

# MaqFACS Manual

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# Introduction

The Facial Action Coding System, or FACS (Ekman and Friesen, 1978; Ekman, Friesen & Hager, 2002), is an anatomically-based coding system for measuring facial movements in humans (<http://face-and-emotion.com/dataface/facs/description.jsp>).

FACS describes how individual facial movements (Action Units = AU) change the appearance of the face in terms of position and shape of facial features and facial landmarks, such as furrows.

Recently, the FACS has been modified for use with chimpanzees (ChimpFACS [www.chimpfacs.com](http://www.chimpfacs.com)) and here we describe its modification for use with rhesus macaques by...

- Identifying the muscle(s) underlying each AU. Where this is unknown, the movement is described as an Action Descriptor (= AD)
- Illustrating each movement with photographs, videos and diagrams.
- Describing how several AUs may interact to change the facial appearance
- Identifying any common problems with discriminating between individual AUs.

Facial muscles are similar between the three species, so the aim is to use the same AU's and criteria wherever possible, but to develop new AU's where the facial anatomy differs. Standardised terminology is used throughout these systems so that facial movement can be compared accurately between species.

Note: Examples of single AUs are given wherever possible but if other movements are present, they will be given in [parentheses]

# MaqFACS Certification

As with FACS and ChimpFACS, the MaqFACS requires certification to use. Practice materials and the final test are available at...

<http://userwww.service.emory.edu/~lparr/MaqFACS.html>

- Please cite “MaqFACS was supported by the National Institutes of Mental Health (R03MH082282) to L.A. Parr” when referencing this manual/coding system
- Useful references

A.M. Burrows (2008). The facial expression musculature in primates and its evolutionary significance. Bioessays, 30, 212-225.

B.M. Waller, L.A. Parr, K.M. Gothard, A.M. Burrows & A.J. Fuglevand (2008). Mapping the contribution of single muscles to facial movements in the rhesus macaque. Physiology & Behavior, 95, 93-100.

A.M. Burrows, B.M. Waller & L.A. Parr (2009). Facial musculature in the Rhesus Macaque: Evolutionary and functional contexts with comparisons to chimpanzees and humans. The Anatomical Record, 215, 320-334.

# Modifying FACS for Macaques

The process of modifying FACS for other species of primates:

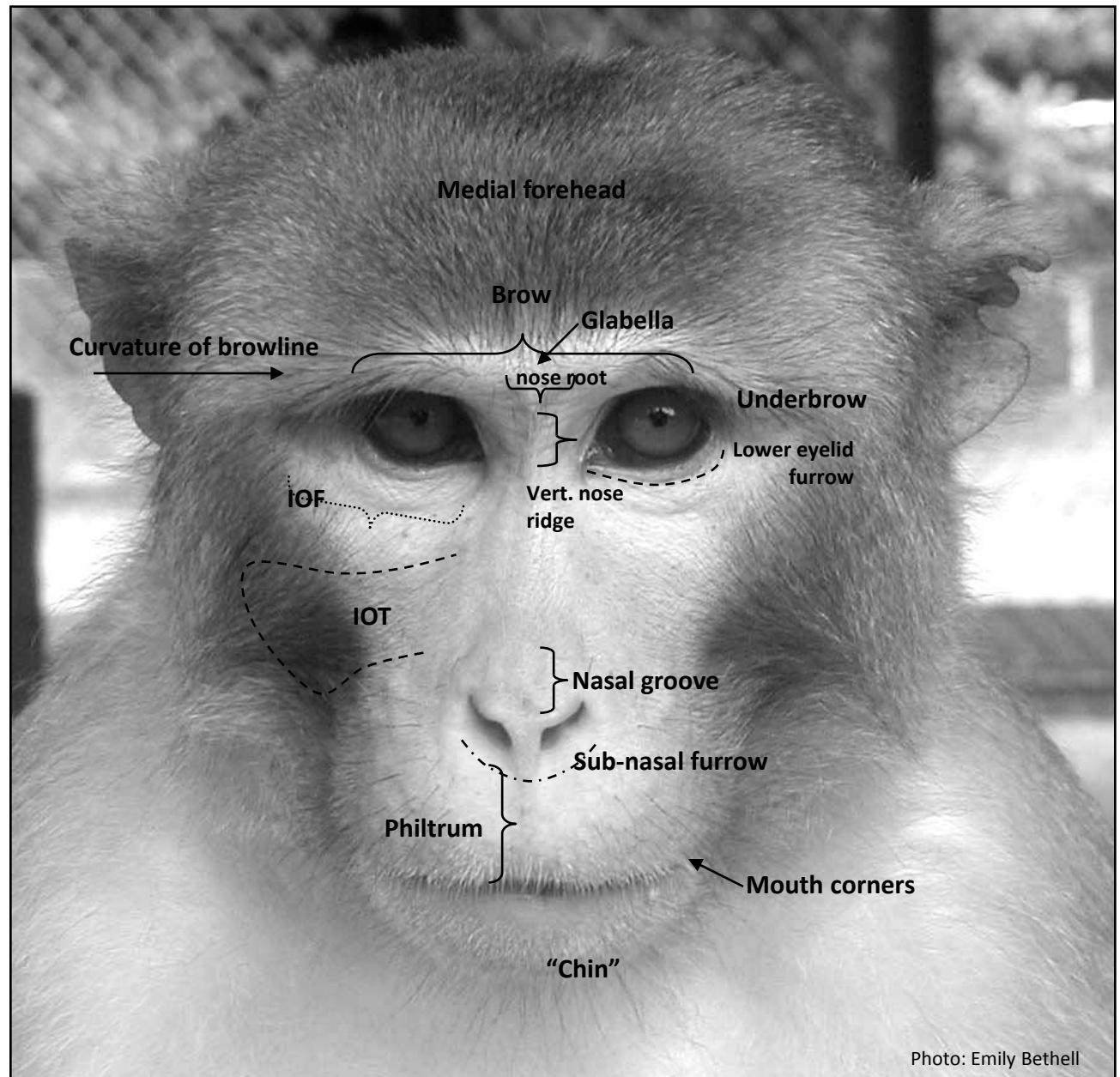
- Describe the facial muscle plan in rhesus macaques in terms of presence, location, and size of facial muscles
- Describe the functional anatomy using intramuscular stimulation to examine how each muscle changes facial appearance (see Facial Landmarks)
- Careful consideration of morphological differences between the macaque and human face
- Micro-analysis of video footage to identify, describe and illustrate AUs in freely behaving rhesus macaques
- Provide descriptions of appearances changes for each movement using similar Action Unit labels as FACS, whenever possible

## Facial landmarks in the rhesus macaque

Abbreviations:

IOF – Infraorbital furrow

IOT – Infraorbital triangle

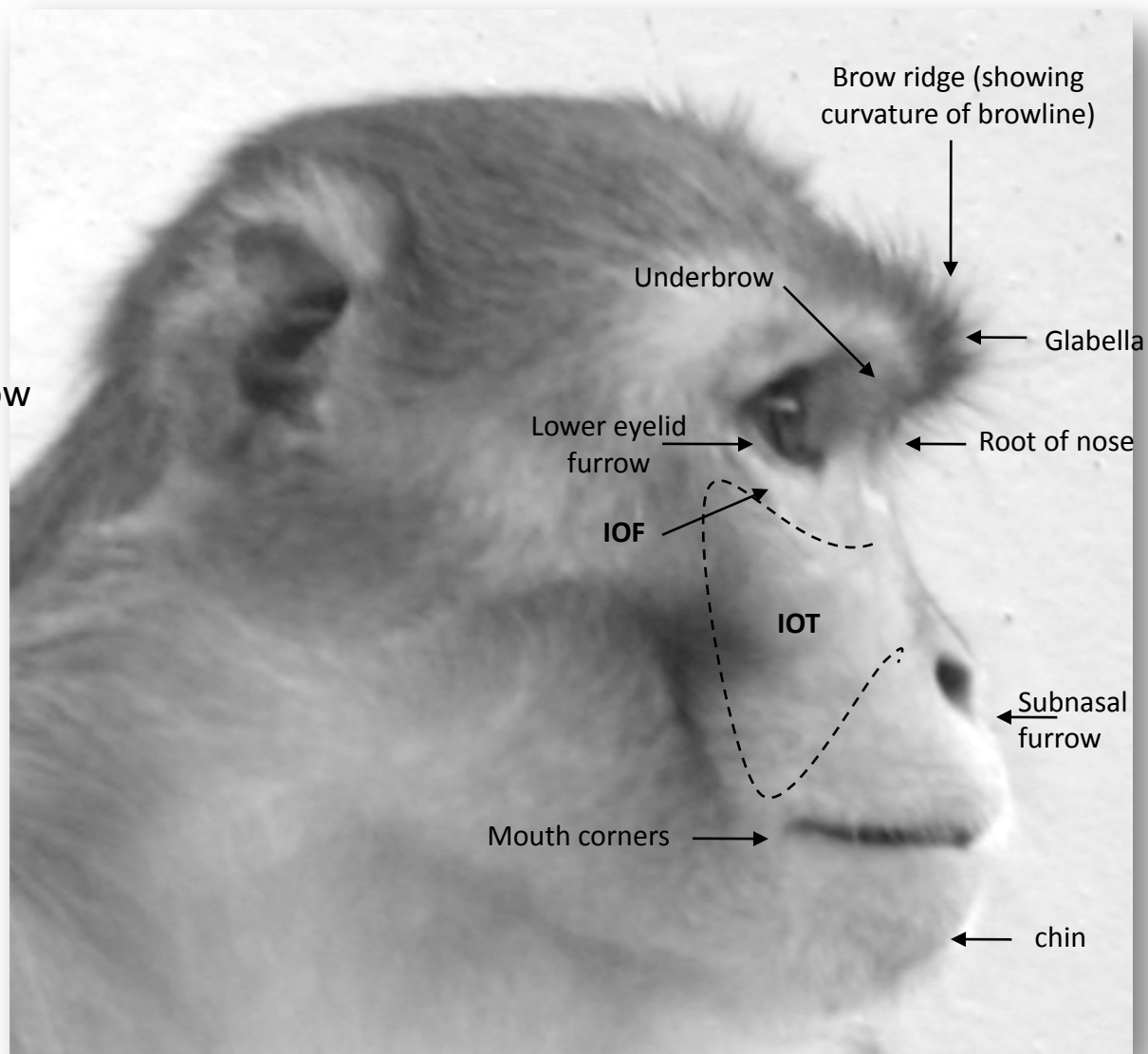


**Facial landmarks  
in profile:**

Abbreviations:

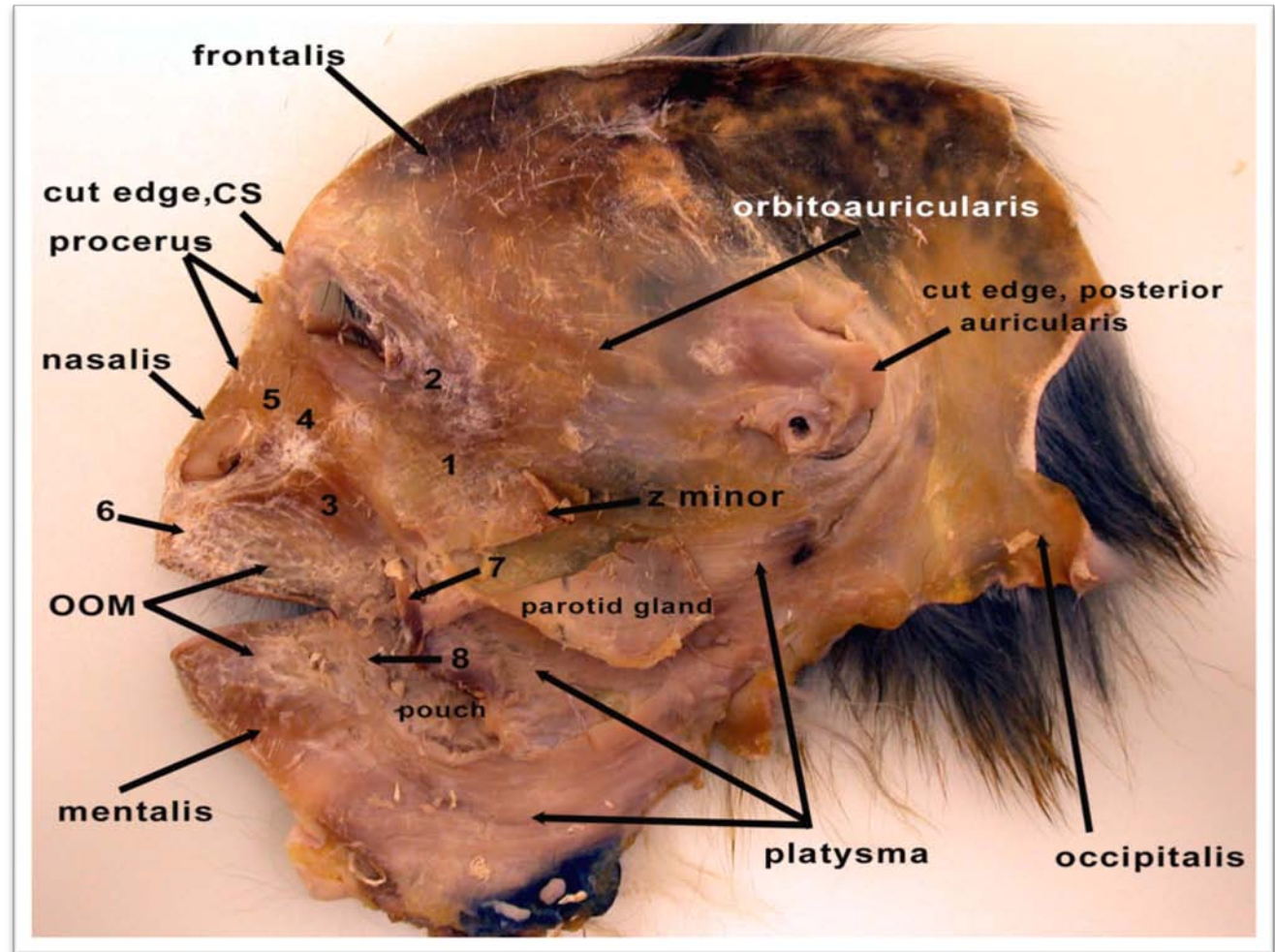
IOF – Infraorbital furrow

IOT – Infraorbital  
triangle



## Facial muscles in the rhesus macaque

1. Zygomatic major
2. Orbicularis oculi
3. Caninus
4. Levator labii superioris
5. Levator labii s. alaeque nasi
6. Depressor septi
7. Buccinator
8. Depressor labii inferioris



From : Burrows, Waller & Parr (2009)

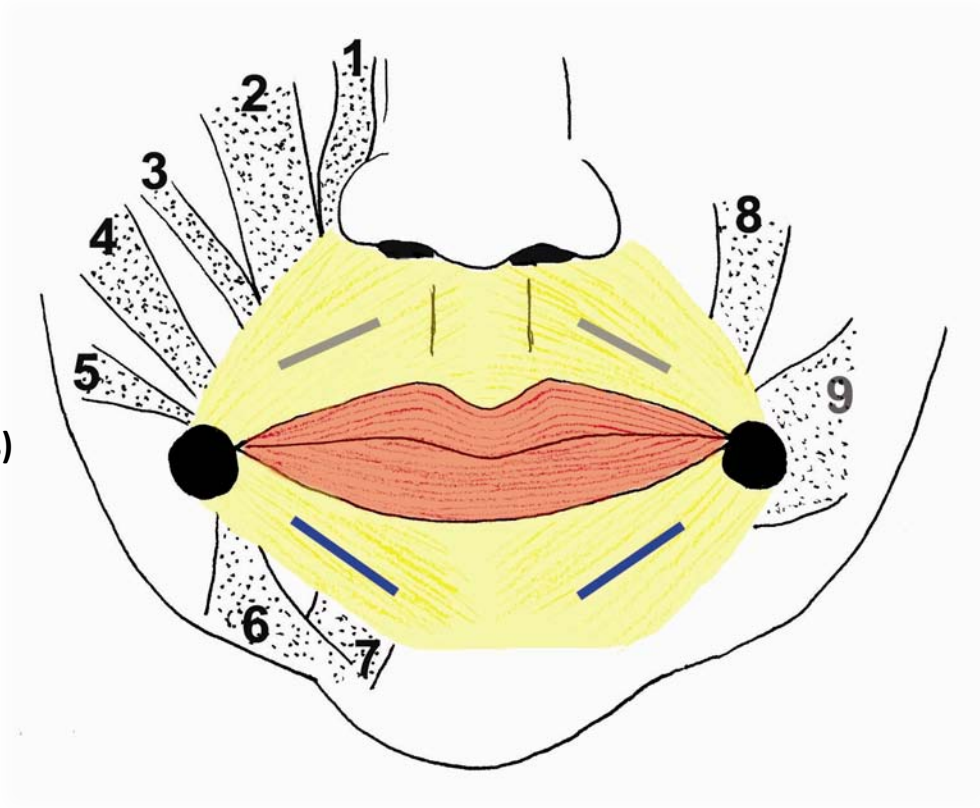
Basic muscle plan similar to human and chimpanzees.

Important differences - Absent: Risorius; Variable in macaques: depressor supercillii, zygomatic minor, anterior auricularis, levator labii superioris alaeque nasi, depressor septi

## Schematic representation of Orbicularis oris muscle (OOM) fibers and their attachments (from Burrows, Waller & Parr, 2009)

Yellow and red highlights the pars peripheralis and pars marginalis portions of the OOM, respectively. The black dots indicate the modiolar region where the segments of the OOM attach. Portions 1-7 represent deep attachment and segments 8 and 9 superficially attached fibers. Grey lines on upper lip represent incisivii superioris and blue lines on lower lip represent incisivii inferioris

- 1- levator labii alaeque nasi
- 2- levator labii superioris
- 3- zygomatic minor
- 4- zygomatic major
- 5- risorius
- 6- depressor anguli oris (triangularis)
- 7- depressor labii inferioris
- 8- levator anguli oris (caninus)
- 9- buccinator





# Definitions for describing facial appearance changes

adapted from Ekman & Friesen, 1978

## Changes to lip and other features

**Elongate:** mouth appears to be longer than usual in horizontal plane

**De-elongate:** mouth appears to be shorter than usual in the horizontal plane

**Narrow:** feature becomes less visible, surface area is reduced in size

**Widen:** fleshy part of lip is revealed more or is wider than usual

**Flatten:** lips appear to flatten against teeth, protrude less but not in the case of suckling

**Protrude:** lips come forward or out away from the face more than usual

**Tighten:** lips appear tight, not relaxed or loose, muscles within the lips has contracted

**Stretch:** lips are pulled and the skin stretched like a rubber band

**Rolled in:** lips are turned or rolled inwards, disappearing almost entirely...but not due to tightening, pressing or stretching

**Pursing:** lips are pulled medially causing them to protrude forward

**Cinching:** mouth is tightened distal to the lips

## Terms that describe transient excrescences of the skin

**Bulge:** protrusion of skin where skin appears pushed outward by muscle or by skin being stretched over the eyeball or bone

**Bag:** loose skin which wrinkles as it is gathered together or pushed, bag remains loose, not taut, and it may be permanent but could thicken or become larger / more prominent with certain actions

**Pouch:** pocket-like shape often protrudes like a bulge, also may be permanent in some faces but certain actions will make more prevalent

## Terms that describe marks in the skin

**Line:** surface line with no depth, usually quite fine in terms of width, some faces may show permanent surface lines and these may deepen to a wrinkle with certain actions

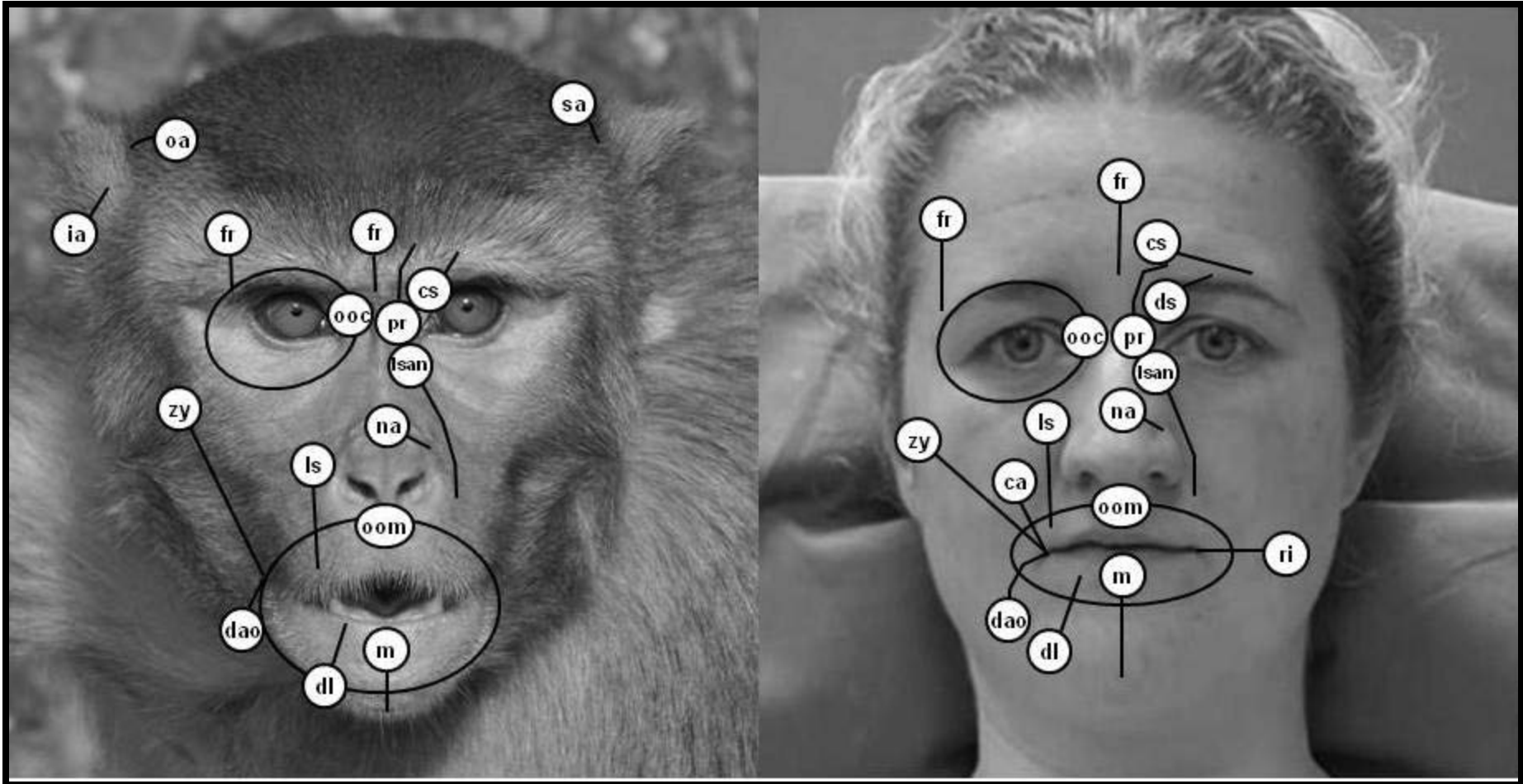
**Wrinkle:** line which has some depth and often has more width than a surface line, some faces may show permanent wrinkles but they will appear with certain actions, other faces may have permanent wrinkles but these will deepen with certain actions

**Furrow:** term describes a place on the face where certain wrinkles may appear, lower eyelid furrow, intraorbital furrow. In some faces, these don't appear unless there is a specific action. In some faces, these are permanent but can deepen to a wrinkle with certain actions, i.e. permanent lines in the infraorbital furrow

## Facial Action Map:

Proposed direction of muscle action based on intramuscular stimulation

KEY: fr = frontalis, pr = procerus, cs = corrugator supercilli, ooc = orbicularis oculi, lsan = levator labii superioris, na = nasalis, zy = zygomatic major, ca = caninus, ri = risorius, oom = orbicularis oris, dao = depressor anguli oris, dl = depressor labii inferioris, m = mentalis, oa = orbito-auricularis, sa = superior auricularis, ia = inferior auricularis



From : Waller, Parr, Gothard, Burrows & Fuglevand (2008)