

Fear-then-relief, mindlessness, and cognitive deficits

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Abstract

The assumption that mindlessness underlies the effectiveness of the ‘fear-then-relief’ social influence technique has been verified in four studies. The first two experiments indicated that compliance of those experiment participants who were made to function on the thoughtful level under a ‘fear-then-relief’ condition decreases to the level observed in the control group. The other two experiments were to analyze the cognitive functioning of people who at first experience fear and then a sudden and unexpected relief. The first of these experiments indicated that the amount of time needed to detect the expression of emotion on other persons’ faces is prolonged, and the second of these latter two experiments that the participants’ arithmetical abilities are impaired (mental addition and subtraction of three two-digit numbers). Copyright © 2002 John Wiley & Sons, Ltd.

The fear-then-relief scene already belongs to the canon of action cinema and literature: two policemen run an interrogation; the first is very severe—usually older, he yells at the suspect and sometimes even beats him or her. Then suddenly the other policeman—a friendly man, who proposes coffee and a cigarette, and thinking aloud how to help the suspect, takes his place. Very often under these new unexpected circumstances, the suspect—so far obstinately refusing any form of cooperation—starts to confess everything, implicating not only himself or herself but even his or her companions.

Dolinski and Nawrat (1998) assumed that the above ‘good cop–bad cop’ scenario is only an exemplification of a general rule, and is not just a specific phenomenon connected uniquely with police interrogation. They set forth the hypothesis that a sudden retraction of the external sources of fear leads to people’s increased compliance with various requests, suggestions, and commands. They demonstrated, for instance, that requests to fill in a questionnaire or to make a charity donation were fulfilled much more willingly by people who had just heard the sound of a police whistle while crossing the road in a place not intended for that purpose, and after having turned their eyes in the direction of the sound suddenly realized that somebody (not a policeman) was just playing a joke.

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They observed increased compliance also among car drivers who found, placed under the windscreen wiper of their car, a small piece of paper which at first looked like a police ticket given to them for having parked in a no-parking area, but which under closer scrutiny turned out to be just an ad for a hair-growth-stimulating shampoo.

Research on the effects of arousal has repeatedly documented that some techniques of social influence are more effective when arousal levels are high (see Baron, 2000 for a review). When people who are debilitated because of a high level of arousal become less capable of carefully processing message characteristics, they begin to rely more on peripheral cues such as a requester's politeness (Chaiken, 1987; Petty & Cacioppo, 1986; Sengupta & Johar, 2001).

Another relevant line of research deals with positive emotions effects. As numerous studies have shown, persons are more willing to help when they are in a good mood (e.g. Batson, 1991; Schaller & Cialdini, 1990). Since the events in which fears are not confirmed cause a positive state of relief or elation (Solomon, 1980), it seems possible that a good mood-compliance model may be the mechanism underlying the effectiveness of the social influence technique based on a sudden retraction of the external sources of fear.

If we assume that the above-mentioned jaywalkers or drivers, who parked their vehicles in a forbidden area, were highly aroused or/and experienced a positive emotional state, it seems clear why they should have been willing to comply with different requests presented politely. Dolinski and Nawrat (1998) demonstrated, however, that these people, when just realizing that the danger was over, did not experience either more negative or more positive emotions than the people in the control group. Additionally, in the laboratory study (Experiment 4) they showed that unexpected fear which is not followed by a relief state did not produce compliance. Taking all this into account, one may conclude that the *dynamics of the experienced emotions* (first the fear, and then the relief), and not the tension of either fear or the following positive emotions, is what makes people more compliant in the subsequent moment when they are confronted with a request.

What psychological mechanism, then, is responsible for the situation of fear that increased compliance when the source of this fear is suddenly and unexpectedly removed? Dolinski and Nawrat (1998) suggest this compliance is because the action program launched by the fear is not compatible with the demands of the changed situation. Emotion researchers draw our attention to the fact that every emotion automatically activates an action program (e.g. Frijda, 1986; Oatley & Jenkins, 1996). Fear is elicited when people feel endangered themselves. The reaction which is then activated usually suppresses all current actions, increases our cautiousness about the external environment, or makes us freeze or flee (e.g. Denny, 1991; Tomkins, 1991, Tuma & Maser, 1985). At the very moment when the stimulus that provokes and justifies our experience of fear is suddenly removed, we may experience a short-lasting state of disorientation. The action program produced by fear is no longer functional in the new circumstances, and a new program that would be adequate has not yet been instigated. Our assumption is that during this moment of disorientation people function automatically and mindlessly, engaging in automatic, pre-programmed actions. This interpretation is in accordance with the results of an experiment inspired by Langer, Blank, and Chanowitz (1978), and recently conducted by Dolinski and Nawrat (1998, Experiment 5).

The participants were individuals who crossed a street in a prohibited place. For half of the cases, the fact was just noted down, but the remaining participants heard a police whistle (produced by the experimenter) as they crossed the street. These participants typically turned around in the direction of the whistle and, realizing that it was just a joke, and there was no threat of being fined, continued to the other side of the street. A confederate asking for a donation and carrying a moneybox next approached all participants. As in the original experiment by Langer *et al.*, he formulated a request only ('Excuse me, would you please give us some money?'), or a request with an artificial justification ('Excuse me, we are collecting money. Would you please give us some because we

have to collect as much money as possible'), or a request with a real justification ('Excuse me, we are from the "Students for the Handicapped" organization. Would you please join our charity action because we have to collect as much money as possible to cover the cost of a holiday camp for mentally handicapped children?').

Results showed that in the emotionally neutral conditions (i.e. when the participants were not disturbed by the whistle while crossing the street), the participants behaved in a thoughtful manner. They hardly ever reached for their wallets, when they heard the request or the request with an artificial justification. Noticeably more often, wallets were reached for when the request was justified with a real justification, that is, with the information about the organization behind the charity action and its aim. The reactions of the fear-then-relief participants were quite different. In this case it was enough to provide any kind of justification for the request to increase the inclination of the participants to produce their wallets. It also turned out that in the fear-then-relief conditions, people who were approached with the request accompanied by the artificial justification very seldom asked any questions about the aim of the action or the organization responsible for it. However, asking questions in this situation was a common reaction among the participants in a neutral emotional state. This pattern of results is consistent with the assumption that the fear-then-relief technique, like some other forms of social influence (see Cialdini, 2001) introduces people into a state of mindlessness, which in turn increases compliance.

Although psychologists agree that in many social situations people tend to react mindlessly and automatically, they do not agree as to whether it is caused by the limitation of human cognitive resources (e.g. Posner & Snyder, 1975; Taylor, 1981), or by motivational deficits (e.g. Neisser, 1976; Navon, 1984). With no aspiration to solve this dilemma as far as the general functioning of a human being is concerned, we, however, assume that in the specific state of fear-then-relief, mindlessness occurs not because of motivational deficits, but because of limited cognitive resources.

A typical example of fear-then-relief would be the situation which is probably familiar to every car driver. Directly after a very dangerous traffic situation (e.g. narrowly avoiding an old lady who has walked straight onto a busy road), drivers happen to make 'silly' simple mistakes. This is not because such drivers do not care any longer to be cautious (which would be a motivational deficit), but because at this very moment they are not able to remain fully cautious (which probably results from cognitive resources deficits). Similarly, a man interrogated by a bad cop and then by a good one starts to own up not because he no longer wants to function mindfully but because he is not able to remain mindful.

Langer (1989) prefers the motivational approach to the phenomenon of mindlessness. She assumes that people start to function mindfully whenever remaining in the state of mindlessness would be too costly for them. In accordance with this assumption, participants in the Langer *et al.* (1978) experiment behaved mindlessly when the cost of staying mindless was low, but shifted their functioning into the thoughtful mode when mindlessness could be too costly.

It is worth noting that people have a lot to lose both in Dolinski's and Nawrat's (1998) experiments and in the cases of the drivers who have just miraculously avoided an accident, or as suspects being interrogated first by a bad cop and then a good one. Consequently, according to Langer and her colleagues, persons in these predicaments should be highly motivated to avoid mindlessness and to shift their functioning to the thoughtful level. Apparently, however, they do not do this. What does it mean?

Despite the fact that the state of persons having just experienced fear-then-relief to a great degree resembles the state of mindlessness described by Langer and her colleagues, it seems that their origins are quite different. Mindlessness occurring in routine and recurrent situations can result mostly from the lack of motivation to function mindfully. On the other hand, the outcome of a sudden withdrawal of the sources of a subject's emotion (i.e. the situation analyzed in this article) seems to be caused by a *deficit of cognitive resources*.

The series of experiments presented below was aimed at the further empirical exploration of the fear-then-relief phenomenon. In the first two experiments we wanted to see what happened to people under the fear-then-relief condition if they were at the same time made to function cognitively on the *mindful level*. Our assumption was that if mindlessness underlay compliance in the fear-then-relief condition, then in the experimental situation specified above increased compliance should not be induced. In the latter two experiments, we took a closer look at the cognitive functioning of people under the fear-then-relief condition. We assumed that this condition should reduce the participant's cognitive resources. Thus people who experience sudden relief following fear should score worse in different tasks which require attention or memory engagement than people who experience a single and relatively stable emotion or people in whom no emotion is evoked.

Hence, in our first experiment we decided to differentiate the fear-then-relief condition in such a way that part of the fear-then-relief participants were also made to function on the thoughtful level. The demand to function thoughtfully was created by introducing an unclear and extraordinary situation. Such situations demand much more processing and make people more mindful (e.g. Langer & Piper, 1987; Ritchhart & Perkins, 2000). We assumed that the frequency of compliance obtained by the participants introduced in that condition should not differ from the frequency of compliance for the participants who were not introduced into the fear-then-relief state. Increased frequency of compliance was expected, therefore, only from those participants who were first introduced into the fear-then-relief state but were not made to function additionally on the thoughtful level.

EXPERIMENT 1

Overview

Participants were induced into the fear-then-relief state by a sudden grasp on the shoulder from behind. After they turned round they saw that an unknown blind man had grasped their shoulder. In some of the conditions, the man formulated a message that demanded from the participants the engagement of cognitive processing, and made them return to the thoughtful state. The dependent variable was compliance with a request directed to the participants a moment later by another confederate. In the control group, the participants were addressed only with the final request.

Procedure and Participants

The experiment was conducted in front of the Hala Targowa (covered marketplace) in Wrocław. The first confederate, a young man, waited by the exit of the hall. He was wearing dark spectacles and holding a white stick in his hand, both attributes of a blind person. He was standing behind the closed half of the large double-door, thus remaining out of view of the people leaving the hall. Every fifth person leaving the hall alone became a participant in the experiment. The participants were randomly assigned to one of three groups by means of a preset schedule of subsequent three types of conditions. In total, 90 people participated in the experiment (30 in each of the conditions).

The first confederate did not approach any control participants at all. He did, however, approach participants assigned to the two experimental groups. For those participants he suddenly grabbed their shoulders and said 'Excuse me'.

We assumed that this situation should evoke at first the participants' fear followed by a sudden fear reduction.¹ In this fear-then-relief state, the participants should be mindless. For one experimental group, however, we wanted to make the participants return to mindfulness. This was induced by asking them to think about certain given information. Thus, after saying 'Excuse me', the confederate added 'How many minutes until *x* o'clock?' Here an exact hour was specified, about three and a half hours later than the time of the experiment. The participants would then look at their watches and calculate the time left until the hour specified by the first confederate.

After continuing seven meters past the hall's exit door, the participants were approached by a second confederate, also a young man, who said: 'Excuse me, I am a student of sociology. Would you be so kind as to donate 5 minutes of your time to fill out a questionnaire about present living conditions of Poles?' The participants' consent to this request was treated as indication of their compliance.

Results

Initial analysis indicated that the participants' sex had no impact on the frequency of compliance with the request to complete the questionnaire ($\chi^2 < 1$). Therefore, this factor was ignored in the further analysis.

If we assume that introducing people into the state of mindlessness underlies the fear-then-relief technique, then this technique should cease being effective in those conditions where people just relieved from fear are at the same time induced to function thoughtfully. In other words, it was expected that only people grabbed by the shoulder by the blind man and then apologized to would turn out to be more compliant than participants in the control group. No difference in compliance was expected, however, between the fear-then-relief/mindfulness group (i.e. participants grabbed by the shoulder, apologized to by the blind man and asked to calculate hours and minutes left until the indicated hour) and the control group. The adequate test for this hypothesis is a two-step analysis. The first step was the comparison of the differences between the control group and the fear-then-relief/mindfulness group. It turned out that the proportion of participants in these two groups who complied with the request to fill in the questionnaire was identical (30%). The next step was to compare the level of compliance for these two groups versus the compliance observed in the fear-then-relief/mindlessness group (53%). The difference was statistically significant: $\chi^2(1) = 4.63, p = 0.0315$, such that compliance was much higher in the expected fear-then-relief/mindlessness condition.

Discussion

The results of the experiment are consistent with our predictions. The frequency of compliance in the fear-then-relief/mindfulness group did not differ from the frequency obtained in the control group.

¹The effectiveness of this manipulation was checked on another group of thirty participants. As in the original experiment, the first confederate suddenly grabbed participant's shoulder and said 'Excuse me'. After continuing seven meters past the hall's main exit, each participant was approached by a second confederate who explained to them that a psychological experiment had been just conducted. The second confederate asked the participant to explain what he or she had felt when being unexpectedly grabbed by his or her shoulder. Most participants (24 out of 30, i.e. 80%) answered they were frightened or felt fear. The confederate then asked them to assess the intensity of those emotions on a 10-point scale, where 1 indicated a minimal fear/scare experience and 10 a maximal fear/scare. Subsequently, they were asked what they felt when they realized that it had been a blind man who stopped them, and who then apologized. Five out of 30 (17%) participants answered they felt relieved. Most of them (21 out of 30; 70%), however, were still scared or felt fear. Again, they were asked to assess the intensity of the emotions experienced. A within-subjects *t*-test ($n = 21$) revealed that the intensity of negative emotions was much stronger in the first condition (6.43) than in the second (3.95); $t = 6.71, p < 0.000002$. We may assume therefore that, although on the basis of the procedure described here, we are not always able to induce the fear-then-relief state, we may certainly obtain a sudden reduction of fear.

This indicator was, however, higher in the group in which participants experienced fear-then-relief, and were not made to return to the thoughtful state. This could mean that mindlessness is the very psychological state that is responsible for increased compliance of people who have just experienced fear-then-relief. Unfortunately, an objection could be made that other aspects of the experimental procedure may account for the findings. Specifically in the fear-then-relief/mindfulness condition, participants not only engaged their cognitive abilities to calculate the time, but by doing so they at the same time complied with the request formulated by the blind person. The fact of fulfilling the first request could have modified their compliance with the subsequent request, formulated by the second confederate. Although the classical *foot-in-the-door* effect (Freedman & Fraser, 1966) occurs when the person, having fulfilled the first request, becomes more likely to comply with the second, tougher request, some researchers (e.g. Fish & Kaplan, 1974; Miller & Suls, 1977) argue that under certain conditions a reverse effect can occur. Having fulfilled the first request, the person may conclude that the norm of helping others has been satisfied, and consequently become less compliant with the second request.

If we assume that a similar mechanism functioned in Experiment 1, we could presuppose that the fear-then-relief/mindfulness participants would not be more compliant than participants in the control group, because the former had already fulfilled the first request, and not, as we assumed previously, because they managed to make their cognitive functioning more mindful. To clear this doubt, in our next experiment we decided to induce the mindfulness of participants' cognitive functioning in a way that would not require fulfilling any requests.

EXPERIMENT 2

Overview

This research was a conceptual replication of Experiment 1, the only difference being in the method for manipulating mindfulness. We assumed that the question 'Is that you?' asked abruptly by the apparently blind person would force the participants to function mindfully. To answer this unexpected question, they would need to explain that they probably did not know the person and think why he could possibly suppose he knew them.

Procedure and Participants

The employed procedure was quite similar to the procedure of Experiment 1. There were, however, two major differences. The first change was in the script of the first confederate pretending to be a blind person in the fear-then-relief/mindfulness group. In this experiment he said 'Excuse me, is that you?' The participants who are asked 'Is that you?' usually expressed their astonishment, and said they did not know the person asking the question. The confederate then nodded his head. The other change was in the time required to complete the questionnaire by a single participant. As our experiment was performed during noisy road construction works in close proximity to Hala Targowa in Wroclaw, it became difficult for pedestrians to pass along in front of the hall and at the same time not to be discouraged from stopping. It was necessary, therefore, for the second confederate to state that the questionnaire would take only one minute to complete. There were altogether 90 participants (30 in each of the three conditions).

Results

Initial analysis indicated that participants' sex had no impact on the frequency of compliance with the request to take part in the questionnaire ($\chi^2 < 1$). Therefore, this factor was ignored in the further analysis.

As in Experiment 1, we first compared the proportions of compliant participants in the control group (27%) with those who were compliant in the fear-then-relief/mindfulness group (17%). This difference was statistically non significant ($\chi^2 < 1$). In the second step, we compared the average proportion for both of these groups with the proportion of compliance obtained in the fear-then-relief/mindlessness group (43%). This difference was statistically significant: $\chi^2(1) = 4.57, p = 0.0325$.

Discussion

The results were consistent with those of Experiment 1: the experience of fear-then-relief increased the subsequent compliance of participants only if this specific state was not accompanied by the shift of functioning to the mindful level. Because the construction of Experiment 2 excludes the interpretation of the obtained dependencies in terms of the reversed foot-in-the-door effect, we can assume that it is the mindlessness induced in the fear-then-relief situation that is responsible for subsequent compliance. Feeling more confident in our interpretation, we decided to look in our next experiments at the way people function cognitively under the fear-then-relief circumstances. If such a specific emotional state really induces mindlessness caused by cognitive deficits, people who experience sudden relief from fear should be cognitively less efficient. However, it would be hard to assume *a priori* what kind of cognitive tasks could make such deficits detectable. First, we decided to study the functioning of people on a task that measured the perception of facial expressions of emotion.

In social interactions people quite often use the emotions expressed in other people's faces to optimize their own social functioning (e.g. Salovey & Mayer, 1990; Scherer, 1988). Although considerable data on the processes of emotion expression perception (e.g. Ellison & Massaro, 1997; Ekman, 1982; Young, Rowland, Calder, Etcoff, Seth & Perrett, 1997; Öhman, Lundqvist, & Esteves, 2001) exists, little is yet known about the influence of the emotional state of the individual on his or her perception of the facial expressions of other people's emotions. The exception is the research that demonstrated people's tendency to perceive the same emotions of other people which they themselves experience (e.g. Feshbach & Feshbach, 1963; Niedenthal, Halberstadt, Margolin, & Innes-Ker, 2000; Schiffenbauer, 1974). However, it is not known if the experienced emotion modifies *the speed* with which the emotion expression is recognized. This situation becomes still more complicated if we add the conditions of our curiosity, that is, of our experience of fear-then-relief, as it is not known if the potential facilitation of emotion expression perception should deal with the perception of other people's fear or joy. That is why when preparing for Experiment 3 we did not formulate any hypotheses as to the consequences of the congruence of the participant's actual or just experienced emotional state with the emotion to be perceived on another person's face. We have assumed, however, that if the emotional state resulting from the fear-then-relief experience causes cognitive deficits, such deficits might take the form of prolonging the time required for the participant to detect the emotion expression accurately. In order to verify this hypothesis, we decided to take into account in our experiment not only the fear-then-relief and the control conditions but also of a condition of fear. This structure of conditions should enable us to see which of the two—the experience of fear itself or the sudden withdrawal of the source of fear (i.e. the fear-then-relief experience)—is responsible for the potential differences in the speed of emotion expression detection.

Another problem is connected with the sex of participants. So far, it has been demonstrated (Hall, 1984) that women are more efficient in the detection of emotion expressed in other people's faces than are men.² We should then expect our experiment to confirm this observation.

EXPERIMENT 3

Overview

In Experiment 3, we created three different conditions of the emotional states experienced by the participants. The applied method of emotional state manipulation was based on the paradigm employed in one of the studies by Dolinski and Nawrat (1998, Experiment 4) which allows for the creation of the following conditions: experienced fear, fear-then-relief, and emotional neutrality. Regardless of the experimental manipulation applied, all participants were next asked to take part in one of the variants of the test on the speed of emotion expression detection. The test was based on the experimental idea by Hansen and Hansen (1988).

Participants and Procedure

The participants were 96 students of the Collective Technical High School in Wroclaw (48 girls and 48 boys) aged 16–18. All participants were volunteers. They were invited to the Institute of Psychology, University of Wroclaw, for the 'measurement of different skills and abilities'. They were informed they could withdraw from the research at any time and for no reason. (None of the participants used this possibility.) The participants were randomly grouped for six experimental conditions (three types of emotional state \times two variants of the test) in such a way as to obtain eight girls and eight boys in each of the groups.

After their arrival at the Institute, the experienced fear group participants were informed by the first confederate (a woman) that they would participate in a research project on the impact of penalty on the learning process. After each participant had been welcomed, he or she was told:

As you know, we are interested in your skills and abilities. Actually, we are particularly interested in your effectiveness at learning. Your task will be to learn the associations of various words. However, should you make an error while learning, you will be given a mild, not very painful electric shock. You will receive more details about this research in a couple of minutes.

Participants in the fear-then-relief group received exactly the same information, but when the confederate approached the door to leave the room, the door opened and another confederate appeared (a man) speaking loudly to her and to the participant:

The professor who supervises the laboratory has just decided to postpone studies of effectiveness learning until the weekend. In this case, you will participate in a totally different experiment, one that concerns visual-motor coordination. Your task will be to throw darts at a target, and by no means will you be given electric shocks. This study shall start in a couple of minutes.

Participants in the control group were simply told:

You will take part in a research project concerning visual-motor coordination. Your task will be to throw darts at a target. This study shall start in a couple of minutes.

²With the exception of the emotion of anger, which is usually decoded more quickly and more accurately by men, especially when another man is the expressor of this emotion (Wagner, MacDonald, & Manstead, 1981; McAndrew, 1986).

To all groups, the confederate added:

Before we start, I would like to ask you to take part in a very short research project which I am conducting for my master's thesis. I will show you a tableau of 72 photographs of human faces. Could you point as quickly as you possibly can at the face that expresses an emotion different from the other faces.

The confederate showed the participant the table of photographs and switched on a timer at the same moment. The size of the table was 30×21.5 cm; it contained 72 photographs (6 rows of 12 pictures each) of the same person—a woman of about 40.³ The confederate measured the time required by each of the participants to answer the question. Depending on the experimental conditions, one of two tables was shown to the participants. The first contained 71 pictures of the woman smiling, among which there was one picture of the same woman looking frightened. The second table showed the same pictures; only this time one picture of the smiling woman was hidden among 71 pictures of the woman looking frightened. The 'different' picture was always placed in the fifth row and third column.

Results

An ANOVA 3 (Emotional state) $\times 2$ (Task variant) $\times 2$ (Participant's sex) for the dependent variable of the time needed for indicating the face expressing a different emotion than the other faces showed a strong main effect of the emotional state; $F(2, 84) = 37,433$, $p < 0.000001$, the effect of the task variant close to statistical significance; $F(1, 84) = 3,518$, $p < 0.065$, and the effect of the interaction of these two factors; $F(2, 84) = 4,592$, $p < 0.013$. No effect of the sex of participants on the detection speed of emotion expression was observed in either of the experimental conditions ($F < 1$).

The main effect of the emotional state was due to the participants in the fear-then-relief condition, needing more time (18.437 seconds) to find the target face than the participants in the fear condition (13.625 seconds) and in the emotionally neutral condition (12.594). The difference between the latter two conditions was statistically non-significant ($p = 0.147$). The main effect of the task was due to the fact that participants required slightly more time (15.537 seconds) to find the frightened face among the smiling faces than they needed to find the smiling face among the frightened faces (14.333). This effect is, however, strongly modified by the interaction of the emotional state and task variant factors. The nature of this interaction is presented in Table 1. It is evident that the fear-then-relief participants needed more time to answer the question than other participants did. While neither in the fear conditions nor in the emotionally neutral conditions did the task variant influence the length of time needed by participants to fulfill the task, individuals in the fear-then-relief conditions took longer to find the frightened face among the smiling ones.

Table 1. Average time (in seconds) of finding the face different than the rest as the function of the emotional state of the participants and the task variant

	A frightened face among smiling ones	A smiling face among frightened ones
Fear	13.500 _a	13.750 _a
Fear-then-relief	20.250 _c	16.625 _b
Neutral state	12.562 _a	12.625 _a

Note: The values with no common subscript differ at the level of at least 0.05.

³We used the photographs found in the web page <http://www.culsock.ndirect.co.uk/MUHome/cshtml/nvc/nvc3a.html>

Discussion

Results did not reveal any effects connected with the sex of participants. Hence, the theory that women detect emotion expression more quickly than men do (Hall, 1984) was not confirmed by our Experiment 3 either in the control condition, or in the fear condition, or in the fear-then-relief condition. It is possible that this fact results from the differences in the procedures employed in our experiment and in the research discussed by Hall.

We obtained, however, quite interesting effects connected with the different experienced emotional states. It turned out that the experience of fear which is suddenly exchanged by the experience of relief causes disturbances in the detection of emotion expression revealed in the prolonged—as compared to the control group—time needed for detection of a face expressing a different emotion than other faces. Such disturbances, however, did not appear in the condition where participants experienced unrelieved fear. This suggests that the analyzed disturbance of cognitive functions is an outcome of the experience of fear and relief occurring sequentially, and not just in the experience of fear by itself.

It is also interesting that the fear-then-relief participants needed more time to find the frightened face among the smiling faces than to find the smiling face among the frightened faces. At the same time, this phenomenon was not observed either in the control condition or in the fear condition. It is hard to find a satisfactory explanation for this result. It is possible that a fear-then-relief condition does worsen the perception of any signals of danger. Such an explanation would be coherent both with what is known from films and literature (that is, the inability of an interrogated suspect to perceive the trap set by the good and the bad policemen), and the results of studies which confirm that the fear-then-relief state inclines people to become compliant with various requests and tasks (Dolinski and Nawrat, 1998).

The negative influence of the fear-then-relief state experienced by the participants on their cognitive functioning as revealed in Experiment 3 deal with a relatively simple task. Numerous studies have shown that human cognitive system is highly practiced to detect human faces (e.g. Zajonc & Markus, 1984; Hansen & Hansen, 1988; Öhman *et al.*, 2001). A question appears whether the state of unexpected relief from fear similarly affects the more complex data processing functions. This problem became the focus of our next experiment.

EXPERIMENT 4

Overview

The emotional state manipulation was analogous to that used in the previous experiment. However, this time the participants were asked to perform the task of mental addition and subtraction of three two-digit numbers. The idea of this kind of dependent variable—understood as the disturbance of intellectual functioning—was already used in the research of Norem and Illingworth (1993, Experiment 1).

Participants and Procedure

Forty-eight students of the Collective Technical High School in Wroclaw (24 girls and 24 boys) aged 16–18 took part in the experiment. All participants volunteered for the experiment. They were invited to the Institute of Psychology, University of Wroclaw, to participate in a study involving the ‘measurement of different skills and abilities’. At the same time they were informed they could withdraw from

the research at any time and without needing to give any reason. (None of the participants opted to discontinue.) The participants were randomly assigned to three experimental conditions (fear, fear-then-relief, and neutral emotion). Each group consisted of eight girls and eight boys.

Participants took part in the experiment individually, on the premises of the Institute of Psychology, University of Wrocław. Manipulation of the emotional state was largely identical to that employed in Experiment 3. However, because we used a different dependent measure in this experiment, the last instruction given by the confederate was slightly modified. This time he said:

Before we start, I would like to ask you to take part in a very short research project which I am conducting for my master's thesis. I would like you to solve mentally as many of the simple arithmetical tasks you are about to be given as you can. Remember that you cannot put down anything else but the final totals.

Each participant was seated at a desk and given a sheet of paper with a series of 35 simple arithmetical equations, each of them including the addition and subtraction of three two-digit numbers (e.g. $27 + 54 - 36 = \dots$). The number of correctly calculated equations was the indicator of the intellectual functioning efficiency.

Results

An ANOVA 2 (Sex of participants) \times 3 (Experimental conditions) for the number of correctly calculated totals⁴ revealed a main effect of experimental conditions; $F(2, 42) = 4.743$, $p < 0.014$. In the fear-then-relief condition, the average number of correct totals (16.812) was lower than in the fear condition (19.125), $p < 0.018$, and lower than in the emotionally neutral condition (19.437), $p < 0.008$. The difference between the latter two conditions was not statistically significant ($p = 0.739$).

Discussion

The pattern of results obtained again indicates that the fear-then-relief experience has a negative influence on the participant's cognitive functioning. Participants researched under this condition solved fewer arithmetical equations than participants did in either the fear group or the emotionally neutral group. The observed cognitive deficits connected with the inability of performing relatively simple arithmetical operations are therefore a consequence of a specific emotional experience of fear-then-relief, and not of fear alone.

GENERAL DISCUSSION

The results of the four experiments form a coherent picture. In the first two experiments it turned out that although the participants of the fear-then-relief groups were more compliant with requests than the participants of the control groups, these differences disappeared if after being relieved of fear they were induced to function mindfully. This pattern of results is consistent with Dolinski's and Nawrat's (1998) suggestion that fear-then-relief leads to a state of mindlessness, which increases compliance. The second two experiments focused on the cognitive functioning of people in a state of fear-then-relief. It turned out that people who experienced fear-then-relief show cognitive dysfunction.

⁴We planned to analyze the number of errors made by the participants in each of the experimental conditions. However, we gave up this idea, as there were too few errors and they were quite evenly distributed over the experimental conditions.

These functional disturbances are revealed both in relatively simple tasks (Experiment 3) and in performing more complex arithmetical operations (Experiment 4).

The functional disturbances mentioned above could be interpreted in terms of deficits of cognitive resources. Why, however, should the state of fear-then-relief lead to a deficit of these resources? At least two competitive explanations seem possible.

The first is that the state of fear-then-relief can incline a person to retrospective thinking. The person reconsiders the strange situation that has just occurred and starts up the counterfactual thinking (Gavanski & Wells, 1989) generating alternative scenarios of what could have happened but never did. As a result of starting up this process, the person has too few cognitive resources left for an effective solution of problems in current reality.

The alternative explanation is the assumption that in the conditions of fear-then-relief the person's cognitive resources are not engaged in any external activity. (By external activity, we understand here the person's solving any kind of cognitive problem, including retrospective analysis, recalling the details of the experienced event, or counterfactual thinking.) Then what *are* the cognitive resources engaged in? Perhaps in the specific state of fear-then-relief the cognitive system is not busy with the external reality, but with recovering its own balance. The cognitive resources could be then directed at turning off the action program activated because of experienced fear but no longer adequate, or at handling the physiological consequences of the sudden drop of excitement.

The question whether any of these two hypotheses accurately explains why the subject under fear-then-relief reveals disturbances of cognitive functioning cannot be answered on the basis of the experiments presented in this article. Further experiments are required which would enable a more direct tracing of the cognitive resources in which a fear-then-relief subject engages.

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