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CAN AN EMOTION BE ACCURATELY JUDGED BY ITS FACIAL EXPRESSION ALONE?

SAMUEL W. FERNBERGER*

The statement is often made by witnesses in criminal cases that either the defendant or the plaintiff was in a certain emotional state at a given moment before or during the alleged crime. Such a statement is a judgment made from a perception of the facial or bodily expressions—how the person looks and acts. The witness says: "So and so was enraged—his face was livid, his teeth were bared." Or "So and so did this act in cold blood—his face was calm and there was not even a frown on his brow." Or "So and so was bewildered because. . . ." Such statements are admitted as testimony and many lawyers believe that they carry great weight with the jury.

The validity of such statements is not only commonly believed, but is also believed by some psychologists. They not only believe that such judgments of emotional states are valid, but, on the whole, that they are easy to make. In a recent popular text of psychology by Downey¹ is the following statement which characterized this point of view—with the usual cautions. The Italics are mine.

"But it is not so easy to determine just what has gone right or wrong. We can tell a gloomy face from a happy one, but it is difficult to tell a sad countenance from a disgusted one, or to be sure that a bright smile means joy rather than amusement. *Some people, however, have quite a gift for reading faces. This gift is a valuable one, for it makes it possible to understand and sympathize with people.* You will want to find out whether you possess this gift and to what extent. Therefore, I am producing six photographs expressing six different emotions. Write down the emotion expressed by each of the six faces. Then ask at least twelve other persons to name the emotions and compare your list of names with theirs. *If you make a good many mistakes, don't be discouraged. It is possible to learn to read what is written in a face just as one learns to read printed matter.*"

It is obvious that this statement implies at least three fundamental facts. (1) The "reading" of an emotion by its facial expression is valid. (2) This ability is inborn—apparently God-given—for some fortunate individuals. (3) For those so favored a small amount of practice will make them competent to make such valid judgments.

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¹June E. Downey, *The Kingdom of the Mind*. N. Y.: 1927, Macmillan, p. 180.

A number of authors have made analyses of facial and postural expressions of emotion. Of these, perhaps the best known is that of Darwin.² Probably the most searching and complete analysis is that of Pideret.³ This author deals largely with the profile of the face and divides it into four parts: mouth, nose, eye and brow. He then finds that with a limited number of different mouths, eyes, noses and brows he can build up all of the major and many of the minor emotional expressions.

A few years ago Boring and Titchener⁴ worked out a wooden model using the Pideret faces. They painted the various forms of the four facial features on separate blocks which could then be inserted in the face and hence it was possible to build up any of the emotional expressions according to the Pideret formulae.

This model forms the basis of a series of experiments which were carried out at the Laboratory of Psychology of the University of Pennsylvania during the last few years. These studies by Buzby, Jarden and Fernberger and by Fernberger⁵ make a complete analysis of various phases of this question of the judgment of emotion by its expression.

The method employed in the first three of these studies was the same and consisted of three distinct steps. Graduate and Undergraduate students at the University of Pennsylvania were asked to make the judgments—716 in the Buzby study; 995 in that of Jarden and Fernberger; and 770 in the first study by Fernberger alone.

Buzby selected the six faces representing Anger, Dismayed, Horrified, Disdainful, Disgusted and Bewildered and showed these successively to his subjects. These faces were selected as representing supposedly vivid, marked and very different emotions. Each observer was given a sheet containing a list of 18 descriptive terms (containing the six correct ones) and, for each face, was asked to check the term which best described the face shown. The number of these judgments is given in Table I.

²Charles Darwin, *Expression of Emotion in Man and Animals*, 1875.

³Th. Pideret, *Mimik und Physiognomik*, 1867.

⁴Edwin G. Boring and Edward B. Titchener, *A Model for the Demonstration of Facial Expression*. Amer. Jour. of Psychol., 1923, 34, 471-485.

⁵Dallas E. Buzby, *The Interpretation of Facial Expression*. Amer. Jour. of Psychol., 1924, 35, 602-604.

Ellen Jarden and Samuel W. Fernberger, *The Effect of Suggestion on the Judgment of Facial Expression of Emotion*. Ibid., 1926, 37, 565-570.

Samuel W. Fernberger, *Six More Pideret Faces*. Ibid., 1927, 39, 162-166.

Samuel W. Fernberger, *False Suggestion and the Pideret Model*. Ibid., 1928, 40, 562-568.

TABLE I

	<i>Anger</i>	<i>Dismayed</i>	<i>Horrified</i>	<i>Disdainful</i>	<i>Disgusted</i>	<i>Bewildered</i>
Pleased	169	...	3	...	...	2
Displeased	2	22	5	18	13	1
Stubborn	2	10	1	54	...	...
Attentive	5	330	...	3	...	47
Quizzical	82	134	...	7	...	81
Inattentive	2	9	...	37	...	18
Dismayed	29	46	25	11	1	44
Reverential	1	29	...	21	...	28
Affable	46	12	...	...	...	6
Bewildered	111	57	6	4	...	261
Amazed	62	16	39	2	...	226
Horrified	41	1	439	...	...	...
Raging	22	...	84	...	...	...
Disapproving	6	24	8	94	36	2
Disdainful	50	11	11	265	51	...
Anger	14	...	12	5	2	...
Contemptuous	65	7	12	152	236	...
Disgusted	7	7	71	43	377	...

The 18 descriptive terms which the observer was to check will be found in the first column of this table. In each successive column will be found the number of times each of these terms were reported for the facial expression found at the head of the column. The correct judgments are in italic face type. Hereafter the designation "correct" judgment will be used to designate that which Pideret believed to be correct facial expressions of the different emotions. These facial expressions are very similar to those of Darwin and of the other principal authors who have made similar analyses.

For the Angry and Dismayed faces the scatter is great and the number of correct judgments is small. Angry was judged most frequently as *Pleased* and very frequently as *Bewildered*, *Quizzical*, *Contemptuous*, *Amazed* or *Disdainful*. Indeed, 10 of the 18 possibilities contained a higher frequency than the correct one. The Dismayed face was judged as *Attentive* with a very high frequency (over 46 percent), and also *Quizzical* and *Bewildered* were reported more frequently than the correct emotion.

For all of the other four faces the scatter was great but much less than for the other two already discussed and in every case the correct descriptive term was marked with the highest frequency. The percentages of correct judgment are: *Horrified*, 60; *Disdainful*, 37; *Disgusted*, 53, and *Bewildered*, 37.

Buzby's analysis also shows that there are no significant sex differences and that, if anything, psychological sophistication (as measured by the number of courses in psychology which the observer had taken) tends to *decrease* the frequency of correct judgments and hence the validity of these judgments.

The results of Buzby's study led Jarden and Fernberger to consider the causes of this extreme scatter of judgments found for all of the faces. They used the same six faces which had been employed in the former experiment. But they now introduced a new factor in the situation in the form of two degrees of suggestion. These same six faces were shown to a new group of subjects and, with the lower degree of suggestion, the emotion which the face was supposed to represent was *named* and the subject judged in terms of four categories: (1) Not the emotion named; (2) A poor; (3) A fair, or (4) A good representation of the emotion named. Throughout this paper the procedure just described will be called "*Named*." The higher degree of suggestion, which will be called "*Analyzed*," employed the same four categories of judgment. But now the experimenter first named the emotion and then himself assumed the facial (and bodily) expression along Pideret lines. This expression was then analysed—the biological importance of the various features was pointed out—and then the model face was built up before the group and they were asked to make their judgment. The author believes that this is the highest degree of suggestion possible.

The results of this study will be found in Table II. In this table will be found the percentages of correct judgments without regard to

TABLE II

<i>Expression</i>	Per Cent Correct Judgments		
	<i>No Suggestion</i>	<i>Named</i>	<i>Analyzed</i>
Anger	2	36	56
Dismayed	6	80	86
Horrified	63	98	95
Disdainful	37	98	98
Disgusted	53	99	99
Bewildered	36	96	96

whether the subject considered the face a poor, fair or good representation of the emotion. As a basis for comparison, the Buzby percentages of correct judgments are to be found in the first column.

In every case the lower degree of suggestion greatly increased the percentage of correct judgments. For the four faces which had, in the Buzby experiment, without suggestion, a frequency of correct judgments of over 33 percent. (Horrified, Disdainful, Disgusted and Bewildered) the correct percentage of "correct" judgments now becomes almost absolute (96 percent or better). For the other two faces (Angry and Dismayed), the percentages of "correct" judgments are very materially increased.

With the higher degree of suggestion (analysed) the correct percentages for Angry and Dismayed are again increased—in the case

of Angry quite considerably. The higher degree of suggestion does not increase the percentage of correct judgments for the other four faces (Horrified, Disdainful, Disgusted and Bewildered) in which the lower degree of suggestion had already been so effective.

Jarden and Fernberger found, also, that the higher degree of suggestion, as compared with the lower, leads to a slight but far from marked shift from the "poor" to the "good" judgment category.

The relations of the effects of the degrees of suggestion may be visualized from Figure 1. The emotions used are extended along the

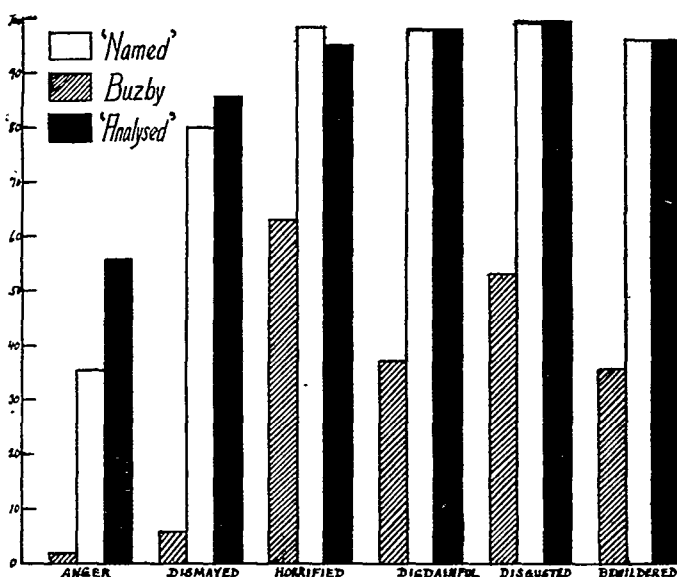


FIGURE 1

Per Cent Correct Judgments

abscissa and the three percentages of correct judgments for each emotion are erected as ordinates.

In order to test these matters further, Fernberger worked with a new group of subjects and with six new faces. The emotions chosen were Quizzical, Amazed, Contemptuous, Attentive, Stubborn and Reverential. The same three procedures which had been employed by Buzby and by Jarden and Fernberger were again used in this study. At least two months intervened between successive presentations of this material.

Note—Figures 1, 2 and 3 are reproduced here by courtesy of the *American Journal of Psychology*. See *Am. J. Psychol.*, Vol. 37, p. 567, Vol. 39, p. 165 and Vol. 40, p. 564.

TABLE III
No SUGGESTION
Frequency of Judgments

<i>Expressions Listed</i>	<i>The Expressions Employed</i>						<i>Reverential</i>
	<i>Quizzical</i>	<i>Amazed</i>	<i>Contemp- tuous</i>	<i>Attentive</i>	<i>Stubborn</i>		
Pleased	11	5	1	9	2		84
Displeased	33	20	20	7	92		14
Stubborn	17	1	9	8	372		13
Attentive	112	6	3	137	39		26
Quizzical	150	16	6	90	10		42
Inattentive	37	3	9	71	11		27
Dismayed	24	106	5	57	10		11
Reverential	10	2	2	34	17		379
Affable	27	4	3	35	3		48
Bewildered	65	101	2	180	1		29
Amazed	9	102	1	96	2		7
Horrified	3	181	...	4	...		9
Raging	1	4	...	...	1		4
Disapproving	53	22	72	10	112		24
Disdainful	132	23	198	13	30		20
Anger	6	5	3	1	24		2
Contemptuous	55	39	328	10	25		12
Disgusted	25	130	108	8	19		19

The results for the first procedure, namely, checking the best descriptive term from a list of 18, will be found in Table III, which corresponds in form to Table I above. The scatter for these six faces was even greater than it was for the faces employed before. For Quizzical, Amazed and Reverential every one of the 18 possible terms was checked at least once. For Attentive and Stubborn all but one and for Contemptuous all but two of the terms were checked. Again, without suggestion, the percentage of correct judgments was decidedly low.

These percentages of correct judgments are given for all three procedures in Table IV which corresponds in form to Table II above.

TABLE IV

<i>Expression</i>	<i>No Suggestion</i>	<i>Named</i>	<i>Analysed</i>
Quizzical	20	78	91
Amazed	13	82	91
Contemptuous	42	97	99
Attentive	18	76	95
Stubborn	48	95	97
Reverential	49	84	87

These relations are visualized for the reader in Figure 2 which is identical in form to Figure 1 above.

It will again be seen that, without suggestion, none of the faces are correctly judged with a percentage as great as 50 percent. Again

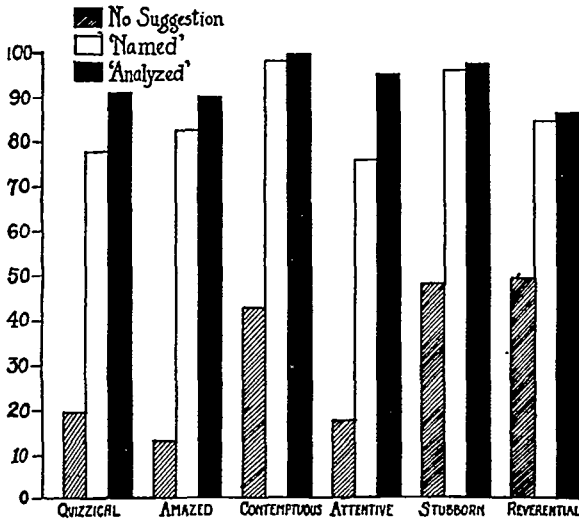


FIGURE 2

Per Cent Correct Judgments

the lower degree of suggestion—merely naming the emotion—materially increases the percentage of correct judgments for all six faces. Contemptuous, under these conditions, is correctly judged with a frequency of 97 percent; Stubborn with a correct frequency of 95 percent. With the lower form of suggestion, Attentive is the lowest with 76 percent—just a three to one bet.

Again the highest form of suggestion (analysed) increases the percentage of correct judgments for all six faces. The lowest is Reverential with almost a nine to one bet; while Contemptuous rises to a correct frequency of 99 percent.

The results reported up to the present moment are definite and perfectly clear cut. They indicate that intelligent subjects cannot judge any emotion by recourse to figure with a high degree of validity when no suggestion is given. On the other hand, when a slight degree of suggestion is given (when the emotion is merely named), the judgments greatly increase in validity. With the higher degree of suggestion (when the facial expression is analysed as well as the emotion named) the validity is again increased—considerably for those emotions which were not so highly valid for the lower degree of suggestion and only slightly for those emotions which were already highly valid with the lower degree of suggestion.

These results so emphasize the effect of suggestion in the formation

of judgments such as these that Fernberger, in his last study, tested out the importance of this factor from a new approach. He obtained judgments from 666 undergraduate and graduate students in psychology at the University of Pennsylvania. He used the same faces already employed by Buzby and by Jarden and Fernberger reported above, namely—Angry, Dismayed, Horrified, Disdain, Disgusted and Bewildered.

The first procedure was again employed; the subjects checked the best descriptive term from the same list of 18. The results are given in Table V which is identical in form to Tables I and III above.

TABLE V

666 Cases	Anger	Dismayed	Horrified	Disdain	Disgusted	Bewildered
Pleased	155	4	6	2	...	2
Displeased	6	12	4	32	13	1
Stubborn	4	15	3	69	7	4
Attentive	7	294	...	4	...	103
Quizzical	69	114	2	11	...	115
Inattentive	5	11	3	35	...	24
Dismayed	21	28	22	15	1	32
Reverential	6	38	...	21	1	40
Affable	60	10	4	2	...	18
Bewildered	67	51	24	7	1	184
Amazed	26	17	55	...	...	136
Horrified	23	3	355	...	2	1
Raging	25	3	65	2	1	0
Disapproving	15	28	13	92	54	5
Disdainful	57	19	10	210	73	1
Anger	15	3	9	3	...	...
Contemptuous	79	8	26	115	226	...
Disgusted	26	8	65	46	287	...

We find a complete verification of Buzby's findings. There is a very wide scatter of judgment for all six faces—again is this especially true for Angry and Dismayed for which each of the 18 terms were checked at least three times. Also there is a relatively small percentage of correct judgments for any of the faces in this procedure in which no suggestion was given.

The same two procedures for the two degrees of suggestion were given in identical fashion. The face was "named" but, in this experiment, a false suggestion was given for the experimenter gave the wrong name to the subjects. Thus the face for Angry was called Pleased; Dismayed, Quizzical; Horrified, Attentive; Disdain, Displeased; Disgusted, Contemptuous and Bewildered, Reverential. Some of these terms are in the same series but distinguish varying degrees of the same fundamental emotion (Dismayed, Disdain, Disgusted). Some of the false suggestions are of the series already employed by Fernberger (Quizzical, Attentive, Contemptuous and Reverential).

For the higher degree of suggestion (analysed) the same terms were used as false suggestion. The results are given in Table VI which

TABLE IV

<i>True Face</i>	<i>False Suggestion</i>	<i>No Suggestion</i>	<i>Named</i>	<i>Analysed</i>
Anger	Pleased	2	59	80
Dismayed	Quizzical	4	87	93
Horrified	Attentive	53	19	60
Disdain	Displeased	32	93	97
Disgusted	Contemptuous	43	98	98
Bewildered	Reverential	28	85	95

is constructed like Tables II and IV. The true faces are first given followed by the false suggestions and then the percentage of "correct" judgments when no suggestion was given and then for the two degrees of false suggestion.

The results are given in visualized form in Figure 3 which is identical in form with the other two figures.

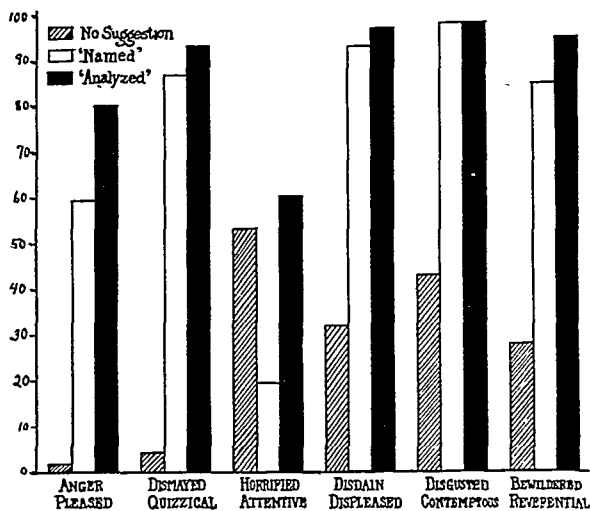


FIGURE 3

The false suggestion was effective in all of the cases except the Horrified-Attentive combination. In this case, the face for Horrified is thrown strongly into action. It is not surprising that this face which is so strongly activated should not be interpreted as Attentive for which the face is more or less in repose. As a result, this face, which was judged correctly in 53 percent of the cases, without suggestion, dropped to 19 percent, under the lower degree of false suggestion. We then

tried to determine the judgment with the higher degree of suggestion and, to this end, built up a situation of which this face became a special case of Attention. We said that the man was supposed to be keenly attending to something else when some other object *compelled* his attention and the face was supposed to represent him at that moment. In order to account for the mouth, which is incongruous for Attention, we invented a proverb that one can attend better while mouth breathing than when breathing normally through the nose. This proverb, which so far as we know we invented and which we believe to be untrue, had a familiar ring to a surprisingly large number of the subjects. Under these circumstances the percentage of "correct" judgments increased to 60 percent.

For the other five faces the false suggestion of both degrees was practically as effective as the true suggestion. In several cases the lower degree of false suggestion (naming) was actually more effective than the true (Pleased for Angry and Quizzical for Dismayed). For the higher degree of false suggestion (analysed) this was more effective than the true in the same two cases. For the last three faces (Displeased for Disdain; Contemptuous for Disgusted and Reverential for Bewildered), the results are almost identical for the higher degree of true or false suggestion and, in every case they are over 95 per cent correct.

An analysis of the results for true and false suggestion reveals no significant sex differences nor any differences due to degrees of psychological sophistication.

It may be argued that the wooden model of the profile of the face, such as has been employed in these investigations, is so artificial a situation that it has no bearing on the practical problem as to whether or not such judgments should be admitted as testimony. A recent experiment by Sherman⁶ gives identical results with a method that is perhaps less artificial than the ones described above. Working with infants under twelve days of age, Sherman experimentally produced Hunger, Fear, Anger and Pain. Motion pictures were taken of the stimulus situation and of the reaction. These were shown with the following variations: (1) Reaction alone without the stimulus situation (identical with our "no suggestion" series); (2) Reaction with the correct stimulus situation (identical with our true suggestion series) and (3) Reaction with a transposed or false stimulus situation (identical with our false suggestion series). Graduate students in psychol-

⁶M. Sherman, *The Differentiation of Emotional Responses in Infants*. 1. Judgments of emotional responses from motion picture views and from actual observation. *Jour. of Comparative Psychol.*, 1927, 7, 265-284.

ogy, medical students, student nurses and Normal School freshmen acted as subjects. In this way Sherman obtained judgments from individuals who were supposed to be familiar with infant reactions (or at least to whom such knowledge would be highly useful) and from others who were supposed to be more or less naive to judging such reactions. The results are identical to the ones reported above for the Pideret model. The motion picture results show a wide scatter of judgment when the reaction is shown alone; much greater validity of judgment when the stimulus situation is shown before the reaction and also a greater but false validity to the judgments with the transposed and false stimulus situations. Sherman concludes in part (Page 284): "The results indicate that the stimulus preceding the reaction shown was usually the deciding factor in the name given to the reaction."

It would seem that the results outlined above have a certain theoretical significance and a great practical significance as well for the taking of testimony. They would indicate that little can be determined of an emotional state in another individual from the perception of an abstracted facial expression (and we believe for postural expression as well) completely divorced from a general, total stimulus situation. If a stimulus situation is indicated, the emotional state is judged in accordance with that *situation* rather than in accordance with the facial expression. This judgment is made correctly with a high probability if the stimulus situation is correctly indicated or correctly perceived and it is made incorrectly with quite as high a probability if the stimulus situation is falsely indicated or falsely perceived. This would indicate that our judgments of the emotional states in others are in the nature of social meanings dependent more upon the stimulus situation than upon anything else. Such judgments can be honestly made and made with a very high degree of subjective assurance and still they are as likely to be false as true.

Although these experiments were carried out under extremely artificial conditions, it seems reasonable to conclude that all such judgments of emotion based on a perception of the facial expression of another individual alone should be questioned in the testimony of criminal procedure.