

# COGNITIVE, SOCIAL AND PHYSIOLOGICAL DETERMINANTS OF EMOTIONAL STATE

## STANLEY SCHACHTER & JEROME E. SINGER (1962)

### HISTORY

Schachter and Singer developed the two-factor theory of emotion. The two-factor theory suggests that emotion comes from a combination of a state of arousal and a cognition that makes best sense of the situation the person is in. It is the cognition which determines whether the state of physiological arousal will be labeled as joy, fear or whatever.

For example, the two-factor theory of emotion argues that when people become aroused they look for cues as to why they feel the way they do.

### AIM

The aim of the study is to test the two-factor theory of emotion. From the aim three propositions (or hypotheses) were devised:

- 1) If a person experiences a state of arousal for which they have no immediate explanation, they will label this state and describe their feelings in terms of the cognitions available to them at the time.
- 2) If a person experiences a state of arousal for which they have an appropriate explanation, then they will be unlikely to label their feelings in terms of the alternative cognitions available.
- 3) If a person is given the same cognitive circumstances, the individual will react emotionally or describe his feelings as emotions only to the extent that he experiences a state of physiological arousal.

### METHOD

The method used was a laboratory experiment with independent measures. There were two independent variables. The information about the adrenalin injection given to the subjects, and the situation they are put in (euphoria situation or anger situation).

## PARTICIPANT

The participants were 184 male college students, taking classes in introductory psychology at Minnesota University. 90% of which received two extra points on their final exam for every hour they served as subjects. The subjects' health records were checked to make sure that the adrenalin would not have an adverse effect.

## PROCEDURE

The first independent variable (**information about the adrenalin injection given to the subjects**) was manipulated in the following way.

As soon as a subject arrived, he was taken to a private room and told by the experimenter:

*In this experiment we would like to make various tests of your vision. We are particularly interested in how certain vitamin compounds and vitamin supplements affect the visual skills. In particular, we want to find out how the vitamin compound called Suproxin' affects your vision.*

*What we would like to do, then, if we can get your permission, is to give you a small injection of Suproxin. The injection itself is mild and harmless; however, since some people do object to being injected we don't want to take you into anything. Would you mind receiving Suproxin injection?*

If the subject agrees to the injection (and all but 1 of 185 subjects did) the experimenter continues with instructions we shall describe shortly, then leaves the room. In a few minutes a physician enters the room, briefly repeats the experimenter's instructions, takes the subject's pulse and then injects him with Suproxin. Depending upon condition, the subject receives one of two forms of Suproxin—• epinephrine or a placebo, which was actually a saline solution, which has no side effects at all.

The effects of the adrenalin are - increasing in blood pressure, heart rate, blood sugar level, respiration rate, and blood flow to the muscles and brain, with an accompanying decrease in blood flow to the skin. This is often experienced as palpitations, tremors, flushing and faster breathing. The effects begin after three minutes and last from ten minutes to an hour.

The subjects were then put in one of **four experimental conditions**:

1. **Adrenalin Ignorant** - subjects were given an adrenalin injection and not told of the effects of the drug.
2. **Adrenalin Informed** - subjects were given an adrenalin injection and warned of the 'side effects' of the drug (hand shake, heart pounding, dry mouth etc.). The subjects were therefore prepared for the effects of the adrenalin (although they thought they were to do with the suproxin).
3. **Adrenalin Misinformed** - subjects were given an adrenalin injection and told to expect side effects but were told these would be numb feet and headache. These subjects would, therefore, not be expecting the effects of the adrenalin.
4. **Control Group - Placebo** - subjects were given an injection that would have no effect and were given no instructions of what to expect.

The experimenter's initial hypothesis has suggested that given a state of physiological arousal for which the individual has no adequate explanation, cognitive factors can lead the individual to describe his feelings with any of a diversity of emotional labels. In order to test this hypothesis, it was decided to manipulate emotional states which can be considered quite different—euphoria and anger. Therefore second independent variable (**the situation they are put in - either euphoria situation or anger situation**) was manipulated in the following way.

Immediately after the subject's injection, the doctor left the room and the experimenter returned with a stooge. The stooge was introduced as another subject and the experimenter stated that both had had the Suproxin injection and that they had to wait for 20 minutes while the Suproxin was absorbed into the bloodstream, after which they would both be given the same tests of vision.

The participant was placed in either the euphoria situation or anger situation.

## THE EUPHORIA SITUATION

The room in which this was said had been deliberately put into a state of mild disarray. As he was leaving, the experimenter apologetically added:

*The only other thing I should do is to apologize for the condition of the room. I just didn't have time to clean it up. So, if you need any scratch paper or rubber bands or pencils, help yourself. I'll be back in 20 minutes to begin the vision tests.*

As soon as the experimenter left the room the stooge introduced himself again, made a few icebreaker comments and then began his routine which consisted of playing with items (paper, rubber bands, pencils, folders and hula hoops) left in the room. The stooge encouraged the participant to join in while he played with the objects. The routine was standardized as far as was possible. The stooge goes through a prescribed routine designed to involve the subject in manic behaviour, and thereby produce a reason for the subject to feel happy. The activities are:

- doodling a fish on rough paper
- crumpling the paper, the stooge played basketball with it, with the use of a waste bin.
- Throwing the paper ball to the subject asking him to join in
- Continues game
- The Stooge gives up and makes a paper aeroplane instead.
- plays with throwing the plane
- throws plane at subject
- continues flying plane
- The stooge tears a part of the plane and makes a paper pellet. This is fired with a rubber band.
- Continues shooting
- builds a tower out of folders and shoots at it
- The stooge misses several times and then hits it giving a loud cheer.
- starts to pick up folders and notices a pair of hula hoops, and tries one
- The stooge twirls the hoop on his arm, whilst saying "Hey, look at this - this is great".
- replaces hula-hoop and sits down with feet on table

The stooge never knew which condition any particular subject was in.

## THE ANGER SITUATION

Immediately after the injection, the experimenter brought a stooge into the subject's room, introduced the two and after explaining, the necessity for a 20 minute delay for "the Suproxin to get from the injection site into the bloodstream" he continued, "We would like you to use these 20 minutes to answer these questionnaires." Then handing out the questionnaires, he concludes with, "I'll be back in 20 minutes to pick up the questionnaires and begin the tests of vision." Before looking at the questionnaire, the stooge says to the subject,

*I really wanted to come for an experiment today, but I think it's unfair for them to give you shots. At least, they should have told us about the shots when they called us; you hate to refuse, once you're here already.*

The five-page questionnaire started innocently enough, but then grew increasingly personal and insulting (e.g. 'How many times each week do you have sexual intercourse?'; 'With how many men (other than your father) has your mother had extramarital relationships?') The stooge, sitting opposite the subject, placed his own answers so that at all times they were both working on the same question. At regular points, the stooge made a series of standardized comments about the questions, starting off innocently enough, but growing increasingly discontented and finally he ends in a rage. For example:

*Question 25 presents a long series of items such as "Does not bathe or wash regularly," "Seems to need psychiatric care" etc. and requests the respondent to write down for which member of his immediate family each item seems most applicable. The question specifically prohibits the answer "None" and each item must be answered. The stooge says, 'I'll be damned if I'll fill out Number 25 'Does not bathe or wash regularly'—that's a real insult.' He then angrily crosses out the entire item.*

*Question 28 reads: "How many times each week do you have sexual intercourse?" 0-1; 2-3; 4-6; 7 and over. The stooge bites out, "The hell with it! I don't have to tell them all this."*

*The questionnaire continues for eight more questions ending with: "With how many men (other than your father) has your mother had extramarital relationships?"  
4 and under: 5-9: 10 and over*

This routine again was standardized and the stooge never knew which condition any particular subject was in.

Overall, the study ran **seven conditions** as shown in table below

**The conditions in the Schachter and Singer experiment:**

<b>Euphoria</b>	<b>Anger</b>
Informed	Informed
Ignorant	Ignorant
Misinformed	
Placebo	Placebo

**MEASUREMENT**

Two types of measures of emotional state were obtained. Standardized observation through a one-way mirror was the technique used to assess the subject's behavior. To what extent did he act euphoric or angry? The second type of measure was self-report in which, on a variety of scales, the subject indicated his mood of the moment. Such measures can be considered "public" indices of mood for they would, of course, be available to the experimenter and his associates.

**OBSERVATION**

**EUPHORIA**

For each activity the extent to which the subject joined in was measured.

- Category 1 - Joins in
- Category 2 - initiates new activity
- Categories 3 and 4 - Subject ignores or watches stooge.

Two independent observers agreed on 88% of the items.

**ANGER**

For each unit of activity the subject was coded according to how much they agreed or disagreed with the stooge.

<b>ANGER - SCORING OF SUBJECT'S BEHAVIOUR</b>		
<b>SUBJECTS BEHAVIOUR</b>	<b>EXAMPLE</b>	<b>SCORE</b>
Agrees	'I don't like that kind of personal question either'	+2
Disagrees	'Take it easy, they probably have a good reason for wanting the information'	-2
Neutral	Non-committal or irrelevant response	0
Initiates agreement	'Boy, I hate this kind of thing'	+2
Initiates disagreement	'I'm enjoying this'	-2
Watches		0
Ignores		-1

When the subject's session with the stooge was completed, the experimenter returned to the room, took pulses and said:

*Before we proceed with the vision tests, there is one other kind of information which we must have. We have found, as you can probably imagine, that there are many things beside Suproxin that affect how well you see in our tests. How hungry you are, how tired you are, and even the mood you're in at the time—whether you feel happy or irritated at the time of testing will affect how well you see. To understand the data we collect on you, then, we must be able to figure out which effects are due to causes such as these and which are caused by Suproxin. The only way we can get such information about your physical and emotional state is to have you tell us. I'll hand out these questionnaires and ask you to answer them as accurately as possible. Obviously, our data on the vision tests will only be as accurate as your description of your mental and physical state.*

In keeping with this rapid speech, the questionnaire that the experimenter passed out contained a number of mock questions about hunger, fatigue, etc., as well as questions of more immediate relevance to the experiment. To measure mood or emotional state the following two were the crucial questions:

**The self-report rating scale used by Schachter and Singer.**

1. How irritated, angry or annoyed would you say you feel at present?

I don't feel at all irritated or angry	I feel a little irritated and angry	I feel quite a lot irritated and angry	I feel very irritated and angry	I feel extremely irritated and angry
--	-------------------------------------	--	---------------------------------	--------------------------------------

2. How good or happy would you say you feel at present?

I don't feel at all happy or good	I feel a little happy and good	I feel quite a lot happy and good	I feel very happy and good	I feel extremely happy and good
-----------------------------------	--------------------------------	-----------------------------------	----------------------------	---------------------------------

For the score of self-reported emotion, the anger score was subtracted from the happiness score. The scale is a measure of happiness minus anger (i.e. the higher the positive value, the happier the subject reports himself feeling).

When the subjects had completed the questionnaires, the experimenter announced that the experiment was over, explained the deception in detail, answered any questions and swore the subjects to secrecy. Finally, subjects answered a questionnaire about their experiences, if any, with adrenalin and their suspicion about the experimental set-up.

None knew anything about the experiment beforehand, but 11 were so extremely suspicious that their data was automatically discarded.

## RESULTS

The subjects who received the injections of adrenalin showed significantly more sympathetic arousal (as measured by pulse rate and self-ratings on palpitation, tremor, numbness, itching and headache) in comparison to the placebo subjects.

[However, five subjects showed no relevant symptoms to the adrenalin and thus, were excluded from the study]

### EUPHORIA SELF-REPORT

SELF-REPORT OF EMOTIONAL STATE IN THE EUPHORIA CONDITIONS		
CONDITION	NUMBER OF SUBJECTS	AVERAGE SELF-REPORT SCALES
Adrenalin Informed	25	0.98
Adrenaline Ignorant	25	1.78
Adrenaline Misinformed	25	1.90
Placebo (Saline)	26	1.61

As expected, the adrenaline misinformed group, and the adrenaline ignorant group, reported being happiest. This is because they experienced the effects of the adrenaline, and having no explanation as to why they felt that way, attributed the feelings to feeling happy. This result was significant, adrenaline misinformed compared with adrenaline informed. Comparing adrenaline ignorant with adrenaline informed the significance level is 0.02).

BEHAVIOURAL INDICATIONS OF EMOTIONAL STATE IN THE EUPHORIA CONDITIONS	
CONDITION	ACTIVITY INDEX
Adrenaline Informed	12.72
Adrenaline Ignorant	18.28
Adrenaline Misinformed	22.56
Placebo	16.00

As expected, the adrenaline misinformed group joined in the activities more than the other groups. Comparing the adrenaline misinformed with the adrenaline informed the difference was significant at the 0.05 level. Unfortunately for Schachter and Singer the difference between the adrenaline ignorant and informed was not significant.



## ANGER

BEHAVIOURAL INDICATIONS OF EMOTIONAL STATE IN THE ANGER CONDITIONS		
CONDITION	NUMBER OF SUBJECTS	ANGER UNITS
Adrenaline Informed	22	-0.18
Adrenaline Ignorant	23	+2.29
Placebo	22	+0.79

As there was no real difference between the adrenaline misinformed and ignorant groups, the misinformed group was not used for the anger conditions. We can conclude that the information about side effects did not produce auto-suggestion, and therefore the subject's experience of any side-effects was real.

For anger units, there was a significant difference between the adrenaline informed and adrenaline ignorant conditions, in the expected direction (ignorant getting angrier).  $p$  is less than 0.01.

The placebo group are moderately angry, coming between the other two conditions. Comparing the placebo group to the adrenaline ignorant group the difference is significant, with less than 0.05.

In the euphoria condition the misinformed participants were feeling happier than all the others. The second happiest group was the ignorant group. This demonstrates that these participants were more susceptible to the stooge because they had no explanation of why their bodies felt as they did. The informed group felt the least happy because they understood why they felt as they did.

In the anger condition, the ignorant group felt the angriest. The second angriest group was the placebo group. The least angry group were those who were informed. Again this shows that participants were more susceptible to the stooge because they had no explanation of why their body felt as it did.

The behavior (which was observed through a one way mirror) matched their self-reports.

### EXPLANATION

Schachter and Singer argue that their findings support their two-factor theory of emotion. The two-factor theory of emotion states that the physiological arousal in different emotion is entirely the same and we label our arousal according to the cognitions we have available.

They argue that all three propositions were supported.

## ADVANTAGES

## DISADVANTAGES

## CONCLUSION

The two-factor theory of emotion has been an influential theory of emotions. However subsequent work has shown that the relationship is more complex than the two-factor theory predicts.

For example psychologists now argue that peoples efforts to understand an unexplained state of arousal is more extensive than a quick examination of cues in the surrounding environment. When we seek to explain a state of arousal, we don't merely use others' behavior but call on many other sources of information as well, particularly our own past history – we search for prior occasions on which we felt this arousal state to explain its occurrence now.