

# Beautiful Bronze or Sad Silver?

Group 1

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## Abstract

Once a sport competition is over and the medal winning athletes are gathered for interviews, not all of them are happy with the results. This paper presents an experimental survey with muted videos of athletes that either won a bronze or silver medal and participants that had to guess which medal each athlete won, based on the displayed nonverbal behavior. Studies show that the emotional state of happiness in winning something is not so much dependent on what was won, but on how it contrasts with the thought of what might have been. In addition, research demonstrates that women are better in decoding nonverbal behavior than men. Based on that we assumed that bronze winners display more genuine smiles (H1), women are better in identifying genuine smiles (H2), and athletes with genuine smiles are more often identified as having won silver than bronze (H3). No hypothesis could be confirmed.

*Keywords:* nonverbal communication; facial expressions; fake smiles; genuine smiles; happiness; winning; emotions

## Introduction

Facial expressions are an important tool of apprehension in nonverbal communication (Svegar, Fiamengo, Grundler, & Kardum, 2018), because they transmit crucial information concerning the internal human emotions and intentions of other people that the self interprets and acts upon (Mühlberger, Wieser, Gerdes, Frey, Weyers, & Pauli, 2011). Therefore, the correct interpretation of facial expressions facilitates and eases face-to-face interactions (Calvo & Lundqvist, 2008) as emotional states of others

that are transmitted via these means are identified by the observer, but they might also be transmitted without intent by the speaker as non-verbal cues are (mostly) free of deception (Buck & VanLear, 2002).

This research focuses on a theory by Medvec, Madey and Gilovich (1995), which posits that the emotional state of happiness in winning something is not so much dependent on what was won, but on how it contrasts with the thought of what might have been. A study by Tversky and Griffin (1991) demonstrates that people who finished second in a competition are actually less happy than those winning third place, because they cognitively compare it to winning first place instead of not winning at all. Previous research (Scharlemann, Eckel, Kacelnik, & Wilson, 2001) mainly focused on measuring the emotional states that people uttered after the competition (e.g. 'How did you feel after winning...?'), but not so much on the emotional states that people revealed via nonverbal behavior. Therefore, the present study sets out to investigate if people can discern whether someone won a bronze medal or a silver medal in a European track and field championship solely based on facial expressions displayed by the athlete in an interview after the race.

In general, smiles are an important way to correctly identify the emotional state of happiness in others, whereby the visual decoding process of the observer mostly focuses on the mouth region, while in the meantime other regions add minimal value to this recognition process (Nusseck, Cunningham, Wallraven, & Bültho, 2008; Calvo & Nummenmaa, 2009; Du & Martinez, 2013). Depending on the smile, the same set of facial muscle movements are (always) involved and Ekman, Hager and Friesen (1981)

found a way to quantify the muscle group sets via a Facial Action Coding System. In this way, a fake smile can be objectively discerned from a genuine smile. Based on the literature on emotions in winning and losing (Medvec, Madey, & Gilovich, 1995), we expect that:

H1: Athletes winning a bronze medal portray more genuine smiles than those winning a silver medal.

Although women are in general better at decoding nonverbal behavior (Hall, 1978; McClure, 2000) than men, it is not clear as of yet whether women are also better in correctly identifying genuine and fake smiles. Based on the overall stance in research that women are better in decoding nonverbal behavior, we hypothesize that:

H2: Women are better than men at correctly identifying genuine smiles and therefore are more often correct at identifying which medal was won.

A study by Matsumoto and Willingham (2009) found that gold and bronze winners displayed more genuine smiles, while silver winners showed more sadness or no emotion at all. When a silver winner smiled, it was identified as a non-genuine, controlled smile. This corresponds with Medvec, Madey and Gilovich's (1995) findings that the thought of what might have been can considerably lower happiness over finishing second. However, we do expect that participants have difficulty identifying which smiles are genuine and which are fake. Moreover, we assume that the participants expect silver winners to be happier than bronze winners, as second place is objectively better than third. Therefore, we hypothesize that:

H3: Athletes portraying genuine smiles are more often identified as having won silver than bronze.

## Method

### Materials

We decided to conduct a survey for the means of this study and combine it with a corpus analysis through 'Open Face'. For the corpus, all clips were taken from the YouTube Channel 'European Athletics' and showed athletes that were interviewed right after they had won either a bronze or a silver medal (see appendix B) at a track and field event. All clips were recorded in front of the same background and every athlete was asked similar questions, which made the particular YouTube channel an ideal choice for this study.

Every video was shortened to a maximum of 28 seconds, so that the survey could be kept as short as possible and that the participants still got a good idea about the athlete's emotional state. The videos did not contain sound, since this study focused on facial expressions only. In total, twenty clips were collected, of which ten clips were of silver medal winners and ten clips of bronze medal winners. The male/female ratio (five male winners and five female winners) was kept accordingly for both conditions.

### Participants

In total, 40 study participants (24 women, 16 men) aged between 19 and 58 ( $M = 25.45$ ,  $SD = 9.22$ ) were solicited. The survey took five minutes to complete and participants were not paid for completing the task. Participants needed to be proficient in the English language as the survey was conducted in English. 24 participants were of Dutch origin and 16 participants were of different origin. 12 participants watch sports monthly and 12 participants watch sports weekly. Three participants stated to watch sports daily. Nine participants watch sports once or twice a year, and four participants stated that they never watch sports.

## Procedure

The survey was distributed online via ‘Qualtrics’ using a convenience sampling method (see appendix A). Before the survey began, all participants were asked for their gender, age, nationality and how often they watch sports, to correlate these data to the results. The participants were instructed not to write anything down during the experiment and they were told that they would not get any feedback on the accuracy of their answers. Participants then got to see all 20 clips in random order. Each clip was followed by the same question: ‘Do you think this athlete won a bronze or a silver medal?’ and two options were given as answers: ‘Bronze medal’ or ‘Silver medal’.

## Coding

The trimmed YouTube clips were coded using OpenFace, which is a facial recognition algorithm that focuses on facial behavior patterns. It uses machine learning algorithms and neural networks to detect and extract action units (AUs) from the given material. Each action unit contains the expression of an individual face muscle movement. Action units were used by Ekman, Friesen and Hager in 2002 to explain the Facial Action Coding System (FACS) that they developed (as cited in Jaiswal & Valstar, 2016). The procedure of the program starts with adding input (picture/video) by the user.

Next, Open Face is detecting the face and after completion, a facial landmark detection is done. This means that it places dots around the face and the important facial features (i.e., eyebrows, eyes, mouth, nose). The information gathered in the aforementioned step is used by the program to detect eye gaze and head pose that will be used to determine the face alignment and extract the position of facial muscles. Consequently, dimensionality reduction is applied, followed by feature fusion and person normalization. After the outlined steps are completed, the program outputs the results in the form of AUs. The output is available both in real time (visible on the screen) and on

storage (it creates files with all the detected action units). It is important to point out that OpenFace repeats this procedure for every frame of the video. Moreover, it provides a confidence and a success measure for every AU that states how certain the program is about its judgement. A visual representation of this procedure is shown below.

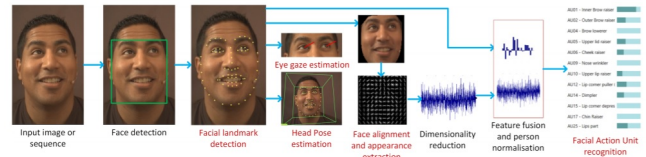


Figure 1: OpenFace process step by step (retrieved from Baltrušaitis, Robinson, & Morency, 2016, p. 3)

The AUs used in this study are AU12 and AU6. AU12 shows if the corners of the mouth are raised (the person is smiling) and AU6 indicates whether there are wrinkles in the eyes area. These two AUs have been selected because their analysis can shed light on the authenticity of the displayed smiles: AU12 indicates if the person is smiling, while AU6 indicates if the muscles groups around the eyes are moving too, which is one of the most recognized cues of an authentic smile. The mentioned pair of AUs is composing the variable ‘Happiness’ which was calculated by summing up all the values of each AU per clip and divided by the number of frames. Furthermore, the two results were summed up and then divided by two (the number of action units used), producing the ‘Happiness’ value for each clip. Separately, the values of AU12, Confidence and Success were recorded following the same steps mentioned previously, with the exception of the division by two, since only one item was used for each of them.

The authenticity of the smile for both studied categories (bronze and silver medalists) will be determined by the mean values of ‘Happiness’ and AU12. The higher the score of AU12, the more the athletes smiled. In contrast, the lower the score of ‘Happiness’, the more they faked it because it indicated a lower presence of AU6. For H3, each video was given a label in accordance to the ‘realness level’

of the smiles presented in it (genuine/fake) based on a 0.5 difference between the scores of AU12 and Happiness (AU12 < Happiness with at least 0.5, the smile is genuine). This value was chosen because, as mentioned earlier in this section, Happiness is composed from AU12 and AU6. Thus, the bigger the difference, the more AU6 influenced the score. Moreover, a difference of at least 0.5 between AU12 and Happiness means that the score of AU6 was at least 1 (scores were summed up and divided by two) which indicates that the muscle group around the eyes moved when the person smiled.

## Results

To examine if athletes winning a bronze medal portray more genuine smiles than those winning a silver medal, all clips were coded in OpenFace. The results that were obtained after analyzing the data indicates a mean value for AU12 of 0.4350 ( $SD=0.19$ ) for the Bronze category and 0.5360 ( $SD=0.31$ ) for the Silver category. Based on this, it seems that athletes who won a silver medal smile more often than the ones that won bronze. The mean value of Happiness is 1,0150 ( $SD=0.41$ ) for the bronze winners and 0,7150 ( $SD=0.21$ ) for the silver winners. After looking closely at these results, we can conclude that even if the silver winners smile more often, the lower difference between the scores of AU12 and Happiness indicated the insufficient presence of AU6, which means that their smiles are fake. The situation is reversed for the bronze winners, who smile less often compared to the other group, but have a considerably larger difference between the two scores, which means their smiles are most likely authentic.

Both categories had high scores for Success and Confidence (over 86% for Confidence and over 92% for Success). However, an Independent Samples T-Test was applied and the results show that the difference between the means of the group is not statistically significant ( $p=0.053$  for "Happiness" and  $p=0.399$  for AU12). The  $p$  value for Happiness is however, extremely close to the desired level

which makes it quite difficult to draw a conclusion upon this. The results of AU12's significance level was expected since it was normal for those that wanted to portray happiness to smile and this result only shows us that both groups smiled in almost equal quantities. Thus, no significant support was found for the first hypothesis that athletes winning a bronze medal portray more genuine smiles than those winning a silver medal. To examine if female participants of the survey were better at identifying whether an athlete won a silver or a bronze medal (H2), an Independent Samples T-Test was performed. On average, women had 10.54 answers correct ( $SD=2.90$ ) and men had 9.75 answers correct ( $SD=1.16$ ). This difference was not significant ( $Mdif = -.79$ ,  $t(38) = -.99$ ,  $p = .328$ , 95% CI [-2.41, 0.83]) and therefore it can be concluded that hypothesis 2 is not supported by the data.

Finally, a Chi-square test was conducted to test the hypothesis that athletes portraying genuine smiles are more often identified as having won silver. In total, eight athletes portrayed a genuine smile. Since this sample is relatively small, we report the Fisher's exact test. Six of the eight athletes that portrayed a genuine smile won a bronze medal, two won silver. Four athletes are identified by most participants as having won silver (respectively by 62,5%, 67,5%, 55% and again 55% of participants), one athlete is identified as having won silver half of the time (by 50% of participants), and three athletes are mostly identified as having won bronze (respectively by 60%, 67,5% and 55% of participants). There was no significant association between the actual medal won and the participants' identification as a silver medal ( $\chi^2(1) = 2.67$ ,  $p = .429$ ). Of the six bronze medal winners, 66.7% was identified as winning silver ( $N=4$ ) and none of the two silver medal winners were identified as winning silver ( $N=0$ ). Only two of the bronze winning athletes with genuine smiles were correctly identified. These results do not support the third hypothesis.

## Discussion

Statistically, no significant results were obtained by our data that could confirm hypothesis 1 or 2. We did however find the expected, (albeit insignificant) results that, for one, bronze medal winners portrayed more genuine happiness and second, women identified more medal winners correctly than did men. Therefore, some weight may still be given to hypotheses 1 and 2 and it might be interesting for further research to investigate this. Our third hypothesis, 'athletes portraying genuine smiles are more often identified as having won silver than bronze', was not confirmed either. Just four of the eight athletes that portrayed genuine smiles were more often identified as having won silver and even those results had only small differences in the percentages between bronze and silver.

Interestingly, all of these genuinely smiling athletes that were identified by the participants as silver winners, were actually winners of bronze medals. This points towards some bias or misconception about athletes that have won a silver medal, but our results indicate that this does not come from the perception of genuine smiles. Future research may look into the cause underlying this observed effect.

### Limitations

The individual expectation of the athletes is a limitation of this study. We assume that some athletes go into the final competition as a clear leader or are just generally considered to be the favorite, thus these athletes are looking forward to win gold and would not be happy with silver. It could, however, also be that they were just happy to have made it into the final competition and winning was not their 'main focus', which would subsequently mean that more genuine happiness can be expected for these particular athletes, despite the medal they might win in the end. By selecting athletes for our corpus at random, we tried to minimize the influence of this assumption being wrong for some athletes. Since the theories on happiness and winning bronze, silver or gold have already been proved, we

thought it would be statistically unlikely for this assumption to have a significant effect on our results.

Another limitation of this research is the possible learning curve of the participants. After a while participants in our survey might grow tired or start to figure out what the goal of the research is and thus they may try to give the expected answer. Randomizing the question order for each participant should minimize this effect, but it probably could not be completely avoided.

### Future research

Future research with bigger data samples could look into whether the small results for H1 and H2 of this study would hold true for larger sample sets as well. A similar experiment on a larger scale might result in data that does show significant differences between the groups and this would give a more solid conclusion as to whether our small results were just a coincidence or whether bronze medal winners really show more genuine happiness than silver medal winners, and whether women are truly better at identifying genuine happiness than men.

Another topic for future research might be the fact that bronze winners that portrayed genuine smiles were more often identified as silver winners. This research has already shown that the effect was not due to the mere portrayal of genuine smiles, but further research is needed to see which factors cause people to think genuinely happy bronze winners are most likely to be silver winners.

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## Appendix

### A. Survey (main part)

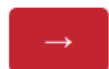
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Hello there!

We are six students at Tilburg University doing a course on nonverbal communication. Our research for this course focuses on athletes competing in championships. First we will ask you some simple background questions. You will then be shown 20 short clips of athletes being interviewed after they have won a medal and we want to know what medal you think they won, based on the (muted) video. There is no need to think about it for long or write anything down, since the focus is on your perception. Therefore you will not get feedback on the accuracy of your answers. The entire survey takes about 6 minutes to complete. If you have any questions, you can contact Eva de Feber: [e.defeber@tilburguniversity.edu](mailto:e.defeber@tilburguniversity.edu)

Thank you for helping us out!

Eva de Feber  
Fabian Weiß  
Fleur van Dongen  
Hanane Elghabzouri  
Lorena Macovei  
Simone Houweling



How old are you?



Are you male or female?

Male

Female

< >



What is your nationality?



How frequently do you watch sports?

Never

Once or twice a year

Around once a month

Weekly

Daily



## B. Survey (stimuli)

All clips can be found online in the following playlist:

[www.youtube.com/watch?v=N6HU\\_S0RUNk&list=PLcK171AvdoZfITGkffpMKj72I3P-9KING](http://www.youtube.com/watch?v=N6HU_S0RUNk&list=PLcK171AvdoZfITGkffpMKj72I3P-9KING)

### Bronze

The following 10 stimuli form the group of 5 male and 5 female bronze medal winners:



Do you think this athlete won a bronze or a silver medal?

Bronze medal

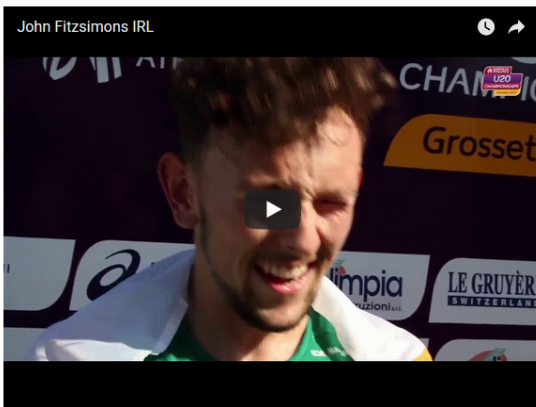
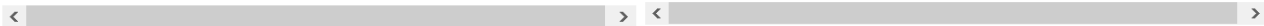
Silver medal



Do you think this athlete won a bronze or a silver medal?

Bronze medal

Silver medal



Do you think this athlete won a bronze or a silver medal?

Bronze medal

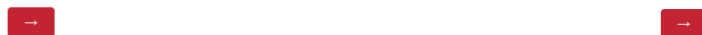
Silver medal



Do you think this athlete won a bronze or a silver medal?

Bronze medal

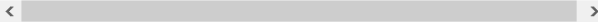
Silver medal





Do you think this athlete won a bronze or a silver medal?

- Bronze medal
- Silver medal



Do you think this athlete won a bronze or a silver medal?

- Bronze medal
- Silver medal



Do you think this athlete won a bronze or a silver medal?

- Bronze medal
- Silver medal



Do you think this athlete won a bronze or a silver medal?

- Bronze medal
- Silver medal





Do you think this athlete won a bronze or a silver medal?



Do you think this athlete won a bronze or a silver medal?



### Silver

The following 10 stimuli form the group of 5 male and 5 female silver medal winners:



Do you think this athlete won a bronze or a silver medal?



Do you think this athlete won a bronze or a silver medal?





Do you think this athlete won a bronze or a silver medal?

Bronze medal

Silver medal



Do you think this athlete won a bronze or a silver medal?

Bronze medal

Silver medal



Do you think this athlete won a bronze or a silver medal?

Bronze medal

Silver medal



Do you think this athlete won a bronze or a silver medal?

Bronze medal

Silver medal





Do you think this athlete won a bronze or a silver medal?

- Bronze medal
- Silver medal



Do you think this athlete won a bronze or a silver medal?

- Bronze medal
- Silver medal



Do you think this athlete won a bronze or a silver medal?

- Bronze medal
- Silver medal



Do you think this athlete won a bronze or a silver medal?

- Bronze medal
- Silver medal

