

Contents

Reviews of the First Edition
Preface to Second Edition
Preface to the First Edition
Acknowledgements

PART I CONCEPTS

Facial Beauty

with Hengameh B. Naini

Definition of beauty and aesthetics

Is beauty 'in the eye of the beholder'?

The enigma of facial beauty

'Ideal' proportions

Symmetry

Averageness

Facial neoteny

Sexual dimorphism (secondary sexual characteristics)

Heredity

Cultural influences on the perception of facial beauty

Beauty and facial beauty: historical and philosophical perspectives

Socrates and Plato

What Is Beauty? The *Hippias Major* and *Phaedo*

From Aristotle to Montaigne

xvi	From Hume to Darwin	13
xviii	Keats and the eternal beauty of the nightingale's song	15
xx	Shelley and the appreciation of beauty	16
xxii	Emerson on 'beauty'	16
	Beauty and mathematics	17
	Facial Beauty: Scientific perspectives	17
	Facial attractiveness research	17
	Attractiveness research: the experimental method	17
	Attractiveness research: threshold values	18
	The Line of Beauty (serpentine line)	20
	Importance of facial beauty	22
	Self-image and negative self-perception	22
	Outsider's perceptions	22
	'Social disability'	22
	Stereotyping	23
	Teasing and Bullying	23
	Severity of deformity	23
	Striving for form	23
	References	24
	Facial Proportions: Classical Canons to Modern Craniofacial Anthropometry	26
	Chapter 2	
	Introduction	26
	Ancient Egypt	26
	Ancient Greece	27
	The Archaic Period	27
	The Classical Period	29
	The Roman conquest of Greece	33

Ancient Rome	34
The Renaissance	36
Leon Battista Alberti	36
Leonardo da Vinci	38
Leonardo's Notebooks	40
Albrecht Dürer	47
The Enlightenment and neoclassicism	51
Neoclassical canons of proportion	51
Cranioimetry	51
Twentieth century	53
Modern craniofacial anthropometry	53
Leslie Farkas – the pioneer of modern craniofacial anthropometry	54
The golden proportion	55
The ongoing problem with research into the golden proportion	59
The basis of scientific reasoning	59
Conclusion	61
References	61

Chapter 3

Facial Expression: Influence and Significance	63
Introduction	63
Importance of facial expressions	63
History of research into facial expressions	64
The work of Duchenne	65
The work of Darwin	65
The work of Ekman	67
The debate: Are facial expressions of emotion universal or culture-specific?	68
Summary of The Evidence	68
Conclusion	70
References	70

Chapter 4

Psychological Ramifications of Facial Deformities	72
Introduction	72
Health and psychosocial well-being	72
Self-image	73
The effect of the response of others on those with facial deformities	74
Facial deformity, perception and social interaction	74
Teasing and bullying	75
To treat or not to treat? The controversial debate	75
Body dysmorphic disorder: the delusion of deformity	76
Body dysmorphic disorder	76
Diagnosis	79
Informing the patient	81
Management	81

Managing facial deformity in a neurotic-dysmorphic patient	81
Conclusion	82
References	82
Further reading	83

PART II CLINICAL DIAGNOSIS

Section 1 Patient Interview and Clinical Diagnostic Records 87

Introduction to Section 1	87
Diagnosis	87
Terms of direction, position and movement	87

Chapter 5

Patient Interview and Consultation	89
Introduction	89
Presenting complaint	89
History of presenting complaint	90
Psychosocial history	91
Perception	91
Motivation	91
Expectation(s)	91
Cooperation	92
Risk/harm/cost versus benefit considerations	92
Shared decision-making	92
Support network	92
Medical history	93
Danger signals and the 'problem' patient	93
Concluding remarks	93
References	94

Chapter 6

Clinical Diagnostic Records, Natural Head Position and Craniofacial Anthropometry	95
Introduction	95
Clinical diagnostic records	95
Radiographs	95
Clinical photographs	97
Clinical videography	97
Study models	97
Serial height measurement	98
Three-dimensional hard and soft tissue imaging	98
Natural head position	99

Ethnic differences	160
Facial type: frontal view (norma frontalis)	160
Facial shape	160
Facial height-to-width ratio/proportion	161
Facial index	161
Facial type: profile view (norma lateralis)	162
Facial divergence	162
Sagittal facial profile contour	164
Angle of facial profile convexity (alternative term: facial contour angle) (clinical/soft tissue)	164
Angle of facial profile convexity (cephalometric/skeletal)	165
Attractiveness research	165
Facial angle (clinical/soft tissue)	165
Facial angle (cephalometric/skeletal)	165
Cranial base angle	166
Anterior cranial base length	167
Parasagittal facial profile contour	167
Vertical facial profile form	167
Vertical facial growth pattern and hyperdivergent facial type	167
Horizontal facial growth pattern and hypodivergent facial type	168
Mandibular plane angle (clinical)	168
Mandibular plane angle (cephalometric)	169
Gonial angle (Ar-Go-Me)	169
Convergence of horizontal facial planes (Sassouni analysis)	170
Facial height to horizontal facial depth ratio (cephalometric)	170
Facial growth axes (cephalometric)	171
Facial axis	171
Y-axis	171
Facial curves and curvilinear relationships	171
Curvilinear relationships – frontal and profile views	172
Angularity of facial contour lines	172
Facial profile curves and ‘S-shaped’ curvilinear considerations	172
Contour defects	173
Sexual variation: the main differences between male and female faces	174
‘Ethnic’ variation: considerations in facial aesthetic evaluation	175
Historical background	175
Considerations in facial aesthetic evaluation	175
Clinical implications	176
Facial ageing	178
Skin	178
Fat	179
Muscle	179
Dentoalveolus	179
Current understanding, controversies and future research	179
Recognizing the visible effects of ageing	181
References	182

Chapter 9

Facial Proportions	184
Introduction	184
Craniofacial height to standing height proportion	185
Classical, Renaissance and neoclassical proportional canons	185
Anthropometric data	189
Attractiveness research	189
Clinical implications	190
Vertical Facial Proportions	190
Vertical craniofacial bisection	190
Vertical facial trisection (Vitruvian trisection)	190
Vertical craniofacial tetrasection	191
Artist’s facial ‘grid’	191
Validity of proportional canons	191
Craniofacial bisection	191
Facial trisection	192
Craniofacial tetrasection	192
Cephalometric evaluation – anterior face height ratio	192
Lower anterior facial proportions	192
Anthropometric vertical facial measurements	193
Comparison of proportional canons with modern measured proportional ratios	193
Attractiveness studies	193
Clinical implications	194
Transverse facial proportions	194
The central fifth of the face	194
The medial fifths of the face	197
The lateral fifths of the face	198
Concluding remarks	198
References	198

Chapter 10

Facial Symmetry and Asymmetry	199
Introduction	199
Relationship between symmetry and proportion	199
Balance and harmony: a note on terminology	200
Aetiology and classification of facial asymmetry	200
Aetiology	200
Classification	200
Clinical evaluation	201
Purpose of the clinical evaluation	201
Frontal facial examination	201
Bilateral symmetry	201
Facial midline (midsagittal plane)	202
Vertical reference lines/planes	203
Horizontal (transverse) reference lines/planes	203
Superior view	205
Submental view	205
Lateral view	205

Oblique lateral (three-quarter) view	205
Transverse occlusal plane view	205
Dynamic clinical evaluation	206
Mandibular lateral displacement	206
Asymmetrical facial animation	208
Dental midlines	209
Maxillary dental midline	209
Mandibular dental midline	209
Distinguishing between mandibular and isolated chin asymmetry	209
Radiographic/cephalometric evaluation	210
Posteroanterior cephalometric radiograph	210
Midsagittal plane	210
Vertical reference lines/planes	211
Horizontal (transverse) reference lines/planes	211
Triangular analysis	212
Lateral cephalometric radiograph	213
Panoramic rotational tomography (OPT – orthopantomograph)	213
Three-dimensional imaging evaluation	214
Dental study casts	214
Three-dimensional facial soft tissue scans	214
Computed tomography	215
Magnetic resonance imaging	218
Craniofacial growth and treatment timing	218
Treatment timing	218
Superimposition of serial cephalometric images and other imaging modalities	219
Growth prediction	220
Nuclear medicine (scintigraphy)	220
References	222

Section 3 Facial Aesthetic Analysis: Regional Analysis 223

Introduction to Section 3	223
The modified subunit principle	223
Relativity and the five facial prominences	224
The five facial profile prominences	225
References	225

Upper Facial Analysis 226

Chapter 11

The Forehead	227
Introduction and terminology	227
Anatomy	227
Clinical evaluation	228
Frontal view	228
Forehead width	228

Forehead height	228
Profile view	229
Forehead inclination	229
Supraorbital rim projection	230
Morphology of the glabellar-nasal radix region	231
Superior view	231
Curvilinear relationships	231
References	232

Chapter 12

The Orbital Region	233
Introduction	233
The eyes	233
Eyebrows	234
Terminology	234
Anatomy	234
Clinical evaluation	236
Eyebrow position and contour	236
Orientation of palpebral fissure	236
Eyelids (palpebrae)	237
Eyelid shape	237
Eyelid tonicity	238
Upper lid crease (superior palpebral fold; supratarsal fold)	238
Orbital fat	238
Eye width and interocular dimensions	238
Telecanthus	239
Orbital hypertelorism	239
Orbital hypotelorism	239
Normal values	239
Proportional relationships of the orbital region	239
Relationship of bony orbit and globe	239
Symmetry	240
The eyelashes	240
References	240

Midfacial Analysis 242

Chapter 13

The Ears	243
Introduction	243
Terminology	243
Anatomy	243
Clinical evaluation	244
Ear position	245
Ear size and proportions	245
Ear axis	246
Ear protrusion (lateral projection)	246
Ear symmetry	248
References	248

Chapter 14

The Nose	249
Introduction	249
Terminology	251
Anatomy	252
Soft tissue features of external nose	252
Skin of the external nose	252
Bony skeleton of the external nose	252
Cartilaginous skeleton of the external nose	253
Nasal type, topography and the subunit principle	254
Classification of nasal type	254
Nasal index	254
Ethnic variation	255
Topographic nasal landmarks and nomenclature	255
Relative nasal spatial relationships	255
Nasal height	256
Nasal length	256
Nasal tip projection	256
Nasal aesthetic subunits	257
Clinical evaluation	257
Frontal evaluation	257
Vertical proportions	257
Transverse proportions	257
Nasal symmetry and asymmetry	257
Nasal tip morphology	258
Columella–alar relationship (frontal view)	259
Lateral alar axis (frontal view)	259
Profile evaluation	259
Radix evaluation	259
Nasion position	259
Nasofrontal angle	260
Nasal dorsal evaluation	261
Nasal tip rotation	262
Nasal tip projection	262
Nasal tip angle	265
Nasal tip support	265
Alar lobule to tip lobule relationship	266
Columella–alar relationship (profile view)	266
Nasolabial angle	267
Dynamic nasolabial evaluation	269
Basal evaluation	269
Columella (Basal View)	269
Nares (nostrils, basal view)	270
Relative nasal relationships – evaluation	270
Nasal – forehead/brow ridge relationship	270
Nasal – upper lip relationship	271
Nasal – lip – chin relationship	271
Nasal – submental region relationship	271
Normative values for nasal dimensions	271
Nasal function	272
References	272

Chapter 15

The Malar Region	274
Introduction	274
Terminology	274
Anatomy	275
Clinical evaluation	275
Bizygomatic width	275
Malar position	277
Height of malar contour	278
Malar projection and sagittal contour	278
Area of maximal malar projection	278
Malar projection and contour in oblique lateral view	280
Frontozygomatic curvilinear contour	280
Lower component of the frontozygomatic angle	280
Principles in planning the correction of malar deficiency	280
References	282

Chapter 16

The Maxilla and Midface	283
Introduction	283
Terminology	283
Terms of jaw position in the sagittal plane	284
Terms of maxillary position in the vertical plane	284
Terms of jaw size	284
Terms of maxillary bodily movement in the three planes of space	284
Terms of maxillary rotation around the three axes of rotation	284
The six degrees of freedom	286
Anatomy	286
Clinical evaluation	288
Sagittal midfacial-maxillary evaluation	288
Soft tissue evaluation	288
Dentoskeletal evaluation	292
Vertical maxillary evaluation	293
Transverse maxillary evaluation	295
Maxillary width and dental arch width	295
Maxillary dental midline	296
Orientation of the transverse occlusal plane	296
Maxillary deficiency	297
Sagittal maxillary deficiency	297
Vertical maxillary deficiency	299
Transverse maxillary deficiency	300
Relative versus absolute maxillary transverse deficiency	300
Principles in planning the correction of maxillary deficiency	300

Maxillary excess	301
Sagittal maxillary excess	302
Vertical maxillary excess	302
Transverse maxillary excess	305
Principles in planning the correction of maxillary excess	305
Maxillary asymmetry	305
References	306

Lower Facial Analysis 307

Introduction	307
---------------------	-----

Chapter 17

The Lips 308

Introduction	308
Anatomy	308
Embryology	308
Anatomy	308
Ageing	309
Terminology	310
Clinical evaluation	310
Lip lines	310
Lip activity (function)	311
Lip tonicity	311
Dynamic lip evaluation	312
Lip morphology (form)	312
Lip height	312
Lip thickness	314
Lip contour	316
Lip curvature (frontal view)	316
Lip curl (profile view)	317
Lip inclination	318
Lip posture	319
Lip prominence	321
Aetiology of lip prominence	321
Evaluation of lip prominence	322
References	326

Chapter 18

Mentolabial (Labiomental) Fold 328

Introduction	328
Mentolabial fold (sulcus) depth	328
Mentolabial angle	328
Attractiveness research	331
Vertical position of the mentolabial fold	331
Mentolabial fold morphology	331
Advantages of mandibular advancement surgery over isolated genioplasty	332
Influence of mentolabial fold morphology on management of chin deformities	332

Influence of vector of bony chin movement on mentolabial fold morphology	334
Influence of lower anterior face height on mentolabial fold morphology	334
References	334

Chapter 19

The Mandible 335

Terminology	335
Anatomy, morphology and size	335
Normal Anatomy and Subunits	335
Morphology	335
Size and position	338
Proportional relationship of body to ramus	339
Sagittal and vertical relationships	339
Mandibular deficiency	339
True sagittal mandibular deficiency	339
Relative mandibular deficiency	339
Diagnostic features	340
Mandibular excess	342
True mandibular excess	342
Relative mandibular excess	342
Diagnostic features	343
Attractiveness research	346
Transverse relationships	346
Proportional relationships	346
Bicondylar width and bigonial width	347
Mandibular asymmetries	347
Hemimandibular hyperplasia	348
Hemimandibular elongation	349
Hybrid (mixed) forms of hemimandibular hyperplasia and elongation	349
Unilateral condylar hyperplasia	350
Attractiveness research	350
Discriminative thresholds	351
References	352

Chapter 20

The Chin 353

Introduction	353
Anatomy	353
Terminology	354
Chin excess and chin deficiency	354
Progenia (sagittal chin excess)	354
Retrogenia (sagittal chin deficiency)	356
Vertical chin excess (VCE)	358
Vertical chin deficiency (VCD)	359
Classification of chin deformities	359
Clinical evaluation	362
Sagittal evaluation and chin projection	362
Sagittal position of soft tissue chin	363

Vertical incisor relationship (overbite)	400
Transverse incisor relationship	402
Buccal segment relationships (canine and molar relationships)	402
Sagittal buccal segment relationship	402
Vertical buccal segment relationship	403
Transverse buccal segment relationship	403
The term 'Class' and classification	404
The aetiology of malocclusion	406
Skeletal factors	406
Soft tissue factors	407
Local factors	409
Habits	409
Oral health	409
Dental condition	409
Oral hygiene and gingival/periodontal condition	410
Oral mucosa	410
Occlusal function	410
Dynamic occlusal function	410
Temporomandibular joint function	410
References	410

Chapter 23

Smile Aesthetics with <i>Daljit S. Gill</i>	412
Introduction	412
Importance of the smile in facial aesthetics	412
Types of smile	412
The generation of a smile	413
Clinical evaluation	413
Lip aesthetics	413
Lip lines	413
Upper lip-maxillary incisor relationship	414
Incisor exposure and phonetic analysis	418
Incisor exposure in oblique lateral view	419
Incisor exposure and anterior occlusal guidance	419
Smile symmetry	420
Dynamic upper lip curvature	420
Orientation of the transverse occlusal plane	420
Orientation of the sagittal occlusal plane	421
Smile curvature (smile arc)	421
Factors influencing the smile curvature	422
Maxillary occlusal plane inclination	422
Lower lip curvature	423
Maxillary incisor inclination	423
Maxillary incisor vertical position	423
Maxillary incisor crown height	423
Dental midlines	425
Buccal corridors (negative space)	425

Smile aesthetics in profile view	427
Sagittal position of the maxillary central incisors	427
Vertical position of the maxillary central incisors	427
Maxillary incisor inclination in profile view	428
Conventional measurement of maxillary incisor inclination	428
Maxillary incisor labial face tangent	429
References	431

Chapter 24

Dentogingival Aesthetics with <i>Daljit S. Gill</i>	432
Introduction	432
Anatomy	432
The concept of 'biological width'	433
Clinical evaluation	434
Tooth shape	434
Theories of 'ideal' tooth shape	434
Tooth size	436
Width-to-height ratio of maxillary central incisor crown	436
Seventh key and dental occlusion	437
Tooth size analysis	437
Tooth proportions	438
Tooth symmetry	439
The unilaterally peg-shaped or congenitally absent maxillary lateral incisor	439
Arch form	440
Maxillary incisor axial angulations	441
Gradation (front-to-back progression)	441
Gingival aesthetics	442
Gingival colour, texture and biotype	442
Gingival level	443
Gingival contour	443
Gingival embrasures	443
Gingival zenith	444
Contacts, connectors and embrasures	445
Tooth colour	446
Description of tooth colour	446
Arch shade progression	446
Tooth shade value contrast with skin colour	447
Age changes	447
Clinical shade selection	448
References	448
Index	450