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Maximizing Replicability in Describing Facial Behavior

Man has inherited from the primitive anthropoids the ability to draw back his lips in anger, to open them in a laugh, or again, to protrude them into a funnel and so to confer kisses on the objects of his affection. How much dour literature, ancient and modern, might be lightened by this thought! (Gregory 1963)

Physical variation among humans has properly inspired, *inter alia*, generations of anthropologists. In days of yore, coerced by an insatiable desire to formulate human 'types', our intrepid professional ancestors deftly wielded anthropometer and caliper to collect computer-boggling lists of indices of head, face and body. Like *Oreopithecus*, many of those data with their related speculations, died without issue. Professional phylogeny shifted to the 'new physical anthropology', in which Washburn (1951) declared it was of infinitely more evolutionary significance to explore process rather than type. How is mandibular morphology determined by contractions of *m. temporalis*, *m. pterygoideus*, and the masseter? Later, other questions followed: What are the relations of face and dental morphology to culture? How is the face used in primate communication? Whatever the question, one is always faced with the corollary problem: how can facial behavior be best described? One answer to this question is the focus of this paper: viz., that description is most felicitously accomplished with reference to the contractions of the various muscles, a view which is by no means unique. By way of approaching this subject, a cursory review of some studies of the

face will be made. In addition to artists, anatomists, and physiologists, the face has been studied by anthropologists, biologists (ethologists), and psychologists — each with a preference for how facial behavior should be described.

The study of the face by anthropologists can be viewed as coalescing from the two major foci of that discipline in America: biological and cultural. In 1936, Goldstein pointed out that, with all the voluminous, anthropologically-related literature on human growth, there had been relatively little on the face to that date. He summarized what there was. As early as 1866, Weckler had studied the development of the head and face. Hrdlicka (1900) and Connolly (1928) made inter-racial surveys. Boas (1911) studied morphological changes in immigrants. Hellman (1927, 1935) made important contributions. Schultz (1920) and Schaeffer (1935) wrote on ontogeny ; Krogman (1930, 1931a, b, c.) on phylogeny.

Loth (1949) studied facial variation in the structure of facial muscles, and concluded there were differences between Caucasoids and Negroids, a conclusion that had been reached earlier by Huber (1931). Darwin (1872:18) had long before noted that "the observation of Expression is by no means easy", something Loth discovered for himself:

It is very hard to study facial muscles on the living subject, and is possible only with intelligent people with whom one can communicate to evoke the desired facial expression ... I ... gave up this study in Uganda. (1949:222)

Fortunately, later workers have been more persistent.

In 1946 Hooton, in his immortal *Up from the Ape*, stated: "I venture to predict, that another couple of decades may establish, upon a rigorously scientific base, some rather astounding associations of physiognomy with behavior" (1946:176).' Two decades from the year Hooton penned this prophecy, Steegmann (1965:355), in a stimulating reappraisal of facial morphology as it relates to climate, notes (echoing Goldstein's 1936 comment) that "the face has gone almost unexamined as an area of experimental physical anthropology", although he mentions some studies by physiologists in the 50's and 60's. In a publication by one of Hooton's students the same year, Carleton Coon (1965:258) includes a brief discussion of the muscles of expression and scattered references to their function in primates, a matter DeVore (1965) considers in more detail. A year later, Buettner-Janusch (1966:74-77) delineates facial muscles and their functions. Steegmann (1967, 1968, 1970, 1972) has continued his study of the face's adaptation to low temperature. Kohara (1968)

has indicated that the inability of Japanese to contract the orbicularis oculi and frontalis unilaterally in the wink and one-eyebrow raising respectively is a biological phenomenon, not a cultural one. More recently, Chevalier-Skolnikoff (1973, 1974) provides information on the *Cercopithecidae* which corroborates some of the conclusions reached in the study of regional facial expression (Seaford 1975, 1976), in which pursing and lip smacking may have a rapport-establishing function.²

Curiously, Hooton's schedule was accurate.

A convenient, as well as symbolic, place to begin tracing the interest of cultural anthropology in facial expression is the work of Sir Edward Burnett Tylor. Musing over the face's response to mood, he wrote:

The ascertaining of the precise physical mode in which certain attitudes of the internal and external face come to correspond to certain moods and mind, is a physiological problem as yet little understood; but the fact that particular expressions of face are accompanied by corresponding and dependent expressions of emotional tone, only requires an observer or a looking-glass to prove it. The laugh made with a solemn, contemptuous, or sarcastic face, is quite different from that which comes from a joyous one; the ah! oh! oh! hey! and so on, change their modulations to match the expression of countenance. (1871:166)

Tylor noted the close association of speech with gesture. He thought that gesture in "the lower races" was relatively prominent, and that it assumed many of the functions of "articulate speech". Moreover a facial expression of emotion so-called can be quite affectless:

By turning these natural processes to account, men contrive to a certain extent to put on particular physical expressions, frowning or smiling for instance, in order to simulate the emotions which would naturally produce such expressions, or merely to convey the thought of such emotions to others. (1871:165)

Although Tylor seems to give preeminence to culture in the molding of expressions of emotion "a certain action of our physical machinery shows symptoms which we have learnt by experience to refer to a mental cause" — his comments also suggest Ekman's concept of "display rules" (Ekman, Friesen, and Ellsworth 1972:23). That is, although emotions have universal modes of expression, they are elaborated upon in certain situations by culturally standardized procedures.

An early student of face and body gestures in America was Franz Boas. He was interested in demonstrating that gestures are not biologically determined, but artifacts of culture, changing "with great ease" (1938:125). His programmatic statement that "motor habits of groups of people are culturally determined and (are) not due to

heredity" (1938:126), placed the whole matter beyond cavil in some minds, and provided a seemingly firm basis upon which to build subsequent anthropological perspectives, a bias which probably led anthropologists away from the Darwinian fold,³ while psychologists were returning (Ekman *et al.* 1969, Ekman 1972, Izard 1968, 1971). His extensive observations of Northwest Coast culture indelibly influenced his students (Birdwhistell 1970a:38-39), among whom were Otto Klineberg, David Efron, Edward Sapir, and Margaret Mead.

In a book dedicated to Boas, Klineberg emphasizes the importance of culture in facial expressions: "There is ample evidence in ethnological literature that emotional expression varies in the same manner ... as language, and that it is also to some extent a conventionalized form of communication" (Klineberg 1935:282). At the same time Klineberg is careful to consider the possibility that pansapient expressions exist beneath cultural accouterment (1935: 285, 287-88): "There are undoubtedly certain types of expressive behavior which are common to all human societies" (1940:176).

David Efron, an Argentine and a Jew, who had traveled in Italy, had Italian friends in Argentina and had studied with Boas in New York, was uniquely sensitized to cultural differences in modes of expression. True to his mentor, Efron notes: "... one is never confronted with a purely physical movement in gesture, but always with gestural movement, i.e., meaningful movement, whether strictly 'linguistic' or 'discursive' (1941:64).

That Edward Sapir attributed some body movements to a learned code is an indication of Boasian influence, according to Birdwhistell (1969:381), but sometimes the former seems less captivated by cultural relativism. With usual, uncanny intuition he perceived the nonverbal context of language in the familiar quotation:

In spite of ... difficulties of conscious analysis, we respond to gestures with an extreme alertness and, one might almost say, in accordance with an elaborate code that is written nowhere, known by none, and understood by all. (1949:550

Such facial movements as the wrinkling of the brow can be 'unconscious symbolism' facilitating communication.

It is no coincidence that Margaret Mead wrote the preface for the 1955 edition of Darwin's *The Expression of the Emotions in Man and Animals*, the book from which my own interest sprang and which must be the single, most significant work inspiring modern research on facial expression. The pioneer photographic study of personality she did with Gregory Bateson (Bateson and Mead 1942) corroborates the Boasian dictum that human behavior is above

all cultural, a notion which does not easily yield to refutation.

Embued with cultural relativistic perspective, Weston LaBarre (1947) impressively marshals ethnographic examples leading him to conclude that "there is no 'natural' language of emotional gesture". Even though the same expressions might be found cross-culturally, the meanings attached to them vary from one culture to the next.

The allegedly "instinctive" nature of such motor habits in personal relationships is difficult to maintain in the face of the fact that in many cases the same gesture means exactly opposite, or incommensurable things, in different cultures. Hissing in Japan is polite deference to social superiors. (1947:56)

Clearly the most active exponent of the Boasian tradition in the study of the cultural significance of behavior is Ray Birdwhistell. After acknowledging his debt to Boas, Efron, Sapir, and LaBarre, he attributes to descriptive linguistics the real impetus behind his founding of kinesics (1952), "the scientific investigation of the *structured* nature of body motion communication" (Birdwhistell 1968b:381). Spreading behavior on a linguistic model, body motion is compared to "kinesic building blocks (which) are ranges of movement, quanta of motion" (1968a). "Gestures are really *bound* morphs" (1966:183). Birdwhistell is concerned with isolating "kines" which are "least perceptible units of body motion" (1970a:166) in order to work out a kinic system upon which is based the kineme and kinemorpheme (1970a:193-200 *et passim*). He comments on the difficulty of delineating mouth kinemes.

The seven kinemes which make up the present circumoral complex are tentative. Only continued research will give us confidence that these represent complete assessment and that the list is composed of equivalent categories. The list includes "compressed lips," "protruded lips," "retracted lip," "apically withdrawn lips," "snarl," "lax open mouth," and "mouth overopen." I am particularly doubtful about the first two of these. Both may belong to some general midface category which we have thus far been unable to isolate.

To this list must also be added "anterior chin thrust," "lateral chin thrust," "puffed cheeks," and "sucked cheeks." "Chin drop" may gain kinemic status. (1970a:100-01)

From his statement that his "work was only complicated by assumptions about communication as an elaboration of a pan-human *code* emergent from the limited possibilities of physiological response" (1970b:19) it is evident that he maintains the traditional anthropological position of cultural preeminence.

DESCRIBING FACIAL EXPRESSIONS

The literature on facial behavior manifests some reluctance to formulate descriptions in terms of muscle contractions. Probably the main reason for this is the variability of the musculature making it impossible to discern, for example, if the risorius or the platysma is really retracting the corners of the mouth. Moreover, further ambiguity is introduced in the observation process itself, for who can be sure he is precisely delineating — without electromyography (or maybe even with it) — the contribution of every single muscle to a given facial expression? Darwin notes the problem of variability:

The facial muscles blend much together, and, as I am informed, hardly appear on a dissected face so distinct as they are here represented. Some writers consider that these muscles consist of nineteen pairs, with one unpaired; but others make the number much larger, amounting even to fifty-five.... They are ... very variable in structure ... they are hardly alike in half a dozen subjects. They are also variable in function. (Darwin 1955:23)

Yet the great naturalist himself did not refrain from referring to specific muscle contraction when describing facial expressions (e.g., Darwin 1955:148-49) for fear he might be attributing movement to a muscle which just happened not to be there. Surely muscles such as *m. orbicularis oris*, *m. mentalis*, *m. triangularis*, the *zygomaticus*, the *quadratus labii superioris*, the *corrugator*, *m. frontalis*, and the *platysma* must always be present on normal human faces for the very fact that most people's faces work as they should.

As for the objection that describing facial behavior in terms of specific muscle contractions on the grounds that it would be unscientific, since one is never quite sure whether the job is being done by the muscle which is supposed to do it or another, it is my contention that this is far out-weighed by the gain in observer replicability-potential. That is, if I know what usually happens when a particular muscle contracts, and so state that such a muscle is contracting, any future observer will know precisely what movement I describe. Moreover, my guess is that the muscles described as doing the contracting would be actually doing it most of the time. Tinbergen (1955:7), for one, appears undaunted by possibilities of ambiguities:

Because it is our task to analyse behaviour as co-ordinated muscle activity, the ultimate aim of our description must be an accurate picture of the patterns of muscle action. Except in some especially simple cases, this has never been done, probably because most workers are only dimly aware of the necessity.

In 1862 Duchenne established the precedent for describing facial expression in terms of facial muscle contraction in his careful study of muscle physiology. Darwin relied heavily on this work (1955: 148-50, 200-02, *et passim*), and its procedure appears most useful in describing facial behavior today. Ekman, Friesen, and Tomkins (1971), in fact, point out the relevance of Duchenne's work and proceed to base the Facial Affect Scoring Technique on it, at least up to a point. After quoting Darwin's comment about Duchenne that "no one has more carefully studied the contractions of each separate muscle and the consequent furrows produced on the skin", these authors opt for description by "furrows" rather than contractions".

Initial attempts to describe facial behavior in terms of muscle movements revealed that it was often quite difficult to determine which muscles had moved by looking at the face. A decision was made to describe the appearance of the face primarily in terms of wrinkles, ... (1971:40)

If, indeed, Duchenne's procedure was to be followed, and if the "wrinkles" referred to are the result of muscle contraction, why not go to the source rather than to the consequence? Furthermore, if it is so "difficult to determine which muscles" move, so that wrinkles have to be used instead, what has happened to Duchenne's procedure by now? For its originators FAST was successful — out of 51, 45 photographs were judged correctly — but the technique is unsuitable for behaviors which are not related to affect. If descriptions of facial expression are to be given in terms of "wrinkles" (especially if one does this because he is not quite sure what the facial muscles are doing), how can someone untrained in FAST definitions know for sure what behaviors are being effected?

Recently, Kendon (1975) has stealthily studied kissing behavior. In a *tour de force* describing the amorous activities of the face, he rightfully points out that procedures used to categorize emotions are inadequate for general descriptions — a point which is well-taken even if one concedes that kissing is not nonemotional. The notations he devises, modified from Ekman and Kendon (1969), are, notwithstanding, not unlike those of Birdwhistell (1952b:40-44) in their limited utility for other studies. For example, the category "mouth corners raised in definite smile", symbolized by the usual spread-U form, would have confused description of the southern smiles I studied which are characterized by *unraised* corners. Surely the most important datum here is that a "definite smile" is being effected, which a category based on muscle contractions would have more amply

described. This advantage is used in two of Kendon's notations which are based on muscle contractions. Interestingly, he finds female faces more expressive than males' — a phenomenon I also noted in the study of Virginia faces' (see below).

In an earlier study, Blurton Jones suggests that "precise descriptions" of facial muscle contraction can be best approximated by dividing the face into "segments" which are made up of "components" (1971:365). These segments are simply "guides to where to look on the face" (1971:372) having nothing to do with describing a whole facial expression. Alternatives for describing components are "location of shadows and lines" (cf. Ekman *et al.* 1971), reference to the assumed muscle contractions per se, or "positions of landmarks". Blurton Jones opts mainly for the latter device since, he reasons, one can never be absolutely sure he can accurately describe all muscle contractions by sheer observation, and, besides, why impose on the reader the necessity for learning names and functions of all the facial musculature (1971:368-69)? At the same time he notes it is "fairly easy to make a good interpretation of a face in terms of the muscle activity involved". Fortunately the 'landmark' emphasis (shortcomings of which are discussed below) is fortified with contraction data wherever this makes description more precise. Although his descriptive procedure appears quite adequate for the photographic materials illustrating his paper, my own preference would have been to include contraction data in every case, and force the serious student of facial expression to learn the facial muscles and their behavior — something he needs to know anyway! Moreover such data would make somewhat less tedious the 'component' system which tends to be confusingly atomistic sometimes.

Less flexible as a multipurpose system of description, but exemplifying the advantages of the muscle referent are Izard's categories (1971:242-45). While pertaining only to expressions of emotion, that worker nevertheless carefully delineates all muscle contractions usually involved in each expression.

Hjortsjo (1970) has recently provided a thorough treatment of facial muscle contractions. Although emphasizing expressions of emotion, that author follows the unabashed, detailed description of muscle contraction after the traditional manner of Duchenne (1862), Virchow (1908), Lightoller (1925, 1928), and Huber (1931), *inter alia*. The uninformed readers with whom Blurton Jones is concerned would never be the same after studying this little book.

If the phylogenetic and/or ontogenetic components of facial expressions are to be understood and sorted out from cultural phenomena,

in the case of *Homo sapiens*, muscle contractions per se must be the significant units. If this be so, there is great value in standardizing descriptions of primate facial expressions in terms of muscular contractions. Many times this is not done. Take for example for 'pout face' which a chimpanzee displays if it wants to regain contact with its mother's body. The pout muscle par excellence is the mentalis — something every *Homo sapiens* infant instinctively 'knows'. But Goodall (1969:420) does not specify if that muscle is used — a datum which would corroborate her category and make interspecific comparison meaningful. Moreover, van Hooff (1969:59) in describing "the pout face" omits comment on muscles which might be associated with the lips which "are protruded; typically they stay pressed together near the mouth corners, but are lifted in the middle region, thus creating a small round opening". One could assume the configuration of "the middle region" is caused by the mentalis, but it is not clear if contractions are occurring in the chin or upper face.⁶

Andrew (1965:92) does mention the action of the orbicularis oris which "may round the lips or thrust them forward in a pout". However, although this is an "important human facial expression" which is shared by chimpanzees among other primates, no mention is made of whether or not the mentalis is participating. This is even more curious when he goes on to describe a primate threat (human indignation) expression which uses the same rounded lips but with an expulsion of air. Testing the pout and indignation expression on myself, I discover I use the mentalis effecting the former, but not the latter. This just could be a significant difference which simple, complete description would make available for future investigations.

Grant (1969) has suggested an "ethological check list" for human facial expressions. He considers the face to be divided into three relatively independent expressive areas: "gaze, eyebrow position and mouth position". To these he adds body posture. The lower part of the face "with the extreme mobility built into the lips and mouth has the greatest number of expressive positions". In determining a procedure for describing behavior, he questions whether a minimal element exists in nature. But description must go on, so he weighs the validity of patterns built up from muscle contractions against "functional" designations, "bits of behaviour which fulfil a particular function". He prefers the latter, since "many recognisable patterns of behaviour can be adequately described and may yet vary considerably in terms of muscular contraction", as, for example, a pecking bird will use different muscles according to the positioning of its prey, but that it is pecking is incontrovertible. He chooses, then,

cutaneous, "functional" descriptions rather than muscular ones (Grant 1969:525-27, 535).

In trying to avoid one kind of misinterpretation, Grant's choice might well lead to others. One of his "flight" elements, for example, is "mouth corners down". The description of this element is: "The lips are closed and the corners of the mouth are drawn down.... This element is frequently associated with 'Sad frown' (1969:528). His plate 11 a (Pl. I Fig. 1) illustrating this expression shows a double-chinned youngster looking quite serious, but with, apparently, no muscles contracting, with the possible exception of the corrugators, which of course accounts for the 'frown' component. His mouth indeed is bowed cranially, but this is apparently a natural stance, and the corners do not appear to be 'drawn' caudally. Blurton Jones (1971:372, 387) points out the difficulty of judging "mouth activity", one reason being that "the resting position of the mouth is with the corners just below the lower lip." Grant describes the "Sad frown", thusly: "The brow is wrinkled horizontally by the scalp being drawn forward. The eyebrow tilts down at the outside corner" (1969:527). Although Blurton Jones (1971 374) cautions that con-

PLATE I



Fig. 1

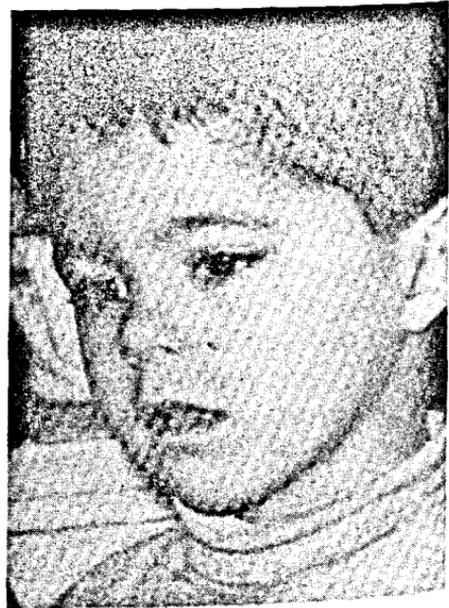


Fig. 2

Fig. 1. "Sad frown" (Grant 1969: P1. 11a)

Fig. 2. "Eyebrow raised" (Grant 1969: P1. 10a)

tractions in this area are difficult to discern, I cannot avoid thinking that the photograph reveals none of the purported facial muscle contractions. Concerning "the scalp being drawn forward" Hjortsjo (1970:50) does mention this contraction, but Duchenne (in Tomkins 1962:239) and Gray (1959:415) refer only to the backward motion of the occipitofrontalis. It is this upward contraction which causes horizontal wrinkles. Moreover, the mesial action of corrugators causing barely perceptible vertical wrinkles is not mentioned at all. On the other hand, Grant's Plate 10a (Pl. I Fig. 2) is purported to show "eyebrow raised", although I am unable to determine any contraction of the frontalis. (Of course, Blurton Jones' previously mentioned point should be kept in mind.) These cases suggest that cutaneous topography can suggest muscular contractions when there are none, and lead to their nonobservance when they are present. Hinde (1966: 10-11), while pointing out the value of "descriptions by consequence" over sheer muscle contractions, also cautions that they may bias future hypotheses based upon them, and that they easily lend themselves to "overinterpretation". It would seem that a few of Grant's 'elements' are cases in point.

One other matter involved in observing human facial expression is the presence or absence of speech. Bilabial stops and nasals, for example, necessitate clamped lips, while high central or back vowels call for orbicular contractions. Failure to take these behaviors into account can cause ambiguities in description, a case of which occurs in a recent book on primate behavior. The 37th president of the United States is depicted displaying an "open-mouth threat" (Jolly 1972:161). Although the photograph appears to match the label eminently, the possibility of the presidential mandible's being dropped to articulate a low-front or central vowel cannot be overlooked. If this be the case, the main purpose of the mouth's being open is simply phonetic. Perhaps the photograph showing the "tense-mouth face" (1972:156) of the same president is more accurate, but this could represent the articulation of a bilabial consonant, even though the degree of contraction is abnormally exaggerated. Notation of speech behaviors should be salient in describing facial expressions. Only after accounting for these is one able to speculate about the non-verbal phenomena.

AN EXERCISE IN MUSCLE CONTRACTIONS

At the 1966 Annual Meeting of the Pennsylvania Sociological Society the results of a study of over 10,000 yearbook photographs (e.g.,

P1. VI Fig. 2) exploring the possibility of regional patterns of facial expression was reported (Seaford 1966). Evidence that various muscular contractions were more typical of the southern U.S. than other places led to further research at the University of Virginia in 1969. The earlier study was fully supported by the new data, and these became the substance of a doctoral dissertation (Seaford 1971). Throughout this research the problem of description was salient. Birdwhistell's notation (1952b:40-44) based on facial topography was not suited to describing the kinds of facial behaviors encountered. The Facial Affect Scoring Technique (Ekman, Friesen, and Tomkins 1971) was considered, but that system, developed for describing expressions of emotions, provided no way to describe, for example, the simultaneity of the levator-depressor action of the face — a common phenomenon in the South. Description in terms of the facial muscle contractions themselves appeared to be the only answer (cf. Fig. 1).

In describing the facial expressions of 62 Virginians, categories based on muscular contractions were found useful in delineating recurring patterns in that sample. What has been called the "southern syndrome" (Seaford 1966, 1971, 1975, 1976) consists of the following patterns:

- (1) Orbicular Clamp (Pls. II, III) is formed by contractions of the orbicularis oris superioris and inferioris, not infrequently assisted by m. mentalis, joining the lips together with varying degrees of firmness;
- (2) Purse-Clamp (Pls. IV-VI) results from the clamping action just described, but elaborated by contractions of the caninus and triangularis (and/or modiolus) resulting in a mesial movement of the angles of the mouth;
- (3) Pursed Smile (Pls. VII, VIII) is produced by contractions of the zygomaticus major and the various heads of the quadratus labii superioris which are countered by the orbicularis oris;
- (4) Inferior Press Smile (Pl. IX) is a variant of the Pursed Smile effected when the quadratus labii inferioris is activated resulting in the squaring off of the lower lip as it is pressed against the mandibular alveolus and/or lower teeth;
- (5) Angle Depression Smile (Pl. X) is caused by antagonistic contractions of the triangulares, sometimes assisted by the platysma, simultaneously with contractions of the levators of the upper face;
- (6) The Tongue-Lips (formerly Tongue Display Type A) (Pls. XI, XII) pattern occurs as the tongue is discretely protruded by the posterior fibers of the genioglossi, while the apex is spread by the verticalis as it passes through the lips;

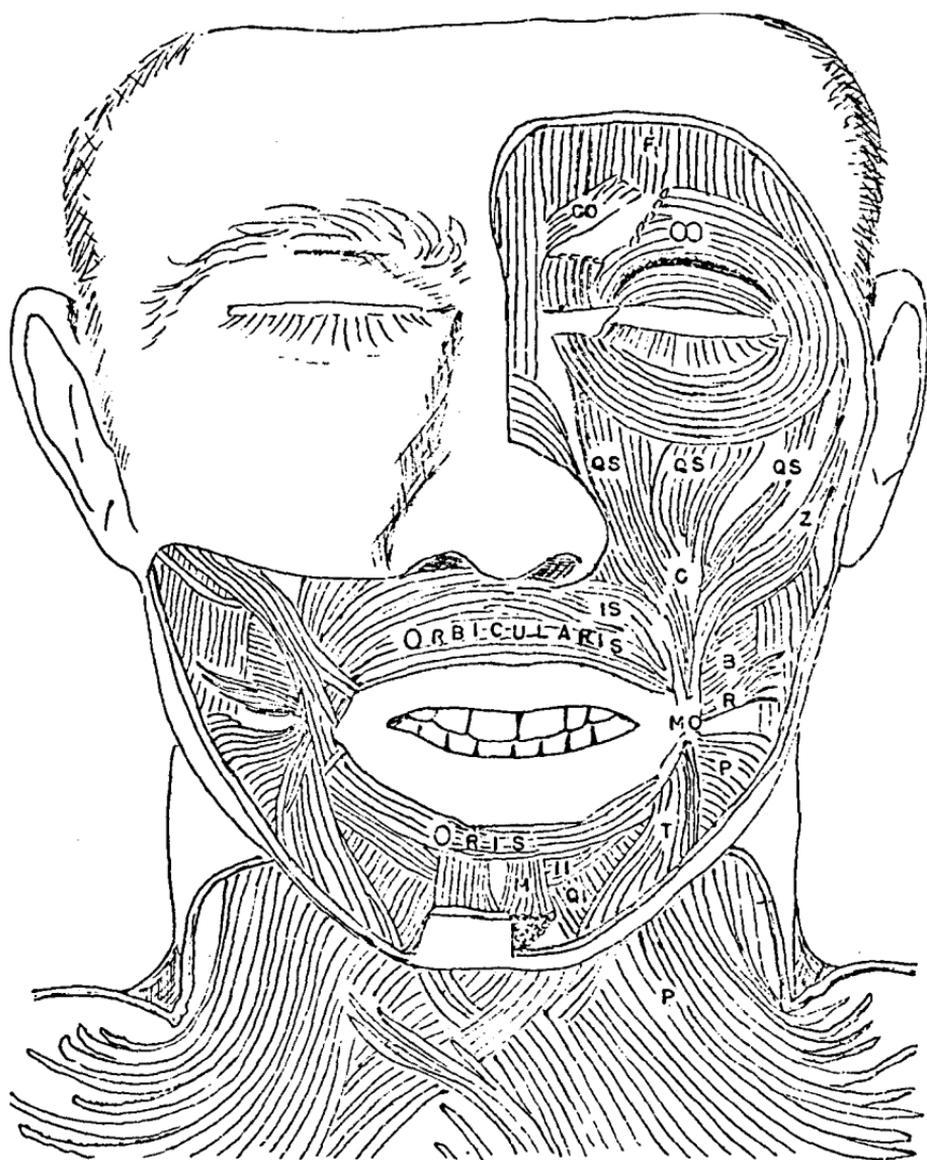


Fig. I. Selected Facial Muscles

Buccinator (B); Caninus (C); Corrugator (CO); Frontalis (F); Incisus Inferioris (II); Incisus Superioris (IS); Mentalis (M); Modiolus (MO); Orbicularis Oculi (OO); Orbicularis Oris; Platysma (P); Quadratus Labii Inferioris (QI); Quadratus Labii Superioris (QS); Risorius (R); Triangularis (T); Zygomaticus (Z). Orbicularis Oculi cut to show Corrugator. (After Grant 1951: Figs. 448 and 499 with omissions and modifications from Shapiro 1947 and Gray 1959 — original sketch revised in Seaford 1976.)

PLATE II Female Orbicular Clamp



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8

Fig. 3. Some menial contraction of orbicularis oris; therefore, more properly a Purse-Clamp.

Fig. 8. Dorothea Payne Todd Madison (1768-1849) by Rembrandt Peale (Weddell 1930).

(7) Tongue Smile (Pl. XIII) patterns are formed either by the tip of the tongue touching the upper incisors or the tongue's being curled behind the teeth simultaneously with contractions of the levators of the upper face;

(8) Mandibular Thrust (Pls. XIV), a result of contractions of the masseter and pterygoideus, is defined by its title.

The difference between the occurrence of these patterns in the Virginia sample and the Pennsylvania control is significant at the .01 level (Seaford 1976:620). Data were collected from yearbooks, photographs, historic paintings, as well as from informants during face-to-face interaction. Artifacts of articulation were considered unlikely in yearbook photographs and paintings. Other photographs taken during the fieldwork were synchronized with audio tape to ascertain moments of articulation. From portraits of colonial

PLATE III Male Orbicular Clamp



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8

Figs. 1-3. Probable mentalis action.

Figs. 3,8. Articulating "hmm".

Fig. 4. Pattern possibly caused by clamping of orbicularis oris with mentalis assist, and/or loss of teeth. James Gibbon (1759-1835) by John B. Martin. Courtesy Virginia Historical Society.

Figs. 5-8. Strong mentalis action.

Virginians historic depth was suggested for Orbicular Clamp (Pl. II Fig. 8), and Purse-Clamp (Pls. IV Fig. 6; V Fig. 3; VI Fig. 1). The fact that the fourth president of the United States and some of his peers display these patterns suggests they have been part of proper Virginia bearing for some time.'

Although other workers may have been able to study and to describe these paintings without reference to muscular contractions (an improbable feat in my opinion), the fact that I was sensitized to behavior of the orbicularis oris and the levators and depressors in Virginia faces made me instantly aware of what was probably transpiring in the Madison physiognomy. By describing this behavior in terms of the contractions of the orbicularis oris, the caninus and the

PLATE IV Female Purse-Clamp



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7

Fig. 5. Slight alveolar prognathism could affect contraction of orbicularis oris.
 Fig. 6. Probable mesial contraction of orbicularis oris. Lucy Gray Briggs (d.1779)
 of Dinwiddie County (Weddell 1930).

triangularis and/or the modiolus — an emphasis on process rather than type — the possibility that other workers will be able to replicate it is maximized.

The advantages of describing facial behavior in terms of muscle contractions are:

1. In observation it provides a safeguard against subjective impressions about what behavior is, in fact, being effected;
2. In recording it furnishes enough information for the reader to precisely replicate the expression — with his own muscles if he wishes;
3. In making interspecific comparisons it addresses the most significant unit of structure and function;
4. It provides categories to describe cultural variations of primary expressions of affect; e.g., depressor-levator antagonism in Southern smiles.⁸

PLATE V Male Purse-Clamp



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8

Fig. 3. Possible locked modioli causing slight mesial movement of lips. John Buchanan (1743-1822), Episcopal rector in Richmond from University of Edinburgh. Courtesy Virginia Historical Society.

Fig. 8. Purse-Clamp with strong mentalis assist.

PLATE VI Purse-Clamp



Fig. 1



Fig. 2

Fig. 1. James Madison (1751-1836) by Gilbert Stuart (Christian Science Monitor 1971).

Fig. 2. A Northcarolinian pictured in yearbook (Yackety Yack 1949:84).

PLATE VII Female Pursued Smile



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8

Fig. 1. Articulating "hmm".

Fig. 7. Articulating vowel of "cook", but triangularis (Angle Depression Smile) and platysma contractions in addition to those of the orbicularis oris not phonetically necessary.

PLATE VIII Male Pursed Smile



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8

Fig. 1. Pursing artifact of articulating initial bilabial stop of "put", but smile and triangularis action not phonetically required.

Fig. 5. Articulating high front vowel of "deep".

Fig. 6. Orbicularis oris assisted by triangulares restraining levator contraction of upper face.

Fig. 7. Articulating "uh".

Fig. 8. Articulating last vowel of "begin".

PLATE IX Inferior Press Smile



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8

Fig. 5. South Carolinian informant.
 Figs. 6-8. Georgian informants.
 Figs. 5, 8. Triangularis contraction also.

PLATE X Angle Depression Smile



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6

Fig. 1. Probably articulating initial dental fricative of "they".

Fig. 2. Angle Depression combined with Inferior Press.

Fig. 3. Articulating "ah".

Fig. 4. Lower face appears as if crying.

Fig. 5. Strong action of orbicularis oris, triangularis and mentalis countering levators of upper face.

Fig. 6. Angle Depression fortified by platysma. Frontalis also contracting.

PLATE XI Female Tongue-Lips



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8



Fig. 9



Fig. 10



Fig. 11



Fig. 12

PLATE XII Male Tongue-Lips



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8



Fig. 9



Fig. 10



Fig. 11



Fig. 12



Fig. 13



Fig. 14



Fig. 15



Fig. 16

PLATE XII Tongue Smile



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5

Fig. 1. Crowning Miss Albermarle County. Both women effecting Tongue Smiles.
(Courtney "The Daily Progress").

Fig. 5. A South Carolinian.

PLATE XIV Mandibular Thrust



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6

Figs. 1-2. Combined with Orbicular Clamp.

Fig. 4. Articulation **uncertain**, but Mandibular Thrust obviously elaboration of phonetic requirements.

Fig. 5. Pause after articulating "time".

Fig. 6. Articulating velar stop and **low mid vowel** of "calm".

NOTES

¹ Hooton is referring to constitutional anthropology.

² I have speculated (Seaford 1975, 1976) that if friendliness be highly valued in a subculture, the 'ready-made' primate patterns of pursing and lip-smacking could be 'marshalled' by the communication system as an appropriate way to express it.

³ Although Darwin recognized that some expressions "apparently have been learnt like the words of a language" (1955:352), he emphasized that "all the chief expressions exhibited by man are the same throughout the world" (1955:359). Among anthropologists, Earl Count (1958) is an early representative of a trend to theorize outside cultural limits without fear of 'reductionism'.

⁴ Recently, Ekman and Friesen (1976) have published a significant statement in which they describe facial behavior by 'Action Units' based squarely on muscle contractions. The thoroughness of their approach should provide a well-organized, convenient method for describing facial expression. I hope it is widely adopted. The same authors promise an even more detailed treatment in *The Facial Atlas* (forthcoming).

⁵ Out of a sample of 62 Virginians, 32 women effected 390 patterns of the southern syndrome; 30 men, only 288. Women were notably higher in Inferior Press Smile (17:4), Angle Depression Smile (66:28), and Tongue Smile (7:2).

⁶ In the summer of 1973 I had the pleasure of chatting with van Hooff about descriptions of facial expression. If I remember correctly, he preferred not to refer to muscle action because of the impossibility of precisely documenting every contraction.

⁷ Since Virginia was settled by people from the British Isles, it is possible that the typical English orbicular restraint could have been an imported cultural behavior which persisted in its New World variety. Darwin (1955:212) noted triangularis action during the laugh of one of his female compatriots and I have also noted it on English faces. A Dickinson colleague, Robert Cavenagh, informs me that pursing is common among his fellow Scots (cf. Pl. V Fig. 3). What all this might or might not have to do with the primate purse I am not prepared to say, nor am I sure that the British are notorious for their friendliness!

⁸ Some of the very authors whose works I have used as illustrations herein have furnished me with enriching perspectives both in print and in conversation. Some might not agree with my point about basing all descriptions of facial expression on muscle contractions. My own research was made possible by NSF Grant GS-2338 and grants from the Dickinson College Faculty Research Fund.

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