

Devon Schiller

Face, a Keyword Story

The Archiving Vocabulary for Facial Expression in the German

Imaginary from Printed Text to Digital Image

1 Introduction

There are many *Geschichte* [stories] about the human *Gesicht* [face] archived across the media imaginary of the German-speaking countries, between the art of physiognomy in the humorist medicine of the Age of Print, and the science of facial expression in the digital biometrics of today's Algorithmic Age. By "face story," I do not only describe the face by its phenotypical expressions, biologically specified and culturally universal, with their variability largely determined by display rules and social scripts. Rather, I define "face" as an explanatory concept, and in terms of *what* knowledge goes into *how* we experience our faces and the faces of others. The visible human *surface*, as an *idea* of self, is assembled through the world of face-to-face as well as mediated interactions, and plotted in agreement with societal attributes and social values (Goffman 5). In this sense, face is the product of scholarly discourse and socio-political discussion of "work." This face, that over-codes the proprioceptive body and even head, operates by an order of reasons as it is "deterritorialized" from the broader systems of the world, in a process of "facialization" from corporeal to calculus (Deleuze and Guattari 170–72).

I propose that across the most recent five centuries of what I define as "face studies," archival vocabularies—both inferential labels for making message-judgments, as well as keyword categories for storage, transmission and retrieval—play an essential role in the memory feedback of aesthetic-rhetorical artifacts into work practices and processes. Because of this, to semantically metasearch a seemingly-basic keyword as /facial expression/, and perform a cross-database or federated query that links word-organized archival content, can trace new and alternative histories for one of the most primordial resources for making meaning in the human experience. And not only may such a cross-cultural, intermedial, and trans-historical archival semantics demonstrate the extent to which "face concepts" stably fix or fluidly shift across the discursive conceptuality and localizing historicity of their mediation, but how the very "face question" itself is—and has always been—principally a *textual* way of thinking.

To prospect these propositions, I probe a digital thesaurus, and two digitized objects there archived, as well as the very archiving systems that are intermedially referenced or combined in the original making of these “face artifacts.” Towards this knowledge horizon, I adopt from the German-speaking countries that are here my focus, the vantages of *MedienKunstHistory* [Media-ArtHistories], *Bildwissenschaft* [Image Science], and the *Digitale Geisteswissenschaften* [Digital Humanities]. I also use a new Media Art Research Thesaurus. This online tool was developed between 2014 and 2016 in Austria, by the *Department für Bildwissenschaften* at *Donau-Universität Krems* [Department of Image Science at Danube University Krems], and with the support of *Die Fonds zur Förderung der wissenschaftlichen Forschung* [Austrian Science Fund, or FWF] (Grau et al. 1). By utilizing the Thesaurus, I perform a keyword metasearch across two semantically “bridged” archival domains. These domains are also designed, and their resources digitized, by the Department for Image Science. The first domain is the online *Graphische Sammlung Stift Göttweig* [Graphic Art Collection of Göttweig Abbey], or GSSG. With acquisitions recorded since 1612 at this Benedictine monastery, the GSSG today preserves over thirty thousand Renaissance and Baroque prints, and is one of the most voluminous private holdings of graphic works in Austria. The second domain is the Archive of Digital Art (ADA). Established in 1999 as the pioneering encyclopedia in the field of digital art (also known as media art or “new” media), ADA today represents user-generated content from hundreds of community members out of over five thousand peer-reviewed applicants, through an open access social web 2.0 platform.

Interoperably traversing these media imaginaries both “traditional” and “avant-garde,” the Media Art Research Thesaurus is a digital archival domain that supports a controlled semantic classification schema. With its computing platform, a TYPO3 content management system (CMS), Thesaurus keywording achieves metadata functionality. GSSG specialist archivists and ADA social archivers manually code this “data about data” onto information objects in graphical JPEG and MP4 as well as textual PDF formats. Thus, keyword metadata digitally annotate digitized artworks with a “shapeshifting text” (Maduro). By search query and social coding—through processual *usage*—these keywords newly-diagrammatize and re-narrativize the discursive interrelationships between those web-linked archival resources, and serve to expand accessibility, increase disseminability, and variegate contextuality (Ernst, *Digital Memory and the Archive* 27).

Within the technoarchive that is the Thesaurus, keywords are hierarchically organized as a “tree-like” taxonomy, whereby “branching” lexical units group from broad categorical generalities into narrow subcategorical specificities—much like class → instance, genus → species, and type → token. No

mere folksonomy with but a decentralized tagging assemblage, Thesaurus' keywords conform to a proprietary standardization. From a triadic "root" categorization that includes /Aesthetics/, /Subject/, and /Technology/, a select four hundred natural language keywords (and keyword phrases) codify art communities both old and new (Grau et al. 7).

To devise the Media Art Research Thesaurus, field experts qualitatively surveyed art historical indexes (such as the Getty Arts and Architecture Thesaurus, Iconclass, The Warburg Institute's Subject Index); as well as contemporary art glossaries (The Dictionnaire des Arts Médiatiques, GAMA, Daniel Langlois Foundation, Netzspannung); and even digital festivals as technology-catalytic forums (Ars Electronica, Inter-Society for the Electronic Arts, Transmediale).

For example, Iconclass, popular worldwide among cultural heritage institutions, began in the 1950s with Dutch art historian Henri van de Waal (1910–1972), and today is managed by the Rijksbureau voor Kunsthistorische Documentatie [Netherlands Institute for Art History], or RKD. Through a subject-specific alphanumeric notation (like the Dewey Decimal System), Iconclass classifies (3) /Human Being, Man in general/ → (32) /human types; peoples and nationalities/ → (32A) /human types/ → (32A6) /physiognomy/. The Ars Electronica Festival, whose Prix Ars Electronica and Golden Nica is to digital art what the Academy Award and The Oscar are to film industry, premiered on the 18th September 1979 in Linz, Austria, and today hosts thirty-five thousand visitors annually. Through its digital and print didactics, Ars Electronica increasingly catalogues artworks that incorporate /biometric/ technologies.

The Media Art Research Thesaurus, in order to "bridge" terminologies both historically established as well as contemporarily unstable (Grau et al. 2), encodes /Subject/ → /Body and Human/ → /physiognomy/, and /Technology/ → /Interface/ → /biometrics/. Etymologically-speaking, the word physiognomy (pronounced fizɪ'ɒ(g)nəmi) compounds a portmanteau from the Ancient Greek φύσις [*physis*] and γνῶμων [*gnōmōn*]. Most commonly, *Physis* translates as "form" or "works of nature," but without a direct English correlate. And *gnōmōn*, which relates to both γινῶσκω [*gignōskō*] "knowing" and γνῶσις [*gnōsis*] "knowledge," variously transcribes as "discern," "examine," "interpret," or "judge," simply a "mark," and most generally an "index." A *gnōmōn* was also the instrument of a sundial by which a cast shadow is measured. Alliterated together, *physis*+*gnōmōn* mean, roughly, "form interpreter" or "nature knowing." Biometrics amalgamates, with βίος [*bios*] as "life" and μέτρον [*mētron*] as "measure," into "life-measuring." This turns another cheek among the many faces of what I define as "face studies," a moving science or supradiscipline guided not by formal disciplinization but by media change. But both ide-

as about self, and the face (art)works by which they become conceptable to *Homo significans*, the Media Art Research Thesaurus semantically links with the keyword search /Subject/ → /Body and Human/ → /facial expression/. Through its metasearch function, the Thesaurus locates archival resources that are keywords tagged with /facial expression/ in narrative opposition to each other, and as items on a list that by their theoretical association can be relationally clustered (Manovich, *The Language of New Media* 212–232).



Fig. 1 (left). Johann Nepomuk Strixner. 1808–1815. “Master Study of Albrecht Dürer’s *The Four Apostles* (1826).” 46.9×17 cm. Lithograph printed with tint stone and white highlights. Printed in: Johann Nepomuk Strixner and Ferdinand Polity. 1808–1815. *Les Œuvres Lithographiques choix de dessins d’après les grands maîtres de toutes les Ecoles, tirées du Musée de S.M. le roi de Bavière par Strixner, Polity et Cie’*. Munich: Johann Baptists Stunz. Archived in Göttweig Abbey Graphic Print Collection. Digitized by Department of Image Science, Danube University Krems, Inv. Nu. Je_002 and Je_003. Used with permission.

Fig. 2 (right). Julius von Bismarck, Benjamin Maus, and Richard Wilhelmer. 2010. *Public Face* © Felix Rundel, courtesy of the artists.

With the keyword phrase /facial expression/ as my point of departure, and the correspondences and confictions between /physiognomy/ and /biometrics/ as my analytical space, I lexically link two privileged case studies: Johann Nepomuk Strixner’s 1808–1815 master study of Albrecht Dürer’s *Die vier Apostel* [*The Four Apostles*]; and Julius von Bismarck, Benjamin Maus, and Richard Whelmer’s 2008, 2010, and 2014 *Fühlometer* [*Feel-O-Meter*] or, as later titled, and as I refer to it, *Public Face* (fig. 1 and fig. 2). However, I do not archaeologically search for an origin in Strixner’s *Apostles* to Bismarck’s *Public Face* as having discrete affordances in an immobile history, but rather genealogically trace an

intermedial space between these face artifacts as having diverse subjectivizations in many confrontational histories. That is, instead of excavating a “straight line” for media evolution *from* traditional lithographic print *to* avant-garde digital media, I expose the “broken circles” of media entanglement *between* these art forms.

2 Archiving Face

2.1 In Search of Face

As I proof here, keyword categories can be helpful in the semantic meta-analysis of ideas about face, as well as the discursive contextualities and localizing historicities for these face concepts over the many faces of face studies these past three millennia. But such metadata—or “face data about face data”—is also processually and methodologically necessary in the very archiving action whereby scholars of the visible human surface make the facial expressions of emotion both noticeable and knowable.

With the archival *arché* or act, data “about face” can be stored, transmitted and retrieved so that it can be used again as information through the *ars memoriae* or memory feedback into work process (Ernst, “Archive in Transition” 475). Most broadly defined, a “face archive” is any place where facts “about face” get made (from the view of a subject-oriented anthropology), or a space where facts perform their possibilities (to an object-oriented ontology). In other words, researchers into facial expression utilize archives as operationalizing systems for the formation and transformation of statements about what the face *is*. And through archival practices and processes, they cause this multiplicity about what the face could be *here* in this discursive contextuality, or might be *then* at that localized historicity, to emerge as regular events to be manipulated and modified (Foucault, *The Archaeology of Knowledge* 147). Facts, as suggested by the word’s etymology—from the Medieval Latin *factum*, “an action or event, a thing done,” and Classical Latin *facere* [to do]—are indeed *artifacts* (Daston 680).

By the making of artifacts in an archive, a researcher into facial expression searches for facts about face and its 1) *schema*, 2) *image*, and 3) *affect* as holistically encompassed on a trichotomic continuum. The 1) *face schema* is the phenomenological first-person subjective experience of one’s own face or that of a close other, through its anatomical as well as neuroanatomical expression in motor neurons, cranial nerves, and facial muscles; perception in the fusiform face area of the visual system; and representation in the sensorimotor cortex of

the brain. The 2) *face image* is the epistemological second-person objective conceptualization of a face, by the descriptive observation of its muscular contraction mechanisms and skin appearance movements, as well as their measurement and classification into discrete units upon which can be based truth claims and validity tests. And 3) *face affect* is the hermeneutic third-person intersubjective interpretation of the face, with a critical exegesis of the folk, pop-cultural, or scientific knowledge (and its mediations) that, while perhaps beyond conscious awareness, effect attitudes, beliefs, or dispositions toward face (cf. Gallagher). Or, to put it naively, the central questions of face study remain: What is our sensorimotor experience of face? How do we consciously attend this experience? And to what extent is this experience mediated through sociopolitical languages?

2.2 The Face Collector

All scholars who research facial expression are also archivists—whether they are from the place where Gutenberg first innovated the printing press, or of this time, when technocrats invent automated frameworks. Most even personally testify to the processual essentiality of cultivating an archival practice. And they do so self-witness explicitly, in methodological exposé of their pictures, and the intellectual provenance of their writings (cf. Darwin 13–35; Ekman and Friesen 240–243). Some scholars of face are even characterized by their colleagues or companions as “born collectors” (Colombo 36; Gibson and Rafter 21–3), “gifted face readers” who spend many an hour immersed with meditations of facial expression (Tomkins xi; Gladwell), or experiencing some kind of some such “archival impulse” (cf. Foster 3).

In the search for face over the last half millennia, these face collectors have archived: the great masters of the visual arts remediated as etching, photograph, or today’s digitized image; aristocratic portraiture and emblemata; spontaneous candid photos found in a print shop or bookstore; mug shots and wanted posters; celebrities and politicians recorded off televised news or mass media; selfies web-scraped from the Internet; and scene extractions made with distributed smart camera. Such *found objects* are the “raw stuff”—the very artifacts and material of thought—in that which I call *face studies*. Of course, the archivization of materialities and imagings has long been held as a necessitated condition of knowledge production in both the “two cultures” of the sciences and humanities. But to the face collector, the archiving of such artifacts is more than an experiment result, proof instrument, argument narrativization, popular dissemination, or institutionalizing strategy. Further, artifacts of face constitute a singular immanence in both media-expression and image-content,

becoming *how* the face subject is transmitted in an object, as well as *what* the research work is about. Respectively, face archives may be purpose-built and pre-existent archives can be so temporarily purposed, either in history, or to historian—as I do here with the Media Art Research Thesaurus, and its semantic link between the Göttweig Graphic Collection and Archive of Digital Art.

Many face collectors, who for much of their lives search the folds, lines, and wrinkles of brow, cheek, and jaw, also spend years—sometimes decades—in the discovery, development, and dissemination of archival technologies. That is, beyond archiving some found objects about face, through the archive they also make their own face artifacts. For this, an archive, so named after the Greek ἀρχεῖον or *arkebeion* meaning “house” depends upon a technological apparatus—cabinet or collection, library or museum, anthology or index, exhibition or workshop, laboratory or studio, database or dataset, or an online platform for the digital or digitized.

Indeed, each and every face collector, whether they are a self-professed artist or scientist, or partitioned so by society, also personally testifies to an art-based research, training in the arts, or that they themselves are artists. Never in Western media culture—at least not since around 500 BCE when the physiognomist Zopyros diagnosed from a portrait that the philosopher Socrates be possessed “of many vices”—has there been a face archive not theoretically as well as practically located at the very intersection of art and science.

Really, when it comes down to a question about face, most analytic judgments of archivization are likewise an aesthetic judgment of intermeditation. This term—*intermedia*—has wide articulation in German image science and art histories since the 1990s. After the Latin prefix *inter* for “among, between, or during,” its first usage by romantic poet Samuel Taylor Coleridge in 1818, further popularization came from Fluxus “anti-art” artist Dick Higgins in 1966, with its framework beholden to the intertextuality of literary semiotician Julia Kristeva from the 1960s–70s. And the intermedial relation *per se* has been acknowledged since antiquity.

By retrospectively applying this media philosophy, I suggest that the face archive is not solely a space in which are housed *mixed-* or *multi-media*, and where the materials of various established art forms are “brought together” and merely juxtaposed (Clüver 14, 43); the *remediated*, where pre-existing media are appropriated, refashioned, or simulated (Bolter and Grusin); or the *trans-medial*, where certain motifs appear across all the various media specificities of its artifacts, and so in turn emanate a “trans-archival aesthetic” (Ernst, “Archive in Transition” 475). Rather, the face archive is *intermedial*, and ontologically a *betweenness*. Almost “as if” or “as like” a performative stage (Krtilová 37–45), here an assemblage or network of media and all their affordances, specificities, and technologies exist in process of becoming. Towards an empir-

ical horizon of “*Medienerkenntnis*” [media recognition] (Krämer 82), face collectors search for the face in the media by understanding these media in relation to other media with their respective processes of socio-cultural production.

2.3 Evidencing Face

The face collector, harnessing the new or newest media for its past perfect promise to re-determine present knowledge (Gates 8–10), probes the totality of extant material cultures: historical diachronic or contemporary synchronic, found objects and made artifacts. To make facts about face is dependent upon the indexing of observed facial expression data, from which hypothesized facial content information can be retrieved. This is achieved, principally, using artifacts made within archives—whether lab or studio, dataset or exhibition. Here, a “proofing of thingyness” or “trial of things” takes place. That is, to carry such metaphor, the archive becomes like a courtroom in which a judiciary of artist-scientists examine and cross-examine the artifacts through a scientific methodology. And it is an apt metaphor, because for the face researcher—whatever their discipline—there is usually a perceptual bias or methodological empathy: all facial signs are presumed to be meaningful until proven otherwise.

Faces most afford evidence as “something becoming apparent as something” (Siegmond qtd. in Krüger 14) when somebody fixes them into something plastic. Through such artifaction, and in Classical rhetoric called a *demonstratio ad oculos* [demonstration by the eye] (Russell VI.ii.32), past *formings* of the face are transcribed into present *formations* of *faceeness*. In the search for face, those scholars who research facial expression have, for instance, pictorially and textually diarized the facial behaviors of their own children during maturation from infancy to adolescence; they have used mirrors both analogue and digital to train facial expressiveness on their own faces through voluntarily muscle. In these ways, *making faces* within the archival space, experiential occurrences of *this* or *that* “living” facial event—both artificially staged and naturally spontaneous, both static and in real-time—are translated into so many “plastic” face artifacts to be qualified or quantified.

When studying facial expressions as so-called averbal or nonverbal components of communication that paralinguistically coordinate within social interaction and spoken language, the procedural reason for needing artifacts is simple: in order to objectivize the face, more than one face must already be observable. This instance of comparison could be the face in the mirror, or the faces in an “electronic mugbook.” But, to perform such artifaction, the new or newest media is most commonly used, be it a drawn sketch, woodcut print,

written manuscript, printed book, photographic plate, motion picture, videotape, data matrix, digital image, digital text, or algorithmic and automated framework. Media such as painting or sculpture may also be harnessed in face research, but are so less frequently. Although media specificities fluctuate over the two millennia of the face project, media affordances fixate as consistency, economy, legibility, portability, reproducibility, and usability. But only when an artifact of face is archived into a constellation, whether assemblage or series, does it become the ἐνάργεια [*enargeia*] of evidence or an illustration. Then, artifacts might evoke an immediate witness to facts, and with such immersive vividness that the spectator has the impression of looking “at the very thing itself” in all its circumstance and consequence (Clark IV.liv.68).

As considered from the view of German-speaking *Bildwissenschaft* [Image Science], a vantage cultivated in the rhetoric of Antiquity, this *evidenz* involves a “pictorial-performative procedure” (Krüger 16) between the artifact that *shows*, its content that is *seeable*, and the experience of *seeing*, in trilateral reciprocity (Halbfass 830). As this evidence becomes cognizable (or, more accurately, recognizable) through the production of an artifact, facts can then be made via aesthetic judgments. That is, “the media is the method”—to frame this evidentiary procedure in the language of visual studies, the Anglo-American counterpart to the German *Bildwissenschaft* (cf. McLuhan and Fiore). As the face collector through their face archive makes some face artifacts, it is by the physical signifiers or sign vehicles of these objects—their material or materiality, their *medium*—that information about face is conveyed. But such mediation does not only instantiate statements about what the face *is*, *can* or *may* be, and structurally formalize these truth claims, but also methodizes the creative hypothesizing and visual thinking of work processes.

2.4 Naming Faces

This “physiognomic genre,” as I call it, can be classified by a picture plane that isolates face from head and body, balanced lighting with even illumination and contrast emphasis, chronological and typological sequencing of multiple images, and alphanumeric code as image metadata—among other stylistic elements. And these aesthetic characteristics are relatively constant between corporeal, graphic, and textual informative mediations, as well as kinesthetic, ocular, and auditory sensory modalities. Of course, there is no *a priori* diagrammatic logic behind why verbal linguistic phonemes should make transparent averbal morphologic corpemes. Yet, “words about face” have since the physiognomists of old been used in face studies to make facts about face.

Within the causal conditional that *if* there is *this* physiological form /smile/, *then* there must also be *that* psychological function /happiness/, the letters /s/, /m/, /i/, /l/, and /e/ do not simply correspond to forming “features into a pleased, kind, or amused expression” (OED). The /-/ of the /l/ and the /./ of the /i/ are not morphologically equivalent to the *zygomatic major* pulling upwards the /lip corners/ and *orbicularis oculi* gathering laterally the /eye folds/. Only by conventional law does such a “real” facial expression connect with the visual pattern of the word /smile/ rather than, say, the word /frown/. The size or style of the typography in which /smile/ is written do not necessary decrease or increase with changes in the intensity of a facial expression. And the keyword category /happiness/ could still convey the same meaning about face if called by any other name (/Supercalifragilisticexpialidocious/ might work pretty much just as well). Even languages themselves differ in their labeling of emotions or temperaments. In German, for example, /*gemütlich*/ [cozy], /*scha-denfreude*/ [happy about the pain of another], /*mitgeföhl*/ [empathy with the feeling of another], /*trauring*/ [funerary grief], and /*glücklich*/ [happy and lucky] have no exact correlate in English.

Which keyword terms or phrases are used to describe a certain facial expression of emotion—whether the humorist temperament /sanguine/ or the basic emotion /happiness/—are contingent upon a kind of paradigmatic “face of the age”; that is, the leading explanatory system for measuring facial sign-vehicles, as well as for evidentiary interpretation of the face’s message-judgments. With face studies, the interest has always been more in valuating inferential labels than typologizing inferential units. A particular face story at its time of narration is assimilated into such interpreting encyclopedias as those about atavism, criminality, deception, emotion, ethnicity, gender, intelligence, or leadership. And the facial expressions of emotion distinguished and defined by keyword categories are ontologically neither actual nor possible, but rather linked to such socio-cultural codes about facial sign meaning.

3 A Tale of Two Archivings: The Göttweig Abbey Graphic Art Collection

3.1 The Face Story by Johann Nepomuk Strixner

To problematize how keyword vocabularies feed artifacts of face back into the practices and processes of face work, as well as the extent to which an archival semantics presents a given face concept to be fixedly stable or fluidly shifting across the many faces of what I define as face studies, I probe the Media Art

Research Thesaurus developed by the Department of Image Science at Danube University. By performing the keyword search from the category /Subject/ → to subcategory /Body and Human/ → and its sub-subcategory /facial expression/, I semantically retrieve from both the *Graphische Sammlung Stift Göttweig* (GSSG) and the Archive of Digital Art (ADA) numerous artifacts in which facial expressions that have been plasticized in pigment, print, or pixel appear—either in history, or to historian—to wear the mask of a scientific calculus about face. These include a face story by engraver and lithographer Johann Nepomuk Strixner (1782–1855), stored within the *Graphische Sammlung Stift Göttweig* [the German for what in English is known as the Graphic Art Collection of Göttweig Abbey] in Niederösterreich [Lower Austria], an UNESCO World Heritage Site since 2001, and digitized into their online archive. Strixner is little remembered by art history, save for the odd institutional record or reference entry. Even at *Stift Göttweig*, directing curator of the *Graphische Kabinett* [Graphical Cabinet] Gregor Martin Lechner, a theological art historian and indoctrinated priest, catalogues no biography for this 19th century *stecher* [engraver]. The keyword-based metasearch, however, that locates Strixner’s work in narrative opposition to today’s art, can well illuminate histories alternately and newly contextualize.

Because Strixner’s life is but a footnote to art history, some biographic information is necessary to contextualize his history with the artifaction of face. Strixner began studying the arts at fifteen, before apprenticing to Hermann Joseph Mitterer in Munich at his *Feiertagsschule München* [Holiday School] for applied vocational training. At the time, Munich was growing as a centrum of technological modernization in printing methods, as well as for venturesome enterprise in lithographic mediations. Like many draftsmen, Strixner found employment with Johann Alois Senefelder, the former lawyer and sometime poet who in 1798 invented λίθος [*lithos*, stone] γραφειν [*graphein*, to write]. To promote lithography, and its market for art reproduction, Senefelder and Strixner collaborated in 1808 to intermedially transpose Albrecht Dürer’s *Christlich-Mythologische Handzeichnungen* [*Christian Mythological Drawings*]. As Senefelder himself later accounted, this memorial to Dürer “fixed the reputation of our establishment” (62)—as it did that of Strixner as well, and brought the young artist one etching-stylus closer to make an archive of his very own face.

In 1808, Strixner matriculated to the *Akademie der Bildenden Künste München* [Munich Academy of Fine Arts]. After graduation, he received a consignment to intermediate the *Alte Meister* [Old Masters] exhibited at the *Bayerische Staatsgemäldesammlungen* [Bavarian State Painting Collection]. Among its many homages to all thingynesses Germanic, the 423 print series included Johann Strixner’s lithographic master study of Albrecht Dürer’s oil painted artwork *Die vier Apostel* (the authentic German title for what the English-speaking world

knows as *The Four Apostles*). That Strixner had witnessed the original proves his first contact with the face concept of the four humors.

The Göttweig Abbey Collection acquired Strixner and Polity's *Lithographiques*, and within it Strixner's *The Four Apostles*, not long after its publication in the early 19th century. One hundred years earlier, art conservationist, diplomat, and patron Abbot (1714–1719) Johann Franz (Gottfried) Bessel had sponsored the protocols that systematically augmented the Collection. In a project developed between 2002 and 2012, Danube University digitized the lithographic master study along with more than 6000 other graphic works. In the Department's Digitization Center, a Digit Repro Master, which combined an English Linhof M679cc digital camera, German Anagramm scanback, and flicker-free fluorescent bulbs, afforded 8000×9700 pixel resolution, 16-bit color depth per channel, and uniform lighting. With this new such digital materiality, Strixner's *Apostles* could be “virtually” exhibitable and online indexed (Grau and Coones iv). Within the GSSG online database, with an ImageFinder/DocuMax content management system as Internet platform, the two panels of *The Four Apostles* from Strixner's *Les Œuvres Lithographiques* are code-named “Je_002” and “Je_003.” Keyword metadata encodes data fields about this face artifact, such as *stecher* [engraver] /Strixner/, *inventor* [inventor] /Dürer/, [genre] /*Heiligendarstellung*/ [Holy Representation], *Ikönographie* [iconography] /*Neues Testament*/ [New Testament], and *Technik* [technique] /*Lithographie*/ [lithography]. “Metadata teams”—the “unsung heroes of digitization,” according to The Getty Museum's first-ever digital media architect, Chris Edwards—create this digital surrogacy of original artifacts, for which a record without image is more highly evaluated than image without record (Stephan 2). Yet, among this metadata for *The Four Apostles* by Strixner there is no textual cipher to /facial expression/ for this saintly tetrad.

3.2 Humorous Faces

As an archival resource worthy of the keywording /facial expression/, Strixner in his lithographic master study of 1808–1815, succeeding Dürer in his painting *Four Apostles* of 1526, intermedially referenced the art of /physiognomy/, as theory behind—and method within—the medicine of the humors (or humors).

Of course, in the Media Art Research Thesaurus, such a paradigmatic dimension is implicitly imagined within the image grid of its metadata visualization (Manovich, *The Language of New Media* 212–232). That is, because when using the Thesaurus, a keyword search /Subject/ → /Body and Human/ → /facial expression/ retrieves Strixner's apostles from its Web storage, and digi-

tally transmits it to the user's device, this work seems to be authoritatively connected with such meaning. Certainly though, I would not (and did not) take the keyword's word for it—or, more correctly, the keyword coder's. Instead, from the archival record's primary endodata within itself (such as, on the GSSG, front matter, image annotations, printing institution, etc.), I web-linked down the Internet “rabbit hole” to this archival record's secondary epidata framing it—artist biographies, critical reviews or library catalogues (cf. Genette 344–351). A single keyword as metadata, transcribed between porous zones of private backend datafication and public frontend discursivity can make present many keyword textualities (and some “link deaths”) by which users may navigate through algorithmic thresholds of interpretation *ad infinitum*.

Johann Neudörffer (1497–1563), a professional Nurembergian calligrapher, was the first to notice a “physiognomy-saint connection.” Himself working on *Apostles*, Neudörffer inscribed the Lutheran epistles at the base of the oil on linden wood panels (215×76cm). And in the mid-16th century, memorializing Dürer in a series of short biographies on Nuremberg artists, Neudörffer vouched how the “pictures in oils” represented “properly speaking, a sanguine, a choleric, a phlegmatic, and a melancholic” humorist prototype (qtd. in Panofsky 234–235). To eponymous Dürerian biographer Erwin Panofsky (1892–1968), “it is impossible to discard this statement of a man” who conversed and collaborated with Dürer in the master artist's own workshop. With other art historians (Pfeiffer 390), however, this primary source ego-document contains no conclusive evidence that Neudörffer credibly witnessed Dürer “say” and not only “show” it.

Regarding Albrecht Dürer's *The Four Apostles* (1526), Erwin Panofsky's *The Life and Art of Albrecht Dürer*, first published in 1943, recognized: 1) *iconographical* motifs (iconic), where the “indexes of age and complexion” and “hierarchy of [color] values” of the saintly faces, have a likeness or community in some quality with already more than one face of their humorist type; 2) *iconography* themes (indexical), where the “*maxima*, or *optima*” apostolic visages with most “dominant” scale and foreground arrangement, correspond in fact to literatures on humorist pathology and physiognomic deduction regarding the “no-blest humours [sic]”; and 3) *iconology* intrinsic meanings (symbolic), where the four apostles gain imputed qualities from “Dürer's period and by Dürer himself” when related to the socio-cultural conventions, habits or laws of the early modern period (235).

This humorist pathology, while a “theory of everything” (Kemp 15), is also a face concept in which the human visage is comprehended to be a microcosm of the natural world, and the very embodiment of all the universe's physics and forces in equilibrium or imbalance. Humorism persevered extant from the dietetic principles of classical antiquity, and texts by Empedocles of Acra-

gas (c. 495–425 BCE), Hippocrates of Cos (c. 460–370 BCE), and Galen of Pergamum (c. 130–210 CE); to the diagnostic practices of the medieval and early modern periods, through Dürer’s time, beyond Strixner’s; and well into the 20th century with its technosocial accelerationism of psychometric taxonomies.

With this holistic model for face in humorist medicine, the physician, as well as the physiognomist, described the *kraseis* [Latin for mixtures] of matter—the material, or even the media (cf. Belting)—or for the human *temperare* [temperament]. In so doing, they identified well-mixed or poor-balanced functions, and evaluated these as the first cause of either good or bad health and character (Leunissen 22). Through this “four roots of all” numerological philosophy, physician and physiognomist alike diagrammed personhood into informational categories (fluid, organ, element, season, entity, celestial, life cycle, astrological aspect, quality) within a tetradic taxonomy of human types: sanguine (blood, liver, air, spring, sky, morning, youth, Jupiter, hot-moist), choleric (yellow bile, spleen, fire, summer, sun, midday, maturity, Mars, hot-dry), melancholic (black bile, gall bladder, earth, autumn, earth, evening, later middle age, Saturn, cold-dry), or phlegmatic (phlegm, lungs, water, winter, night, old age, Venus, cold-moist).

But physicians diagnosed from the external *symptomata* [symptoms] of the body, to the internal diseases of a patient, so as to provide a prognosis and prescribe a treatment. Physiognomists, however, deduced from the *outside* physiological behavior or *semeia* [signs] of the face to the psychological phenomena *inside* of an individual, so as to operationalize the self *inside out* into these universal or utilitarian attributes.

3.3 See Your Face in this Painting as in a Text

To Dürer, however, the *techne* (Latin from the Greek τέχνη, or art) of *technitai* (practitioners of this art) in physiognomy was no mere particulate amidst a generalized early modern and Northern Renaissance “atmosphere of face” or “facial ethos”—as even Panofsky only traced (260–275). Rather, Dürer navigated the German media landscape that he inhabited in such a way as to intermedially reference particular face archives, and feedback through the *ars memoriae* the facts about face therein plasticized into his work process.

At the very space and time Dürer painted *The Four Apostles*, printers were beginning to publish material about physiognomy in anthologies, books, encyclopedia, and pamphlets (Porter 108). As with Strixner’s Munich at the turn of the 19th century, because of Senefelder’s lithography, Dürer’s Nuremberg at

the turn of the 16th century, because of Gutenberg's innovation, sustained rapid economic growth to its print industry (Pettegree 36, 40, 93–94).

It can be stated with enough probability as to perhaps be a fact, that Dürer's *Four Apostles* intermedially referenced Desiderius Erasmus' face artifacts. Erasmus of Rotterdam (c.1466–1546), a Dutch Catholic priest and sobriquetical “Crowning Glory of the Christian Humanists,” was a longtime acquaintance of the master artist. In 1520, six years before *Apostles*, Erasmus sat twice with Dürer for a portrait. And when Dürer passed on the 6th of April 1528, Erasmus praised him as an artist who “even depicts what cannot be depicted ... characters and emotions; in fine, the whole mind of man as it reflects itself in the behavior of the body” (qtd. in Panofsky 44). Much of this accolade, Erasmus appropriated from *Naturalis Historia* (c. 77 CE), in which Pliny the Elder praised Apelles of Kos for painting “such perfect likenesses that ... a physiognomist, or *metōposkopos* as [the Romans] call them, was able to tell from the portraits alone how long the sitter had to live or had already lived” (qtd. in Elsner 203). That is, by using the keyword /physiognomist/, and keyword phrases for the logical inference from /physical behavior/ to /psychological phenomena/, the author Erasmus explicitly extolled the artist Dürer to be a scientist of face.

Actually, Erasmus authored ideas about face throughout his ample oeuvre. In 1511, Erasmus first published in Latin his *Moriae Encomium* (or *In Praise of Folly*), translated into German just a few years before Dürer began *Four Apostles*. There, Erasmus satirized the civil stratosphere of statesmen who “haue two faces muche vnylike and dissemblable,” aristocrats with “faces lyke visers,” and churchmen who “did but ones loke [wisdom] in [hir] face” (Knight). Through his protagonist-narrator, Folly, “distributrix and dealer of all felicitie,” Erasmus parodied: “if any man, mistaking [Folie] for Wisdom, could not at first sight convince himself by my face, the true index of my mind?” . . . “[N]or do I carry one thing in my looks and another in my breast,” his Folly said, for “I am no Counterfeit.” This German keyword, *Kontrafactur* [counterfeit] even came to categorize a poetic genre of mimetic imitation purposed to parodiably inspection. Proclaiming the human visage first among “parts of the body are named honest, that endengre gods, and men,” Erasmus stated—and Folly narrated—that the signs of face are “no lying myrrour of the minds disposition.”

Along with the textual representation of Erasmus' *Folly*, German portraitist Hans Holbein the Younger (c.1497–1543) graphically represented *Folly* as a “fool” mirror-gazing upon a theatrical prop cast in her own likeness, a “true index” of self-transparency, reflection, and knowledge (fig. 3 and fig. 4).

Holbein only illustrated one first edition of Erasmus' *Folly* with these pen and ink sketches, a copy owned by Protestant theologian Oswald Myconius.

But other image-makers over the centuries remediated this physiognomic protocol across innumerable text editions, inspiring the symbolic *topos* of “the fool and the mirror” as an onto-cartographic blueprint.



Fig. 3. and Fig. 4. Hans Holbein. 1515. “A fool considers himself in a mirror.” Feather pen with brown ink, 22.3×16 cm. In: Erasmus of Rotterdam, *Encomium Moriae*. Copy belonging to Johann Froben, Basel, Switzerland, Inv. No. 1622.166.29 1662.166.13 fol. E 2 verso and fol. K 4 verso and. Photo © Kunstmuseum Basel/ Martin P. Bühler. Used with permission.

Of course, *Folly's* most stereotypical *formulae* or *topos* (Huhtamo 34), “the face and the mirror,” can be seen in ontological cartographies that have endured since classical antiquity in physiognomic thought and material culture, as with maps for being like Narcissus, Prudence, and Venus. By Dürer’s day, many books about face even called for personal or communal reading with the aid of a looking glass, as did popular physiognomic games and prayers (Porter 280)—a kind of “choose your own [face] adventure” or “do it [the facial expression] yourself” combinatorial narrativization. And prefaces to physiognomic texts, such as “Of this said booke make oft a looking glas” (Manzalaoui 275), often served to restate the Augustinian rule “that you may see yourself in this little book *as in a mirror*” (Bradley 100–105).

3.4 Textualizing Face

But Dürer intermedially referenced other face archives and the artifacts therein housed as well. On the 7th of May 1522, one year before Dürer composed preparatory drawings for his *Apostles* (Panofsky 230–231), and four years before he completed the painting, Strasburg printer Johann Schott published in Latin the first-ever printed treatise with an entire chapter “periaxiomatibus de faciebus signorum” [about the value of facial signs] to be illustrated with a face archive of individual case studies (Porter 157). German reformist priest and consulting astrologer Johannes de Indagine (1456–1537) authored an introduc-

tion to physiognomy. Hans “Grien” Baldung (c. 1484–1545), Dürer’s very own apprentice, carved the woodcut prints to interlay the “modern” humanistic type (fig. 5 and fig. 6).



Fig. 5. and Fig. 6. Hans Baldung. 1522. Woodcut. In Johannes de Indagine, *Introductiones apotelesmaticae elegantes in Chyromantiam, Physiognomiam, Astrologiam naturalem, Complexiones hominum, Naturas planetarum*. Universitätsbibliothek Basel, DA III 21. Used with permission.

With his introduction to physiognomy, Indagine pursued the paramount objective of the face project: to “beholde the whole bodye, with the lyneamentes, and proporcion of the same, whiche is called his Phisiognomie,” and by so doing make visible “the inward motion and affections of the mide and heart” (Withers 1575). As with most Renaissance face scholars, Indagine translated accepted truths into astute observations, justifying this with the classical writings of ancient Greece and Rome (Porter 199). Indagine even claimed that one physiognomic aphorism “confirms the Old Proverb, *Animi mores corporis temperamentum sequuntur*; the disposition of the soul follows the temperament of the body” (1557).

Indagine’s “Physiognomiam” sections co-localized both spatially and temporally with Baldung’s twenty-two faces in eleven woodcuts. Both textual subject and graphical predicate, adjacent each other on the printed page, communicated information about the same referent object: a facial *aliquid* [something] that *stat pro* [stands for] the psychic *aliquo* [something] that emanates it—much like how smoke *stood for* the fire that produced it in the third century BCE Hellenistic Stoics definition of σημεῖον (*semeion* or sign). For example, through the face archive of *Introductiones Apotelesmaticae*, Indagine composed statements of fact such as “the face of them that be very cleane, is meane in the cheeks, and temples & somewhat fat. And that face is a true face, louing and not disdainful. The mery face commeth of a mery heart, and so the contrary” (qtd. in Porter 199). This semantic network intermedially referenced Galen’s in *De Locis Affectis*, that sanguine “heat” makes “a man tall ... soft, fair and fat”, as Dürer’s

oil pigments in *Vier Apostel*, that St. Paul by his physiognomic visage is of sanguine temperament.

As Indagine and Baldung's book about face met with wide acclaim across Europe, the number of woodcut physiognomies increased from eleven woodcuts with twenty-two faces in the Latin folio of 1522, to an unprecedented forty-five faces for the Dutch translation of 1536. Some faces added are identical as regards their physiognomic signs (fig. 7 and fig. 8) to those in Dürer's *The Four Apostles* (Panofsky 230–231). This may suggest that Baldung and his physiognomic treatise informed Dürer's painting. Or perhaps the master's painting became a face artifact in the face archive of *Introductiones*, which would be standard curricula in the study of face for nearly two centuries.



Fig. 7 (left). Joannis Indaginis. 1536, 10 February. *Introductiones apotelesmaticae elegantes in chyromantiam, physiognomiam, astrologiam naturalem, complexiones hominum, naturas planetarum* (detail). Etchings by Hans Baldung. Printed by Jan Berntsz in Dutch. Utrecht. Universiteitsbibliotheek Utrecht, R fol 456 (Rariora).

Fig. 8 (right). Albrecht Dürer. 1526. *Die vier Apostel* (detail). Each panel 215×76 cm. Oil on lindenwood. Munich: Alte Pinakothek. Open source.

3.5 In the Name of the Face

In addition to a master study of *The Four Apostles* (1526), Johann Nepomuk Strixner and Ferdinand Polity's *Les Oeuvres Lithographiques* (1808–1815) also contained Polity's intermedial transposition of Dürer's *Self-Portrait* (1500) (fig. 9, left). Almost certainly, Strixner proposed the inclusion. While still a student, he had similarly—if less skillfully—imitated (fig. 10, center) the Great Master's

visage in *Christlich-Mythologische* (1808). The positive reviews for Strixner and Polity's *Lithographiques* were, at least in part, by virtue of the prevailing nostalgia for Dürerian prestige in the German-speaking socio-cultural imaginary. Three centuries later, a printing of this stone lithograph with white highlights is stored in a file drawer of the Göttweig Abbey Graphic Print Collection (GSSG). It is retrievable as a digitized image from the GSSG online. And it is transmitted to users of the Media Art Research Thesaurus via the keyword search /Subject/ → /Body and Human/ → /facial expression/ (among other possible search paths). As such, on the Thesaurus, Polity's lithographic master-study of Dürer's painted self-portrait also semantically links to my privileged case studies: Strixner's *Four Apostles* as well as Bismarck's *Public Face*.



Fig. 9. (left) Ferdinand Polity I. 1810–1816. *Albertus Durerus Noricus*. Lithograph printed with tint stone and with white highlights. 46×38cm. In Johann Nepomuk Strixner and Ferdinand Polity. 1810–1816. *Les oeuvres lithographiques*. The British Museum. CC BY-NC-SA 4.0.

Fig. 10. (center) Johann Nepomuk Strixner. 1808. *Albrecht Dürer*. Lithographic print. In Johann Alois Senefelder. 1808. *Albrecht Dürer's Christlich-Mythologische Handzeichnungen*. London: The British Museum, U.1171. CC BY-NC-SA 4.0.

Fig. 11. (right) Albrecht Dürer. 1500. *Self-Portrait*. Oil on wood panel. 66.3×49 cm. Munich: Alte Pinakothek. Public domain.

The face artifact of Dürer's visage (fig. 11, right), as in Strixner and Polity's *Les Oeuvres Lithographiques*, even appeared within the physiognomic literary tradition. Ludwig Tieck (1773–1853), for example, *Sturm und Drang* novelist and Strixner's contemporary, textualized physiognomics in his 1798 *Franz Sternbalds Wanderungen: Eine Altdeutsche Geschichte* [Franz Sternbalds Hiking: An Old German History]. In the novel, the fictional protagonist, twenty-two year old apprentice Franz, one sunny day turned his physiognomic gaze upon his master Dürer's visage. And *Franz bemerkte deutlich, wie die Umrisse von Alberts Gesichte*

denen auffallend glichen, mit denen man oft den Erlöser der Welt zu malen pfeget [Franz could distinctly see how the contours of Albrecht's face were strikingly similar to those with which painters usually depict our Saviour] (qtd. in Tytler 160). Of course, in his self-portrait, Dürer styled his face deliberately like a Christ the Anointed. And Tieck, as a virtual reader narrativizing for the real readers, described the face of Dürer from its facial sign-vehicles to his own moral message-judgments, as in: the terminology "*edlen Stirn hervor*" [fine forehead]; the qualified adjectival phrase about eyes looking "*feurig aber sanft*" [piercingly, yet gently]; and the "*Umrisse*" [contours] of Dürer's face that he is "*den Erlöser der Welt*" [the Redeemer of the World] (Tytler 160).

Tieck published this textual portrait of an artist as a young man coming-of-age while navigating Enlightenment and proto-Romantic themes of affect, individualism, and nature, a decade before Strixner and Polity realized their own Dürer portraits. The emergent artists were ages sixteen and twelve respectively, no doubt aspired to paint like the Master, and most likely read the historical fiction. Thus *Franz Sternbalds Wanderungen*, which popularized face science, motivated the use of Dürer's face in *Les Oeuvres Lithographiques*. So inspired, Strixner's encyclopedic archive thereby enclosed an idea of Dürer's individual physiology as an ideal of Germany's collective psychology.

But Dürerian face artifice was made famous just thirty years before Strixner and Polity's *Lithographiques*, when Swiss Pietist minister Johann Kaspar Lavater (1741–1801) published the *Physiognomisches Fragmente zur Beförderung dere Menschenkenntniß und Menschenliebe* [Physiognomic Fragments: For the Promotion of Human Understanding and Human Love] (1775–1778). These four-volumes, themselves a "living" or participatory archive, set off a till then unparalleled—if not unprecedented—*Raseri der Physiognomik* [physiognomic frenzy] (Lichtenberg). Subscribing readers' submitted portraits, which Lavater intermedially combined into lithographic emblemata, inscribed with his own personalized hand-written "face readings," and included within a future edition (Rauchensteiner and Swoboda 112). These silhouetted profiles became highly regarded in German civil society, as they offered prominent aristocrats a valuable celebrity based on facial recognition or recognizability (Gray xxxii).

For this printed treatise, the first in Germany to be disseminated by subscription, Lavater made the face artifact of "a boldly sketched portrait of Albert Dürer" into a factual statement for "the universality of physiognomical sensation" (Lavater 47). After Dürer, Lavater claimed that the "original language of Nature, written on the face of Man" would one day "certainly become a science definable in mathematical terms" (Lavater qtd. in Gray 5). And today, the website header for the *Die Pinakotheken* homepage is none other than Dürer's portrait of his own face.

3.6 Keywording the Face by Dürer

Yet, in the over two centuries since Lavater's *Physiognomisches Fragmente*, the keyword descriptions for Dürer's *The Four Apostles* are still dominated by a traditional art historical vocabulary. These keywords have led to a lastingly impact on its face artifacts' metadata coding as an information object, and informed both platform domain indexing and user community retrieval of its many digitized iterations—even of Strixner's lithographic study.

At the Google Search level of entry into the information ecosystem of the Internet, a brief survey of results links the lexical units most frequently annotated, coded, or tagged to */Albrecht Dürer The Four Apostles/*. Reading between electronic commerce and personal blogs of the first 30,500 hits, an English Wikipedia article connects Hex #0645AD blue hyperlinks to pages about the artwork's medium */panel painting/* on wood with oil paint; the German */Renaissance/* mastered by Dürer; Bavarian */Elector Maximilian I/* who acquired the painting for */Munich/* in 1627; */Nuremberg/* where Dürer was born and practiced his art; as well as the */Four Temperaments/* of humorist medicine.

And on the German page of *Die freie Enzyklopädie* article, linked contributions include those about */diptychon/* and the */Lutherbibel/*; the particularized four apostles */Johannes/*, */Petrus/*, */Markus/*, and */Paulus/*; and their associated */sanguiniker/*, */phlegmatiker/*, */choliker/*, and */Melancholiker/* humors. WikiArt tags the artwork with the style */Northern Renaissance/*, genre */religious painting/*, as well as with */Christianity/* and */Saints-and-Apostles/* themes. And a search result for *Gardner's Art Through the Ages*, an American textbook first published in 1926, now in its 15th edition, and standard curriculum to many art history 101 courses, links to a digitized edition on Google Books, where the user is directed to a thematic inset */Luther and the Reformation/* (Kleiner 630).

With a reading of a less generalist and more specialized direction, like keywords also code the *Die Pinakotheken* [Picture Galleries] of the Bavarian State Picture Collection in Munich, where Dürer's original *Vier Apostel* [*Four Apostles*] (Inv. Nr. 545) today is displayed for past remembrance or future erudition, and is digitized for online visitors. The website frontend enables no keyword search engine functionality. And the website backend inspects navigational coding rather than keyword metadata. Yet, programmed keywords within a word layout descriptive paragraph, highlight for virtual readers "sich eine schmale Inschriftenleiste, die Bestandteil des Bildes ist" [the narrow inscription strip, which is part of the picture], and the Lutheran "*Warnung*" [warning] Dürer—with Neudörffer's calligraphy—there addressed to the Nuremberg City Council, that the "*weltlichen regenten*" [secular regents] ought respect the "word"

of the Bible and beware of religious “*falschen Propheten*” [false prophets]. These keywords are, word for word, after Panofsky (233).

Such a challenge to classification is even apparent in the keyword categories of archive catalogues. Since the 13th century, European libraries collected physiognomic treatises, and by the late Middle Ages university curricula educated physiognomic thought. For instance, in the mid-15th century, statutes of the Albert-Ludwigs-Universität Freiburg [University of Freiburg] in Breisgau, Germany, prescribed the reading of physiognomy (Porter 75). Yet, the early modern librarian might well catalogue “books about face” under such keyworded categories as /astrology/, /Chiromancy and Geomancy/, /Logic and Dialectic/, /Medicine/, /Metaphysique/, /Morale /, /moral treatises on the Virtues and vices/, /Oracles, dreams and hermetic philosophy and magic/, /philosophy/, /Physics and Natural History/, or /Sciences and Arts (Astronomy and Cosmos)/ (Porter 115–116).

By the early 21st century, there have been many faces to what I define as “face studies” as a documented field of inquiry: anthropometry, biometrics, characterology, craniology, humorist medicine, non-verbal communication, pathognomy, phrenology, physiognomy, and the science of facial expression. Even so, there is a continuing absence of a comprehensive presence in disciplinary identity for the diverse researches into knowledge by the visage. In fact, only I here have introduced the keyword phrase /face studies/ with a first usage. Such a lack of coherence causes both an *intradisciplinary* problem, whereby face scholars have difficulty integrating their idea(s) of face within the rhizomatic network of information communities, as well as an *interdisciplinary* problem, wherein face concepts and methods become difficult to exchange across academic arenas.

Indeed, since classical antiquity, individual “authors of face” invent largely *ex novo* their own idiosyncratic face concept and method, in a perpetual “reinvention of the wheel”—or “reinvention of how to best describe the mouth corners and eyebrows, and determine their meaning.” Altogether, the presence of an absence in shared keywords about face both within and across disciplines, significantly constrains artistic, scientific, and technologic creatives in making a robust and sustainable knowledge on the visible human surface—one of the most primordial resources for meaning-making within *Homo significans* (Latin for signifying man, a contemporary play on the binomial nomenclature *Homo sapiens*, or wise man, for our human species). Thus, a meta-analysis of the many faces of face studies is called for. With research tools for digital humanities such as the Media Art Research Thesaurus, the archival resources that are Dürer’s original painting (1526) and Strixner’s copied lithograph (1808–1815) of *The Four Apostles* can both be newly diagrammatized and re-narrativized among the histories of the face.

4 A Tale of Two Archivings: The Archive of Digital Art

4.1 The Face Story by Julius von Bismarck

Using the Media Art Research Thesaurus, I perform the keyword search that is for my Thesis the privileged case study, from the category /Subject/ → to sub-category /Body and Human/ → and its sub-subcategory /facial expression/. This keyword phrase /facial expression/ semantically links Strixner's *The Four Apostles* (1808–1815), from the Graphische Sammlung Stift Götting (GSSG), as well as German principal artist Julius von Bismarck (1983–), digital designer Benjamin Maus, and Austrian filmmaker Richard Wilhelmer's *Public Face* (2008, 2010, and 2014), from the Archive of Digital Art (ADA). As keyword tagged by specialist metadata coders and socially tagged by ADA community members, respectively, both *The Four Apostles* and *Public Face* correspond in the keyword /Subject/ → /Body and Human/ → /facial expression/. But once retrieved from web storage and transmitted to user interface, and graphically displayed adjacent each other within a justified and responsive image grid, the lithographic print and digital artwork also conflict between /Subject/ → /Body and Human/ → /Physiognomy/ and /Technology/ → /Interface/ → /biometrics/. This conflation points to the primary “broken circle” of media entanglement between these face artifacts from which my semantic probing departs.

In contrast to the early 19th century Johann Nepomuk Strixner, whose *Four Apostles* is housed within the past archivization at Götting Abbey, the early 21st century Julius von Bismarck's *Public Face* is housed on the present archiving that is the Archive of Digital Art. Strixner is a “dead artist,” the primary sources or ego documents he left behind radically open to methodological empathy and evidentiary interpretation. Bismarck, however, is a “living artist”—some thirty-five years of age at the time of this writing. As such, that his portrait of face is also an artifact for face can be stated with enough certainty as to be considered a fact. Indeed, Bismarck “says so” himself, explicitly self-witnessing and personally testifying within his methodological exposé to having used the science and technology of face studies as both subject-image and medium-vehicle for his one-and-a-half ton, eight-meter circumference, neon and steel, Automated Facial Expression Analysis-based “smiley.”

As he self-described on the Archive of Digital Art, Bismarck—a “wannabe physicist” (Hinrichsen)—uses his digital art-based research to conduct experiments with the physics and forces of the material universe. Much as with the early modern physiognomist, who inferred from facial signs to humorist temperament, thereby deducing the mixtures of matter in a man, Bismarck

somaticizes from bodily symptoms to natural forces such as gravity, light, and pressure (Bismarck). In the German artistic tradition called for by Dürer to be based on the right foundations of science and mathematics, Bismarck explains his intent as an artist as being like “that of a scientist,” although he “wouldn’t have the patience” for the discipline’s validity testing, preferring to more loosely hypothesize facts that, while probable, may be undoubtedly false. By augmenting physical spaces with “an other-dimension” via ocularcentric technologies such as cameras, lenses, and mirrors, Bismarck “wants to find out what there is out in the world and how I can contribute to our understanding of it” (Hinrichsen).

Bismarck’s ideas about face are contingent upon the “facial atmosphere” or “face ethos” at this the beginning of our Algorithmic Age, when Automated Facial Expression Analysis largely conjures in the German cultural imaginary the foreboding vision of a grand technocratic “eye in the sky.” These electronic machines are mythologized by the mass and news media as omniscient observers with omnipresent visual access. As goes this face story, AFEA-frameworks gaze into the digital cave of human-computer interaction and computer-mediated communication, social networks and selfie culture, spectacle and surveillance societies. A computer state, through an Orwellian phantasm of institutionalized control, monitoring, and watchfulness, is conceptualized as the very embodiment of the utopian transparency latent in the panopticon, and dystopian technocracy of panopticonism. This global change to the media climate, so feared by *faciophobic* and fetishized by *faciaphilic*, stimulates technosocial accelerationism in psychometric taxonomies—or, as in the late 18th century physicist Lichtenberg satirized with physiognomist Lavater, an ever increasing “physiognomic frenzy.”

At least, that is the myth. And while this is a story told across 21st century information landscape, digital artists narrativize today’s ‘face of the age’—its paradigmatic explanations and pedagogical norms—with critical dataveillance and tactical mediation. Working at the intersection of art, science, and technology, an increasing number of digital artists, including Julius von Bismarck, base their face (art)work on Automated Facial Expression Analysis, and its functionality achieved via the face artifacts stored, transmitted, and retrieved from face archives. Such digital artworks—on the Archive of Digital Art, and semantically linked into the Media Art Research Thesaurus—are keyword-coded by the digital artists themselves as a socio-culturally recognizable kind of action that extends across diverse genrefications.

For example, with *Selfiecity* (2014) Lev Manovich’s Software Studies Initiative web scrape from *Instagram* self-portrait “poses and expressions” a psychographic “mood analysis,” media visualizing “lots of smiling faces” in Bangkok (0.68) and São Paulo (0.64), and so greater “Happiness,” and in Moscow the

least “on the smile score scale” (0.53) of five cities subjectivated, and so with the most “Anger” (Manovich, *Selfievity*). Yet Manovich confesses “enough difficulty collecting selfies,” that he “doesn’t know” how “state-of-the-art face analysis software” uses “scientific research in emotion” (Manovich, “Skype Interview”).

With *Face-to-Facebook* (2011), third in *The Hacking Monopolism Trilogy*, Paolo Cirio and Alessandro Ludovico sort one million *Facebook* profile pictures by facial gestures popularly used “to define a person at a distance” into /climber/, /easy going/, /funny/, /mild/, /sly/, and /smug/ groups on a dating website “Lovely-Faces.com.” Cirio and Ludovico “selected forty samples for each category in an ‘arbitrary’ way based on how they looked,” so as to “customize” a neural network from the MatLab Library (Cirio and Ludovico), which they “randomly bought from one of the weird Italian coders that happened to have one of the few automated face recognition algorithms” available at that time (Cirio).

And with *Mood Meter* (2012), Javier Hernandez and Ehsan Hoque install a computer vision system to count smiles on The Massachusetts Institute of Technology campus, “a time-changing location-based emotional footprint,” or “live portrait,” of interactors faces’ overlaid with a “green happy smile” if greater than 50% intensity, and yellow “smiley blob” if less (301). Hernandez and Hoque, who self-identify not as artists but as scientists, commit method to reviewed journal, though not spatiotemporally contiguous with the interactive graphs and map displays of their project website, or the work itself.

The social tagging of such information assemblages as /facial recognition/ and /biometrics/ is little clarified and much confused by Archive of Digital Art community member artists and scholars as they naïvely keyword their own digital artworks. In fact, /facial recognition/ preludes process, and /biometrics/ postludes production in the /Automated Facial Expression Analysis (AFEFA)/ software frameworks upon which they base their /Database Art/, /Digital Activism/, /Installation (interactive or performance)/, /Net Art/, and /Robotics/.

4.2 See Your Face in This Smiley as Through the Digital

In order to make factual statements about what facial expressions *are*, *can*, or *may* be in the Algorithmic Age, face collectors *pro tempore* Bismarck, Maus, and Wilhelmer through *Public Face* intermedially combine fluorescent neon tubes and steel buttressing sculpture with an Automated Facial Expression Analysis (AFEFA) hard/software *interface*. These differentiable media, ontologically *between* some more conventional mediations and most contemporary technolo-

gies, “wear down” and “constitute newly” into a “plurimedial constellation” in which each is “simultaneously and oscillatingly present” (Hansen-Löve 325). Within *Public Face*, the AFEA-system constitutes a singular immanence in both how media expresses “the changing, average emotions of city inhabitants” through an object, as well as what image content this object makes visible “to everyone in a public space” (Bismarck). In other words, Automated Facial Expression Analysis is *how* the artwork is made, as well as *what* the artwork is about.

Spectating passersby see Bismarck’s *Public Face* as a colossal “smiley,” that weighs one-and-a-half tons, and has an eight-meter circumference. As with most digital artworks composed among technologies that disperse functionality and rapidly obsolesce, *Public Face* is characterized by its ephemerality, interactivity, processuality, and both site and context specificity (Grau 4). To exhibit *Public Face* in each of its several iterations (2008, 2010, 2014), Bismarck, Maus, and Wilhelmer had to install *in situ* surveillance cameras, computer servers, and software frameworks (fig. 12 and fig. 13.).



Fig. 12 and Fig. 13. Arnie Fehmel and Raasso Hilber. “Public Face II - Making-Of.” *Vimeo*, Studio of Julius Von Bismarck, 7 July 2010, vimeo.com/26688450. Used with kind permission of the artists.

The face artifact has been displayed at Berlin’s 7th District Templehof-Schöneberg in 2008; in 2010 as part of the PROVINZ exhibition at Malzfabrik Gallery. Space light-tower on the Island of Lindau at the eastern end of Bodensee [Lake Constance]; in 2014 on top of the former Phillips Administration Building (built 1962–1964) high rise at Triester Straße 64 in Vienna. These places make it possible for the Automated Facial Expression Analysis system to detect faces up to considerable range and down to 8×8 pixels, as well as extract data from the census features of numerous interactants. But there the face artifact that is *Public Face* also represents by μίμησις (Greek for mimesis) or

imitatio the very facial plane and position in the human phenotype itself with its actual bilateral symmetry. This artwork of the digital achieves such representativeness both literally and figuratively. The emoticon “face” in fluorescent tubes and steel sculpture is located spatially forward of an architectural structure, *as if* a human face ventrally in front on the coronal plane. And its “eyes in the sky” surveillance cameras are related hierarchically above those individuals passing-by, *as like* the ocular organs superiorly on top a vertical position. That Bismarck, Maus, and Wilhelmer’s *Public Face* preserves some face schema and image in its actuality, stimulates in the spectator a mostly non-conscious face affect, as well as pre-linguistic level of emergent meaning that is based on the recurrent patterns of their own “daily” sensorimotor interactions. That is, they perceive this artifact *as if* or *as like* our own face.

But passersby’s interaction with *Public Face* is also a carto-ontogenesis of selfhood. The first instance of self-cognition (before there can be self recognition) in a catoptric prosthesis, as in gazing at one’s own double image reflected in a mirror, marks a symbolic encounter that involves the very *mirroring* between a first-person subjective “I” and a second-person objective “you.” Similarly, expressing interactors as well as installation expression—audience and artwork—gaze back through a biofeedback loop into each others’ faces, as the media that is muscular mechanisms and skin movements is representationally reflected in the media that is buttressing sculpture and fluorescent tubes. Metaphorically, at least, if not scientifically, *Public Face* is like a “window to the soul.”

In the traditional lithographic printing of the early 19th century, Strixner’s *Four Apostles* immersed spectators within an illusory 360° image space, wherein each apostolic figure referenced one of four humorist temperaments. And the face of a melancholic Saint Paul gazed back at the viewer across the fourth wall of the lithographic print, so as to encompass them in the center of this “physiognomy in the round.” In the avant-garde digital mediations of the early 21st century, Bismarck’s *Public Face* immerses passersby within a 360° archival space, wherein “everyone feels a potential victim of emotional control” (Mittendorfer) because each of their facial expressions are keyword coded with one of four basic emotions.

To evidence with immediacy such a concept about face, principal digital artist Julius von Bismarck and his collaborators mounted 200–500mm f/2.8 APO EX DG Ultra-Telephoto zoom lenses (fig. 12), produced by the Sigma Corporation of America, onto digital single-lens reflex cameras (DLSR). These, in turn, are connected to a Sophisticated High-speed Object Recognition Engine (SHORE™) Framework, created at the Fraunhofer Institute for Integrated Circuits (IIS) in Germany (fig. 13). From real-time facial event input, to aggregate emotion lexicon output, Bismarck’s *Public Face* plasticizes visible hu-

man *surfaces* into face artifacts that compute the movement commands for the “smiley” installation. As *Public Face*’s “mouth,” a semi-circular curve of neon and steel, and separate half-circle upper as well as lower “eyelids,” rotate on their vertical axis, the face artifact displays expressions related to four Basic Emotions categories: >_< as *wut* [anger]; :) as *freude* [happiness], :(as *kummer* [sadness], and 0_0 as *wundern* [surprise]. These so-called emoticons, the word itself a portmanteau of emotion+icon, trace across intermedial genealogies from salient averbal gestalts and anthropomorphic pictograms; through unfixed typographic convention and typographical art; to the yellow smiley ☺ designed by graphic artist Harvey Ball in 1963 for State Mutual Life Assurance; and the ASCII :-) character sequence first proposed by computer scientist Scott Fahlman, on a 1982 “joke markers” thread of the Carnegie Mellon online bulletin board (bboard). And today, emoticon faces are digitally archived within almost every communicational device. So, as Bismarck stated “[p]eople see the smiley face, and find it funny.” Then, they discover that *Public Face* “can read emotions, and that’s funny as well. But in this instance, the laughter sticks in the throat because they consider: what if this software got into the wrong hands?” (Kaczor).

Shinning a light both neon and Diogenean, *Public Face*’s media specificities—neon and steel, cameras and AFEA—intermedially reference the emoticon, emoticon-based, and emoticon-like signs. Beyond the formalized grammar and syntax of written oral language, vertical ASCII or Unicode :-) or horizontal emoji ☺ correspond to facial expression, its co-speech gestures, and gross body language as a kind of electronic paralanguage. The “semiotic machine” (Nadin) of the computer, whether laptop, touchpad, or smartphone, and their standardized graphical user interface (GUI), predominantly advances verbal signs over the averbal signs of face-to-face (F2F) communication. Consequently, computer-mediated communication (CMC), short messaging service (SMS), and social network service (SNS) all enclose a “semiotic vacuum” (Bülow 306) devoid of behavioral codes. The media etiquette—or “netiquette” (Reid 166)—of the emoticon may not yet be keyword searchable on Google. And Oxford Dictionaries only first recognized an emoji as word of the year in 2015 (the “Face with Tears of Joy,” or Unicode Character U+1F602). But ☺ or ☹ are today as much emotions vocabulary as are /happy/ or /sad/.

4.3 Digital Face Archivization

But beneath its aesthetic *surface*, *Public Face* achieves its actual functionality—much in the sense of Janus, the two-faced Roman god of transition who cast his two-faced gaze both towards future and past—by locating visually

within comparative opposition two “lists” of faces: the “living” facial actions of passersby, in real time made into plastic artifacts when captured with digital cameras; and the “dead” face artifacts from photograph databases, fed newly into work process through the memory retrieval (Belting 198–199).

The essential procedure of the Sophisticated High-speed Object Recognition Engine (SHORE™) Framework (fig. 14) used by Bismarck, Maus, and Wilhelmer in *Public Face*, as with most Automated Facial Expression Analysis (AFEA), is to 1) *detect* ‘real’ views of human faces in photographic artifacts; from these 2) *extract* face data by determining facial points or landmarks such as the eye, mouth, and nose corners; and 3) *classify* these facial expressions of emotion under metadata keyword categorizations based on their visual comparison to prototypical face models housed in digital archives. In order to expound this facial “mask” applied by *Public Face* onto spectating passersby, it is critical to examine how socio-political languages—such as that for Basic Emotions from today’s face studies—includibly become stored within SHORE™ into an *a priori* knowledge system from which AFEA is performed (Schuller 232–233).



Fig. 14. Fraunhofer Institute for Integrated Circuits. SHORE™. Photograph © Fraunhofer IIS/Kurt Fuchs. Used with permission.

Jens-Uwe Garbas and the Institute for Integrated Circuits (IIS), innovated SHORE™ at the *Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V.* [Fraunhofer Society for the Advancement of Applied Research] in Erlangen, Germany, with the support of a European Commission grant (#FP6-2005-IST-5) for Information Society Technologies (IST). SHORE™ Framework is algorithmically trained using face archives. These are also termed “electronic mugbooks,” after the English slang *mug* [face], and the late nineteenth “signaletic notice” proceduralized by Parisian policeman Alphonse Bertillon.

And just as in the late 19th century, when face collectors intermedially combined photograph cabinets with photographic cameras within the archival space, in the early 21st century the *archival* technology is as pivotal as the *archived* media when making facts about face (Sekula 16). With Bertillon's *portrait-parlé*, a “speaking likeness” or verbal portrait” (Sekula 55) turned “real lives into writing” (Foucault, *Discipline and Punish* 185). With this face concept for “*l’homme moyen*” [“the average man”], the aim “had been not only to go once more through the task of Albert [sic] Dürer, but to execute it also on an extended scale” (Knox v) through a social and moral statistics. And some five centuries after Dürer, and his *The Four Apostles*, face archives continue to store, transmit, and retrieve indexical artifactions that are manually annotated with physiological landmarks that correspond specifically to psychological lexicons.

But the archival technology of the digital technosphere also significantly contrasts with the archival catalogue of the file cabinet as used in “Bertillonage” for identifying criminals through anthropometric measurements. In the Automated Facial Expression Analysis frameworks of today, digital and digitized face artifacts—sometimes more than 10,000 in number—present multimodally as visual graphic annotated with verbal texts to a face algorithm as its probe sets and evaluation protocol. By so training the algorithm, an operationalized face model can be computed for “universal” application to “similar faces in yet unseen images” (Ruf 238). At first sight, or even on *n*th look, this archival ghost in the machine of Bismarck's *Public Face* may not be visible to the artwork's spectating interactors. And to the naked eye, even by the end of exhibition days, these training photographs *per se* are not materially present. The Fraunhofer team trained SHORETM's face detection and extraction functionalities using the CMU+MIT dataset, BioID, and Facial Recognition Technology (FERET) Database, which house face artifacts photographed from mass media, corporate culture, and defense department, respectively. And to train facial classification, the Japanese Female Facial Expression (JAFPE) database supplied faces staged in a university laboratory. All of these face artifacts intermedially combine into *Public Face* as the very “sources” that determine the Automated Facial Expression Analysis *systemreferenz* [system reference] by which its newly formed media-specificity comes into being (Rajewsky 53).

Used to train SHORETM's facial detection, for the CMU+MIT Dataset the face collectors digitized from video signal and scanned photo 130 images with 507 total facial expressors. These face artifacts include *found objects* such as great masterpieces of visual art, as well as celebrity musician “head shots,” stock photography of infants and adolescents, news media stills, face gestalts in academy lecture, and television cast press releases.

Within the CMU+MIT Dataset, each graphical face is notated with textual code, one line that provides a ground truth facial location as x and y coordi-

nates for left-eye, right-eye, nose, left-corner mouth, center-mouth, and right-corner mouth (Wang). These verbal linguistic phonemes (a, b, c, 1, 2, 3, etc.) compose digital signs with an arbitrarily conventional symbol reference to facial *formations*, while averbal morphologic corpemes constitute analogue signs with a directly qualitative iconic reference to a facial *formings*. Correspondingly, this digitizing artification transposes literally the physiognomic textualism—largely consistent across face studies in the five centuries since the advent of the printing press—wherein meaning about the face is interpreted not from the sign-vehicles of the face itself, but from the signs for the face as marked in a text.

After learning how to detect human faces in photographic artifacts, SHORE™’s algorithmical functionality for the extraction of face data is trained by the Fraunhofer team on the BioID digital face archive. Their open-source face archive stores 1521 digital photographs with 23 different expressors. With photographs taken at corporate headquarters with desktop computer mounted web-cameras, “real world” conditions lead to variations in illumination, background, and scale (fig. 15 and fig. 16). For high interoperability across platforms, each image is formatted as a text in American Standard Code for Information Exchange (ASCII) binary.



Fig. 15. and Fig. 16. BioID GmbH. “BioID Face Database—FaceDB.” *BioID Face Recognition*. Used with permission.

The Facial Recognition Technology (FERET) program, operated from August 1993 to July 1997, is funded by the US Department of Defense’s CounterDrug Technology Development Program Office (CDTDPO) run through the Defense Advanced Research Projects Agency (DARPA). This face archive aims to “support government monitored testing and evaluation” in automated face recognition with applications towards “security, intelligence, and law enforcement” (Philips et al.). The FERET “image corpus” archives 14,126 total faces, in *evidentia* or series of 1564 image sets, which include 1199 individuals. The

face artifacts employ the very same cognitive style that is relatively stable in the rhetorical artifications used throughout face studies, since Indagine's "Physiognomiam" spatio-temporally co-localized with Baldung's woodcuts.

For training face analysis, SHORE™'s "happiness analyzer" is "benchmarked at a recognition rate is 95.3%" (Ruf 244) on the Japanese Female Facial Expression (JAFFE) database. Ten Japanese female models have posed 213 facial expressions. Frontality and visibility, as picture plane isolates face from body, and forward-facing models tie away hair "to expose all expressive zones of the face" (Lyons et al.). Alphanumeric code spatially co-located adjacent, as 60 Japanese undergraduate subjects code nominal semantic categories of /anger/, /disgust/, /fear/, /happiness/, /sadness/, and /surprise/ for image metadata.



Fig. 17. Thirty-one face images annotated with emotion category "Happy" from the JAFFE database (KA.HA3.31 not shown), Lyons 1998. Used with permission.

Conflicting, however, with physiognomic texts, which afforded for a face competency that was relatively proportionate to the reader's literacy in the socio-political codes of face meaning, most Automated Facial Expression Analysis systems are "black box" frameworks. Introduced by technological industry and scientific experts, these proprietary closed source algorithms veil the ma-

jority of program functionality input from available data output. To configure such a framework so that resulting content from detection and analysis of a photographic image can be annotated with face marker points and emotion class attributes, a “user or client”—such as the digital artists Bismarck, Maus, and Wilhelmer—needs only to “know how to configure it and integrate it into a larger scale application” (Ruf 237–238). As such, *Public Face* itself becomes an in-visible and un-knowable face archive, a “shadow archive” (Sekula), hidden from the immediate observation of the artists as well as by spectators. But intermedially concealed on the verso of the images in JAFFE, these FACS photographs rhizomatically fuse in the deep *subface* of the media combined into *Public Face*.

4.4 Doing the Facial Foursome

Johann Nepomuk Strixner’s *The Four Apostles* lithographically represented *from* the age and complexion of facial formations, *to* the four humorist temperaments /choleric/, /melancholic/, /phlegmatic/, and /sanguine/. Whereas, Julius von Bismarck, Benjamin Maus, and Richard Wilhelmer’s *Public Face* digitally represents *from* the mouth-corners and eyebrows of facial formings, *to* the prototypical expressions of the emotions /anger/, /happiness/, /sadness/, and /surprise/ (fig. 18 and fig. 19). But in each tetrad-saintly face and emoji smiley is represented how, as Hippocrates early described in his *De natura hominis* [The Nature of Man], the “constituents of a man are, according to both convention [i.e., nurture] and nature, always alike and the same” (Jones II.31). In other words, a form of the flesh must correspond to a function of the mind, and will do so across all ethnicities, genders, individuals, and peoples—whether the mental phenomena are typologized by keywords humorist or biometric. Such a “universality hypothesis,” in the 19th century Charles Darwin made into an argument in *The Expression of the Emotion in Man and Animals*, and in the 20th century Paul Ekman made into an algorithm with the Facial Action Coding System (or FACS). Today, Automated Facial Expression Analysis (AFEAs) frameworks—such as that intermedially combined by Bismarck in *Public Face* (2008, 2010, and 2014)—are functionally contingent upon this “Universality Theory.”

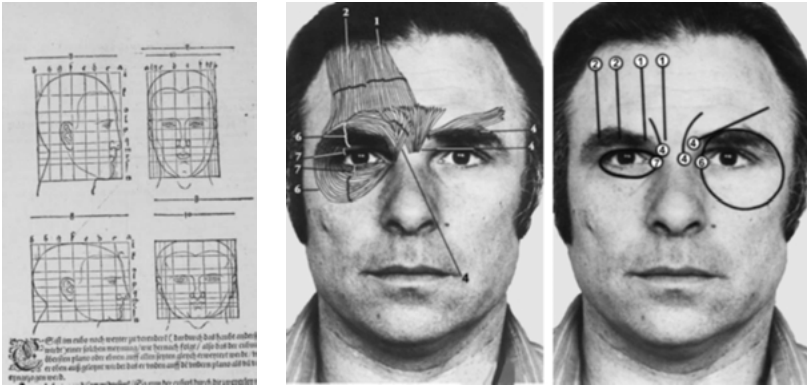


Fig. 18. (left): Albrecht Dürer. *Hierinn sind begriffen vier Bucher von menschlicher Proportion durch Albrechten Durer von Nurerberg [sic.] erfunden und beschuben zu nutz allen denen so zu diser kunst lieb tragen* [Four Books on Human Proportion]. 1528. Hieronymus Andreae Formschneider, 1528. Glasgow School of Art. CC BY-NC-SA 2.5 SCOTLAND.

Fig. 19. (right): Paul Ekman, Wallace V. Friesen, and Joseph C. Hager. *FACS Manual on CD-ROM*. Network Information Research Corporation, 2002, 15.

The procedural reason for needing *universality* is simple: solely on the basis of a stable binary (or one-to-one) correspondence between a physiological behavior and a psychological phenomena (Boys-Stones 40), can the theoretical belief in the facial expressions of emotion as being discrete biological prototypes be crafted into a practical approach for informing self and instrumenting life. This “law about face,” that its expressions are universal, is beneficial to affective computing, or computing that “relates to, arises from, or influences the emotions” (Picard 1), because Automated Facial Expression Analysis becomes quantifiably operationalizable through syllogistic logic.

From the so-called Universal Emotion View or Basic Emotions Theory (BET), emotions are seen to be phylogenetically stable and functionally discrete neuro-humor dispositions that activate with the appraisal of stimuli, and trigger patterns of response such as the anatomical mechanics that produce facial behaviors. While a diversity of thinkers in the twentieth and twenty-first centuries have determined between two and twenty such Basic Emotions, in the 19th century naturalist pioneer Charles Darwin first identified universally recognizable facial expressions of emotion across cultures and, from these, investigated whether there are prototypical emotions specified by biology. In *The Expression of the Emotions in Man and Animals*, translated into German the very year of its first publication in 1872, Darwin hypothesized that every “true or inherited expression seems to have had some natural and independent origin,” and “once existed in a much lower and animal-like condition” (130).

This treatise began (page-one, line-one) by reviewing the state of the art in physiognomic thought. Darwin critiqued that “many works have been written on expression,” but these “older treatises”—such as those by Indagine, Erasmus, Dürer, and Lavater—had “been of little or no service” (Darwin 13). In contrast, Darwin based his face concept not on *surface* forms in skin appearance but *subface* formings in muscular anatomy. He observed facial signs *semeia* [signs] not as humorist *symptomata* [symptoms] but ethogrammatical *signa* [signals]. Though just another marked sign type, the signal—unlike the symptom—had a sign-function directed upon triggering receiver action. With *Expression*, Darwin codified for “the several passions in some of the commoner animals” what today’s animal communication scientists call *ethograms*. Darwin detailed these behavioral dossiers—or “palettes of the face”—to be of “paramount importance” because they afforded “the safest basis for generalization on the causes, or origin, of the various movements of Expression” (28). Open to all *demonstratio ad oculos* by which to make facial expressions apparent as emotions signals, Darwin hoped “to derive much aid from the great masters in painting and sculpture, who are such close observers,” and looked to “engravings of many well-known works” to retrieve information about face (25). But as he probed both historical found objects and contemporary made artifacts, the evolutionist extraordinaire determined photography “made by the most instantaneous process the best means for observation, as allowing more deliberation” (155). With some, Darwin even annotated psycho-emotional keyword classifications, as with his own archived copy of Schultz’s *The Actor Portraying Various Character Types* from 1867: /(avaricious) miser/, /cocky fellow dandy/, /good nature/, /happy simpleton/, /hypocrite/, /lazy man/, /learned man scholar/, /morose grumbler/, /silly (weak head)/. That these face artifacts might evoke an immediate witness to his ideas about face, Darwin cropped and montaged them into the constellation or series of evidence.

For a hundred years, Darwin’s *Expression* lay fallow under the abrupt climate change of the Behaviorist zeitgeist (Ekman and Rosenberg 11), but by the mid-20th century, Darwin’s dangerous idea (well, one of them)—that facial expressions of emotion are phenotypic prototypes, biologically specified and culturally universal, with variability largely determined by volitional display rules and social scripts—again proved scientifically fertile and ripe for harvest. However, a century after Charles Darwin, differing scholars both devised and discarded many a system for coding the facial expressions of emotion. In order to design a facial coding system that measured and classified what the face *can* do, rather than what it *should* do (Ekman, Friesen and Hager 103, 110; Ekman and Rosenberg 14), a digital archive of face artifacts was needed.

Psychologists Paul Ekman and Wallace Friesen at the University of California San Francisco would develop the first-ever digital face archive. They

called it The Visual Information Display and Retrieval System (or VID-R). Ekman himself had long cultivated a proficiency in photography, and even attended the University of Chicago with photographic theorist Susan Sontag. He discovered the science behind the method using still photograph and motion picture documentation of peoples such as the Fore of Papua New Guinea, whom had not yet had visual contact with mass media, and so could not have learned or simulated the facial expressions of Western culture. Ekman and Friesen's pioneering interface between electronic computer and video equipment "came about as a by-product" of the need to store, transmit, and retrieve this "overwhelming amount of film" (Ekman and Friesen 240). At the time, in the late 1960s, Ekman and Friesen within their archival space intermedially combined Sony PV 120 U video tape recorders, an MVR video disc recorder, high-resolution television monitors, ASR 33 teletype keyboard printer with paper tape punch and reader, and the Digital Equipment Corporation's PDP-S computer. This technological apparatus and its media specificities—though obsolescent when compared with the Fraunhofer's SHORE™ framework—then afforded for film-to-video transfer, real time and slow motion viewing, video fields search and frame retrieval, and "dubbing" new visual events without information loss in tape originals, as well as the writing of data matrixes by which to keyword-code facial signs (Ekman and Friesen 242–243).

Out from this digital archive for ethnographic artifacts, and over the subsequent ten years, Ekman, Friesen, and their Emotions Lab at the University of California San Francisco, developed the Facial Action Coding System by modeling their own visible skin movements in a mirror, self-firing ever more discrete muscular contractions, and transcribing these facial expressions into photo- and videographic media. The face archive that would eventually become the *FACS Manual*, housing face artifacts that include photographic GIF, video MOV, and textual PDF-formatted files, fielded into interpretation appearance changes in the folds, lines, and wrinkles of the Upper and Lower Face; how to code both spatial analysis as well as specific measurement of these signs and their Intensity into visual classes or Action Units; and transcribe the combination of these AUs into facial expressions as linear notation of alphanumeric code (e.g. 6c+12d, or the Duchenne Smile). Applying FACS, expert raters measure the visible signs of the human *surface*, describe its muscular contraction mechanisms and skin appearance movements, and code these into visual classes termed Action Units.

Julius von Bismarck's *Public Face* specifically references the medium *qua* system of FACS in the movement commands of its fluorescent neon tubes and steel buttressing sculpture into emoticon representations of the keyword categories /anger/, /happiness/, /sadness/, and /surprise/. These FACS-supported Basic Emotions, the SHORE™ algorithm learned to detect, extract,

and classify through the Japanese Female Facial Expression (JAFPE) database. Rhizomatically fused into the deep histories of the intermedia combined within *Public Face*, all of the above face archives and face artifacts signal passersby to apply text-bound schemata when interacting with the digital artwork.

5 Conclusion: The Face by Any Other Name

These two face stories, those of Johann Nepomuk Strixner's (1810–1815) lithographic treatise *The Four Apostles*, and Julius von Bismarck's digital artwork *Public Face* (2008, 2010, 2014), alike in intermediation, and in the German media imaginary where they are most often shown and told, both describe a certain level of what I call “facial literacy.”

But by such “facial expression competence,” I do not illustrate the media-specific metaphorizing that has endured since Classical Antiquity, wherein the /face/ target domain is lexically substituted “as if” or “as like” a /text/ source domain, with its muscular contraction mechanisms and skin appearance movements diagrammed in a relation of similarity to a grammar with a “syntax” or a book to be “read.” Nor do I intend a “calculating science of the unseen” (Stafford 118), whereby naïve, expert, or even automated face raters deductively infer (or “read”) from the *outside* physiological behavior of the face, to the psychological phenomena *inside* of an individual. Whether *Public Face* is—or is not—with robust validity “able to *read* the emotions on a person's face” (Bismarck; emphasis added), as Bismarck makes his statement of fact, this digital face artifact does indeed transcribe literally a figurative textualism: the “turning of real lives into writing” (Foucault, *Discipline and Punish* 185), and facial expressions into so many marks or signs to be systematized or measured. So, by facial literacy, I illumine somebody's degree of knowledge in the face schema, image, and affect of the day, and the paradigmatic explanations and pedagogical norms that compose a face concept or concepts.

Such an idea about face is not simply a generalized “given” within any facial atmosphere or ethos, some discursive contextuality or localizing historicity, but rather is specifically made through the “face work” (Goffman 5) of face collectors—those artists and scientists like Strixner and Bismarck, Indagine and Garbas, Lavater and Darwin, Dürer and Ekman. And this “work,” this forming and transforming of statements about what the face *is*, *can*, or *may* be, principally takes place through memory feedback into work process, through *archivization*.

The face archive may vary greatly cross-culturally and trans-historically in the media specificity of its technological apparatus, and be it Strixner's *The Four Apostles* or Bismarck's *Public Face*, Indagine's *Introductiones Apotelesmaticae* or the

Fraunhofer's SHORE™ framework. However, all of these face archives are there and then themselves an intermedial *betweeness*, rhizomatically located at a performative intersection among or during: 1) The “language” of scientific inquiry that as a discursive calculus *prescribes* a modelling system for stating possible meanings about face. And 2) the “corpus” of scientific communication with its artifacts *proscribes* through media imaginary the evidentiary interpretation of these meanings (cf. Foucault, *The Archaeology of Knowledge* 130). That is, to identify a “face archive” is to 1) name a space *into* which statements about face ontologically commence through the content indexing of face artifacts, according to the biological nature of the face, as well as the socio-political history of its (inter)mediations. But it also 2) names a space *from* which these statements nomologically command through the content retrieval of face artifacts, in an exercise by face collectors of their objectivizing gaze through societal actions (cf. Derrida).

This archive of face affords not only for the storage, retrieval, and transmission of face artifacts, and for the making of facts about face by aesthetic judgements. But face artifacts also intermedially combine, reference, and transpose face archives, and the face concepts thereof. Although, of course, this *intermediality* might be just a “shadow archive,” perhaps beyond conscious awareness, but that still effects attitudes, beliefs, or dispositions towards one's own face or that of another.

By keyword-problematizing my privileged case studies, two German face artifactions, one /facial expression/ historical from the Age of Print, and one contemporary from today's Algorithmic Age, I probed their respective archival contextualities: Johann Nepomuk Strixner as through his *The Four Apostles* (1810–1815) making intermedial references to the textual structures of Dürer, Indagine and Baldung, Erasmus, and some citations removed to the Classical authors as well. This *systemreferenz* to the textual medium *qua* facialization system of /physiognomy/, in cognitivist terms, signals a spectator to apply textuality-bound schemata when gazing upon the lithographic image, as too with its oil-painted origin point (1526). While contributing signification to the artwork, this intermedial reference affords for a face competency the transparency of which is relatively proportionate to a spectator's literacy in socio-political codes of face meaning, as in the humorist temperament prototypes lexicalized as /sanguine/, /choleric/, /phlegmatic/, and /melancholic/.

In contradistinction to such a “clear box” face concept, however, Julius von Bismarck with his *Public Face* (2008, 2010, 2014) makes intermedial combination not only of sculptural elements, surveillance cameras, and computer server, but the Automated Facial Expression Analysis software framework SHORE™, “living” face artifacts of passersby, and those of the CMU+MIT, BioID, FERET, and JAFFE archives. This plurimedial constellation “wears

down” and “constitutes newly” the imagistic media *qua* facialization system of /biometrics/, with all these face artifacts becoming inextricably merged in *Public Face* as simultaneously and oscillatingly co-present (Hansen-Löve 325). While contributing signification to the artwork, this intermedial combination affords for a face competency the teleological opacity of which is determined by scientific experts and technological industry, a “black box” that hides how exactly basic emotion prototypes /anger/, /happiness/, /sadness/, and /surprise/ are retrieved, stored, and transmitted. Consequently, Bismarck’s artist interviews, exhibition statements, and online reviews that frame *Public Face*, illuminates the algorithm only as that “developed by the Fraunhofer Institute” (Bismarck), with no evaluation of face artifacts made or further archived (Hernandez et al. 301).

From reader engagement with the physiognomic aphorisms of the Age of Print (Porter 217), to media reception with the computable face of the Algorithmic Age, face collectors artist and scientist alike tend to be interested less in the phenomenological experience or even epistemological description for the schema and image of the face, than in the hermeneutic interpretation—and indeed, (e-)valuation—of its affect. That is, face artifaction and archivization is typically motivated not by what the face *is*, *can*, or *may* be, but by what the face *should* do, rather than what it *can* do. Physiognomists, scientists of facial expression, and even Automated Facial Expression Analysis systems all use the “auxiliary organs” of media prostheses to extend their perceptual faculties, and overcome the limitations of naked opthamoception set by the eye’s retinal structure to become a “kind of prosthetic God” (Strackey 37–39). But most of their face questions are at least to some degree theory-biased, the gaze cast towards making message-judgments more than measuring sign-vehicles, and typologizing inferential labels more than inferential units (Ekman, Friesen and Hager 103, 110). Within face archives, these inferential labels indicate a psychological content for a physiological expression, and act as a cipher or key to a practical facial coding system, as well as the theoretical ideas about face upon which it is based. As a kind of physiognomic metadata—or “face data about face data”—such keywords operate by the textualization of “actual” corporeal facial expressions into the Στοιχεῖα (*stoichea* or *elementa*) of a facial expression calculus, and from an *analogue* continuum perceived with graded layers on an implicit dimension, into *digital* units within a limited infinity of discrete possibilities on the explicit.

So would a facial form, formation, or forming that is labeled by certain inference, such as the humorist temperament /sanguine/ or the basic emotion /happiness/, /melancholic/ or /sadness/, if called by any other name still convey the same meaning about face? Certainly, yes, the forty-four bilaterally symmetrical striated facial muscles, and their selective and sexual evolution in-

to a communication system, are biologically specified. But it is only because of the media imaginary that signifiers—such as “ruddy complexion,” and “tall ... soft, fair and fat,” or the *zygomatic major* pulling upwards the lip corners, and *orbicularis oculi* laterally gathering the eye folds—are recognized as having a socio-politically inherited, specific meaning. And if such a / facial expression / were to be called by any other facial keyword, it might well retain its conventional entanglement with /physiognomic/ or /biometric/ tradition. But it could not if it were nameless, and unable to be recurrently identified through intermediations both image and text, physiognomic treatise or digital artwork.

The face concept that conditions this keywording is also the obstacle to its analysis, as only by a paradigm shift in explanatory models can such /facial expression/ be complicated or contextualized. But, the semantic cross-database search through face archive vocabularies—a *digital face literacy*—makes visible a face story about face stories, or a human meta-face that can indeed, as hoped Aby Warburg (1866–1929), “father” to *Bildwissenschaft*, “cast light on great and universal evolutionary processes in all their interconnectedness” (Gombrich 271–275).

Works Cited

- Belting, Hans. *Face and Mask: A Double History*. Translated by Thomas S. Hansen and Abby J. Hansen. Princeton, NJ: Princeton University Press, 2017.
- Bismarck, Julius von, Benjamin Maus, and Richard Wilhelmer. 2008. “Stimmungsgasometer/ Fühlometer; or, Public Face.” 1 Feb. 2016 <<https://www.digitalartarchive.at/database/general/work/stimmungsgasometerfuehlometer.html>>.
- Bolter, Jay David, and Richard Grusin. *Remediation: Understanding New Media*. Cambridge, MA: The MIT Press, 2000.
- Boys-Stones, George. “Physiognomy and Ancient Psychological Theory.” *Seeing the Face, Seeing the Soul: Polemon’s Physiognomy from Classical Antiquity to Medieval Islam*, edited by Simon Swain. New York and Oxford: Oxford University Press, 2007, pp. 19–124.
- Bradley, Sister R.M. “Backgrounds of the Title *Speculum* in Medieval Literature.” *Speculum: A Journal of Medieval Studies*, 29, 1954, pp. 100–115. JSTOR, 28 Jan. 2017 <http://www.jstor.org/stable/2853870?seq=1#page_scan_tab_contents>.

- Bülöw, Edeltraud. "Sprechakt und Textsorte in der Telekommunikation." *Telefon und Gesellschaft Band 2*, edited by Forschungsgruppe Telefonkommunikation. Berlin: Spiess, 1990, pp. 300–312.
- Cirio, Paolo. Email Interview with Devon Schiller. 18 January 2017.
- Cirio, Paolo, and Alessandro Ludovico. "Face-to-Facebook: How We Did It." 28 Jan. 2017 <<http://www.face-to-facebook.net/how.php>>.
- Coleridge, Samuel Taylor. "Coleridge on Spenser." *Literary Remains of Samuel Taylor Coleridge*, vol. 1, edited by Henry Nelson Coleridge. London: William Pickering, 1836–1839.
- Colombo, Giorgio. *La scienza infelice: Il museo di antropologia criminale di Cesare Lombroso* [1975]. Turin: Bollati Boringhieri, 2000.
- Darwin, Charles. *The Expression of the Emotions in Man and Animals* [1872]. New York: Penguin Books, 2009.
- Daston, Lorraine. "Hard Facts." *Making Things Public: Atmospheres of Democracy*, edited by Bruno Latour and Peter Weibel. Cambridge, MA: The MIT Press, 2005, pp. 680–685.
- Deleuze, Gilles, and Félix Guattari. *A Thousand Plateaus: Capitalism and Schizophrenia*. Translated by Brian Massumi. Minneapolis, MN: University of Minnesota Press, 1988.
- Derrida, Jacques. "Archive Fever: A Freudian Impression." *Diacritics*, vol. 25, no. 2 (1995): pp. 9–63.
- Ekman, Paul, and Erika L. Rosenberg, editors. *What the Face Reveals: Basic and Applied Studies of Spontaneous Expression using the Facial Action Coding System (FACS)*, 2nd ed. Oxford: Oxford University Press, 2005.
- Ekman, Paul, and Wallace Friesen. "A tool for the analysis of motion picture film or videotape." *American Psychologist*, vol. 24 (1969): pp. 240–243.
- Ekman, Paul, Wallace Friesen, and Joseph C. Hager. *FACS Manual on CD-ROM*. Network Information Research Corporation, 2002.
- Elsner, Jaś. 2007. "Physiognomics: Art and Text." *Seeing the Face, Seeing the Soul: Polemon's Physiognomy from Classical Antiquity to Medieval Islam*, edited by Simon Swain. Oxford: Oxford University Press, pp. 203–224.
- Ernst, Wolfgang. "Archive in Transition." *Interarchive, Perspektiven/Perspectives 137*, translated by Alexis Theodorou. Hannover: Niedersächsischen Lotostiftung, 2002, pp. 475–483.
- . *Digital Memory and the Archive*. Minneapolis, MI: University of Minnesota Press, 2013.

- Foster, Hal. "An Archival Impulse." *MIT Press Journals*, Fall 2004, pp. 3–22.
- Foucault, Michel. *The Archaeology of Knowledge and the Discourse on Language*. Translated by Alan Sheridan. London and New York: Routledge, 2002.
- . *Discipline and Punish: The Birth of the Prison*. Translated by Alan Sheridan. New York: Vintage Books, 2012.
- Gallagher, Shaun. *How the Body Shapes the Mind*. New York and Oxford: Oxford University Press, 2011.
- Gates, Kelly A. *Our Biometric Future: Facial Recognition Technology and the Culture of Surveillance*. New York: New York University Press, 2011.
- Genette, Gérard. *Paratexts: Thresholds of Interpretation*. Cambridge: Cambridge University Press, 1997.
- Gibson, Mary, and Nicole Hahn Rafter. "Introduction." *Cesare Lombroso: Criminal Man*, edited and translated by Mary Gibson and Nicole Hahn Rafter. Durham, NC: Duke University Press, 2006.
- Gladwell, Malcolm. "The Naked Face." *The New Yorker Magazine*, Annals of Psychology, 5 Aug. 2002. 3 June 2017 <<https://www.newyorker.com/magazine/2002/08/05/the-naked-face>>.
- Goffman, Erving. "On Face-Work: An Analysis of Ritual Elements in Social Interaction." *Interaction Ritual: Essays in Face-to-Face Behavior* [1967]. New York: Doubleday, 2005, pp. 5–45.
- Gombrich, E.H. "Aby Warburg: His Aims and Methods: An Anniversary Lecture." *Journal of the Warburg and Courtauld Institutes*, vol. 62 (1999): pp. 268–282.
- Grau, Oliver, Sebastian Haller, Janina Hoth, Viola Rühse, Devon Schiller, and Michaela Seiser. "Documenting Media Art: A WEB 2.0-Archive and Bridging Thesaurus for MediaArtHistories." *Leonardo*. June 23. 2017. 4 Sept. 2017 <[doi:10.1162/LEON_a_01482](https://doi.org/10.1162/LEON_a_01482)>.
- Grau, Oliver and Wendy Coones. "The Digitized Assets of the Graphic Collection of the Göttinger Abbey." *MediaArtHistories Archive*. 2012. 4 Sept. 2017 <hdl.handle.net/10002/592>.
- Grau, Oliver. "The Database of Virtual Art: For An Expanded Concept of Documentation." *ICHIM 03, Art Access & Visual Education / Éducation visuelle & Accès à l'art*, 2003.
- Gray, Richard T. *About Face: German Physiognomic Thought from Lavater to Auschwitz*. Detroit: Wayne State University Press, 2004.

- Halbfass, Wilhelm and Klaus Held. "Evidenz (evidentia, evidence, self-evidence)." *Historisches Wörterbuch der Philosophie*, vol. 2, edited by Joachim Ritter and Karlfried Gründer. Basel: Schwabe, 1972, pp. 829–834.
- Hansen-Löve, Aage A. "Intermedialität and Intertextualität: Probleme der Korrelation von Wort-und Bildkunst—Am Beispiel der russischen Moderne." *Dialog der Texte: Hamburger Kolloquium zur Intertextualität*, edited by Wolf Schmid and Wolf-Dieter Stempel. Vienna: Wiener Slawistischer Almanach, 1983.
- Hernandez, Javier, Mohammed Ehsan Hoque, Will Drevo, and Rosalind Picard. "Mood Meter: Counting Smiles in the Wild." *Proceedings of International Conference on Ubiquitous Computing (Ubicomp)*. 2012. pp. 301–310.
- Hett, W. S., translator. *Minor Works: On Colours. On Things Heard. Physiognomics. On Plants. On Marvellous Things Heard. Mechanical Problems. On Indivisible Lines. The Situations and Names of Winds. On Melissus, Xenophanes, Gorgias*. By Aristotle. Cambridge, MA: Harvard University Press, 1936.
- Higgins, Dick. *Horizons: The Poetics and Theory of the Intermedia*. Carbondale, IL: Southern Illinois University Press, 1984.
- Huhtamo, Erkki. "Dismantling the Fairy Engine: Media Archaeology as Topos Study." *Media Archaeology: Approaches, Applications, and Implications*, edited by Erkki Huhtamo and Jussi Parikka. Berkeley, CA: University of California Press, 2011, pp. 27–47.
- Hutchison, Jane Campbell. *Albrecht Dürer: A Biography*. Princeton, NJ: Princeton University Press, 1990.
- Jones, W.H.S., translator. *The Nature of Man. Hippocrates, Vol. IV*. By Hippocrates. Loeb Classical Library 150. Cambridge, MA: Harvard University Press, 1931.
- Kaczor, Eva. "Julius von Bismarck and the Smiley in Berlin." *Art Berlin/Kunstszene Berlin*. 2012. 1 Feb. 2016 <<http://www.artberlin.de/kuenstler/julius-von-bismarck-smiley/>>.
- Kemp, Martin. *The Human Animal in Western Art and Science*. Chicago: University of Chicago Press, 2007.
- Kleiner, Fred S. *Gardner's Art Through the Ages: A Global History*, 15th edition, vol. 1, 2016. Boston: Cengage Learning.
- Knight, Thomas Chaloner, translator. *The praise of folie: Moriae Encomium a booke made in latine by that great clerke Erasmus Roterodame* [1549]. *Early English Books Online. Text Creation Partnership*. 2003. 1 Feb. 2016 <<http://name.umdl.umich.edu/A00384.0001.001>>.

- Knox, R., translator. *A Treatise on Man and the Development of His Faculties* [1842]. *Internet Archive*. Internet Archive, 1 Feb. 2016 <<https://archive.org/details/treatiseonmandev00quet>>.
- Krtílová, Kateřina. "Intermediality in Media Philosophy." *Travels in Intermedia[lity]: ReBlurring the Boundaries*, edited by Bernd Herzogenrath. Lebanon, NH: Dartmouth College Press, 2012, pp. 37–45.
- Krüger, Klaus et al. "Double Vision—Manifold Evidenz." *Double Vision: Albrecht Dürer and William Kentridge*, edited by Klaus Krüger, Andreas Schallhorn, and Elke Anna Werner. Munich: Sieveking Veerlag, 2016, pp. 12–18.
- Lavater, Johann Caspar. *Physiognomy: Or, the Corresponding Analogy Between the Conformation of the Features and the Ruling Passions of the Mind* [1826]. Internet Archive, 1 Feb. 2017 <<https://archive.org/details/physiognomyorcor00l-ava>>.
- Leunissen, Mariska. "Physiognomy in Ancient Science and Medicine." *Oxford Handbook of Science and Medicine in the Classical World*, edited by Paul Keyser and John Scarborough. Oxford: Oxford University Press, 2016.
- Lichtenberg, Georg Christoph. "Über Physiognomik; wider die Physiognomen: Zu Beförderung der Menschenliebe und Menschenkenntnis." *Schriften und Briefe*, vol. 2, edited by Wolfgang Promies. Munich: Carl Hanser Verlag, 1968–1971.
- Lyons, Michael J. *JAFFE Database*. 1998. 28 Jan. 2017 <http://www.kasrl.org/jaffe_info.html>.
- Lyons, Michael J., Julien Budynek, and Shigeru Akamatsu. "Automatic Classification of Single Facial Images." *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 21, no. 12, Dec. (1999): pp. 1357–1362.
- Maduro, Daniela Côrtes. *Shapeshifting Texts: Keeping Track of Electronic Literature*. 2017. 28 Jan. 2017 <<https://shapeshiftingtexts.wordpress.com/>>.
- Manoff, Marlene. "Theories of the Archive from Across the Disciplines." *Libraries and the Academy*, vol. 4, no. 1, 2004, pp. 9–25. Project Muse, 28 Jan. 2017 <<https://muse.jhu.edu/article/51302>>.
- Manovich, Lev. *The Language of New Media*. Cambridge, MA: MIT Press, 2001.
- . *Selficity*. 2011–2014. 28 Jan. 2017 <<http://selficity.net/>>.
- . Skype Interview by Devon Schiller. 2 December 2015.
- McLuhan, Marshal, and Quentin Fiore. *The Medium is the Massage: An Inventory of Effects*. Berkeley, CA: Ginko Press, 1967.

- Mittendorfer, Elisabeth. "Riesen-Smiley misst Stimmung der Wiener." *derStandard.at*, 10 Feb. 2014 <<http://derstandard.at/1389859858081/Riesen-Smiley-misst-die-Stimmung-der-Wiener>>.
- Nadin, Mihai. "Semiotics for the HCI Community." *Code*. 2001. 20 Jan. 2017 <<http://www.code.uni-wuppertal.de/uk/hci/>>.
- Panofsky, Erwin. *The Life and Art of Albrecht Dürer* [1943]. Princeton, NJ: Princeton University Press, 1955.
- Pettegree, Andrew. *The Book in the Renaissance*. New Haven, CT: Yale University Press, 2010.
- Pfeiffer, Gerhard. "Albrecht Dürer und Lazarus Spengler." *Festschrift für Max Spindler zum 75*, edited by Dieter Albrecht von Geburtstag, Andreas Kraus, and Kurt Reindel. Munich: CH.Bech'sche Verlagsbuchhandlung, 1969, pp. 370–400.
- Phillips, P. J., P. J. Rauss, and S. Z. Der. "FERET (Face Recognition Technology) Recognition Algorithm Development and Test Results." *Army Research Lab Technical Report 995*, October, 1996.
- Picard, Rosalind W. "Affective computing." Tech. Report: 321, *MIT Media Lab*, Tech. Rep., 1995.
- Porter, Martin. *Windows of the Soul: The Art of Physiognomy in European Culture 1470–1780*. New York: Oxford University Press, 2005.
- Rajewsky, Irana O. *Intermedialität*. Tübingen: Francke, 2002.
- Rauchensteiner, Meinhard, and Gudrun Swoboda. "Physiognomische Rhetorik I." *Das Kunstkabinett des Johann Caspar Lavater*, edited by Greda Mraz and Uwe Schögl. Wien: Böhlau, 1999, pp. 110–17.
- Reid, Elizabeth. "Virtual Worlds: Culture and Imagination." *CyberSociety: Computer-mediated Communication and Community*, edited by Steven Jones. Thousand Oaks, CA: SAGE Publishing, 1995, pp. 164–183.
- Ruf, Tobias, Andreas Ernst, and Christian Küblbeck. "Face Detection with the Sophisticated High-speed Object Recognition Engine (SHORE)." *Microelectronic Systems: Circuits, Systems and Applications*, edited by Albert Heuberger, Günter Elst and Randolph Hanke. Berlin: Springer-Verlag, 2011, pp. 243–252.
- Rummel, Erika, editor. "On the Education of Children." *The Erasmus Reader*. By Desiderius Erasmus. Toronto: University of Toronto Press, 1990.
- Russell, Donald A., translator and editor. *The Orator's Education*, vol. III. By Marcus Fabius Quintilianus [Quintillian]. Cambridge, MA: Harvard University Press, 2001.

- Schuller, Björn W. "Multimodal Affect Databases: Collection, Challenges, and Chances." *Oxford Handbook of Affective Computing*, edited by Rafael A. Calvo, Sidney K. D'Mello, Jonathan Gratch, and Arvid Kappas. New York: Oxford University Press, 2015, pp. 323–333.
- Sekula, Allan. "The Body and the Archive." *October*, vol. 39 (1986): pp. 3–64.
- Senefelder, Johann Alois. *Senefelder on Lithography: The Classic 1819 Treatise*. Mineola, NY: Dover Publications, 2005.
- Stafford, Barbara Maria. *Body Criticism: Imaging the Unseen in Enlightenment Art and Medicine*. Cambridge, MA: The MIT Press, 1993.
- Stephan, Annelisa. 2017. "A Conversation with the Getty's Imaging and Digital Media Architect: Chris Edwards will spearhead digitization projects, imaging R&D, and a deep dive into 3D." 27 Apr. 2017. 5 June 2017 <<http://blogs.getty.edu/iris/a-conversation-with-the-gettys-new-imaging-and-digital-media-architect/>>.
- Strackey, James, translator. *Civilization and its Discontents*. By Sigmund Freud. New York: W.W. Norton, 1962.
- Tomkins, Silvan S. *Affect Imagery Consciousness: The Complete Edition, Volumes I–IV*. Berlin: Springer, 2008.
- Tytler, Graeme. *Physiognomy in the European Novel: Faces and Fortunes*. Princeton, NJ: Princeton University Press, 2014.
- Vegetti, Mario. "Galen on Body, Temperaments and Personalities." *Greek Science in the Long Run: Essays on the Greek Scientific Tradition (4th c. BCE–17th c. CE)*, edited by Paula Olmos. Cambridge: Cambridge Scholars Publishing, 2012, pp. 265–280.
- Withers, Fabian, translator. *Briefe introductions, both naturall, pleasant, and also delectable unto the art of chiromancy, or manuel divination, and physiognomy* [1557]. By Johannes de Indagine. Early English Books Online. Text Creation Partnership. 2003. 1 Feb. 2016 <<https://quod.lib.umich.edu/e/eebo2/A0396-8.0001.001?view=toc>>.