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Feelings on Faces

From Physiognomics to Neuroscience

Experiments and observations

Of all the ways in which the outward signs of the body express inner feeling, physiognomy[1] and gesture have been the most studied. In this essay, I will deal with physiognomy and its related form, pathognomy. Gesture must wait for another occasion. Both physiognomy and the study of gesture, at least in their traditional and historical forms, have generally been taken as the very type of disciplines that have ignored the pressures of culture and difference, failing to take into account the social construction both of interiority and of its outward manifestations. It is true that physiognomy and pathognomy, like the study of gesture, sought to establish fixed correlations between expression and emotion, when in fact the relationship between particular expressions and specific emotions are very often the product of cultural and contextual constraints, pressures, and circumstance. Or so the usual insistence runs. Hence, for example, the continuing high scepticism about projects like Charles Le Brun's and the complete disdain of the physiognomic projects of Lavater.[2] Even Darwin's great work on the subject has only recently begun to return to favor (though only hesitantly amongst academic humanists), despite its clear articulation of the role of cultural constraints on emotional expression.[3] In what follows, I will set out how, contrary to conventional views of the neurosciences as reductionist, the neuroscience of facial expression and its emotional recognition does not in fact impugn this role, but substantially enhances it. My aim is to suggest that the role of culture in the construction of both feeling and expression is considerably more complex than current views of cultural determinism seem to allow.

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1 Some of the interdisciplinary manifestations are more plausible than others (for instance, pathognomy), and some are more improbable altogether (for instance, metoposcopy).

2 That there are other reasons for the rejection of such writers I discuss below, in my assessment of Willibald Sauerländer's essay on physiognomy. Sauerländer's assault is predicated on a fear of direct response rather than mediated ones.

3 Darwin, Charles. *The Expression of the Emotions in Man and Animals*. Ed. Paul Ekman. Oxford, New York: Oxford University Press, 1998.

The face is fickle, variable and often untrustworthy (or so we think).[4] We feel uncomfortable interpreting the emotions it seems to betray, partly because of the easy mobility of its features, partly because we think we know how good people are at dissimulating what they feel.

But most people respond to facial expressiveness swiftly enough, and are quite good at reading the emotions on a face. Otherwise social relations would be even more difficult than they are.[5] We jump to conclusions about the face and react to its expressions: we seem instantly to recognize the emotions it expresses.

As guides to understanding the feelings of others, or to accurately judging the emotions expressed by faces in pictures, theories of facial expression have generally been regarded with scepticism.

Criticism of such theories usually falls into two categories: they are too schematic (sometimes they indeed seem to verge on the laughable); and they take no account of the differences between the expression of emotions in different cultures.

As if when we travel abroad we cannot recognize the emotions of others – but for the most part we do, even though sometimes we make mistakes.

It is likely that there are gender differences in face-based emotion recognition.[6] But how large or how basic these differences are is not yet clear. Whether they can be attributed to one or more of the notions that women, compared to men, rely more on facial feedback for emotion recognition; or that they rely more on embodied simulation for such recognition than in the case of the less embodied, more rule-based strategies of men; or that they look more at the

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4 As often noted in the case of real or alleged criminals. "[...] our instincts about others, [when we judge from their faces], can be dangerously superficial," as Ian Leslie wrote in *The Guardian* on 7 October 2011 about the acquittal of Amanda Knox in the now-famous Perugia murder trial of 2007–2011.

5 Very often a number of neurological deficits underlie difficulty in reading emotions off faces. Such difficulty is now often said to be a symptom of a number of syndromes, including autism, Asperger's syndrome. For particular examples in the case of faces, see the work of Simon Baron-Cohen and now the very useful collection of essays edited by Niedenthal, Paula M., et al. "The Simulation of Smiles (SIMS) Model: Embodied Simulation and the Meaning of Facial Expression." *Behavioral and Brain Sciences* 33.6 (2010): 417–433.

6 Some basic material can be found in Cahill, Larry. "Why Sex Matters for Neuroscience." *Nature Reviews Neuroscience* 7.6 (2006): 477–484, and in Vigil, Jacob Miguel. "A Socio-Relational Framework of Sex Differences in the Expression of Emotion." *Behavioral and Brain Sciences* 32.5 (2009): 375–390. A good summary of the literature on these differences is now available in Simpson, Elizabeth, and Dorothy Fragaszy. "Can We Really Leave Gender out of It? Individual Differences and the Simulation of Smiles Model." *Behavioral and Brain Sciences* 33.6 (2010): 459–460.

eyes, or make swifter judgments about the expression of the eyes and mouth, or that they are better at distinguishing smiles, or that they have more activation in brain regions containing mirror neurons – all these proposals are moot.[7] They are also (mostly) a matter of degree rather than of fundamental difference, of social learning and social context rather than of basic capacity. Many of the proposed differences may well be the result of top-down influence; without scanting the possibility of gender difference in emotional recognition, I will continue to consider the degree to which bottom-up responses play a basic role in such recognition.

Once more the issue of correlation arises. In expression theory (or pathognomics)[8] this correlation is between inner feeling and outward expression; in physiognomics it is between inner character (however so defined; the problem stares one in the face, so to speak) and outward appearance, as indicated by the marks and features of the face (or of the hand in chironomics, and so on).

Of course we tend to make swift (though coarse) physiognomic as well as pathognomic judgments too; but this does not make them respectable.

The idea of correlation has come to be despised. But it need not be subverted by what is obvious: for example, that the recognition of an emotion may be enhanced by the visual context of the face.

Although the nuances of emotional expression are particular, they are capable of being subsumed under the general.[9] We shall return to the issue of classification.

The question is whether correlations are subverted by context, or to what degree they are.

A radical position would be that there are no broad correlations between emotions and their expression. This would fly in the face of common sense and common observation.

7 See the literature mentioned above (note 6). See also, amongst many possible examples, Biele, Cezary, and Anna Grabowska. "Sex Differences in Perception of Emotion Intensity in Dynamic and Static Facial Expressions." *Experimental Brain Research* 171.1 (2006): 1–6; Krumhuber, Eva, et al. "Facial Dynamics as Indicators of Trustworthiness and Cooperative Behavior." *Emotion* 7.4 (2007): 730–735; Stel, Mariëlle, and Ad van Knippenberg. "The Role of Facial Mimicry in the Recognition of Affect." *Psychological Science* 19.10 (2008): 984–985; Schulte-Rüther, Martin, et al. "Gender Differences in Brain Networks Supporting Empathy." *Neuroimage* 42.1 (2008): 393–403.

8 The distinction between physiognomy and pathognomy was clearly set out in the writings of Georg Christoph Lichtenberg. "Über Physiognomik; wider die Physiognomen. Zu Beförderung der Menschenliebe und Menschenkenntnis." Georg Christoph Lichtenberg. *Schriften und Briefe. Vol. 3: Aufsätze, Entwürfe, Gedichte, Erklärung der Hogarthischen Kupferstiche*. Ed. Wolfgang Promies. Munich: Hanser, 1972. 256–295.

9 The allusion here is to Charles Le Brun's 1668 *Conférence sur l'expression générale et particulière*; see below.

That the process of emotional recognition through the movements of the face sometimes fails is no argument against it. It does so, often enough.

We can distinguish between true and false emotion with relative ease; we can also see when emotion is caricatural. Sometimes we think an emotion is excessive and we become impatient with it, even when others do not think of it as melodramatic or as inappropriate or caricatural as we do.

That sometimes we are puzzled by the expression of a figure in a visual work, by the emotional content of that expression, is not fatal to the possibility of a theory of correlation between emotion and expression. Such puzzlement arises often enough. Often it is precisely that imprecision that makes beholders pause, either to dismiss the representation as inadequate, or to consider it further. Such imprecision can be a social or an artistic strategy.

Current fashion in the humanities insists that correlations are modifiable by context, and mediated by reflection. It is easy enough to admit that they can be – but with this caution: reflection does not always produce the most accurate results. It can (as we shall see) muddle them. In this case the issue of correlation firmly returns.

Reservations about correlation and direct recognition of emotion are related to the fear of direct sensation, particularly with regard to aesthetic experience.

What, in the end, is the threat that underlies such fear? It is clear enough: loss of self-control, diminution of our individuality, the danger of entering a realm in which experience does not adequately reflect our all-too human distinctiveness.

But what might it really mean to say "all-too human?"

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Whose eyes do not dilate in terror, whose mouth does not gape, at the sight of a snake, or a large truck bearing down upon one?

One's eyes open wide, one's mouth widens, one's jaw drops when one sees a gigantic waterfall, a wonder of nature, any towering cliff, anything, in short, that falls under Kant's category of the sublime.

It could perhaps be claimed that there are gradations here: one's mouth opens still wider, one's jaw drops still lower, one's eyebrows are raised even higher in the case of amazement than, say, terror; one could assert that in expressions of amazement the lower jaw actually locks, whereas in the case of terror it seems to go slack. But such borderlines are fine. Certainly one could establish, if one had a sensitive electromyograph, a scale of firmness of contraction of muscles around the mouth or eyes, going from fear to amaze-ment to gross terror.

Of course there are nuances of expression, sometimes small, sometimes substantial. These have not yet been thoroughly studied; but such a study would probably be too boring, too lost in minutiae, like Bulwer's seventeenth century book of gestures (always cited as the perfect example of culturally and chronologically bound gesture).[10]

Superciliary muscles are critical when it comes to the expressive modulation of the opening of the eyes; so is rigidity of gaze. But one could never establish saccadic patterns in the case of fear in real life. One cannot, after all, attach eyetrackers to subjects when out walking in the field or forest; but one can certainly do so in the case of looking at pictures in a laboratory, or even in a museum (though the latter remains to be done).

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Clearly one's perception of facial characteristics is influenced by the faces one has seen before, or to which one is regularly exposed. Webster et al. examined how judgments of characteristics such as gender and national identity, as well as of emotional expression, were affected by the kinds of faces viewers normally see. Observing that "variability among faces is a fundamentally important source of information about individual and group identities and the long term (e.g. age) and short-term (e.g. emotional) states of an individual [and that] we are all exposed to a different diet of faces," they noted that their results suggested that "these natural stimulus variations are potentially large enough to induce different states of adaptation in observers that may influence strongly how faces are perceived and interpreted." "Adaptation," they continued, "is thought to facilitate efficient coding of low-level stimulus features by normalizing visual responses to the average stimulus levels in scenes, and aids perceptual constancy by discounting variations both in the environment and in the observer." And they concluded that "adapting face perception to the average characteristics of the distribution of faces that an individual encounters may similarly be important for calibrating the visual process encoding faces."[11]

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10 Bulwer, John. *Chirologia: or, the naturall language of the hand. Composed of the speaking motions, and discoursing gestures thereof. Whereunto is added Chironomia: or, the art of manuall rhetoricke. Consisting of the naturall expressions, digested by art in the hand, as the chiefest instrument of eloquence, by historicall manifesto's, exemplified out of the authentique registers of common life, and civill conversation. With types, or chyrograms: a long-wish'd for illustration of this argument*. London, 1644.

11 Webster, Michael A., et al. "Adaptation to Natural Facial Categories." *Nature* 428.6982 (2004): 557–561, here 560.

All this seems logical enough. But the question is less that of adaptation to the faces one has seen than the speed and the frequent accuracy – and not just the mistakes – with which viewers identify the emotion on a face. Another question is the surprising consistency between particular kinds of facial expression and particular emotions, as now most notably claimed first by Darwin and then by Ekman. Of course, when it comes to seemingly instant identification of the emotion behind the expression, one's immediate perceptions may be modified by reflection; but the chief point of interest for us are the first stages in the identification of an emotion, the kinds of response that are instantaneous and precognitive. That they may later be modified seems a less problematic issue altogether.

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While the facial fusiform area (FFA) fires in response to faces, other areas are involved in responses to their emotional expressions.[12] Both amygdala and ventro-medial prefrontal cortex are activated in response to emotional faces. For some time now, a twofold model has been applied to this distinction. It posits separate functional routes for facial identity on the one hand and the expression of emotion on a face on the other. The first is concerned with responses to largely invariant and unchangeable features, the second with responses to changeable and dynamic elements in a face.[13] The first is associated with the FFA, and the second not only with limbic areas such as the amygdala, as only stands to reason, but also with the STS, which is always activated, as we have seen, by human biological movement. One route is cortical, the other subcortical.[14] Signals in the subcortical route are fast-processed via superior colliculus, pulvinar, and amygdala. This is a bottom-up system

12 See the many articles by Nancy Kanwisher, beginning with Kanwisher, Nancy, et al. "The Fusiform Face Area: A Module in Human Extrastriate Cortex Specialized for Face Perception." *The Journal of Neuroscience* 17.11 (1997): 4302–4311. For reservations, see, for example, Gauthier, Isabel, et al. "The Fusiform 'Face Area' Is Part of a Network that Processes Faces at the Individual Level." *Journal of Cognitive Neuroscience* 12.3 (2000): 495–504. For the origins of her work and the opposition to it, see my forthcoming volume on art and neuroscience.

13 As, for example, in Haxby, James V., et al. "The Distributed Human Neural System for Face Perception." *Trends in Cognitive Sciences* 4.6 (2000): 223–233. Earlier in the now classic Bruce, Vicki, and Andy Young. "Understanding Face Recognition." *British Journal of Psychology* 77.3 (1986): 305–327.

14 Johnson, Mark H. "Subcortical Face Processing." *Nature Reviews Neuroscience* 6.10 (2005): 766–774; Calder, Andrew J., and Andrew W. Young. "Understanding the Recognition of Facial Identity and Facial Expression." *Nature Reviews Neuroscience* 6.8 (2005): 641–651.

that may be modulated by prefrontal processing.[15] ERP and MEG studies have shown that such subcortical processing occurs at much shorter latencies (less than 100 ms) than those associated with the structural coding of face recognition.[16]

But the standard model has been questioned by Calder and Young. They observed that STS may be activated in the course of the processing of facial identity as well, and so the supposedly clear distinction between infero-temporal activity on the one hand and STS on the other is not quite as clear as the two-tier model proposes. As so often, they also pointed to neuropsychological deficits in further support of their criticism of the standard model. One of their main examples was the case of prosopagnosic patients who have difficulty in recognizing both faces *and* emotional expression, and they reported studies showing that STS is involved not simply in the perception of biological motion, but in the *integration* of visual form with motion.[17] For them, even facial identification involves a dynamic component, and the separation of identity and expression is relative not absolute.

Even so, Calder and Young were unable to argue away the basic division between cortical and subcortical streams. It is both a pragmatic and an empirically clear model – for all the possibility of occasional overlap. And it usefully extends to a further set of findings that are directly relevant to viewers' responses to faces and facial expressions.

Over the course of the last decade, a number of researchers have examined responses to faces at high and low levels of spatial frequency resolution (images with tight versus large scale degrees of luminance variation). One of their most significant findings here has been that HSF information is processed by the cortical route, and LSF by the subcortical route respectively (fig. 1). The first is processed by parvocellular channels, the second by magnocellular ones. It is the latter, phylogenetically older route that provides rapid but coarse signals to the amygdala.[18]

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15 For further references, see Vuilleumier, Patrik, et al. "Distinct Spatial Frequency Sensitivities for Processing Faces and Emotional Expressions." *Nature Neuroscience* 6.6 (2003): 624–631.

16 Eimer, Martin, and Amanda Holmes. "An ERP Study on the Time Course of Emotional Face Processing." *Neuroreport* 13.4 (2002): 427–431; Streit, Marcus, et al. "Time Course of Regional Brain Activations during Facial Emotion Recognition in Humans." *Neuroscience Letters* 342.1/2 (2003): 101–104; Johnson, "Subcortical Face Processing."

17 All from Calder and Young, "Understanding the Recognition." The usual clinical finding has been that prosopagnosic patients with cortical damage are poor at identifying faces, they can still detect emotional expressions. Cf. de Gelder, Beatrice, et al. "A Modulatory Role for Facial Expressions in Prosopagnosia." *Proceedings of the National Academy of Sciences of the United States of America* 100.22 (2003): 13105–13110.

18 Vuilleumier et al., "Distinct Spatial Frequency Sensitivities."

So far so good. One might well suppose that swift responses to emotional expression is the result of the processing of LSF information, whereas the specificity of HSF information subserves the identification of facial features. But we all know how swiftly one sees a face in a picture. And indeed, *holistic* face perception has been shown to be largely supported by low spatial frequencies.[19] Morever, in an important new article, Kumar and Srinivasan demonstrated that such global face processing facilitates the identification of faces with happy expressions, while local processing facilitates the identification of faces with sad expressions – so that the former is mediated by low SF resolution, and the latter by high SF content, particularly in the right hemisphere.[20]

But even if this is so (and some might think it improbable), the apparent inconsistencies disappear when one realizes that the issue here is the rapid perception of faces holistically, and that the identification of the details of expression – perhaps via a HSF route – represents a later stage of processing. Perhaps it takes less representational definition (of the kind represented by low spatial frequency) to evoke a happy than a sad response, and that happy expressions are thus perceived more swiftly than sad ones. The coarse LSF that is involved in processing happy expressions may well be engaged prior to the HSF that plays a more dominant role in the perception of sadness. But note that sadness is not to be conflated with fear, and that there can be no doubt of the fast amygdalic processing of fear responses on the basis of LSF information (see fig. 1).

In either event, it is clear that the twofold-route model is further reinforced by these implications of the two spatial frequency bands, with the cortical route subtended largely by slower HSF levels, and the subcortical one by faster LSF ones.

While the basic distinction between separate functional routes for responses to faces and to emotional expression corresponds to the traditional distinction between physiognomy and pathognomy, the updated model adds a plausible explanation for the seeming instantaneity of the recognition both of emotions and of faces.

In their investigation of the cognitive modulation of emotional processing of visual stimuli in faces and pictures, Keightley et al. recalled earlier research

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19 Goffaux, Valérie, and Bruno Rossion. "Faces Are 'Spatial': Holistic Face Perception Is Supported by Low Spatial Frequencies." *Journal of Experimental Psychology. Human Perception and Performance* 32.4 (2006): 1023–1039.

20 Kumar, Devpriya, and Narayanan Srinivasan. "Emotion Perception Is Mediated by Spatial Frequency Content." *Emotion* 11.5 (2011): 1144–1151.

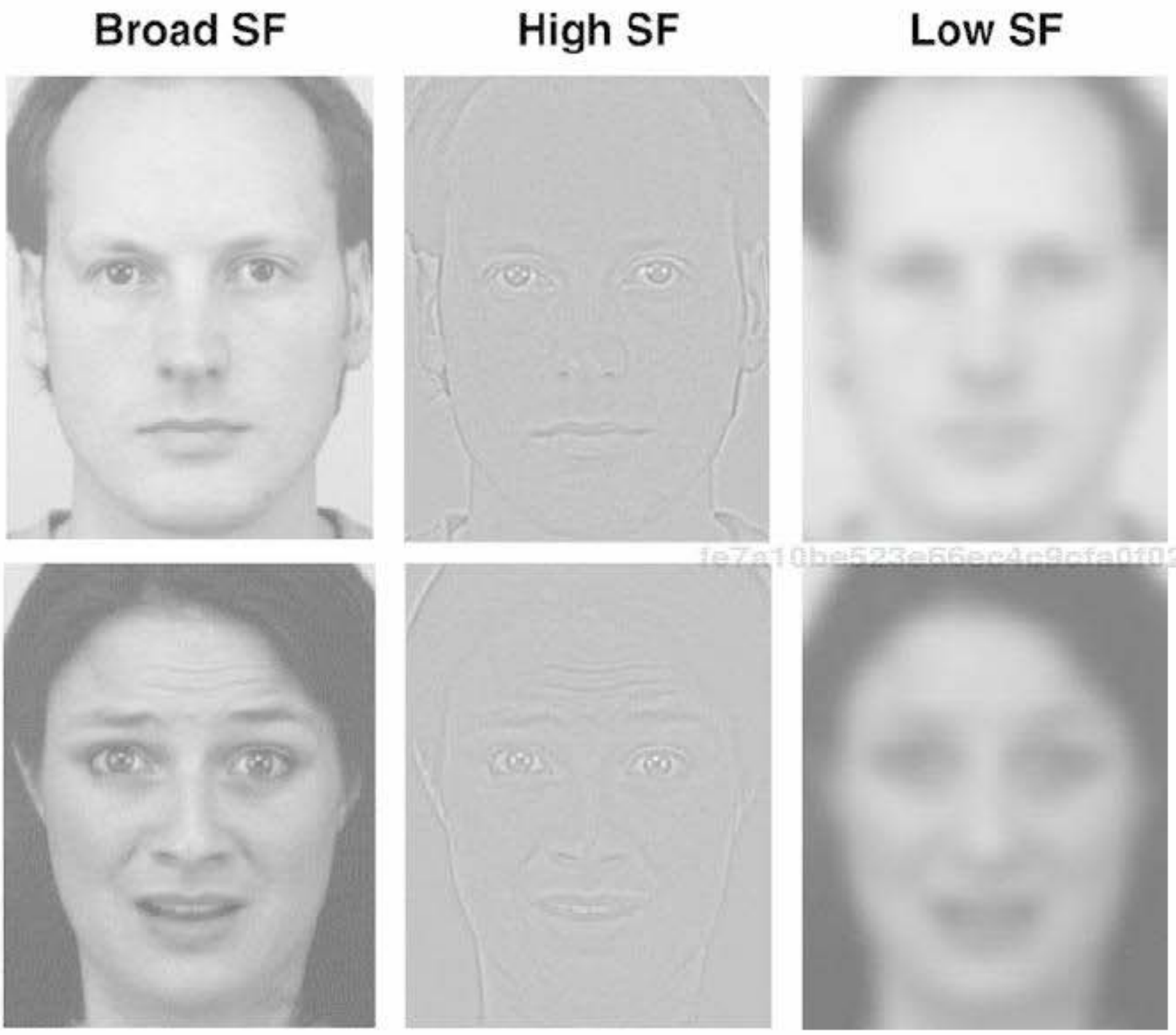

Fig. 1: Faces with broad (full spectrum) frequency (on the left) filtered to contain only high spatial or low spatial frequencies (middle and right columns respectively). While gender judgments depend equally on HSF and LSF information, the latter plays a more crucial role in the processing of fearful expressions – that is, the amygdala is more responsive to low than to high spatial information.
Source: Vuilleumier et al., "Distinct Spatial Frequency Sensitivities," 625.

showing that affective responses to stimuli occur prior to cognitive processing of such stimuli. They emphasized that the amygdala responds not only to fear signals, but also to faces *per se*, and concluded that emotional faces activate the amygdala and other limbic regions "in an automatic or pre-attentive fashion."[21] Indeed, Whalen et al. had already reported increased amygdalic

21 Keightley, Michelle L., et al. "An FMRI Study Investigating Cognitive Modulation of Brain Regions Associated with Emotional Processing of Visual Stimuli." *Neuropsychologia* 41.5 (2003): 585–596, here 593.

response to masked faces, to faces which viewers did not even report seeing.[22] The amygdala has also been shown to respond to fearful faces presented outside the focus of attention, even though inattention leads to decreased activation of the face-selective regions of the fusiform cortex.

In the understanding of the expressions of a face, the eyes play a central role. They are the most vivid signs of the life in an image, as well as in a person. As the old metaphors have it, they seem to provide direct access to the soul. If there is any element that attracts attention in a picture, or allows for initial detection of a face, it is the eyes that convey the greatest impression of the vitality – indeed the mobility – of a face. No wonder that one of the most frequent iconoclastic acts is the effort to delete the eyes of an image, as if by so doing, its imagined vitality, benign or malign, is eliminated. Tellingly, the facial fusiform area shows much greater functional connectivity with amygdala during direct gaze – that is, when there is direct contact between viewer and viewed face – than during averted gaze. Indeed, in one of his many fundamental contributions to the understanding of emotional responses to people and to pictures, Ralph Adolphs has shown that even patients with damage to the amygdala can successfully recognize fearful expressions if their attention is directed to the eyes.[23] If you do not see the eyes, or your attention cannot be drawn to them, you will have difficulty in perceiving the kinds of signals that betoken emotion.

From the manuals of physiognomy

Let us turn to the history of what has often seemed to be a failed chapter in the history of representation and of the understanding of emotion. In so doing, we will also return to the hard question of correlation.

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In 1586, the first edition of Giovanni Battista Della Porta's *On Human Physiognomy* appeared. It was an instant success and was soon republished. Reprinted,

22 Whalen, Paul J., et al. "Masked Presentations of Emotional Facial Expressions Modulate Amygdala Activity without Explicit Knowledge." *The Journal of Neuroscience* 18.1 (1998): 411–418.

23 Adolphs, Ralph, et al. "A Mechanism for Impaired Fear Recognition after Amygdala Damage." *Nature* 433.7021 (2005): 68–72.

Fig. 2: Top: Comparison of heads of a man and a lion. Bottom: Comparison of heads of a man and a donkey.
Source: Della Porta, Giovanni Battista. *De humana physiognomonia. Libri IIII*. Naples, 1598. 34, 86.

reedited, reduced, adapted, and modified, it appeared over and over again, all over Europe, for the next century and after.

On Human Physiognomy was extensively illustrated with engravings (see, for example, fig. 2); it came out of a long physiognomic tradition, including, most famously, a treatise wrongly attributed to Aristotle, and the Greek, Latin, and Arabic versions of Polemon's *Physiognomy*.

To almost all modern readers, the illustrations of Della Porta's book (and the principles behind them, articulated at great if clumsy length) seem absurd.

The idea behind *On Human Physiognomy* was that the outward traits of a human face represent inner character; and that individual character is to be sought in the character supposedly possessed by the animal the face most closely resembled. The circularity of this notion is self-evident. You are sup-

posed to be able to draw the appropriate parallels between the look of a man and a look of an animal – whose basic character is taken to be self-evident.

In other words: a man who looks like a lion is strong like a lion; a man who looks like a pig is porcine: slow, fat, and greedy; a man who looks like a fox is, as we still say, foxy – so sly and underhand; a man who looks like a donkey is, as we still also say, an ass; and so on and so forth (fig. 2).

We would give little credit to such views and such illustrations now. The illustrations are crude and caricatural, at least partly as a result of the need to force the evidence for similarity, and reinforce the wished-for comparison.

Foucault famously noted – precisely in the context of Della Porta and his works – that the interpretation of natural phenomena in the Renaissance was based on similitudes: similitude (and very often forced or willed anthropomorphization) became explanation.[24]

The extreme version of such science was represented by the doctrine of signatures. This doctrine, in which the tell-tale visual sign was shared by both *explanandum* and *explanans*, underlay both physiognomy and its plant parallel, phytognomy.

Semiotically speaking, the relationship between sign and signified in this doctrine was anything but arbitrary (or at least was not taken to be so).

In Della Porta's almost as popular *Phytognomy* (first published in 1588),[25] the similarity of appearance, the look of a plant, offered the clue to its medicinal powers.

Physiognomy had always brought in its train a number of other disciplines – even more so after Della Porta. They were all based on the similarity between outward appearance and alleged character. *All these disciplines, from metoposcopy to celestial physiognomy and even chironomy, attributed a set of fixed correlations between outward appearance and inner character.*

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In April and May of 1668, Charles Le Brun gave a lecture or *conférence* on the expression of the passions (as the emotions were called then) to the newly-created French Academy of Painting. It was repeated at least once in 1681, but probably on another occasion as well.

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24 Foucault, Michel. *The Order of Things: An Archaeology of the Human Sciences*. London, New York: Routledge, 1989. For a fuller account, see Freedberg, David. *The Eye of the Lynx: Galileo, His Friends, and the Beginnings of Modern Natural History*. Chicago: University of Chicago Press, 2002.

25 Della Porta, Giovanni Battista. *Phytognomonica*. Frankfurt: Nikolaus Hoffman, 1608.

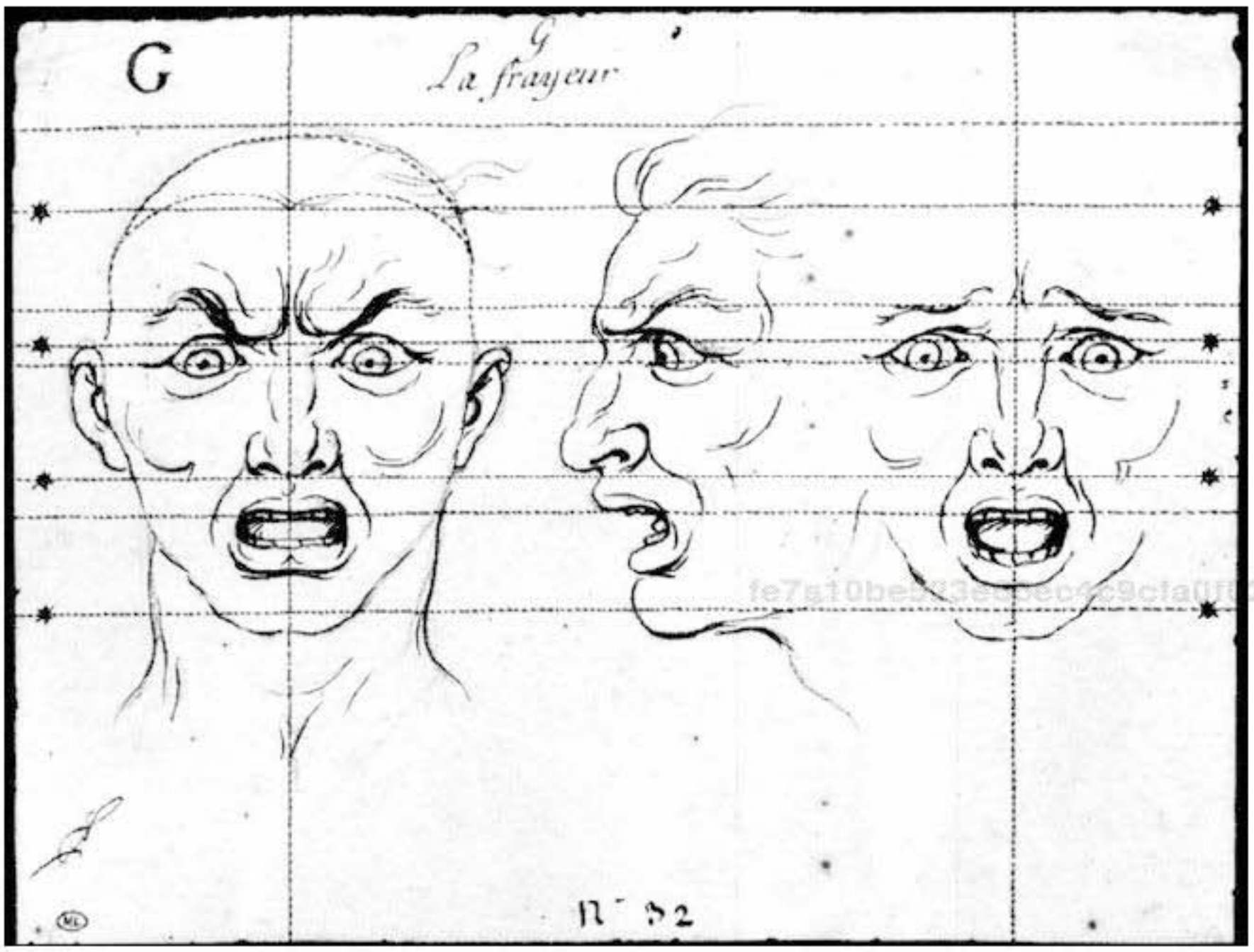

Fig. 3: Charles Le Brun. *La Frayeur: deux têtes de face et une de profil.* Black chalk, pen, and black ink, 19,5 × 25,6 cm. Paris, Musée du Louvre, Cabinet des Dessins.
Source: Le Brun, Charles. "Conférence de Monsieur Le Brun sur l'expression générale et particulière." Charles Le Brun. *L'Expression des passions & autres conférences. Correspondances*. Ed. Julien Philipe. Paris: Édition Dédale, 1994. 47–109, here 77.

The passions of the soul constituted a system that could be read by signs expressing the fixed correlations between inner feeling and outward expression.

Le Brun and his followers aimed to provide quick and easy guides to the identification of the emotions; but very soon the editions of these guides became little more than objects of fashion.

Others in France in the seventeenth century had already been interested in the problem of physiognomy. For example, Marin Cureau de La Chambre published a series of works, whose titles alone tell the story: *The Characters of the Passions* (1640/1645); *Treatise on the Knowledge of Animals* (1648); *The Art of Knowing Men* (1660); *The System of the Soul* (1665); *Discourse on Friendship and Hatred between Animals* (1667).

The possibility of correlation was also implied by Descartes's 1649 *Treatise on the Passions of the Soul*. Precisely as one might *not* have expected from the great separator of mind and body, it implied that the soul was represented by,

and readable through, the body. In this work he was very far from the error attributed to him by Damasio.

When Le Brun's lectures on *The General and Particular Expression of the Emotions* was reprinted afterwards (it appeared in over sixty editions and versions through the next century and a half), it showed faces with distinctly represented expressions that Le Brun insisted were codifiable. On the basis of particular configurations of the lines of muscular expression on a face – superciliary, zygomatic, and corrugator – you could always tell (or you *should* always be able to tell) what emotion was expressed (fig. 3). Such and such a configuration expressed anger, such and such fear, such and such astonishment, such and such disgust, and so on. The idea was to offer a definitive repertoire of the apposite marks on faces for the signs of inner emotion, and of the long sought-after correspondences between the feeling and the expression of the emotions. But this idea has often been dismissed, on the grounds that the correlations are too rigid, too mechanical even, and that the expression of emotions varies from culture to culture.[26]

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The purely physiognomic tradition culminated in the late eighteenth century with the *Physiognomical Fragments* of work of the Zurich pastor Johann Caspar Lavater, published in 1775–1778. It remained fashionable for generations after it was published (the first English edition was published in 1789 and was illustrated by William Blake and other artists; Georg Christoph Lichtenberg commented on it pungently).

The danger of caricature is apparent from the hundreds of illustrations in Lavater's work (fig. 4).

The difference between Lavater and Le Brun is striking. More often than not, their approaches are elided under the term of physiognomy. Lavater fitted into the more firmly traditional physiognomic mainstream from the ancients Aristotle and Polemon on to Della Porta. He sought to define character on the basis of physiognomic configuration.

The presumption of the Pastor from Zurich, who (like Kant) never travelled beyond his native province, emerges clearly. Lacking in any deep knowledge of

26 Even the best modern study of Le Brun is sceptical about the possibility of universal correlations between emotional expressions and emotions (Montagu, Jennifer. *Expression of the Passions: The Origin and Influence of Charles Le Brun's 'Conférence sur l'expression générale et particulière.'* New Haven, London: Yale University Press, 1994): It still contents itself with the weak contextual position. It takes the easy way out by seeing only difference, as if difference were more difficult to describe than similarity.

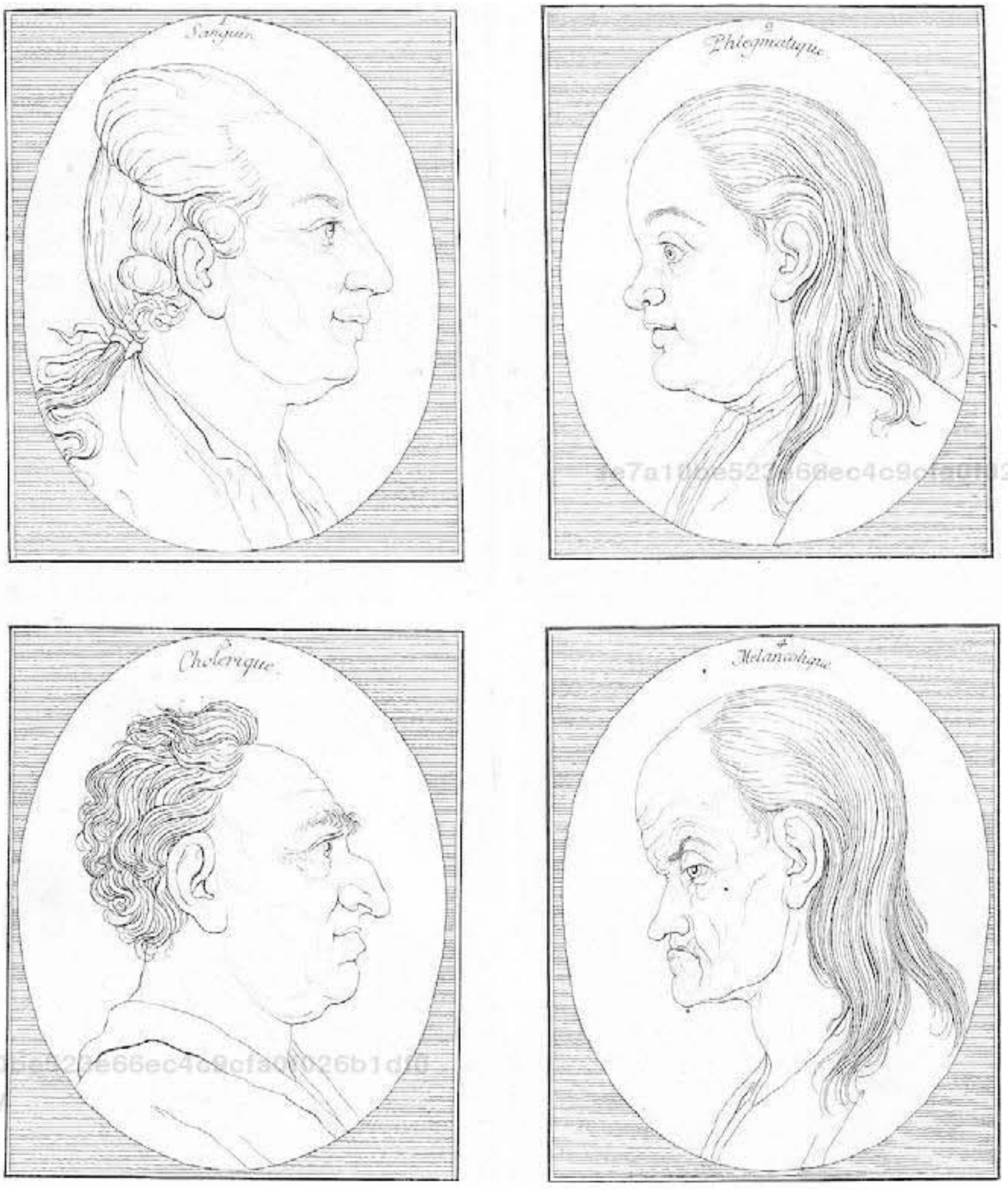

Fig. 4: *Les quatre tempéramens.*
Source: Lavater, Johann Caspar. *Essai sur la physiognomonie destiné à faire connoître l'homme et à la faire aimer. Première partie*. La Haye: Jacobus van Karnebeek, 1781. 263.

human nature, he attempted to classify not emotional responses, but character types – choleric, melancholic, sensual, and so on – on the basis of physiognomic features: pointed noses, thick lips, drawn or swollen cheeks, fat or thin, and so on and so forth. From these he thought he could deduce general personality.

No wonder it became popular.

Lavater's insistence on correlations between personality and configuration of facial features is unnuanced. "Obstinate, like enthusiastic persons, have perpendicular foreheads. [...] Absolute perpendicularity, and absolute want of understanding, are the same," and so on, absurdly.[27]

The fundamental difference between Lavater and Le Brun is this: Lavater drew his conclusions on the basis of physiognomic *features*; Le Brun drew his on the basis of the actions of the muscles of the face, and made correlations between coordinated groups of muscles and emotional feeling. Both Duchenne de Boulogne and Darwin would do better.

The difference is profound. Permanent features of the face have little to do with cortical activity; the movement of the muscles of the face – like those of the rest of the body – have everything to do with them. (I exclude the obvious fact that over time temporary expressions, if used often enough, can begin to influence the look of a face; but this is not a step Lavater took. He mentioned muscle movement from time to time, but had little understanding of their effect on the morphology of the face.)

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In the nineteenth century, the pathognomic tradition was taken up by two distinguished exponents, Duchenne de Boulogne (who did experiments) and Charles Darwin (who did not). Like Duchenne, Darwin put the technique of photography to new illustrative use.

In his *Mechanism of Human Physiognomy* (1862), Duchenne argued for clear correlations between particular contractions of facial muscles and particular emotional states.

To him, this suggested the universality of such correlations.

Duchenne showed that the spontaneous smile that results from genuine feelings of pleasure involves the contraction of two sets of muscles in particular: the *zygomaticus major* around the mouth, and the *orbicularis oculi* around the eyes (which also lifts the cheek). These are muscles that cannot be driven by will alone.

Similarly in cases of distress or fear with the corrugator muscles on the forehead and between the eyes.

Duchenne demonstrated the clear distinctions between spontaneous responses and consciously willed ones.

If the descending pathway from the motor cortex to brainstem and spinal cord is damaged, voluntary facial movement is impossible, but spontaneous

27 Lavater, Johann Caspar. *Essays on Physiognomy; for the Promotion of the Knowledge and the Love of Mankind*. Trans. Thomas Holcroft. London: Whittingham, 1804. Vol. 3. 7.

laughter and smiling remain possible; if pathways from the forebrain to the motor cortex are damaged, then spontaneous smiling becomes impossible (the more usual, though still rare, case occurs when smiling is prevented only in the half of the mouth contralateral to the lesion).

For the most part, you can tell the difference between a spontaneous and a volitional smile. Only *zygomaticus major* is involved in the latter, whereas the *orbicularis* muscle, as noted, is also involved in the former.[28]

Obviously, you can sometimes smile to mask a feeling that would not normally be conveyed by a smile, such as sadness, mourning, grief – preparation, in other words, to deceive. This is called the non-Duchenne smile. Sometimes you can be taken in, sometimes not. There is a large literature on the degree to which non-Duchenne smiles elicit a correct or an incorrect response.[29]

The test for a painter would be to convey, through a smile, the emotion that is intended to be masked. In other words, could a good painter – or photographer – or sculptor – convey a feeling that is intentionally not consistent with the outward expression of an emotion (say displeasure conveyed by smile, rather than pleasure)?

Duchenne referred to a "natural language" of instinctive emotional expression. "Once this language was created, it sufficed for him [God] to give all human beings the instinctive faculty of always expressing their sentiments by contracting the same muscles. This rendered the language universal and immutable."[30]

Duchenne implied that there was a syntax of muscular contraction corresponding to the relevant emotions: hence the language metaphor. You can read emotions and get meaning from them, just like language – in this case a universal language.

But this would be misleading. To see is not to read (though to read – unlike to listen – is to see, and of course to touch).

It is true that we have no other way of speaking about the interpretive relationship between sign and meaning (unless we clumsily use the word "decipher;" but generally that relationship, even if arbitrary, is more transparent than "decipher" suggests).

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28 For a wide-ranging summary of recent work on the Duchenne smile, see Niedenthal et al., "The Simulation of Smiles (SIMS) Model."

29 For a good discussion and illustrations, see again Niedenthal et al., "The Simulation of Smiles (SIMS) Model."

30 Duchenne de Boulogne, Guillaume Benjamin. *The Mechanism of Human Facial Expression*. Ed. and trans. Andrew R. Cuthbertson. Cambridge, New York, Paris: Cambridge University Press, 1990. 19, cf. 229–230. The idea is not dissimilar to Augustine's on the natural language of the emotions.

We speak of reading the signs. But in the case of responses to facial expression, "seeing" does not imply interpretation (though of course it could and should). A verb for the correct way of expressing the correlations between visual signs and understanding is lacking.

* * *

Darwin's *Expression of the Emotions in Man and Animals* appeared in 1872, a decade after Duchenne's book.

The theory that accompanied earlier accounts of the problem was thin or absent; Darwin's was much more powerful and took into account the neurological dimensions, both of expression and of habituation.

More clearly than anyone earlier, he set out what was cultural and what was consistent in the correlations between emotion and expression, both in humans and in animals. But Darwin nuanced the implications of strong correlation. He gave instances of the cultural modification and supplementation of basic body movements associated with the expression of certain sentiments (for example, tenderness toward a child or a beloved). Maoris rub noses, Westerners kiss. In both cultures the bringing of body close to body signified the provision of or search for physical warmth, solace, nutrition.

Darwin remained firm about the constancy of the relationship between emotion and expression across the species, but did not exclude local modulation. Like Duchenne, he illustrated his work with photographs.

* * *

From the late 1960s on, Paul Ekman renewed and revitalized the arguments for the correlations between particular emotions and particular expressions. He also showed how the possibility of distinguishing between voluntary and involuntary emotions supported the theory of strong correlation.

He began by identifying six basic emotions, from which his correlations proceeded: anger, disgust, fear, joy, sadness, and surprise (Le Brun, for example, had love, rapture, veneration, jealousy as well, but he made no claim for basic versus complex emotions). Although it is easy to acknowledge that some emotions phase into others, that there may be other identifiable emotions (for instance, contempt), that some are basic and others complex, and that his list like others may be too crude, his division continues to form the basis of much research.[31]

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31 In his study of emotional expression amongst the South Fore people of New Guinea, Ekman himself acknowledged that they may not have distinguished between surprise and

To cleave to this classification (or an alternative one) need and should not detract from the essential issue of the modulation of whatever emotions we choose to call basic. Ekman's ones are as good as (and perhaps better than) any.

Some readers of Ekman find it less easy than his claims suggest to identify emotions from their allegedly particular expressions. They find they make mistakes of identification. They do not always recognize the emotions for what Ekman says they are. They feel that they need to be more expert than his arguments for the intuitive judgments of faces allow (or what Duchenne might have called natural judgments).

But Ekman argued that one could train oneself – or be trained – to recognize emotions from facial expression pretty accurately. This is still not an argument that has won general acceptance. It seems to fly in the face of the possibilities of anthropological variation in the way in which emotion can be expressed.

And what if someone put on, or faked an expression?

Would you be able to see through it?

Ekman himself raised the question; indeed, much of his work has had to deal with seeing through lies (note the way in which we use both a literal and metaphorical expression for dealing with dissimulation).

There is a difference between a genuine smile of pleasure and a forced or even a willed smile. Though plenty of people may be taken in by it, you can learn to detect it. Some people are naturally good at detecting what is genuine and what is fake in the expression of an emotion, others are more easily taken in.

In our own culture we generally recognize the emotions of others who share our culture. Some of us seem to be more skilled than others at doing so. But most of us are familiar with cases of expressive deceit, of the false expression of emotions. Some are more skilled than others at recognizing such deceit. Reflection may help arrive at the correct conclusions. The rest of the body often provides corroborative or contra-indicative signs. But too much deliberation over too much information causes confusion. Sometimes, as we know from much experience, reflection produces less accurate judgments than intuition. What is at stake is the accuracy of automatic and instantaneous response.

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fear; and he added contempt as an emotion with universal recognition. Any number of attempts have of course been made to add other universal recognizable emotions – guilt, shame, interest even: but all of these seem too complex – and possibly *too* dissimulable – to qualify either as a basic emotion or as susceptible to cross-cultural recognition. Cf. Ekman, Paul, et al. "Pan-Cultural Elements in Facial Displays of Emotions." *Science* 164.3875 (1969): 86–88. The photographs were shown in the exhibition *The Search for Universals in Human Emotion: Photographs from the New Guinea Expedition*, San Francisco, Exploratorium, 22 January – 11 May 2008.

The question of representation

Ekman's evidence (like much of Darwin's) comes in the form of photographs.

Since so many falter in identifying the emotions behind these faces, the prospect of a 'natural language' of emotions is called into question. But this may be because the language is not so natural after all; that we have to learn it.

We are not skilled enough at this task. We need more information than a still photograph can provide.

Or is it because there is already too much in a photograph?

For the fact is that photographs do not provide too few clues to identification. They provide too many. They belong to that class of images – engravings in herbals are another – that provide too much information for classification.[32]

To say that one recognizes the emotional expression on a face: surely this cannot require close representation of the features and muscles of a face?[33]

You waver when you see even a small detail that suggests another emotion (emotion is always a great attractor of attention). But before you waver you have already grasped an emotion – probably the correct one.

After all, you can detect a face and the expression on a face from a minimum of cues.[34]

You cannot identify unless you can classify.

Correlation depends on the possibility of classification. Classification in turn depends on descriptive parsimony. Too much information leads to the crossing of the boundaries essential to classification. The beauties and descriptive richness of pictures (as always, broadly taken) become worse than superfluous; they mislead and cause mistakes.

No wonder that Francesco Stelluti's 1637 edition of Della Porta's *Physiognomy* dispensed with illustrations altogether. So did Linnaeus. Both realized that visual illustrations were too misleading because they were too full, too dense with detail, too capable of making one think of alternative possibilities. They could not find a visual system that was abbreviated enough.

But the exponents of line thought they had an advantage here. Line drawings are self-evidently more schematic than pictures or photographs.

Correlations depend on schemata. Descriptive parsimony becomes the chief ingredient of any attempt to illustrate correlations between emotions and

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32 For a further discussion of this issue, see Freedberg, *The Eye of the Lynx*.

33 It goes without saying that the definition of close representation, dependent as it is on available schemata, is moot.

34 As also in Arnheim, Rudolf. *Art and Visual Perception: A Psychology of the Creative Eye*. Berkeley: University of California Press, 1954. Cf. Biederman, Irving. "Recognition-By-Components: A Theory of Human Image Understanding." *Psychological Review* 94.2 (1987): 115–147.

their expression. Too much information leads to the crossing of the boundaries essential to classification. To cross the line is to make a mistake.

Then the question becomes one of recognition. The issue extends beyond faces and facial expression to the correct identification of other bodily movements and their emotional dimensions. What are the minimal numbers of lines and dots necessary for such recognition? The question has still not gone away, and it occupies many researchers.[35] How much does it take to recognize, or to imitate? In any case, one would not want recognition to depend on close or anything like complete description; this might be fatal, or at least evolutionarily illogical.

Many of the forerunners of Darwin depended on schematic illustration, or on the elicitation of schematic viewing, by which I mean viewing underwritten by a mode that enables the (swift) selection of distinctive traits, undistracted by extraneity and superfluity.

Already in 1883, Francis Galton had noted that a face stimulus is perceived at a glance rather than as a collection of independent features.[36]

But one cannot have guides to the reading of expressions without schemata, either for classification or for its representation.

Abandoning the language metaphor, Duchenne wrote that one should be able "like nature herself, to paint the expressive lines of the emotions of the soul on the face of man."[37] "Paint" of course is misleading; "line" generally is not.

Le Brun and his many subsequent illustrators chose relatively parsimonious graphic means to show what muscles of the face – and what muscular configurations – conveyed particular emotions. He and his illustrators did not want the possibility of making a mistake, or using the wrong line to suggest another emotion. So the linear approach to illustration remained relatively concise. As always, however, effective schematization was misdirected by the drive to further aestheticize the line (this is not to say schematization is necessarily unaesthetic; on the contrary).

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35 For important early work on detecting faces in "impoverished" images, especially under degraded viewing conditions (for example, low image resolution), see Torralba, Antonio, and Pawan Sinha. "Detecting Faces in Impoverished Images." *AI Memo* 028 / *CBCL Memo* 208 (2001): 1–13. Similar questions may be raised about the identification of expression on the basis of high or low frequency images (that is, large scale versus tighter degrees of luminance variation).

36 Galton, Francis. *Inquiries into Human Faculty and Its Development*. London: Macmillan, 1883. Cf. Goffaux and Rossion, "Faces Are 'Spatial,'" 1023.

37 Duchenne de Boulogne, *The Mechanism*, 9.

The principle was clear; but the danger was caricature, particularly in the hands of inept draughtsman.

We see this in Lavater and in any numbers of the later editions of Le Brun's heads.

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Two forms of possible correlation: first, the correlation between the feeling and the expression of the emotion; second, the correlation between the feelings of the person observed (or the picture of the person observed) and the feelings of the observer.

We have already spoken of the first; let us turn to the second. When we see a work such as Rogier van der Weyden's *Descent from the Cross*, we have little doubt about most of the emotions the artist seeks to convey (figs. 5a–c).

They speak (as we say) for themselves. We perceive the sadness and tensions of the actors in the scene immediately, with little if any reflection, because the same parts of our brain fire upon the recognition of their emotions as would in theirs if they were living actors. The artist is so expert at showing the lineaments of grief that we instantly recognize the emotions he wishes to convey. His success in this domain lies in his ability to represent the expression of the emotions in such a way as to activate the same emotions in the viewer. We do not just *read* them, as intellectuals habitually say, we feel them through the activation of motor responses in ourselves that are adequate to that particular emotion; and such responses, both corporeal and emotional, ensue automatically upon sight.

Who does not know, who cannot instantly feel in the imagination, the gentle upturn of the ends of the mouth, the light tightening of zygomatic muscles, the sense of tenderness of gaze as one looks at a beloved child in a state of peace or happiness?

Most of us are blessed in being able to recognize such states in others, from the expression on their faces. Blessed, because such empathy for expression offers pleasure in life, and pleasure from art. Some who have muscular deficits in the areas relevant to the expression of such states cannot recognize them in others. Some, who have cortical losses in the places where emotions have their neural substrate, cannot recognize such states either.

Patients who have Moebius Syndrome, who are congenitally unable to move their facial muscles and move their eyes from side to side, are incapable of recognizing the emotions of others – and certainly not from their facial expressions.

Part of being whole is to be able to recognize the emotions of others. It is to have the innate capacities to do so.

Fig. 5a: Rogier van der Weyden. *Descent from the Cross*. C. 1435. Oil on oak panel, 220 cm × 262 cm. Madrid, Museo Nacional del Prado. Detail, head of John the Evangelist. *Source*: Campbell, Lorne, and Jan van der Stock. *Rogier van der Weyden 1400–1464: Master of Passions*. Zwolle: Waanders, 2009. 18.

Fig. 5b: Rogier van der Weyden. *Descent from the Cross*. C. 1435. Oil on oak panel, 220 cm × 262 cm. Madrid, Museo Nacional del Prado. Detail, head of Nicodemus. *Source*: Campbell and van der Stock, *Rogier van der Weyden 1400–1464*, 18.

Fig. 5c: Rogier van der Weyden. *Descent from the Cross*. C. 1435. Oil on oak panel, 220 cm × 262 cm. Madrid, Museo Nacional del Prado. Detail, head of Mary Salome. *Source*: Campbell and van der Stock, *Rogier van der Weyden 1400–1464*, 18.

Of course it is always possible to train to improve; and it is easier, in principle, to do so than one might think.

And empathy, as Jonathan Cole once trenchantly put it, needs a face.[38]

Seeing emotion

There is a matching system – to use Rizzolatti's useful term – not only for motor actions, but for emotional stimuli too. "Common coding" is Wolfgang Prinz's term for this process.[39] Of course, as we have repeatedly observed, emotions are underwritten by movements, even small ones; so too for the expressions of emotions on the face.

Others call this a shared representations mechanism, which also allows observers to "resonate," as they put it (perhaps too vaguely), with the autonomic and visceral state of the other individual.[40]

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38 Cole, Jonathan. "Empathy Needs a Face." *Journal of Consciousness Studies* 8.5/7 (2001): 51–68.

39 Prinz, Wolfgang. "Experimental Approaches to Action." *Agency and Self-Awareness*. Ed. Johannes Roessler and Naomi Eilan. New York: Oxford University Press, 2005. 165–187.

40 Decety, Jean, and Philip L. Jackson. "The Functional Architecture of Human Empathy." *Behavioral and Cognitive Neuroscience Reviews* 3.2 (2004): 71–100. Much of the material on the

As always, the role of the amygdala in fear responses offers the most graphic examples.

The mere sight of an expression of fear activates viewer's own amygdala too.

The same for expressions of disgust and the corresponding activation of the anterior insula in viewer as well as in viewed.[41]

In the case of fear, amygdalic activation can occur even before the visual stimulus arrives at V1. This almost certainly happens with other emotions too.

If one's amygdala is damaged, both one's recognition of fear and one's feelings of fear are seriously impaired.[42]

Even when one imitates an expression of fear oneself, the amygdala is involved. The same for disgust and the insula.

Indeed, the effect can appear to be stronger in the case of imitation than in that of observation.[43]

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Similar networks are activated by the perception of facial emotional expression as in the generation[44] and expression of similar emotions.[45] Observers simulate the observed emotions of others, whether consciously seen or not.

A neonate imitates the buccal expression of a mother even though it has never seen itself do so in a mirror.[46]

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following pages comes from this outstanding survey of research on human empathy in general. The concept is also clearly discussed in Adolphs, Ralph. "Neural Systems for Recognizing Emotion." *Current Opinion in Neurobiology* 12.2 (2002): 169–177; Adolphs, Ralph, et al. "A Role for Somatosensory Cortices in the Visual Recognition of Emotion as Revealed by Three-Dimensional Lesion Mapping." *The Journal of Neuroscience* 20.7 (2000): 2683–2690.

41 Wicker, Bruno, et al. "Both of Us Disgusted in *My* Insula: The Common Neural Basis of Seeing and Feeling Disgust." *Neuron* 40.3 (2003): 655–664.

42 As in the case of 30 year-old patient S. M. examined by Adolphs, Ralph, et al. "Fear and the Human Amygdala." *The Journal of Neuroscience* 15.9 (1995): 5879–5891.

43 Iacoboni, Marco, et al. "Cortical Mechanisms of Human Imitation." *Science* 286.5449 (1999): 2526–2528; Carr, Laurie, et al. "Neural Mechanisms of Empathy in Humans: A Relay from Neural Systems for Imitation to Limbic Areas." *Proceedings of the National Academy of Sciences of the United States of America* 100.9 (2003): 5497–5502.

44 As in much of the work of Ralph Adolphs; but see Adolphs, Ralph. "Recognizing Emotion from Facial Expressions: Psychological and Neurological Mechanisms." *Behavioral and Cognitive Neuroscience Reviews* 1.1 (2002): 21–61.

45 Ekman, Paul, and Richard J. Davidson. "Voluntary Smiling Changes Regional Brain Activity." *Psychological Science* 4 (1993): 342–345; Carr et al., "Neural Mechanisms of Empathy in Humans;" Leslie, Kenneth R., et al. "Functional Imaging of Face and Hand Imitation: Towards a Motor Theory of Empathy." *Neuroimage* 21.2 (2004): 601–607. Carr et al. offer another good survey of research on empathy at that point.

46 Famously demonstrated in Meltzoff, Andrew N., and M. Keith Moore. "Imitation of Facial and Manual Gestures by Human Neonates." *Science* 198.4312 (1977): 75–78; Meltzoff, Andrew N.,

Ulf Dimberg showed how electromyographic responses in the facial muscles of observers are congruent with those involved in the observed person's facial expressions. When we see someone else smiling the same muscles that contract in her, contract in us too; similarly with our brow muscles when we see someone angry.[47]

Ralph Adolphs later set out how the sight of facial expressions in others can trigger similar expressions on one's own face, even in the absence of conscious recognition of the stimulus.[48]

In the case of affective blindsight, you do not see a danger signal, but you still respond to it. Indeed, if you see a positive signal and a danger signal at the same time, you may think you see only the positive signal; but your face will show the signs of fear.[49] Why? Because the signal goes along the subcortical visual pathway that runs from retina to superior colliculus, to posterior thalamus and amygdala, even before it reaches the visual cortex itself.[50]

In some instances of affective blindsight, patients with V1 lesions are able to correctly distinguish between the affective valence of facial expressions projected in their blind field despite having no conscious perception of the stimuli.[51]

Hemianope patients, those with damage to one side of the visual cortex, making it impossible for them actually to see an emotional stimulus in their blind field, nevertheless register on their faces clear reactions to what they cannot see.[52]

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and M. Keith Moore. "Newborn Infants Imitate Adult Facial Gestures." *Child Development* 54.3 (1983): 702–709.

47 Dimberg, Ulf. "Facial Reactions to Facial Expressions." *Psychophysiology* 19.6 (1982): 643–647.

48 Adolphs, Ralph, et al. "Dissociable Neural Systems for Recognizing Emotions." *Brain and Cognition* 52.1 (2003): 61–69; Dimberg, Ulf, et al. "Unconscious Facial Reactions to Emotional Facial Expressions." *Psychological Science* 11.1 (2000): 86–89; see also Wallbott, Harald G. "Recognition of Emotion from Facial Expression: Some Indirect Evidence for an Old Theory." *British Journal of Social Psychology* 30.3 (1991): 207–219.

49 Tamietto, Marco, and Beatrice de Gelder. "Affective Blindsight in the Intact Brain: Neural Interhemispheric Summation for Unseen Fearful Expressions." *Neuropsychologia* 46.3 (2008): 820–828.

50 See the summary by Tamietto, Marco, et al. "Collicular Vision Guides Nonconscious Behavior." *Journal of Cognitive Neuroscience* 22.5 (2009): 888–902.

51 De Gelder, Beatrice, et al. "Non-Conscious Recognition of Affect in the Absence of Striate Cortex." *Neuroreport* 10.18 (1999): 3759–3763. For a good current overview of this effect, see also Tamietto, Marco, et al. "Unseen Facial and Bodily Expressions Trigger Fast Emotional Reactions." *Proceedings of the National Academy of Sciences of the United States of America* 106.42 (2009): 17661–17666.

52 De Gelder, Beatrice, et al. "Unconscious Fear Influences Emotional Awareness of Faces and Voices." *Proceedings of the National Academy of Sciences of the United States of America*

The old term "emotional contagion" has been revived by researchers to describe "the spontaneous tendency to synchronize our facial expressions with those of another person."[53]

Observers who are exposed to smiling faces activate the same facial muscles involved in producing a smile – even when they do not consciously see the emotion on the face; and this creates a corresponding feeling of happiness.[54]

The distinctive contractions of upper and lower lip in expressions of disgust, the wrinkling of the nose when one sees something particularly repellent (especially in the implications of smell or taste), the tight downward contraction of the superciliaries: we recognize these movements of the face as hallmarks of disgust, and easily make them.

To what degree does the mere production of such a configuration produce disgust? Probably very little, unless done with much more closeness than most of us can muster. It would seem to work better with anger and amazement (and certainly a smile): attend carefully to your autonomic responses – though they may seem slight – when you try this out.

Often the making of a facial expression generates internal changes in the body. Ekman and his colleagues did a series of experiments in which they asked subjects to make the facial expressions for anger, surprise, sadness, happiness, disgust, and fear; and found that doing so brought about a clear sense of the subjective experience of associated emotions, as well as a series of relevant autonomic changes (for instance, heart rate, skin conductance, finger temperature, and other somatic activity).[55]

When we see emotions in others, we can be pretty sure that we recognize them for what they are, that these are indeed the feelings that lie behind their representation, precisely because of our capacity to reproduce them inwardly or outwardly.

102.51 (2005): 18682–18687; cf. de Gelder, Beatrice, and Nouchine Hadjikhani. "Non-Conscious Recognition of Emotional Body Language." *Neuroreport* 17.6 (2006): 583–586.

53 Tamietto et al., "Unseen Facial and Bodily Expressions," 17661; cf. de Gelder, Beatrice. "Towards the Neurobiology of Emotional Body Language." *Nature Reviews Neuroscience* 7.3 (2006): 242–249. Also much discussed in the work of Singer and de Vignemont.

54 Dimberg et al. used a backward-masking method, in which subjects were prevented from consciously perceiving 30-ms exposures of happy, neutral, and angry target faces by having them immediately followed and masked by neutral expressions.

55 Ekman, Paul, et al. "Autonomic Nervous System Activity Distinguishes among Emotions." *Science* 221.4616 (1983): 1208–1210; Levenson, Robert W., et al. "Voluntary Facial Action Generates Emotion-Specific Autonomic Nervous System Activity." *Psychophysiology* 27.4 (1990): 363–384.

"Pretty sure" because of the ever-present possibility of deception, and because the borderlines are so fine. For example, one might confuse fear and amazement from time to time – but for the most part, in normal life, we have little difficulty in separating one from the other.

How would you recognize the emotions of others if a part of your body were not capable of registering in itself the corporeal expression of those emotions?

Adolphs has shown that the integrity of the sensorimotor system is critical for the recognition of emotions displayed by others.[56] It supports the reconstruction of what it would feel like to be in a particular emotion by means of simulation of the related body state. In other words, the recognition of emotions in others requires that the perceiver be able to reconstruct the somatic and motoric dimensions usually associated with producing and experiencing the emotion seen.[57]

Paula Niedenthal did an ingenious experiment in which she asked subjects to put a pencil in their mouths while looking at photographs of facial expressions. When you do this, you can neither smile nor frown; you are unable to move your facial muscles in the normal way. Niedenthal found that subjects keeping the pencils between teeth were much less able to detect changes in emotional facial expressions than the other participants, who could mimic the expressions if they so wished.[58]

The issue is not just that of the brain; it is of the capacity of the body to imitate, in some form, even inexplicit, the emotional expression of others.

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A still larger question arises – that of how to speak of the apparent automaticity of the involuntary imitation of observed expressions (and of many other bodily movements too).

Associated with this question is the issue of non-conscious responses. Sometimes we are not aware that we have seen an emotional expression, yet still respond as if we had seen an emotion; we recognize it even if we do not see it. Such a response may more suitably be called unconscious than automatic.

More and more research is being dedicated to automatic responses that are sometimes quite independent of awareness. Beatrice de Gelder, who has

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56 Adolphs et al., "A Role for Somatosensory Cortices."

57 Adolphs et al., "Dissociable Neural Systems."

58 Niedenthal, Paula M., et al. "Embodiment in Attitudes, Social Perception, and Emotion." *Personality and Social Psychology Review* 9.3 (2005): 184–211.

done much work on affective blindsight and body responses, has described how fear recognition may be "mandatory and independent of awareness."[59] Indeed, her research on non-conscious recognition of facial expression has shown that fear specific effects generated enhance neuronal activity not only in the amygdala (and pulvinar) but in the fusiform gyrus itself.[60]

Like other physical and felt responses to the sight of the bodies and movements of others, responses to faces and emotional facial expressions force assessment of what often seems to be automatic.

If you were taking a rarefied position on aesthetic response, you might say that responses to faces hardly raise significant questions about art. But this would indeed be too rarefied.

What are we to make – to put it bluntly – of the relationship between the biologically needful response and the aesthetic one? Between the need to sense the agony of another before we fall into the same situation ourselves, to run away from danger, to identify the disgust of an infant when it tastes rancid food, to calm the rising ire of a violent person and, say, the pleasure to be derived from the identification of the emotions of figures populating a picture, from the ways in which expression tells a story which we piece together, or simply from the mimetic skill of the artist? (I, for one, have never found the works of Franz-Xaver Messerschmitt particularly interesting aesthetically; many others have.)

One might claim that physiognomic expression has nothing to do with aesthetic pleasure at all (though this would be a stretch, much as one might want to divorce traditional mimetic views from current views of aesthesis). Of course, in many pictures there are no physiognomies.

Identification of the emotions of others is not in and of itself aesthetic. But the ways in which humans – and other animals too – identify the emotions of others offer insights into elements of cortical transmission that are essential for any form of aesthetic understanding.

Forgetting – or perhaps not really noting – the difference between a Lavater and a Le Brun, Willibald Sauerländer denounced the whole physiognomic tradition, on the grounds that it paved the way for the legitimation of direct sensation in the understanding of works of art. His agenda was that the importance of art lies in the degree to which it enables reflection on what is seen in

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59 In fact, "unconscious fear recognition remains robust even in the light of a concurrent incongruent happy facial expression or an emotional voice of which the observer is aware." (De Gelder et al., "Unconscious Fear," 18682.)

60 De Gelder et al., "Unconscious Fear."

an artwork; and that unmediated experience can have no role in the aesthetic understanding.[61]

Sauerländer would also have argued against all proposals *à la* Le Brun, on the grounds that no aesthetic response could be as automatic as Le Brun's drawings implied (since correlation implies a certain degree of automaticity). Sauerländer might have acknowledged the possibility of making such instant judgments about the emotions that lie behind the expressions of others; but he would have said that such judgments have no place in responses to the work perceived as a work of art.

The fear is of sensationalism and immediacy.

The same disdain – better, the same fear – was shared by Ernst Gombrich in his well-known essays on physiognomy.[62] He admitted that physiognomic perception (as he called it) carried "strong and immediate conviction." Observing that the categories of "smiling" and "menacing" "are amongst our earliest and most basic responses," he insisted, contrary to all the claims of this book, that "[t]here is no advantage in our remembering the early stages of our probings that have been superseded by a better fit."[63] For Gombrich, such basic responses (as he himself put it) are regressive; and neither he nor Sauerländer believe that such regression plays a role in understanding art or culture.

It would be hard to mistake Gombrich's deep discomfort with what he believes to be regressive responses, in this case immediate and direct responses to emotional expression (as also in the case of human faces imagined in clouds and other natural phenomena). In the end, despite his claims for reflection as an element in understanding art, the exclusion of responses that are immediate, sensory, and involve the body does not leave much place for a fully-fledged aesthetic theory that will serve us, either now or in the future.

No one would argue that aesthetics consists only of automatic or immediate responses. What is at stake is the problem of how and what we conceive of as preceding reflection, of what actually *does* precede reflection, and of how reflection modulates precognitive states of being prior to awareness. The task must now be to consider the ways in which bottom-up responses are modulated by prefrontal processes in the brain, and to better understand the inhibitory constraints on motor and bodily responses to visual stimuli in works of

61 Sauerländer, Willibald. "Überlegungen zu dem Thema Lavater und die Kunstgeschichte." *Idea. Jahrbuch der Hamburger Kunsthalle* 8 (1989): 15–30.

62 In particular in Gombrich, Ernst H. "On Physiognomic Perception." Ernst H. Gombrich. *Meditations on a Hobby Horse and Other Essays on the Theory of Art*. London: Phaidon Press, 1963. 45–55.

63 Gombrich, "On Physiognomic Perception," 48–49.

art. These forms of cortical as well as subcortical inflection of automatic and immediate involvement with representation lie at the core of aesthetic experience. The point at which neural inhibition engenders reflection and contemplation is critical; but these are complex matters that require much unravelling and so must be set aside for another occasion.

For authorities like Sauerländer – and the many philosophers and scholars who think like him – the pleasures of culture arise from the intellectual mediation of immediate responses. It would be impossible to deny that they often – perhaps mostly – do. But to exclude the kinds of bodily responses that Sauerländer and others call unmediated – and that may indeed align us with animals – would be to preclude an essential element in our involvement with images and with art. It would be to overlook the many ways in which responses to art cannot be thought of in terms of context alone, because the effects of art are necessarily and inevitably predicated on the dialectics of body and brain. Our reactions to what we see, and our estimate of the quality of what we see, depend as much on the impact of circumstance and on our individuality as on the schematic generality that underlies it. They depend on the relationship between our local and accidental particularity and the bodies that we are given from birth and that continue to dominate our lives until the grave.[64] These are bodies whose structure we only understand through discovery of their similarities with others.

The body, as Shaun Gallagher put it, may shape the mind, but it is also underpinned by a neural substrate that is itself able to be shaped. To overlook the role of bodily understanding and its neural underpinnings is not to vulgarize aesthetic understanding, but to impoverish it. To ignore the constitution of the body in the analysis of responses to what we see is to take the fundamental tension away from responses to art, and desiccate what it has to offer. The bodies we are given and cannot entirely remake, and the image we have of our bodies, may indeed be modified by circumstance, but the time has come to more fully admit what it means to talk about difference. It arises not only from distinctions between circumstances, but even more clearly from the modification of that which joins individuals to each other and of what is similar across human circumstance. It is this that offers us the richness and incommunicabilities of difference itself.

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64 I allude here to the notion of body schema, clearly set out by Gallagher, Shaun. *How the Body Shapes the Mind*. Oxford: Oxford University Press, 2005.

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