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STYLES OF OROALIMENTARY BEHAVIOR: RELATIONSHIP WITH MODULATION OF EMOTIONAL BEHAVIOR AND MYOGRAPHIC TENSION OF THE ORAL REGION[1]

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Summary.—The relationship between styles of oroalimentary behavior and both modulation of aggressive behavior and myographic tension at rest for some muscles engaged in the process of mastication was examined for 24 women. Our data suggested an inverse relation between outward overt hostility and oral appetitive hyperactivation with or without partial masticatory components. Moreover, the oral appetitive activation was negatively correlated with the myographic tension of oral region, particularly the right masseter.

The aim of the present research was to examine the relationship between some aspects of oroalimentary behavior and modulation of emotional behaviors, particularly hostility and anxiety. About this relationship there is a wide psychoanalytic literature (Abraham, 1953; Reich, 1975; Braeutigam & Christian, 1975) in which often are mentions of deep links between oral and aggressive behaviors and discussions of oral aggressivity.

For us both orality and aggressivity are not abstract "energies" or only psychodynamic contents but are expressed as definite behaviors appearing in response to identificable stimuli (external or internal, present or memorized) with encephalic centres modulating their programming and realization. This last aspect presents different phenomenological levels: a so-called psychological one and a so-called physiological one. In reality, the behavioral expression results from an interaction of the two aspects.

In neurophysiological research writers have often pointed out the role of particular encephalic structures in producing some behaviors labelled as emotional-instinctive. For example, the stimulation of hypothalamic areas (lateral nucleus) produces an appetitive search for food and its consumption in the awake and free-moving animal. Other encephalic centres (amygdala) have been described as having some areas whose stimulation elicits only consummatory stages or fragments such as biting, licking, swallowing, etc. (Magnus & Lammers, 1956). Moreover, in the hypothalamus has been located the area of defense reaction the stimulation of which determines a behavior of attack-escape (Abrahams, Hilton, & Zbrozyna, 1960). More recently Fonberg (1972) pointed out that the regulation of such instinctive behaviors is in reality somewhat polycentric in the sense that the specific hypothalamic area is

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under the control of modulating areas of the lymbic system. In any case, a datum in neurophysiological research is the existence of close encephalic centres, each specialized to produce a specific pattern but which still mutually influence each other in the sense of excitation and of inhibition. Anochin (1975), with reference to this, has suggested a mechanism of commutation, which consists essentially in the passage of excitation from an encephalic area, modulating a particular instinctive behavior (for example, aggressive behavior), to another encephalic area determining a different behavior (for example, oroalimentary behavior).

We think that the data of neurophysiological research can be framed also into theoretical models of more strictly clinical origin. For example, as regards the study of oroalimentary behavior, some authors (Haynal & Pasini, 1979) have noted how often a bulimic behavior represents the equivalent of an inhibited aggressive or anxious behavior.

In the present research we want to point out the relationship between styles of oroalimentary behaviors, which on the basis of psychoanalytic suggestions (as expressed in our model) we consider as personality traits, and styles of modulation of emotions of which we consider one aspect of their phenomenology, that is, the verbal one as indicated by analysis of verbal content as proposed by Gottschalk (1969). We refer to aggressivity in general and not to the so-called oral aggressivity, even if psychoanalysis has studied oral aggressivity and we inquire into a relationship between aggressivity and oroalimentary behavior. Deep connections are postulated among the different forms of aggressivity (general, oral, etc.), as has emerged also in prior research (Ruggieri, Sabatini, & Muglia, 1985) in which modifications of tension of oral musculature appear also in forms of general hostility.

Moreover, we want also to examine the relation of oral and hostile behaviors to the myographic tension at rest of the muscles engaged in the process of mastication because they are directly involved in both oroalimentary behavior and some forms of aggressivity (as biting, etc.). In earlier research (Ruggieri, *et al.*, 1985) we found that the myographic tension of the masseter and orbicularis oris of the right half of the body was directly related to overt outward (verbal) hostility as measured by Gottschalk's method (1969). Even more so the myographic tone at rest of such muscles should be related to oroalimentary style in addition to the modulation of emotional behaviors.

METHOD

Subjects

We examined 24 undergraduate women in psychology. They were between 20 and 30 yr. old, with a mean age of 25 yr. All subjects declared themselves to be right-handed.

Procedure

Muscular tone at rest was measured by electromyographic equipment using Beckman coupled surface electrodes. Electromyographic potentials were sent to an amplifier with the band pass between 20 and 1000 Hz. The EMG signal was sent to an integration system which operated the analysis of amplitude and then to a converter which converted the amplitude into frequencies. This signal was digitalized through a 1-sec. period and then appeared on a display apparatus.

The electrodes were placed on the left and right orbicularis oris and the left and right masseter muscles for each subject. Measures were taken in random order by a preprogrammed arrangement. For the orbicularis oris the electrodes were placed both on the right and left halves of the upper lip. For the masseter the electrodes were placed both on the right and left sides of the face corresponding to the corner between ascending and descending branches of the mandible. The ground electrode was placed on the right wrist. For each muscle a mean score of 10 measurements was obtained. Each measurement lasted 1 sec.; intertrial intervals were 1 sec.

The study of aggressive components was carried out using Gottschalk's test (1969). This test distinguishes three forms of hostility: (a) that directed outward both overt (from the subject to others) and covert (attributed to others); (b) that directed inward, that is, from the subject onto himself; and (c) ambivalent, that is, hostile attitudes from other people toward the self of the subject. Moreover, the test includes a measure of anxiety. The content and representations of hostile acts and events were gathered through verbal records of the interviewed subjects. Each subject was asked to talk for 3 min. about an interesting or dramatic experience, and this material was then analyzed by two independent judges using the method of content analysis of verbal behavior described by Gottschalk (1969). The magnitude of an affect is calculated using the formula, $\sqrt{100 \times (f_1w_1 + f_2w_2 \ldots f_nw_n + 0.5)/N}$, where f_n is the frequency per unit of time of any relevant type of thematic verbal reference, w_n is the weight applied to such verbal statements and N is the number of words per unit of time; for further information see Gottschalk (1969, pp. 22).

To measure the styles of oroalimentary behavior the subject was given a questionnaire with 70 items, including both so-called normal and pathological oroalimentary behaviors as, for example, heartburn, compulsive eating, eating as substitute for affection needed, masticatory habits, etc. (Ruggieri & Guerrera, 1984).

In a previous research (Ruggieri & Guerrera, 1984) from this questionnaire we derived through a factor analysis four factors describing four oroalimentary styles. Factor A or appetitive hyperactivation defines mostly attitudes

of a specific greediness recalling sucking behavior. In other words, it describes the typical processes of the appetitive stage of oroalimentary behavior with consummatory attitudes of a sucking type. In fact, it clusters items such as "to eat with greediness", "to be impatient to eat", "to eat with a lot of appetite", "to have difficulty in chewing", "to need much food to become satiated", "to react to depression and anxiety by eating", etc. Factor B or appetitive hyperactivation with motor and masticatory behaviors of the oroalimentary sphere clusters items referring both to appetitive hyperactivation as in Factor A and to the tendency to solve oral hyperactivation with motor behaviors of masticatory type ("often to eat sweetmeats", "to chew sweetmeats and chewing gum", "to bite one's lips", etc.). Factor C or conflictual orality describes a subject who has a constant attitude of acceptance-refusal of food and transfers this attitude also to interpersonal experience. In other words, he tries to "put in" but in the same time inhibits the swallowing of both physical and psychic material. There are items such as "to feel disgust when attention is paid to food", "often to vomit", "often to say: what disgust!", "to have relations with persons considered sickening", etc. Moreover there are items describing both a motor hypercontrol of oral drives and diseases of digestive system. Factor D clusters items referring to smoking behavior.

RESULTS

The final scores for each subject on the Gottschalk test were the mean

TABLE 1
MEANS AND STANDARD DEVIATIONS ON ALL MEASURES ($n = 24$)

Measures	*M*	*SD*
Myographic scores: *M* amplitude in 1 sec. (arbitrary unit)		
Right masseter	244.54	146.28
Left masseter	206.12	131.78
Right orbicularis oris	130.35	98.01
Left orbicularis oris	101.91	53.81
Total right score	183.86	97.63
Total left score	151.93	59.92
Gottschalk scores: verbal emotional content		
Overt outward hostility	0.98	0.42
Covert outward hostility	0.60	0.69
Total outward hostility	1.28	0.50
Inward hostility	1.32	0.63
Ambivalent hostility	0.83	0.66
Anxiety	2.42	0.90
Oroalimentary styles: scores on questionnaire		
Factor A	6.00	2.52
Factor B	8.16	2.71
Factor C	10.42	3.90
Factor D	2.79	2.21

TABLE 2

PEARSON'S CORRELATIONS AMONG FOUR FACTORS OF OROALIMENTARY STYLE AND OTHER VARIABLES

Measures	Factor A	Factor B	Factor C	Factor D
Gottschalk scores				
Overt outward hostility	−0.42†	−0.48†	−0.58†	−0.22
Covert outward hostility	0.15	−0.13	−0.04	0.29
Total outward hostility	0.15	−0.42†	−0.39†	0.15
Inward hostility	−0.01	0.01	0.26	0.22
Ambivalent hostility	−0.30	−0.34†	−0.20	−0.39†
Anxiety	0.04	−0.20	0.12	0.19
Myographic scores				
Right masseter	−0.41†	−0.36†	−0.01	−0.19
Left masseter	−0.18	−0.19	−0.07	−0.33
Right orbicularis oris	−0.30	−0.15	−0.20	−0.06
Left orbicularis oris	−0.24	−0.05	−0.05	−0.22
Total right score	−0.45†	−0.35†	−0.08	−0.17
Total left score	−0.30	−0.18	−0.05	−0.45†

†$p < 0.05$, $n = 24$.

values of the two independent judges' scores which were highly correlated ($rs = 0.89$ to 0.95).

Means and standard deviations for each of the examined variables are indicated in Table 1. Pearson's correlations among the four factors of oroalimentary style and the other variables are indicated in Table 2. As it can be seen, Factor A (appetitive hyperactivation) showed a statistically significant negative correlation with overt outward hostility, myographic tension of the masseter and total myographic tension (masseter plus orbicularis oris) of the right half of the body ($p < 0.05$). Factor B (appetitive activation with masticatory attitudes) showed a statistically significant negative correlation with overt outward hostility, total outward hostility, ambivalent hostility ($p < 0.05$). Moreover, Factor B scores were negatively correlated at a statistically significant level with total (masseter plus orbicularis oris) and masseter myographic tension of the right half of the body ($p < 0.05$). Factor C (conflictual orality) was negatively correlated with overt outward hostility, total outward hostility ($p < 0.05$) but showed no significant correlation with the myographic scores of the examined muscles. Finally, Factor D (smoking behavior) was significantly and negatively correlated only with ambivalent hostility and total myographic score (masseter plus orbicularis oris) of the left half of the body ($p < 0.05$). No significant correlation was found between oroalimentary styles and scores on anxiety.

DISCUSSION

Our psychophysiological model considers the instinctive behaviors (oroali-

mentary, aggressive, etc.) as integrated patterns expressed through psychic and biological manifestations. Many psychic manifestations are acts realized through the action of definite anatomic structures (to beat, to eat, etc.). The psychodynamic models, for us, have examined only one aspect of the whole series of manifestations: the so-scalled "psychic energy" of the psychoanalysts is an abstraction, a separation between experiential subjective components and physiological and biological processes from which the first result. We propose a schema inverse to the psychoanalytic one by placing the subjective components in the context of determinate psychophysiological behavioral patterns. For each instinctive behavior we consider aspects of both biological and psychological phenomenology. Such instinctive patterns appear when stimuli act on encephalic structures. Stimuli can be different and of varied origin as, for example, artificial stimuli in a research laboratory or internal stimuli linked with cognitive and psychological processes. In this sense what psychoanalysts call psychodynamic processes can be considered as internal stimuli.

In this framework is placed the comparison between the so-called oroalimentary drives and aggressive behaviors which we observed in our research.

From examination of Pearson's correlations clearly emerges an inverse relationship between some forms of hostility and oroalimentary styles and habits. In our previous research (Ruggieri & Guerrera, 1984) on the oroalimentary habits we have singled out four factors. To understand the meaning of these factors, we must refer to a psychophysiological model proposed earlier (Ruggieri & Guerrera, 1984).

In accord with the literature on instincts (Moruzzi, 1973), the normal oroalimentary behavior is composed of two stages, appetitive and consummatory. The sequence of instinctive behavior ceases when a certain quantity of food introduced in the organism has the effect (as chemical messenger) of a signal to stop in those encephalic centres from which the behavioral sequence was initiated. Besides food, information coming from the muscles engaged in the masticatory activity would have the role of retroactive stop on the encephalic centres (Anochin, 1975). Oroalimentary behavior can undergo important modifications for different subjects in the normal population. It is possible (a) that the encephalic centres are constantly stimulated, for example, by profound psychodynamic themes, called "unconscious" and linked to the oral area, or (b) that the centres continue to act because they receive no adequate signals to stop retroactively. Obviously the situations (a) and (b) can also occur simultaneously. The second is the case in which the masticatory activity is relatively poor and the tendency is rather that of swallowing little masticated food. Here the subject is characterized by a marked prevalence of appetitive components (constant sensation of hunger, greediness, disposition to eat abundantly, etc.). This attitude is described by Factor A which we call

appetitive hyperactivation. It is also possible that the subject controls his hyperactivation by often carrying out behaviors of masticatory type (to chew sweetmeats often, chewing gum, etc.) which inhibit the encephalic pace-makers. Such an attitude is measured by Factor B of our questionnaire called by us "appetitive hyperactivation with motor and masticatory behaviors of the oroalimentary sphere". The third possibility is represented by the production of supplementary signals to stop. In fact, we hypothesize that behavioral attitudes such as "to clench the jaw" (engaging masseter muscle at rest) or "to set the teeth not to cry" constitute peripheral events having a retroactively inhibitory effect on the encephalic centres of the oroalimentary activity and not only of that one. Factor C includes these aspects besides conflictual attitudes towards oroalimentary activity (tendency to vomit, a sensation of nausea when food is masticated a long time, a feeling of disgust when paying attention to food, etc.) appear. The fourth factor or Factor D refers to smoking behavior.

Going back to the relationship between oroalimentary attitudes and the modulation of hostility, it can be seen that each of the first three factors is negatively correlated with overt outward hostility ($p < 0.05$): the more evident, peculiar and stable become some oroalimentary attitudes in form of both sucking excitation and oral conflicts, the lower is the tendency to manifest aggressivity. So a sort of contraposition forms between two opposite functional polarities, orality on one hand and hostility on the other. In other words, if the relationship between oroalimentary behavior and overt outward hostility were confirmed by further research, it should be possible to hypothesize the phenomenon of commutation: the oroalimentary behavior would substitute for the aggressive one. But the inverse hypothesis is also possible, that those persons able to verbalize their hostile drives tend to reduce or restrain evident displays of the oroalimentary sphere.

Moreover, ambivalent hostility as measured by Gottschalk (which we could call paranoidal: hostility from other people toward the subject) is negatively correlated with Factor B of the appetitive hyperactivation accompanied by masticatory behaviors and with the Factor D of smoking ($p < 0.05$). In other words, both to chew (chewing gum, sweetmeats, etc.) as a frequently exhibited behavior and to smoke could have an inhibitory effect on these paranoidal mechanism, probably producing a sort of peripheral discharge of the excitation linked to the central programming. On the other hand, both the factors have in common some motor behaviors of oral region (the Factor C to chew sweetmeats, etc., the Factor D to smoke) which work almost "to no purpose" for food intake. Such behaviors can be considered as a sort of oral automanipulation with the intent of reducing the aggressive projections.

Finally, the alimentary styles (Factor A and B) are negatively correlated with the levels of myographic tension, that is, the appetitive and the appetitive-

masticatory attitudes match a low myographic tension of masseter and total score (masseter plus orbicularis oris) of the right half of the body ($p < 0.05$). In other words, the appetitive sucking behaviors, unlike other instinctive behaviors such as the aggressive one whose preparatory stage requires greater muscular tension, are linked to a lower myographic tension of the oral region consonant with greater receptiveness of the oroalimentary apparatus. We recall that the aggressive oral behaviors are characterized, according to the clinical model, but biting and chewing which were clearly different from the behavior of "assuming" with poor mastication typical of the style of hyperactivation of sucking.

The same relation occurs for the Factor D of smoking, but in this case the negative correlation refers to the total myographic score (orbicularis oris plus masseter) of the left half of the body ($p < 0.05$). The different involvement of the two halves of the body in the relationship between muscles and oroalimentary attitudes is not absolutely casual, for us. In previous research (Ruggieri, *et al.*, 1982) on cerebral dominance in relation to gesturing (both free gesturing and manipulative self-contact), we hypothesized that the right half of the body is involved in situations in which interaction with the environment is evident, while the left half (especially for self-contact behaviors) is active in situations referring to internal processing of the subject himself (mnestic, emotional content, etc.). Moreover, we recall that in other research (Ruggieri, *et al.*, 1985) the total, masseter, and orbicularis oris myographic scores of the right half of the body were positively correlated with overt outward hostility, while the total and masseter myographic scores of the left half of the body were positively correlated with ambivalent hostility. It is easy to hypothesize at this point that the greater involvement of the right half of the body for right-handed subjects appears in the overt outward aggressive behaviors. The sucking alimentary components have an inhibitory effect just on this half of the body.

Finally, with regard to Factor C an inverse correlation with overt and total outward hostility supports the inhibitory role which also Factors A and B have on aggressive behavior. The lack of a relationship with the myographic scores could indicate that the muscular system is unhooked from the simple bipolar play activation-aggressivity/inhibition for sucking preparedness and vice versa. In this case, it is possible to hypothesize that the muscular tension serves as artificial stop to more behaviors programmed by the encephalic pace-makers (for example, anxiety, etc.).

However, ours are preliminary results obtained on a small sample of young women so further investigations are needed to confirm our data.

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