

The background features several abstract purple geometric patterns. At the top right, there are thin, light purple concentric circles and intersecting lines. Below this, on the right side, is a larger, more complex pattern of overlapping purple shapes, including circles and curved bands. At the bottom left, there is another pattern of overlapping purple circles and lines. The overall design is minimalist and modern.

Biocultural Approaches to the Emotions

Alexander Laban Hinton

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Edited by

Alexander Laban Hinton

*Department of Anthropology
Rutgers University*



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5 Emotion and embodiment: the respiratory mediation of somatic and social processes

Margot L. Lyon

[W]e are everywhere faced with physio-psycho-sociological assemblages of series of actions. These actions are more or less habitual and more or less ancient in the life of the individual and the history of the society.

(Mauss 1973(1935):85)

Statements about “our lived experience of being embodied” need to be cashed in (as Husserl would say) for evidence that *shows* embodiment to be an experienced fact. Unless and until such experience(s) can be described, the metaphysical (and logical) disjunction between on the one hand an incarnate subjectivity – or lived body – and on the other a Cartesian metaphysics, will remain, and with it the problem of how “the mental” and “the physical” are in fact united.

(Sheets-Johnstone 1990:304)

Few bodily functions more beautifully illustrate the relationship between thinking and anatomy as does breathing.

(Lowry 1967a:3)

Emotion links social and and somatic processes

It must be acknowledged that the term embodiment speaks to physical as well as subjective and social processes. A conceptual framework which takes account of the bodily dimensions of social life is therefore necessary. It is this fundamental question of the embodiment of social life that is addressed in this chapter.

One path for the linking of bodily and social domains is through the study of emotion. Emotion may be understood as a complex construct comprised of a number of “components.” It is both embodied and social relational (Kemper 1981; de Rivera 1984; Scheff 1988) and as such, requires the exploration of the question of interrelationships between social and biological being. In a conceptualization of social life as structured relations (in particular historical and cultural contexts) between human bodies, emotion can be seen to inhere in and to be a product of those relations. Emotion thus has a com-

plex mediating role: it is implicate in social and bodily relations and, as a product of structured social relations, it is therefore foundational in the creation of society. Through an understanding of the place of emotion in social life, then, the role of the body as an agent in “world construction” can be clarified and elaborated.¹

The experience of embodiment is especially present when we *feel*, when we are emotionally engaged in the world, whether or not we are self-consciously aware of that engagement. In this chapter, one bodily capacity linked to feeling will be addressed. This is the respiratory capacity – breathing. The ways in which this bodily function (through both anatomical and physiological mechanisms) is always implicated in the mediation of subjective and somatic being in the context of social and cultural life will be considered. The chapter thus has as its aim the exploration, through the respiratory mechanism, of one dimension of the “somatic” basis of social life.

The relationship between body and society has been a theme in the works of some major theorists including, for example, William James and Emile Durkheim. Marcel Mauss, also, in his “Techniques of the Body,” took up the “strong sociological causality” revealed in our bodily actions (1973[1935]:85), addressing the influence of society, culture, and history on bodily being and action. For Mauss, the “habits” (*habitus*) of the body thus formed through this interaction “do not just vary with individuals and their imitations, they vary especially between societies, educations, proprieties and fashions, prestiges. In them we should see the techniques and work of collective and individual practical reason” (1973:73). Mauss calls for a triple viewpoint of biological, psychological and sociological facts and says that even if the action is primarily bodily or biological, it too is subject to the same forces of socialization, imitation, and authority that affect other aspects of social life. Mauss includes in his account the “habits” of breathing (1973:87). The phenomenologist, Buytendijk, following Plessner, similarly acknowledges in his notion of “encounter” the importance of the interrelationship of bodily action and social context: “The forms of (animal) movement are forms of behavior, since they carry visibly in themselves and ‘delineate’ the relation of the body to the environment and conversely of the environment to the body” (Buytendijk and Plessner quoted in Grene 1968:124). And, the work of the psychologist, William James (1950[1890]), whose writings were known to the French sociological school, was also concerned with the role of habit. James wrote on both the bodily and social bases of habit and argued for its importance in the maintenance of social order.²

Mauss’s concept of “*habitus*”, later much developed by Bourdieu (e.g., 1977), is important in its indication of the inextricability of bodily and social being, i.e., how the patterning of bodily processes is *part* of our social being. But his treatment of it remains unidimensional in so far as it fails to address

the mechanisms through which bodily and social being are intertwined.³ It is precisely the concept of emotion which can address this issue and thus extend and clarify Mauss's perspective on how the mechanism of "habit" may operate through a process much more complex than the concepts of imitation and socialization can accommodate.

The following material explores how respiratory function can be used to explore the import of emotion in bridging sociocultural and somatic processes. The remainder of this section outlines in brief the perspective on emotion which is taken in the discussion here, and introduces the topic of respiratory function. Section two provides background information on respiratory function and how the nature of respiratory control mechanisms underpin its role in both behavioral and physiological processes. Section three examines how patterns of breathing are linked to emotional agency, including particular examples which illustrate the relationship of respiration to the generation of subjective states in the context of culture and social life. The final section using the conception of "affective order", discusses how respiratory rhythms are one pathway for the continual modulation of emotion in the context of group life, and so are a crucial bodily pathway for the ordering of human social behavior. The chapter as a whole may be seen as a development of Durkheim's point regarding the emotional basis of social life and social action.

Bodily and social relational dimensions of emotion

Emotion is a hypothetical construct which, like the concepts of memory and perception, for example, is based on a number of classes of evidence which may be physiological, behavioral, interpretive, and so forth, and which may include data of many sorts from verbal reports to expressive behavior to peer-group reactions (Plutchik 1984:199). Emotion is thus often described as consisting of a number of components or dimensions both bodily and cognitive (e.g., Scherer 1984:294).⁴

When emotion is dealt with in terms of its social and cultural dimensions, there is a tendency in the relevant literatures to ignore the bodily aspects as irrelevant to analysis. The dominant approach in the social sciences is a social or cultural constructionist one which gives priority to the cultural and social construction of the *meaning* of emotions, the nature of emotional expression, and its control or governance. However, none of the components of emotion – including the bodily – can be understood in isolation from the others, nor can emotion be understood in isolation from the social context – real or imagined – in which it occurs. An adequate approach to emotion, then, should have a place for the various components as well as for how all of these are a function of social relations.

Emotion is integral to our very being. In evolutionary terms, our capacity for the experience, perception, and expression of emotion is associated with the development of increasingly complex forms of social relations. Indeed, the evolution of the affective system is a function of the mediation of social relationships, *not* a primitive relic of our “animal” past which has come to be submerged by “reason” in human evolution (Reynolds 1981:82, 38). Nor is emotion primarily a primitive urge, as Freud would have it, which when not suppressed or repressed, breaks through to disrupt social functioning. Rather, emotion acts to *organize* human behavior in complex ways, as Leeper (1948) argued early on, and as Scherer’s (1984) conception of the components and functions of emotion leads us to see.⁵ Further, emotions cannot just be seen as internal states but are a *function* of social relationships. Indeed, they can be viewed as social relationships (de Rivera 1984; de Rivera and Grinkas 1986).⁶

Most of social science cannot be said to be embodied in any real sense. Partly an historical product of divisions between the physical or biological and the social sciences developed in the late nineteenth and early twentieth centuries, such divisions contributed to the shaping of the empirical and theoretical boundaries of the various academic disciplines (Benton 1991). The continued elaboration of and privileged theoretical position given to concepts such as reason and culture in the social sciences both reflects and has ensured the dominance of a cognitivist perspective. The body is excluded from this except as it is socially or culturally constructed, that is, except in so far as it is the subject of thought. Thus, in sociology, an emphasis on rational and structural models has tended to override any impetus to ground them in or link them to bodily processes. In anthropology, the dominant cognitivist or ideational perspectives have meant that the concepts of symbol and of culture have been made to do the work of biological, psychological, and social perspectives (Geertz 1973; Shweder 1984), while leaving them inchoate within the concept of culture itself (Lyon 1995). Such cognitivist approaches have reduced concern with behavior in the larger sense and resulted in a deemphasis of bodily being, the preeminence given to the phenomenological roots of anthropology notwithstanding. When the body is taken up, it tends to be through culturally grounded ideas *about* the body. In anthropology, especially, both body and emotion are frequently subsumed within the culture concept and treated only as productions of culture.⁷

This is not to say that some form of reembodiment of social and anthropological theory has not been a matter of concern in the social sciences. Dennis Wrong, a sociologist, argued as long ago as 1961 for the significance of the human body in the understanding of social processes. The anthropologist, John Blacking, at a conference on the anthropology of the body in 1975, called for an expanded study of the body in the social sciences (Blacking

1977). And, the body has recently reemerged in scholarly writing in structuralist, feminist, and post-modernist accounts (Frank 1990). However, explanation about the body in the social sciences tends to continue to divide along the axis between approaches grounded either in material, biological explanation, or in social and cultural explanation, rather than on the exploration of interrelationships between them in a theoretically productive fashion.⁸ This has worked to prevent an adequate consideration of the importance of body *qua* body in social and anthropological theory. The body continues to be treated either as a bounded physical entity, or as a social artifact, rather than as both subject and active agent in the creation of social processes and institutions.

A parallel conceptual division also pervades accounts of emotion. Although there is a growing awareness of the importance of emotion in social life, and emotion is increasingly the object of anthropological and sociological interest (e.g., Lutz and White 1986; Thoits 1989), the emotions literature is frequently organized in terms of a distinction between so-called positivist and constructionist, or universalist and relativist, perspectives. The persistence of the organization of debate along this divide, Kemper's (1981) clarifications notwithstanding, is evidence of a failure in our models of emotion to come to terms with bodily agency.

A bodily example

It is one thing to say that emotion makes possible the conceptualization of how physical being is implicate in social being and vice versa, but a demonstration of this as an ongoing process is more difficult. This task is approached here through a discussion of one particular bodily process, respiration, and how it is implicated in the generation and experience of emotion in social contexts, and how the experience of emotion, in turn, acts back on respiratory functions; for respiratory capacities and emotion are clearly linked.⁹ Respiratory patterns are associated not only with internal physiological regulation but with the generation and regulation of feeling states, as well as with the expression of feeling and its communication through various types of movement and vocalization. Through a consideration of examples drawn from the literature on respiration, this chapter seeks to provide a case of how "consciousness" (inclusive of "feeling") may be located simultaneously in the organism and in society and culture, and thus is a basis for understanding the integration of bodily being with social experience and its place in the ordering of social action. Respiration provides a confined domain in which to explore this relationship.

Of all the particular capacities of the body, breathing is unique in that it is the only one which is simultaneously under both autonomic and "conscious"

control. For this reason, respiratory function is subject to modulation through either of these channels at all times. This modulation is mostly below the threshold of awareness, and varies complexly in reference to internal physiological factors, environmental factors, type and level of physical activity, and individual and group aspects of subjective social experience. The “dual control” of respiration means that particular patterns or styles of breathing may – in their appropriate social and cultural contexts – come to be differentially associated with particular types of subjective experience. These patterns may be habitual or voluntary, activated directly or indirectly, and be used consciously or unconsciously. Although they are observable primarily in cases of unusual behavior or states, e.g., in trance or ecstasy, the relationship between respiratory patterns and subjective experience is a basic feature of how our bodies function. It is part of the “background” of our bodily being and is implicated in the very basis of social organization.

The purpose of this discussion is not to reduce feeling to respiratory function, nor is it to match particular respiratory patterns and specific experiential states. Indeed, these are not fruitful directions of enquiry, for although there is a physiological dimension to every aspect of being, behaviour can never be reduced to physiological processes (Buytendijk 1950:127).¹⁰ Thus, I am not concerned with the attempt to simply locate explanation about human social behavior in biology, nor to reduce experience and feeling to concepts such as arousal¹¹ or other states thought to be linked to particular breathing patterns or techniques. Rather, I am concerned with how to simultaneously represent, through emotion, both physiological phenomena and the experiential and active dimensions of those phenomena within the sociocultural context in which they occur.

I thus use the interconnectedness of emotion and respiratory patterns to demonstrate emotion’s simultaneous role in linking physiology and society, bodily and social-relational experience. Our bodily being – which takes its forms in terms of its basic capacities for sociality and the establishment of social relations – is crucial in the constitution of society. The interrelationship between respiratory function and emotion is part of that bodily being and thus part of the genesis of “social order.”

Respiration, feeling, context

Respiration serves both behavioral and metabolic functions

It is of interest that spirit and breath are represented by a single term in many languages, giving unitary conceptual form to the complex interrelationship of breathing, consciousness, and feeling. In Greek, for example, *psyche* includes both breath and mind, as does the related term *pneuma*.¹² In Sanskrit,

prana encompasses both breath and soul. In many other languages, terms for breath are closely associated with terms for feeling and emotion (e.g., Onians 1954; Wellenkamp 1988; Roseman 1990). The interrelationships of ‘mind’, emotion, and breath which figure in such linguistic conceptions mirror the complex anatomical and physiological connections that in fact link the human respiratory system and other bodily systems. These interconnections can be understood partly through the fact that the respiratory, cardiovascular, and other organ systems all ‘share’ innervation through the autonomic nervous system, and this system, along with the limbic and hypothalamic areas of the brain, is also of key importance in emotion.¹³ Variations in breathing patterns are thus linked to variations in feeling states, both processes being mediated by the autonomic nervous system. Emotional expressivity is also associated with autonomic changes. Ekman *et al.* (1983) have shown that certain changes in facial expression, for example, even quite mechanically generated ones, correlate with different patterns of autonomic activity. Similarly, the work of Lanzetta has demonstrated that there is a correlation between increased autonomic activity and increased facial expressivity (Lanzetta *et al.* 1976 cited in Brown 1991:26).¹⁴

Respiration provides a framework within which to address the simultaneity of behavioral and autonomic processes, for respiratory mechanisms are harnessed to both autonomous, internal processes and external, socially mediated processes. This happens because respiration is under *both* ‘voluntary’ and autonomic or ‘involuntary’ neural control. The skeletal muscles attached to ribs and between ribs and sternum, which serve to raise and lower and thus expand or contract the rib cage to draw in or expel air, are subject to voluntary control, as can be experienced by intentionally taking a deep breath or holding the breath. These muscles are also innervated by branches of the autonomic nervous system which further provides the major innervation of the smooth (rather than skeletal) muscle of the diaphragm. Breathing is thus also ‘automatic’ as can be experienced by remembering that we do not have to think to breathe. Respiration is the only autonomic function of the body so mediated. Breathing thus serves both metabolic and behavioral systems (Plum 1970:159). Particular respiratory patterns can come to be associated with particular feeling states both by convention and by conditioning, and can be used in the direct manipulation of physiological and subjective states. Further, respiratory patterns and their accompanying manifestations are communicative in both a surface and a deeper sense. They can reveal to an observer clues as to the physiological and subjective state of the person. They are also one of the chief mechanisms mediating the establishment of common interactional rhythms and synchronous behavior in groups.

The point here is that breath is one pathway through which this interrelationship between body, emotion, and social being is constituted and through

which it can be explored. It provides an ideal example in that the respiratory function is fundamental to being, i.e., is at all times engaged, and is at all times a reciprocal pathway of communication between bodily and social being. It is implicated in the production of speech, song, all forms of bodily movement, facial expression, and so forth. Respiratory patterns thus cannot be isolated from the wider bodily and psychosocial context of which they are a part. The shared neuroanatomical links with emotion make clear the intimate connections between respiratory patterns and subjective experience without necessitating a concern with arguments about specificity of those relationships. However, this implicate relationship is so much part of our being, both physical and sociocultural, and is so rarely within our conscious awareness, it is difficult to consider at all. The fact that ventilation patterns are continually responding ‘‘automatically’’ as well as being acted on, modulated, or manipulated through our actions within various sociocultural contexts, makes it even more difficult to represent.

Respiratory physiology

A brief introduction to the physiology of respiration is provided here as background for subsequent material on the implications of the control and conditioning of respiratory patterns in social context. The physiology of respiration has been well described. Respiration provides for the regulation of gas exchange which provides a supply of oxygen adequate to the metabolic needs of the body and which removes excess carbon dioxide produced in those metabolic processes. The air moved through the lungs comes into proximity to venous blood moved through the lungs by the circulatory system so that gas exchange can take place. Normal breathing (termed eupnoea) is that which meets metabolic demand for the supply of oxygen and the removal of carbon dioxide in reference to the level of activity of the body.¹⁵

Carbon dioxide, however, *not* oxygen, is the primary stimulus in the functioning of the respiratory system. That is, raised or lowered carbon dioxide levels¹⁶ cause physiological responses. Even small increases in carbon dioxide levels, as for example in underbreathing, cause an increase in ventilatory response (Slonim and Hamilton 1976:133). Thus, if we try to breathe shallowly and infrequently or hold the breath, we eventually experience a powerful urge to take a breath. This urge is due to the build up of carbon dioxide, rather than the lack of oxygen, and the effects this increased carbon dioxide level has on the nervous system. The threshold for hypoxia, oxygen deprivation, is very high and has little effect on ventilation. This can be (dangerously) demonstrated by rebreathing expired air in a closed system in which carbon dioxide is continually removed or absorbed by a chemical filter, e.g., using a gas mask such as used to be commonly available in army surplus

stores. In the absence of a build up of carbon dioxide in the rebreathed air, there is little sense of oxygen deprivation until hypoxia is well advanced (Slonim and Hamilton 1976:136–140). However, the resultant hypoxia will eventually cause increasing impairment of function and ultimately unconsciousness. This was dramatically demonstrated on camera by Jonathan Miller in an episode of the British documentary series “The Body in Question,” during which Miller used a closed gas mask with carbon dioxide filter to demonstrate his progressive loss of function and eventual near loss of consciousness.

Ventilation in excess of bodily metabolic requirements, that is overbreathing, is termed hyperventilation or hypocapnia (from capnos for smoke referring to carbon dioxide as a byproduct of burning). Contrary to popular understanding, hyperventilation does not result in too much blood oxygen, but rather a lowered level of carbon dioxide. The overbreathing “washes out” carbon dioxide and results in a reduction in blood carbon dioxide levels, leading to a decreased partial pressure of carbon dioxide (partial pressure means the amount of one gas relative to that of other gases) in arterial blood. The blood partial pressure of oxygen is only slightly increased in this process. If hyperventilation continues, body tissue stores of carbon dioxide are also reduced.¹⁶

Effects of overbreathing are rapid and diverse. Most of us have subjectively experienced minor effects of hyperventilation such as dizziness or a sense of lightheadedness when blowing up a balloon or some other inflatable object. The repeated long exhalations used in inflation brings about a reduction in partial pressure of blood carbon dioxide which in turn acts on the nervous system to cause vasoconstriction of both arteries and veins supplying blood to the brain, particularly the neocortex. This leads, in effect, to a mild form of hypoxia, but a brain hypoxia associated with changes in circulation rather than with a deficiency of oxygen in inspired air. This vasoconstriction can be immediate, commencing after only a few seconds of prolonged exhalation, and is mediated by the central nervous system on which the carbon dioxide acts. Thus, carbon dioxide levels are associated with the control of cerebral blood flow, particularly to the forebrain (Lum 1976:203).¹⁷ The subjective experience or expression of emotion often associated with periods of hyperventilation is thought to be facilitated by lowered cortical control associated with reduction of blood flow to this area.

The regulation of gas exchange is under the control of the central nervous system, i.e., the brain and spinal cord, as well as the peripheral nervous system including the autonomic nervous system. The autonomic nervous system originates in the brain in the hypothalamus and branches into two parts as it leaves the spinal cord, the sympathetic and parasympathetic chains. The autonomic system is responsible for the motor innervation of the heart,

lungs, diaphragm, digestive tract, other viscera as well as glands and hair follicles. As was noted above, the control of the respiratory system can be seen to be "automatic" in response to internal signals mediated in the lower regions of the brain, including the response to blood carbon dioxide levels. Control of the respiratory system is further subject to behavioral influences which are also mediated by autonomic pathways as well as higher centers of the brain (Plum 1970; 1974).

A discussion of more specific mechanisms of control cannot be attempted here. What is important is that respiratory patterns are determined by complex mechanisms involving both behavioral and neurochemical components.¹⁸ The neural centers implicated in basic functions such as respiration are also important in such processes as emotion, awareness, memory, learning, sensation, and motor control. Plum notes, for example, that in healthy, awake individuals, the cerebral hemispheres do much to control breathing rhythm and depth even when metabolic stimuli vary or are removed (1970:166).¹⁹ This control of breathing is necessary in order to produce and maintain speech, for example, and is also involved in laughing and sobbing (Plum 1974:208).²⁰ It is the example provided by the behavioral implications of these interconnections which is of concern here.

Subjective associations of variations in respiratory patterns

Attention to the interrelationship between respiration and emotion appears primarily in literature drawn from medicine, psychology, and psychiatry. Its minor import in social science sources will be taken up in Section three. The clinical bias of the former literatures exerts particular constraints, orienting discussion toward problems of the definition and delineation of abnormal states, i.e., the association of abnormal respiratory patterns with what are defined as physical or psychological pathologies. Much of the emphasis is on the parameters of particular ventilatory forms such as hyperventilation and its frequent association with anxiety or panic states, as well as a wide range of physical manifestations. However, the very considerable clinical literature on hyperventilation is useful for the purposes of this chapter in that it addresses the question of the interlocking of respiratory functions and emotion.

As already noted above, the neurophysiological relationship that exists between respiratory stimuli and emotion is partly mediated by the brain and the peripheral nervous system, particularly the autonomic nervous system. Also mentioned was the fact that while the latter is responsible for the routine control of the body's physiological adjustments including heart rate and respiration, it is also associated with what is frequently termed emotional arousal (LeDoux 1986:308). Indeed, the autonomic nervous system and the endocrine

system, along with the brain, are the principal physical mechanisms governing emotional response. It is the role of the autonomic nervous system in the mediation of the respiratory drive, via its various connections with other parts of the brain and peripheral nervous system which in turn act on endocrine secretions, which “provides the pathways necessary for the inclusion of altered breathing as part and parcel of emotional experiences” (Johnson 1967:44).

Explicit discussion of relationships between physiological and emotional dimensions of respiration is to be found primarily in the clinical literature on hyperventilation. This tends to divide into work concerned with the definition, description, and differential diagnosis of hyperventilation, and that concerned with delineating what is often termed “hyperventilation syndrome,” that is, habitual hyperventilation, considered as indicative of some form of neurosis, primarily anxiety states.²¹ Linked to this literature are studies of catharsis and abreaction, also concerned with physiology and the experience of emotion.²² The concern here is not with debates about the identification and classification of possible syndromes but with the identified effects of hyperventilation.

The particular range of effects associated with overbreathing was first described in the respiratory physiology literature by Haldane and Poulton in 1908 (Bass & Gardner 1985:602; see also Johnson 1967 for a review). The subject also has a long history in medical literature (e.g., Kerr *et al.* 1937; Engel *et al.* 1947). However, according to Lum (1976), despite this considerable early and detailed work, contemporary medical texts rarely include adequate accounts of the wide range of signs – both subjective and observable – associated with hyperventilation. Rather, emphasis tends to be given to the rarely observed acute manifestations, with other signs and symptoms glossed under terms such as “anxiety state” (Lum 1976:196–197) or “panic attacks” (Bass & Gardner 1985:605), thus severing them from their association with patterns of respiration.

Further, because of the simultaneous voluntary and involuntary aspects of respiration, attempts to clinically determine in any precise and refined way an association between overbreathing and particular signs or symptoms cannot be successful. The intentional clinical reproduction of symptoms through forced breathing generally relies on the presence of “the classic triad” of signs associated with hyperventilation (“massive overbreathing, paraesthesiae and tetany” [Lum 1976:375]). Yet the acute signs are, according to Lum, merely the “tip of the iceberg” of a phenomenon that affects at one time or another a significant percentage of the population, as most cases do not present with the signs typical of acute hyperventilation.²³ In an editorial in the *Journal of Psychosomatic Research*, Lum states that the actual signs are frequently unrelated to those thought to be typical of hyperventilation and “may affect any part of the body, and any organ or any system” (1975:375):

“Symptoms may show up anywhere. . .for we are dealing with a profound biochemical disturbance, which is as real as hypoglycemia and more far-reaching in its effects” (1975:375).²⁴ It has been suggested recently, for example, that overbreathing may be linked to the symptoms widely associated with chronic fatigue syndrome, with depression, and other common syndromes or disorders.

The various signs or symptoms associated with overbreathing are thus so diverse as to make their summary difficult. A selection of terms associated with its effects are as follows: weakness, malaise, a sense of impending doom, excitement, apprehension, light-headedness, feelings of unreality (floating), dizziness, ringing in the ears, blurred vision, feeling faint, tightness in the chest, inability to breathe deeply, frequent sighing and yawning, palpitation, precordial pain, tightness in the throat, dry mouth, epigastric distress, tingling and numbness in extremities and face, muscle cramps especially in the hands and feet, twitching tremor of extremities, cold moist hands and feet, and so forth (see Johnson 1967:92; Lum 1976:220–224). Symptoms reported, for example, by a study group of military recruits diagnosed as being hyperventilators were: feeling short of breath, difficulty in talking, feeling of breathing “too much,” feeling excited for no reason, face numb or tingling, hands tight and hard to open, feeling that everything is unreal, crying for no good reason, laughing for no good reason, tongue numb or tingling (Lowry 1967c:111).²⁵

Though the clinical literature tends to give emphasis to negative correlates such as anxiety or panic, Lum argues that in fact anxiety is quite often the product of hyperventilation itself which may be triggered by any number of other factors which go unrecognized by physicians (Lum 1975:380). For example, it has been suggested “that the loss of voice seen in singers and their conditions of anxiety and stress may be due to hyperventilation” (Lowry 1967b:16). Or, the association of hyperventilation with crying observed in children who “thinking tears were warranted but finding them not quite spontaneous, facilitate crying by taking a few deep breaths” (Lowry 1967b:15–16). Further, triggers for hyperventilation are “not necessarily associated with fear or anxiety” (Lum 1976:198): “Laughter, pleasure, excitement or animated conversation may all do it – even watching the television. Likewise exertion or the malaise of real physical illness. (Lum 1976:198). The point here is that the diversity and range of signs associated with overbreathing provide a clear indication of the variety of physiological and subjective experiences associated with variations in respiratory patterns.

The dominant orientation of the clinical accounts referred to in the above section is, of course, psychological. There are, however, other sources through which to broaden our inquiry. These provide for a better understanding of how basic respiratory functions, through emotion, are implicate in

bodily being *and* social being, that is, how “emotional being” is constructed within the larger social and cultural context. Such an extension contributes to the further understanding of the embodiment of social processes. The following section takes up some of the ways in which respiratory capacities come to be structured or patterned in social and cultural context.

Respiratory function, bodily agency, and emotion in socio-cultural context

Habits of the body

Viewing respiratory patterns as “habitus” in Mauss’ terms, we understand that what the clinician seeks to see as symptom of disorder may equally be seen as habit of behavior given form and expression in particular social, cultural, and psychological contexts. At the individual level, even the maintenance of a particular level of blood carbon dioxide is subject to habit. Lum, for example, cites borderline overbreathing in some individuals which acts to keep carbon dioxide levels low such that “any physical or emotional disturbance may trigger off a chain reaction of increased ventilation, rapidly producing hypocapnic symptoms, alarm engendered by the symptoms, consequent sympathetic arousal resulting in increased ventilation and increased symptoms” (Lum 1975:380). With repetition, the association between a particular context or stimulus and overbreathing may with repetition take on “the characteristics of a conditioned reflex” (Lum 1976:198). Even an individual’s very sensitivity to carbon dioxide may be altered by conditioning and thus a factor in hyperventilatory experience, as evidenced by patients who have breathing abnormalities associated with anxiety symptoms, and for whom “their hypersensitivity appears to be a disorder of conditioning rather than a biochemical alteration” (Brown 1991:171).

Such habits may be a function of social and cultural forces as well, for patterns of breathing are highly adaptable and readily formed. For the child, breath control is an important part of learning the forms of motor behavior necessary for communication through speech as well as other forms of expression such as song, whistling, etc. This learning is accomplished in ways that are appropriate to the particular psychosocial as well as sociocultural context in which that child exists. As breathing is under voluntary control, “[w]e may stop, start, vary rate, depth and rhythm, and use either diaphragm or thorax at will. The natural pattern of breathing may therefore be modified by voluntary control and training, and moulded to the dictates of custom, convention or erroneous ideas of ‘health’ and physical fitness” (Lum 1976:219). The puffed out chest characteristic of military training, for example, encourages overbreathing through excessive use of the thorax, a

“type of breathing more appropriate to exertion, stress or anxiety,” but which with continual use “will become as effortless and unconscious as the acquired skills of riding a bicycle, swimming or skating” (Lum 1976:219). The habits of breathing thus entail a reciprocal relationship between body and behavior in sociocultural context; they are a unified feature of being, but one subject to modulation in both “directions.” This requires a return to the question of the relational nature of emotion and the importance of the body in that process.

The “capture” of bodily capacities by emotion (and vice versa)

Tomkins states that “[t]he breathing mechanism is continually being captured by the prevailing affective responses” as the “breathing patterns of normal human beings are continually modulated by such affects as fear, joy, depression, grief, startle, distress and anger” (Tomkins 1962:48). This process, as Tomkins emphasizes, is an ongoing one. It is part of the “background” of being. Tomkins could as well have stated it in the reverse, that is, that changes in breathing patterns are associated with the generation of affective responses. The bodily experiences associated with alterations in respiratory patterns are therefore *part* (whether explicitly labeled as such or not) of the embodied awareness of one’s subjective state in any relational context, i.e., an aspect of emotion (cf. de Rivera 1984; James 1950 [1890]). Further, the dual control of respiratory capacities already described means that particular techniques of breathing may be used in the facilitation of affective responses and thus of particular types of emotional experience.

The question of the relationship of the bodily components of emotion to emotional experience has theoretical implications which must be acknowledged here. The bodily and perceptual components of emotion cannot in fact be separated from *within* the domain of social action, for together they are partly constitutive of that action. The emphasis on the bodily aspects of emotion requires a reconsideration of ideas which are generally linked to William James. James associated the feeling of emotion with the bodily changes which accompany or follow the perception of some exciting fact (James 1892:375); for example, the sense of heartswelling or tears on listening to poetry or drama or music which moves us, or the sense of one’s heart stopping or the breath catching when faced with something frightening. Such bodily changes seem to precede or be simultaneous with the perception of being moved. The experience of bodily awareness which may sometimes precede conscious awareness of a particular emotion and the process of its interpretation can be illustrated by recalling an instance of the experience of strong emotion which was apparently objectless. A common example is the rush of feeling triggered by some stimulus such as a particular odor or sound,

which we can only later associate with some past charged event or relational context. Such an approach to emotion sees “that an emotional state is, fundamentally, the awareness of changes in the state of the body” (Papanicolaou 1989:xiii). James’ approach and its linking with the work of Lange, the so-called James–Lange theory, has frequently been dismissed in favor of more “cerebrocentric” theories. Papanicolaou, who reexamined James’ model in the light of later evidence, found James’ work to be supported (albeit in a somewhat modified form), and found the distinctions made between James’ theory and the so-called Cannon–Bard theory (e.g., Cannon 1928) to be grounded in misunderstanding. Papanicolaou recast James’ theory as what he termed a “somatic theory of emotion” giving place to *both* peripheral bodily and central sources of emotion: “‘Somatic’, because the object of any emotional experience is the flesh in commotion and not because the brain is any less necessary for instigating that commotion and monitoring it than it is necessary for sensation, movement or external perception” (Papanicolaou 1989:xiv).²⁶ The relevance of this here is that such a model can be easily extended to encompass the sociocultural components of the process. The role of the respiratory capacity in the genesis and experience of emotion as explored here supports the importance of such an integrated approach.

The modulation of breathing is thus a bodily capacity closely linked and fundamental to human emotional capacity. It has an important role in almost all areas of human activity including major communicative acts such as talking, crying, singing. Even in sleep, this relationship is said to pertain: “Asleep as well as awake, man’s breathing reflects his emotional state. If something absorbs his interest, his breathing reflects his excitement” (Slonim and Hamilton 1976:142). “Indeed, the respiratory system is a major mode of expression for a variety of feelings. The breath-holding of temper tantrums or anger; the singing, humming, or whistling of happiness; the sighing of passion; and the sobbing and crying of sorrow or grief are only a few examples” (Slonim & Hamilton 1976:142).

*Some culturally mediated examples of the relationship between
respiratory patterns and subjective states*

Particular respiratory patterns are, of course, implicated in any type of organized bodily movement including those used in speech and song, dance, marching, work practices, etc. These patterns, then, are one medium through which to investigate the embodiment of social and cultural life including its affective dimensions. However, as already noted, most sources which explicitly deal with the relationship between breathing patterns and emotion tend to be focused on what are viewed as abnormal physical or psychological states, with the abnormality seen to be located either in incorrect breathing

patterns or in psychological states which are thought to be affecting or altering respiratory patterns. Anthropological accounts and other non-clinically oriented accounts which happen to include description of respiratory patterns tend to focus on the implications of specific techniques of breathing for the intentional achievement of particular subjective states in the context of group expression as for example in studies of certain types of religious behaviour, healing, music, dance, or trance. The emphasis is thus on how manipulation of the respiratory capacity may be used to facilitate the experience of particular subjective states.

The relationship between respiratory patterns and emotion is most easily observed in those sociocultural contexts in which the experience of unusual states is facilitated and made manifest. These states may be consciously attributed to the use of a particular technique of breathing or simply to some organized action which acts to establish some respiratory pattern. Examples can be found in contexts involving heightened emotion such as conversion or possession rituals, trance, or practices involving states of calm or quiet as in certain meditation traditions. An obvious example of the latter are the Asian yogic and other meditative techniques in which breath regulation is highly developed.²⁷ Most studies of meditation techniques have emphasized their psychological effects – the reduction of arousal and the facilitation of calm or restful states. Many yoga practices involve slow, near vital capacity breathing techniques with a pause after both inspiration and expiration. It has been demonstrated that “voluntary slowing of respiratory rate of subjects under stressful conditions reduced physiological arousal” (Bass and Gardner 1985:606). Another study supported yogi masters’ claims that a form of “slowed respiration – that is rapid inhalation followed by slow exhalation at a reduced respiratory rate – was an effective technique for reducing physiological arousal when anticipating and confronting a threat” (Bass & Gardner 1985:606; see also Gellhorn and Kiely 1972:402–404).

Although a general association between levels of arousal and breathing patterns pertains, particular subjective states cannot be matched with particular breathing techniques and their respective autonomic correlates. Subjective states are simultaneously a function of many factors including sociocultural context, psychological factors, etc. Further, no single physiological variable can be said to correlate with any particular level of arousal (Stein 1967:148).²⁸ Even the equation of underbreathing and overbreathing with the reduction and enhancement of arousal, respectively, is crude as is apparent from detailed studies done on meditation (e.g., Gellhorn & Kiely 1972:402; Cappo & Holmes 1984; Schwartz *et al.* 1978; Wallace 1970).

The obverse of techniques of breath control used in meditation for the lowering of arousal are those which aim to enhance emotional arousal, frequently in pursuit of some expressive state. Many Western, somatic-based,

emotive therapies which emphasize the efficacy of emotional expression, such as Reichian²⁹ or so-called "neo-Reichian" or "neo-gestalt" therapies, explicitly utilize particular breathing techniques, primarily hyperventilation. A deep, rhythmic combination of diaphragmatic and thoracic breathing is used, for example, in "rebirthing" and "primal therapy" to facilitate the recall or reexperiencing of emotions and the open expression of these. "Connected breathing," "holotropic breathing," and "pneumocatharsis" are popular terms which have been used for such techniques.³⁰ Such therapies are frequently grounded in "hydraulic" models of emotion emphasizing the necessity of emotional release or catharsis. The facilitation of emotional experience and expression seems to operate through the effect of overbreathing on blood carbon dioxide levels which triggers vasoconstriction, leading to a reduction in blood flow to the forebrain and therefore a reduction in neocortical control. The facilitation of emotional expression apparently results from less effective neocortically based monitoring, thus lessening the ability of the conscious mind to "override" or integrate emotion within everyday action, enabling a more focused and intense experience and expression of emotion. However, any examination of such techniques and exploration of the bases of their efficacy needs to be undertaken within the study of the larger social and psychological contexts in which they are used.

There are many other relatively mechanical uses of particular breath techniques which could be mentioned in reference to subjective changes. The Lamaze method of breathing used in childbirth to help control pain and facilitate uterine contractions is one of these. Women using the technique commonly report unusual sensations and feelings which may be associated with autonomic changes induced by lowered blood carbon dioxide. It should be noted also that over- or underbreathing is always subject to individual manipulation, including that done intentionally for particular social effects. Charles Darwin and Florence Nightingale, for example, are both said to have exploited the effects of overbreathing to bring on apparent states of syncope or collapse (Lum 1975:220 citing Pickering 1974).

In reference to group phenomena, many forms of ritual illustrate the importance of alterations in respiratory patterns in the generation of group feeling. Accounts which comment directly on bodily aspects of ritual activity are generally concerned with a search for some explanation for what are seen to be unusual states such as ecstasy and trance. William Sargant, a psychiatrist interested in religious behavior, for example, addressed the use of overbreathing and other "physiological weapons," as he termed them, in religious conversion and possession states: "Fasting, chastening of the flesh by scourging and physical discomfort, regulation of breathing, disclosure of awesome mysteries, drumming, dancing, singing, inducement of panic fear, weird

or glorious lighting, incense, intoxicant drugs – these are only some of the many methods used to modify normal brain functions for religious purposes” (Sargant 1957:79). In *The mind possessed: A physiology of possession, mysticism, and faith healing* (1973), Sargant documents instances of overbreathing in various ritual contexts such as the rhythmic overbreathing used by men of the Samburu and Mole tribes in northern Kenya to bring them to a state of trance during dancing, and the chanting and overbreathing techniques among certain Arabic peoples for trance purposes, the effects of which he compares to those induced by hyperventilation in Western patients (1973:115–118). In a further example, he discusses practices associated with Pocomania, an African-Christian sect in Jamaica and Barbados, who use “tromping” or rhythmic overbreathing in order to “bring down the Holy Ghost” (1973:166). Sargant’s studies stress the importance of emotional excitation and its resolution in forms of abreaction often leading to collapse.³¹ He notes: “Some sects pay more attention than others to a direct stirring up of emotions as a means of affecting the higher nervous system; but few wholly neglect it” (1957:79).

Studies of healing rituals among the !Kung provide a clear example of the use of overbreathing (Katz 1982). Katz sees the breathing and other techniques of the rituals as generating the transformation of consciousness considered necessary by the !Kung for obtaining healing power (1982:345).³² The dancers exhibit rapid deep breathing with long exhalations, show trembling and tetany, and are reported to experience sensations of searing pain in the area between the diaphragm and the waist, to feel light, tremble, and feel fear. Katz says that “!Kia intensifies emotions, be they fear, exhilaration, or seriousness” (1982:349).

Such states constitute more dramatic examples of the interrelationship of bodily action and affective states in social and cultural context. What is important, however, is that this is a general phenomenon. The role of the establishment and use of common respiratory rhythms in group action is evident in any number of social and cultural contexts. Almost any type of patterned activity that involves organized co-action provides the opportunity for common bodily and affective experience. Roseman, writing on healing rituals among the Temiar, rainforest dwellers in peninsular Malaysia, describes the beating of bamboo tubes which resonate with or mimic bodily and natural rhythms, the effects of which include entrainment or synchronization of bodily rhythms. The sound, she says, “gains affective power through its rootedness in the rainforest and the body” (Roseman 1990:241). The synchronization of bodily rhythms including respiratory rhythms could be sought in many other forms of song and chanting. Also, the bodily postures used during song or verbal praise have an effect on respiratory function. For example, in many Christian services, the raising of the arms to reach up and

out during singing or praise has an effect on posture and chest capacity and encourages a deeper and more open breathing pattern which, in that context, may have important implications for subjective experience.³³

The above examples provide clear evidence of the relationship between emotion and variations in respiratory pattern in particular sociocultural contexts. As has been seen, this interrelationship functions generally, not just in special ritual or therapeutic contexts. The relationship between respiration and emotion is foundational and always operative. It is further embedded in other bodily attitudes and thus part of the “background” of our being in the social world. The role this association plays in the establishment and maintenance of social relationships must therefore be acknowledged.

The body and “affective order”

The overall aim of this chapter has been to demonstrate the interlocking relationship between respiratory function, emotion, experience, and action in the context of social life. The first section of this chapter established the study of emotion as a means for conceptualizing the links between bodily and social being. It proposed the examination of how one bodily mechanism, respiration, functions within ongoing social processes in the generation of subjective states, and so is materially implicate in the creation of society as “social fact.” The second section (“Respiration, feeling, context”) used a variety of scientific literatures to explain the main features of the functioning of the respiratory mechanism. Section three explored the implications of respiratory patterns in the generation of emotion and subjectivity in sociocultural context. In view of the social-relational ontology of emotion, that is, that it is *generated* in the context of ongoing social life, it is possible to make some further general points about the central place of bodily agency in the generation of subjective experience. Respiration has been explored in terms of how it is shaped (consciously or unconsciously) in structured activity, and how it shapes individual and group response, and in so doing is implicated in our engagement with the world and in the very creation of that world. This final section addresses this latter issue through drawing out some additional points using the notion of synchrony and introducing the concept of an “affective order.”

References to the structuring or patterning of respiratory function in the context of social relations (and cultural life) can be seen to bear some relationship to discussions of the concepts of rhythm and synchrony in studies of non-verbal communication, in the micro-analysis of interaction, and in physiological sociology more generally (e.g., Byers 1976; Davis 1982; Hall 1983; Barchas 1976; Barchas & Mendoza 1984; Kiritz & Moos 1974). Such studies hold that social life has rhythmic properties. Rhythm in this sense is

a form of temporal patterning grounded in both biological and social functions. It is a property of structures, not an entity in itself (Mathiot & Carlock 1982:176), that is, it is a property of groups. "Rhythm produces the expectation of continuity and changes in rhythm signal new experiences" (Brown 1991:45). Byers sees the notion of rhythms as a conceptual tool. For him, rhythms "are process, and they are relationships" (Byers 1982:139). What is important here is that what is termed rhythm must also be seen in terms of how it is grounded in bodily functions and bodily action, including respiration, heart rate, endocrine system function, etc., as well as the myriad forms of organization of bodily movement, posture, the generation of sound, and so forth.

My argument is thus not merely oriented to how respiratory functions aids in the establishment of interactional rhythms, although in fact respiratory corhythm is an important function of group interaction. Breathing rhythms of group co-members *do* come to be in some synchronous relationship to a dominant rhythm (Johnson 1967:71). And, this synchronous relationship has important communicative functions, both in itself, and because it is implicated in other aspects of behavior such as speech rhythms and intonation patterns as well as movement. But the concern here is to formulate more clearly how emotion is implicated in the mediation of bodily and group processes. Given the intimate interrelationship between respiratory function and emotion, the process of the establishment of the respiratory co-rhythms has obvious affective consequences (and vice versa). The particular respiratory rhythms and their affective consequences are thus a function of the structure of the social relationships to which they pertain, for persons in relation are also bodies in relation (Collins 1981). Significantly, however, such a view does not restrict inquiry to the level of small group or face to face interaction. It can pertain at any level of social relationship, for emotion is part of, is embedded in, the act of being in relationship itself. In emphasizing the place of emotion in social life in this way, one can avoid an implicit reliance on a consensus model of social organization.³⁴

As has been demonstrated in preceding sections, the modulation of respiratory function in any context is intimately connected with emotional experience whether or not that experience is consciously perceived. It has been seen that respiratory patterns may be structured within particular emotional contexts, and that alterations in respiratory patterns also act in the generation of the experience of emotion. This experience is only partly explained by the concept of arousal, although the use of particular respiratory patterns in the context of social and cultural action, as in music, dance, vocalization, etc., is one of the chief bodily mechanisms facilitating arousal, just as changes in levels of arousal may result from a person's negative or positive perception of their position in a social setting and so effect changes in respiratory and

other bodily functions. Alterations in respiratory patterns thus may be seen to be one of the most important bodily mechanisms through which physical and emotional being are shaped or “tuned” in the context of social relations. This mechanism, implicated as it is in the ongoing forms of action that constitute social and cultural life, is therefore fundamental in the establishment and ordering of social relationships at the material level. That is, it is a fundamental aspect of – and mechanism for – the interlinked and reciprocal ordering of bodily, social, and cultural being.

Emotion organizes human behavior, and it does so in ways that go beyond what may be understood through concepts such as motivation. Durkheim saw that action in groups engendered what he termed a “moral force.” Such a force, for Durkheim, is partly grounded in emotion, i.e., emotion which has its origins in particular social forms. These emotions or collective sentiments, for Durkheim, are the basis of the productive power, the efficacy, of society (Durkheim 1915 (1965):406). Durkheim, of course, was concerned primarily with the social ontology of emotions. It is the social ontology of emotion that is of concern here also, but from the perspective of the place of *bodies* in that process. The exploration of respiratory function has been an attempt at understanding how social processes, through emotion, are embodied. Respiration is one bodily capacity that acts to establish an affective order among persons and bodies and therefore is a component in the establishment of social relationships themselves. It provides a bodily mechanism through which both individual and social dimensions of emotion are made manifest.

The implications of the “capture” of respiratory functions by social conditions (and vice versa) are thus far greater than concepts such as emotional engagement or arousal can indicate. Arousal, as already indicated, merely gives emphasis to individual subjective experience or response within a given environment. It is insufficient for it cannot indicate how emotion is implicated in individual and group *agency* in the social life. The continual modulation of respiratory capacities in any given social context provides evidence of how one bodily mechanism is a *part* of the organization of human behaviour simultaneously at both the individual and group levels and how emotion mediates this process. It contributes to the demonstration of how affective organization is grounded in the interaction of physical, psychological, social, and cultural factors.

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NOTES

1. Merleau-Ponty (1962 [1946]) saw the body as an agent in world construction through lived experience. Emphasis in his scheme is on how experience serves as the basis of all knowledge, rather than on the bodily mechanisms through which that experience is given or any role that emotion may have in this process of the apprehension of the world. Merleau-Ponty's account of the foundations of being can thus be extended to encompass how emotion is implicated in bodily agency.

Emotion has figured more recently in the work of certain phenomenological psychologists. Gendlin, for example, has written on what he terms "felt meaning" as opposed to verbal or cognitive meaning. For Gendlin, this "directly felt, experiential dimension" is responsible for guiding action and is the basis of meaning, for nothing means except as it "interacts with felt experiencing" (Gendlin 1962:1). Gendlin, however, gives emphasis primarily to the conscious experiencing subject although his notion of experience is that it is concrete: "[R]egardless of the many changes in *what* we feel – that is to say, really, *how* we feel – there always is the concretely present flow of feeling. . .we *always* have concrete feeling, an inward sensing whose nature is broader [than any] specific idea, wish, emotion, perception, word, or thought" (author's italics) (1962:11). It is clear from Gendlin's examples, although he deals with the notion of feeling in a restricted sense, that he sees this feeling as bodily through the body's ordered interaction with objects in the environment: "These objects may or may not be present, yet the body order includes the patterns of interaction that *could* obtain if they *were* present (Gendlin 1962:25). This resonates with Kemper's notion that emotions result "from real, anticipated, imagined, or recollected outcomes of social relationships" (Kemper 1978:32). The idea of simultaneity of body sense and emotion is a point that I develop in this chapter.

2. James stated: "Habit is thus the enormous fly-wheel of society, its most precious conservative agent. It alone is what keeps us all within the bounds of ordinance, and saves the children of fortune from the envious uprisings of the poor. It alone prevents the hardest and most repulsive walks of life from being deserted by those brought up to tread therein" (James 1950[1890]:121).
3. See Lyon 1997 for a critique of Mauss' concept of habitus, and the further development of the argument regarding the central place of emotion in any analysis of the embodiment of social life.
4. Scherer, a psychologist, lists the following components: "(a) cognitive appraisal or evaluation of stimuli and situations, (b) the physiological component of activation or arousal, (c) motor expression, (d) the motivational component, including behavior intentions or behavioral readiness, and (e) subjective feeling state" (Scherer 1984:294). Multiple components, in Scherer's terms, are associated with the multiple functions that the emotional capacity performs, e.g., evaluation of the environment, regulation of the physiological system, preparation for action, communication of intention, and reflection and monitoring (Scherer 1984:297).
5. As Scherer notes, the flexibility of behavioral adaptation in higher animals "is largely due to the emotion systems" (1984:295). The existence of the emotion systems has made it possible to "decouple" behavioral reaction from events in which they arise such that cognitive-evaluative and other processes intervene.

6. de Rivera, for example, describes what he sees as the three main approaches to the study of emotion: the psychological, the phenomenological and the sociological. The first "conceives of emotion as a process occurring within an organism located in an environment." The second takes the view that "human emotions are not processes that occur within organisms situated in an objective environment" but rather "different ways of being-in-the-world." The third perspective, the sociological, for de Rivera, is concerned with how persons exist in relationship with others: "[E]motion is viewed as a characteristic of the *relationship* between two people" (1984:116–118).
7. For a critique of anthropological perspectives on emotion, see Lyon 1995. For a treatment of the place of emotion in social theory more generally, see Lyon and Barbalet 1994.
8. Within the biological sciences, there have been a number of attempts to integrate sociological and biological perspectives. In the history of modern biology, for example, there were many who advocated holist approaches as opposed to reductionist or mechanistic approaches, and who sought an understanding of "the integrative, regulative functioning of physiological systems in ways which required them to think holistically about living organisms" (Benton 1991:16–17). J. S. Haldane, an early researcher on respiratory function, could be included among those scholars utilizing holistic perspectives.
9. The term respiration includes both the physiological and mechanical processes associated with breathing. Webster's *New Twentieth Century Dictionary* gives the following definition of respiration: "In physiology, the act, process, or function of breathing; in higher animals, the act by which air is drawn in and expelled from the lungs."
10. It should also be noted here that I am not arguing for a collapse of the logical distinction between "mind" and "body." The two terms represent quite different conceptual categories, not simply two aspects of the same thing (cf. Csordas 1990). As Helmuth Plessner points out, experientially, we both *are bodies* and *have bodies* and experience these two aspects of embodiment quite differently (Plessner 1970 [1941]). This is a point which is also intimately linked to the foundations of the sense of self.
11. The term arousal carries the implication that certain states represent an observable change in reference to ordinary or resting states. Such a manner of use in reference to emotion frequently implies a homeostatic model of emotion wherein emotion is seen as disruptive of "normal" homeostatic states. This is not the intention here.
12. See Chapter 3 ("The stuff of consciousness") in Onians (1954), for a discussion of Greek and Roman concepts of breath and the relationship of breath to thought and emotion.
13. The importance of autonomic interconnections in the functioning of the endocrine and immune systems could also be mentioned here. This would allow the extension of our discussion of embodiment and emotion to the areas of health and illness more generally. On immune networks, see for example Blalock (1984) and Varela *et al.* (1988). See also Lyon 1993 for a review of some of the models of immune system interactions in reference to the place given to social context.
14. The close neurological relationship between respiration and facial expression is apparently grounded in the common phylogenetic origin of the muscles used in

facial expression and those of gill structures in lower animals (Bell 1844; Brown 1991:26 citing Rinn 1984). See also Darwin 1965.

15. Normal resting breath averages 13 to 17 breaths per minute with a tidal volume ("depth" of breath or amount of air moved) of approximately 500 milliliters per breath. This gives a normal resting volume of 7.56 liters per minute (Slonin and Hamilton 1976:47). Under conditions of muscular exercise, ventilation increases both in frequency and tidal volume.
16. Of the gases which are stored in the various tissues and fluids of the body, carbon dioxide comprises the largest, with major stores in bone and body fluid. A person of 70 kilograms would have approximately 35 liters of stored carbon dioxide, an amount which would equal the bodily metabolic production of carbon dioxide over a period of 140 minutes (Slonin and Hamilton 1976:92–93). If a person hyperventilates so that the total volume of air moved past the alveoli in the lungs is doubled, then the partial pressure of alveolar carbon dioxide (PaCO_2) will be halved eventually (after body stores reach a new level) (Slonin and Hamilton 1976:50, 93).
17. Reduction in cerebral blood flow is also related to electroencephalographic changes. Lowry, citing work done by Engel, Ferris, and Logan states:

They found a direct connection between blood carbon dioxide tension and the frequency of brain waves. An average subject was able to slow his brain to 4 cycles per sec. by rapid breathing of sea level air for 150 sec. Electroencephalogram slowing was most marked when the carbon dioxide level dropped rapidly, when blood sugar was low, when inspired air contained less oxygen than usual, when the patient stood, and following the administration of amyl nitrate and nitroglycerin. With equal amounts of hyperventilation a patient with a high blood sugar level tends to hyperventilate until tetany appears while a subject with a low blood sugar level tends to have marked alterations of consciousness and an earlier spontaneous cessation of hyperventilation. (Lowry 1976b:16–17)

18. These interactions are mediated by the neocortex as well as by lower centers in the brain and nervous system. For example, lower areas of the brain in the brain stem (medulla and pons areas), are in synaptic contact with cranial and spinal nerves, so that the muscles of face, throat, chest, and diaphragm are coordinated for purposes of respiration. But these lower reflex mechanisms include also mechanisms originating in the peripheral nervous system and the cardiovascular system, these latter mechanisms being themselves subject to influences which have their origins in higher centers, i.e., subject to cortical control.
19. The control of behavioral and metabolic functions in respiration, though generally represented as separate, are in fact closely integrated physiological systems operating in parallel. These "parallel structures" function at most levels of the brain, with the behavioral portions of control mainly in somatomotor and limbic fore-brain structures (Plum 1970:159, 174).
20. Different forms of speech entail different breathing patterns. According to Brown:

An important function of the rhythm of speech is to allow us to continue to breathe while speaking. We require a complex pattern of breathing movements to modify our respiration so that speech can be produced. This includes movements of the abdomen and chest as well as of the larynx and upper airway. Our breathing must coordinate with the duration and intensity of what we wish to say, and all these factors must be taken into account before we begin to speak. (Brown 1991:39–40)

21. Bass and Gardner (1985) in a review of emotional influences on breathing point out that the category of "hyperventilation syndrome" is very problematic as there is no adequate basis for distinguishing it from hyperventilation itself (1985:601). They note that the term was introduced by Kerr *et al.* (1937) to cover an array of symptoms resulting from both anxiety and hyperventilation (Bass and Gardner 1985:602). They state that "[m]ost of the clinical and physiological features of hyperventilation syndrome can occur in the absence of detectable psychiatric abnormality" and the authors prefer the term "idiopathic symptomatic hyperventilation" (Bass and Gardner 1985:602).
22. Literature on the intentional generation of emotional responses using respiratory stimulus is generally located within work on the use of catharsis or abreaction in therapy. Both Lowry (1967b) and Lum (1976) cite B. I. Lewis on the relationship of hyperventilation to emotion. In patients suffering from anxiety attacks, Lewis found that when he reproduced the symptoms of hyperventilation in patients by pushing on the lower part of the chest to encourage thoracic breathing, after first putting the patient in a similar state of mind to that in which the original attacks occurred, in nearly all "there was a marked emotional catharsis with weeping and revelation of important historical material" (Lewis cited in Lowry 1967b:20).
23. Pfeffer notes that hyperventilation is said to affect between 6 and 11 percent of people seen by medical practitioners (1978:47).
24. Because of the wide range of symptoms, Lum notes "[s]uch patients are often pursued relentlessly with every investigative device known to modern science, and end up with the label of 'anxiety state'" (Lum 1975:375).
25. The effects of hyperventilation are generally divided according to whether they are central (e.g. alteration of blood gases, cerebrovascular changes, changes in acid-base balance) or peripheral effects (e.g., vasomotor effects such as vasoconstriction of vessels in the skin especially the extremities, reduced blood flow to the gut, etc.). For example, activation of the sympathetic nervous system produced by hyperventilation over a few minutes shows itself in dilated pupils, cold extremities, sweating of palms and axillae, and tachycardia (Lum 1976:207, 210). Whatever the physiological effects, however, it is clear that there is wide scope to the types of subjective experiences associated with these changes.
26. There have been other, earlier arguments for the value of the Jamesian approach. Wenger in 1950 argued for an integration of the findings of Cannon and Bard with those of James and Lange and for their further development: "Emotion would be continuous, because autonomic activity is continuous, while the state of homeostasis would be regarded as a state of emotion, and we would speak of increased or decreased emotion from this basic pattern" (Wenger 1950:5).
27. For one introduction to this, see Ewing (1901).
28. Yoga traditions themselves, for example, emphasize the importance of concentration, contemplation, scriptural study, and other practices in pursuit of goals, not just physical techniques which by themselves may lead to "quite unforeseen and disturbing results such as mental disequilibrium" (Zaehner 1966:72).
29. Wilhelm Reich, a psychoanalyst concerned with the somatic bases of neurosis, developed the concept of the location of psychological conflict or trauma in the musculoskeletal system as revealed in the carriage and expressions of the body (Kovel 1976:130). Bodily manipulation is said to help make a patient aware of how conflicts are held in the body and aid in their emotional expression, as well

as in the reemergence of early memories. Reich used overbreathing in combination with physical postures or exercises to aid in the expansion of the chest. Lowen, a student of Reich's, states: "For Reich, then, the first step in the therapeutic procedure was to get the patient to breathe easily and deeply. The second was to mobilize whatever emotional expression was most evident in the patient's face or manner" (Lowen 1975:19). Describing his own therapy with Reich, he says: "I would lie on the bed and breathe as freely as I could, trying to allow a deep expiration to occur. I was directed to give in to my body and not control any expression or impulse that emerged" (1975:19). Many schools of therapy utilize principles described by Reich, often in modified form. Freud and Breuer also, working long before Reich, utilized techniques (mainly hypnosis) designed to achieve abreaction of past trauma in patients.

30. One need only consult catalogs or directories of alternative therapies which are available in any large city for evidence of the many therapeutic techniques utilizing the breath. Grof (1988:170–184) contains a description of the use of "intense breathing," which he terms "holotropic" breathing in the context of his own particular therapeutic perspective.
31. There are many studies of abreaction and catharsis in the psychological literature (see Nichols and Zax 1977 and Scheff 1979 for surveys). Scheff (1977, 1979), a sociologist, developed a theory of ritual based on catharsis, i.e., that ritual performs the function of providing a context for "the appropriate distancing of emotion" such that individuals can cope with "universal emotional distresses" (1977:484). He sees ritual in terms of how it functions in emotional expression: "Effective ritual is the solution to a seemingly insoluble problem, the management of collectively held, otherwise unmanageable distress. Ritual is unique in that it meets individual and collective needs simultaneously, allowing individuals to discharge accumulated distress and creating social solidarity in the process" (Scheff 1977:489).
32. A dance is performed which is said to activate *n/um* or energy in those who are healers. The intensification of this energy leads the dancer-healers to experience an enhanced consciousness called *!kia* during which they are able to heal others.
33. This posture also mirrors the bodily disposition of the child who reaches up and outward to embrace or be embraced. Such postures themselves have affective correlates which should be considered as part of the complex of bodily forms which are implicate in both the experience and generation of emotion. See de Rivera (1984) on the bodily disposition of the infant as one basis for a typology of emotions as social relations.
34. As Scheff (1988) has shown in his discussion of the social conformity studies, to be out of "synch" with the group of which one is a part can result in shame.

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ALEXANDER LABAN HINTON teaches in the department of anthropology at Rutgers University. He has done ethnographic research in Cambodia, specifically on the cultural origins of Cambodian genocide, and has published a number of articles in scholarly journals.

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