

During the last decades the face has reappeared in the labs of experimental research. This is due to a new 'trading zone' that has come up through the emotional turn in neuroscience. With his programmatic title *The Feeling of What Happens. Body and Emotion in the Making of Consciousness* (1999), Antonio Damasio provided the happy message that «the noticeable absence of a notion of *organism* in cognitive science and neuroscience» has come to an end because they have «finally endorsed emotion.»<sup>1</sup> Conversely, this 'emotional turn' in the neurosciences corresponds to a renewed greater status accorded to the brain in research into feelings, precisely in psychology, too.<sup>2</sup>

However, because emotions are not readily accessible to empirical methods, researching them depends on ways and instruments for grasping them indirectly. And here the face plays a prominent role as a physiological site of signifiers or indicators of emotions. Affects occupy the threshold of *soma* and *sema*, of the empirical and the semantic, of physiology and psychology, therefore its investigation touches a hot zone in the antagonism of measurement and meaning. Viewed as arousal, as physical or neuronal activities, affects can only be approached via indirect indicators such as pulse, blood pressure, hormone production and the like, while to study them as specific emotions, as phenomena of the soul or psyche, means that one must rely on interpretation – even when trying to decode the facial expression.

### **1. Emotions as medium between physiology and a psychological semantics**

Image-generating methods at present describe the terrain of close interaction between neuro-physiology, anatomy of the brain and experimental psychology. However, due to the emphasis on the potentials of brain-imaging one often forgets that 'neuronal maps' do not represent emotions or feelings, but just measured and recorded brain activities that can only be endowed with meaning via secondary indicators. By means of visualization techniques, such as *Positron Emission Tomography* (PET) and *Functional Magnetic Resonance Imaging* (fMRI), specific active or 'fired' regions of the brain are localized when the test persons undertake specific actions and intellectual activities. In addition, brain research has identified brain regions in the subcortical structures and the limbic system (*limbus* = seam)<sup>3</sup> that are 'responsible' for feelings and sensations. Since then, the credo has been that cognition is not possible without emotion.

The transition between physiology and the semantics of emotions is not seldom hidden in the nomenclature chosen. For Damasio, for example, 'feelings' specify the subjective notice taken of changes in one's own physical excitation; 'emotions' by contrast refer to distinct affect profiles: «When the body conforms to the profiles of one of those emotions we *feel* happy, sad, angry, fearful, dis-

gusted.»<sup>4</sup> ‹Feeling› serves here to link a subjective physical state with the ‹profiles› of the traditional lineage of types of emotions, and is thus the medium that links physiological phenomena with culturally shaped, semantically distinct emotions. The ‹emotional profiles› refer here to the culturally codified modulation of affects that are defined as respectively distinct by means of language.

In a different context, I explored the concept of emotions/feelings as used in the contemporary neurosciences in terms of its cultural and conceptual preconditions against the background of the tradition of catalogs of affects since Aristotle, namely the shift in paradigm from *pathé* in ancient culture to *passion* in Christian societies and to *sensibilité* during the 18<sup>th</sup> century.<sup>5</sup> It became apparent that the current concept of ‹feeling› (or emotions) comprises the recurrence of a pathos-formula from the age of *sensibilité/sensibility*.<sup>6</sup> Already in the 18<sup>th</sup> century, feeling was construed as a kind of intermediary between the poles of *sensibilité physique* and *sensibilité morale*.<sup>7</sup>

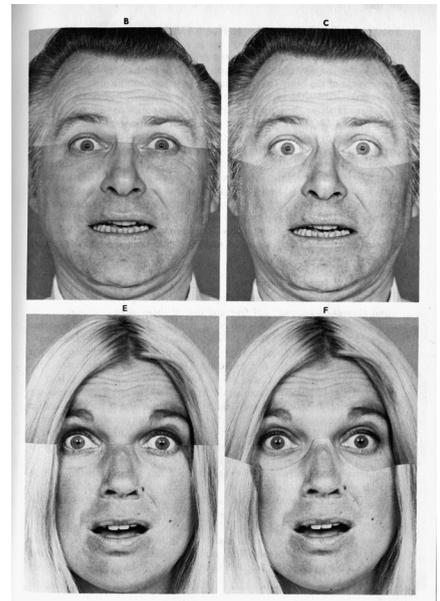
Today, the paradigm of ‹feeling/emotion› is located in the center of the ‹trading zone› of neurological brain research and experimental psychology – a fact, which is not least the result of an increased exchange of the development of instruments. Alongside ‹neuro-imaging›, the ‹facial gestures› – or respectively the ‹expressions of emotions› – play a key role as the physiological matrix for coding different feelings. The theoretical argument for suggesting that the movements of facial muscles can be taken as an indicator of feelings is based on the so called ‹efference-hypothesis›, according to which the stimuli of the central nervous system are passed on to the peripheral nerves of the organs. A more recent idea is the ‹facial feedback hypothesis›, assuming that ‹the control of facial expression produces parallel effects on subjective feelings.›<sup>8</sup> While brain research takes the physiological ‹signs› of affects as correlates for mapping specific brain activities, psychological basic research increasingly uses neuro-imaging as a control study to identify indicators that cannot be grasped by statements of the test persons or by measuring other physiological correlates (such as pulse, blood temperature, skin temperature).<sup>9</sup> The focus here is on somatic markers for specific affects (above all in the face or the autonomous nervous system). The experiments in question relate to a serious epistemological problem of neurosciences: the transition from *quantitative* practices (e.g., measuring the difference in ‹blood-oxygen level› between passive states and states of activity, called *BOLD*) to *qualitative* concepts (e.g., distinct feelings or emotions). It was exactly this incompatibility of epistemes that prompted Sigmund Freud to abandon his project of a neurological based theory of memory, in *Entwurf einer Psychologie*, and to dispense with physically localizing psychological processes.<sup>10</sup>

The very concept of the *image* in the practice of and discourse on neuro-imaging points to a complex problem, located on the interface between data iconology and data semantics. These new images may function like voyages of discovery into regions that up to recent times have remained invisible; yet what they achieve goes beyond representation and similarity. They do not depict things or occurrences, but functions, activities, features or matters recorded via specific indicators.<sup>11</sup> Only by transferring these data into mimetic images, that is into a seemingly natural, skull-shaped representation of the brain, do they gain such a suggestive power – suggesting that through them the inner labors and secrets of nature are emerging directly before our eyes. All the talk of an ‹iconic› or ‹pictorial turn› is misleading. What we are actually taking part in at present is a turn toward a visual culture be-

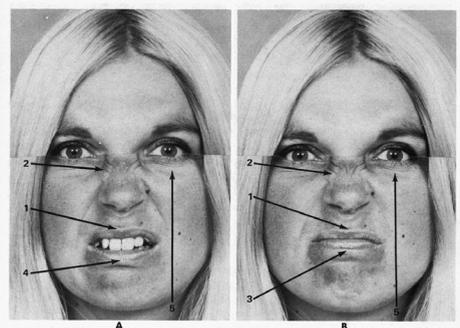
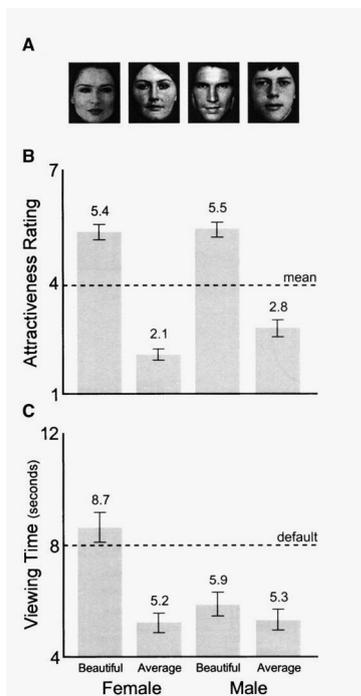
pond images – namely to a point where in electronic culture script, image and numerals meet in one and the same vanishing point, in the digital recording system.

The iconic images on the user interface level conceal the fact that these new images are *ipso facto* data. In PET-technique (*Positron Emission Tomography*), active regions of the brain are visualized by injecting emission-active materials, e.g., radioactive dextrose. For fMRI (*Functional Magnetic Resonance Imaging*), blood flow and oxygen activity are measured, the differences between the «normal status» (whatever its exact meaning) and the activity are computed, the data is then translated into a scale of different gray tones and finally inputted into the image of a brain.<sup>12</sup>

Measurements of the actions of facial muscles function exactly the opposite way.<sup>13</sup> Here, the data is actually based on a physiognomic paradigm for interpretation. The key instruments of this kind of experiments include: (1) the *Facial Action Coding System (FACS)*, which classifies movements of facial muscles as an affective expression (fig. 1), (2) measurement and representation methods for the *Autonomous Nervous Systems (ANS)*,<sup>14</sup> such as *Electromyography (EMG)* and computer-supported evaluation of video recordings,<sup>15</sup> as well as (3) experiments on affective experience using visual stimuli (e.g., the *International Affective Picture System, IAPS*), combined with explicit and implicit statements by the test persons via questionnaires (e.g., *IAPS* in combination with *Self Assessment Manikin, SAM*).<sup>16</sup> While these experiments make use of the latest and most advanced techniques, the interpretative patterns that are quite literally inscribed into these techniques date back far into the 19<sup>th</sup> century. In the following I shall explore the development of these instruments to see how they organize the epistemological problem of the relation between physiological indicators and the semantic of affects, that is to say between measurement and meaning. At first I will refer to the more recent development of instruments during the last decades to analyze the underlying paradigms from a far older history of science.



1 Facial Action Coding System (FACS): Fear. See Paul Ekman and Wallace V. Friesen, *Unmasking the Face. A Guide to Recognizing Emotions from Facial Clues*, New Jersey, 1975.



2 (De-)Coding feelings or *Unmasking the Face*: Disgust in the Facial Coding System.

3 A diagram with comparative data from male and female test persons, and their brain activity in different regions of interest (ROI) when viewing images, recorded by functional magnetic resonance tomography (empirical study by a Massachusetts research team).

## 2. FACS – From coding facial expressions in psychology to measurement

Non-experts most likely will not find it easy to forge a link between photos from Ekman and Friesen's atlas of images of feelings published in 1975<sup>17</sup> (from which the *Facial Action Coding System (FACS)* derives) and diagrams from a quarter of a century later, such as the empirical data from neuro-imaging from an assessment of *fMRI*, as for example provided by an article of 2001 entitled «Beautiful Faces Have Variable Reward Value. *fMRI* and Behavioral Evidence,»<sup>18</sup> (fig. 2, 3) or by another group experiment from 2002 dedicated to the judgment on trustworthiness, in which both brain imaging and «facial emotional expressions» were used.<sup>19</sup>

It is not just the list of six authors' names from five institutions (Neuroscience, Psychiatry and Psychology Departments, Center for Biomedical Imaging at Harvard and MIT) indicating that such research has entered a new era of «Big Sciences.» What is more significant here in methodological terms is that, thanks to the use of *fMRI*, the activation of different regions of the brain is measured and represented in order to combine the data with traditional instruments from experimental behavioral research (in this case a press-the-button experiment and an evaluation of images by the test participants). The experiment: Male and female test persons are shown photos of attractive faces whose attraction they (1) rate on a scale of 1–7, while (2) the time spent viewing each image (which could be varied by pressing a button) was measured and (3) brain activity, differentiated by localizing different «regions of interest,» was recorded. This way, the conscious evaluation by the test persons was correlated with an indirect indicator for interest (viewing time) and with localization of simultaneous neurological processes in the brain. While the psychologists could identify the impact of

beautiful faces on the test participants' attentiveness, the neurologists were able to improve their brain maps with localized specific functions; and the neuro-imaging technicians were able to test their methods. The experiment is one of the more rare examples in which the research interests of the fields involved ideally complemented one another. Often times, methods of experimental psychology are used as ancillary methods in brain research, where they are combined with neuronal maps, while conversely psychologists utilize neuro-imaging as ancillary tools to control by measurement the statements of test persons.

In the course of measurement techniques entering psychology, indicators of feelings were partly shifted away from visible signs interpreted by an observer to nonverbal and for the human observer almost imperceptible facial muscle movements. Like brain processes, these «covert signals» are now recorded by using «exact» methods, be it by *Electromyography (EMG)*, i.e. a technique of recording movement of the autonomous nervous system, or by computer-supported evaluation of video recordings of fast facial muscle movements such as blinking. However, since also the measurement of covert indicators ultimately refer to the same *Facial Action Coding System*, it is necessary to pay closer attention to this system and what it is.

The *Facial Action Coding System* used in all research and therapeutic contexts today is based on FACS, a system introduced in 1978: the *Facial Action Coding System* (1978) by Paul Ekman and Wallace V. Friesen.<sup>20</sup> Therefore, in 2008 the *12th European Conference on Facial Expression* was dedicated to the celebration of 30 years of FACS. However, this manual for professional users has a forgotten predecessor. The system of reading the face was actually invented three years earlier, when both authors published a type of self-help manual offering training in reading the feelings of another person from their facial expression and controlling one's own face in front of a mirror: *Unmasking the Face. A Guide to Recognizing Emotions from Facial Clues* (1975) by Ekman and Friesen.<sup>21</sup> While the main part of the book depicts facial signs of certain emotions, the authors also discuss basic scientific statements about the function and meaning of feelings and their visualization. Their underlying assumption that facial expressions are universal dates back to Charles Darwin's *Expressions of the Emotions in Man and Animals* (1872). Although the authors, in contrast to the wide-spread notion that facial expressions are more sincere and straightforward than words, tend to believe that facial expressions can be controlled, distinguish between controlled and uncontrolled, voluntary and involuntary, true and false feelings. In distinguishing three types of signals, they describe facial expressions as a form of language with a communicative function that can be understood universally and across cultures: «The face provides three types of signals: *static* (such as skin color), *slow* (such as permanent wrinkles), and *rapid* (such as rising the eye-brows).»<sup>22</sup> The linguistic paradigm inherent to their description of facial expressions is evident in the book's own metaphors, e.g., in the image of punctuation: «The rapid facial signals are used then to convey emotion messages and emblematic messages. They are used as *conversational punctuators*.»<sup>23</sup>

The major part of the book consists of an atlas of images with facial expressions for six «basic emotions»: *surprise, fear, disgust, anger, happiness, sorrow*. In terms of the afore-mentioned three signal types, the photographs show that the coding system for the affects does primarily refer to the *rapid signals*, that is to physiognomic (or rather: facial) movements. The photos are the result of a remarkable scenario, as the two performing models, a scientist and an actress,

were precisely not told to mime particular feelings, but to move specific facial muscles in line with a kind of screenplay; this performance was then documented in the photos. The script of grimaces is based on a catalogue of movements, which comprises a summary of scientific knowledge on expressive gestures. For a start, the authors had compiled a tableau with statements on expressive phenomena by Charles Darwin, Duchenne de Boulogne, Ernst Huber (1931), Robert Plutchik (1962) and others: «We constructed a table which listed all the facial muscles and the six emotions, entering into the table what these men had written about which muscles were involved in what way for each emotion.» The authors had to admit that there were many gaps, «where no one had said anything about the involvement of particular muscle in a particular emotion,» gaps which they then filled themselves.<sup>24</sup> Four experiments were conducted to test the list of facial muscle movements: two in which they correlated the movements to other indicators of subjective experiences of feelings; and two others in which the focus was on assessing the social validity of the expression in communicative situations. The book devotes one chapter to each of the basic emotions and describes the facial movements, sub-divided into three areas: (1) eyebrows/forehead; (2) eyes, (3) lower half of the face with mouth and lip movements, and ends with a chapter paying tribute to its character as a self-help manual dedicated to «checking your own facial expression.»<sup>25</sup> The intensity of the facial movements is taken as the key indicator for deviation from the «normal» state. In order to prove the significance of the individual movements, the authors made photomontages combining image sections of all three regions. In this way, phantom images were created – in the literal technical sense of police Identikit pictures. Ekman and Friesen's coding system for facial movements thus claims to be an atlas of images of basic emotions, whereas a media-theoretical and semiotically informed analysis makes clear that the images are the result of a montage. In summary, it can be said that FACS actually is the product of combining (1) a tableau of historical scientific knowledge of presumed physiognomic codes with (2) photographic recordings of their embodiment acted out by living models and (3) an *ars combinatoria* of physiognomic signifiers of the three sections of the face. This concept is in line with a traditional iconography of the face (fig. 4).

The physiognomic paradigm of the coding of emotions is – *qua palimpsest* – also present in those sets of instruments that were developed in the wake of FACS. In many empirical techniques developed after FACS the emphasis is, above

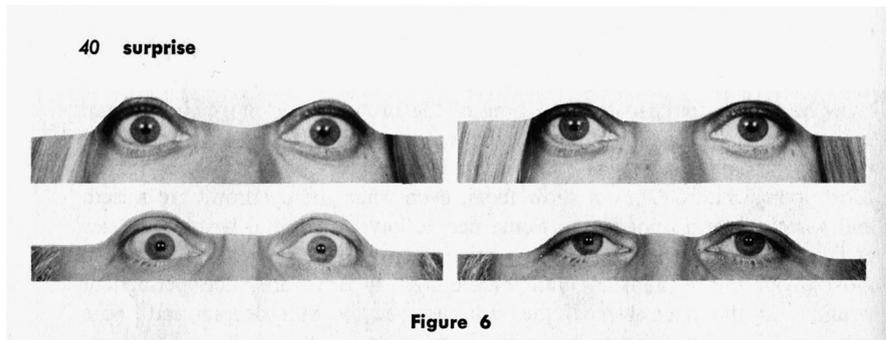


Figure 6

4 Phantom images or the *ars combinatoria* of FACS: pairs of eyes showing surprise.

all, on trying to eliminate the element of interpretation, namely the human observer who is defined as a «subjective factor» or a «sensitivity problem» and believed to disturb «objective» procedures: «This «sensitivity problem» has been diminished by the use of facial electromyography (EMG),» claim L. G. Tassinary and J. T. Cacioppo in their article on «Unobservable facial actions and emotions.»<sup>26</sup>

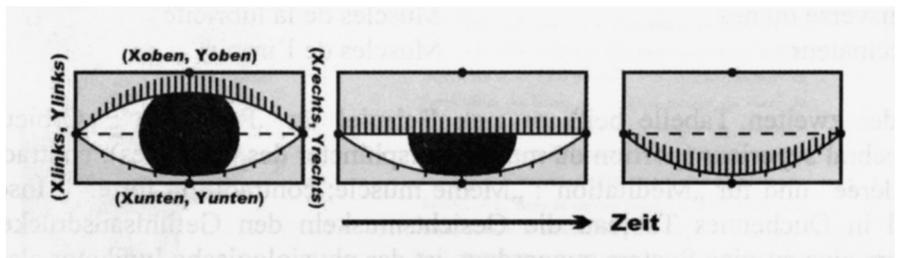
When replacing the iconography and semiotics of facial expressive movements by *Electromyography* a double shift takes place. Concerning the indicators, this means a shift away from visible «overt facial expressions» to the «covert somatic actions» of the facial muscles; concerning the recording technology, this means a shift away from photographic representation of physiognomic signs to a technical measuring, which records those physiological movements that are invisible on the outside. By means of *EMG* the activity of the skin, tissue and muscles of the face are recorded and measured even before they can be perceived by the eye.

Thus, by means of *EMG* scientists attempt to address a level prior to the modification of lines, folds, and shapes in the face that can be interpreted as a code, and in this way they seek to trace the emergence of expressive gestures in *statu nascendi*:

Overt facial expressions are the result of varied and specific movements of the facial skin and connective tissues caused by the contradiction of facial muscles. These movements create folds, lines, and wrinkles in the skin and the movement of *facial landmarks*, such as brows and corners of the mouth. Although muscle activation must occur if these facial actions are to be achieved, muscle action potentials in the face can occur in the absence of any overt facial action if the activation of the muscles is weak or very transient or if the overt response is aborted sufficiently early in the facial action. Methods designed to *measure* the muscle action potentials (rather than the overt effects of the muscle action potentials) can provide a more complete record of the facial response throughout its entire dynamic range.<sup>27</sup>

Besides *EMG*, video recordings of facial expressions provide another instrument of measuring the rapid signals of facial movements. Whereas *EMG* is more suitable to detect the covert facial movement, the transient movement can be analyzed by computer-supported analyses of video-recorded faces, as for example in an experiment on «Automatic Recognition of Eye Blinking in Spontaneously Occurring Behavior (fig. 5).»<sup>28</sup>

The objective of such measurement is to detect «unique *signatures* for specific emotions.»<sup>29</sup> In this way, the observer position is indeed avoided; yet the facial action retains its status as the code of a catalogue of emotions, as is highlighted by the metaphor «*signatures*.» The epistemic object has shifted from the lines and folds of *facial landmarks* whose status as a code is obvious, to the finer *signatures* whose



5 FACS / Measuring «FACS-units» through video recordings: *Eye action classification*.

semantic nature disappears as measuring techniques become more and more advanced. This substitution of interpretation by exact methods does not generate measured facial landmarks<sup>30</sup> but instead a sort of *seismography* of the «autonomous nervous system,» a notation system of involuntary actions of the face's muscles.

Yet, when technology attempts to throw the paradigm of interpretation overboard, it does not mean that the observer's position really disappears: Instead it is sublated in the physiological nomenclature of the anatomy of the face – sublated in the Hegelian sense of «retained» and «elided» – while the observer in question is one of 19th-century experiments. And indeed, the nomenclature of the individual muscles of the face dates back to Guillaume-Benjamin Duchenne de Boulogne's *Mécanisme de la physionomie humaine ou Analyse électro-physiologique de l'expression des passions* (1862), where the face is described as a tableau of physiologically localized signs of feelings, and the names given to the individual muscles are derived from the feelings that they express on the surface of the face.

### 3. Physiognomic semiotics and anatomical nomenclature

The experimental electrophysiology of Duchenne de Boulogne, using electric stimuli to trigger contractions of the test persons' facial muscles, which were then taken as a «language of passions,» with the prompted facial movements and distortions recorded photographically, created an immediate connection of electricity and photography. His image atlas with the electro-photographically produced *expressions des passions* is part of an experimental culture, which forced through its use of recording techniques the rise of empirical methods and the victory march of the natural sciences at the end of the 19th century. And, similar to nowadays, it was already motivated by the wish to eliminate both language and the observer from scientific research. This shows just how strong the phantasm of a knowledge independent of language has driven and accompanied the development of experimental research and the norm of exact methods – while we can nevertheless discern a persistent reference to language both in the concept of a «language of the passions» and in the diverse alphabetical and semiotic metaphors used by Duchenne to describe facial expressions.

Duchenne's project goes back to Buffon's description of the human face as a «*tableau vivant*» – «Lorsque l'âme est agitée, la face humaine devient un tableau vivant» –, in particular when investigating the laws that rule expressions of human physiognomy by studying its muscle activity.<sup>31</sup> These facial movements were conceptualised as a «language.» This is obvious in his declared objective to provoke contractions in the muscles of the face by electric stimuli «pour leur faire parler le langage des passions et des sentiments,» and to photograph this «language.» His photographic recordings concentrated on «les lignes expressives de la face pendant la contraction électrique de ses muscles.» The result was described by Duchenne as an «*orthographe de la physionomie en mouvement.*» He took up Buffon's concepts of *trait* and *caractère* – the facial *traits* as the expression of each and every movement of the soul and the *character* as an expression of each of its actions – and condensed them to «traits caractéristique,» – which means that the traits themselves become the characteristic signs. Duchenne thus reformulates the *tableau vivant* of the face as a tableau of signs whose expressive lines form the orthography of a physiognomy in movement (fig. 6).



6 Duchenne de Boulogne's anatomy of the facial muscles as a physiological semiotics of affects: equation of the nomenclature of the muscles and the semantics of the emotions.

Duchenne's *Physionomie humaine* gains the quality of an exact method by dint of the fact that he (1) constructs an anatomy of facial muscles,<sup>32</sup> conceptualized as a mean of expression, and (2) compiles a tableau of distinct *expressions*, which are distinguished both according to the muscles involved and to the intensity of their movements. This system functions via mutual attribution: In a «tableau synoptique,» he directly links the individual muscles to a list of movements denoting feelings and attributes them to certain zones of the face; conversely in a «tableau synoptique,» he presents a list of *expressions* linked to muscle movements by the different zones of the face.<sup>33</sup>

In the second table we read, for example, under «reflection:» «Orbiculaire palpébral supérieur (portion du muscle dit sphincter des paupières); contraction modérée;» and for «meditation:» «Même muscle; contraction forte.»<sup>34</sup> His table thus offers an ideal coding system, in which the nomenclature of the muscles («muscle de l'agression,» «muscle de la douleur» or «muscle du pleurer») has the emotions represented by anatomy, without any detour, translation or disfiguration. As a result, the physiognomic markers function as clear signs of the affects. Since the anatomical nomenclature of the face invented by Duchenne remains valid up to this day, modern experimental psychology has inherited its simple interrelation between anatomy and meaning, including the indifference toward a distinction between *traces* and *signs*. It is, to a high extent, the anatomical nomenclature that enables the «problem of coding» to be forgotten and that contributes to the new measuring techniques being associated with the assumption that the

factor of interpretation could be excluded. When the underlying semiotic paradigm becomes invisible in recording techniques such as *EMG*, then the problem of semiotic constitution disappears in the phantasm of exact methods and the entire problem of a grammatology of feelings is being concealed, covered up.

However, against the horizon of a «grammatology» one might recall Derrida's maxim: «The trace must be thought before the entity [étant].»<sup>35</sup> This maxim calls to our attention especially those processes, which generate a specific semiotic system and its laws, which produce distinct meanings by producing «differences.» If we apply such a thought to the meaning of expressive movements/actions, then we have to focus on the threshold of translation between the physiological processes/somatic markers and the semantics of feelings, i.e., precisely that threshold which is at the heart of neuroscientific research into emotions.

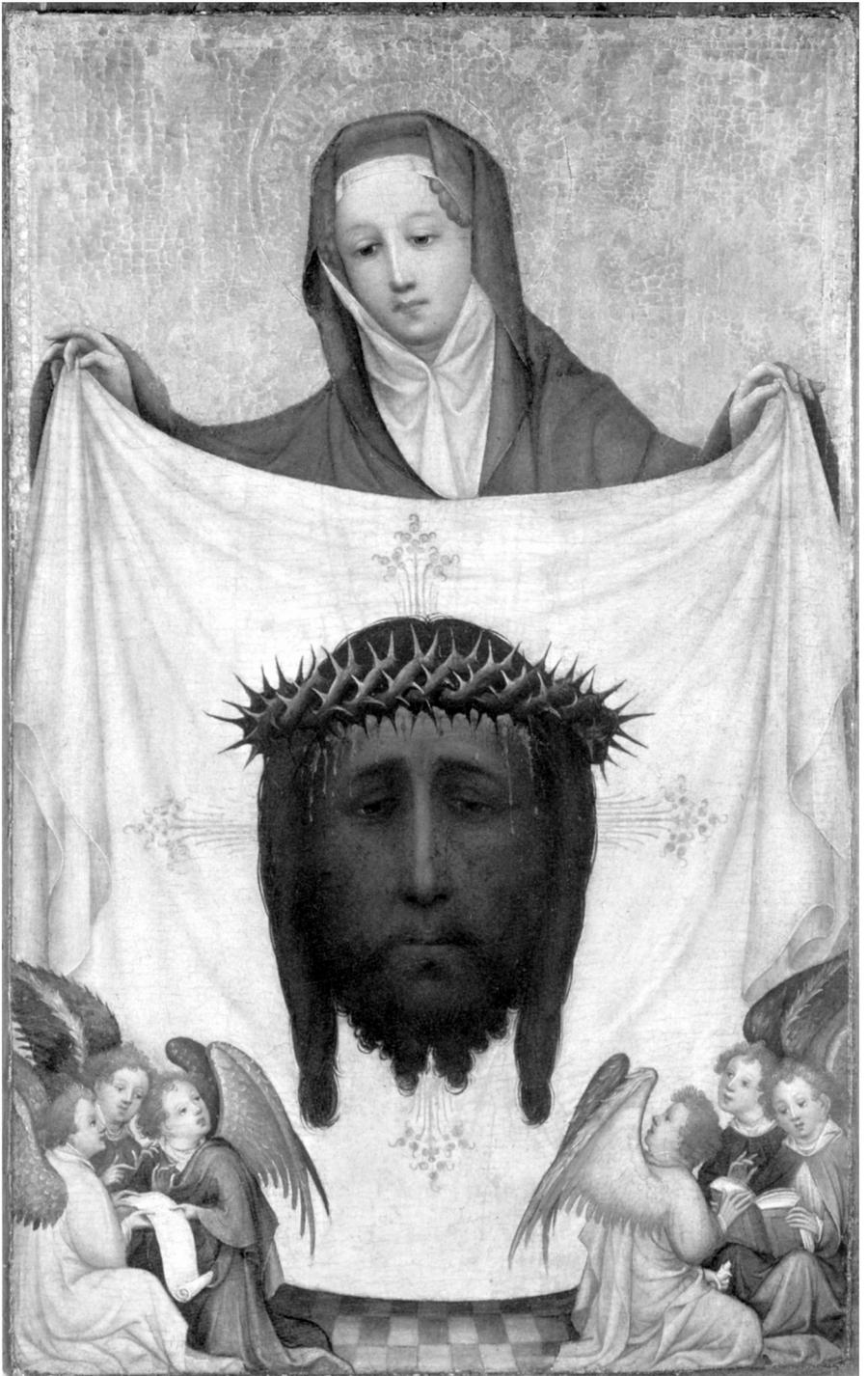
#### 4. Representation of the face – between sign, trace and image

In video recordings or *Electromyography* used to get evidence of facial actions otherwise not discernible to the human eye, this threshold is present in the form of a classificatory and a temporal difference: between the *still* invisible or the «covert signals» and the *already* visible, the «overt signals,» or as the difference between the volatile and the distinct movements, say of the eyelids and lips. This difference coincides with advances in the instruments used within empirical methods, a shift from interpreting to measuring. From the perspective of art studies and the theory and history of images, this transition corresponds to the relationship of material traces and iconography in images of the face: a relationship that touches the core of what the human image is. In fact, it addresses the very origin of Western iconography as discussed for example in Hans Belting's instructive study of the early images of Christ with the telling title «Face or trace.»<sup>36</sup> Belting describes the genesis of Christian iconography in terms of the complex transition from the corporeal remains of Christ's face in the «Veronica» to the pictorial representation of the face in countless paintings of Christ as *vera icon* (fig. 7).

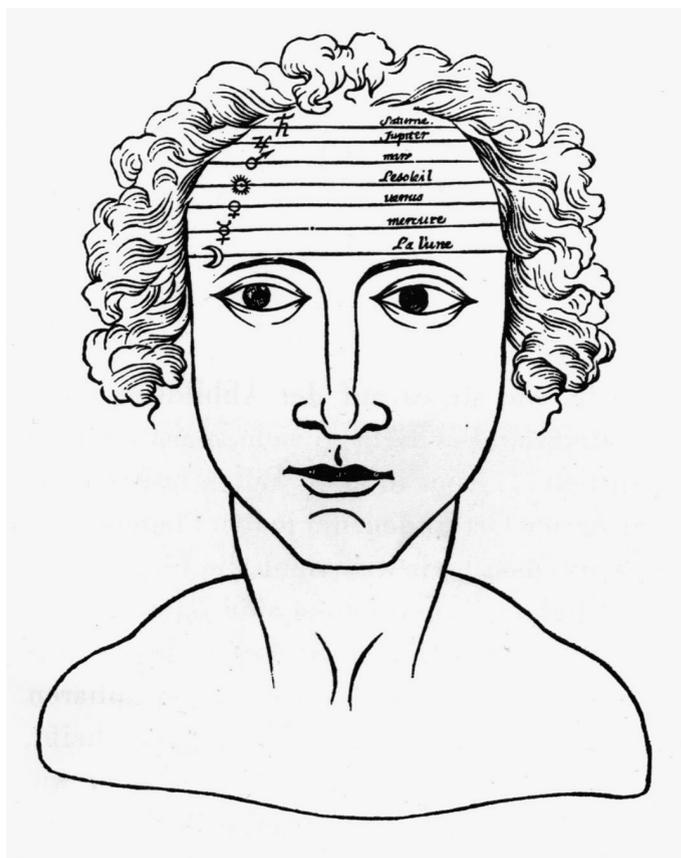
The transition from the material remnants presented to the viewer as testimony to the painted face of Christ entails the transformation of traces into the depiction of a person. What we witness here is a primordial scene in the Western concept of the image, the genesis of the iconic images. This picture is indebted structurally to the image in the form of a corporeal depiction being superimposed over those traces that preceded it. Concerning Peirce's distinction between three different types of images – icon, index, symbol – this means, that it makes no sense to analyze to which of these types a single picture belongs. Instead it is necessary to dynamize or temporalize his theory, that is to closer analyze the moments of transition between different forms of visual representations.

The same constellation between traces and iconographical depictions that constitutes the *vera icon* paradigm underlies all physiognomy, while its history developed the other way: with a shift from outer to inner actions, from static to fleeting lines and from signs to measured traces. All physiognomic concepts share their aim to understand the movements of the human face as a coding system, a conventionalized and decipherable semiotic system that corresponds to a list of affects or character traits.

When, in his book *Metoscopia* (1558) Girolamo Cardano sets himself the task of reading from the lines of a forehead, it is still obvious from his reference to the «lines



7 Master of Saint Veronica, *Saint Veronica with the Sudarium*, ca. or after 1425, painting on wood, 78,1 × 48,2 cm, Munich, Alte Pinakothek, Bayerische Staatsgemäldesammlungen, inv. 11866.



8 The emergence of physiognomy from the interpretation of facial lines as signs of character: Girolamo Cardano, *Metoscopia*, 1558.

and characters» of the face that physiognomy arises from an interpretation of those traits that shape the face and render it legible as a type or sign: the birth of physiognomy from the character in the double sense (fig. 8).<sup>37</sup> In the wake of this idea, the face became the «cabbalist center» of anthropology (see J.F. Helveticus, 1660).<sup>38</sup> And in the *Conférence sur l'Expression Générale et Particulière des Passions* (1687) by Charles Le Brun, the idea to read from the face was linked with the project to create a catalogue of affects. The faces in his drawings, distorted to the point of being unrecognizable, form a typology of «*les passions*:» *la colère* (rage), *le désir* (desire), *l'horreur* (fear), *la frayeur* (fright). In his explanations, Le Brun addresses that interaction of brain and face, which defines the model of research on feelings today (fig. 9):

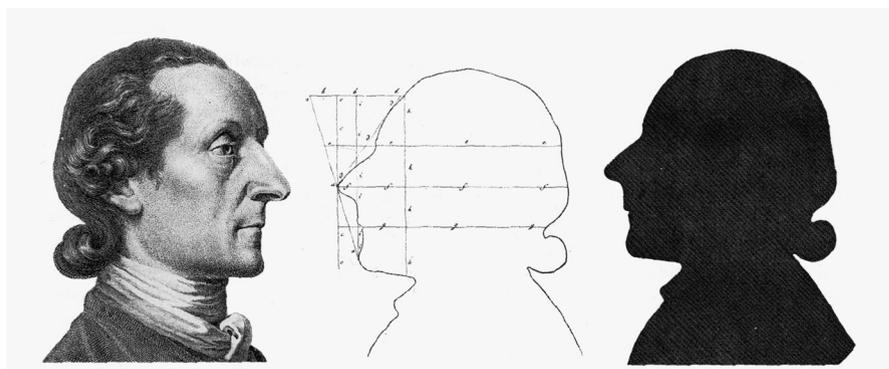
If it is true that there is a part of the body in which the soul is directly active, and if that is the brain, then we can likewise say that the face is the part of the body in which what it feels allows itself to be seen particularly clearly. [...] The muscles only move thanks to the nerves ..., the nerves first become active owing to the spirits contained in the cavities of the brain, and the brain receives these spirits specifically through the blood that constantly flows through the brain, where it is warmed and diluted such that a certain, very fine air arises that enters the brain and fills it out.<sup>39</sup>



9 Charles Le Brun (1687), tableau with expressions of passions.

It was, in the first place, the moralization of the physiognomic model in the age of sensibility that developed the art of interpretation, which then turned physiognomy into a study of human character, with the goal of «discerning from someone's face/gestures and shape whether they were of a good or bad disposition,» as Johann Heinrich Praetorius puts it in his *Physiognomicum* (1715).<sup>40</sup> Then, with J.G. Lavater's *Physiognomische Fragmente* (1775), the interpretations of the forms and features of the face became that project of «fostering a knowledge of humanity,» namely the «ability to discern from a person's outward appearance his inner life, that which is not directly open to the senses, by means of a natural expression.»<sup>41</sup> The physiognomic code, be it the basis of the traits and characters of the soul or the list of affects and expressions of emotions, thus focuses on deciphering the meanings associated with the face's physiological features (fig. 10). This concept even underlies those procedures in experimental psychology that today seek to avoid interpretations and to eliminate the «subjective factor,» measuring physiological indicators or «FACS units» instead.

Comparable problems of representation are to be found in the history of images of the brain.<sup>42</sup> Unlike the *face*, the representation of the *brain* does not in-



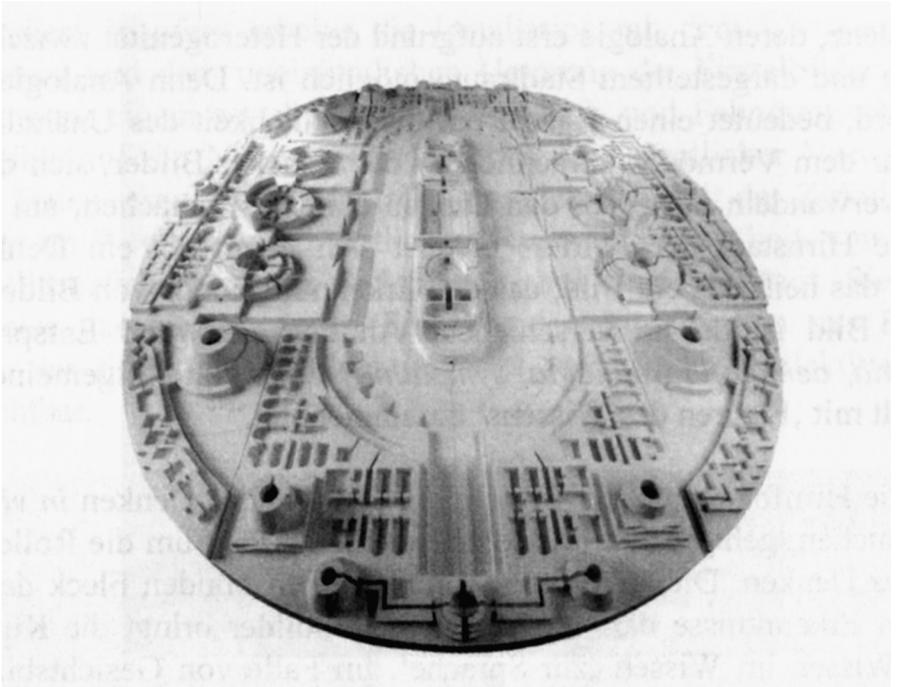
10 Coding of silhouette and permanent facial traits in order to determine character: Lavater (1775).

volve the problem of translating corporeal traces into signs, yet it does involve the problem of bridging the link, not accessible to empirical observation, between the behavioral sphere (actions, verbalization, affects) and the neurological processes (brain anatomy), i.e. that of the so-called 'black box.' To summarize: The material culture of research into emotions is shaped by a complementary, inverse constellation: by data appearing in the guise of images (brain-imaging and other image-generating techniques) and by recording techniques whose physiognomic interpretative paradigm is masked by measurement methods (*EMG*, electronic evaluation of videos).

## 5. Images of the brain and face in contemporary art

Interpretations of brainmaps and of 'facial emotional expressions' not only play a central role in the above-described array of empirical-research instruments; their pictures have long since seeped into the public sphere to become mass-medial icons. Against the background of this development the question emerges of how brain and face are treated in contemporary art and whether – or in what way – artistic insight into their significance differs from scientific insight. In what follows, I shall comment on some examples in which artists make use of images of brain and face, from either the iconographic or scientific repertoire. Let us first look at an image of the brain – a model of the *Mnemosyne* project of artists Anne and Patrick Poirier (fig. 11).

Created in 1991, the model has the title *Mnemosyne, first Excavation*. It represents an oval bas relief in whose surface structure both the form of a human brain and the topography of a city can be recognized. But no identity or similarity between the two is being asserted here;<sup>43</sup> it is rather the manner in which topography functions as a medium for complex processes of translation between cognitive space and external space – or, put differently: topography as a figure mediating between intelligible and spatial orientation. The artificial similarity between city and brain does not imply any identity. It presents itself as the figure of a correspondence whose analogy is only possible on the basis of the heterogeneity of cerebral physiology and represented urban space. As Barbara Stafford has observed, analogy signifies a struggle over the similarity of what is dissimilar<sup>44</sup> – comparable to the capacity of verbal or visual images to appropriate the

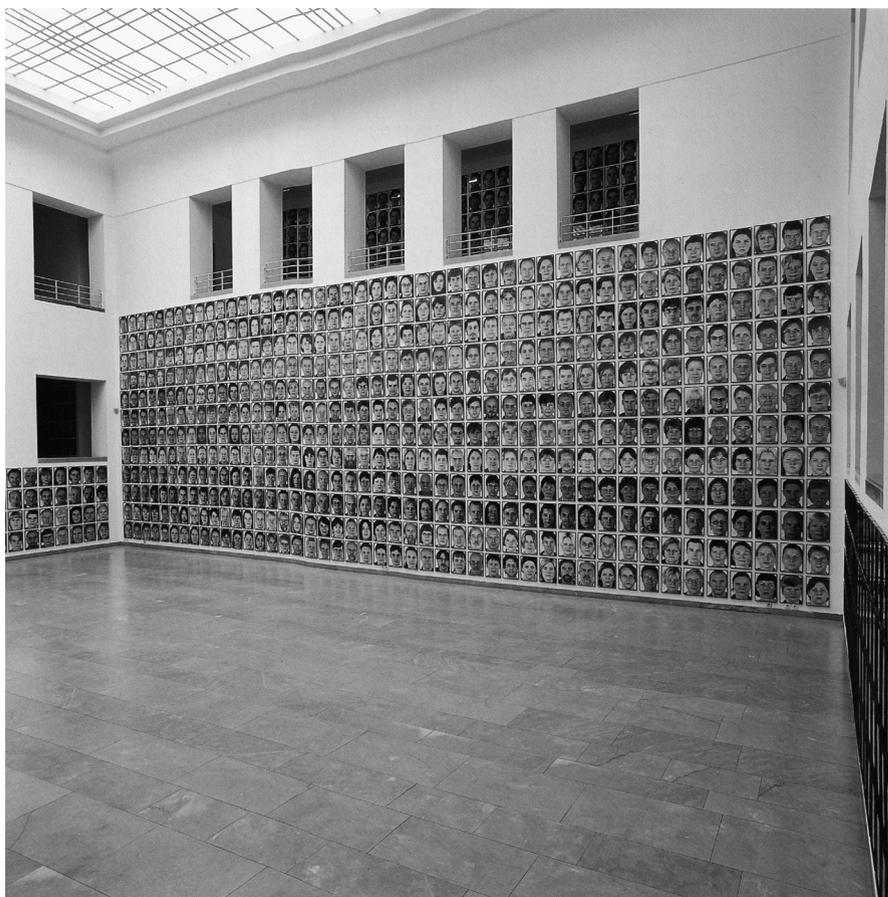


11 Topography as a conceptualization of cerebral and urban images: Anne and Patrick Poirier, *Mnemosyne*, 1991.

outer world or to adapt themselves to things in a process of re-appropriation. In this way, the Poiriers' cerebral city proves to be a conceptual image par excellence, which is to say: an image reflecting the perceptive mode of images. And symbolic forms have played a prominent role already in the founding process of cities and urban structures.<sup>45</sup> W.J.T. Mitchell, in referring to Foucault's *The Order of Things*, puts it as follows: «The image is the general notion, ramified in various specific similitudes (*convenientia*, *aemulatio*, *analogia*, *sympathia*), that holds the world together with «figures of knowledge.»»<sup>46</sup>

While brain research works with images that pretend to represent thinking *in vivo*, the Poiriers' artistic work revolves around the role of images within the process of thinking. Now as before, this question constitutes a blind spot in scientific research and knowledge. In the case of images of the brain, art thus allows an area of non-knowledge within scientific knowledge to «speak.» By contrast, in the case of images of the face, we can observe that many artistic works operate exactly on the same threshold where empirical research is relevant: the threshold where the significations of physiological traces emerge as expressive gestures. This is the locus of the transition from silence to speech, from corporeal movements to the semantics of feeling, from subjective impulses to communicative coding.

Jochen Gerz's installation in the *Museum am Ostwall* in Dortmund, entitled *The Gift*, consists of 700 photo-portraits comprising a physiognomic picture-atlas; covering the museum's walls, it enacts the development of an archive (fig. 12). Within the archive, the serial of individual likenesses form the body of a popula-



12 The corpus of a physiognomic photo atlas, generated from various images: Jochen Gerz, *The Gift*, 2000.

tion. While, on first glance, the installation appears to represent something like a 'collective memory,' the myth of unity evoked by this idea is at the same time punctured and infiltrated by the process of the installation's production, which traces the portrait's complexity, disunity, and heterogeneous origin: The 'building' of the archive went along with a photo-exchange project, so that the public photo-atlas is at the same time a scattered private one.<sup>47</sup> As the installation operates with the transition between the different, non-uniform origins of the individual images and their formation into a serial archive of passport and mug shots, its iconography points to the closeness between demography and governmental administration of personal data. The installation thus plays with the circulation of medial pictures in a multiple exchange constellation, that is, of public space and privacy, individual and social body, visibility and invisibility. As such, the installation renders visible the disappearance of what is foreign within the shadow of what is private – and thus addresses the flip side of the public image and so-called 'collective memory'.

Images of various faces also form the material for Jochen Gerz's film *Die kleine Zeit vor der Antwort* (*The Small Time Before Responding*). The film presents faces of a



13 Jochen Gerz, *Die kleine Zeit vor der Antwort*, 2001.

special sort: caught in the moment preceding response to a specific request, that is, in the brief time before speaking – before emotion has formed itself into distinct expression (fig. 13). The silence and expressions of the faces thus capture precisely the unnoticeable or hardly noticeable movements preceding expressive physiognomic gestures. Clearly distinct from the electromyographic recording of ‘covert’ or involuntary facial gestures in experimental psychology, what is involved here is not an effort to exclude so-called subjective factors but rather to foreground them. The film, as it were, extracts silence out of a debate’s verbal flow – what was asked from the people in the film was a statement about the controversy over plans for the *Holocaust Monument* in Berlin. In this way it underscores just those moments of hesitation that usually vanish during the act of communication. Hence what is at stake here is rendering visible the affective traces preceding the code of discourse, exactly those ‘covert signals’ experimental research hopes to identify with the help of measuring the movements of facial muscles. But in focusing on recording ‘unique signatures for specific emotions,’ such research possibly fails to grasp the very moment of hesitation and indistinctness preceding and making possible, in the first place, the distinct meanings of the ‘physiognomic code.’

A yet more obvious limitation of empirical research on feeling emerges from its own matrix, the *Facial Action Coding System*, which only addresses the universals of physiognomy, the six (or more) so-called basic feelings. Although in art history portrait iconography presides over a far more complex and differentiated repertoire of expressive gestures,<sup>48</sup> this pictorial archive itself is not able to cover the broad range of traces that are engraved and inscribed into human faces. There exist traces of life and memory speaking an entirely different language – neither that of the muscular movement preceding expressive gestures



Wenn Augen sprechen: Zuei der Überlebenden des Massakers von Sant'Anna di Stazzema

Foto: Katalog

14 Traces beyond language: photos of survivors of massacres in the exhibition *I Bambini Ricordano*, 2003.

nor that of the moment of hesitation participating in the discourse's formation and accompanying it as a sign, traces that have never been translated into language and will never enter communication.

Such mnemonic traces, representing language's «other», are visible in the facial features of individuals whose photos are displayed in an exhibition by Oliviero Toscani entitled *I Bambini Ricordano*, located in Sant'Anna di Stazzema – a village in the Apuan Alps near the Tuscan coast in the province of Lucca (fig. 14). The photos are of the few survivors of a massacre carried out by the Nazis in the village on August 12, 1944, in the course of which nearly all its inhabitants were murdered. Traces of the horror are inscribed in the faces, the folds and furrows of these survivors, who at the time were between two and eighteen years old: mnemonic traces located outside traditional affective catalogues and physiognomic sign systems.

This extreme example can serve as a conclusion. It may suggest how far more complex the affective meaning of facial traits really is, and how far more difficult to decipher than the semantics of feeling and the physiognomic encoding captured in various recording, decoding, and measurement processes, however «precise» these may be.

## Annotations

1 Antonio R. Damasio, *The Feeling of What Happens. Body and Emotion in the Making of Consciousness*, London 2000, p. 40.

2 There is an ancient tradition of locating the soul in the brain that was reanimated around 1800 by Soemmering and Gall and triggered a «change in perspective from the organ of the soul to the brain,» see Michael Hagner, *Geniale Gehirne. Zur Geschichte der Eliteforschung*, Göttingen 2004, above all chapter 2. In psycho-physics around 1900 the brain again played a key role in researching the «movements of the emotions,» among others in the work of Wilhelm Wundt. See Wilhelm Wundt, *Philosophische Studien*, 21 vol, Leipzig 1883–1902, vol. 6, 1891).

3 For an exact account of this system (the amygdala, hippocampus, etc.) see Gerhard Roth, *Das Gehirn und seine Wirklichkeit. Kognitive Neurobiologie und ihre philosophischen Konsequenzen*, Frankfurt am Main 1997, chapter 9, p. 178–212. See also Joseph Le Doux, *The Emotional Brain*, New York 1996; Mark Solms and Oliver Turnbull, *The Brain and the Inner World. An Introduction to the Neuroscience of Subjective Experience*, New York 2002.

4 Antonio R. Damasio, *Descartes' Error. Emotion, Reason, and the Human Brain*, New York 1995, p. 149.

5 In the *Nicomachean Ethics* Aristotle resorts to pleasure/unpleasure to describe how the affects function like a matrix of affect modulation, while construing their exact profile in terms of a classificatory series: «By the emotions, I mean desire, anger, fear, confidence, envy, joy, friendship, hatred, longing, jealousy, pity; and generally those states of consciousness which are accompanied by pleasure or pain.» Aristotle, *Nicomachean Ethics*, transl. Harris Rackham, Hertfordshire 1996, book 2, chapter 5, p. 38.

6 Sigrid Weigel, «Pathos – Passion – Gefühl. Schauplätze affekttheoretischer Verhandlungen in Kultur- und Wissenschaftsgeschichte,» in: id., *Literatur als Voraussetzung der Kulturgeschichte. Schauplätze von Shakespeare bis Benjamin*, Munich 2004, p. 147–172.

7 See Frank Baasner, *Der Begriff der «sensibilität» im 18. Jahrhundert. Aufstieg und Niedergang eines Ideals*, Heidelberg 1988.

8 Andreas Hennenlotter, Christian Dresel, Florian Castorp, Andres O. Ceballos-Baumann, Afra M. Wohlschläger, Bernhard Haslinger, «The Link between Facial Feedback and Neural Activity within Central Circuitries of Emotion – New Insights from Botulinum Toxin-Induced Denervation of Frown Muscles,» in: *Cerebral Cortex*, 2008, vol. 19, issue 3, p. 537–542.

9 See studies such as Robert F. Simons, Benjamin H. Detenber, Thomas M. Roedema and

Jason E. Reiss, «Emotion Processing in Three Systems. The Medium and the Message,» in: *Psychophysiology*, 1999, vol. 36, p. 619–627; Karen L. Schmidt, Jeffrey F. Cohn and Yingli Tian, «Signal Characteristics of Spontaneous Facial Expressions. Automatic Movement in Solitary and Social Smiles,» in: *Biological Psychology*, 2003, vol. 65, p. 49–66.

10 It was Sigmund Freud who extensively discussed the transition from the quantitative, neuronal paradigm and the «quality problems» from the epistemological and methodological points of view, in his attempt to develop a scientific theory of memory. See Sigmund Freud, «Entwurf einer Psychologie (1895),» in: *Gesammelte Werke. Nachtragsband. Texte aus den Jahren 1885–1938*, ed. by Angela Richards with the assistance of Ilse Grubrich-Simitis, Frankfurt am Main 1987. For an English translation see Sigmund Freud, «A Project for a Scientific Psychology,» in: id., *The Complete Psychological Works of Sigmund Freud*, ed. by James Strachey, (The Standard Edition of the Complete Psychological Works of Sigmund Freud), 24 vol., 1953–1974, vol. 1 (1886–1899), London 1966, p. 283–387.

11 Examples from different disciplines are to be found in *Mit dem Auge denken. Strategien der Sichtbarmachung in wissenschaftlichen und virtuellen Welten*, ed. by Bettina Heintz and Jörg Huber, Zurich 2001. On the position of image-generating methods in the context of the active role of visual and linguistic images in knowledge see also Sigrid Weigel, «Bilder als Hauptakteure auf dem Schauplatz der Erkenntnis. Zur poiesis und episteme sprachlicher und visueller Bilder,» in: *Ästhetik Erfahrung*, ed. by Jörg Huber, Zurich 2004 (Interventionen, vol. 13), p. 191–212.

12 This is just to offer a simple description; the actual procedure is of course much more detailed and complicated.

13 For a survey see Andreas Hennenlotter, *Neural Systems for Recognising Emotion from Facial Expression*, PDF dissertation, Regensburg University, 2005, <http://www.opus-bayern.de/uniregensburg/volltexte/2005/544/> (January 27, 2012).

14 See Paul Ekman, Robert W. Levenson and Wallace V. Friesen, «Autonomic Nervous System Activity Distinguishes Among Emotions,» in: *Science*, New Series, 1983, vol. 221, no. 4616 (September 16, 1983), p. 1208–1210.

15 For example, Louis G. Tassinary and John T. Cacioppo, «Unobservable Facial Actions and Emotion,» in: *Psychological Science*, 1992, vol. 3, no. 1, p. 28–33.

16 I would like to thank psychologist Andreas Keil (University of Constance) for references and data on the instruments used in experimental psychology.

- 17 Paul Ekman and Wallace V. Friesen, *Unmasking the Face. A Guide to Recognizing Emotions from Facial Clues*, New Jersey 1975.
- 18 Itzak Aharon, Nancy Etcoff, Dan Ariely, Christopher F. Chabris, Ethan O'Connor and Hans C. Breiter, «Beautiful Faces Have Variable Reward Value. fMRI and Behavioral Evidence,» in: *Neuron*, 2001, vol. 32 (November 8), p. 537–551. See also Elizabeth A. Phelps, Kevin J. O'Connor, William A. Cunningham, E. Sumie Funayama, J. Christopher Gatenby, John C. Gore and Mahzarin R. Banaji: «Performance on Indirect Measure of Race Evaluation Predicts Amygdala Activation,» in: *Journal of Cognitive Neuroscience*, 2000, vol. 12, p. 729–738.
- 19 J.S. Winston, B.A. Strange, J. O'Doherty, R.J. Dolan, «Automatic and Intentional Brain Responses During Evaluation of Trustworthiness of Faces,» in: *Nature Neuroscience*, 2002, vol. 5, issue 3, p. 277–283.
- 20 Paul Ekman and Wallace V. Friesen, *The Facial Action Coding System. A Technique for the Measurement of Facial Movement*, Palo Alto 1978.
- 21 Ekman/Friesen 1975 (as in note 17). For an advancement of their system see Ekman/Friesen 1978 (as in note 20); and Paul Ekman, «Facial Expressions of Emotion. New Findings, New Questions,» in: *Psychological Science*, 1992, vol. 3, issue 1, p. 34–38.
- 22 Ekman/Friesen 1975 (as in note 17), p. 10. Italics by the author.
- 23 *Ibid.*, p. 13. Italics by the author.
- 24 *Ibid.*, p. 28.
- 25 *Ibid.*, p. 154.
- 26 Tassinari/Cacioppo 1992 (as in note 15), p. 28.
- 27 *Ibid.* Italics by the author.
- 28 Tsuyoshi Moriyama, Takeo Kanade and Jeffrey F. Cohn, «Automatic Recognition of Eye Blinking in Spontaneously Occurring Behavior,» in: *Proceedings of the 16th International Conference on Pattern Recognition (ICPR 2002)*, conference Québec City, Los Alamitos 2002, p. 78–81.
- 29 Tassinari/Cacioppo 1992 (as in note 15), p. 30. Italics by the author.
- 30 As created, for example, through the use of biometrics around 1900, e.g., with the method of «geometric identification» developed by M. Mathews. See Milos Vec, *Die Spur des Täters. Methoden der Identifikation in der Kriminalistik (1879–1933)*, Baden-Baden 2002; Susanne Regener, *Fotografische Erfassung. Zur Geschichte medialer Konstruktionen des Kriminellen*, Munich 1999.
- 31 Guillaume-Benjamin Duchenne de Boulogne, *Mécanisme de la physionomie humaine ou Analyse électro-physiologique de l'expression des passions* (1862), Paris 1876, préface; this and the following quotations p. XI–XII.
- 32 *Ibid.*, p. 1–4.
- 33 *Ibid.*, *Considerations générales*, p. 42–47.
- 34 *Ibid.*, p. 45.
- 35 Jacques Derrida, *Grammatology*, Baltimore/London, 1997, p. 47.
- 36 Belting suggests that the image of Christ is unlike the image types known in Classical Antiquity, as it is neither the image of a dead, absent body like in traditional funerary images, nor does it fit into the line of images of Gods, of non-visible, supernatural, non-corporeal deities. Instead, the image of Christ has to refer to the enigmatic status of a mortal and yet resurrected body, of which there can be no representation, while the traces left by the dead body serve as the only documentation. Belting reads the project of turning these traces into an image of Christ's face as the enigma inherent to the image of Christ, which epitomizes the contradictions of Christianity itself. See Hans Belting, «Face or Trace? Open Question around the Prehistory of Christ's Icon,» in: *Chrysay pylai. Essays Presented to Ihor Ševcenko on his Eightieth Birthday by his Colleagues and Students*, 2 vol, Cambridge (Massachusetts) 2002, vol. 1, p. 1–10.
- 37 This and the following quotations are taken from Elisabeth Madlener, «Ein kabbalistischer Schauplatz. Die physiognomische Seelenerkundung,» in: *Wunderblock. Eine Geschichte der modernen Seele*, ed. by Jean Clair, Cathrin Pichler and Wolfgang Pircher, exhib. cat., Vienna, Wiener Festwochen – Messepalast Wien, 1989, p. 159–179. Translations by Christine Kutschbach.
- 38 Iohannes Fridericus Helveticus, *Amphitheatrum Physiognomiae Medicum oder Runder Schauplatz der Arzeneyschen Gesichtskunst*, Heidelberg 1669, p. 11.
- 39 Charles Le Brun, *Conférence sur l'expression générale et particulière des passions* (1687), Verona 1751, p. 6–8. Translation from German.
- 40 Johann Heinrich Praetorius, *Physiognomicum*, Hamburg 1715, title page.
- 41 Johann Caspar Lavater, *Physiognomische Fragmente zur Beförderung der Menschenkenntnis und Menschenliebe* (1775), Stuttgart 1984, p. 21. Translation by Jeremy Gaines.
- 42 See Michael Hagner, «Hirnbilder. Cerebrale Repräsentationen im 19. und 20. Jahrhundert,» in: *Der Entzug der Bilder. Visuelle Realitäten*, ed. by Michael Wetzels and Herta Wolf, Munich 1994, p. 147.
- 43 For a discussion of the hypothesis of a similarity between the architecture of brain and city see, for example, Wolf Singer, *Der Beobachter im Gehirn*, Frankfurt am Main 2002, p. 200–210. Singer sees both analogies – through the assumption of fractal structures – and differences. One misunderstanding emerging in the reception of the Poiriers' cerebral city-model stems from the initial assumption that the model postulates an analogy between brain and city, then introducing scientific counter-

guments. See, e.g. the historian Egon Flaig, in an essay entitled «Spuren des Ungeschehenen. Warum die bildende Kunst der Geschichtswissenschaft nicht helfen kann» («Traces of What has not Transpired. Why Graphic Art Cannot Help the Historical Sciences»), in: *Archäologie zwischen Imagination und Wissenschaft. Anne und Patrick Poirier*, ed. by Bernhard Jussen, Göttingen 1999, p. 16–50. Interestingly, Flaig's plea for an ineluctable difference between those two realms is based on a misjudgment regarding their different modes of cognition and representation. For art objects do not lay claim to any explanation of how the brain or social memory function. Rather, they reflect the symbolic form of the relevant topography, which has been made use of in both the physiology of the brain (see the anatomical and neurological topography of cerebral regions) and in cultural memory, as approached in historical scholarship.

**44** See Barbara Stafford, *Visual Analogy. Consciousness as the Art of Connecting*, Cambridge (Massachusetts) 1999.

**45** See chapter 12 on topography as a cultural technique in the history of cities in Sigrid Weigel, *Literatur als Voraussetzung der Kulturgeschichte. Schauplätze von Shakespeare bis Benjamin*, Munich 2004, p. 248–284.

**46** William J. Thomas Mitchell, *Iconology. Image, Text, Ideology*, Chicago 1986, p. 11.

**47** To explain this more in detail: Over a five-day period in August 2000, visitors to an exhibition in Dortmund's Zeche Zollern (a closed down coal mine now functioning as an industrial museum) were asked to let themselves be photographed. While a collection of almost 5000 photos – always taken from the same angle – gradually grew on the other museum's walls, the regional paper published the portrait collection's continuous history. The title *The Gift* is a play on the fact that in turn for leaving their own portraits to the collection, each of the photographed visitors received the photo of another visitor. Through this pairing with a «stranger» the collection now mounted in the Museum am Ostwall is tied symbolically to another collection scattered in innumerable private homes.

**48** See for example *Das Antlitz des Deutschen in fünf Jahrhunderten Malerei*, ed. by Rudolf Kassner, Frankfurt am Main 1980.