modern painting inures us to the aspect of the world housing not discrete forms, but trajectories and vectors, lines of tension and strain. Form in the essence of a solid substance melts away and resolves itself into a dynamic process ... if to the scientist solidity and simple location are illusions born of the grossness of our senses, they are also to the modern painter. His canvasses are fields of force; his shapes the transient aggregates of energies that seem to be on their way. In the imagery of modern art waves of matter have usurped the place of tangible visible things.

Peirce's conception of the scientist represents a useful paradigm in the extension of human knowledge beyond the immediate experience. His argument is, however, inadequate. It is not sufficient to limit this paradigm to the scientist since the role of the artist is strongly analogous. In what follows the concept of the artist will not be equated with Peirce's narrow definition but will rather be based on his wider notion of the scientist. This point has been implicit in the entire discussion up to now.

The exploration of our physical and mental universe is also the concern, for example, of revolutionary electro-
videographic film and television artists. Their abstract imagery and wave patterns are an attempt to redefine the relationship between the signifier and signified. According to Fredrickson (1979, pp.184-186) this kind of cinema, which also includes some commercial narrative and documentary film, can be classified as "symbolic" (in the Jungian sense) cinema. In the present schema it would be more correct to label this kind of cinema as synaesthetic cinema, a paradigm which was dealt with in an earlier section (see pp.69ff).

In the Peircean framework, the shift in relationship between the signifier and its signified has implications for the triadic relative which operates more and more at the level of a genuine sign and less and less on a purely degenerate level of the iconic and indexical.

Their signs are unrestrained, unconventional and constantly mutating in an effort to reduce their dependence on cultural perceptions, rituals, concepts and models embodied in the artist's linguistic and material heritage. They are looking for a new language which can take account of non-substantial elements which are not bound by time, space and linear geometry. These images are not necessarily linked to archetypal symbols as outlined by Jung despite Fredericksen's claim that many of these film makers not only "create" symbolic works, but refer to Jung in their own comments upon their work (Fredericksen, 1979, p.186; also see Youngblood, 1970, pp.163-167 and 226-239). With the present state of psychological knowledge it remains unclear as to whether such symbols are generated by the sub-conscious or conscious mind. Electrovideographic artists nevertheless realize that nature is no longer directly apprehensible and that it is removed from immediate sensation. This process may, however, be further complicated by the background noise generated by the brain which can result in the creation of archetypal symbols. The signs and codes embodied in the abstract images created by such artists, if studied holistically, can be subjected to a structuralist investigation of the laws of formation behind the image. In other words, the art created by electro-videographic artists does not offer an immediate, apprehensible reality,
but rather the laws of connection or modes of relations behind the realm of appearance. Thus a semiotics of art, whether abstract or representational, is also susceptible to categorization in terms of phaneroscopy - firstness, secondness and thirddness. Abstract images will cut through conscious models of "reality", reveal new ideas or firsts, identify new autonomies or seconds and approach the ultimate state of things, or thirds. Archetypes are simply undefined and identified firsts "which are what they are regardless of anything else, each complete in itself; provided, of course, that they be capable of composition" (Peirce, I.295), that is, connection by thirds. There is nothing to prevent such firsts from having a neurophysiological basis or from acting as indices; "seeing stars", for example, is both caused by and indicates a hard blow to the head.

What was once the preserve of the physicist - energy and matter, space and time - are now regarded as an integral part of the processes, appearance and significations of art.

Art is a vehicle for communication and enables a society to create and transmit a distinctive culture through a unity of visual perception. A unity, which is a third, may be defined as the sum of cultural units (which are therefore the meaning to which the code makes the system of sign-vehicles correspond) and involves the understanding of language as a social phenomenon (Eco, 1976, pp.67-68). According to Fiske and Hartley (1978, p.60), anything a person does or makes contains signs encoded in his culture, and the methods he employs are primarily determined by cultural convention. It is by means of these conventions that a culture establishes and maintains its identity. In this context conventions act as cohesives in all codes, whether of language, dress behaviour, architecture or of any cultural system. Herbert Read (see Sash, 1970, p.I5), for example, asserts that during the great artistic periods of civilization a fundamental unity of vision controlled all that was made and done - even down to rituals, parades and pageants. The artist, impelled by his creative spirit toward synthesis, needs to achieve a creative unity of a higher order of structure, value and purpose. Read,
Gropius (1935) and other eminent scholars contend that this unifying power (or third) is lost in our world of ever increasing specialization. This unity which was once negentropic has outgrown its function and discarded its common cultural base. The recent innovation of Art History as an academic discipline, coupled with the observation that in education the new audio-visual media are being used as twentieth century channels to convey a conceptual context that is still nineteenth century or earlier (McHale, 1968) and the non-development of an overriding style of art (or signification system) that springs spontaneously from the basic social and economic realities of our way of life suggests a disintegration of this visual unity or mode of relations. In the search for new visions, artists now create visual images without 'object' matter which the visually uneducated spectator is unable to read. The entropic condition represented by this fragmenting visual unity and governed by the Second Law of Thermodynamics has been reversed and an increasing order and diversity within the visual sub-systems has occurred. This shift from a cultural and hence semiotic homogeneity to diversity affects triadic relatives relating to interpretant production as well as the potential unifying factors or systems of connection found in thirdness. For example, the postfigurative transference of information from one generation to the next and even from one century to the next, has been replaced by a prefigurative transfer on a daily and even an hourly basis. If this visual unity has disintegrated it is because of the receiver's inability to decode semantically significant information emanating from the artistic sub-systems, all of which are at a different stage of negentropic or entropic and semiotic development, and to integrate the continual inflow of information into the interpreting structure around which to unite his own ideas. The receiver has to continually update his mental models of reality in terms of the complex immediacy of present day communication and continually changing dimensions of firsts, seconds and thirds as well as a bewildering array of new signs and codes and cultural meanings.
Science

The language of science represents an extreme degree of specialization in the direction of a mathematical precision. Such precision is only possible in relation to certain materials and can be gained only by using terms in special and previously defined senses. The codes of science and mathematics are logical, constrained by convention and consisting of static, arbitrary and unmotivated signs. In addition, they are designed to be totally devoid of connotative or expressive meanings (found in the second and third orders of signification). Art also represents a specialization of language for the purpose of precision but does not exclude as science does communication via associations, emotional colourings and implications of attitude and judgement. Art consists of aesthetic codes which employ more motivated signs and operate on both the denotative (first order representational signs) and connotative levels of signification. They are less conventionalized and less codified than logical codes.

Art and Science

The polarity between art and science is a genetic factor, for their respective derivations, although probably sharing a common historical ancestry, went on to develop along divergent paths. Cohen (1971) states that the artist's (mental) model is given and he accepts it as he finds it. His task is to match reality to this model in whatever medium he works. Conversely, the scientist constructs a model to match nature and modifies it when necessary. For him nature is given. However, despite these opposing standpoints the rapprochement of art and science is normatively feasible since if scientific technology is able to alter the realm of what can be done, and art reveals nature as it is, the domain of what ought to be done can be defined. The influence of technological innovations of the media, such as the various forms of film and television, can affect decisions on desirable ends as well as suggesting new means of attaining those ends. In other words, the duty of a
language of vision is not only to explain reality, but to improve it. The two-dimensional man of pre-neotechnic society who was predicated upon the nature of the opposition of form and matter, mind and body, and the individual and the universal was transformed by technological mediation into a more integrated one-dimensional man. That is to say, the traditional oppositions of the two-dimensional world have been transformed into a convergence of functions, a structural unity, by technology. Technology establishes a semiotic link between man and machine, machine and nature and man and nature. The extension of technological rationality leads to the formalization of communication in the realms of technology, labour, and interpersonal relations, which have been heralded in the economic exchange system. At this stage both language and functional sign and symbol systems become integrated into the larger system. This process of semiotization led to what Lefebvre (1968, p.209) calls "the collapse of referentials" and laid the foundations for the universal semiotic of technological experience. The elimination of two-dimensional civilization and of values transcending the exchange process, the transformation of objects into signs, the rise of manufactured symbols to the forefront of consciousness, the uprooting of traditional languages (eg., art, music and literature), and the tendency toward the confusion of formal and ordinary language eliminated the traditional, unreflected distinction between the denotative and the referential (contextual) functions of language. Thus, according to Shapiro, in the new universal semiotic of technological experience, in which 'form and content', if they still exist, are on the same level. In this context, languages and images become the referential wherein all aspects of action and meaning become intertranslatable sub-systems. Owing to the penetration of everyday life by technology, all sectors of the former become intertranslatable and saturated with meanings derived from relation to other sectors, so that the new referential is what Henri Lefebvre (1968) terms quotidiennete, quotidianity or everydayness. The consequence of the art-sciences-technology -nature synthesis is to make technology a form of sense-
experience and experience a form of technology. Art and technology coalesce onto a common base which lends itself to semiotic analysis. In addition, technology is largely responsible for the growth in range and volume of signs available for the communicative process. Pivotal to this sort of semiotic system and fundamental to the operation of a one-dimensional society is the blurring of the distinction between the conscious and the unconscious, and the externalization of the unconscious. These two states of being become interrelated symbolic systems, which, although on different levels, nevertheless derive their meanings from the same sources. Technology functions to break down the unconscious, reorganize it and recombine it in forms that structure the previously 'external' world. In other words, our unconsciousness system is in the course of reconstructing itself in bits and pieces outside us (Simondon, 1958, p.334). The dichotomies of the two-dimensional civilization of the useful and the beautiful are unified by technology into the functional. One example of the process is the use of computer films, which, using conventional mathematical models and various gaming techniques as inputs, can simulate alternative environmental futures. In one such film, City-Scape, mathematical equations describe a three-dimensional environment which is transformed onto a two-dimensional cathode ray tube. The properties of visual display include true perspective, controlled colour and brightness and infinite depth of focus. By manipulating a control of the computer the spectator is able to drive a vehicle through the city with such a strong sense of reality that while moving north he is able to turn around and view what has been behind him in the south. In this way a strong sense of location and environment is created for the driver/spectator. Youngblood (1970, p.252) comments that such films "create facts, not myths which obscure the boundaries between life and art with a scientific finality unequalled in subjective art". Thus the conscious and the unconscious fuse together in the one-dimensional society. This one dimensionality obviates the either/or antithesis of digital communication and mediates a coherent structural unity without interfering.
in the structure itself. This encapsulates Shapiro's (1970) notion of "the universal semiotic of technological experience", a result of which is a semiotic where language, functional sign and symbol system have become integrated into a metonymic relationship in which the elements of the system are not reduced to binary opposites, but remain intact. In metonymy, signification relies on the capacity of a sign to act as a part which can signify the whole.

In City-Scape, for example, an evolving discipline of mathematical aesthetics (in the Kantian sense) would assist in the analogical evaluation of the city produced in this film. The aesthetic elements would be pre-established and their appearance, distribution and form described in analogical terms. That is, of continuous forms of mutating meaning concerned not with either/or oppositions, but rather with varying pitches, quantities, densities or rhythms. Analogic forms are polysemic or isotopic, that is, they employ the use of several sign systems simultaneously. In the present example the isotope utilized would incorporate sensuous elements like light, colour, sound, tones, perspectives, textures as well as meanings or semantic units deduced from objects, form and design. A pyramid of degrees of quality could be constructed incorporating economic, visual value, symbolic and aesthetic variables. The synthesis of art and technology through the process of semiotization is effected through this form of technological experience.

The creator of City-Scape is attempting to translate the results generated by one language (a logical code of computer language) into another code system (aesthetic visual codes). These translations or mutations facilitate interpretation of the implications of one style of analysis for another style of analysis. Although both systems of codification represent different ways of saying the same thing, when structures are established to handle both languages simultaneously (as in City-Scape) the communicative and semiotic qualities of the new medium assist in a greater understanding and an enhanced one-dimensionality. The result is an extension of our language and a new
analytical category to facilitate a greater comprehension of forms that constitute the external world. Every work of art threatens the stability of existing codes and not only elicits feelings in terms of the emotional interpretant but also produces further knowledge. This extension reveals unsuspected possibilities and changes the attitude of the user towards them. Thus the addressee becomes aware of new semiotic possibilities, an intensified degree of one-dimensionality, and he is compelled to reassess the whole language, the extensive inheritance of what has been said, what could be said and what should be said. The extension of semantic systems in this way means to change the way a culture or society sees the world, to enrich the process of semiosis, to synthesize art and technology through the process of semiotization. According to Shapiro (I970, p.I6I), this is effected:

Primarily by means of modern design, which becomes the form of the universal technological experience. The evolution of modern design is an essential component of the process of one-dimensionality, and indeed serves as an index of the latter's temporal development, since it derives from the machine process the forms for creating a total (totalitarian) environment in which technological experience defines and closes the experiential and aesthetic universe.

The implication is that it is through the senses that man must be conquered. The semiotic goal is the sensualization of culture. City-Scape, for example, may call forth an emotional response only or it may proceed to the final interpretant through the synchronization of the senses. Such technological experience can optimize community involvement in the planning process for this one-dimensional ambience is quicker and easier to evaluate than the arbitrary signs and abstract numerical data spewed out on miles of computer printout. This is expressed by the designer of City-Scape, Peter Kamnitzer (see Youngblood, I970, p.250 as follows:
We would like to put the researcher, designer, decision-maker or the public at large in an environment where they could be exposed to what various futures may look like. We will do this with computer simulation, which I believe will trigger the next creative leap in the human brain.

The video-environment of City-Scape, in fact, goes much further than simply exposing the viewer to possible future states of urban living. If grounded in Shapiro's concept of the universal semiotic of technological experience we see that this computer movie synthesises art and technology into a one dimensional experience where the unconscious and conscious merge. Through the process of semiotization the viewer's experience is removed from a purely metaphoric (denotative) interpretation where the image of an alternative future is not displayed but displaced. The spectator's experience is rather located in a metonymic mode in which the part connotes the whole and involves a natural contiguity between art and life. Whereas the metaphoric depends on a constructed equivalence, the metonymic provides a much wider representation of related concepts. In the metonymic mode therefore, the attentive viewer is able to project himself into a lesser, but quite tangible sense of participation and presence as he moves around this illusionary city.

The value of this kind of technological experience is not calculated by its resemblance to past experience as in the binary either/or paradigmatic nature of the metaphor, but through its analogical both/and syntagmatic divergence from expected past performance.

Having established the symbiotic relationship between the artist and the scientist, it is now necessary to investigate the concept of the artist as design scientist.

**The Artist as Design Scientist**

We have already argued that the goals and objectives of art and science are the same. Only their respective method-
ologies differ. In this respect Bronowski's (I965, pp.3,13) view of science which is similar to that of Peirce's, is relevant:

The organization of knowledge in such a way that it commands more of the hidden potential in nature ... all science is the search for unity in hidden likenesses.

The purpose of art is directly analogous and the concerns of the scientist are also the domain of the artist. The term "design scientist" as originally formulated by Youngblood (I970, pp.70-73) is, however, inadequate in terms of the underlying theoretical base of this investigation. He decomposes the word "design" into "de" and "sign" which indicates "to remove the symbol of". In this context symbol signifies ideas distinct from experiences. This non-specific use of the word "symbol" to account for the second trichotomy of signs as well as the categories of firstness, secondness and thirdness perforce constrains his analysis to a non-semiotic realm. In the present context the use of "design" will not be to negate the symbol but rather to assist in the generation and manufacture of new signs whether iconic, indexical or symbolic. That is to say, the design scientist is responsible for the mediation of the universal semiotic of technological experience.

Coordinating the creative ideas of the artist with the technologically conversant scientist requires a common language or polysemic medium to express ideas through logic, reasoning, analysis and the formulation of goals and objectives, as well as a semiotic structure for recording the result. In conjunction with this evolving science an understanding of semiotics, a theoretical grounding in art and a technological ability to manipulate media and machines may in part presage the technological artist or design scientist, who, in contradistinction to the pure artist does not rely on the intuitive, emotive and random procedures which have typified the creative process to date. If the content of media is art, and art is the creation of a new world, never seen before, imperceptibly gaining on reality
(Lebel, 1968), the solutions offered by artists also identify some of the problems which will inevitably have to be faced in the future. This also holds true for the technological artist or design scientist. The technological mediation between the inherent dualisms of Western society has resulted, as we have seen, in a metonymic fusion whereby the two dimensions have become one. This in turn is aided by the artistic process, which assisted by the speed and accuracy afforded by technology has catalysed new signs and sign systems which are both triadic and pure.

The function of the design scientist is to blur the distinction between art and life. According to Youngblood (1970, p.42) life becomes art when there is no difference between what we are and what we do. In contrast, the mass public insists on entertainment over art in order to escape an unnatural way of life in which interior realities are not compatible with exterior realities. The universal semiotic of technological experience works to close the gap between what is and what ought to be. Or as Jacob Bronowski (1965) expresses it: "(we) ought to act in such a way that what is true can be verified to be so". Here, the whole is greater than the sum of its parts. The relationship between means and ends has been inverted; now the means, the medium determines the end, by suggesting ends we never knew before.
CHAPTER 4

SYNERGY AND SEMIOTICS

Synaesthetic cinema is poly-modal, finding without imposing. The individual modes or components interact and combine to produce a system whose performance is greater than the sum of the contributions of its separate parts. This unification is known as synergy. The terms en-ergy and syn-ergy are complementary. Energy refers to differentiating out the separate functions of nature and studying sub-systems isolated from the whole complex of the universe, a digital approach. In contradistinction, synergy represents the integrated behaviours of nature and refers to the behaviour of whole systems, unpredicated by the separately observed behaviours of any of the system's separate parts or any sub-systems of the system's parts, an analogical metonymic approach.

Digital communication may be likened to the notion that a chain is no stronger than its weakest link. This suggests that the part (the weakest link) will prophesy the behaviour of the whole. This argument can be rejected when the chain is joined back on itself for this rationale assumes that the chain is linear and experiencing opposing vectors of stress. Buckminster Fuller (1969, p.65) explains:

We think a chain ought to be an infinite line rather than a circle because we inherited the Greek concepts (Euclidean) of linear and plane geometry (which) imposed the concept of an infinite surface and the infinite line as logical to the then prevalent belief that the earth was flat ... However, in nature all the lines are completely curved and all the chains do eventually return upon themselves.

Youngblood (1970, p.109), by extrapolating Fuller's argument and by analogously comparing the physics concept of opposing vectors of stress to the digital process of narrative drama, especially of the genre type, concludes that the malfunction of any one element in the linear narrative constitutes a
break in the system. This in turn causes a semiotic break and forces the narrative to relinquish its hold over the viewer's consciousness. Dramatic narrative cinema is therefore anti-synergetic since individual components of the linear drama predict the performance of the whole system. These parts must remain constant, highly probable and follow the prescribed digital/syntagmatic rules of the linear narrative system of conflict-crisis-resolution. The stability of this narrative system can be explored by synchronic analysis. Synaesthetic synergy occurs only when the separate parts behave with analogical probity and without their being aware of themselves. Fuller provides an example from the discipline of metallurgy. If the metals in chrome-nickel steel tried to retain their individuality the synergetic effect of tripling the tensile strength through conversion to alloy would not happen. Chrome, nickel and iron have tensile strengths of 70 000, 80 000 and 60 000 pounds per square inch respectively. Although the sum of their respective strengths is 210 000, the strength of the three alloys together is 300 000 pounds per square inch which is five times as strong as the alloy's weakest link and four times the strength of its strongest link.

Similarly, the artist fuses his materials into an alloy greater than the contributions of its ingredients. He breaks codes to create new ones. Conversely, the entertainer constructs a package that is equal to the sum of its separate parts. He is constrained by the conventional nature of the medium and the expectations of the audience. Synaesthetic synergy exhibits a diachronically measurable capacity for mutation, of integrating previously separate elements and producing not a concept of greater complexity but rather one which subsumes many different variables into what is known as an elegantly simple construction. That is, the antitheses of the two-dimensional world have been transformed into the structural unity of one dimensional society. Form and content co-exist on the same level in metonymic relation to one another. Synergy is open-ended.
and encourages a continuous reformulation of goals to ensure progress and uninterrupted change. Synergy is not concerned with myth, fiction or the conceptualization of man in the universe, but rather with the materialization of the presence of invisible energy. This type of signification reflects images of the world beyond the reality of cultural interpretations and moves into what Youngblood (1970, p.79) terms "extra-objective" reality. This concept calls to mind Siff's (1977, p.85) Communications Uncertainty Principle. Youngblood (1970, p.127) goes on to develop the structural determinants of this reality:

The theory of relativity reduces everything to relations; it emphasizes structure, not material. We've been taught by modern science that the so-called objective world is a relationship between the observer and the observed, so that ultimately we are able to know nothing but that relationship. Extra-objective art replaces object consciousness with metaphysical relation-consciousness.

This conclusion has its roots in the Second Law of Thermodynamics. It will be remembered that the entropy of any closed system tends to increase with time. That is to say, no information can be transmitted with perfect fidelity within a system. Every transmitted message experiences some distortion, as in the case of, for example, a distant and indistinct short wave radio reception. According to the Second Law of Thermodynamics it is axiomatic that all communication is subject to a greater or lesser degree of distortion. Since communication is necessary for observation for all phenomena in the universe, the inherent noisiness of information transmission constrains the human organism to an imprecise perception of everything that constitutes its environment. Synergy functions where the act of perceiving is under the conscious control of the perceiver.

The Structure of Synergy

Benson (1972) argues that the logical consequence of the Second Law of Thermodynamics is a state of ultimate entropy. Other writers (e.g., Angrist and Hepler, 1967) go so far as to
suggest that life should be regarded as an inexplicable quirk with negligible significance in the overall process of degeneration. This argument suggests, for example, that curative medicines assume a negative value (in the conventional sense) in the general scheme of the universe, whereas poisons are imbued with a positive catalyst which speeds up the inevitable process of growth and decay. In this context, art cannot allay the inexorable process of degeneration.

The counter argument to these deterministic postulates proposes a dynamic equilibrium theory of the universe in which the increase of entropy is offset by an increase of synergy. This brings the discussion to a complementary definition of the concept of entropy. That is, entropy may also be defined as the quantity of energy in a system not available for doing work. In a state of ultimate entropy, all the energy of the universe is unavailable for doing work. The counter argument assumes that the universe can and does convert this useless energy into useful energy. This process occurs when energy which becomes unavailable for use in one subsystem of the universe is recycled for use in other subsystems. Life and progress are found in these enclaves of decreasing entropy.

This energy model is able to include both life and death, synergy, entropy and negentropy. The stuff of the universe is continually recycled, and the system as a whole is maintained in dynamic equilibrium. Benson (1972, p.198) offers an explanatory analogy:

The universe might be likened to an organic garden in which healthy plants are always growing in humus which is always decaying. Without the process of decay, plants would starve. Without the process of growth, there would be nothing to decay.

In cinematic terms, the entropy-synergy relationship causes new growth or semiosis in a system which is composed of homeostatic, evolutionary and revolutionary processes. Energy dissipated from a revolutionary film filters through the various subsystems, is converted into useful energy and maintains these processes in a state of dynamic equilibrium.
Decay provides the impetus, fuel or nourishment for new growth, new ideas and new techniques.

Synergy then, is the essence of living systems: regenerative, implosive, constructing and organizing. It is organic rather than mechanistic. In his discussion on synaesthetics and synergy Youngblood (1970, p.III) concludes:

Synergy is the essence of the living present, and it is the essence of art. Where synergy does not exist, energy tends towards entropy and change becomes increasingly unlikely.

Specializing or differentiating out ignores the relation of the subsystem to the larger whole. Where artists are integrated into the general system of things they will be able to transcend their speciality. They will act as catalytic agents in subsystems or organizations to enable these components to transcend themselves and become organic parts of a larger whole. Their actions will be of a semantically significant nature in the search for a creative unity on higher levels in the hierarchy of order. A hierarchy is developed through semiosis and the synthesis of parts and wholes. The wholes in turn are isomorphically related to wholes of an ever larger order of magnitude. The process whereby many different wholes combine into one whole at a higher level of order is termed syncretism.

Apart from the quality of wholeness and integration, synergy acknowledges the property of emotion in relation to reason. In human interaction synergy will tend to occur where these two processes cooperate. Synergy may not occur where one process is more dominant than the other. An individual must be aware of the process of his perception and be able to exert conscious control over the conversion of sight impressions into thought images (Youngblood, 1970, p.III). This condition is a pre-requisite of synergy, for man is not only the most rational but also the most emotional animal (Esser, 1974, p.349). Evidence from species comparison suggests that emotional susceptibility increases with intellectual capacity (Hebb and Thompson, 1968, p.761).
Concludes Esser (1974, p.349): "To be more rational is to be more sensitive, and something must be said about the discomfort and even pain that unavoidably accompany synergy". By implication, synergy causes rational ideas to become emotionally significant. This property permits the artist to use both rational and non-rational means of relating. In other words, synergy presupposes the existence of more than one thinking process. Youngblood (1970, p.III) sums up the implications of these observations for cinema as follows:

The emotional content of dramatic narrative cinema is predominantly the result of expectations that the viewer brings with him to the theatre, and thus he remains passive during the viewing experience so that his conditioned response to the formula may be fully gratified. In this way he satisfies his unconscious need to experience the particular emotions that he has already decided to experience. The film is "good" or "bad" in relation to its effectiveness as a catalyst for these predetermined emotions. However, the emotional content of synaesthetic cinema exists in direct relation to the degree of conscious awareness of the act of perceiving, and is thus seldom predictable.

Predictability implies entropy, not synergy, a process which is exemplified in the work of Sergei Eisenstein which moved from a state of negentropy to one of entropy.

The following section will look at this example and show how the process of synergy led to growth and change through the operation of unlimited semiosis amongst film directors who adhered to different paradigms.
CHAPTER 5

TWO TYPES OF FILM THEORY

Andre Bazin (1967) writing on the early development of film identified two schools of movie making: the image directors and the reality directors. The former group were basically propagandists who aimed to intensify the object depicted. Their postulates may be described as part-whole theories. In contrast, the reality directors, whose work relied on natural signs or icons, attempted to bring out a deeper structure of reality. This theory is termed relation to the real. Despite the opposing viewpoints of these two approaches, both were developed from a common root, what Christian Metz (1974, p.4) calls the impression of reality.

Part-Whole Theories: The Image Directors

The image directors were most strongly characterized by the Russian formalists who developed and refined film language into a highly sophisticated form of communication. This they did despite the fact that prior to the 1917 Bolshevik revolution the Soviet industry was totally lacking in indigenous traditions. The young post-revolution film makers did not regard themselves as entertainers or artists in the pure sense, but rather as teachers and propagandists. Said Eisenstein (See Jacobs, 1969, p.I22)."Moulding the feeling and intelligence of the masses is one of our political problems and for this end we find movies most effective". That cinema is a powerful means of influencing the masses was acknowledged by Lenin, "Among all the arts the most important is that of cinema"(See Jacobs, I969, p.I22). Eisenstein and his contemporaries had a dual objective:

1. To exploit the cinematic medium to educate the proletariat in the history, theory and aims of the new political order; and
2. To instruct a new wave of film makers to carry out these objectives.

The theoretical explorations of the Russian film makers
followed two separate paths. On the one hand were the succinct propositions of Pudovkin and Kuleshov reported in *Film Technique* (1929) and on the other were the erratic, but more incisive writings of Eisenstien (1943, 1951, 1962, 1968).

The Russian movie was based on a technique called montage. Andre Bazin (1967, pp.23-28) defines montage as the ordering of images in time which creates "... a sense of meaning not proper to the images themselves but derived exclusively from their juxtaposition". He identifies three basic types of montage:

1. Parallel montage, where two actions are taking place at a geographical distance by means of alternating shots of each;
2. accelerated montage, where a multiplicity of shots of ever decreasing length create an illusion of increasing speed; and
3. montage by attraction, where the meaning of one image is reinforced by association with another image, not necessarily part of the same episode.

According to Pudovkin and Kuleshov, montage gave birth to film as an art because the movement created between shots set it apart from still photography and animation. Supported by Raoul Haussman (see Wollen, 1974, p.32) who commenting on Berlin Dadaism, said:

> We called this process photomontage because it embodied our refusal to play the part of the artist. We regarded ourselves as engineers and our work as construction: we assembled (in French monter) our work, like a fitter.

This line of argument led Pudovkin to conclude that a single unit shot was simply a facsimile of the empirical world, but where shots are joined together the film maker is able to force the viewer to experience a film incident as if it really happened. A pedestrian being knocked down by a car, for example, is not shown in all its informational detail. Instead, Pudovkin developed a technique of piling up images.
A shot of a pedestrian walking towards a street; a driver's hand pressing a hooter, a foot on the brake pedal, and a pair of broken spectacles lying in the road. Comments Pudovkin (1929, p.56):

The material of the film director consists not of real processes happening in real time, and real space, but on those pieces of celluloid on which the processes have been recorded. The celluloid is entirely subject to the will of the director who edits it.

Pudovkin assisted by Kuleshov formulated their theories by means of experimentation and audience testing. In their most famous experiment they joined close up shots of an expressionless actor with, inter alia: a shot of a plate of soup standing on a table; a shot of a coffin which contained the body of a dead woman, and a third close up of the actor was joined to a shot of a little girl playing with a toy. Pudovkin (1929, p.140) relates the result:

When one showed the three combinations to an audience which had not been let into the secret the result was terrific. The public raved about the acting of the artist. They pointed out the heavy pensiveness of his mood over the forgotten soup, were touched and moved by the deep sorrow with which he looked at the dead woman, and admired the light, the happy smile with which he surveyed the girl at play. But we know that in all three cases the face was exactly the same.

Whereas in each case the referent, the expressionless actor, remains unchanged, the synergy produced by this signifier when combined with other signifiers (the soup, coffin and child playing with a toy) gave rise to differing interpreters in the mind of the interpreter. These interpreters were produced through the conscious juxtaposition of the alternating shots by the director. Pudovkin and Kuleshov were the first film makers to consciously conduct experiments in search of a science of control of messages which would interact with the audience to create a desired response. This case fulfills the conditions of synergy in so far that
the resulting interpretant is greater than the sum of the contributions of the separate shots and that this is consciously acknowledged by the producer, though not the viewer. This experiment, ratified by others, helped Pudovkin and Kuleshov to formulate an aesthetic credo:

Kuleshov maintained that the material in film-work consists of pieces of film, and that their composition method is their joining together in a particular, creatively discovered order. He maintained that film art does not begin when the artists act and the various scenes are shot-this is only the preparation of the material. Film art begins from the moment when the director begins to combine and join together the various pieces of film. By joining them in various combinations in different orders, he obtains differing results. (I929, pp. I38-I39).

In other words, he is directing the production of interpretants and forcing them to settle at the level of the ultimate logical category.

Pudovkin applied these principles in practice and generated concentrated narrative passages which had little personal appeal in comparison to the narrative cinema of DW Griffith in America, where the behaviour and movement of the actors dominated the editing. These differences occurred because of differences in dramatic intention. The Pudovkin-Kuleshov approach deals with a prestylized reality where the intention is to rearrange segments of actuality into a dramatic narrative which explains reality to the viewer. In contradistinction to the objectives of synaesthetic cinema they tried to "wrest order from chaos" and have provided not an explanation of reality but rather the reality of an explanation. That is to say, whereas synaesthetic cinema reveals a deeper structure of an unstylized reality (i.e. it finds without imposing), the Kuleshov-Pudovkin approach which is itself a constructed artifact which deals with a prestylized reality imposes a perspective or viewpoint on the world.
Eisenstein's approach was more sophisticated than that of his colleagues. He regarded the unit shot simply a point of departure, as the film's basic building block. He rejected Pudovkin's argument that the shot was just a piece of cut reality and defined the shot rather as a conformance of formal elements such as lighting, perspective, movement and depth. Eisenstein also opposed Pudovkin's theory of constructive editing which proposed that a scene is most effectively presented by linking together a series of specifically chosen details of the scene's action. Eisenstein never linked shots in a smooth sequence but rather created film continuity by a series of shocks or collisions. He applied his engineering knowledge to derive a scientific approach in his search for a theory of film. Eisenstein describes how he derived the term "montage of attractions" as follows:

... in every scientific investigation there must be a unit of measurement. So he (Eisenstein) set out in search of the unit of impression produced by art! Science knows 'ions', 'electrons' and 'neutrons'. Let there be 'attraction' in art. Everyday language borrowed from industry a word denoting the assembly of machinary pipes, machine tools. This striking word is 'montage' which means assembling, and though it is not yet in vogue, it has every qualification to become fashionable. Very well! Let units of impression combined into one whole be expressed through a dual term, half-industrial and half-music-hall.

(Quoted in Wollen, 1974, p 132)

Eisenstein was ultimately to develop five levels of montage:

I. Mathematical metric: conflict is generated in the duration of the shots corresponding to a measure of music.

2. Rhythmic: the duration of shots are dependent upon content within the frame - the movement within the frame impels the montage movement from frame to frame.

3. Tonal: a modically emotional colouring in terms of
rhythm and mood generated by lighting.

4. Overtonal: the collective calculation of all the piece's appeals and is more intense than tonal montage in that this method relates directly to psychological perception.

5. Intellectual: this approach was to direct not only the emotions but "the whole thought process as well". (Eisenstein, 1963, pp.72-83).

This last method replaced montage of attractions with a Pavlovian process of stimuli or shocks which steered a course between extremist sensual assault on the spectator on the one hand, and the demands of political agitation on the other. Eisenstein (1942, p.17) explains:

The science of shocks and their 'montage' in relation to these concepts should suggest their form. Content as I see it, is a series of connecting shocks arranged in a certain sequence and directed at the audience ... All this material must be arranged and organized in relation to principles which would lead to the desired reaction in correct proportion.

In semiotic terms too, Eisenstein is more complex than his contemporaries. Whereas the work of Pudovkin and Kuleshov operates at the indexical or second order of signification, Eisenstein proceeds to the symbolical or third order of signification. His science of shocks and collisions enables him to invoke this category. Interpretation of Eisenstein's montage must rely on the property of thirdness which is inherent in the composition of the symbol. Symbols occur whenever the image stands for more than and other than its immediate iconical or indexical referent and where "... the interpreter will associate a mental icon with the objects which are denoted by the context in which the symbol is used. It is this habit of association which is the symbol" (Peirce, 2.298). Eisenstein sought to use the symbol, the mode of relations employed in his montage, to influence the thought and conduct of the interpreter. Like his fellow film makers, Eisenstein too deliberately directed the
production of interpretants. But his objective was different for he aimed to connect everyday occurrences with an ideologically preconceived political truth. The medium of connection was montage. Peirce (3.360) reminds us that symbolic signs are "... always abstract and general, because habits are general rules to which the organism has become subjected". Eisenstein was seeking to cause a habit-change. He was not interested in pursuing the final interpretant, but instead a backward linkage which enlists the emotional, energetic and logical interpretants in the attainment of a pre-determined, cybernetically controlled goal. The objective was a modification of consciousness in terms of the goals of the Bolshevik revolution. Montage is the input which is designed to direct energy towards the pre-programmed goal; montage is the energy of control. This energy was harnessed by separating out in dialectical form the inherent dynamism of nature. Eisenstein (1963, p.45) labelled this process "Being" which describes "... a constant evolution from the interaction of two contradictory opposites". He explained that the "... social mission" of art is "to make manifest the contradictions of Being" (Eisenstein, 1963, p.46). But because "Being" is derived from a dialectical synthesis, organic nature assumes a passive inertial role which can only be activated through a "collision" with the opposing logic of rational art. In other words, art is located at the intersection of nature and industry. Eisenstein (1963, p.27) writes:

Montage thinking - the height of differentiatedly sensing and resolving the 'organic' world - is realized anew in a mathematic faultlessly performing instrument-machine.

This machine has deconstructed the real world or first and dispenses it in clean slices or seconds. The resulting binary digits are then programmed in the requisite order.

The Art Machine

The concept of art as a machine stems from the use of art
as a device for controlling the responses of an audience. Eisenstein (1963, p. 38) writes:

If montage is to be compared with something, then a phalanx of montage pieces, of shots, should be compared to the series of explosions of an internal combustion engine, driving forward its automobile or tractor: for similarly, the dynamics of montage serve as impulses driving forward the whole film.

A film-machine then, is of a system-maintaining or homeostatic nature where the machine works to correct adverse disturbances through the detection of deviations from the desired performance. That is, a set of interpretants has been predetermined by the director and the film functions to bring these into line with the social experiences of the viewer. The effect produced is an ultimate logical interpretant, a habit which is a predilection to behave in a certain manner under certain conditions. It is a resting place prescribed by ideological conditions.

While the invention of the machine may in itself be an innovation, it does not necessarily follow that the function it is designed to carry out should be of a negentropic nature. A machine is built to provide a solution to a pre-existing problem and to control and predict the probability of an event occurring. In terms of Eisenstein's cinematic objectives, his films were designed initially to create change in order to establish a stable level of social organization which would, once the goals had been attained, become a self-adapting process which would then suppress further undesired change. At first, Eisenstein's films were unpredictable because the technique was new and the viewer had little previous cinematic experience to guide his interpretations. But, in due course, with his having established montage as a genre (subject to a specific style, rules and conventions), the emotional content of his films became dependent on the expectations which the now conditioned viewer consults during a cinematic experience, expectations which defined the probability that film content can be pre-
dicted and understood simply by classification. In other words, although Eisenstein was initially able to transcend the second order of signification, the indexical, and reach the third, symbolic level, once his genre became established and homeostatic, it lost impact and semiotically degenerated to the indexical order.

The Organic Variable

The second input variable, the use of an organic analogy, was serviced by ideas from Lenin's Philosophical Notebooks (1925), "On the Question of Dialectics" in which Lenin stated, "In any proposition we can disclose as in 'a nucleus ('cell') the germ of all the elements of dialectics". Eisenstein linked this neural analogy to his concept of the shot and developed a second category of montage, "the molecule of montage". Intrinsic to this organic proposition is a sense of life, of connection, of an invisible procreative purpose. An organism utilizes its property of homeostasis to resist chaos, disintegration and death. The organism exists solely for itself - survival. Unlike a machine or communications system it does not live to promote a preprogrammed human goal. The life principle of the organism Eisenstein labelled "theme". This concept corresponds to Hegel's notion of 'idea' and Christianity's conception of 'soul'. It is this force which governs the way the organism behaves and regulates alternatives in the battle for survival. Eisenstein (1942, p.II) describes the function of the theme in the following terms:

Each montage piece exists no longer as something unrelated, but becomes a particular representation of the general theme which in equal measure penetrates all the shot-pieces.

Eisenstein went on to say that in a good film the particular representations, when properly ordered, produce the theme which has itself brought them into being. The theme exerts a fundamental influence in the choosing of the cells or
montage-pieces which constitute the synergetic whole. These cells are chosen from the universe of alternatives because inherent in their make-up is the signature of the genetic code which constitutes the film theme. In other words, the validity of these cells is dependent upon their being a microsystem of the theme. This process ensures that the cells or montage-pieces will interact in a polyphonic montage and create a "monism of ensamble" (Eisenstein, 1963, p.20; I59-I74). The question now becomes: how does the film maker discover the theme? Here Eisenstein differed from other organic theorists who held that close observation of nature yields the organic theme which is then capable of infusing an artwork with its natural energy - the synaesthetic approach. In contrast, Eisenstein argued that truth can only be attained through the use of the mind as a filtering device in the "true" interpretation of nature and history. Eisenstein rejected the notion of an unstylized reality which encompasses the natural, uninterfered with meaning of things. He considered his mission to be the apprehension of the true form of an event and then to utilize that form in the construction of his artwork. To attain "true" reality, unstylized reality must be discarded and broken down into its component parts and then reconstructed according to a "reality principle". By transcending the superficial realism (or unstylized reality) of an event the film maker searches for its dialectical form which in turn provides the theme. This theme will dictate patterns of montage and the raw material to be used in the creation of an ideologically prestylized reality where meaning is organized and determined by signification and the manipulation of interpretants. The viewer will recreate the theme of the film as his mind energizes the attractions presented. The interactions between these cells or montage-pieces will escort the viewer towards the conclusion as both he and the film approach the ultimate image of the theme.

This organic analogy did not and could not serve Eisenstein's dialectical objectives. The metaphysical problems raised by this almost mystical approach and his vacillation between his organic and mechanistic theories of
montage coupled with his insistence that in revolutionary cinema montage was the only fundamental artistic feature was in the end to preclude a further adumbration of his ideas. Biological functions which are of an analogical nature cannot be reconciled with Eisenstein's digital conception of film art, which existed to reflect events from an ideological point of view. Dudley Andrew (1976, p.68) has succinctly stated Eisenstein's problem:

... Eisenstein simply wanted a film to get things done like a machine but he did not want his machine to be made out of any old parts, some engineered on the spot, others bought at a junk yard, all held together in whatever fashion seemed to work. So he reached for nature, for the organic in which all parts are interrelated in a self-sustaining system. But this more attractive model was necessarily 'useless'. That which is naturally self-sustaining does not promote the revolution.

Eisenstein's basic problem can be traced to his anti-synesthetic conception of art which was geared to creating a homeostatic cybernetic system aimed at directing and controlling a national consciousness. To achieve this goal he had to control and limit the process of semiosis according to ideological constraints. He misunderstood the nature of the semiotics that he had developed for he incorrectly assumed an unchanging relationship between the signifier and signified, and the rider that this connection must always be mediated by the interpretant. He also lacked a sufficient understanding of cybernetics: for this discipline takes the view that the structure of a machine or organism is an index of the performance that may be expected of it.

Wiener (1954, p.57) provides an example of an ant whose behaviour can be attributed more to instinct than to intelligence. He states that this organism is a type of computing machine whose instructions are all set forth in advance on tapes which have next to no feedback mechanism to see it through the uncertain future. It is this limited feedback property which restricts the usefulness of the ant physio-
ology. If for "tapes" one reads "genre" or "montage", the result is the same. The physical straitjacket in which the insect (or film-goer) grows up is directly responsible for the mental or psychological straitjacket which regulates the ant (or spectator's) pattern of behaviour and his ability to decode and effectively use new information.

In other words, the biological nature of the organism doomed the use of this variable to failure from the start. An organism is not a machine to get a job done; neither is art. Any attempt to preestylize an unstylized reality is a subversion of the notion of art.

In summary, the image directors were primarily concerned with the effect on the viewer's emotions. Through the content of image and the resources of montage, film makers had at their disposal a sophisticated arsenal of means whereby they could impose their interpretation of an event on a spectator (Bazin, 1967, p.26) who was allowed no freedom of association. Eisenstein in particular, did not want the spectator to evaluate for himself - he was told how to react by means of a visual code: "A work of art, understood dynamically, is just this process (shock montage) of arranging images and feelings in the mind of the spectator" (Eisenstein, 1942, p.17). Montage as used by Eisenstein did not present the event, it alluded to it while the significance of the film is in the ordering of these elements rather than their objective content. The Russian film maker created an absolute through the deployment of montage. He attempted to conform nature to his own conceptual structures and his perception of reality as defined by the Bolsheviks. Montage cinema cannot then be synaesthetic cinema.

Relation to the Real Theory: The Reality Directors

The work of Eisenstein and his colleagues must be studied in relation to developments in America and Germany. Directors like Robert Flaherty, Erich von Stroheim and FW Murnau concentrated on the documentary strengths of film and developed the style initiated by DW Griffith. This group of directors was identified by Andre Bazin (1967, p.II2) who talked of cinema
being "the art of the real" and "that realism of space without which moving pictures do not constitute cinema". Film was argued to be an art because the camera captures the visual and spatial realisms that the physicist measures. Further, this "... image of the world is formed automatically without the creative intervention of man" (Bazin, I967, p.138). Although the camera captures the physicists notion of reality the realism of cinema is based on a psychologist's notion of reality. We look at a film as we look at reality because we know that it was recorded mechanically. Whether it looks real or not does not really matter: "We are forced to accept as real the existence of the object reproduced" (Bazin, I967, p.13). Bazin acknowledged that reality per se could never appear on the screen, "If what we see depicted had really been the truth, successfully created in front of the camera, the film would cease to exist because it would cease, by the same token to be a myth" (see Youngblood, I970, p.106). He therefore borrowed a term from geometry, "asymtote of reality" to bridge the gap between reality and film. Éric Rohmer (I938, p.36) later redefined this concept as the "objectivity axiom". Axioms are like assumptions, they cannot be proved or disproved. Once accepted, they serve as a foundation from which a system of thought can be derived. A film in Bazin's terms then, is a tracing of reality, a kind of a priori reality, always approximating reality and constantly dependent on it (Bazin, I967, pp.9-16). Films made in this mode had no use for montage. Their objective was not to create or impose a reality, but to explore dramatic space to reveal a deeper structure of reality and to identify preexisting relations (Bazin, I967, p.27). Bazin(I967, p.27) commented that the camera cannot see everything at once but it makes sure not to lose any part of what it chooses to see". Quoting von Stroheim's work as an example, Bazin (I967, p.27) writes:

In his films reality lays itself bare like a suspect confessing under the relentless examination of the commissioner of police. He has one simple rule for direction. Take a close look at the world, keep on doing so, and in the end it will lay bare for you all its cruelty and ugliness. One could easily
imagine as a matter of fact a film by Stroheim composed of a single shot as long-lasting and as close-up as you like.

Bazin's theory is based on a preference for natural signs and indices. In other words, he developed an aesthetic which was founded on the indexical characteristics of the photographic image. In his paradigm the film image models itself after the patterns of nature and is existentially linked to the objects it depicts. This approach has as its objective a cinematic style which does not try to explain or mould nature in terms of its own interpreting structure. In Youngblood's terms, this type of film making does not "wrest order from chaos" but rejects the absolute nature of montage and substitutes a synaesthetic cinema which realizes that chaos is order on another level. The films of Rossellini and de Sica, for example, reflect a faithfulness to nature and add a dimension to the revelation of reality. The camera has attempted to discover the rules of structure by which nature has achieved order and in so doing has reflected reality, or as Bazin describes Rossellini's Open City, "This is the way things are". Of Flaherty Bazin (1967, p.27) comments:

What matters to Flaherty, confronted with Nanook hunting the seal, is the relation between Nanook and the animal; the actual length of the waiting period. Montage could suggest the time involved. Flaherty however confines himself to showing the actual waiting period; the length of the hunt is is the very substance of the image, its true object.

The films of the reality directors represent the beginnings of synaesthetic cinema which entails a recognition of the process of perception and an expansion, not control, of human consciousness. That is to say, unlike montage which controls the reaction of the interpreter and hence the nature of the interpretant, this kind of movie is open-ended and allows for undelineated interpretive association. Synaesthetic cinema transcends the constraints of genre.
conventions, is synergetic and consequently negentropic. Synaesthetic cinema is, according to Youngblood (1970, p.81):

... a space-time continuum. It is neither subjective, objective, nor nonobjective, but rather all of these combined: that is to say extra-objective.

Synaesthetic cinema makes possible the ability to move beyond the objective human condition into newer extra-objective territory. Within this paradigm reality stands for "relations" and cinema "the art of relations", that is, the relation of information within the film and the relation that exists between the film and the spectator where it is fused by the act of perception. Non-object art, for example, expresses the relations of energy, while the accuracy of the relations expressed depends on the degree of consciousness of the artist. That is to say, the extra-objective condition is tied to concepts of reality and the artist's representation of reality. In synaesthetic cinema reality is not necessarily rendered in terms of conventional notions of time, space or dimension. The slit-scan corridor sequence in 2001: A Space Odyssey could, for example, encompass an entire life-time or merely a split second in the consciousness of the space capsule pilot. The reality presented to him transcended solid objective phenomena which were subsumed into a systemic reality of viscous interacting, inter-penetrating polymodal forms and colours creating dynamic forces which exist beyond the normal field of perception. The non-material cosmo-psychological movement generated a system of visual and auditory relations interacting with the consciousness of the viewer to produce a unity of synergetic, synaesthetic syncretism. In 2001: A Space Odyssey, the notion of reality transcends even the social and natural realm and becomes the art of relations.

One of the problems of both Eisenstein's and Bazin's theories is that although the real is the starting point for both theories, neither attempts to define the real or develop any doctrine of the real. Although both theories are therefore built on an unknown foundation, both are clear
with regard to cinema's relation to the real. Eisenstein's part-whole theory goes beyond the real in that the smaller unit, the shot, is explained in terms of the larger, the whole film. Having begun with the real in the first place Eisenstein had to break with the real in order for film to become art. For relation to the real Eisenstein substitutes montage.

In contrast, in Bazin's theory the real is not transcended since he maintains that film art is achieved in the shot itself. Unlike Eisenstein therefore, Bazin does not have to break with the real in the name of art.

**Reality and Synergy**

If we accept Eisenstein's contention that the smaller unit (the shot) is to be seen in relation to the larger, and that by inference his theory goes beyond the real and represents "a creation", then we must accept that the whole is greater than the sum of its parts. Unlike the montage-as-linkage postulates of Kuleshov and Pudovkin, the notion of a creation is an intrinsic element in Eisenstein's montage-as-collision theory. Eisenstein (1942, p 18).

The juxtaposition of two separate shots by splicing them together resembles not so much a simple sum of one shot plus another shot - as it does a creation. It resembles a creation rather than the sum of its parts - from the circumstance that in every such juxtaposition the result is qualitatively distinguishable from each component element viewed separately.

Eisenstein treated the human mind as a kind of psychological machine which was fuelled and energized by a conscious mental leap on the part of the viewer in deriving meaning from the juxtaposition of opposing ideas or shocks represented in montage-pieces. The synthesis of these opposites in the mind of the spectator was effected through his resolution of the tensions with which he was confronted in terms of plot, plot, characterization, lighting, editing etc. Disparate
montage-meaning unified by the spectator created dramatic meaning, "a feeling for the whole", or "total experience" or "the quality of totals", which describe a notion which is at a higher level than montage, just as montage operates on a higher plane than the attractions it juxtaposed. Although the interactions between art, nature, industry and spectator have combined through montage to produce a message whose existence is greater than the sum of the contributions of its separate parts, montage cinema is essentially anti-synergetic because this form of editing deunifies reality according to the existing perception of phenomena and reels it off into separate pieces. It then seeks to reunify the recorded images to use them as signs to facilitate a process Eisenstein (I963, p.47) calls "...a dynamization of the inertia of perception" which changes "'the traditional view' into a new one".

The difference between dramatic narrative linear cinema and Eisenstein's films is that although in both cases meaning is a consequence of pre-conditioned expectations already existing in the mind of the viewer, Eisenstein nevertheless managed to force his spectators to take an active rather than a passive role. This he did by forcing the viewer "... to traverse the road of creation the author traversed in creating the image" (Eisenstein, I963, p.28). The information that Eisenstein imparted, at least during the early stages of the Revolution, continually revealed new ideological aspects of the spectator's relationship with his circumambient environment and refined his perception of the new recreated realities which was then fed back into his environment interlinking with other aspects of his increasingly socialized culture. The film maker utilized this transfer of energy by creating even more refined messages in film. This cybernetic process continued until the technique, montage, stagnated and was unable to refine or enhance the film maker's messages any further. The conceptual design of the Russian film machine determined the quantity and variety of information that the viewer was likely to derive from it. Since the amount of infor-
mation transmitted by a system is directly proportional to the universe of available options, we can conclude that the various levels and categories of montage, which are exhaustive, work to restrict choice, information, new code formation, and consequently, signification.

In other words, the film machine functions as a homeostatic system which is fuelled by attractions (the juxtaposition of individual shots) which exchange information with the larger system (the film montage) in order to develop a higher order of dramatic understanding which directs the viewer's consciousness toward a predetermined interpretation of an event (Fig.I2).

The reality directors followed a different growth-inducing path. Despite the purely revelatory purpose of their films, their conformance to the basic conditions of synaesthesia, a resistance to codification and high rates of redundancy, and their adherence to the open-ended objectives of synergy, these movies laid the foundation of an extra-objective cinema unrestricted by the mental programmes or ideological preconceptions of the director. As such they were susceptible to syncretic mutation on the most sensitive level of perception. Thus, synaesthetic cinema cannot reel the world off in little fragments because it is not concerned with the objective world, but rather with the extra-objective world. An example of a purer more advanced conception of synaesthetic cinema can be found in the electrovideographic images of Jordan Belson. According to Youngblood (1970, pp.158-159) he regards his films not as exterior entities, but literally extensions of his own consciousness. Belson (Youngblood, I970, p.159), who consistently refers to Jung's philosophy and psychology, says, "I first have to see the images somewhere... I mean I don't make them up". Of Allures completed in I96I, he writes:

I think of Allures as a combination of molecular structures and astronomical events mixed with subjective phenomena - all happening simultaneously. The beginning is almost purely sensual, the
Figure I2: Homeostatic system

Output disturbances no allowance for disturbances

Attracted emotional and psychological response

Predictable performance

Sensory mechanisms

Input

Output

The

Montage

Tactile

Visual

Tactile deviate

Deviant rect cor action

Desired

Goal

Correction

Prefer
end perhaps totally nonmaterial. It seems to move from matter to spirit in some way.

This kind of film is an attempt to break through man-made models and representations of reality which tend to limit the size, complexity and accessibility of the universe perceived. Synaesthetic cinema transcends the notion of reality which is no longer expressed in terms of a concrete representation of objects, things and beings, but is rather expressed in terms of the meeting point between inner and outer reality. This kind of relation-consciousness cinema invokes Siff's Communications Relativity Principle where the viewer is aware of the process of his own perception and is able to invest the experience with meaning by exerting conscious control over the conversion of sight impressions into thought images (Youngblood, I970, III). Belson's film, Re-Entry (I964) describes this concept exactly:

Re-Entry is chiefly informed by two specific sources: John Glenn's first space trip, and the philosophical concept of the Bardo, as set forth in the ancient Bardo Thodal ... According to Jung, Bardo existence is rather like a state of limbo, symbolically described as an intermediate state of forty-nine days between death and rebirth. The Bardo is divided into three states: the first, called Chikai Bardo, describes the psychic happenings at the moment of death; the second, or Chonyid Bardo, deals with the dream state that supervenes immediately after death, and with what are called karmic illusions; the third part, or Sidpa Bardo, concerns the onset of the birth instinct and of prenatal events. (Youngblood, I970, p.I63; see Evans-Wentz, I960).

Belson aligns the three stages of the Bardo with the three stages of space flight: leaving the earth's atmosphere (death), moving through deep space (karmic illusions), and re-entry into the earth's atmosphere (re-birth).

Einstein's theory of relativity reduces everything to relations; it emphasizes structure, not material. Cinema is the art of relations. Synaesthetic cinema is a space-
time continuum: it rejects absolutes such as montage-as-collision or montage-as-linkage. Although made up of discrete elements, synaesthetic cinema is conceived and edited as a single continuous perceptual experience. It has nothing in common with the postulates of Gestalt psychology according to which the viewer must make an either/or choice. This form of cinema is synergetic: the content of the film's message deals with the relationship between its parts, and when structure and content are synonomous, all elements are equally significant. (Youngblood, 1970, p.85). Dramatic narrative and a linear sequential time flow contain a low value of equi-probability and have little in common with general relativity theory. As Einstein has stated, "The separation between past, present and future has only the meaning of an illusion, albeit a tenacious one" (see Jung, 1974).

The language of the Hopi Indians reveals a verbal equivalent with Einstein's general relativity theory. Their language has no concept of past, present or future. Instead, they have terms which translate roughly as objective (manifest) or subjective (unmanifest). The 'objective' embraces all objects and events that are or have been accessible to the senses, and which therefore includes past and present. The 'subjective' refers to all events that appear in the mind, of which the future is only a part (Payne, 1973, p.108). Moreover, the Hopi's believe that each creature possesses its own reference system. Experience of any event, therefore, is relative to the consciousness of the observing creature, a concept which is closely analogous to Eisenstein's relativity theory. This model is able to involve both and analogical relationships found in multiple superimposition used by, for example, Stan Brakhage in Dog Star Man (1964).

The conventional use of superimposition where A is superimposed over B to produce AB where A then fades as C fades in and so on, a digital sequence, is replaced with an analogical "present manifesting" space-time continuum. This becomes apparent if shots A, B and C occurring simultaneously project the same image, but from slightly different perspectives, or with varied inflections of tone and colour.
According to Youngblood (1970, p.87), it is through this process that a synaesthetic film becomes one image constantly manifesting. Dog Star Man is divided into Prelude and Parts One to Four. Prelude offers a fast collage of multiple superimpositions and combined images which flow out of a fuzzy translucent vapour and slowly coagulate and take form, only to be obscured by yet other images and counter-motions. Part I uses superimpositions more economically, giving more attention to the interface relationship between individual shots. Any suspicion of montage is rigorously eliminated as the individual shots slowly fade in and out into different colours. The result is a totality of consciousness, a mosaic simultaneity of the present manifesting. The single figure which climbs the snow embraced mountain is superimposed with images of the human environment ranging from the micro-spectrum of the bloodstream to the larger macro-spectrum of the sun, moon and universe. This total experience subsumes both time and space into a single cognition which goes way beyond Eisenstein's concept of parallel montage which indicates simultaneous but geographically separate events. Such spatially or temporally disparate dimensions do not exist in consciousness.

In Dog Star Man, Brakhage is attempting to transgress the finite, to examine the world of relation-consciousness, of an extra-objective reality, the notion of universal unity and cosmic simultaneity. The implications of this quest are expressed in the following passage:

Imagine an eye unruled by man-made laws of perspective, an eye unprejudiced by compositional logic, an eye which must know each object encountered in life through a new adventure of perception. Imagine a world alive with incomprehensible objects and shimmering with an endless variety of movement and gradations of colour. Imagine a world before the beginning was the word. (Brakhage, quoted in Youngblood, 1970, p.91).

Such images as occur in Dog Star Man, Allures, Re-Entry and a host of other electrovideographic films are accountable for within the Peircean semiotic system. Despite his
Brakhage has stated that his films describe a world unencumbered and unstructured by linguistic models which distort and define reality. The implication is that de Saussure's linguistic paradigm is unable to satisfactorily account for these non-narrative images. Although Peirce (1.91) states that "Esthetics is the art of ideals, or that which is objectively admirable without any ulterior reason", his semiotic nevertheless offers an adequate paradigm to explain the sign system operative within the images created by electrovideographic artists. The reasons for this have already been dealt with. The next chapter will show that it is Peirce's semiotic rather than the de Saussurean semiology which is best able to deal with the questions raised by synaesthetic cinema.
CHAPTER 6

SOME FURTHER CONSIDERATIONS OF THE PEIRCEAN PARADIGM

This thesis has been concerned with the Peircean paradigm to the exclusion of the de Saussurean approach.

It has shown that the two are generically distinct and care should be taken when mixing them. Current literature abounds with this confusion between the two. The terms 'semiology' and 'semiotics' appear to have become inter-changeable with little heed being paid to their differing derivations. A more rigorous theoretical distinction must be made in studies which deal with the investigation of signs and sign systems. Some writers like Fiske and Hartley (1978) have taken the best of both paradigms and enriched their approach with salient tenets of newer paradigms like those offered by Barthes and others. Little attempt has been made to explicitly reconcile the differing theories, to identify their common bases and to see how the one relates to the other. Much discussion has occurred relating to the differences between Metz and Wollen. Few film studies, however, have been concerned with the wider implications of Peirce's ideas. Despite the initial impetus given by Wollen to the study of a semiotics of the cinema, little progress has occurred within this paradigm. The reasons for this may be traced to the rather superficial reading by Wollen of the work of Peirce as well as to the immense impact made by Metz in Europe with his semiological notions. Peirce's concepts have never been explored to the full by film semioticians and what references are made rarely proceed beyond a reiteration of his second trichotomy of sign, index and symbol. While later writers like Eco (1976) do incorporate the notion of interpretants in their theories, the application remains a general one with little attempt being made to assess the contributions of the subdivisions of immediate, dynamical and logical. Film semioticians seem to have ignored these sub-categories altogether. Indeed, few authors have addressed themselves to a study of the internal workings of Peirce's theory of signs or the components which govern the production of signs.
Instead there has occurred a preponderence of discussion towards the definitions of a macro-semiology or semiotic. Three approaches may be identified in current American and European film study – semiology or semiotics, the psychoanalytic, and a neo-Marxist based semiotic.

The first approach has formed the basis of this study. The second, the psychoanalytic, is an expanded semiology which goes beyond that which is uttered to study the act of uttering itself. This orientation has gained prominence through the later work of Metz (1965) supported by his French, English and American followers. It is based on Jaques Lacan’s interpretation of Freud’s theories. His central thesis concerns the unconscious. Unlike Jung, Lacan denies that the unconscious exists prior to language, that language is its precondition and content. This paradigm accepts de Saussurean semiology (see Wolheim, 1979, p.24), but contradicts Jung’s concept of the symbol which is linked to the pre-linguistic, possibly pre-human, layers of the unconscious. The postulates of Jung, therefore, have little affinity with a Lacan-based psychoanalysis (Wolheim, 1979, p.40). In contrast, the Peircean schema is able to incorporate Jung’s archetypal imagery with ease and has been shown to be able to account for many of the perceptual effects caused by neurophysiological determinants.

The third major semiotic approach is a neo-Marxist one which sees films as signs which stand for known or knowable underlying processes which are of a material or economic nature. This school insists that the work of de Saussure, Jakobson and the whole structuralist and aesthetic semiology is limited. They propose instead that the problem of the relation between subject and signifier can only be resolved by resorting to a historical materialism that integrates the scientific revolution inaugurated by Freud and psychoanalysis (Screen, 1975). This approach views the early work of Metz and "classical semiotics" with great suspicion.

Fredericksen (1979) states that the first of these approaches is instanced by the works of Peter Wollen (1969), Metz (1974a, 1974b), Gianfranco Bettettini (1968) and Jurij
Lotman (1976). He does acknowledge that the objectives that these authors follow are not identical and that with the exception of Wollen, they have progressed under the influence of de Saussure and contemporary linguistics.

The question of meaning in the semiological paradigm has moved, under the guidance of these authors, from what Lotman (1976) calls the "semantics" of the film sign to the sign's place and function within de Saussure's thesis that meaning is essentially generated by differences within a system. For example, the English words "cat" and "rat" partially derive their meaning from the fact that "c" and "r" are different elements of a paradigmatic set to which "at" may be attached. Lotman (1976, p.31) applies this process to film and assesses its significance for the syntagmatic elements of the film meaning as follows:

Every image on the screen is a sign, that is, it has meaning, it carries information. This meaning, however, can be of two kinds. On the one hand, images on the screen reproduce some sorts of objects of the real world. A semantic relationship is established between these objects and the screen images. The objects become the meanings of the images reproduced on the screen. On the other hand, the images on the screen may be augmented by some additional, often totally unexpected meanings ... The first types of meanings are present in an individual frame or shot, while the second require a series of shots - a sequence. Only in a series of shots appearing one after the other can we discover the mechanisms of differences and similarities, thanks to which some secondary sign units emerge.

From this Fredericksen (1979, p.173) concludes that there is consequently little mention of signs per se in Metz's work emphasis falling rather on higher-order concepts such "message", "code", "text" and "system". Metz (1974b, p.207) has proceeded further than this and has gone so far as to attack the priority of the "sign" in semiological study:

The notion of the sign, in effect - even if one submits it to a healthy reduction in scope and if one confines it to the minimal sense which has been specified - has no right to play
a more important role in cinematic and filmic semiotics than in other areas of contemporary semiotics and linguistics. Without rejecting the notion of the sign as such, it must be realized that it only represents, today, one tool of research, and that it no longer enjoys the privileged and central status which it had with Saussure or Peirce; other notions have been shown to be just as important, and sometimes more so, for the concrete progress of analysis: generation or transformation, syntagm and paradigm, system and code, expression/content, form/matter/substance, etc. A system of signification is not only a system of signs; units larger or smaller than the sign play a considerable role in it; the 'level of the sign' should not be isolated from the others. This is one more reason ... for not linking the study of the distinctive units of the film to the exclusive search for the cinematic sign.

This reduction of the sign by Metz is consequent upon his more systemic approach and the need to identify smallest units, or semes (or phonemes in linguistics). This need results from Metz's conclusion that film does not have smallest units or minimum entities, that it is rather a medium of expression subject to ad hoc rules than a system of communication governed by rigid procedures. Metz (1974a, p.106) concludes that the laws of a film language call for statements within a narrative, and not monemes within a statement, or still less, phonemes within a moneme. He concludes that a shot is an assertion, a complex statement of undefined length (Metz, 1974a, pp.II5-II6). The shot is by definition more than one frame, its minimum segment is the syntagma, that is, more than one frame. To remove several frames from the shot, would be, to destroy the shot. (Metz, 1974a, p.106). Peirce, in contradiction is able to define his smallest unit precisely — it is measured by the phaneron. It corresponds to Metz's description of the shot-as-assertion in that it defines the collection of signs that are present to an interpreter at any given time. Phaneroscopy has a four-fold function: first, to describe the features of each of the classes of elements within the phaneron (i.e. firsts, seconds and thirds);
second, to show that each class is distinct, although they
cannot exist separately, and third to enumerate the principal
subdivisions of classes. The phaneron, however, is not predi-
cated solely upon the syntagmatic properties of the film image.
Unlike Metz's sequential approach where the minimum unit or
seme is an entire shot and which plays down the contribution
of the sign, in Peirce's semiotic the sign is afforded an im-
portance, a function and properties correlative of the intrinsic
structure of the phaneron itself. That is, the phaneron sub-
sumes both the sign and the code into its general structure as
well as other elements such as the general idea (or first) and
discrete sign-meanings (seconds). The phaneron is the smallest
entity, the seme. The seme is totally coherent within itself,
is not dependent on the syntagmatic axis and can therefore ap-
ply to the individual frame or simultaneously across a se-
quence of frames. The image within the frame can be single or
of multiple superimpositions. Two points arise from this con-
cclusion: first, the phaneron covers anything that appears to
mind and accounts not only for verifiable experiences, but al-
so dreams, fictions, misapprehensions and fantastical situations.
Further, it can include representations of extra-objective
reality, relation-consciousness etc.: in short, anything that
comes to mind. Second, the phaneron is the collective total
of what is present to the mind at a specific moment. Peirce,
however, does not set limits to the borders of the phaneron,
its beginning and end in time. One may conclude that Peirce
is concerned with that which is present to the mind rather
than with the distinct parts of what is present. That which
is present is conditional upon the collectivity of signs,
their triadic interaction and their relationship to the central
idea of the phaneron, the relative autonomies contained within
it and the method of their connection. In other words, a sym-
biotic relationship exists between signs and codes, the one
cannot be downgraded at the expense of the other as Metz has
suggested for his semiology.

Fredericksen (1979, p.173) concludes that Metz's ...
privileging of the 'systemic' over the 'semantic' is one
reason Jung's 'symbol' (and his sign) occupies no space in
contemporary film semiotics". The implications for semiotics
are outlined by Fredericksen (1979, p.173):
His (Jung's) definitions of sign and symbol turn on the character of the semantic tie — known "standing for" known versus known "standing for" relatively unknown ... Where the character of semantic ties is not given much attention, concern for differentiating criteria — and for the different kinds of ties — will not occur. (We should note that Jung is not the only victim here. Peirce, who in this respect is similar to Jung, is likewise precluded from a central role in film semiotics as it is now developing, notwithstanding Wollen and Armes's attempts to use his index, icon and symbol typography for theoretical and historical analyses).

Here it is necessary to digress slightly and deal with Harman's (1977) attack on both Metz and Wollen. Harman maintains that the Metz/Wollen definition of the code is similar and that any sort of system or structure might be called a code. He accuses Metz and Wollen of cheating because their usage of the term disguises the fact that much of aesthetics and criticism is properly concerned with something other than the significance of signs. The example offered is that of instrumental music which Harman claims is not a language or a system of signs because it does not represent or signify anything. He does acknowledge that an understanding of musical structure plays a role in the appreciation of musical interpretation. This attack on Metz and Wollen is devoid of an understanding of the process of perception, Wiener's concept of semantic significance or the role of interpretants in sign recognition. Thus, while the individual signs may not be consciously identified or even known to the recipient, he nevertheless, as an interpreter, automatically produces an interpretant, the idea to which the sign gives rise. This idea may be as vague as a first or as specific as a second. The code in the Peircean construct is governed by his conception of thirds, the mode of relations by which messages can be composed. Film music, for example, is designed to signify moods through a feed-forward linkage where alternatives are worked out in advance of the image. While Metz's schema has no place for the notion of interpretants, his definition of a code is very
clear: it is a method of formalization existing as unified fields of commutation (Metz, I974b, pp.28-29). By ignoring the perceptual process, and how it is accounted for in either format, Harman (I977, pp.23-23) has incorrectly concluded that "... neither Metz nor Wollen has given any reason at all for identifying film theory with semiotics". His further statement that "The theory of signs, in Peirce's sense, contains no laws or general principles; at best it contains a few categories of classification" (Harman, I977, p.24) is to totally disregard the cultural basis of communication which is determined by the category of thirdness. Harman's argument in reductionist for Peirce has basically supplied a means of explanation, a method of analysis, a schemata with great potential for development.

Further semantic issues relating to film semiotics may be found under discussions dealing with Metz's writings on "impressions of reality" and connotation. Metz, by taking into consideration only that Bazinian cinema which permitted the event to be reproduced with a minimum of cinematic mediation, was able to conclude that film was not a language because it lacked true signs. Metz (I974a, pp.74-75) states:

The image is first and always an image. In its perceptual literalness it reproduces the signified spectacle whose signifier it is; and thus it becomes what it shows, to the extent that it does not have to signify it.

Elsewhere, referring to Eisenstein's films, Metz (I974a, p.37) writes:

Eisenstein never shows us the course of real events, but always, as he says, the course of real events refracted through an ideological point of view, entirely thought out, signifying from beginning to end. Meaning is not sufficient; there must also be signification... from the point of view of the means of expression, one can distinguish between the "natural" meaning of things and beings (which is continuous, total, and without distinct signifiers: the expression of joy on the face of a child) and determined signification.
Bazin equates the language of film with film aesthetics. This approach, followed by Metz, is founded upon the indexical characteristics of the photographic image where the cinema is seen to reveal, not to signify. This theory relies on natural signs in preference to symbolism and styles rather than codes. Rossellini is said to have stated "Things are. Why manipulate them?" This position is supported by Passolini (1965) who argues that film is stylistic before it is grammatical. Alexandre Astruc (1949) avers that his film "vocabulary" consists of the mien of things, "... the impasto of the world". Marcel Martin (1955) writes that film does not contain a strict system of signs, while Merlin-Ponty's phenomenological perspective holds that a sequence of film, like the spectacle of life, carries meaning within itself (Metz, 1974a, p.42). In other words, the film image models itself after the patterns of photographic reality and is existentially linked to the objects it depicts. A pure cinema would therefore portray a perfect illusion of reality.

The belief that film can exist without distinct signifiers is an obviously dyadically derived de Saussurean semiology which excludes the role of the interpreter. Where images exist independently of an interpreting mind they cannot be identified, but as soon as they are perceived by an interpreter, they become signs. The sign cannot be short-circuited - the signifier and signified are not separate in film.

In contrast to Metz, Peirce rejects the idea of intuitive or perceptual knowledge. There is no direct awareness of things-in-themselves. All knowledge is a product of signs. One sign involves other signs in an infinite regression in which there is no first sign, no initial cognition (Murphey, 1961, pp.106-179). By definition then our perceptual environment is a world of representations. This world is determined by Peirce's triadic relative where the object is something with which the interpreter is already familiar, as Peirce (2.231) states, "... that with which it (the sign) presupposes an acquaintance in order to convey some further information concerning it". This definition allows Peirce to include the phenomena of "natural signs" in his semiotic. In other words, natural events, such as clouds, whose chief
object is not communication but which can be "read" as indexical signs fall into the category of "natural". Peirce (2.274) offers an example of a sunflower:

Thus, if a sunflower, in turning toward the sun, becomes by that very act fully capable without further condition, of reproducing a sunflower which turns in precisely corresponding ways toward the sun, and of doing so with the same reproductive power, the sunflower would become a Representaman of the sun. But thought is the chief, if not only mode of representation.

Perception is the key to interpretation. If the sunflower produces an interpretant in someone's mind which stands for an object (the sun), with which the interpreter is already familiar, then the sunflower is a sign.

The later work of Metz, influenced by Eco's postulate that all images are coded, revised his tenet that "natural" images do not signify. James (1978, pp.390-391), commenting on the nature of this revision, points out that three important conclusions follow from Metz's supposition of an analogical relation between filmic signifiers and their signifieds, together with the assumption that the smallest unit of discourse is the shot. These are firstly, that film is poor in paradigms (see Metz, 1974a, pp.69-70); secondly, it must therefore look to the wealthier syntagmatic axis for the arrangement of shots, what Metz calls the Grande Syntagmatique. This basically combinatory orientation constrained Metz to a study of moving images, a syntactical grammar, a language system which could not be extended to a general theory because of its absolutist adherence to narrativity. Penley (1975, p.19), for example, has noted that "Christian Metz likes feature-length, fictional, narrative, dramatic films: everything else goes into the set of not-cinema". Thirdly, (Metz, 1974a, p.96) acknowledged that "The semiotics of cinema can be conceived of either as a semiotics of connotation or as a semiotics of denotation". Film is unique in this respect for in any traditional work of art, the world that is represented (the denoted) never constitutes a major
part of what the author is communicating. In non-representational art, such as music, it is even missing. When present in literature, it function is merely to introduce the expressed world - the connotative level. In cinema the connotative is linked to the denotative. Metz, however, opted for the latter, arguing that "The properly aesthetic orderings and constraints ... framing, camera movements, and lighting effects ... serve as the connoted instance, which is superimposed over the denoted meaning" (Metz, 1974a, p.96). This orientation effectively excludes the symbolic, the triadic relative, if not the whole second trichotomy. The condition necessarily constrains Metz's analysis to the level of the dynamical object, the degenerate sign. The further implication is that Metz reinforces his emphasis on the reality reproduced, on the signified rather than the signifier. James (1978, p.391) concludes:

The entire web of Metz's methodology is then fundamentally counter to experimental cinema (specifically the montage cinema of Eisenstein) and in fact, as Sam Rohdie points out, by its programmatic definition unable to accommodate texts which "move against the dominant codes, refuse any attempt to be absorbed (into the dominant textual systems)".

Metz's paradigm cannot therefore account for the abstract and symbolic images created by revolutionary film makers or electrovideographic artists. Metz thus constrains choice to within the limits set by his system, a reality based semiology. In contrast Peirce can account for a cinema of relations, a synaesthetic rendition of non-object images existing beyond the realm of an ordinary physical, solid-object based existential reality. The creators of such films have little to do with narrativity and are as concerned with the notion of equivalence, the vertical poetic axis of selection which is rich and symbolic in connotated overtones increasingly made more sophisticated by improvements in technology, as they are with the build up of sequence, or the Grande Syntagmatique.
In contrast to Metz, Peirce's formulation is able to take the interpreter well beyond mere denotation into the realm of connotation which is simultaneously iconic or motivated, indexical and symbolic. The process of unlimited semiosis allows the symbolic relation between the signifier and signified to progress ad infinitum. This is characterized by a system of high-value equi-probability in which the interprets produced are measured in terms of negentropy. These interprets represent audience response and measure changes in the film-audience-society system. This in turn causes changes of the system, that is, the genre or film structure, its probability level and its semiotic components which are ordered to a content. Metz's construct is unable to account for this process and perforce remains an essentially synchronic as opposed to the more dynamic diachronic Peircean system. Signs, even "natural signs" which have a potential for signification, as in the Peircean schema, have recourse to the final interpretant and the choices available in a high value equi-probable system. New signs and codes can be produced, new relationships between the signifier and their signifieds can be established. This signified can be of a subjective, interior order of reality. James (1978, p.391), referring to the works of the Independent film makers of the I950's and early I960's concludes:

Such a cinema, in which the continuity of illusionist narrative was variously aborted in the interests of greater expressive flexibility, and in which the metonymic reproduction of external space was sub-ordinated to the metaphoric investigation of interior space, was hardly accessible to Metz's procedures. Criticism of it was obliged to discover its frame of reference elsewhere.

James goes on to discuss the relevance of structural film analyses and Wollen's Peircean corrective. He does not, however, follow this through and fails to note the importance of the Peircean paradigm and its ability to subsume all of the above mentioned problems under its wing.

Unlike Metz's semiology, Peirce's semiotic is not media
specific, and can apply itself across the entire range of visual communications media encompassing both intentional and non-intentional signs. His construct is therefore totally universal and far more adaptable than a semiology based on structural linguistics. Further, it can account for the idiosyncratic nature of individual perception while simultaneously providing a means of examining universal tendencies of signs and the logical universe for interpreting the meaning of film and other media content.

An example of this process relates to the metaphorical/metonymic distinction. This, of course, has to do with connotation and the workings of the triadic relative. Linda Williams (1976-77, p.24) conceptualizes metaphor and metonymy as follows:

... out of Jakobson's binary division Metz develops a four-part rhetorico-linguistic classification consisting of metaphors placed in syntagm ('my love, my flame'), metaphors placed in paradigm ('my flame...'), metonymies placed in syntagm ('one hundred ships, one hundred sails...'), and metonymies placed in paradigm ('one hundred sails...').

The problem is to distinguish between the icon and the metaphor and the index and the metonym. Signs in film are both diagnostic (self-referring) and extra-diagnostic (referring to the object). That is, the sign can refer to familiar objects outside the film as well as objects with which the viewer has become familiar within the film. In each case the sign remains iconic, indexical, symbolic or a mixture of all three. But if two symbols are determined to have an iconic relation, such as the energy-wave forms of electrophotographic artists, or if two icons are determined to have a symbolic relation, like the preening peacock and the egocentric Kerenky in Eisenstein's October, then the result is a metaphor. Alternatively, if two symbols are designed to have an indexical relation, such as Dracula's shadow warded off by a cross, or two indices have a symbolic relation, such as shots of the barren island in Antonioni's L'Avventura, the result is a metonym.
One of the effects of synaesthetic cinema is to break the hold that the medium has over the viewer. By removing the experience from past conditioning or convention, a movie like Dog Star Man is able to develop its own syntactical meaning where the semantics of any given image may vary or change in the context of different sequences. This alteration in meanings is brought about by extending the capacity of the paradigmatic axis. This dimension plays a significant role in that it refers to relations between present and absent units. That is the greater the number of possible alternatives to choose from, the more subtle and pertinent may be the choice of unit to feed into the syntagma, thus affecting nuance and enriching connotation. In addition, the use of multiple superimpositions as used by, for example, Stan Brakhage, introduces a new element which greatly complicates the paradigmatic axis. In conventional narrative cinema, this axis operates on a digital either/or basis. The use of multiple interacting superimpositions, however, injects additional seconds which occur simultaneously within the same frame. This serves to transform the digital basis of computation to an analogical one. To meet this change of internal structure, the paradigmatic axis must be redefined to refer to relations not only between present and absent units, but also to an unspecified number of simultaneous presents (or seconds). This enriches the semantic dimension of the paradigmatic axis while the syntagmatic axis or thirdness acts as a mode of relation between not only different images, but also diverse aspects of the same image (Fig.I2). This redefinition is crucial if semiotics is to begin to account for non-narrative, extra-objective cinema. The result in cybernetic terms is an extremely high value equi-probable system.

Peirce's major interest concerns the role of the symbol. He has structured his theory in such a way as to make the interpreter an intrinsic component through the application of the triadic relative. Thus, interpretation is both socially and culturally bound. 'Social' describes patterns of human activity, and 'culture' refers to patterns of belief, values and ideas, as well as the artifacts (eg. film) in
which they may be embedded. These elements coalesce into a behaviour pattern called performance. Separate performances combine into a syncretic form of communication termed social discourse. This involves a synergetic process by which man studies himself through the media (e.g. film, television, theatre etc.). An important characteristic of synergy is the working together of agents in such a fashion that they potentiate each other's actions (Esser, 1974, p.345). In other words, participants in synergetic activities like film making are not only willing to experience another's point of view or to feel each other's emotions, but also to act each other's roles (Esser, 1974, p.351). This study has argued that in transmission, reception and response, film and other media operate in an obvious social context. This paradigm may be extended to include the metonymic relation of the image of the world as a stage: teatrum mundi, of people as actors, assuming and discarding different roles, and of the world of social reality being a play contrived by higher forces. The application of linguistic constructs to theatre has resulted in the formulation of the dramatistic model, in which the metaphorical device of the world representing a stage or being like a stage, is replaced by the metonymic approach which states that the world is a
stage (van Zyl, 1977). Youngblood, (1970, p.78) goes so far as to state that "The world's not a stage, its a TV documentary", and through the medium of television, man is in direct contact with the human condition, and therefore the need to represent it through art falls away. Van Zyl (1977, p.37) argues, therefore, that social reality, as a system of social discourse, can be analysed by seeing it as a teatrum mundi with the concommitant references to such terms as "act", "seem", "character", "performance" and "role". Regarding Hitler as the villain of Europe, speaking about the last act of Stalingrad, and the performance of the troops in the theatre of war is derived from an interpreting structure which perceives events as part of a larger syncretic structure. This interpretation is derived from a structuralist viewpoint. Semiotics presupposes structuralism since it is itself a study of signs and relations (or codes) within the system. The boundary between acting and being one's self (reality) blur as the two actions merge into one. Reality and performance become indivisible and the resulting coalescence is electronically punctuated by cathode ray tubes and other forms of communications technology. This process is accounted for by Shapiro's (1970) concept of the "universal semiotic of technological experience". Van Zyl (1977) finds a parallel to this notion in the dramatistic model. He cites Ingmar Bergman's Persona (1966) as an example:

In this film Bergman has the tragic actress Medea lapse into silence in the face of the unstructured (but mediated by technology) tragedy of the television film of the Buddhist monk immolating himself, or the photograph of the little Jewish boy raising his hands in surrender in the Warsaw ghetto. Bergman reminds us, and himself, that technology can render the performances of social life so directly that the traditional form/content or artist/craftsman opposition no longer holds true. The burning Buddhist monk enacts the ultimate role, death, repeatedly as the film is shown repeatedly to an audience that was not even present at the moment of death... Youngblood says that life is no longer a stage, but Bergman would say that life is both a stage and a television documentary (van Zyl, 1977, p.38).
In this film, technology unifies being and performance into one syncretic act where the part becomes the whole. The universal semiotic of technological experience offers almost the same immediacy as if they were actually there. They are themselves part of the performance. Van Zyl (1977, p.39) concludes:

In cinema-verite the characters play themselves and enact their lives before the camera. They create and are created; they all stand in metonymic relation to the completed part. Film and television technology increasingly emphasizes the part-whole relationship of metonymy, as well as the decreasing significance of the either/or alternatives of art/life.

Another example is City-Scape. The viewer becomes participant, decision-maker, and through the mediation of technology is able to semiotize his environment. The viewer as decision-maker is able to pre-experience alternative futures free of past conditioning, of homeostasis, of a new world gaining on reality. Designer Peter Kamnitzer states, "The on-line experience, the sense of power sitting at the controls, is something very hard to describe. You are turned on. You are involved" (Youngblood, 1970, p.254).

While City-Scape is essentially metonymic in character, the images of the electrovideographic artists are both metonymic and metaphoric. Their cosmic cinema remains primarily metaphorical in function, but at the same time bring the spectator closer to forms that constitute the subconscious. This is facilitated through technology which becomes a form of sense-experience. This kind of experience is dependent on and is mediated by technology.

These images are both metaphorical and metonymic because they account for phenomena beyond the normal object-bound field of vision (molecular reality), where the creation, (the part) stands for the whole. This style of synaesthetic cinema is one of the rare occasions when both metaphorical and metonymic meanings coincide. This contiguity erodes not only boundaries between art and life, but also the distinction between performer and audience and beauty and
function. The participant stands in metonymic relation to the experience he enacts. The metaphoric function places the viewer and connects him to the visual context of the wider experience.

This model contains an apparent contradiction for it mixes the digital and the analogical. The parallel relationship between the metonymic/paradigmatic, and the metaphoric/syntagmatic (i.e. between the analogical and digital), is resolved at a higher level through the participation of the interpreter. That is, whether the image is interpreted as metaphor or metonymy or both is dependent upon the perception of the interpreter. If the interpretant produced proceeds to the final immediate, that which is familiar, then the interpreter will perceive a metonymic relationship. If, however, the interpretant produced subsists in the dynamical category and proceeds no further than the ultimate logical, the image will be perceived as metaphorical only. Metonymy is therefore dependent upon interpretant production, the triadic relative and exists solely in the eye of the beholder.
CONCLUSIONS

CHAPTER 7

Kindem (1979, p.65) has identified some unresolved semiotic problems which he lists in the following passage:

Semiotics is a descriptive science, not a predictive one. It can describe the probable sources of meaning in general, but it cannot predict what meaning will be conveyed in specific context by a specific sign for a specific individual. An understanding of the semiotic sources and possibilities of meaning based upon a semiotic, typological analysis can be of value to both the film maker and the film viewer, critic and theorist. A more complex model would be required to predict the probable reaction of a specific audience to a specific sign at a specific time and place, since this would involve all the social science factors (economics, ideology, psychology, etc.) which must be considered in any predictive model or theory of meaning in human culture.

A number of points arise out of this statement. First, while semiotics may presently be non-predictive in function, it is more than a purely descriptive science. As this thesis has shown, it is primarily explanatory in character, deductive and concerned with the ultimate state of things. As such, it should be concerned with prediction. The way Peirce's theory has been structured suggests that it has this capacity. Second, the more complex model that Kindem speaks of "to predict the probable reaction of a specific audience", has been outlined in the foregoing pages. The marriage of semiotics and cybernetics as evidenced in this study will meet the basic needs of Kindem's "more complex model". Cybernetics, it will be remembered, is the science of control and communication in a society.

This cybo-semiotic model would involve all the social science factors mentioned by Kindem. A major concern of this paradigm would encompass the study of the socio-semiotic of performance. This study has argued that concepts of reality
are ultimately reducible to a system of signs through which representations of reality are produced. Such representations are culturally bound and human activity occurs within the borders defined by a system of signs. The resultant behaviour is categorized as performance which exists as a continuum interlinking art and life. Discrete performances coalesce into a syncretic mutation termed social discourse. Humanity perceives and relates to its world through a process called cognition. The Communications Relativity Principle sets out the relationship which exists between the observed and the observer at the moment of observation. Cognition and perception of an event is subordinate to this principle. In motion pictures, synaesthetic cinema comes closest to approximating this paradigm. Synaesthetic cinema is the art of relations. The structure of these relations falls into the theoretical domain of the structuralist while the signs existing within the system of relations are studied by the semiotician. Semiotics shares with structuralism the fundamental supposition that culture can be understood and studied as recurring and potentially identifiable symbolic operations. A semiotics, however, which seeks only for laws and regularities will tend to operate in a cultural vacuum, much as a semiology of the cinema is doing under the guidance of Metz and his followers. In contrast, the basis of the notion of unlimited semiosis lies in its triadic structure which strongly implies the participation of cultural influences. In other words, a symbiotic relationship exists between semiotics and sociology. This interdependency may more correctly be labelled "socio-semiotics". This discipline holds a specific interest in the relationship between recurring symbolic systems or codes and the particular social and cultural processes which generate and perpetuate them. The major task of the socio-semioticist then, is the classification and interpretation of this complex interplay of signs. Since the media are related to social behaviour in general, the relationship between the signified (e.g. a performance experienced by an audience) and the total context of social, cultural and historical phenomena become of major importance to this field of endeavour (Mukarovsky, 1978). As such, the
visual messages found within film and television may be read as a system of cultural indicators which represent the value structure of a society. These indicators operate as the standing for relation where one thing stands for another. Such indicators may help in identifying social roles operative within any social social system, how they work, what they mean or signify, and what they tell us of the society in question. In short, a study of semiotics cannot be divorced from sociology because the socio-semiotic defines the nature of the interpretant.

The next step in the study of semiotics is to develop an experimental design which will facilitate empirical measurement of semiotic situations. Such a procedure should seek to identify the theoretical and semiotic components of a message. This same material should then be exposed to a stratified cross cultural sample of respondents utilizing experimental and control groups. The responses elicited should be compared to the interpretation derived from the theoretical semiotic analysis. Areas of non-correlation and confusion should be investigated and explained. A development of this rationale will bring the study of semiotics into the domain of statistical analysis which may be able to predict probabilities of interpretation amongst relatively homogeneous audiences. It will further serve to remove the study of the film-audience-society system from the purely qualitative to a more quantitatively based research paradigm.

Also of importance is the further research into the neurophysiological determinants of signs. This sub-discipline of semiotics remains totally under-researched. If Jung's concept of the "symbol" which this study has labelled the "archetypal index" is to be adequately accounted for, some considerable effort must be directed at the investigation of the pre-conscious layers of the brain-mind system. In addition, the relationship between signs and the structure of our perceptual and visual apparatuses will have to be examined if we are to understand how these processes have distorted our picture and representations of the environment. This neurophysiological implication has serious
consequences for the future direction of semiotic research. First, it resolutely moves the investigation away from a Lacan-based psycho-semiotic or semiology. Second, it suggests a definite relationship between neurophysiological structure and perception and language which determine our mental models of reality. This observation entrenches the significance of the triadic nature of interpretant production and removes the investigation from the purely law seeking dyadic semiological paradigm.

Postscript

This study set out to accomplish three specific objectives: first, to unify cybernetics and semiotics into a unified metatheory; second, to extend the application of existing theory to include all communications technologies; and, third, to propose the basis for a semiotic which has a validity beyond a narrative-based film language.

Through the preceding examination and appraisal of Peirce's semiotic, together with the insights gleaned from cybernetics, this study provides a theoretical basis which is able to incorporate the major film theories. The semiotic developed in this study covers, and explains the issues raised by the objectives listed.
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