

Chapter 11

THE COMMUNICATION OF EMOTION: THEORY OF SENTICS

MANFRED CLYNES

ABSTRACT

Theories and sentographic methods of measurement of the biologic basis of emotion communication are given. Specific biologic dynamic forms programmed into the CNS for the communication of specific emotions have been isolated and are called essentic forms. They may be produced through any motor output of sufficient dynamic flexibility, including the tone of voice and appear to be produced and recognized symbiotically. Essentic form and its corresponding emotion are seen to be a single entity with inherent feedback interaction between the expression and the emotional state. Essentic form and the corresponding emotional state exhibit the property of coherence so that only one essentic form can and does correspond to the experience of a particular emotion state. The theory predicts a new form of laughter, called motoric laughter, in which the voice is replaced by a suitable motoric pattern. Only when the motoric pattern replacing the voice corresponds in frequency to the "ha's" of laughter does the new laughter provide the same experience, confirming the coherence principle. Similar essentic forms have been isolated in various cultures for similar emotions. This, combined with the apparent impossibility to retrain individuals to express particular emotions with altered essentic forms, indicates a biologic rather than cultural origin of essentic form. It is proposed that emotion and its essentic form evolve simultaneously.

Nonverbal communication has been studied widely in terms of visual cues, such as body position and facial expressions (e.g., Birdwhistell, 1968; Ekman, 1972; Izard, 1971; Klages, 1950), and less widely in terms of auditory patterns (Bentley & Hoy, 1974). Subtleties of touch as a form of nonverbal communication are least of all studied. (Taste and smell have hardly been explored as possible media of voluntary nonverbal communication.) Painters and sculptors have to content themselves with momentary cross-sections in time to imply movement and expressive relationships. Yet the specific nature of live movement in time most powerfully influences communication. The time course of the expression defines its true character. But in the arts of music, dancing, and acting, the time course of the expression is allowed to reign. Communicating with subtlety and power depends on the almost infinite shades that can be produced in the course of expression. I have called the scientific study of dynamic emotional communication *sentics*.

Sentics aims to study the subtleties of temporal expression and has developed a new method for studying these experimentally. It has discovered some biological foundations of expressive forms through which individuals generate and communicate qualities and emotions. In this chapter, I shall briefly outline some of these findings (see Clynes [1977a, 1979] for a fuller exposition).

An expressive movement is an entity in time; it has a beginning, middle, and end. The first step in studying such entities is to note that it takes a certain amount of time to execute an expression of joy, of anger, of sadness, of love, and so on, and these times differ for different emotions. One may have a succession of such expressions, but each will partake of the character and duration of that particular emotion. The second thing is to recognize that the character of each expressive act is determined before it begins, that is, the time course of an expressive movement is preprogrammed by the brain before it begins. This is very similar, for example, to the way a person might throw a ball to hit a particular target. The way he moves his arm to throw is preprogrammed before he begins to throw: It is determined by his idea of hitting a particular spot. The more precise his idea and the more precise his execution, the more likely he will hit the target. Similarly, the time form of an expressive movement represents the state that seeks expression and is more powerful the more closely it corresponds to the expressive form of its quality.

It appears that there is a class of qualities of experience that are inherently linked with the motor system. Their expression and state may be considered as a single existential entity. Such a category includes most emotions.

If expressive intercommunication consists of discrete spatiotemporal forms with clear beginnings and ends, we may ask the following question: Can these forms for specific emotions be isolated? Such elemental units of expression were, in fact, found to exist and could be precisely delineated by experimental methods to be described. We have called these elemental chunks or entities of expression *essentic forms*.

Essentic forms turn out to underlie expression regardless of the sensory

modality in which they are expressed; thus, an expressive musical phrase, the tone of voice, a dance step, and an expressive touch partake of similar essentic forms when seeking to express a particular quality.

Once these entities characteristic of each quality have been identified, we can observe the way in which they act and interact. The nervous system appears to be programmed in such a way as to be able to both produce and recognize these forms precisely (see Bentley & Hoy, 1974). They thus represent windows across the separation between individuals and allow contagion of emotion to take place, and they provide emotional understanding of one another.

Essentic forms have the power to generate emotion in the person who produces them, as well as in the one who receives them. Having isolated these elemental forms, it becomes possible to study the way in which they dynamically generate these emotional qualities. The studies summarized here represent a general systematic approach to this question. In the past, psychology and physiology have largely focused separate attention on either the study of the emotional state or the study of expression, rather than on their specific interaction. The generation of emotion affects bodily functions: The electrical activity of the brain, neurohormones, the hormonal system, and the cardiovascular system all respond to the generation of emotion through essentic form. This, in turn, affects the sense of well-being and modulates experience.

One approach to the question of what kind of entity constitutes an emotion is to consider those qualities of experience that can be communicated by means of direct temporal expression. If the contagion of experience through communication is selected as a common property, we obtain a class of qualities of experience nearly all of which are commonly called emotion. Love, grief, joy, anger, hate, laughter, sexual excitement, reverence, hope, and fear may be propagated through dynamic communication by using the tone of voice, expressive gesture, and facial expressive movement, for example. (Yawning is a quality of experience that is also contagious in this sense but is not usually classified as an emotion.)

In man-made information-processing systems, the transmitting units themselves (consisting of zeros and ones) have no meaning in terms of the message. They are like the dots and dashes in a Morse code message. In nature's system of communication of emotions, however, the message units themselves have analog (spatiotemporal form) features that act like keys in locks of our nervous system; the language, sender, and receiver are co-designed with vocabulary and meaning evolved by nature.

Some emotions, such as jealousy, are not communicable through a contagious process of expression. Jealousy, surprise, and to a large extent guilt, for example, are not capable of being embodied in temporal forms of expression that evoke similar feelings. Emotions like jealousy may be regarded as compounded of a number of existential factors of emotional meaning and significance. They have a special focus essential to their nature. Thus, emo-

tions belonging to this second group, which includes jealousy, surprise, and guilt, require a special ideational content to become communicable. Music, for example, cannot portray the latter group in the same direct manner with expressive form as it can the emotions belonging to the first group.

EMOTION AND ITS EXPRESSION: SOME HISTORICAL ASPECTS

In the past, the emotional state and its expression have generally been studied separately, and very little systematic attempt has been made to study the consequences of regarding the state and its expression as one existential entity, incorporating inherent feedback (Laird, 1974). Studies of the psychophysiology of emotions generally have not concerned themselves with expression. Studies of human expression, on the other hand, have generally not investigated the psychophysiological ways in which successful or less successful expressions interact with the emotional state.

The most closely related systematic studies that we find are the studies by ethologists of the function of innate releasing mechanisms (IRMs) in animals. The action of IRMs resembles the function of dynamic expression in a number of ways. However, knowledge of IRMs in animals (predominately birds and fish) does not provide a sufficient framework for understanding the function of human expression in relationships between people and the function of expression in art and music.

Ethologic theories point out the genetic basis of communicative patterns in animals. These theories are in accord with the findings of genetic bases of the dynamic forms of emotion communication, called essentic forms which have been observed and identified through sentographic studies over the last decade.

Darwin (1872), in his study of the expression of emotions, regarded the mind-body interaction as a superstructure resulting from repeated association with earlier physiological processes. Thus, crying was related by him to earlier phylogenetic experience of the presence of foreign bodies in the eye, such as sand. Or, quite strangely, the "vulgar" scratching of one's head as an expression of puzzlement (an irritation according to Darwin) was supposedly a consequence of an abundance of lice among the uneducated, lice-irritated masses. It did not seem possible for Darwin to assume that an expressive phenomenon involving both mind and body should have evolved *in toto*. The sequence had to be, first, a bodily component and then mental associations that would go with it.

Freud, forced to make a choice between mind and body, chose Eros and Thanatos as origins of drives from which other emotional experiential characterizations and satisfactions were supposedly derived.

The view described in this chapter, which is derived from extensive sentographic observation of dynamic emotion communication, is that a particular dynamic form of emotion communication, such as laughter, anger, or even yawning, evolved as a single mind-body entity; the same genetic change that produces the form of expression also produces its corresponding experiential quality. (We are led to this conclusion through the existence of the property of coherence, affirmed through prediction of new psychobehavioral experience that can be experimentally confirmed [e.g., the predicted new form of laughter].)

We may need to go back to the sixteenth century philosopher Spinoza to find an antecedent to this view of emotional entities. Spinoza regarded emotions as natural entities comprising both mind and body and anticipated a biocybernetic approach that partakes of both mental and bodily aspects. His theory of emotions, as part of his ethics, dealt with the specific dynamic interaction of various emotions.

For a review of studies of the nature of expression, the reader is referred to Klages (1950), who, in addition to his own extensive studies, published a comprehensive historical review of the study of expression from the fifteenth century until 1950. For contemporary work in the study of expression, the work of Ekman (1972) and Izard (1971) and the school of body language centered around Birdwhistell (1968) are cited. None of these attempt to study the power of expression to generate, or to discharge, the emotional state. For that aspect, the work of Marañon (1950) is cited. Marañon examined the power of evocative speech: the emotion contagion of demagoguery displayed by the totalitarian dictators.

Of the two classical types of theories of emotion represented by the James-Lange and Cannon points of view, respectively, neither one alone can account for the full nature of emotional experience. It can be readily shown that aspects of emotional experience take place before there has been time for the special bodily changes to occur. On the other hand, individuals with spinal injuries are unable to experience emotion in the same way as individuals with intact spinal cords (Hohmann, 1966).

The perspective on the nature of emotion given by Schachter and Singer (1962) is that if arousal is provided by administration of adrenalin, subjects will as readily label their state one emotion as another, depending on an environment in which an actor is made to portray these specific emotions. These experiments are taken to signify nonspecificity of the emotions. However, in my view, they show the following:

1. Arousal predisposes a person to experience emotion.
2. Communication by actors can contagiously affect the state of a subject.
(These experiments include the communication of emotion, unwittingly, as it were, as part of their demonstration.)

My experiments show, by contrast, that the emotional process can begin with labeling and lead to various states of arousal, some measured parameters

of which may appear to show similar changes. Thus, if oxygen consumption is found to increase in anger, joy, and sex and decrease in love, reverence, and grief, this does not mean that emotions are not specific, but that emotional experience can be different, even if certain parametric measures appear to indicate a similar "arousal" measure. The correlate to the specific experience simply lies elsewhere in the organism. Where this might be shall be discussed later in this chapter.

EXPERIMENTAL MEASUREMENT OF ESSENTIC FORM

To avoid confusion between the words "feeling" and "emotion," I have introduced the term *sentic state* (derived from the Latin root *sentire*) to denote the emotion or feeling state, a generic term applicable at various intensities (a weak emotion is often termed a feeling).

I have further named a simple, single, voluntary movement together with its command decision *an acton* (Clynes, 1969, 1977a). Voluntary raising of the finger is an example of an acton. Such a simple single movement is capable of being modulated by the emotion seeking expression, and one may call such a modulated movement expressing a particular emotional state an *E-acton*. In this chapter, all references to expressive acts refer to *E-actons*.

The expressive character of an emotion appears to lie in its dynamic form or modulation of the E-acton, rather than to be specific only to a particular part of the body. Thus, for example, angry gestures can be made with the arm or leg or can be expressed by the tone of voice using different motor outputs in each case. If one wishes to extract and isolate the dynamic character (if it exists) that expresses the quality of anger, one would want to have a method of production and of measurement that is reliable, repeatable, and quantifiable. To make such a measurement of essentic forms possible, one may choose to measure the dynamic character of an emotion through the transient pressure of a finger on a finger rest. This has the possibility of being readily repeatable, can be measured easily, and thus can become a standard means for measuring and comparing various expressive forms.

Figure 11.1 shows the finger rest used in the experiment. Details of the method and procedure for the use of the apparatus may be found in Clynes (1977a).

Pressure rather than movement is used to measure essentic form for several reasons. First, it is a convenient form of measurement. Second, in using pressure rather than movement, it is more readily possible to characterize passionate states: Certain essentic forms include the experience of muscular tension that is provided by pressing against a finger-rest. Pressing is more suitable than pulling. Even so, because of the resilience of the fingertip, a small amount of movement necessarily ensues. (Small movements of one-

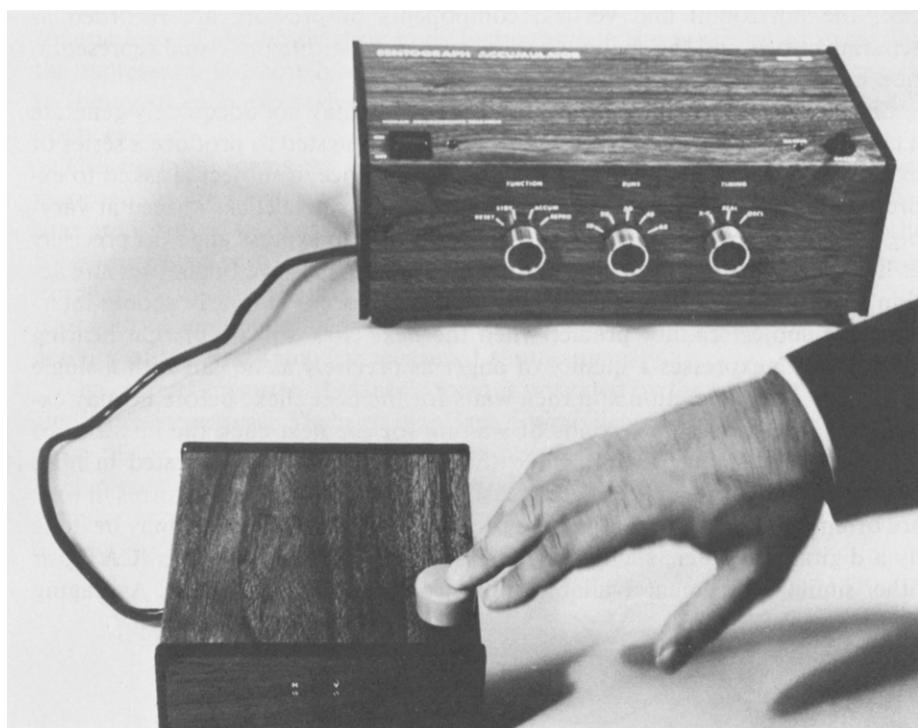


FIGURE 11.1. Sentograph for measuring vertical and horizontal components of transient pressure. Touch transducers and arm position for the measurement of essentia form. Two sets of strain gauges are mounted on a cantilever arm of square cross section, placed at right angles to the directions of measurement. Each is part of a bridge circuit, from which the pressure signal is obtained by amplification. Frequency response is 0-300 Hz. Deflection is .05 mm/100 g. In the background is the averaging computer which stores and sums individual expressions with a resolution of 200 ordinates and 12-bit AD conversion. Sampling rate is 10 msec. A special plastic touch surface is provided which is "gray" to the touch, i.e., does not itself cause tactile pleasure or irritability.

eighth of an inch or so on the finger-rest in a direction away from or toward the body are also acceptable.)

An important feature of these expressive pressure transients is that the direction of pressure is different for different sentic states. In expressing some states, the pressure tends to be away from the body; for other states, it has a neutral, close to vertical, direction. For still other states, it tends to be more toward the body. These distinctions have important significance.

It is necessary to measure not only the amount of the momentary pressure but also the angle of its direction. This is done with two pressure transducers, one measuring the vertical component of pressure and the other the horizontal component. By knowing each of the components at any one time, both the magnitude and the direction of pressure at that moment are known. In prac-

tice, the horizontal and vertical components of pressure are recorded as separate curves and the shapes of these curves constitute the visual representation of essentic form (Figure 11.2).

Since producing a single expression or E-acton may not adequately generate a clear sentic state in a subject, each subject is requested to produce a series of expressions for a particular sentic state. For instance, a subject is asked to express "anger." He then hears a sequence of soft, single clicks spaced at varying intervals a few seconds apart. He is requested to express anger as precisely as he can each time he hears a click with a single, expressive finger pressure action. The clicks are not spaced evenly in time but occur at quasi-random intervals; the subject cannot predict when the next click will occur. On hearing each click he expresses a quality of anger as precisely as he can with a single expressive pressure action and then waits for the next click, before he may express again. During the seconds of waiting for the next click the intensity of anger mounts. As he goes through this process, anger is generated in him. Thirty to fifty expressive acts are measured in this way and their forms in time are often averaged to obtain a more precise shape. The averaging may be done by a digital computer, such as the computer of average transients (CAT), or other similar instrument available in most physiology laboratories. Averaging

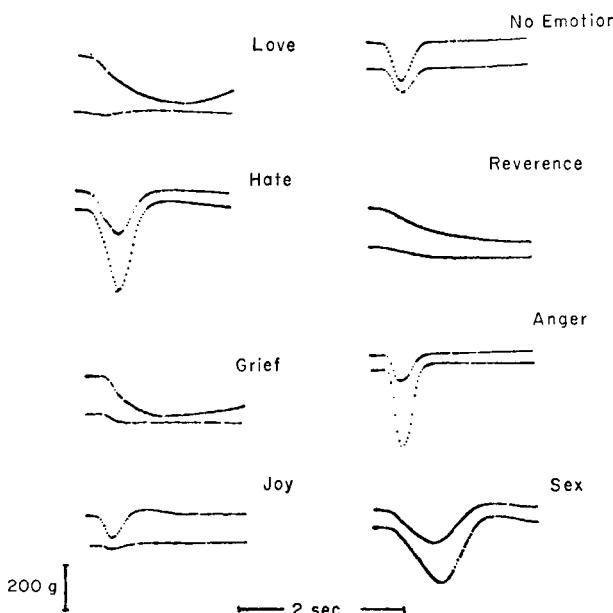


FIGURE 11.2. Sentograms of the essentic forms of emotions, as measured by the sentograph (subject, 42-year-old male). The upper trace for each emotion marks the vertical component of transient finger pressure; the lower trace marks the horizontal component (at twice the scale). No emotion is the form of expression recorded when a subject is asked to express mechanically, as if depressing a typewriter key. Each form is measured as the average of 50 actons. The subtle differences in forms (e.g., between love and grief) are as significant as the more obvious ones.

the space-time shapes of many expressive acts minimizes the effects of minor fluctuations of the sentic state and fluctuations in the precision of executing the expression. (Although averaging results in some loss of accuracy in regard to timing of each expressive form, it is helpful in establishing systematic differences.)

The essentic forms as expressed through transient finger pressure are recorded, as are (in some experiments) the specific actions of various muscles that are involved in the production of essentic form, including muscles of the forearm, upper arm, shoulder, and back (Figure 11.3). The action of these muscles is measured through the electrical activity produced at the neuromuscular junctions. In addition to such electromyograms, the electrical activity of the brain may be measured simultaneously.

The clearest measure of essentic form is provided by the recordings of transient finger pressure. The arm is in fact a biological filter through which activity of the brain not connected with expression of a particular essentic form is eliminated. The brain's electrical activity, in addition to aspects related to essentic form, contains all other activity related to the innumerable conscious,

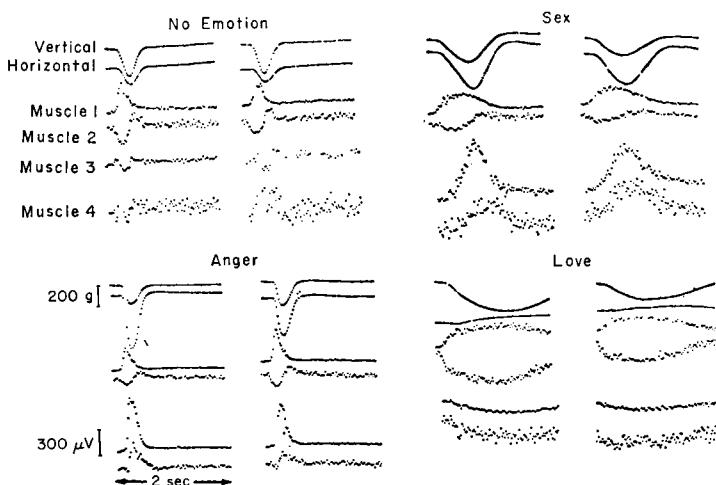


FIGURE 11.3. Sentograms of essentic form as vertical and horizontal components of finger pressure; also, four groups of muscle potentials integrated and rectified with a time constant of .01 sec. Each group is the average of 50 expressions. Muscle potentials are recorded from the forearm, upper arm, front shoulder, and back, respectively. Groups represent repeated recording from the same individual showing the stability of the patterns. "No emotion" consists of a mechanical movement, such as used for typewriting. In "anger" there is a marked accentuation of the horizontal component, indicating a tendency for the acton to be outward, away from the body. The characteristic shape for "love" (not sexual) shows a longer curved action, often with a slightly reversed horizontal component, indicating a pulling inward or embracing mode of behavior. The muscle actions reflect the differences of the essentic form. The preprogrammed time of the acton for love is considerably longer. The characteristic form for sex shows a strong secondary thrust with emphasized late muscle activity. This secondary thrust is characteristic of the purely sexual expression.

unconscious, and autonomic functions. Thus, the expression of essentic form can at present be noted only by averaging the brain's electrical activity as measured from the scalp.

Processes that reflect changes related to particular sentic states, rather than to each separate expression, such as changes in heart rate, cardiovascular function, respiration, oxygen consumption, and the electrical activity of the brain for the duration of each state, have also been measured in various experiments.

It is noted that the essentic forms as observed in this manner have vector properties. There is a specific angle as well as magnitude of the pressure as a function of time. The direction of the vector is rather constant for each dynamic expression and, for most states, changes only slightly during the expression. The tangent of the angle is given by the instantaneous ratio of the horizontal and vertical components of pressure. Anger and hate have outward components of pressure. Joy is vertical. Reverence is slightly outward.

Some expressions display a late, secondary muscular action. These late muscular actions occur approximately .7 sec after the beginning of the acton and are characteristic of certain "passionate" states in which there is a late developing tension in the acton (e.g., hate, sex). These actons contrast with the free character of other actons in which there is no late developing tension (e.g., joy, anger).

E-Actons of specific sentic states have characteristic durations. If we compare a "mechanical" impulse movement such as a single action on a typewriter with the duration of an E-acton, we see that the durations of some of these emotion expressions are considerably extended. The duration of a love acton is at least 2.2 sec and may be considerably longer. Typical values (in seconds) for minimum duration of E-actons are as follows: anger, .7; joy, .9; love, 2.2; hate, 1.2; grief, 2.5.

From these and related observations, carried out over a decade and involving several thousand subjects (Clynes, 1968, 1973, 1975a, 1977a), a number of properties of the communication process have emerged. These properties characterize the natural design of emotion communication systems permitting the generation and contagion of emotion through expression.

In the following I shall enumerate and discuss the function of basic biological design properties that appear to govern the dynamic communication of emotions. These properties may be regarded as constituting the dynamic anatomy of biology's solution for how to communicate emotions. They are not statistical in nature, but reflect organization.

Emotional expression and vectorizing with direction and magnitude. Similar to how a boy might be able to move me. Sentigrams!

1. THE PROPERTY OF EXCLUSIVITY

A sentic state is a single-channel system; only one state can be expressed at any one time.

Different parts of the body cannot be simultaneously used to express different emotions and have the individual experience them all. This does not mean that a "mixed" emotion cannot be expressed, but that two different states (mixed or unmixed) cannot be simultaneously expressed in different outputs.

Experiments with hypnosis carried out by Bull and Frank (1950) showed that even under hypnosis a subject could not be made to express more than one emotion at a time by suggestion. Nor are animals known to be able to express more than one expressive pattern at a time.

2. THE PROPERTY OF EQUIVALENCE

A sentic state may be expressed by any of a number of different output modalities.

This describes the system property that a particular emotion, seeking expression, may be expressed by any motor output mode of sufficient degrees of freedom to accommodate the dynamics of the expressive movement. The experienced links between the expressive movement and the emotion state are similar, whether a leg, an arm, or the muscles involved in producing the tone of voice or other motor outputs are used.

Three main functions in which the expression inherently affects the state are experienced: the satisfaction gained (S), the generating power (G), and the discharging ability (D) in regard to the intensity of the emotion. Each occurs for various motor output modes, though not necessarily to the same degree.

Postural patterns lend additional impetus to the expressive communication, but are not absolutely essential for the perceiver, since expressive sound, for example, may fully communicate emotional quality without any information concerning body posture. Some postures are antithetical to a particular emotion and its expression. We can speak of a positive, neutral, or negative posture with regard to the expression of a specific emotion. For example, lying back in an armchair is not conducive to expressing anger; it is a negative posture with respect to expressing anger. Sitting upright in a chair is a neutral posture for various emotions and is effective for expressing many emotions by the pressure of a finger.

3. THE PROPERTY OF COHERENCE

Regardless of the particular motor output chosen to express a sentic state, its dynamic expression is governed by a brain program or algorithm specific for that state which shall be called essentic form.

This property, perhaps the most centrally important one, signifies that there is an innate coherence between the essentic form of an expression and the emotion state seeking expression. That is, there is a one-to-one correspondence between essentic form and the quality of experience, if the expression is genuine. A bond exists between the physiological manifestation, the dynamic expressive form—the character of movement—and corresponding psychic experience. The nature of this bond is one of the most remarkable of natural phenomena.

As a genuine expression occurs, there is an experience of integrity, a reinforcement of the quality of experience.

Departure from the true expressive form may be of two kinds:

1. Improper execution, due to accidental causes or to improper focusing of intent, so that an expression is produced that does not have the full impact of a true expression.
2. There may be an inhibition of the true expression and substitution of some other form for it.

A faithful expression is recognized by the person expressing it: He or she can be aware of the power of the expression to generate, discharge, and satisfy with respect to the state it expresses. A departure from a true expression will significantly alter these functions (but not necessarily in equal degrees). Psychophysiological coherence is evident even in such a complex expressive form as laughter, and minor fluctuations of expression are of considerable significance and cause a different quality of experience.

Attempts to re-train a person to express anger with the expressive form of love and vice versa have invariably failed.

With a coherently expressed form, a specific satisfaction may be felt about 1–1.5 sec after its completion. An improper execution is accompanied by a corresponding degree of frustration, felt even before it is completed.

These phenomena also result in the process of expression being self-centering (self-steering) in art, music, and dance (that is, repeated expression teaches); one may be gradually attracted, as it were, to the true form. This inner attraction is a very characteristic phenomenon of the expressive process. It can result in a gradual refinement, when opportunity is given for repeated practice. One can, so to speak, fall in love with the true expression; it reveals itself gradually, as one becomes more and more aware of its subtleties. In turn, it provides a more and more powerful effect (until a temporary satiation occurs). Opportunities for this kind of practice occur mainly in the arts, but everyday life and personal interactions also offer opportunities for this to manifest itself.

Coherence means that expression *can* arise from the depth of the psyche. It is a paradox that when expression is most authentic and individual it is also most universal.

Experimental studies of essentic forms measured sentigraphically in Mex-

ico, Japan, and Bali show forms largely similar to those found in the United States, supporting the view of the universal and genetic origin of essentic form (Clynes, 1973) (Figure 11.4).

A mathematical differential equation describing essentic forms is given in Clynes (1973), and the forms computed according to the equation are compared with experimental forms.

4. THE PROPERTY OF COMPLEMENTARITY

The production and recognition of essentic forms are governed by inherent data-processing programs of the central nervous system, biologically coordinated so that a precisely produced form is correspondingly recognized. The recognized form in turn generates a sentic state in the perceiver.

Because they can be recognized, essentic forms gain power to make emotion contagious. The recognition process generally occurs through a modality different from the one in which it was produced. A gesture or facial expression can be perceived through the visual sense; auditory expressions are not recognized by the same structures that produce them. However, in expressing with the sense of touch, there is kinesthetic feedback in which at least a part of the producing system may be involved. That the recognizing function should correspond so well to the producing function is by no means self-evident, although it has generally been taken for granted by human society.

We need to distinguish between recognizing essentic form as it is being produced by the person who is producing and its recognition by another individual. In any particular expressive transmission the effective communication power will depend on the following:

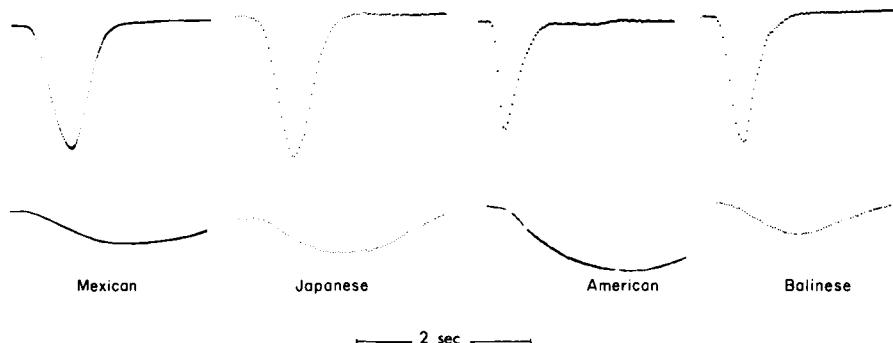


FIGURE 11.4. A comparison of the essentic forms of love and anger in four cultures: Mexican, Japanese, American, and Balinese (vertical component shown). Similarities of the senograms are apparent. Differences between individuals are typically of about the same order as variation between cultures.

1. Biological congruence between the innate capacity to produce and the innate capacity to recognize
2. Successful production
3. Attentive recognition

When there is no congruence between the production capacity and recognition capacity, as, for example, between a man and a beetle, no transmission of emotion occurs. Only when there is congruence between these is the possibility given of emotion communication in the present moment. We may call this the P-R (production-recognition) congruence. P-R congruence exists within a species but also across species to a lesser degree. Dogs, for example, recognize and respond to the expression of anger, fear, and joy from humans. When P-R congruence is largely absent, we experience a corresponding sense of isolation.

Biological P-R congruence has been beautifully demonstrated for crickets by the experiments of Bentley and Hoy (1974), which demonstrated that the production and recognition of crickets' mating songs were governed by the same genetic factor. In their experiments, a new hybrid species was bred, with a new mating song; the females of the new species were attracted exclusively to the new mating song without having previously heard any mating song. Lizards express aggressiveness and dominance by a characteristic up-and-down movement of the head and neck at a definite frequency. This pattern, too, is genetically controlled both in its production and in its recognition, as one of numerous examples that could be cited. In humans, laughter is a salient example of essentic form whose production and recognition are not learned in an arbitrary way, but are innately developed.

An example of a rudimentary essentic form that already has full power of contagion is yawning. Yawning does not necessarily have a primary communicating intent, yet it functions very much like essentic form. In man, the very word "yawning" may cause yawning. A highly specific contagious communicative mode, it shows the features of essentic form communication. (It displays all the seven dynamic properties of biological emotion communication systems listed.) Being little burdened with cultural superstructure, it makes an excellent example for study; this is even more so because of its interspecies application.

The principle of coherence also is well demonstrated in a yawn. The particular feeling of yawning belongs exclusively to a yawn; taking a deep breath by itself will not be accompanied by the feeling of yawning—the whole gestalt of the yawn dynamics needs to be present, including a specific tension in the jaw and back of the neck.

The faithfulness of the form of the yawn affects the recognition, so that we "receive" a yawn only when its form is appropriately "sent." Receiving is carried out without conceptualizing, or the need for symbols, through a direct program of the nervous system. No one is taught how to yawn or how to

*congruence, shared
life experiences and
music you relate
to*

*Production
recognition
congruence*

recognize a yawn. Indeed, it would be impossible because if the P-R congruence did not exist no amount of learning could provide the contagious feeling of yawning.

What seems clear for yawning applies also to the many essentic forms that allow contagious propagation of emotion. Sentographic experiments indicate that similar propagative processes occur. In its use of essentic form it seems nature has been distinctly parsimonious, providing a seeming unity in diversity, allowing the many to be linked together by finite strands. The patterns weaved do not end where our bodies do.

Through essentic form individuals can emotionally touch one another across time and distance. What we "touch," however, is not only the sense receptors but what appears to be a receiving "organ" at a level removed from these. Essentic form has primacy over the sensory modes in that its quality is perceived regardless of whether it is transmitted by sound, light, or touch and in the presence of other sensory input. The perceiving "organ" probably has differentiated internal neuroanatomical organization (this remains to be explored in the brain's organization). The production and recognition of essentic form both involve functions beyond the muscular production and sensory perception mechanisms. Yet without sensory and muscular input and output their communication is not possible.

5. THE PROPERTY OF SELF-GENERATION

The intensity of a sentic state is increased, within limits, by the repeated, arrhythmic generation of essentic form.

This describes the property that reiterated production of essentic form with appropriate timing can generate a state of emotion, without other causes. A single act of expression may increase intensity or discharge it. If circumstances allow more than one expression, and the iteration is appropriately timed, the intensity of the experience will generally tend to increase up to a certain level, remain there, with fluctuations, and thereafter gradually discharge.

Thus, for example, a person who laughs will find it easier to laugh as he continues to laugh. The threshold of laughter will drop, and at times the laughter will maintain itself without further stimulus. But eventually the person becomes satiated with laughter and has to have a period of recovery to be ready to laugh again. Expressions of anger or joy may take a similar course, building up and discharging intensity, though each on a different time scale.

Repetition has a clear role in many biological patterns of sensorimotor interaction. In scratching, for example, there is a gradual increase in sensation as one scratches, after which there is a gradual decrease in sensation and a feeling of satisfaction that lasts for a time. A similar process often occurs in sneezing, and sometimes in coughing and even in yawning. Another example

The one song that gets you going

*repeated listening
Playing it again and again*

of increasing intensity with repetition is the mounting intensity of feeling in sexual stimulation. Here, however, there is the additional special discharge of orgasm.

Inappropriate timing interferes with the way in which repetition of essentic form affects the intensity of the state. In everyday life, this often happens when a person is not free to produce such repetition as needed or when interaction with others forces him to change the timing.

The duration of essentic form is different for each emotion, and the mean rate of iteration generating intensity most effectively is also specific for each emotion. An even, or "mechanical," rate of repetition is inimical to the generation process. Such a mechanical rate of repetition entails predictability, effacing the newness of the expression. If an expression is not perceived as "new" it tends to be subsumed with the previous expression as one unit. It becomes part of an "anatural" unit: It is a double (or multiple) form of a single entity.

In generating emotion by repeated expressive finger pressure at repetition times given by external timing clicks, it was found (Clynes, 1973, 1975a,b, 1977a) that the quasi-random departure from regularity of the repetitions need to have a specific character (in addition to the mean rates being different for each emotion) for the most effective buildup and sustaining of emotion. Randomness of either a Gaussian or a Poisson distribution did not fulfill all requirements and included a certain number of irritating intervals during each sequence.

To provide effective generating power an interval is necessary between the end of one essentic form and the beginning of the next. During this time one experiences the following:

1. Satisfaction of having completed an essentic form
2. Preparation for the execution of the next essentic form
3. An increasing urge to express

The amount of time for these three aspects (which may be called renewal time) varies with the specific emotion and is in the range 1-8 sec. Thus, the mean repetition rate for generating a particular emotion is determined by the duration of the essentic form, plus the appropriate renewal time.

The mean rate is modulated by a randomness factor, which is different for different emotions.

6. THE PROPERTY OF GENERALIZED EMOTION

Sentic states may be experienced and expressed as pure qualities or identities, without reference to specific auxiliary relationships to generate or receive these qualities.

We tend to think of emotion as being generated mainly by relationships with others, by external events, or by specific fantasies and dreams. There is, however, a mode for generating and experiencing specific emotions and qualities that does not depend on particular interaction content, but is brought about by pure essentic form itself. The experience of essentic form itself generates a state that then may or may not draw specific fantasies to it. Thus, a person performing or listening to music can experience emotional qualities without reference to outside events or to recipients: Joy, love, and grief, for example, may be expressed in music.

Generalized experience of emotion is confined not only to the mode of music, although in the past it has been mostly experienced through music. Essentic form expressed through finger pressure is quite as effective in generating these qualities of experience (at the appropriate rates of repetition, as discussed under The Property of Self-Generation [p. 285], these rates are also similar to the sequence of musical phrases).

Such ability to feel emotions in a generalized way, without music, may seem surprising. The experience can be obtained, however, through other sensory modes capable of appropriate temporal relationships. They can be generated visually through modulated lines or simple forms (certain animated films, for example—the dance of simple lines alone can be highly and specifically emotionally meaningful).

The experience of the generalized state incorporates the following two aspects.

1. A virtual body image: This is a gestalt of specific body sensations characteristic of that emotional state, such as lightness in joy, heaviness in grief, etc. Such virtual body images have a fine structure; that is, in addition to general manifestations such as lightness and heaviness, there exist other more subtle special effects. Tensions also affect various parts of the body in different ways for each emotion.

In repressed emotion such body images may be experienced partially only, without the quality of the emotion itself being consciously experienced. Thus, for repressed grief, for example, sensations in the chest, or elsewhere (as part only of an emotional virtual body image complex), may be experienced for a long time, and one may become aware only later that these sensations are part of the virtual body image of grief. This is of considerable clinical importance.

2. A generalized emotion possesses a field of "knowledge." This knowledge is not of specific events or objects, but concerns relationships and attitudes. Each generalized emotion appears to incorporate a kind of world view. When feeling grief, for example, one will tend also to feel helpless and hopeless. Such knowledge will color all potential relationships in one's imagination, contributing to a particular point of view—that pertaining to grief.

A person in a generalized emotional state will tend to (a) remember specific past events related to that state; (b) create fantasies involving that state; and

(c) to a degree, act toward others as if they had caused the state or are recipients of it.

Generalized emotional states are as subject to organic influences as are other emotional states. For example, they are more easily induced at certain times of the day than others and are more difficult to experience after heavy meals. Fatigue also affects the intensity and/or repression of different generalized emotions differently. The experience of generalized emotion can in turn reduce fatigue. (Note that emotions in dreams, however, are experienced without the feeling of fatigue that may have been felt shortly prior to the onset of sleep.)

7. COMMUNICATIVE POWER AS A FORM FUNCTION

The power of essentic form in communicating and generating a sentic state is greater the more closely the form approaches pure or ideal essentic form for that state.

One of the most commonplace events that has defied analysis is that some expressions of a particular feeling have a far greater power of expression than others. We are familiar with this in daily life, in drama, in dance, in poetry, and in music. Among the ancients, Orpheus had a legendary power of expression. Particular gestures can have a major transforming power: witness the power of blessing and of cursing in various societies and at various times in history. The expressive power of Mozart, of Beethoven, or of Chopin on those who heard them play at their best was overwhelming.

One may study the relationship between communicative power and the particular form of an expression conveniently through expressive sound. It is possible to study single expressive sounds. Great differences in expressive quality are produced by small changes in certain of the parameters of the expression. A powerfully expressive form can be greatly reduced in expressive power by such changes. If one begins with a deliberately distorted essentic form, and has the means to remove the distortion, a subject will tend to adjust the parameters so as to restore the original form, without having heard it before. This applies to relatively small distortions, and it implies that there is an ideal essentic form for a particular quality of expression which may be approached asymptotically. To what extent the asymptotic form of one person for a given quality is identical to that of another is an experimental question that can be studied by successive approximation, narrowing the gap of uncertainty as more refined measurements are taken.

With an expression of exceptional purity, it is as if the essence of livingness has been revealed in that quality. The phenomenon of being able to feel such "essences of livingness" through some forms of sound in music phrased by Arthur Schnabel or Pablo Casals, for example, is a source of wonder; such wonder may at times be experienced in daily life also. An expression of this

kind has the power to suffuse into a person not merely its own particular quality, but a sense of participation in what is felt to be a universal stratum of living, independent of time and place and person. It is accompanied by a special sense of security.

One needs to recognize that the power of pure essentic form exists. One needs equally to account for its rarity. Why should certain individuals have a far greater capacity to produce a pure essentic form? Certainly the capacity to recognize is far more prevalent than the capacity to produce such forms.

One needs to ask also why the sense of wonder that accompanies a pure form is absent in an imperfectly realized essentic form. Perhaps unconsciously a comparison may be taking place between the actual and the ideal form in the perceiver, and when they are identical then such wonder occurs. This could be likened to a control system whose setting directs toward the "livingest" quality of experience.

EXPERIMENTAL TESTS FOR DISTINGUISHING BASIC EMOTIONS

Sentic studies provide ways of approaching the question of "basic emotions" in an experimental way. A basic emotion, like a basic color, may be considered as one that cannot be thought of experientially as composed of others. This has been pointed out by Plutchik (1962) as well as by others. One may consider the spectrum of emotions to be composed of a number of distinct emotions, and their combinations and mixtures, in a manner similar to the spectrum of colors.

One experimental way, arising from sentographic methods, to determine which emotions are basic and which are mixed, or compound, makes use of the phenomenon of selective satiation. It is found that expressing a particular state for a number of minutes will generally produce satiation with respect to that state. After an initial period of rise in intensity, and a subsequently maintained level, with fluctuations, the intensity eventually decays to a low or extinguished level. The person then experiences satiety with respect to that particular emotion; however, at this point he or she is quite fresh for experiencing another, different emotion. The satiety is strongly selective.

To the extent that the two emotions are unrelated, the satiety with respect to the first will not affect the second. If, however, the second emotion contains an appreciable component of the first, as a mixture, we may expect satiety with respect to the first to carry over substantially to the second. We thus have a method for distinguishing between successive emotions that do not share a common emotional component and those that do.

A second approach that sentic studies offer toward the problem of basic emotions is by comparing essentic forms produced for specific emotions with

those expressed as feelings toward specific individuals with whom the person who is expressing has a relationship. By studying a large number of people in this way, one can relate particular expressive forms of emotion to forms expressed for various types of relationships. The expressions of relationships contain a large spectrum of emotional meaning. In this spectrum one might expect to find sentograms corresponding to some of the basic emotions to be dominant to a certain extent so that, in large samples, correlations may be found between forms expressed according to the type of relationship and those expressed by emotion alone. In this way, one would expect basic emotions to factor out from their mixtures. (In studying this, however, one must bear in mind that the essentic form of a compound emotion is *not* the algebraic sum of the essentic forms of the components [see Clynes, 1977a].)

TIME FORM PRINTING BY THE NERVOUS SYSTEM

A function of the central nervous system that is especially relevant to the phenomena involved in the repeated expression of essentic form is the function I have named "time form printing," which concerns the way in which the nervous system generates repeated movement.

One of the special modes in which the voluntary motor system can function may be called the repetitive mode. Ordinarily, a separate command decision activates each voluntary movement; in the repetitive mode, however, one initial voluntary command decision sets the pattern, which either is repeated for a definite number of times as projected in the initial command or is repeated indefinitely until a new command to stop or to change the pattern is given. I have called the repetitive production of specific motor patterns with a single initial command *time form printing*.

It had been observed earlier (Clynes, 1970) that if a person started to tap with the hand, the initial rate of tapping would tend to maintain itself across minor beat-to-beat fluctuations that tended to average out. Errors deviating from this rate from beat to beat would tend to be self-correcting (some long-term drift was eliminated by thinking of a particular musical piece).

It was observed only later, however (Clynes, 1977b), that not only the rate but also the *shape* of a repetitive movement tended to be preserved. Whatever the form of the initial shape of a repetitive movement, say by the hand or arm, this form will maintain itself during the repetitions, without further attention or command. When a change of pattern is desired, a single new command must be given for the first modified pattern; thereafter, the modified pattern will preserve itself in the same manner as the original pattern.

Thus, the nervous system is capable of maintaining not only the rate of repetition, but also the specific form of a repetitive movement, with only a single initial command. This time form printing ability is of importance for understanding (a) the basis of the phenomena of rhythm in music and in dance; (b) the control of repetitive patterns such as walking or running; and (c) pathological behavior involving repetitive movement.

In relation to musical rhythm a further important property of time form printing is significant: the capacity of the process to be *modulated* by separate voluntary commands, enabling deviations from a "mechanical" repetition to occur, without stopping the nature of the repetitive process. This occurs in many types of music and is incorporated in expressiveness. In music, the specific form of the repetitive beat has an emotionally meaningful character (which may be experienced inwardly, or expressed outwardly by a motor pattern, such as the beat of a conductor).

Generating emotion by means of repeatedly expressed essentic forms, as in measuring essentic forms, we also encounter a process that is related (though not identical) to time form printing. There is a tendency to preserve a given form of expression once it is started. The process is different, however, from the musical pulse, since repetition is externally initiated by a tap or click, which, moreover, needs to come at unpredictable intervals.

A person who has begun a sequence of expressions expressing love, for example, according to a certain form, will tend to maintain a similar form for a few repetitions, even if the "mind is wandering." This ability to stay within a general region of expressive form acts in turn to stabilize the state itself. This relates to the concept of partial reciprocity as reported in Clynes (1973).

SOME PREDICTIONS OF SENTIC THEORY CAPABLE OF VERIFICATION

The time relationships of essentic form and the principles of sentic communication permit us to make predictions about expressive behavior capable of experimental verification. The lawful behavior exhibited by the biological phenomena of communication and contagion of emotion enables one to treat the subject as a hard science, in that the properties, functions, and relationships observed are seen to be governed by specific design properties or principles and are not of a statistical nature.

In the following paragraphs, I shall describe two predictions of sentic theory that have been verified experimentally.

BLOCKING OF FEELING INTENSITY WITH INCOMPLETE EXECUTION OF ESSENTIC FORM

An incomplete form causes frustration and a blocking, which prevents one from experiencing any other emotional state for a short period of time (as was initially noticed when switching from one emotion to another in sentic cycles: One always needs to complete the last expression of a state before switching to the next).

One could predict, however, that blocking would also occur within the *same* emotion if the essentic form of an expression was prevented from being completed, and it should not be possible to counteract the blocking incurred by

The ability
to stay in
given and
keeping as
a musician
and staying
in a stated
mind or
mood!

one part of the body through another similar expression produced by a different part of the body out of phase with the first.

The prediction that blocking would occur within the same state, if essentic form cannot complete itself, is readily confirmed for interruptions occurring between 20 and 80% of the time course of the essentic form. Earlier interruption is not felt as blocking, but rather as a pause. Quite late interruption sometimes does not cause blocking; inner completion may still be possible, despite the interruption. The duration of blocking is variable, but is at least several essentic forms long.

That such blocking of feeling occurs within the same state, for example, for love and sex, may be quite surprising to many people; however, once understood, it becomes clear that precisely this kind of blocking often stands in the way of satisfactory intimate communication. A corollary is that one cannot *begin* another essentic form with a different part of the body while another part is producing one form, even within the same emotion, without causing blocking. (One can, however, initiate other parts of the body to participate in an ongoing essentic form, provided that the additional parts of the body enter at the same phase in which the essentic form is at the moment; then all of the parts of the body involved complete the remainder of the form together [Clynes, 1977a].)

PREDICTION OF A NEW FORM OF LAUGHTER

Laughter belongs to the category of essentic forms, albeit of higher hierarchical structure, and one may apply sentic communication principles to it. Laughter consists of an glottally chopped breathing pattern and a chopped voice pattern. Laughter also is a modulated carrier of other emotions (e.g., there is joyful, derisive, and sardonic laughter).

The voice pattern may be regarded as one of a number of possible motor output modes according to the principle of equivalence of sentic theory. Accordingly, we should be able to substitute a different motor output for the voice provided that we keep the same chopped breathing pattern. The substituted motor output needs to have adequate dynamic flexibility—that is a sufficient number of degrees of freedom, such as is provided by transient finger pressure.

It is readily confirmed that, if finger pressure is substituted at the same dynamic rate and manner as the chopped voice, all of the characteristic experiences of laughter are produced, including the sense of funniness, tearing of the eyes, twinkling of the eyes, and even paroxysms of laughing. The mean repetition frequency of the chopped voice (the "ha's) and of the repeated finger pressure is 5.03 Hz ($\pm .18$ SD). The frequency chosen by a person laughing using repeated finger pressure is the same that he uses when laughing in the usual ways (Figures 11.5, 11.6, and 11.7). And, in every case, only when

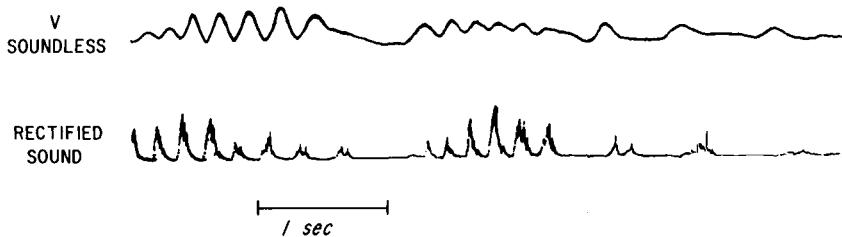


FIGURE 11.5. Shows the comparison of finger pressure (top) and sound when expressing voiced laughter also with finger pressure. The bursts of laughter have a somewhat different rise time and decay time for the motoric as compared with the voiced laughter, but the number of cycles is similar and the repetition frequency is the same.

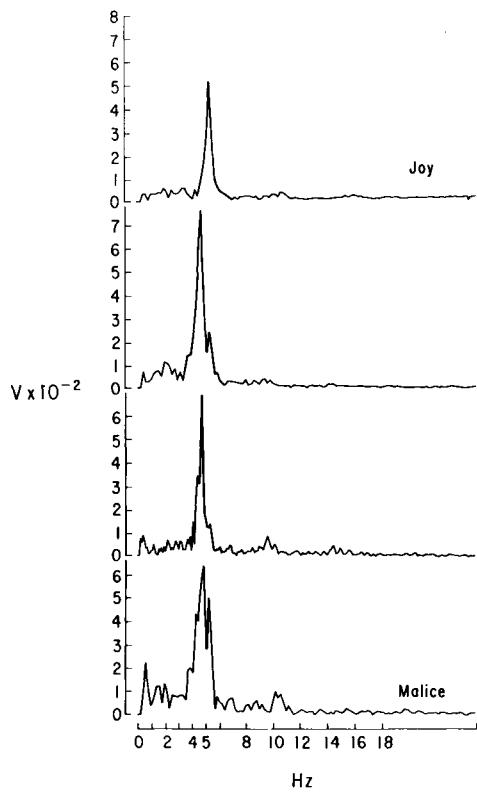


FIGURE 11.6. shows the low frequency amplitude spectrum of various types of voiceless motoric laughter expressed through finger pressure ranging from joyous to malicious laughter. The main harmonic component in all cases is near 5 Hz and corresponds to the repetition rate of the "ha's. Side bands at 10 and 15 Hz appear progressively as the laughter becomes more malicious. The wave shape correspondingly becomes more pointed. The main frequency of 5 per second is the same as for voiced laughter.

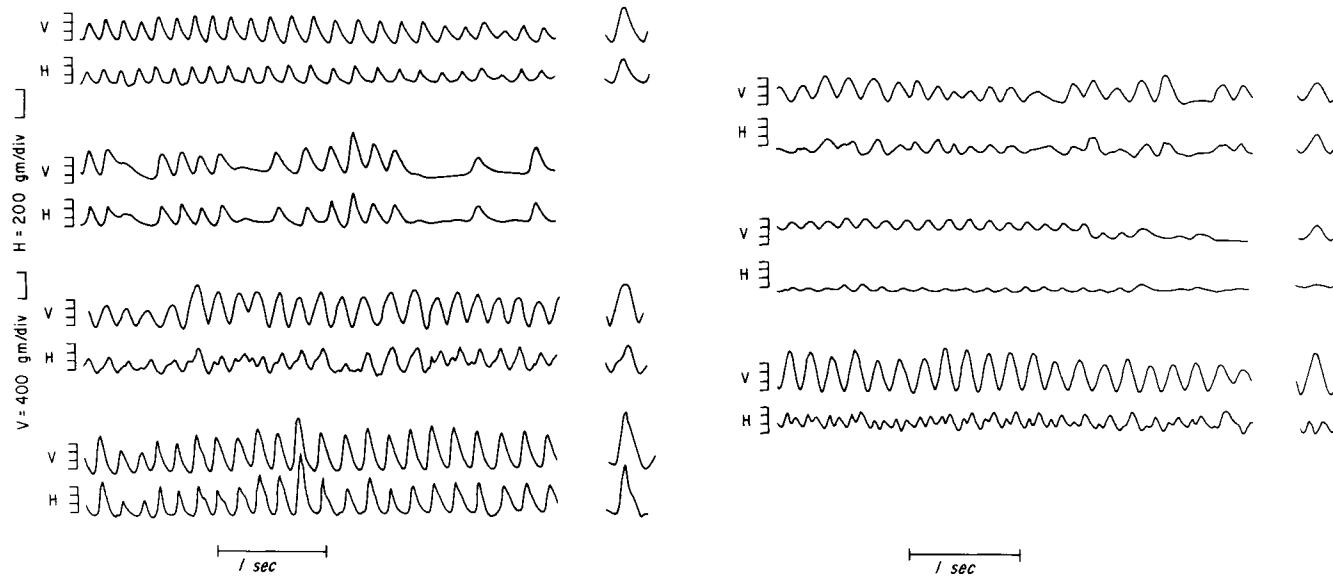


FIGURE 11.7 Various emotional types of voiceless motoric laughter showing vertical and horizontal components of finger pressure. Typical average wave forms are also shown on the right of each trace. The wave form and the angle of pressure are different for laughter with different emotional characteristics ranging from joyful to malicious. The main repetition frequency is closely similar.

the frequency is in that region does the sense of funniness "lock in." The significance of this form of laughter exceeds that of its own intrinsic interest. It constitutes an independent proof of the principle of coherence. It shows that only when the excessive behavior pattern is displayed according to the biologically programmed essentic form is its experiential quality realized.

Like other essentic forms, the essentic forms of laughter are universal, and the characteristic repetition frequency rate for laughter seems to center around 5 per second regardless of race, color, and culture.

YAWNING

Using reasoning similar to that used in the preceding section, it can be seen in yawning that the tension of the jaw and back of the neck that is an integral part of yawning might be substituted by other deliberately tensed parts of the body—for example, clasping the hands together and pressing them together, which would then result in a feeling of yawning without the usual tensions in the jaw and back of the neck. In fact, these tensions can be largely eliminated provided they are substituted by other dynamically similar tensions in the body. The experience of the quality of yawning does not occur without these tensions, such as taking a deep breath only, but does occur when these tensions are appropriately produced in another part of the body. This shows the nature of the coherence between the specific dynamic nature of the expression and the quality of feeling—that is, the specific mind–body link pertaining to the quality of "yawning."

INTENSITY

The intensity of an emotion experience presents a special theoretical problem that has not received adequate attention. A quality of experience of a unique character also has the attribute of intensity. What are the neuronal preconditions giving rise to emotional intensity?

Philosophers have concerned themselves with discrimination between various experiential qualities, but they have not given the phenomenon of intensity of emotion adequate specific attention, as a discriminated quantity of a quality. Preaching either moderation (as the Stoics did) or the synthesis of opposites (as did Goethe and Hegel) refers not to epistemologic but ethical considerations. Spinoza, however, is an exception: He states as an important principle that an emotion could be overcome only by another *more intense* emotion. Human language, however, has been more discerning and has at times provided different words for the same kind of emotion experienced at different intensities, for example, anger/rage, distaste/disgust, joy/ecstasy. While emotion may change in quality when driven through extremes of intensity, there remains a range of intensity within which its quality changes

relatively little. That this is so forces us to consider that somewhere in the nervous system associated with its quality there must also be quantity.

The quantitative forms of perception known in brain function involve chemical concentration of numbers of molecules and rate of discharge of nerve firing, as well as associated synaptic and glial potentials. With every perceptual quality we associate an exterior receptor organ whose neuronal elements provide information concerning intensity, as patterns of neuronal discharge rates. These are processed by specific neuronal networks and brain structures, such as the visual cortex or the auditory cortex, and are eventually received and interpreted through the nonspecific parts of the brain. In general, the nervous system transmits intensity through the number of nerve discharges coming over specific channels or through the concentration of a neurotransmitter substance produced, by the message, at synapses. However, the nervous system does not exclusively limit itself to *external* receptor organs, although those have received the most scientific study.

We may consider that the experience of emotion may possibly involve the stimulation of *internal* receptors, in contrast to the *external* receptor organs of perception (Clynes, 1973). Such internal receptor organs for specific emotions might also be stimulated through transmitting substances released by a successful production of essentic form. We need to consider that there would be different processes involved for each emotion that would act as specific transmitters, that is, as endorphins, enkephalins, or neurohormones. For example, it may be that a specific chemical or electrochemical transmitter relates to laughter. As laughter is maintained, the accumulation of this chemical and its metabolites would be related to a transient decrease in the threshold for further laughter and eventually to satiation. Specific receptor sites and receptor processes may be involved and give rise to refractory periods. A similar dynamic interaction is likely for sexual stimulation and orgasm, followed again by a refractory period.

If specific chemicals and receptor sites are involved in specific emotions, it should be possible eventually to isolate these and identify them. Their action could also perhaps elucidate the function of essentic form as a specific focus of memories associated with the same feeling.

Although we have considered that the intensity of an emotion is increased, or discharged, through repeated essentic form production, we have not considered how single essentic forms might represent intensity as well as quality. It seems that, for this, other parameters and situational clues would need to be involved.

Consider, for example, an emotion portrayed by an essentic form produced in a soft sound. Would the same quality, but of greater intensity, be portrayed by a similar but louder sound? It may at times, but this simple analogy breaks down quite readily. A particular quality of expression may even be associated with a certain range of loudness. Thus, a loving expression in musical sound, for example, will lose its effectiveness when produced very loudly. (Postural and other visual cues give additional information on intensity, of course, but

intensity of
the stimulus
vs the the
intensity of the
emotional
experience

effects such as a flushed face, which may accompany an emotional state, are distinct from voluntary acts of expression involved in emotion communication.) It may be that intensity is not uniquely specified in essentic form; it would seem so at our present state of knowledge.

EMOTIONS AND KNOWLEDGE

How emotions are linked to aspects of knowledge is a subtle, though important, question and can be observed through generalized emotion, in which no situational cause is involved. The following represent some observations about this.

1. Generalized emotion tends to recall selectively past experiences associated with the same state. It acts as a memory search function for a class of experiences, which have in common a similar quality of emotion. This process occurs rather effortlessly. It should be emphasized that it is not an association of the present situational *content* of new experience with specific memories of the past, but that the generalized state acts as a focus or template that draws experiences in memory to awareness.
2. The generalized state also acts as a selective focus to create new fantasies with dynamic content and relationship engendered by the state or its expression. This function is one of the creative functions of the state of emotion.
3. The specific generalized state greatly affects our experience of the relationship of self to others. In anger, for example, we will tend to be angry with any person coming within our orbit, or even with a dog (with the implicit rejection that this implies), and use another person to satisfy the need to express. In the generalized state of love, we will tend to feel accepting and loving toward such others. Generalized emotion involves a world view, through which we experience ourselves as related, unrelated, or negatively related to our environment, or even the universe, in specific characteristic ways (e.g., love includes an experience of the fundamental rightness of the world; hate includes an inhibition of the life force, a feeling of separation).
4. Emotion can produce bias, injustice, and insensitivity to others, when experienced in a dionysian manner, as ego function. Because of this, attempts have been made to eliminate emotionality in creating an equitable social fabric. (Note, however, that most principles of social justice and morality are ultimately based on good will and love.) But when experienced in the Apollonian sense as pure existences, these qualities of emotion teach us to know the subtleties of human nature, to develop empathy; they enrich our knowledge and become the foundation for our understanding of human nature. We can improve our knowledge of the subtle forces of each emotion and see these subtleties in others as well as in ourselves. "Empathy" is a form of knowledge, and the knowledge of emotions is its prerequisite.

5. Emotion can govern action in ways similar to "instinctive" and "intuitive" behavior, as a necessary consequence of the relationship it implies.

A particularly interesting form of interaction between emotion and knowledge occurs with the special emotional condition of "empathy."

As a person functions with empathy, his actions are not constrained by specific emotions but by empathy, which includes understanding all of them.

PERSONAL-ACTIVE (DIONYSIAN) AND CONTEMPLATIVE (APOLLONIAN) MODES OF EMOTIONAL EXPERIENCE AND EXPRESSION

In addition to the properties already mentioned, an important distinction of the human capacity for experiencing and expressing qualities of emotion needs to be made, as shown by the methods of generating and expressing emotions described earlier. Human beings can experience emotions in two different modes of inner connectedness. In the first, most common mode, the energies associated with the emotion are experienced as linked directly with the self, or ego, of the individual and to his drives. The emotional experience is felt as an ego function and directly affects decisions and patterns of action of the individual. This mode may be called Dionysian (note that generalized emotion can be Dionysian, also).

In the other mode of experiencing the emotional qualities, which may be called Apollonian, the qualities are "considered" as existences. For example, a person can say the word "anger" and repeat it until he feels that the inflection expresses the quality of anger purely and precisely, and with such an inflection can feel and communicate the quality of anger without personal anger of the individual. In this mode, the emotions experienced are "considered" as existences in their own right, as natural existences belonging to the sphere of living. Joy and grief are experienced in this contemplative mode, not as *my* joy or *my* grief but as Joy, Grief—anybody's and everybody's joy and grief. It is quite remarkable, and of course important, that humans have the ability to experience and to savor emotional qualities in this mode. Music and art greatly depend on this capacity. (In mythology these dual modes of experience of emotion and their social function have found expression in the personae of the two Greek gods Apollo and Dionysius.)

The involvement of psychic energies in relation to the specific emotional qualities is very different in the two modes (for example, experiencing grief in the Apollonian mode does not drain energy, but escalates energies of compassion). The Apollonian mode of experience is directly linked to the development of empathy, as contrasted with sympathy. (See Clynes [1977] for a study of the different functions of empathy and sympathy.)

VIRTUAL BODY IMAGES IN RELATION TO THE APOLLONIAN AND DIONYSIAN MODES

As one expresses emotion on the finger rest, and experiences a virtual body image of a particular emotion, say anger or love, the regions of the body involved in the virtual body image can be noted to have a geometric center, around which it is diffused. The feeling has a spatial extension, often an ellipsoid or lump-like shape, with vague boundaries. One can quite readily approximate a center for the space of the feeling as well as its approximate extension.

We may draw regional diagrams to denote the principal space of feeling for each emotional quality. Spatial differences of the virtual body images lie in

1. the place of the center of the space along the vertical axis of the body;
2. the extensiveness of the space;
3. the shape of the space.

Most virtual body images are related to the direction and magnitude of gravity. The heaviness of grief and lightness of joy are experienced in the direction given by gravity. Conflict between the virtual body image (which includes the influence of gravity) and the actual situation produces inhibition. This applies to both dynamic expression and the experience of the emotional state. (Thus, when one's body is floating in water, the virtual body image of anger or of grief, but not of joy, is in conflict with the actual situation.) Apollonian virtual body images center higher along the vertical axis than do their corresponding Dionysian forms.

In dreams, emotions are experienced as having virtual body images similar to those in the waking state. Just as we may dream of running, climbing, or falling, we also experience dream emotions with the same virtual body images, although our body is, so to speak, disconnected. The supine position of the body does not interfere in dreams with the experience of specific (dream) emotions as the same position would in the awake state.

CONCERNING THE EVOLUTION OF EMOTIONS AND THEIR COMMUNICATION

Studies of the genetic basis of behavior in animals show that innate releasing mechanisms in the communication of animals are largely genetically preserved, as are mating dances and songs of various species.

It is proposed, as essentic forms appear to be also genetically preserved, that a mutation process would jointly evolve a new essentic form with a new emotional state. As an example of such a development in evolution, we may cite laughter. The universal character of laughter within the human species makes it highly likely that it derives from a common genetic mutation and that

the specific experience of funniness with which it is linked evolved integrally with it. It seems absurd to suppose that the characteristic pattern of laughter evolved first and then by some further mutation the sense of funniness attached itself to it. Nor, vice versa, can laughter's quality be experienced without laughter's characteristic pattern. It is hardly likely that it could have been experienced earlier in evolution in the absence of the pattern of laughing.

What seems true of laughter appears to hold similarly from yawning to the more highly developed contagious patterns of emotional communication. Hunger and sex are very likely the first experiential entities evolved by nature that include specific knowledge. (Of these, sex already has communicative aspects and is probably the first contagious quality of experience evolved.) Hunger guides the individual in terms of what to eat, and how much, through the quality of its experience; sexual feelings guide individuals to choose mates for species survival. The specific nature of the feeling includes its own characteristic expression. If the coherence between the expression and the feeling were destroyed, survival could not take place.

The work outlined in this chapter represents a departure as a systematic theory of dynamic emotion communication, involving body and mind, and the study of the phenomena of emotional contagion. It is relevant to therapy, music, and art. Production and recognition of essentia forms are seen to constitute main elements of the biologic code of emotion communication.

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