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Standard Guide for Facial Image Comparison Feature List for Morphological Analysis[1]

This standard is issued under the fixed designation E3149; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide defines a set of facial components, characteristics, and descriptors to be considered during a morphological facial comparison (see FISWG Best Practices for Facial Image Comparison Feature List for Morphological Analysis).

1.2 This set of facial components, characteristics, and descriptors describes the facial features that may be visible and comparable between images.

1.3 This guide defines a standard set of facial components, characteristics, and descriptors that should be used for facial comparison.

1.4 This guide does not define the comparison process itself, just the feature set to be used during such comparisons.

1.5 This guide does not define a classification system to constrain how those descriptors shall be articulated as applied to samples.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *FISWG Standards:*[2]

FISWG Best Practices for Facial Image Comparison Feature List for Morphological Analysis

3. Terminology

3.1 *Definitions:*

3.1.1 *characteristic descriptors, n*—minutiae of the component characteristics.

3.1.2 *component characteristics, n*—detailed features of the facial components.

3.1.3 *facial components, n*—gross features considered in virtually all comparisons.

4. Significance and Use

4.1 Morphological analysis used for facial comparison should utilize consistent terminology and methodology. This guide provides a standard set of facial components, characteristics, and descriptors to be used as a framework in conjunction with a systematic method of analysis for facial image comparison.

4.2 The order of the facial components in this set is presented from the top of the face to the bottom, not in order of importance or priority.

4.3 Within this guide, the term “face” generally refers to the face, head, and neck inclusively unless specified otherwise.

4.4 There are several instances in this guide in which the term “distance” or “approximate distance” is used. When this term is used in this guide, it does not mean to imply that the precise value of this dimension shall be determined, but rather the relative size of this dimension compared to the overall width or height of the face, if not otherwise specified. In this guide, it is recommended that photoanthropometry not be used at all because of its limitations.

5. Facial Feature List

5.1 The following feature list contains nineteen (19) facial components, each of which is further divided into two levels of detail.

5.2 The facial components are gross features to be considered in virtually all comparisons. The tables in 5.3 further expands each facial component into a set of component characteristics and their associated characteristic descriptors.

NOTE 1—In the figures, dotted lines indicate the position, orientation, or location of the feature, or combination thereof.

[1] This guide is under the jurisdiction of ASTM Committee E30 on Forensic Sciences and is the direct responsibility of Subcommittee E30.12 on Digital and Multimedia Evidence.

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[2] Available from Facial Identification Scientific Working Group (FISWG), http://www.fiswg.org/documents.

5.3 *Facial Components*—The human facial components are multifaceted and when imaging conditions allow, it may be possible to subdivide these components further. Any standard procedure using facial comparison analysis should consider all of the following facial components: Skin, Face/Head Outline, Face/Head Composition, Hair, Forehead, Eyebrows, Eyes, Cheeks, Nose, Ears, Mouth, Chin/Jawline, Neck, Facial Hair, Facial Lines, Scars, Facial Marks, and Alterations. If features are present and observable on a face that cannot fit into the categories below, those features should be considered and included as part of 5.3.19.

5.3.1 *Skin*—"Skin" refers to the overall appearance of the skin. See Table 1.

TABLE 1 Skin

Component Characteristics	Characteristic Descriptors
Overall skin appearance	• Overall texture • Overall tone (for example, luminance, and color)

5.3.2 *Face/Head Outline*—"Face/head outline" refers to the overall shape of the head (cranial vault) and face. See Table 2 and Fig. 1.

TABLE 2 Face/Head Outline

Component Characteristics	Characteristic Descriptors
Shape of cranial vault	• Portrait contour • Profile contour
Overall shape of face	• Portrait contour • Profile contour

5.3.3 *Face/Head Composition*—"Face/head composition" refers to the overall configuration of the facial components, to include their alignment and relative sized, internal to a single face. See Table 3 and Figs. 2[3] and 3.

TABLE 3 Face/Head Composition

Component Characteristics	Characteristic Descriptors
Proportions/position of features on face	• Approximate width of nose relative to eye distances (for example, interpupillary distance, individual eye width, or overall distance between outer corners) • Approximate width of mouth relative to eye distances • Approximate width of nose relative to mouth • Approximate distance from nose to upper lip relative to face length • Approximate distance from chin to lower lip relative to face length • Ear position relative to eyes, nose, and mouth • Eye position relative to face length

5.3.4 *Hair*—"Hair" refers to the shape and distribution of head hair and does not include other facial hair (eyebrows, lashes, facial hair). Hair includes the appearance of the hair itself and the sections of hairline and baldness patterns. Hairline refers to the contour of the edge of the hair along the top and sides of the forehead to the top of the ears. Cranial baldness pattern refers to apparent baldness affecting the hairline as well as gaps on the crown and sides of the head. See Table 4 and Fig. 4.

TABLE 4 Hair

Component Characteristics	Characteristic Descriptors
Hair	• Shape/spatial distribution (including overall hair length) • Texture • Symmetry • Density and distribution of density (including gaps) • Tonality and variation in color/tonality
Forehead hairline	• Detailed shape (for example, symmetry, "widow's peak," "part line," "cowlick")
Hairline right side Hairline left side	• Detailed shape
Cranial baldness pattern	• Detailed shape and distribution

5.3.5 *Forehead*—"Forehead" refers to the part of the face above the eyes, including the brow ridges. See Table 5 and Fig. 5.

TABLE 5 Forehead

Component Characteristics	Characteristic Descriptors
Forehead shape	• Relative height • Relative width • Slope/contour (visible in profile)
Brow ridges	• Prominence • Continuity

5.3.6 *Eyebrows*—"Eyebrows" refers to the strips of hair above the eyes. See Table 6 and Fig. 6.

TABLE 6 Eyebrows

Component Characteristics	Characteristic Descriptors
Right eyebrow Left eyebrow	• Shape (may include detailed observations) • Size (width and length of eyebrow relative to eye size) • Lateral eyebrow vertical end position relative to medial eyebrow vertical position (tilt of eyebrow) ("A" in Fig. 6) • Vertical end position of lateral eyebrow relative to the lateral canthus ("B" in Fig. 6) • Vertical end position of medial eyebrow relative to the medial canthus ("C" in Fig. 6) • Horizontal end position of lateral eyebrow relative to lateral canthus ("D" in Fig. 6) • Horizontal end position of medial eyebrow relative to medial canthus ("E" in Fig. 6) • Conjoined left-right eyebrows ("unibrow") • Density of hair within eyebrow and distribution of density • Hair details (for example, texture, length, thickness, shape, and color) • Noticeably longer hairs
Asymmetry between right and left eyebrows	• Overall shape, size, position, hair details, and so forth (see individual eyebrow descriptors)

5.3.7 *Eyes*—"Eyes" refers to the orbital region below the eyebrows and above the cheeks. See Table 7 and Figs. 7–9.

TABLE 7 Eyes

Component Characteristics	Characteristic Descriptors
Intercanthal distance	• Distance between inner corners of the right and left eyes

[3] Vegter, F., and Hage, J., "Clinical Anthropometry and Canons of the Face in Historical Perspective," *Plastic and Reconstructive Surgery*, Vol 106, No. 5, 2000, pp. 1090–1096.

TABLE 7 *Continued*

Component Characteristics	Characteristic Descriptors
Interpupillary distance	• Distance between the center of the right and left pupils
Right eye fissure opening Left eye fissure opening (outline)	• Shape • Angle [angle from inner corner and outer corner (when eyes are horizontal)]
Right upper eyelid Left upper eyelid (including lashes)	• Prominence (for example, visibility, folds, including epicanthic fold) • Protrusion • Visibility of the crease above the upper eyelid (superior palpebral furrow) • Position in relation to iris or pupil, or both • Lash characteristics (for example, length, density, flow, irregular)
Right lower eyelid Left lower eyelid (including lashes)	• Prominence (for example, visibility, folds) • Protrusion • Visibility of the crease below the lower eyelid (inferior palpebral furrow) • Visibility of infraorbital furrow (a place where a line or wrinkle may appear parallel to and below the lower eyelid running from near the inner canthus and following cheek bone laterally) • Position in relation to iris or pupil, or both • Lash characteristics (for example, length, density, flow, irregular)
Right eyeball prominence Left eyeball prominence	• Degree of protrusion
Right eye sclera Left eye sclera	• Visibility of blood vessels and defects • Color
Right iris Left iris	• Color • Visibility • Diameter relative to eye opening • Position relative to eye opening (in front view) • Irregularity in pupil
Right eye medial canthus Left eye medial canthus	• Caruncle (fleshy prominence at inner eye corner) • Shape and angle of inner corner of the eye
Right eye lateral canthus Left eye lateral canthus	• Shape and angle of outer corner of the eye
Asymmetry between right and left eyes	• Shape, angle • Off-set (for example, one eye higher than the other) • Eyelids (for example, one drooping, one retracted) and eyelashes • Color • Iris and pupil position (for example, cross-eyed) • Overall shape, size, position, and so forth (see individual eye descriptors)

5.3.8 *Cheeks*—"Cheeks" refers to the regions surrounded by the eyes, ears, nose, mouth, chin, and jawline. See Table 8.

TABLE 8 Cheeks

Component Characteristics	Characteristic Descriptors
Right cheekbone Left cheekbone	• Prominence
Right cheek shape Left cheek shape (soft tissue)	• Presence of dimple

5.3.9 *Nose*—"Nose" refers to the entire nasal region. See Table 9 and Fig. 10.

TABLE 9 Nose

Component Characteristics	Characteristic Descriptors
Nasal outline (profile and front view)	• Overall shape • Length or width or both • Prominence • Symmetry
Nasal root (bridge)	• Front view: width, length, shape, depth • Profile view: length, depth, angle
Nasal body	• Front view: width, length, shape, angle • Profile view: length, angle, contour
Nasal tip	• Shape (in front and profile view, including whether or not the tip is bifid) • Angle (for example, up, down) • Symmetry
Nasal base	• Width • Height • Deviation to the right or left
Nasal base: alae (wings of nose)	• Thickness • Symmetry • Shape
Nasal base: nostrils (nasal openings)	• Shape and size of opening • Symmetry • Hair
Nasal base: columella (soft tissue between nostrils)	• Width and length • Relative position • Symmetry

5.3.10 *Ears*—"Ears" refers to the external characteristics of the ears. See Table 10 and Figs. 11 and 12.

TABLE 10 Ears

Component Characteristics	Characteristic Descriptors
Asymmetry between left and right ears	• Size • Shape • Protrusion • Positioning (for example, one higher than the other)
Right ear protrusion Left ear protrusion	• Extent of protrusion
Overall right ear Overall left ear	• Size • Shape • Angle
Right ear helix—superior/inferior (tail) Left ear helix—superior/inferior (tail)	• Size • Shape
Right ear tubercles (auricular/Darwin's tubercle) Left ear tubercles (auricular/Darwin's tubercle)	• Size • Shape • Quantity

TABLE 10 *Continued*

Component Characteristics	Characteristic Descriptors
Right ear antihelix Left ear antihelix	• Size • Shape
Right ear crura of antihelix (superior crux, inferior crux) Left ear crura of antihelix (superior crux, inferior crux)	• Size • Shape
Right ear triangular fossa Left ear triangular fossa	• Size • Shape
Right ear crus of helix Left ear crus of helix	• Size • Shape
Right ear scaphoid fossa Left ear scaphoid fossa	• Size • Shape
Right ear concha (superior, inferior) Left ear concha (superior, inferior)	• Size • Shape
Right ear tragus Left ear tragus	• Size • Shape • Protrusion
Right ear antitragus Left ear antitragus	• Size • Shape • Protrusion
Right ear intertragic/intertragal notch Left ear intertragic/intertragal notch	• Size • Shape
Right ear anterior knob Left ear anterior knob	• Size • Shape
Right ear anterior notch Left ear anterior notch	• Size • Shape
Right ear posterior auricular furrow Left ear posterior auricular furrow	• Size • Shape
Right ear lobule (lobe) Left ear lobule (lobe)	• Size • Shape • Attached or detached
Ear abnormalities	• For example, cleft lobe, "cauliflower ear"

5.3.11 *Mouth*—"Mouth" refers to the entire oral region including the teeth and encompasses the philtrum. See Table 11 and Fig. 13.

TABLE 11 Mouth

Component Characteristics	Characteristic Descriptors
Philtrum	• Prominence • Width of ridges • Width of furrow • Symmetry
Overall mouth	• Shape • Symmetry
Upper lip	• Shape • Fullness • Protrusion • Symmetry • Upper vermilion border shape (for example, "Cupid's bow") and definition • Detail (for example, tubercle, lip creases, alae)
Lower lip	• Shape • Fullness • Protrusion • Symmetry • Lower vermilion border shape and definition • Detail (for example, median sulcus, tori, lip creases)
Lip fissure (opening between lips)	• Shape • Symmetry • Degree of contact/occlusion along length of opening • Corners/angles of mouth (labial commissure)
Mouth asymmetry	• Difference between left and right sides
Overall dental occlusion (contact between upper and lower teeth)	• Symmetry • Degree of contact/occlusion
Gnathism (apparent convexity or concavity of the mouth complex, related to the relative projection of the upper or lower teeth, or both)	• Expression (for example, upper gums/teeth protrude, lower gums/teeth protrude) • Degree
Characteristic detail of teeth	• Shape • Size • Alignment/position (for example, gaps, crooked, missing) • Condition (for example, wear, damage, disease, color)
Mouth abnormalities	• For example, cleft lip (congenital deformity caused by abnormal facial development during gestation)

5.3.12 *Chin/Jawline*—"Chin/jawline" refers to the area of the face defined by the lower border of the mandible (namely, "jaw bone"). The chin is the area on the lower jaw below the mouth. Jawline specifically refers to the area of the face defined by the lower border of the mandible between the chin and the gonial angle or the point at which the lower border of the mandible abruptly changes direction from a primarily horizontal line to a primarily vertical line. See Table 12 and Fig. 14.

TABLE 12 Chin/Jawline

Component Characteristics	Characteristic Descriptors
Chin (profile and frontal view)	• Overall shape • Length or width or both relative to rest of face • Prominence • Symmetry • Details (for example, cleft, dimple, mental groove; refer to 5.3.15 on Facial Lines)
Jawline (from chin to gonial angle)	• Shape • Definition (for example, jowls)
Gonial angle (angle of the jaw)	• Shape • Definition

5.3.13 *Neck*—"Neck" refers to the transitional zone between the head and the trunk and limbs of the body. See Table 13 and Fig. 15.

TABLE 13 Neck

Component Characteristics	Characteristic Descriptors
Neck (overall)	• Width • Height • Details (for example, musculature, veins, wrinkles, folds, "wattle," "double chin")
Laryngeal prominence (Adam's apple)	• Shape • Size • Prominence • Location on neck

5.3.14 *Facial Hair*—"Facial hair" refers to the hair on the face typically covering the cheeks, chin/jaw, upper and lower lip, and neck of the face. See Table 14.

TABLE 14 Facial Hair

Component Characteristics	Characteristic Descriptors
Facial hair above upper lip Facial hair below lower lip	• Shape/spatial distribution (including overall hair length) • Texture • Symmetry • Density and distribution of density including gaps • Variation in color/tonality • Orientation (slanted, straight) • Outline/edge definition (for example, sharp, irregular) • Continuity with facial hair on side(s) or below/above mouth • Noticeably longer hairs
Facial hair on right side Facial hair on left side	• Shape/spatial distribution (including overall hair length) • Texture • Symmetry • Density and distribution of density including gaps • Variation in color/tonality • Orientation (slanted, straight) • Outline/edge definition (for example, sharp, irregular) • Continuity with facial hair above or below mouth • Noticeably longer hairs
Facial hair on neck, below chin/jawline	• Shape/spatial distribution (including overall hair length) • Texture • Symmetry • Density and distribution of density including gaps • Variation in color/tonality • Orientation (slanted, straight) • Outline/edge definition (for example, sharp, irregular) • Continuity with facial hair on side(s) or below mouth • Noticeably longer hairs

5.3.15 *Facial Lines*—"Facial Lines" refers to wrinkles, folds, or creases. Creases or folds are determined by craniofacial structure. Other lines, such as wrinkles, are age-related and are caused by muscle action, loss of elasticity of the skin, or loss of subcutaneous fat/teeth at sunken areas, or combination thereof. The following list represents the most common facial lines and is not an exhaustive list. Special attention should be paid to any lines that do not correspond to those listed below. See Table 15 and Fig. 16.

TABLE 15 Facial Lines

Component Characteristics	Characteristic Descriptors
Frontal lines (forehead wrinkles)	• Distribution • Orientation (vertical or horizontal) • Quantity • Pattern (including relation to one another) • Depth/prominence
Vertical glabellar line(s)	• Length • Pattern (including relation to one another) • Depth/prominence
Nasion crease	• Distribution • Quantity • Pattern (including relation to one another) • Depth/prominence
Right lateral nasal lines Left lateral nasal lines	• Distribution • Orientation • Quantity • Pattern (including relation to one another) • Depth/prominence
Bifid nose crease	• Depth/prominence • Length
Periorbital lines adjacent to right eye (crow's feet/wrinkles) Periorbital lines adjacent to left eye (crow's feet/wrinkles)	• Distribution • Quantity • Pattern (including relation to one another) • Depth/prominence
Right superior palpebral crease Left superior palpebral crease (crease between the upper eyelid and the top of the bony orbit)	• Visibility • Position • Depth/prominence • Shape
Right inferior palpebral crease Left inferior palpebral crease (crease between the lower eyelid and the bottom of the bony orbit)	• Visibility • Position • Depth/prominence • Shape
Right infraorbital creases Left infraorbital creases (creases below the eyes)	• Distribution • Quantity • Pattern (including relation to one another) • Depth/prominence
Upper circumoral striae (lines above upper lip) Lower circumoral striae (lines below lower lip)	• Distribution • Quantity • Pattern (including relation to one another) • Depth/prominence
Mentolabial sulcus (horizontal crease or fold between lower lip and chin)	• Shape • Length • Depth/prominence
Right nasolabial crease/folds Left nasolabial crease/folds (creases or folds extending from nose to corners of mouth)	• Distribution • Quantity • Pattern (including relation to one another) • Depth/prominence

TABLE 15 *Continued*

Component Characteristics	Characteristic Descriptors
Right marionette lines Left marionette lines	• Pattern • Depth/prominence
Cleft chin	• Depth/prominence • Size
Right buccal creases/folds Left buccal creases/folds (cheek to chin)	• Distribution • Quantity • Pattern (including relation to one another) • Depth/prominence
Wrinkles on neck	• Distribution • Quantity • Pattern (including relation to one another) • Depth/prominence
Other creases	• Distribution • Quantity • Pattern (including relation to one another) • Depth/prominence

5.3.16 *Scars*—"Scars" refers to dysmorphic or discolored areas or both of skin where permanent damage has healed (that is, not recent damage). These areas may occur at any place on the face since they are typically caused by random trauma or intentional scarification (for example, branding). See Table 16.

TABLE 16 Scars

Component Characteristics	Characteristic Descriptors
Scars	• Location • Shape • Orientation • Size • Color/tonality • Depth/prominence

5.3.17 *Facial Marks*—"Facial Marks" refers to portions of the skin that contain a different level of pigment than the rest of the surrounding skin (for example, freckles, moles, acne, rosacea, birth marks, bruises, abrasions, vitiligo, and dark/light patches). These areas may occur in any location of the face since they are typically random in nature. Some facial marks are transient features that require contemporaneous images for comparison (for example, acne, bruises, and abrasions). See Table 17.

TABLE 17 Facial Marks

Component Characteristics	Characteristic Descriptors
Skin marks (for example, freckles, moles, acne, rosacea, birth marks, bruises, abrasions, vitiligo, and dark/light patches)	• Location/distribution (including relation to one another) • Shape • Size • Color • Prominence

5.3.18 *Alterations*—"Alterations" refers to any intentional modification to the face with the exception of scarring. See Table 18.

TABLE 18 Alterations

Component Characteristics	Characteristic Descriptors
Piercing	• Location • Description
Makeup	• Location • Description (for example, shape, size, and color)
Tattoo (including cosmetic)	• Location • Description (for example, content, shape, size, and color)
Other	• Location • Description

5.3.19 *Other*—The suite of components and characteristics identified in the paragraphs above should be sufficient to address the vast majority of faces encountered in facial comparison situations. However, in some instances, there may be deformities or other irregularities on a face that do not conform to this set of features. In such instances, it will be necessary to include these irregular features in the analysis. Given the unconstrained range of possibilities that this component set represents, it is simply labeled as "other." See Table 19.

TABLE 19 Other

Detailed Feature Characteristic List	Feature Attribute List
Other text	• Description • Details

6. Keywords

6.1 facial comparison; facial features; morphological analysis