
AHS CAPSTONE IN NONVERBAL COMMUNICATION: DELIGHTFUL DELIVERABLE

INTRODUCTION

Over the past semester, Connor and I have been pursuing two methods of expanding our knowledge of nonverbal communication and skill at encoding and decoding facial expressions.

First, each week we have worked through one chapter of the FACS Training Manual. Each chapter describes how to encode and decode several new action units (AUs), details the subtle differences between these new expressions, explains how the AUs change appearance when in combination, and provides a number of videos and pictures to practice scoring. I have kept simple notes of my progress through the manual in my FACS Journal, included below.

Second, each week we alternate between designing and conducting simple field experiments. We have designed and completed five such exercises:

- Facial Expression Reproductions (Making Faces)
- Decomposing Emotional Expressions
- What Makes a Genuine Smile?
- Comparing Action Units Across Media
- Facial Expressions Differences Across People and Contexts

In addition to the journal and exercises, we will attempt to become officially certified FACS coders by completing the FACS Final Test and submitting it for evaluation. However, this goal is beyond the scope of our official AHS Capstone as the test can take up to two months to be evaluated.

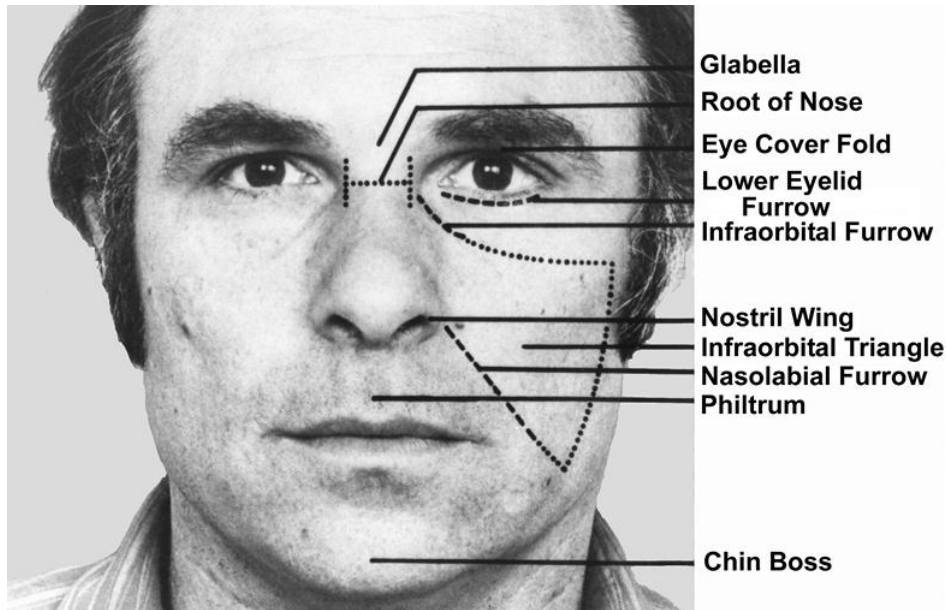
We have both improved significantly in our ability to encode and decode facial expressions according to the official FACS manual. When we started we did not know any of the official designations for action units, and many of them we could not intentionally control. We now have successfully learned to identify and reproduce all of the 44 total AUs. We have also improved our fluency in identifying facial expressions in the real world and our general familiarity with the literature on nonverbal communication through our semi-weekly field exercises.

FACS JOURNAL

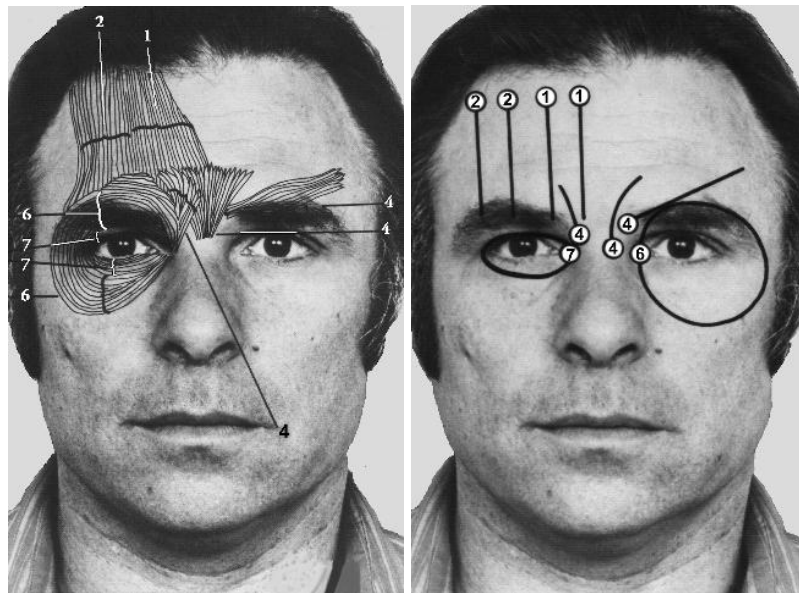
WEEK 1

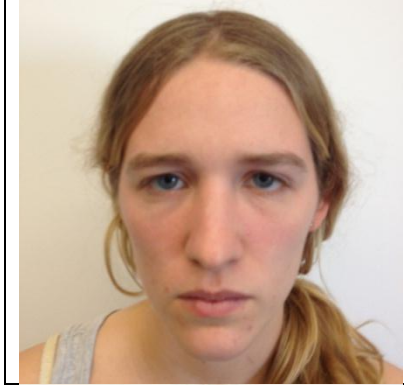
CHAPTER 2: UPPER FACE ACTION UNITS

WHOLE FACE ANATOMY



UPPER FACE MUSCLES





AU4 (Brow Lowerer) – I was able to produce this without moving any other AUs. It was also relatively easy to identify the correct (and incorrect) motions in Connor’s expression.




AU1 (Inner Brow Raiser) – I can’t do this at all. The only way I can get AU1 to move is in combination with AU2.



AU2 (Outer Brow Raiser) – I can do the left side perfectly, but I can’t do the right side at all.



AU5 (Upper Lid Raiser) – This one is very easy.

| | |
|---|--|
|  | <p>AU7 (Lid Tightener) – This one is also relatively easy to do, although difficult to distinguish from other AUs that cause the same eyelid tightening.</p> |
| | <p>AU6 (Cheek Raiser and Lid Compressor) – This one is more difficult – it is especially hard to produce it without also producing AU7.</p> |

WEEK 2

CHAPTER 2: UPPER FACE ACTION UNITS

AU 43 – Eyelid lowerer. I was easily able to do this, although it was difficult to see in the mirror :P.

AU45 – Blink. Also easy to do, but hard to examine.

AU46 – Wink. A little difficult to wink just one eye without using other muscles to keep the other eye open.

CHAPTER 3: SCORING PRACTICE

I did very well on my first try at officially scoring upper face AUs. I had a 90% correlation, and generally was close or perfect on intensity ratings as well. I was nearly perfect at scoring AUs 1,4, and 5, was very good at AUs 2 and 6, and okay at AU7.

COMPARISON OF ANSWERS TO CRITERION: ACCURACY OF EACH AU ACROSS ITEMS

| AU 6 | | | | | | |
|-----------------|------|--------|------|------------------|-----------|----------|
| Agreement index | Hits | Misses | Adds | Intensity Scored | Deviation | Variance |
| 0.8888889 | 4 | 1 | 0 | 4 | -0.5 | 0.5 |

| AU 5 | | | | | | |
|-----------------|------|--------|------|------------------|-------------|-----------|
| Agreement index | Hits | Misses | Adds | Intensity Scored | Deviation | Variance |
| 1.0 | 7 | 0 | 0 | 7 | -0.14285715 | 1.5714285 |

| | | | | | | |
|-----------------|------|--------|------|-----------------|-----------|------------|
| AU 4 | | | | | | |
| Agreement index | Hits | Misses | Adds | Intensity Score | Deviation | Variance |
| 1.0 | 11 | 0 | 0 | 11 | 0.0 | 0.54545456 |

| | | | | | | |
|-----------------|------|--------|------|-----------------|-----------|----------|
| AU 2 | | | | | | |
| Agreement index | Hits | Misses | Adds | Intensity Score | Deviation | Variance |
| 0.8 | 2 | 0 | 1 | 2 | 1.0 | 1.0 |

| | | | | | | |
|-----------------|------|--------|------|-----------------|-----------|-----------|
| AU 1 | | | | | | |
| Agreement index | Hits | Misses | Adds | Intensity Score | Deviation | Variance |
| 0.9230769 | 6 | 0 | 1 | 6 | 0.8333333 | 1.1666666 |

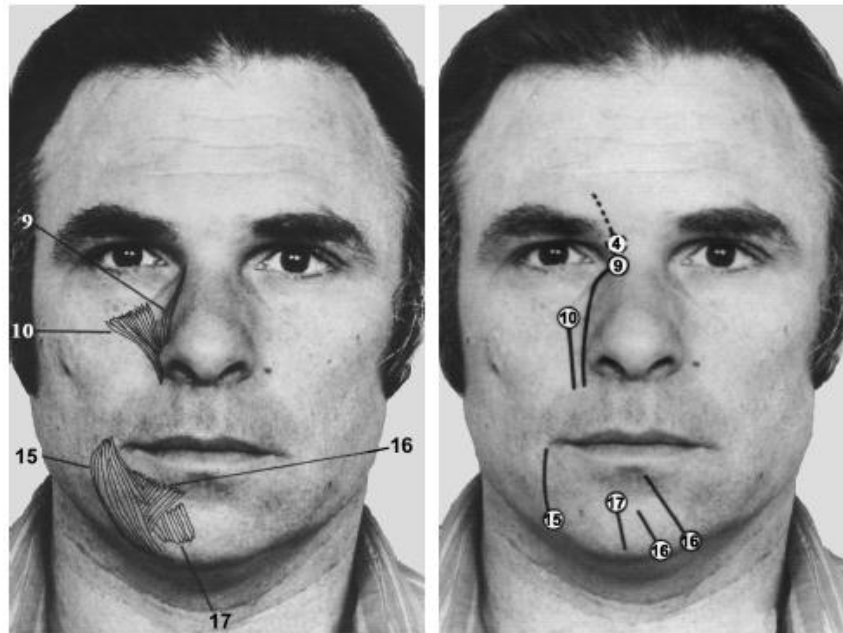
| | | | | | | |
|-----------------|------|--------|------|-----------------|------------|----------|
| AU 7 | | | | | | |
| Agreement index | Hits | Misses | Adds | Intensity Score | Deviation | Variance |
| 0.6 | 3 | 2 | 2 | 3 | -1.6666666 | 3.0 |

OVERALL AGREEMENT INDEX

0.9041096

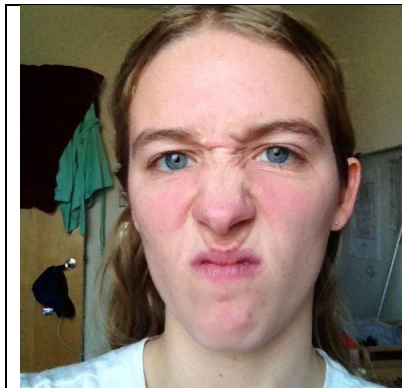
WEEK 3

CHAPTER 4: LOWER FACE ACTION UNITS – UP/DOWN ACTIONS

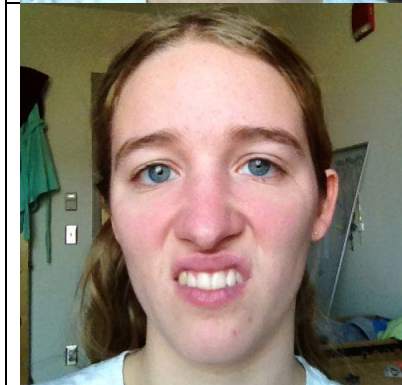


Muscular Anatomy

Muscular Action



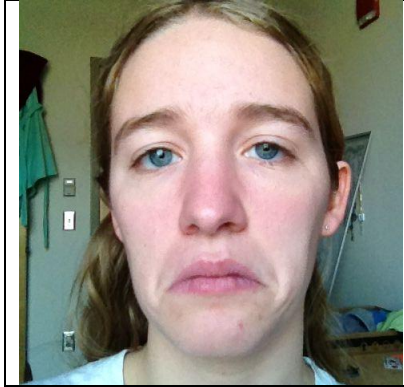
AU9 (Nose Wrinkle) – This one is relatively easy to do, but can be somewhat difficult to isolate from AU4.



AU10 (Upper Lip Raiser) – This is also relatively easy to do (it feels like a sneer of disgust). I can do L10 independently, but haven't been able to really isolate R10 yet.



AU17 (Chin Raiser) – Also easy to do (feels like a pout).

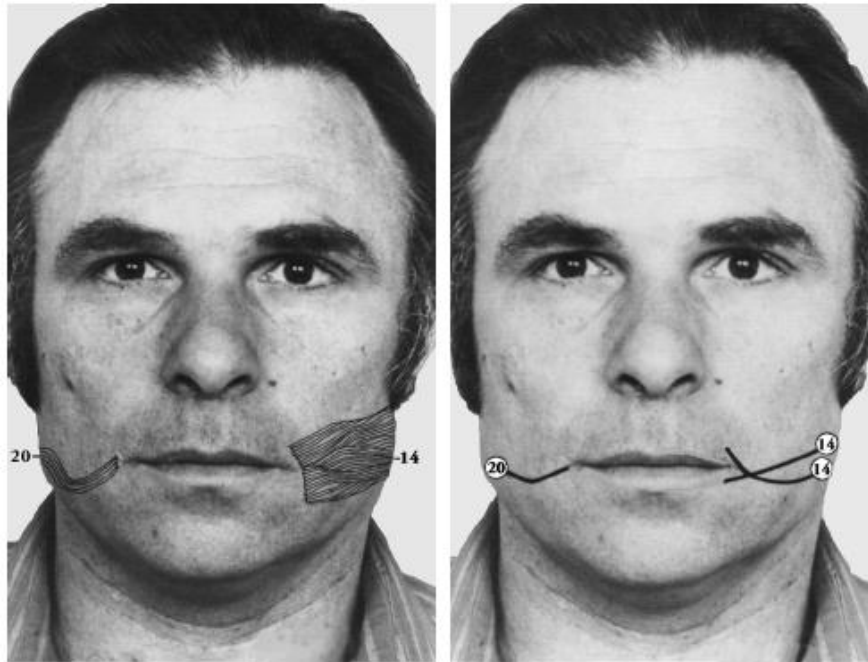


AU15 (Lip Corner Depressor) – This one feels like an exaggerated frown. I was able to do it on my first try, but Connor still can't do it in isolation, and can only barely do in combination with other AUs.

AUs 25,26,27 – These are just scores for lips part, jaw drop, and mouth stretch.

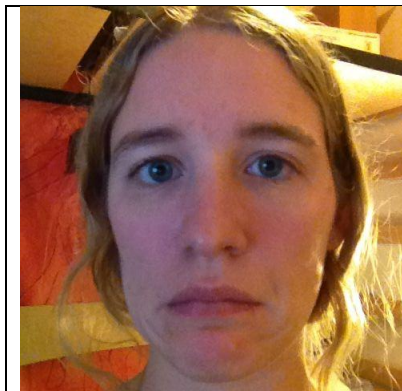
WEEK 4

CHAPTER 5: LOWER FACE ACTION UNITS – HORIZONTAL ACTIONS

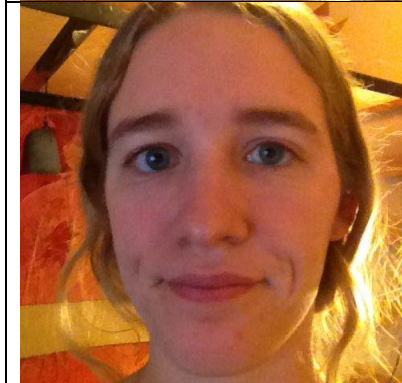


Muscular Anatomy

Muscular Action



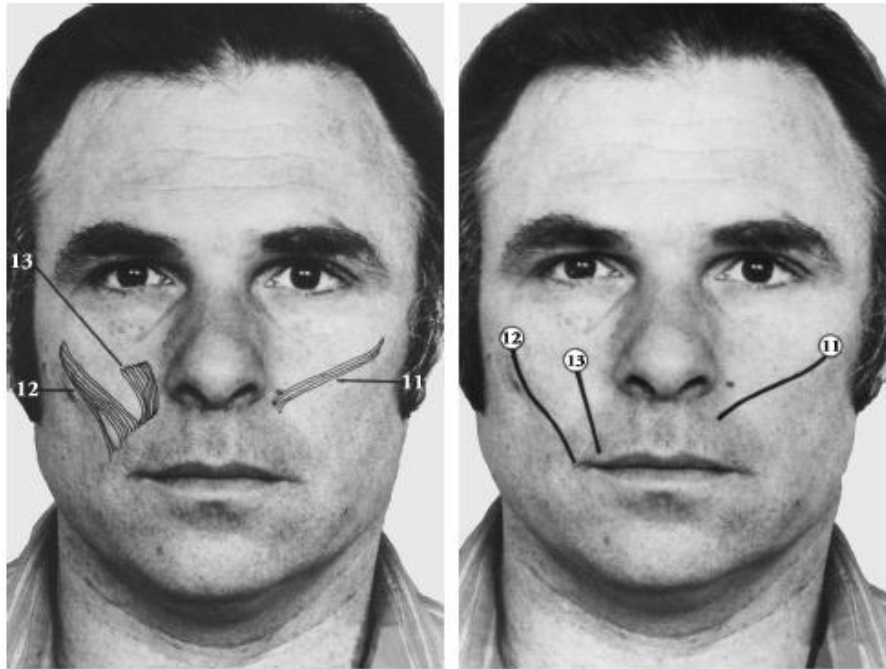
AU20 (Lip Stretcher) – I have some trouble not producing other AUs in combination. In particular, it is easy to add in AU15 with downturned lips or AU12 with upturned lips. It is also easy to throw in some AU17.



AU14 (Dimpler) – I also had trouble distinguishing this from AU12. The muscles feel very similar

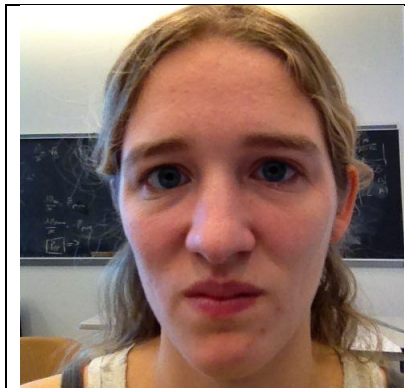
WEEK 5

CHAPTER 6: LOWER FACE ACTION UNITS – OBLIQUE ACTIONS



Muscular Anatomy

Muscular Action



AU11 (Nasolabial Furrow Deepener) – This was initially very difficult to distinguish from AU10, but we were eventually able to isolate the muscle. The difference is that AU10 pulls straight up, whereas AU11 pulls more laterally.



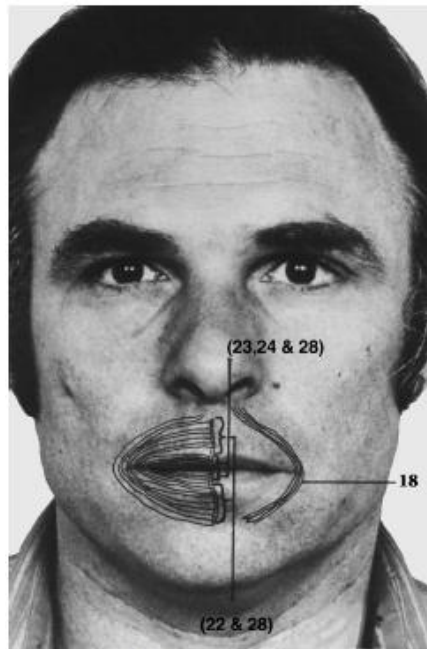
AU12 (Lip Corner Puller) – This is a smile without any other facial actions.



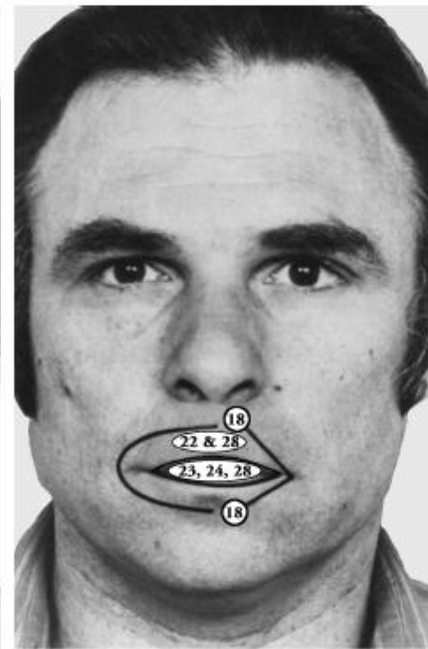
AU 13 (Sharp Lip Puller) –This AU was incredibly difficult to perform, and I’m still not 100% sure I’m doing it properly. Conner and I spent at least 30 minutes practicing it and critiquing each other.

WEEK 6

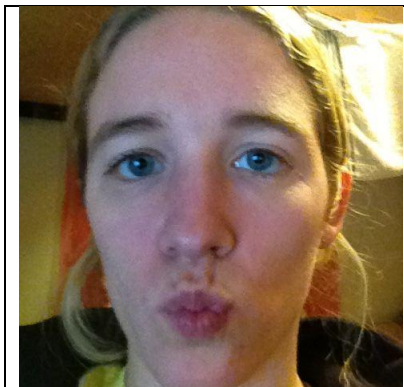
Chapter 7: Lower Face Action Units – Orbital Actions



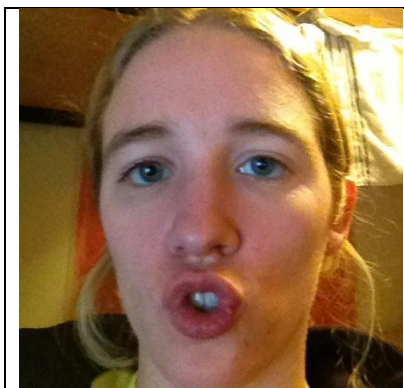
Muscular Anatomy



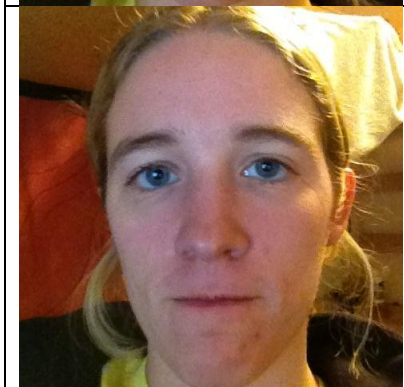
Muscular Action



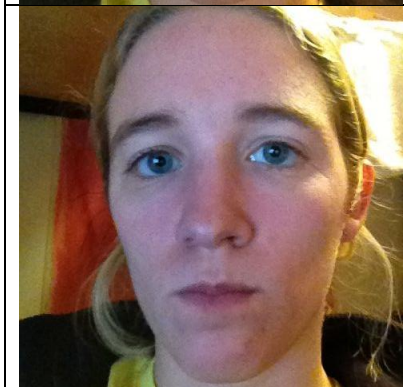
AU18 (Lip Pucker) – This action is very easy to do. It’s just like puckering your lips for a fake kiss.



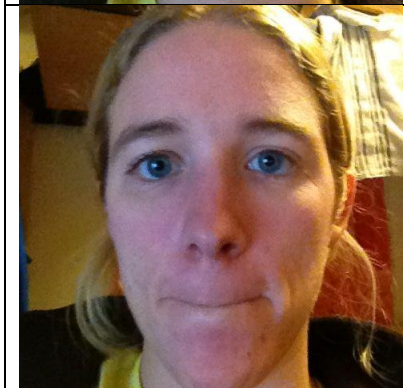
AU22 (Lip Funneler) – This action is also relatively easy to learn. The manual suggested moving your lips as though you were saying “flirt” and then exaggerating the motion. The only difficulty for me was doing it without mixing in AU10 or AU17.



AU23 (Lip Tightener) – At first this was very difficult to do because it was hard to tell which muscles I should use. However, after a few minutes I figured out the correct muscle and then it was very easy.



AU24 (Lip Presser) – The manual said that this would be very easy, but I actually had a lot of difficulty learning how to do it without using AU17 to push my lower lip up.



AU28 +26 (Lips Suck) – This was very easy to do – just suck in your lips. It is usually scored with AU26 because it would be very difficult to do it without dropping your jaw.

EXPERIMENTS

EXERCISE 1: FACIAL EXPRESSION REPRODUCTION (MAKING FACES)

DESIGN

INTRODUCTION

This exercise is an introduction to the difficulties of intentionally producing facial muscle actions and of objectively identifying differences between facial expressions. It will therefore serve as an excellent baseline against which to test your future progress.

LITERATURE

Read this article on the development of deliberate facial movement: <http://www.paulekman.com/wp-content/uploads/2009/02/Deliberate-Facial-Movement.pdf>. Optionally find your own relevant article as well. In your deliverable, try to make connections between your observations and the reading.

EXERCISE

Find six images displaying a variety of facial expressions. Then find one or more friends and ask them to attempt to reproduce the expressions to the best of their abilities. We might recommend using a mirror for assistance. Once your friend is satisfied with their reproduction of each face, take a photo to use for later comparison. Switch roles, such that you also attempt to reproduce the face, and have your friend take a photo when you are satisfied.

DELIVERABLE

Compare the pictures you found with the pictures you took of yourself and your friend(s) and note any differences. Be as specific as possible.

SOME QUESTIONS TO CONSIDER:

- Are there any actions that people seem to have difficulty reproducing?
- Are there any that are universally easy to reproduce?
- Do people attempt to encode the emotions they perceive in the expressions rather than the actual combination of muscle actions that comprise the expression?

REPORT

INTRODUCTION

For this exercise, I found a set of clearly depicted facial expressions online:

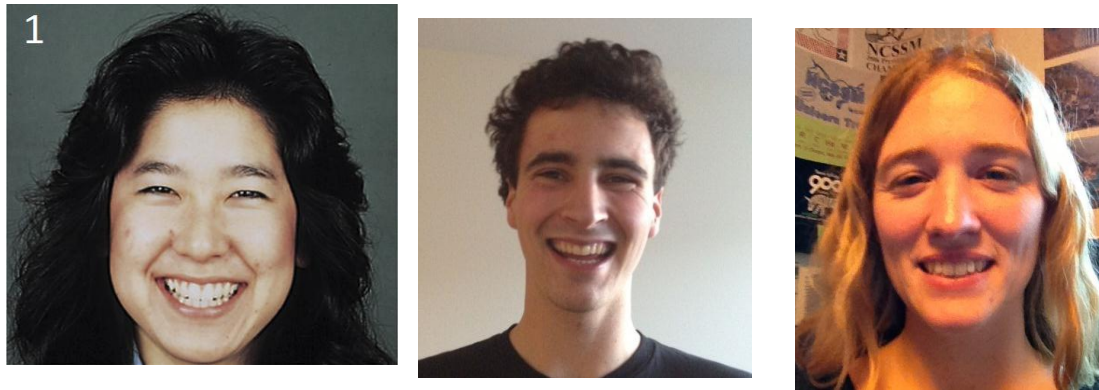


I then asked my friend Kevin to reproduce the facial expressions as exactly as possible. I allowed him to practice and to evaluate his own expression and take his own photo when he felt he had the expression as close as possible, but did not coach him or offer my own advice. Afterwards, I asked him to compare his face with the original and note any differences. On my own time, I also attempted to reproduce the expressions and photographed myself when I felt I had maneuvered my face into as similar an expression as possible.

COMPARISON

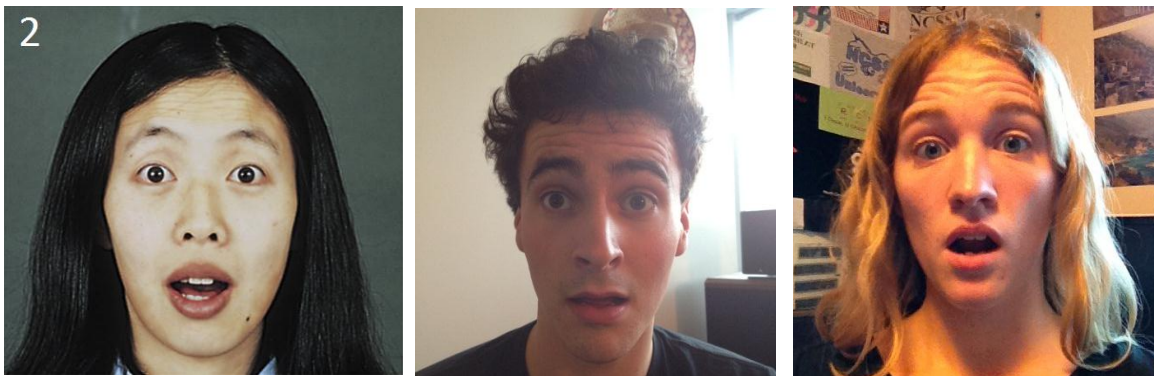
As expected, Kevin was much less intentional about his reproduction of facial expressions than I was. In their 1980 paper titled "Deliberate Facial Movement," Paul Ekman, Gowen Roper, and Joseph Hager note that "Facial expressions...may be achieved by two quite different techniques. In *deliberate action* a person imitates an observed expression or makes a face to fit the memory of an appearance. In contrast, when *generating emotion* one focuses upon the experience, not the expression." (Ekman, 1980) Even though I coached Kevin to use the first technique, suggesting that he try to identify the specific muscles and actions which composed each expression, he had a tendency to label each face as an emotion and then attempt to create the facial expression he associated with that emotion, more similar to the second technique. This is not entirely surprising, and each of the faces was displaying one of the major six emotions (happiness, surprise, fear, sadness, anger, and disgust). However, it meant that he sometimes did not notice the subtle differences between his face and the model.

FACE 1



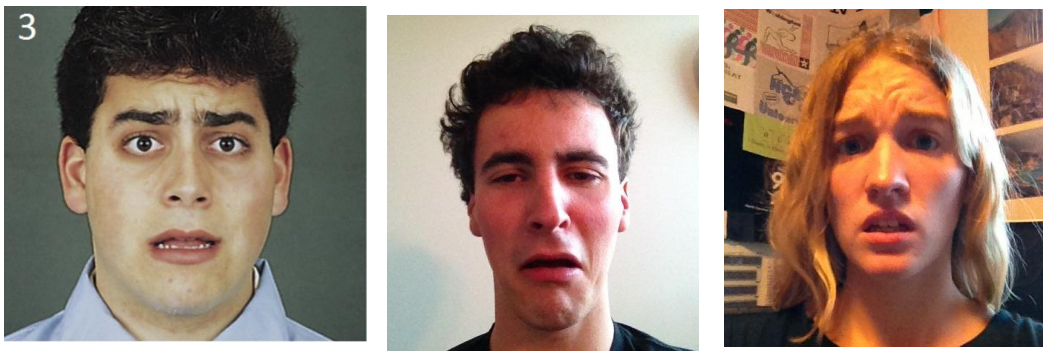
This smile looks like a natural Duchenne smile, and I think both Kevin and I were successful in copying it properly without activating other muscles.

FACE 2



This face was harder to reproduce than might be expected. The key features that I identified were: raised brow, wide eyes, and an open mouth. Kevin noted the brow and mouth, but didn't attempt to widen his eyes more than usual. Neither of us managed to make the open mouth look quite right, but I'm not yet sure how to quantify the difference.

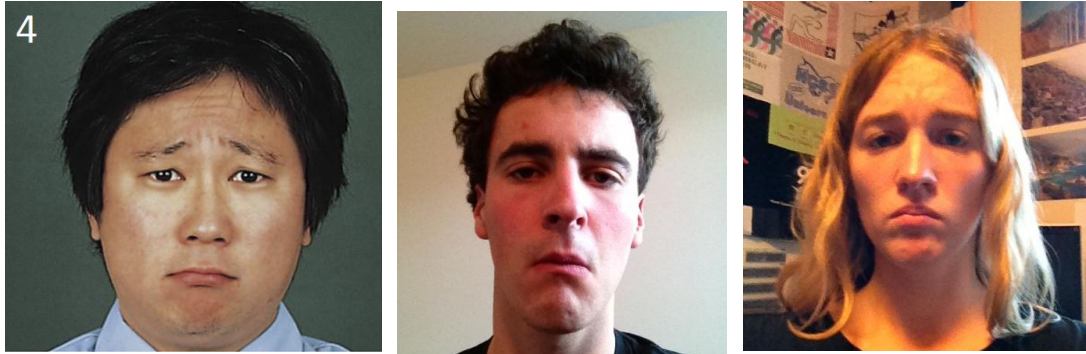
FACE 3



It was hard to simultaneously make all of the movements required to reproduce this expression. Kevin managed to get some brow wrinkling, but no brow raising or wide eyes. His mouth is turned down rather than elongated. When I was attempting to reproduce the expression, I focused on both wrinkling my brow (AU4) and raising it (AUs

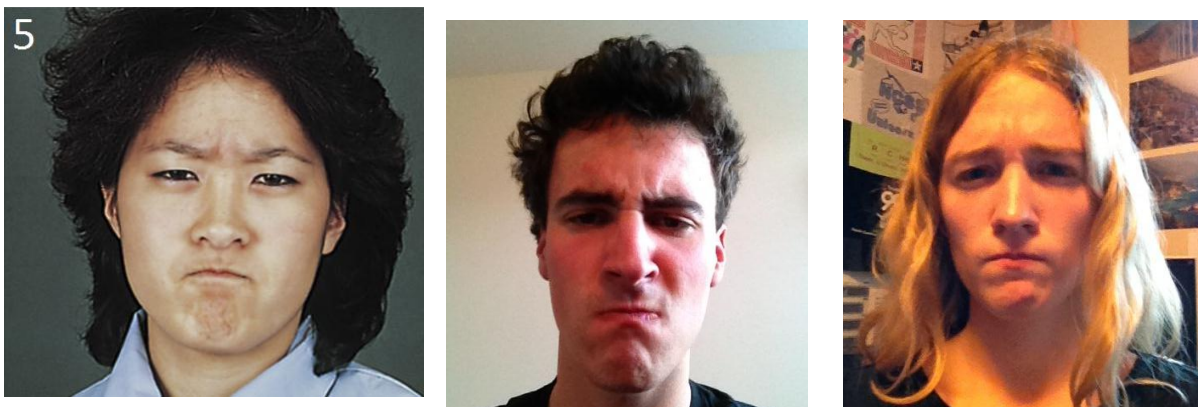
1 and 2), while simultaneously opening my eyes more (AU 5) and opening my mouth. I was unable to reproduce the mouth expression to my satisfaction. On further inspection, I think the model may have been flaring his nostrils as well, although it is a little hard to tell without a neutral comparison.

FACE 4



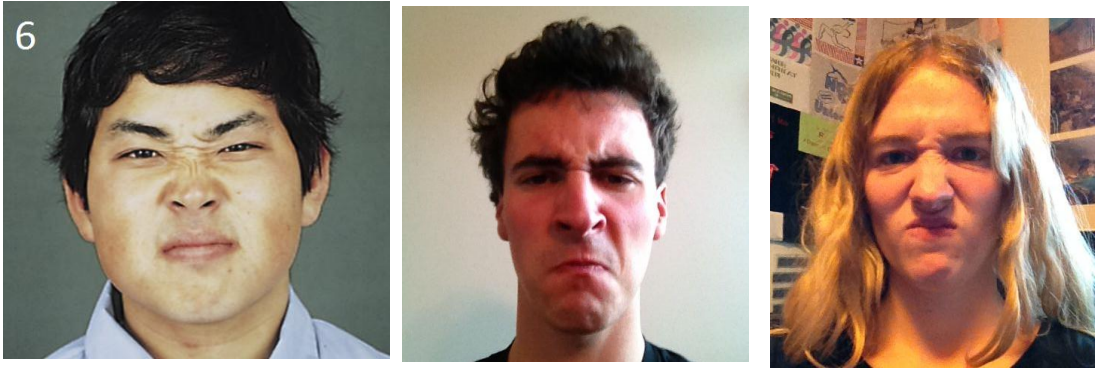
This face was very difficult to intentionally reproduce because the model is raising only the inner portion of his brow (AU1). Neither Kevin nor I were able to raise only our inner brow without also raising our outer brow (AU2). Our mouths also seems subtly different than the model – perhaps more slack?

FACE 5



The model appears to have a lowered brow, raised lower eyelids, and a tight mouth with slightly downturned lips. Kevin seems to have reproduced the lowered brow and tight lips, but didn't copy the raised eyelids, and added in a wrinkled nose. I managed to reproduce the lowered brow without also wrinkling my nose. I think I also more or less matched the eye squinting, but I'm not sure if I copied the mouth properly.

FACE 6



The model in this picture is displaying a wrinkled nose and squinted eyes and seems to be raising his upper lip as well. Kevin copied the wrinkled nose, but again only did so by pairing it with a lowered brow. He also doesn't appear to be squinting his eyes, and his mouth looks tight rather than raised. I did a better job of wrinkling only my nose and not my brow and of raising my upper lip, but I didn't squint my eyes.

REFERENCES

Ekman, Paul; Roper, Gowen; and Hager, Joseph. *Deliberate Facial Movement*. Child Development, 1980, 51, 886-891.

EXERCISE 2: DECOMPOSING EMOTIONAL EXPRESSIONS

DESIGN

INTRODUCTION

In this exercise, you will attempt to identify which AUs are associated with three of the six major emotions (anger, fear, sadness, disgust, surprise, happiness).

LITERATURE

- Skim “Unmasking the Face: A Guide to Recognizing Emotions From Facial Expressions” by Ekman and Friesen. Perhaps choose one or two sections or chapters to study in more depth.
- Skim “What the face reveals: basic and applied studies of spontaneous expression using the facial action coding system (FACS)” by Paul Ekman, Erika L. Rosenberg. Perhaps choose one or two sections or chapters to study in more depth.
- Chapters 1-4 of the FACS manual

EXERCISE

Pick three of the six basic emotions. For each, find one picture online that “officially” represents that emotion and take one picture of a friend attempting to express that emotion. For each picture, identify as many AUs as possible.

DELIVERABLE

Discuss the emotion faces through the lens of AU identification. Compare your friends’ reproductions to the “official” emotion faces you found online.

SOME QUESTIONS TO CONSIDER:

- Is each emotion consistently associated with specific combinations of AUs?
- Is there significant AU overlap between any emotions? Do some AUs have a strong effect on determining which emotion is expressed?
- Are there any cues that indicate your friend is posing their expression of the emotion?

REPORT

INTRODUCTION

In this exercise, I focused on researching which AUs were associated with each of the six major emotions. To supplement this research, I took photos of my friends attempting to convey each of the emotions with their facial expressions and compared their expressions to the “official” descriptions.

FINDINGS

One study, “Differences in facial expressions of four universal emotions,” conducted an analysis of which AUs are present in four of the major emotions (happiness, sadness, anger, and fear) and compared their results to two previous studies (the landmark 1975 research by Ekman and Friesen, and a 1997 study by Gosselin, et al). I have summarized their comparison in the table below.

| | Definite | Probable | Possible |
|-----------|-----------|---------------|---------------|
| Happiness | 6*,12* | 25,26 | 1,7,10 |
| Sadness | 4,15,17* | 1,7,25 | 6,10,11,20,23 |
| Anger | 4,5,25,26 | 7,10,16,17,20 | 9*,23,24 |
| Fear | 4,5,26 | 1, 2*,20 | 7,25,27 |

Table 1. A summary of Kohler et. al's findings. Definite means all three studies agreed, probable means two of three agreed, possible means only one study found the AU associated with the emotion. Starred emotions were identified by the Kohler study as being a “unique qualifying AU,” meaning that the AU was consistently found in this emotion and not the others.

As indicated by the table above, facial expression associated with each of the major emotions can be uniquely characterized by one or more AUs. However, I would argue that one of the studies has a fundamentally flawed methodology. The Gosselin study asked actors to produce facial expressions they associated with each emotion, but this (in my opinion) biased the study toward missing AUs that can be difficult to produce on demand, such as AUs 1, 7 and 10. Thus, I would restructure the table to only reflect the findings of Ekman and Kohler:

| | Both | Ekman | Kohler |
|-----------|----------------|-----------|-----------|
| Happiness | 6*,12* | | 25,26 |
| Sadness | 1,4,15,17* | 6,11,26 | 7,10,20 |
| Anger | 4,5,7,10,25,26 | 17, 23,24 | 9*,16*,20 |
| Fear | 1,2*,4,5,20,26 | 25,27 | |

Table 2. A revised summary of Kohler's findings, comparing only the Ekman and Kohler studies.

HAPPINESS

According to the literature, happiness is strongly associated with AUs 6 and 12 (cheek raiser and lip corner puller), and sometimes paired with AUs 25 and 26 (lips part and jaw drop).



Jason and Keely demonstrating their facial reproductions of happiness.

When I asked my friends to reproduce happiness, they both demonstrated AUs 6, 12, 25, and 26 as expected. They also showed some AU 43 (eyelid drop), and Keely also tipped her head back.

SADNESS

From the literature, sadness is associated with AUs 1, 4, 15, and 17 (inner eyebrow raise, brow lower, lip corner depressor, and chin raiser).

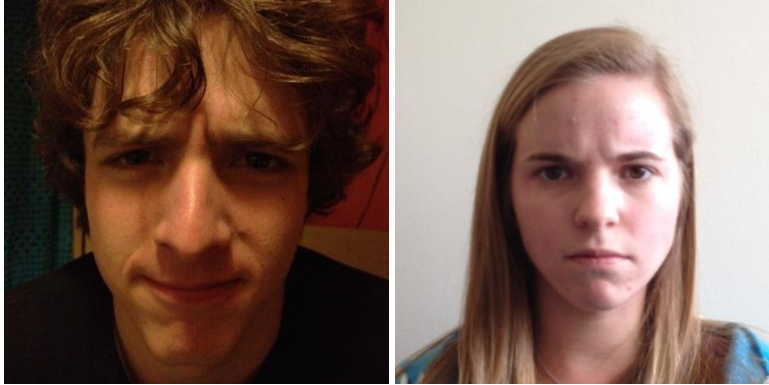


Jason and Keely attempting to produce sad facial expressions.

My friends had more difficulty demonstrating expression of sadness. Jason mostly showed a flat affect – I was only able to identify AU 43 (eyelid drop) in his expression. Keely produced AUs 4, 15, and 17, but also appears to be suppressing a smile (AU 12).

ANGER

My research suggests that AUs 4 (brow lower), 5 (eyelid raise), 7 (lower eyelid tense), 10 (upper lip raiser), 25 (lips part), and 26 (jaw drop) are commonly associated with anger. The Kohler study further found that AUs 9 (nose wrinkle) and 16 (lower lip depressor) were unique qualifiers for anger (i.e. they were associated with anger but none of the other emotions).

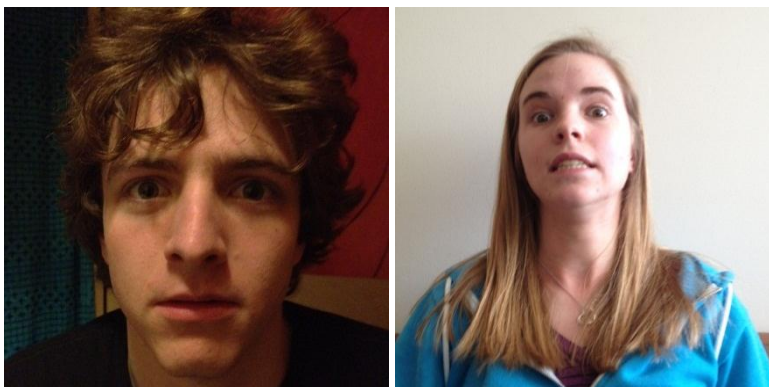


Jason and Keely demonstrating anger.

Both Jason and Keely are only showing AU 4 (brow lower), but they don't have any of the other AUs commonly associated with anger. Their expressions raise the question of whether people tend to have lower standards for decoding emotions than exist when they are legitimately encoding the emotion. For example, it may be that the presence of AU 4 is sufficient for a facial expression to be classified as anger, but that when a person is actually experiencing anger, he or she always encodes more than just AU4.

FEAR

The literature suggests that AUs 1 (inner eyebrow raiser), 2 (outer eyebrow raiser), 4 (brow lower), 5 (upper eyelid raiser), 20 (lip stretcher), and 26 (jaw drop) are associated with fear.



Jason and Keely showing fear.

Keely shows AUs 1, 2, 5, 16, and 20, while Jason only shows 5 and 26. Neither looks quite like a properly fearful face, which is probably because neither has the full 1+2+4+5 combination in the upper face which distinguishes fear from 1+2 (which looks more like surprise), 1+4 (sadness), or 4+5 (anger).

REFERENCES

Kohler, Christian G.; Turner, Travis; Stolar, Neal M.; Bilker, Warren B.; Brensinger, Colleen M.; Gur, Raquel E.; and Gur, Ruben C. *Differences in facial expressions of four universal emotions*. *Psychiatry Research*, 2004, Vol.128, Issue 3, 235-244. <http://www.sciencedirect.com/science/article/pii/S0165178104001908>

EXERCISE 3: WHAT MAKES A GENUINE SMILE?

DESIGN

INTRODUCTION

In this exercise, you will look more into whether there are particular AUs or combinations of AUs that are present in “genuine” smiles as compared to “fake” smiles.

LITERATURE

- Read “Felt, False, and Miserable Smiles” by Ekman and Friesen.

EXERCISE

Take photos of yourself performing various combinations of facial expressions that look like smiles, including one or more combinations that feel “genuine.” Survey other people on which combinations look the most genuine.

DELIVERABLE

Compile results of which AU combinations are perceived as genuine vs. non-genuine. Compare to literature.

SOME QUESTIONS TO CONSIDER:

- Is there a particular combination that is consistently rated as most genuine?
- Are there any single action units which seem to uniquely qualify or disqualify any combination from being rated as genuine?

REPORT

INTRODUCTION

In this exercise, Connor and I conducted a survey to learn more on which combinations of action units (AUs) are perceived as forming a “genuine” smile.

METHOD

Connor and I took 23 photos of our own faces as we intentionally performed various combinations of action units 6, 7, 10, 12, 14, and 25. We also took one photo each of our best attempt at a “natural” smile. We then created a survey in which we asked people to rate each face on a 0-4 scale:

| | |
|---|--------------------|
| 0 | Definitely fake |
| 1 | Probably fake |
| 2 | Can't tell |
| 3 | Probably genuine |
| 4 | Definitely genuine |

FINDINGS

COMBINATIONS OF AUs

The simplest way to analyze our data (which, admittedly, is sparse and not particularly rigorous), is to split the results in half and define any faces that had a rating of more than 2 as “genuine” and a rating of less than 2 as “fake.” Using this metric, there were only six faces which made the “genuine” cut: Connor’s 6+7+10+12+25, 6+10+12+25, and natural face, and my 6+12, 6+14, and natural face.

| Image # | AU combination | Average rating | Standard deviation |
|---------|-----------------------|----------------|--------------------|
| 1 | 6,7,10,12,25 | 2.5 | 1.2 |
| 2 | 6,7,12 | 1.2 | 1.1 |
| 3 | 6,7,12,25 | 1.9 | 1.2 |
| 4 | 6,7,14,25 | 1.0 | 1.0 |
| 5 | 6,10 | 1.4 | 1.3 |
| 6 | 6,10,12,25 | 2.8 | 0.9 |
| 7 | 6,12 | 1.9 | 1.4 |
| 8 | 6,12,14 | 1.5 | 1.2 |
| 9 | 6,12,25 | 1.8 | 1 |
| 10 | 12 | 0.4 | 0.8 |
| 11 | 12,25 | 0.8 | 1.0 |
| 12 | Natural: 6,7,10,12,25 | 2.9 | 1.1 |

Table 3. This table contains the average rating and standard deviation of each of Connor's faces.

| Image # | AU combination | Average rating | Standard deviation |
|---------|----------------|----------------|--------------------|
| 13 | 6,7,10,12,25 | 1.8 | 1.5 |
| 14 | 6,7,12 | 1.5 | 1.1 |
| 15 | 6,7,12,25 | 1.6 | 1.1 |
| 16 | 6,7,14 | 1.2 | 1.2 |
| 17 | 6,10 | 0.8 | 1.1 |
| 18 | 6,10,12,25 | 2 | 1.3 |
| 19 | 6,12 | 2.4 | 1.1 |
| 20 | 6,12,25 | 1.9 | 1.2 |
| 21 | 6,14 | 2.2 | 1.0 |

| | | | |
|----|--------------------|-----|-----|
| 22 | 12 | 1.5 | 1.3 |
| 23 | 12,25 | 1.4 | 1.1 |
| 24 | 14 | 1.6 | 1.1 |
| 25 | Natural: 6,7,12,25 | 3.4 | 1.0 |

Table 4. This table contains the average rating and standard deviation of each of my faces.

The highest ratings were on the two “natural” smiles. When I analyzed these faces to determine which combination of AUs was involved, I discovered that they both had a “posed” analog of the same combination. For both of us, the natural combination was rated significantly higher than the posed smile of the same combination. Thus, there must be more subtle cues than just the combination of AUs that helps distinguish a true smile from a fake one. For example, it is possible that it is not only the particular AUs, but also their relative intensity that helps determine whether a smile is perceived as genuine.

INDIVIDUAL AUs

Another interesting question is whether any single action units seem to uniquely qualify or disqualify any combination from being rated as genuine. If so, we would expect uniquely qualifying AUs to have a very high average rating and uniquely disqualifying AUs to have a very low average rating, indicating that their rating in any expression is independent of the other AUs in that combination. Examining our results (summarized in Table 3) according to individual AUs did not suggest any AU as being uniquely qualifying or disqualifying – on average they were all very similarly rated.

| | All | AU6 | AU7 | AU10 | AU12 | AU14 | AU25 |
|--------|-----|-----|-----|------|------|------|------|
| Connor | 1.7 | 1.8 | 1.7 | 2.2 | 1.7 | 1.2 | 1.8 |
| Jaime | 1.8 | 1.7 | 1.5 | 1.5 | 1.8 | 1.7 | 1.7 |

Table 5. This table summarizes the average rating for all faces containing a particular AU.

However, it is interesting to note that we did not have the same averages across AUs. In particular, Connor’s AU10 was rated much higher than mine and his other AUs, whereas his AU14 was rated much lower. This might be supporting evidence for a theory that each person has a particular combination of AUs in their “natural” smile – and that Connor’s natural smile includes AU10 but not AU14. Since most people at Olin are familiar with our natural smiles, they would tend to rate our smiles in comparison to what they specifically expect for each of us, rather than in comparison to what they would generally expect to see in a smile.

INTERPERSONAL COMPARISON

One last interesting metric of comparison is to see how the same AU combinations were rated differently when performed by Connor vs. me. In particular, Connor’s AU12 was rated only 0.4 while mine was rated 1.5, whereas his 6+10 was rated 1.4 while mine was rated only 0.8. This again supports the theory that perhaps our respondents were ranking our smiles in comparison to their knowledge of our individual “natural” smiles.

DISCUSSION

Paul Ekman and Wallace Friesen, who helped pioneer the study of facial expressions, and who developed the FACS training manual we have been studying, wrote a paper titled “Felt, False, and Miserable Smiles,” in which they compare the AUs found in “felt” (genuine) smiles as compared to “false” (fake) smiles. They “hypothesize that the common elements in the facial expression of all such positive experiences are the action of two muscles: the zygomatic major pulling the lip corners upwards towards the cheekbone; and the orbicularis oculi which raises the cheek and gathers skin inwards from around the eye socket.” (Ekman, 1982) As they explain in a later table, the action of the zygomatic major is categorized as AU12 and the action of the orbicularis oculi is split into AU6 (pars lateralis) and AU7 (pars medialis). Thus, Ekman and Friesen claim that all genuine smiles are composed of AUs 6, 7,

and 12. This did not necessarily correlate with our findings – our versions of 6+7+12 both had low ratings (1.2 for Connor and 1.5 for me). However, I coded my natural smile as containing just 6, 7, 12, and 25, which is the same combination with the addition of AU25 for parted lips.

One major difference between our exercise and Ekman and Friesen's study is that we surveyed people to see which posed combination of AUs were perceived as most genuine, while Ekman and Friesen recorded genuine smiles and analyzed them to determine which AUs they contained. Thus, our exercise could have been significantly affected by 1) the fact that most of our smiles were posed, and therefore, by definition, fake and 2) respondents expectations or opinions on what a "genuine" smile looks like compared to a "fake" one.

REFERENCES

Ekman, Paul and Friesen, Wallace. *Felt, false and miserable smiles*. Journal of Nonverbal Behavior. 1982, 6, 238–252.

EXERCISE 4: COMPARING ACTION UNITS ACROSS MEDIA

DESIGN

INTRODUCTION

This exercise will test decoding abilities in real-world rather than laboratory-staged conditions. It involves decoding recorded media and comparing how facial expressions vary across different types of media.

LITERATURE

Read “Newscasters' Facial Expressions and Voting Behavior of Viewers: Can a Smile Elect a President?” (http://carmine.se.edu/cvonbergen/Newscasters'%20Facial%20Expressions%20and%20Voting%20Behavior%20of%20Viewers_Can%20a%20Smile%20Elect%20a%20President.pdf) or another piece of literature relevant to the topic.

EXERCISE

Choose at least two genres of televised media. While watching, take note of which AUs you see. You may choose to do this by watching a short clip repeatedly or by taking quick notes throughout a longer clip.

DELIVERABLE

Compare the use of facial expressions across the two genres.

SOME QUESTIONS TO CONSIDER:

- Is there a difference in the specific AUs used in the two genres?
- Does one genre generally emphasize nonverbal communication across the facial channel more than the other?
- Does the intensity of scoring differ between the two genres?
- Are any particular AUs used very frequently in one or both genres?
- Does the use of facial expressions in the televised media differ from what you would expect in everyday behavior?

REPORT

INTRODUCTION

In this exercise, I watched the Daily Show and compared Jon Stewart's facial expressions to those to more traditional newscasters.

METHODS

I watched a single episode of the Daily Show (April 5th, 2012), in which Jon Stewart is discussing the egregious overspending on a government conference in Vegas. Throughout the episode, he pulls in footage of other newscasters covering the same topic, thereby setting up a relatively controlled comparison between traditional and humorous newscasting.

FINDINGS

Jon Stewart makes excellent use of his ability to manipulate his facial expressions to accent and emphasize his points, particularly to highlight the humor of the story. This skill is illustrated in several examples below.



Figure 1. Jon Stewart displaying dismayed shock over the price tag on the GSA conference, using AUs 1 and 4 to raise and furrow his eyebrows, and 22, 25, 26 to drop his jaw and funnel his mouth into the classic 'O' shape of surprise.



Figure 2. In this clip, Jon is conveying his disappointment that the government blew money on "lame bullshit". On the left, His brow is furrowed (AU 4), his upper lip is raised in a faint sneer (AU 10), and his chin is pushed up (AU 17). On the right, he is showing a clear unilateral sneer (AU R10) as he lists the conference expenditures (i.e. clowns).



Figure 3. Here Jon is chastising the misuse of funds, saying "you are a disgrace to corruption everywhere." He has his nose wrinkled (AU 9), brow furrowed (AU 4), and his lips turned down (AU 15) and funnelled (AU 22) in disgust.



Figure 4. Jon expresses his anger that the GSA ironically wasted a ton of money when the agency is supposed to be a model of "efficiency and cost-cutting". His brow is extremely furrowed (AU 4), his nose is extremely wrinkled (AU 9), his mouth is pulled down and open (AU 16 and 25) and teeth bared (AU 20).

In comparison, other newscasters limit themselves to a very controlled expression, only allowing the occasional eyebrow raise to bring home a point.



Figure 5. A traditional newscaster. On the left, she has almost no visible action units. On the right, the only significant change in her facial expression is a brow raise (AU 1+2) and head tilt when discussing a surprising fact.



Figure 6. Another traditional newscaster, pointing out that the GSA is "supposed to set the standard for efficiency and cost-cutting." Again, his facial expression mostly stays neutral (left), accentuated only by the occasional brow raise (AU 1+2) and head tilt (right). Compare this to Figure 4 above, which depicts Jon Stewart reacting to the same piece of news.

In general, it seems that traditional newscasters severely limit their facial expressions. They mostly manage to keep a neutral face and only allow themselves the occasional nonverbal punctuation via eyebrow raise. On the other end of the spectrum, Jon Stewart's face is almost never neutral. He is always accenting his words with nonverbal signals. In many cases, his humor actually stems entirely from a discrepancy between what he is saying verbally and what he is saying (just as loudly) nonverbally.

I would posit that traditional newscasters want to appear objective and unbiased, and therefore choose both their words and expressions carefully to attempt to achieve that facade. Research has shown that "positive" facial expressions not only cause the newscaster to appear biased, they can also influence the opinions of viewers. In a 1986 study on the effect of newscaster's facial expressions on the voting behavior of viewers, "it was found that voters who regularly watched the newscaster who exhibited the biased facial expressions were significantly more

likely to vote for the candidate that newscaster had smiled upon.” (Mullen, 1986) Thus, newscasters attempting to present news objectively should be commended for reducing their nonverbal communication, since any “positive” or “negative” expressions could serve as a subjective commentary on their words and therefore unfairly bias their viewers.

In comparison, the Daily Show generates much of its humor via Jon Stewart’s extreme facial expressions. The explicit addition of the nonverbal channel to his coverage of the news gives added depth to the story, but comes at the expense of being more subjective.

REFERENCES

Mullen, Brian, et. al. *Newscasters' Facial Expressions and Voting Behavior of Viewers: Can a Smile Elect a President?* Journal of Personality and Social Psychology. 1986, Vol. 51, No 2, 291-295.

The Daily Show with Jon Stewart. *April 05, 2012 – Anthony Bourdain.* <http://www.thedailyshow.com/full-episodes/thu-april-5-2012-anthony-bourdain>

EXERCISE 5: FACIAL EXPRESSIONS DIFFERENCES ACROSS PEOPLE AND CONTEXTS

DESIGN

INTRODUCTION

This exercise will test your ability to apply the coding skills you have learned in the field. You will observe the same person in different context and different people in the same context to see how facial expressions vary across people and environments.

LITERATURE

Read “The impact of social context on mimicry” (<http://www.er.uqam.ca/nobel/r24700/pubs/BH08.pdf>) or find a similar piece of literature that relates to the topic.

EXERCISE

If possible, observe one person in multiple contexts to see whether their facial expressions are influenced by their environment. Also observe multiple people in the same context (i.e. a cafeteria or class) to see whether different people employ different facial expressions.

DELIVERABLE

Compare the AUs noted for the different people and different contexts and attempt to draw generalizations from your results.

SOME QUESTIONS TO CONSIDER:

- Does context affect facial expression?
- Do people vary in the facial expressions they commonly use?
- Do some people communicate more or less through facial expressions?
- Do people vary in the extremity of their expressions?
- Are any particular AUs common to most people and/or contexts?

DESIGN

INTRODUCTION

For this experiment, I spent one week performing passive observation of common facial expressions of various people in different contexts.

METHODS

I paid close attention to people's facial expressions in various contexts, including a formal dinner, an a cappella concert, mealtimes at the Olin dining hall, a SCOPE presentation, and a number of group conversations. I noted any general interpersonal differences I encountered and considered whether context appeared to affect the type of facial expressions displayed.

FINDINGS

COMMON EXPRESSIONS

The most common expressions I noted were raised eyebrows (AUs 1 and 2), furrowed brows (AU 4), and genuine smiles (AUs 6, 7, and 12).

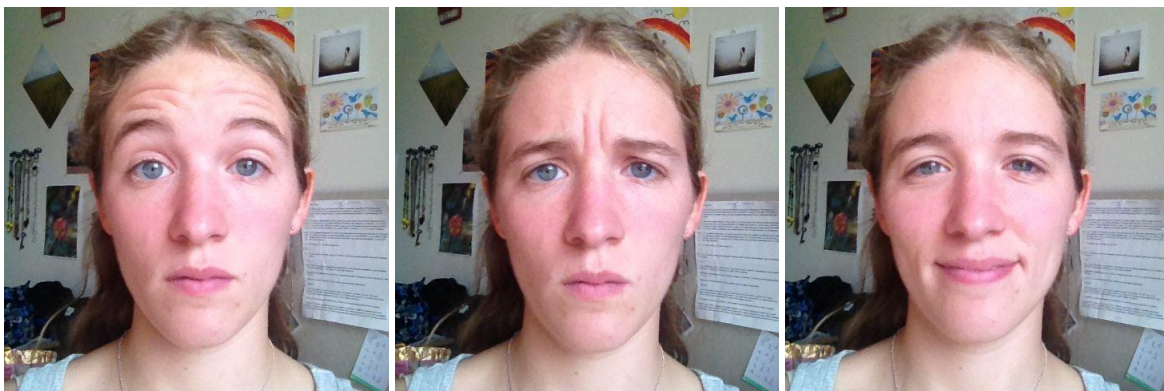


Figure 7. From left to right: AU 1+2, AU 4, AU 6+7+12

These are all used by nearly everyone I observed, across contexts, and for a variety of reasons. The first expression in particular (AUs 1 and 2) spans a wide range of uses – as a greeting, in surprise, for agreement, while thinking, and in a number of other situations as a nonverbal emphasis. The brows furrowed expression is generally used as a sign of anger or disagreement or sometimes to show contemplation. The smile shows happiness or agreement or a variety of other positive emotions.

VARIANCE AMONG PEOPLE

One of the interesting trends I found was differences in the common facial expressions displayed by different people. For example, three of my friends (Erika, Johannes, and Chris) all employ AU 15 (see example image below) much more commonly than other people I observed.

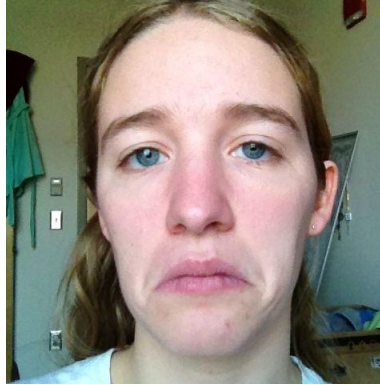


Figure 8. Me demonstrating AU15, the Lip Corner Depressor.

However, I found it interesting to note that they all use this particular AU for different reasons. Chris actually adds this to his normal smile of enjoyment such that his lip corners are pulled down but his enjoyment is apparent through AUs 6 and 7 in his eyes. Johannes often displays AUs 1, 2, and 15 when he is thinking about something, such as considering feedback in a SCOPE design review. Erika uses AU15 to emphasize her verbal disagreement. From my general observations of other people, I suspect that most people use AU15 the same way Johannes does – to nonverbally communicate to a group that they are considering an idea.

VARIANCE BETWEEN CONTEXTS

It was more difficult to note specific differences in facial expressions across contexts, in part because it was difficult to observe a single person in multiple contexts. The few people I did observe in multiple contexts didn't show much variation in their expressions. It seemed that in more formal situations (such as the senior dinner and the SCOPE presentation), people showed fewer expressions overall – mostly limited to eyebrow raising and smiling. This aligns with an observation made in a study on social mimicry (Bourgeois, et al. 2008), which noted "happiness is a 'low cost' emotion. Showing happiness signals that all is well in the environment and does not require action by the observer." Thus, in more formal situations, people might limit their facial expressions to those which correspond to "low cost" emotions since the focus of the situation is on keeping social interactions flowing smoothly.

They also seemed more controlled in the expressions they did display. For example, my friend Scott sometimes has a cheesy, wide-mouth (AUs 25, and 26), eyebrows-raised (AUs 1 and 2) grin (AU 12), which he modulated to a closed-mouth smile (AU 12).

REFERENCES

Bourgeois, Patrick and Ursula Hess. *The impact of social context on mimicry*. Biological Psychology. 2008, 7, 343-352