

Chimpanzee Action Unit 1+2: Brow Raiser

AU1+2 raises the brows and causes changes in the appearance of the forehead and brow. These two AUs do not seem to display the independent action of medial and lateral sections of the brow which is seen in humans. Therefore, brow raising is only presented as a combined AU1+2.

Proposed Muscular Basis

The frontalis originates on the upper cranium (galea aponeurctica) and has no bony attachments with terminal fibres blending with the procerus and orbicularis oculi. Contraction pulls the brow upwards.

Appearance Changes

1. Pulls the entire brows upwards; this movement can be seen as skin moving over the brow ridge or the brow itself may be pulled upwards.
2. The movement may cause the texture of the visible brow to change, as the skin under the brow ridge is pulled upwards and revealed.
3. The wrinkles on the forehead or on the upper part of the brow itself may deepen.
4. Action may cause appearance of eye cover fold to change as brow movement pulls skin upwards.
5. The upwards movement of the brows can often be clearly seen in profile views.

Figure 3.3 Texture of the visible brow changing as AU1+2 pulls the brow upwards



[Video 1](#) Example 1+2 frontal view

[Video 2](#) Example 1+2 in ¾ profile

Figure 3.4 Neutral and AU1+2 showing brow raise and change to eye cover fold



Minimum Criterion

Upwards movement of the brow from neutral position must be seen.

Reference AU1+2

Subtle Differences

Changes in eye gaze and head direction need to be considered when coding AU1+2 as these may influence perception of brows. There may be movement on the lateral areas of forehead during mastication; the chewing action should readily identify the cause of the movement and should not be mistaken for AU1+2.

Figure 3.5 Interaction between gaze and brows



In some individuals:

- Closing (AU43) or blinking (AU45) the eyes may result in the brows being pulled slightly downwards; it is important that the subsequent return to the neutral position is not coded as a brow raise.
- The brows may be so prominent that it is necessary to raise the brows in order to increase the visual field; this should still be coded as AU1+2 if the brow position is raised compared to neutral.

Viewing Angle

In addition, due to the prominence of the brows, slight changes in the angle of the head can lead to quite dramatic changes in the appearance of the brows, for example, visibility of wrinkles. It is therefore important to determine whether changes in the appearance of the brows are due to action of AU1+2 or a change in perspective alone. For example, movement of the brow often accompanies changes in gaze direction so that the head and eyes may be oriented upwards and the brows raised at the same time. It is therefore important that the brow raise be seen beyond the appearance change due to perspective change.

Figure 3.6 Changes in head angle may alter the appearance of the brows



Figure 3.7 Lifting brows to increase visual field



Comparison to Human FACS AU1 + AU2

Unlike in humans, the medial (central) frontalis does not appear to act independently from the lateral portion of the muscle in chimpanzees. Therefore AU1 and AU2 are expected to be seen in combination. However, one video clip shows a lateral AU2 in the chimpanzee; at this stage it is unclear whether this is indicative of a truly independent AU2 action.

The horizontal brow wrinkles which are a key indicator of AU1+2 in humans, are less obvious in the chimpanzee. There are permanent wrinkles on the chimpanzee forehead that may deepen with this action, but this AU is more readily detected by movement along the brow itself. Moreover, while the frontalis muscle is longer in chimpanzees, in some chimpanzees the forehead is almost entirely covered in hair; any wrinkling will in most cases only be visible close to the brows.

The chimpanzee brow and forehead often have visible wrinkles which may be false indicators of brow raising (a cue to AU1 and AU2 in humans) in neutral, so in order to code AU1+2 it is important that some deepening or movement of facial these landmarks is observed.