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Review

FACIAL EMOTIONAL FEEDBACK: NAVIGATING SPACES AND FAKING GASEOUS AXONAL SHORT-CUTS?

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SUMMARY

Silvan S. Tomkins (1911-1991) and scholars advanced the understanding of facial expressions and their connection to emotions in affect theory in confluence with the etho- and ethnological Darwinian traditions. While Tomkins at first attributed the origins of feelings to the mimical muscles, he soon realized that the overlying skin, as moved by the muscles, was the actual, not just facial, agent of feelings. Variants of the contested hypotheses on Emotional Facial Feedback (EFF) struggled since, while basic mostly clinical research on the sensory trigeminal (TGS) and the facial motor system (CN7S) couldn't offer a (patho-)physiology of affect concerning the lay experience of emotions to be felt around (activated) mimical muscles in a variant of soft touch - in a way similar to how "feelings" are elicited by emotional mental content alone. Here a broad psycho-physiological review concludes on three explanations: 1). the many "anastomotic" tracts with close adjacency of motor and sensing branches point to a simulating "shortcut" from the CN7S to the TGS thus just faking "feeling" without ensuing contraction – since branches of CN7S can just be alerted by readiness to move. This could be due to an orthogonal gaseotransmission by H_2S and NO, also regulating its axonally transported enzymes (nNOS e.g.). 2). The very circumscribed sensorial areas in the face creating specific EFF gradients could function more precisely and adapting as a "somatotopic grid" by recruiting the second "onion-shaped" dermatomes of sensorial defluence providing "pain by rate", but also localization. 3). Merely intended movements of the jaw (via preparatory potentials) possibly provide psychological localizations of emotional and other semantic meanings within the Cartesian abstract mental space - limited to 4=3+1 (time) dimensions sustaining the role of movement in future AI. Self-constituting and empathic automatic mimicry and touch interactively point to their core clinical disturbances in "borderline personality" amenable to trigeminal inflammations e.g. at the cavernous sinus.

Key words: *facial emotional feedback – touch – facialis-trigeminus interaction – interaxonal gaseotransmitter – cavernous sinus – borderline personality disorder*

Abbreviations: *CN, CN7: cranial nerve, facialis; P FN: pontine facial nucleus; EFF: emotional facial feedback; EMG: Electromyogramm; FMMs: facial mimical muscles; fNIRS: functional near-infrared spectroscopy; GTs: Gaseotransmitters; H_2S: Hydrogen sulfide; CBS: Cystathionine β-synthase; 3-MST 3-Mercaptopyruvate sulfurtransferase; NO – Nitrogen Oxide; MJMs: mandibular jaw movements; TMJ: Temporomandibular joint; NAcc: Nucleus accumbens; PPG: pterygopalatine ganglion; pSTS: post. Superior Temporal Sulcus; RP: Readiness signal; SCAV: sinus cavernosus; Trigeminal: TGG: T~ ganglion; TGS: T~ system; SNT: T~ spinal nucleus; TCC: T~ cervical complex*

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> *The free expression by outward signs of an emotion intensifies it. On the other hand, the repression, as far as possible, of all outward signs softens our emotions.*
>
> *Charles Darwin, 1872*

> *Smooth the brow, brighten the eye and your heart must be indeed frigid if it does not gradually thaw.*
>
> *William James 1890*

THE LONG ROAD OF AFFECTOLOGY…

Emotions sell, not least, opinions on human mental functioning. But of what nature are they? Duchenne de Boulogne (1862) had identified 33 facial expressions by galvanic stimulations. Evolutionary biology with «The Expression of the Emotions in Man and Animals» (Charles Darwin 1872) started off with a strong thread exploring emotional mimics, especially in their «pure» forms (fear, anger, sadness, joy, surprise, and disgust) observable also as expressed by children, animals, people from various ethnicities and in-patients. These were not intended to provide the emotional "feel" or EFF, Emotional (Facial Feedback: Wikipedia 2024). Yet soon a parallel thread of "James-Lange-Sergi" proposed an emotional "feedback" from rather unspecific vegetative reactions. Giuseppe Sergi (1894), a co-founder of biological psychology (Volpone 2011), already conceived a lower brainstem mechanics of "instinctive associations" (Figure 2) grown out of past existences, all rooted in the nutritional organic life." - i. e. in relevant appropriations - whereby its essential common bulbar center (equally for peripheral and central excitations) commanded it in "both painful and" - with less stimulation - "pleasurable ways", without any other participation of the higher brain beyond consciousness or the psychic revelation (…): the brain as organ of intellectual functions (…) is just a means to excite emotions, like all the stimulated organs and tissues.". Sergi by detailing the facial neurology at the brainstem, albeit without mentioning any role for the skin in EFF, anticipated todays` likely explanation of mimical EFF by bulbar neuronal senso-motoric "mingling" (see below), providing simultaneously facial muscular action and sensitivity. William James only conceded a general muscular co-generation of the essential "bodily" feeling "whatsoever it be", while James R. Angell in 1916

proposed a yet only vegetative valence by "modulating" mimics. Finally Silvan S. Tomkins (1911-1991) (www.tomkins.org) at first proposed the facial mimical muscles (FMMs) as the essential origins, but then realized that it seemed to be the overlying skin where the feeling was evoked as EFF (Tomkins 1995). He had started in a search for digital algorithms from the most abstract concept of affects conceived as mere changes in intensity (1st derivatives) of all sorts of processes (Figure 1), realizing the little mentioned generalized nature of feeling states. This was a shock to behaviorism and psychoanalysis, founded on drives (to accomplish specific tasks). When increases in interest would climb in intensity, generating STARTLE if sudden, and finally distress up to aggression, intermitting relief would release joy - finally sinking into bobbing SADNESS. Thus "primary affects" as interactive dynamical moderators would "be fused with any type of experience". In such resonating processes – also by their "flexibility of assembly" – affects would "lose some of their uniqueness and visibility": they would fade like letters in a word and words in a sentence making them "hide in plain sight". As psychological solutes, their excessive "distillation" would harm the comprehension of phenomena obviously to be explored by moving from the abstract dimensions to the complex therapeutic psychology, of which Tomkins became a leading diagnostic and therapeutic master with "script theory".

Tomkins defined Shame (and Disgust/Contempt) as "auxiliary affects", due to withheld reward triggering "ideological" violence (but not as a display of submissiveness by cognitive and motor weakness), and Guilt as a cognitively demanding redemptive kind of WORRY - but also as a self-Contempt in inferiority – actively promoting their incorrect fusion.

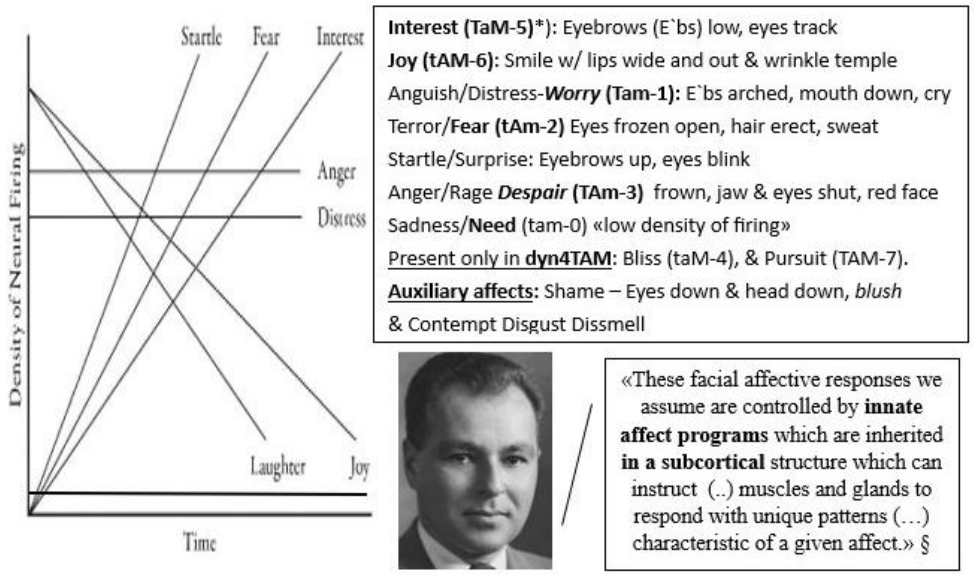

Figure 1. Graph of a theory of innate activators of affect. (Sadness was added later by him). In Silvan S Tomkins: Affect Imaginary Consciousness, 1: 125. *) Corresponding 6 of 8 Thought-Action-Mood terms from dyn4TAM-model (Treviranus 2018) - §) Tomkins SS & McCarter R: What and where are the primary affects. (…) Perceptual and Motor Skills, 1964, 18: 119-58. (Foto by Orren Jack Turner)

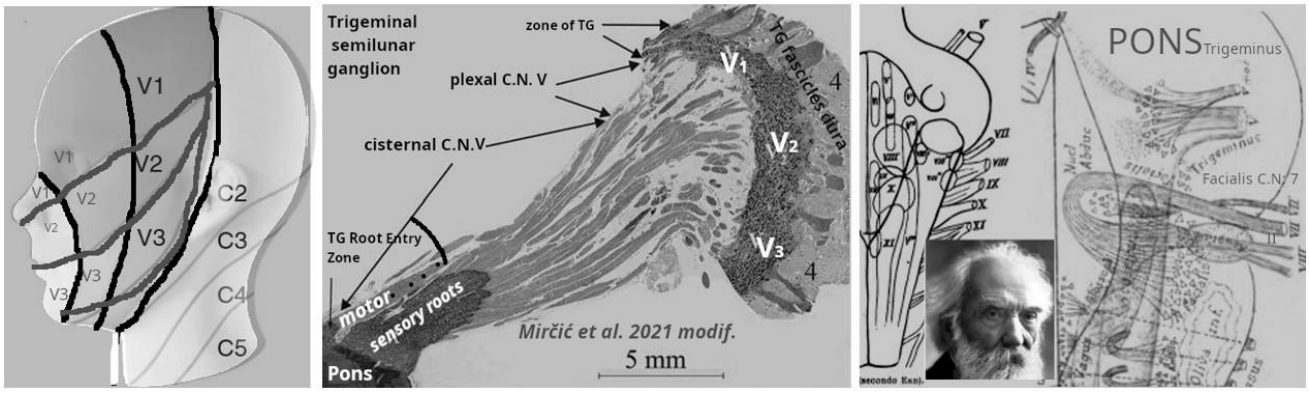

Figure 2. A. Hypothetical superposition of the standard horizontal somatotopy for touch with the anteroposterior "intermingled" "onion"-model of afferents for pain (modif. from Mehnert et al. 2023), which still localizes when functioning in a (low rate) no-pain mode. B. The two pontine trigeminal roots reach out to their "semilunar" ganglion (TG) (Mod. After Mirčić AL et al 2021). **C, D.** Medullary and pontine nuclei inserted in the book by G. Sergi (1894)

How do emotions start and persist as felt?

Facial feeling can be evoked by mimical muscles and touch by oneself and others, in specific areas of the facial skin and can be addressed without moving these muscles. They are a special variant of the skin's touch system essential for selfhood (Barsotti et al. 2024) and bonding by attachment (Nance et al. 2024) as fostered by CARE. Facial mimics emit more or less authentic visual signals of the inner emotional state to others (or to oneself, as in mirrors), allow to connect by also just intended mimicry to the emotional state of conspecifics, pets, wild vertebrates (while proportional to mood), read emotions out of images (Wardle et al. 2020) – much like is known from specific sounds in voice (Schirmer 2018) or music. Perceptual channels herein come together to provide multi-modal empathic faculties (Schirmer & Adolphs 2017) – which may fail in alexithymia (Suslow & Kersting 2021). All this – after the dynamics induced exclusively through the facial nerve by facial mimical muscles within the skin – crucially involves sensibility provided by the largest cranial, the trigeminal nervous system (TGS), conducting and processing most orofacial input, while also moving the masticatory muscles. This, beyond soft or rough affective touch or pain extends to proprioception, temperature, but also taste, smell or sensations from irritants. Yet, besides often psychosomatic considerations about trigeminal pathologies, not much research has centered on emotional functions and dysfunctions of the TGS, while, after a long neglect, "affectivism" has taken over (Dukes et al. 2021, Dargél et al. 2017). In fact, conceptual and methodological shortcomings abound. While providing access to the experienced essential core of emotions, self-reports e.g. are often muddled, whereas objective measurements advance (Sato 2024), posing ethical problems. In research though a huge meta-analysis of Ekmans's and similar much applied, but imperfect methodology of (only) six "basic emotions" failed (Durán & Fernández-Dols 2021). Beneath these circumstantial emotions in recent work few concepts beyond the plane of valence x arousal (of "core affect"), and an incomplete set of basic and auxiliary affects emerged. Yet a "hyper-dimensional" semantic space mapping 27 mixed emotion items might reconcile Cartesian dimensions with gradients of affects moving by their "flexibility of assembly" – to be seen online at (Cowen & Keltner 2017) – whereby imperfect determination of emotional phenomena by somehow causal dimensions or semantic hotspots has become more acceptable. Yet beneath this looms the unsolved issue of how (and how strong!) feelings are felt in EFF.

From affective generators to affective concepts

In establishing "Affective neuroscience" (of feelings) Jaak Panksepp (1943–2017) posited that «among the ancestral brain networks we share with other mammals, a few ounces of brain tissue constitute the bedrock of our emotional lives, generating the many primal ways in which we can feel emotionally good or bad within ourselves.» and he defined by himself specific electro-responding neural networks in also decorticated animals: SEEKING (dysphoria to mania), FEAR, RAGE, reproductive LUST, CARE, PANIC/«separation» GRIEF/ sadness and joyful «rough & tumble» PLAY with e. g. ticklish social touch. Hereby personology entered a new phase (Davis & Panksepp 2018, Davis & Montag 2019). This arrangement of concepts of affects as generated in research animals as «action systems» nearly «complies» (⇔) also with the "corner terms" of the French ante-Kraepelinian dyn4TAM-phase space as spanned between high and low (t, a, m) Thought, Action, and Mood (Treviranus 2018): depressive GRIEF-Sadness⇔NEED:tam0, (not defined)⇔WORRY:Tam1, FEAR⇔FEAR: tAm2, (not defined)⇔BLISS-taM4 versus manic RAGE⇔DESPAIR:TAm3, SEEKING/ »wanting»⇔INTEREST:TaM5, PLAY⇔«social» JOY:tAM6, and also CARE⇔PURSUIT:TAM7 - if one considers «care» as a generalized constructive ACTION meriting positive valence. From reproductive LUST being an only particular sexual SEEKING - with (or without) the general final perceptive «liking» at the e. g. opiod hotspot at the ventral pallidum constituting BLISS-taM4 - results one disaccord with dyn4TAM and another one from lacking a system for WORRY-Tam-1 – an inconclusive low-valenced rumination (brooding, not pondering), hurting self-control: which has been discussed (Song et al. 2022) more as relating to the self and not to a generally gloomy future. Still basic affects denote domains in a semantic space, as e. g. the "appropriative" adaptive one of the dyn4TAM-model, with its Mood-dimension expressing con- or destructive valence, while emotions above this grounding are enriched by more specified circumstances, transmitted as "ancestral life-tasks" (Ekman 1999), like e.g. "embarrassment" signaling that ranking by others exceeds that of self-evaluation. Yet feelings after all also need to be felt. The concept that FMMs need the skin to evoke emotional feeling seems to join nicely with lay experience of the daily emotional (or sexual) effects of touch. The mere self-touch of the facial skin below or above the oral corners only slightly elicits dis- or content, as can easily be tested on oneself – if one is trying to intend the specific emotion – unless the corners are moved. Mimical emotions, furthermore, do not seem to occur if such contracting mimical muscles are impeded by counterpressure to move (and thus the facial tissue). This frontier of research has for too long stayed "untouched" (Bress & Cascio 2024).

The Trigeminus: Sensing the Face and Moving the Jaw

The trigeminal nerve roots exit antero-laterally from the pons, close to cerebellar arterial feeders with siphons possibly protecting cerebellum from mast cell intrusions (Figure 3 in Treviranus 2023). They reach their ganglion

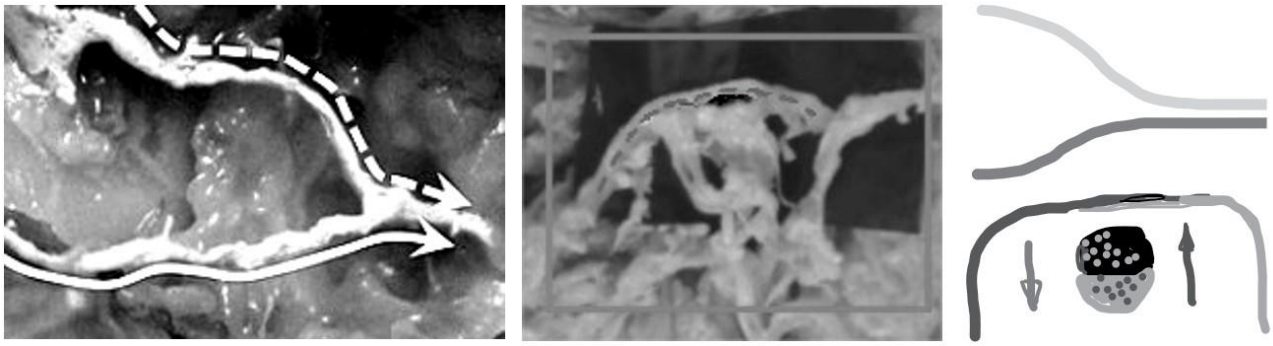

Figure 3. Connections with A. parallel converging (Iwanaga et al. 2023) or B. overlapping (Mohanty et al. 2024) stretches (with A. same or B. counterflow signal directions) allowing for just simulated "virtual feeling" through C. orthogonal gaseotransmitter transmission of preparatory potentials from facial C. N. 7 to trigeminal C. N. 5.

(TGG) over 1,4 cm through the cistern and post-ganglionic rootlets are contained by Meckel's cave, a meningeal pocket lateral to the clivus and sitting on the petrous apex transversed by the carotid artery (Mirčić et al. 2021). The ophthalmic V1-branch of the trigeminal nerve (TN) senses the skin of forehead, upper eyelid, nose; the maxillary one (V2) maxillary sinus and teeth, the middle facial zone, mobile nasal septum, nearby nasal sides and cheek, lower eyelid, conjunctivae, temple, upper lip with fold, labial glands, most of the oropharyngeal cavern, and the dura mater; the mandibular V3-nerve transmits from the lower face and chin up to the preauricular zone and temple, the oral floor, tongue and the jaw (which its motor partner moves). Their signals when fed into the human brainstem are processed in multiple central representations of the TGS as low as C2/C3 (joining the trigeminal cervical complex (TCC) receiving many afferents important for head and neck conditions (Bou Malhab et al. 2025). The long supratrigeminal nucleus (STN) within the brainstem consists of 3 subnuclei: oralis (SVo) for fine facial touch (at its top joining the principal sensory nucleus (PSN)), the interpolaris (SVip) for pain and deviant heat and cold, and the caudalis with «onion»-somatotopy (SVc – aka Medullary Dorsal Horn) for touch and dental pain. At the SVo the receiving zones show a stacked correspondence to the face's three horizontal dermatomes (V1, V2, V3; gathered up to the mid-point of the vertical limit of the head's rear C2-dermatome). Here some neurons of SVo respond with pain only, but others also respond with touch-feeling, while 1/3 of these "WDR"-neurons transcend the V1-V2-V3 dermatomes (Dallel et al. 1990) possibly following the "onion-somatotopy" as well. In pain transmission rates can painlessly low, while localization continues, especially in the TGS along other cortico-thalamic routes (Lenz at al. 2004).

Maybe two "dermatomes" from different brainstem systems therefore could form a common "somatotopic grid", which could prove advantageous by achieving a more comparable "positioning" in widely different faces (Figure 2A).

Mimical muscles and their faking nerves: can a bit of gas do this?

Mimical muscles form nets of muscle cells (Sandulescu et al. 2019), are incited at times by more than one nerve, optimized for speedy omni-directional fatigue-resistant tiny contractions, and insert via maximized indentations into partly elastic fibrous dermal and pericranial layers. Since emotional movements are felt through the TGS, but are all incited through the facial CN7, it should be revealing for the mechanics of EFF that facial muscles quite often receive intriguing conjunctions of motor (facial) and sensory (trigeminal) nerves, but not of their axons (Mohanty et al. 2024). These have been looked at with conventional microscopes only and are of two types (Figure 3): either A. branches join shortly before they enter the muscle (coming to lie close for a short track with anti-parallel signaling) or B. branches meet (with parallel signaling) in opposing directions. From this it could be deduced that indiscriminately some signal connection occurs at right angle between such parallel nerve tracts. Merely preparatory "readiness" potentials (RP) indeed also do occur at the precentral gyrus of M1 (the primary motor cortex) in preparation for the imminent start of voluntary also facial expressions through the CN7 just < 2 sec. beforehand (Korb et al. 2008). Any facio-trigeminal transmission of such RPs would provide only intended – and thus non-occurring – specific contraction signals in (CN7) and a valid specific feeling (TG) - thus to be felt just virtually. Such short-cuts for simulating transmissions could make use of locally produced gaseotransmitters (GTs) like hydrogen disulfide (H_2S) - also creating TGS-stimulating HNO within STN (Teicher et al. 2017) - often cooperating with more readily available nitrogen oxide (NO). GTs diffuse along axons and enter neighboring axons. After injury more nNOS (producing noxious amounts of NO) is transported along axons both of CN7 and TG (Scarpellino 2024, Garthwaite 2015). The more ambiguous H_2S, which protects against O_2-radicals, is also produced in axons e. g. by mitochondrial 3-MST storing it in "bound sulfane sulfur" while improving their function (Munteanu et al. 2025). Axonal signal conduction can be stopped through NO and de- or

increased via H_2S. In water H_2S dissociates into a dipole: a candidate explaining effects of electrotherapies (Treviranus 2024), diffuse along axons and enter neighboring axons because they transverse lipid membranes easily. After injury more nNOS (producing noxious amounts of NO) is transported along axons both of CN7 and TG (Scarpellino 2024, Garthwaite 2015). NO is produced in axons by mitochondrial 3-MST, improving their function (Munteanu et al. 2025). TGGs are activated by a windup between neuropeptides and NO (Messlinger 2020). Neighboring axonal signal conduction can be stopped through NO and de- or increased via H_2S. At the STN the TGS interacts with CN7 neurons in a more common way: the blink reflex between SVi and SVc e.g. is long known (Kofler et al. 2025). Instances of mingled senso-motor networks in any case prove useful in revealing the plentiful further secrets of EFF, whereby spontaneous movement results in strongly felt behavior. Lower mimical power leaves emotional intensity intact (Leach & Weick 2020), yet spontaneous smiles by 94% show quicker and stronger EMG than feigned ones (Perusquía-Hernández et al. 2019). Meanwhile dynamic, micro- and overall expressions are being studied intensely (Straulino et al. 2023). The EFF concept has been somehow and heterogeneously supported by a meta-analysis not considering the type of emotions, avoiding external and internal (cognitive associative or action intending) emotional triggers, while not noting differences wither discrete or dimensional reports were used (Coles et al. 2019). EFF again was not elicited in surprise, nor in fear. Still various cognitive contributions to the emotional experience merely modulate perception and influence of EFF. In this the cerebellum with 80% of all neurons sustains by "internal forward models" beyond moves, for many other, also interactive social processes. Its dense somatotopy has been revealed for facial (headache) pain processing mainly from TG root V1 (Basedau et al. 2023). The models' influence becomes reduced in proportion to cortically processed experiences, but they still "sustain" processes especially by bridging moments in which what is fed back is unexpected or paused (Treviranus 2023). It will therefore also be explored how EFF is sustained e. g. by the cerebellum (Ma et al. 2023; Van Overwalle F et al. 2020), e.g. when its Crus I interacts with the superior temporal sulcus (pSTS), the hub for also contextually remembering (Reddan et al. 2025) social cognition in order to "bridge the feel" when muscle don't (Turrini & Avenanti 2024).

SOCIAL TOUCH: SEEING THE FEEL – FEELING THE SEEN

Human competence in mimicry and general "social touch" is of paramount importance throughout life (Cascio et al. 2019), starting with its role in parenting and attachment (Long et al. 2020) - since we read others' minds through touch (Kirsch et al. 2018). Soft caress-like touch is felt via opioid receptors as also sexually pleasant the more unmyelinated C-fibers in hairy skin fire to be processed in the posterior insula, rather than in the primary SI-cortex. Touching your face, and especially the so-called T-zone (the forehead, nose and chin) up to 800 times a day is normal and exceeds all other skin regions of the body. These spontaneous facial self-touches appear to be correlate with the density of facial hair in the T-zone (Grünwald et al. 2025). Mammalian relaxation by grooming but especially altruistic attachment e.g. to specific human faces, is mainly strengthened by especially (general) facial caressing "soft touch" - which occurs through opioidergic pleasantness, but not via restoring oxytocin (Fu et al. 2018) - and to which in fMRI the subcortex and female infants are more receptive. "Moving light touch" can provoke itchy discomfort and disconnection often by rubs. Yet only the more unpredicted not self-imposed tickle received by others on many other nerve types (beyond those of "soft touch") by familiar ticklers (or machines) is inciting e. g. giggles – if we (even more if hallucinating) are ticklish, in certain areas - and then we might tickle-laugh like apes, even because it's not funny, tickle back, or sense it as tickling our pride: the whys of "gargalesis" abound since long among the great minds (Kilteni 2025) and mechano-sensation by mast cells could contribute. Negative emotions caused by skin disorders instead can be extreme (Mento et al. 2020). Even AI-supported "emotionally intelligent neuro-cosmetics" fails to recognize the fundamental role of muscologenic epidermal movements (Haykal et al. 2025). By knowing how it feels to stress the skin through facial mimical muscle (FMM) we can deduce how others feel rapidly, with sufficient approximation, and with more or less conscious effort – or we can't if these wear mentally controlling masks or we struggle with autistic traits. Mirror neurons (Wikipedia 2025) were first shown to provide an intuitive feel of other's and own movements also in the dACC and amygdala. FMMs smoothen contrasts to neighboring movers favoring gradients. A pictorial atlas of facial muscle movement also recorded EMG-activity (Schumann et al. 2021). Mimicry (and even its synesthesia in 1.8%) have been explored with touch and EMG, rarely asking about the relations between muscles, the skin or its cells and nerves (Hess & Fischer 2024), even bypassing its "feel" in reviews (Japee 2024) - while mimicry is compromised even before alexithymia is noticed (Franz et al. 2021). The mere perception of facial expression involves the left ventral pathway (Liu M. et al. 2021). Extensive brain processing of perceived FMMs "expressions" have been tracked by fMRI and oscillations (Petro et al. 2025). The "facial recognition" (and surveillance) of emotional states of streetwalkers e.g. via deep AI recently has acquired a new ethical connotation (Li & Deng 2021).

THE MENTAL 4D-SPACE JAWS MIGHT COMMAND: ALSO EMOTIONS?

The role of mandibular jaw movements (MJMs) in emotions is neglected outside maybe speech (Chrabaszcz et al. 2019) and painfully disturbed mechanics (Pavlou et al. 2024, Uchima Koecklin et al. 2024) – e. g. at its TMJ-joint involving the posterior insula (Harfeldt et al. 2018) - and their associated mental problems (Scrobota et al. 2025). Dysgnathia harms the brain, whilst chewing gum heals with broad beneficial cognitive and perfusing effects also on the TGS and the cerebellum, profiting from rhythm - as seen on EEG, fMRI and fNIRS (Chmiel & Malinowska 2025). Its "subtle" other role is reduced to a contributor to defiant anger, when shut or to boredom, smile, laugh, surprise, fright or attack menacing bites when opening. Its dynamics - clenching (repressing bites or distractions), relaxing (calm), jaw-drop (astonishment), humorous obliqueness or retraction (fear, disgust) - participate in the generation of feelings as monitoring feedback of jaw-moving activity run from motor cortex to premotor nuclei of the TGS (Mercer Lindsay et al. 2019). The thalamus relays most TG afferences, and overall orofacial muscle proprioception resonates with the slim STN laying behind the main nucleus of the TS (PNT) and instructing the motoric one (Yoshida et al. 2022). A much more abstract and never suspected putative role of MJMs is that of a provider of an apparatus whereby a mental helms(wo)man can steer between meaningful (felt and semantic) spots in the subject's extremely versatile (but only 4-dimensional) abstract space (usually dynamics over time in a cube). There are usually no noticeable MJMs seen, but these are strongly preceded by invisible preparatory potentials in the brain, which are embedded in mental processes (Noel et al. 2025). Such abstract help to a helms(wo)man constituting «4D-Thought» (Halford et al. 1989) could also apply to Perception and Intention (Treviranus 2018) of emotional acts. Movement is presently invigorating philosophy of AI (Segado et al. 2025).

A FACIAL CORE TO BORDERLINE PERSONALITY?

Affective instability is close to a must in borderline personality disorder (BPD) but less specific than weakened "identity" (van Schie et al. 2025) manifested by "hypersensitivity" in relations which are amenable to valid psychotherapies (Zimmerman et al. 2019) pointing to a functional cause like shame; yet BPD is often therapy-resistant ending in suicide in 7%. Bodily self-introspection (Molnar-Szakacs & Uddin 2013) becomes shattered in several psychiatric conditions in different ways (Jenkinson & Rossell 2024). Psychologically and physically injured children are prone to later BPD traits, which is attributed to unexplained widespread volumetric changes in emotion-regulating networks (Camacho-Téllez et al. 2024). An inquiry of the TGS in BPD – not yet figuring as a main road of research (Estric et al. 2022) - thus may concern inflammatory and maturational lesions, genetical constraints, a putative role of – even repudiated - touch (smell, voice), and an overactivation of restraint by shame. Shame plausibly occurs through biting tendencies signaled via the TG's V2 to the pterygopalatine ganglion (PPG) being a putative core of Neuroticism (Treviranus 2018, 2020). Since thereafter PPG's proximal efferents for periarterial grids (Taktakishvili 2010) also may inflame the brain barrier, these parasympathetic efferents may suffer from proximal causes e.g. when passing along the sinus cavernosus (SCAV), an antero-posterior channel sharing just a single dural layer with the sphenoid sinus (and pituitary). An adjacent chronic sphenoiditis is typically inapparent, even on MRI images showing mucus only if inspissated, but present in 15% of neuro-symptomatic children (Khaladkar et al. 2024). Injuries suffered by TGN's V1- or V2- roots, while traveling along the lateral wall of the SCAV (since also CN 3, 4, 6 may suffer palsies) could very well explain many protean syndromes of shame, irritability and shaky TGS-related self-hood of the "borderline" syndromes, for which immune-infectious research only starts to be undertaken (Ajdacic-Gross et al. 2016, Forte et al. 2023). By MRI previous concepts of "imbalance" have been replaced by a robust frontal decrease and rear increase of grey matter along the hypocallosal arterial axis pointing to a longstanding dysfunction of the PPG, while a role in electrostimulation for e.g. flushed H2S (Treviranus 2024) or other GTs is supported at the TGS in rats, where, when given NO, STN neurons fire more or the TGG increases signals and NO-producing neurons (in V1 only) (Dieterle et al. 2011).

CONCLUSION

The validity of concepts on affect and emotions have become an urgent matter for the understanding and betterment of human affairs. A boost of mutual interest and understanding between clinicians and researchers is an integral part of this.

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