

Origin and types of emotional tearing

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ABSTRACT: Objective. *To understand why a wide range of states of mind are expressed by spilling tears.*

Methods: *465 different episodes of crying with tears were analyzed and their motivation interpreted in the search for a common factor.*

Results. *The only common factor in all tear-spilling episodes was a relationship with help: either requesting help or offering help. This leads us to speculate on the biological origins of emotional tearing.*

Conclusions. *1) The classical division of emotional tearing as either negative or positive is based on accidental characteristics and does not answer most of the questions. All kinds of emotional tearing are related to help, and can be classified as requiring-help and offering-help. 2) Why do we spill tears when we are asking for help? When children need help because of hunger, fear or pain, they add tearing to sound and body language to symbolise their suffering. Accordingly, tearing was chosen as a symbol of suffering because the reaction was already present as a reflex response to physical pain when ocular trauma and inflammation occurred, as they did very frequently in mankind's past. Moreover, this sign is seen on the face, the most conspicuous part of the body. 3) Why do we spill tears when we are offering help? As humanity evolved and needed to express empathy and sympathy, i.e. an emotion diametrically opposed to requesting help, the same core symbol was used, though the facial and body language are different. (Eur J Ophthalmol 1999, 9: 77-84)*

KEY WORDS: *Emotional tearing, Weeping, Crying, Tear, Tears*

Accepted: February 2, 1999

INTRODUCTION

There are three kinds of lacrimal secretion: basal, reflex and emotional. Basal tearing is the almost imperceptible flow needed to maintain a lacrimal film on the corneal surface for optical, metabolic and lubricant purposes; it is almost constantly secreted with nictemeral and circumstantial fluctuations. The existence of basal tearing was discovered late in the XVIII century.

Reflex tearing is a lacrimal flow produced in response to a physical stimulus which, when intense, induces copious tearing. This tear spilling washes out foreign bodies and irritating secretions and even

perhaps helps the defenses and repair products on the ocular surface. Our more primitive ancestors knew reflex tear, and gave it a plural name – tears – because they only noticed it when irritation occurred in the eyes, and a liquid spilt out in more or less separate drops.

Finally, emotional tearing is a lacrimal secretion triggered by emotions, such as sorrow or solidarity. Whereas basal and reflex tearing serve the eye and their purpose is well understood, emotional tearing, though also originating in the eye, does not serve the eye, and is basically useless to it. Why then does the eye produce a secretion motivated by an emotion that is foreign to it?

SUBJECTS AND METHODS

One hundred and sixty-six medical school students of the University of Alcalá, Madrid, Spain, volunteered to take part in an enquiry on the motivations and characteristics of emotional tearing episodes. The students were of both sexes, 23 to 30 years and were attending the last two years of medical school.

Each student was given a questionnaire requesting personal information and characteristics of their tearing episodes. Personal information included sex, age, family background, couple situation, and work if any. The questionnaire did not include their names so the students would remain anonymous, also to facilitate the demonstration of their emotions. The students had to note down information on their crying episodes. This included a description of the stimulus that triggered the crying episode, the channel of reception (interpersonal relations, a letter, television, radio, etc.), external manifestations of each episode (watering eyes, flowing tears, lump in the throat, groaning, sobbing, bloodshot eyes, covering the eyes and face with the hands, etc.), duration, reason for stopping, state of mind before and after the episode, hour and day of the week, location, etc.). The questionnaire also included an information sheet on emotional tearing and an instruction sheet on how to answer correctly.

Each participant compiled a questionnaire on their crying episodes for one to two weeks. At the end of this period they handed it in to the researchers who deposited the information in a ballot box, in order to preserve the students' anonymity. The answers given by the students to the questionnaire were analyzed by two of the authors. When an answer was doubtful, the third author participated in the interpretation. Out of 166 questionnaires 164 were considered valid for the present study. We obtained information on 465 emotional tearing episodes.

This study is still in progress and the results on frequency, gender characteristics, physical and psychological manifestations, time, day of the week, etc., for each tearing episode will be published in the future. This paper only presents partial findings on the basic and more essential states of mind of the subject in each tearing episode. We have also included some speculations on the biological origin of emotional tearing.

RESULTS

The most frequent emotions our students felt in the 465 weeping episodes that form the basis of this investigation were admiration, affliction, anger, anguish, anxiety, apprehension, confusion, contrition, deception, dejection, depression, disappointment, distress, dread, ecstasy, embarrassment, enthusiasm, saying farewell, fatigue, fear, fervor, frustration, fury, gaiety, grief, happiness, haughtiness, heroism, hopelessness, hysteria, illness, impotence, incomprehension, joy, loneliness, love rapture and rupture, low self-esteem, melancholy, mourning, misery, mysticism, pain, panic, powerlessness, rage, rapture, regret, repentance, sacrifice, sadness, self-pity, separation, shame, solitude, sorrow, tenderness, unhappiness and worry. In order to find out the meaning each person assigned to these words, we had to consider the context in which they were applied, because words simply cannot express the complexity of our emotions, and because individuals draw the line where one emotion begins and another ends in different places.

Considering the states of mind encountered and their contexts, the only feature that all tearing episodes had in common was a relationship with help requested from or given to others. We therefore concluded that all tearing states of mind could be divided in two: requesting-help and offering-help. In requesting-help tearing, the subject communicates that a problem has arisen (hunger, pain, sleepiness, loneliness, fear...) and consequently cries, demanding help to overcome it. Offering-help tearing starts on observing a fellow human being's troubles or grief; this ignites a feeling of collaboration, sympathy and helpfulness, a feeling which is expressed through tearing. In our study, 35% of the cases were labeled, as requesting-help crying, 56% offering-help, and 9% ambivalent or dubious. Most of the times it was easy to determine whether we were dealing with a requesting-help case or an offering-help one, but sometimes the relation was ambivalent, since both feelings could very well be present simultaneously.

To this classification of emotional tearing in two groups, requesting-help and offering-help, we added two hypotheses to explain why humans produce a lacrimal hypersecretion in their eyes which is unrelated to the necessities of the eye; the first is on requesting-help tearing and the second explains offering-help tearing.

DISCUSSION

Since this study belongs to the sphere of the non-experimental sciences, we are moving in the domain of speculation; any conclusion will therefore remain on theoretical or even purely hypothetical grounds.

The basic classification of emotional tearing in two main groups: requesting-help and offering help

There are numerous psychological states which are expressed through emotional tearing: sorrow, pain, laughter, the observation of an heroic act or the grief of others, etc. It has long been observed that although emotional tearing is mostly present in sorrowful conditions it can also be present in sorrowless states. Hence the old division of these states into two basic groups: positive (happiness, love, etc.) and negative (hunger, pain, loneliness, etc.). The classification of emotional tearing as positive or negative cannot be superimposed on the requesting-help and offering-help distinction. Requesting-help tearing is always linked to negative emotions whereas offering-help tearing may be associated with negative and positive emotions. For instance, crying when we express condolence and when we witness an athlete winning a competition are offering-help tearings; the first, however, is triggered by a negative emotion and the latter by a positive one.

We believe the basic classification of emotional tearing must be that of requesting-help and offering-help, and that the positive and negative division is not essential, but merely linked to an accidental characteristic that accompanies tearing. The following questions, which are not answered by the positive/negative division, can be answered by the requiring/offering-help classification:

1) *Why do children cry more than adults?* Because they are in constant need of help. There is always a requesting-help tearing when they are infants and toddlers, and almost always when they are preschoolers or young school children. Although babies share moments of wonderful love with their mothers, they do not cry for love, as should supposedly happen with the positive/negative classification of tearing. Children do not develop empathy (i.e. the ability to understand other people's feelings) till they are older so the pos-

sibility of offering-help crying does not occur till then.

Adolescents cry less for requesting-help because they need less assistance, though also to demonstrate strength in their struggle in life. However, their offering-help crying gradually increases as they mature and develop empathy, and their understanding of personal and social feelings grows.

2) *Why do women cry more than men?* Very young boys and girls cry with about the same frequency and for the same reasons because their need for help is about the same. As children grow up to adolescence, their number of crying episodes diminishes, much more so in boys than in girls. This is because throughout history men have been brought up to accept their role as defenders of the tribe or group, and as hunters. A demonstration of weakness under these circumstances would have been not only dangerous for them, but also for the women, who, feeling unprotected and at risk, would have rejected them.

Consequently, adolescent boys and adult men have always repressed any demonstration of their need for help and as a result cry less than adolescent girls and adult women. Even the duration of a crying fit is four times shorter in men than in women (1). In our study, women cried only slightly more than men, but they were more frequently requesting help whereas men wept more to offer help.

3) *Why do people frequently feel ashamed when they cry?* Children do not feel ashamed when they cry because their crying has a protective biological aim, and because they have not acquired a fighting role in life yet.

Adolescents and adults, especially men, feel ashamed when they cry demanding for help (for instance in war, in bankruptcy, etc.) because, as we pointed out above, crying reveals a weakness, a demonstration which could be more dangerous in the dominant role of men than for women. Furthermore, most women do not feel ashamed in these circumstances.

But adolescents and adults do not feel or feel very little shame when they cry to offer help (for example, the death by starvation of a child on television, condolence, sympathy, farewell), because this does not imply weakness, on the contrary, it expresses an altruistic and more sophisticated feeling. Therefore, most of the emotional tearing by men is linked to offering-help situations, and the embarrassment men might feel in these situations tends to disappear or diminish dramatically. However, in some cases, it does not

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completely vanish because both the offering and requesting-help situations exist simultaneously.

The lack of embarrassment when children cry, and the gender differences among adolescents and adults cannot be explained by the positive/negative classification, but it is easier to understand with the requesting/offering help hypothesis.

4) *Why do some positive and negative situations trigger emotional tearing, while other such situations (positive such as self-confidence, physical health, an appetite for food, pleasure in eating, sexual satisfaction, etc., and negative such as tedium, surprise, lust or sleepfulness, etc.) do not?* The reason is that emotional tearing is only caused by situations associated with requesting-help and offering-help emotions, whether negative (loneliness, expressing condolences, witnessing a massacre), or positive (listening to the national anthem, when a loved one receives an award, mystical love).

5) *Why is there a universal contradiction in the popular sayings "men don't cry" and "it's just human to cry"?* The positive/negative classification offers no explanation but the requesting/offering-help dipole makes it clear that there is no contradiction between the phrases "men don't cry" and "men who don't cry are bad" since they refer to two different types of weeping, and our subconscious really understands these phrases as: "men don't cry when requesting-help" and "men who lack offering-help emotions have no feelings".

Kottler (2) claims that Muskie, candidate to the U.S. presidency in 1972, lost votes on account of the emotional tears he spilt in front of television cameras and newspaper reporters. President Clinton's popularity, however, greatly increased when he let out emotional tears on several occasions during this decade. It was suggested that the voters' response was different because of a change in society's feelings. We think the reason is somewhat different. Muskie's tears (caused after a brutal attack against his wife) reflected a requesting-help situation and showed vulnerability; Clinton's tears (triggered by religious songs, and by empathy with the victims of wars and natural disasters) expressed sympathy and were an offer of help.

Weak, though not negligible, support for our classification of emotional tears as requesting-help or offering-help, comes from the fact that the second type appears much later than the first in children. The sequence in which basal, reflex and emotional tearing

appears is related to phylogenic and ontogenic development. Basal lacrimal secretion was phylogenetically the first to appear and was already present in amphibians; ontogenetically it is present in the human fetus in the final months of intrauterine life. Reflex tearing phylogenetically exists in numerous reptiles and is present in all mammals; ontogenetically it is not evident in human beings until birth or some weeks later. Emotional requesting-help tearing only evolved in highly developed mammals, perhaps only in human beings and, coinciding with this late phylogenetic origin, ontogenetically it only appears in human beings some months after birth. Considering that offering-help tearing expresses a more sophisticated type of feeling (empathy), and is the most recent kind to appear in the human species – it may only have appeared some millenia ago – we can deduce that this late phylogenetic evolution correlates with that ontogenetically offering-help tearing does not start in children until they are several years old.

Biological origins of requesting-help emotional tearing

The authors who have proposed theories on the origin of emotional tearing have not differentiated requesting-help and offering-help cases. Therefore, when an example was cited, it was always a case of requesting-help tearing.

We have collected from the literature five main theories on the origin of emotional tears: lacrimal gland vasodilation and compression (Darwin), catharsis (Freud), nasopharynx wetting (Montagu), blood clearance (Frey), and smoke/farewell (MacLean). We now put forward a new one: the Suffering Symbol theory, which claims that tearing became the symbol of pain because it copied reflex tearing. Although some of these theories have filled hundreds of pages of scientific literature, they cannot withstand too close analysis.

The lacrimal gland compression theory

According to Darwin (1872) (3), "Children, when wanting food or suffering in any way, cry out loudly, like the young of most other animals, partly as a call to their parents for aid and partly from any great exertion serving as a relief. Prolonged screaming inevitably

leads to the gorging of the blood-vessels of the eye; and this would have led, at first consciously and finally habitually, to the contraction of the muscles around the eye, in order to protect them. At the same time the spasmodic pressure on the surface of the eye and the distension of the vessels within the eye, without necessarily entailing any conscious sensation, will have affected, through reflex action, the lacrimal glands. Finally, through the three principles of nerve-force readily passing along accustomed channels of association, which is so widely extended in its power – and of certain actions being more under the control of the will than others – it has come to pass that suffering readily causes the secretion of tears, without being necessarily accompanied by any other action”.

Evidence does not support the Darwinian theory. 1) Vasodilation affects the salivary glands more than the lacrimal glands when we cry, but salivation does not indicate crying. 2) That compression of the lacrimal glands when we cry produces tearing is arguable if we consider their anatomical location in the orbit. 3) This theory runs counter to the principle that purposeless anatomical and physiological characteristics tend to disappear during the natural evolution of the species.

The catharsis theory

Nervous tension produced by any psychological conflict interferes with a person's normal mental activity. To relieve the brain of this accumulated, disturbing stress, a discharge (catharsis) through a neurovegetative pathway is activated which stimulates the lacrimal gland. Other examples of tensional catharsis through a neurovegetative pathway are blushing or palor in situations of shame and fury. Examples of catharsis through a motor pathway are nervous pacing back and forth when awaiting the birth of a son or daughter, scratching one's head when taking an exam, or smoking when courting a girl.

This theory was fully developed by Freud (4, 5) though some vague antecedents are observed in Darwin (1) who said that children's crying originated “partly from any great exertion serving as a relief”. Greenacre (6) suggested that lacrimation might, like urination, be a tension-relieving activity. García de la Torre (7) defined it as a catharsis and mentioned the possibility of psychosomatic diseases appearing (intestinal ul-

cers, asthma) if crying was repressed. Finally, Vingerhoets et al (8) wonder whether crying should be considered a kind of displacement activity, like nail biting and leg swinging.

The catharsis theory seems reasonable, and we do not find strong arguments against it.

The nasopharynx wetting theory

According to Montagu (9) tearing when crying is used to moisten the dried nasopharynx: “Even a fairly short session of tearless crying in a young infant has a drying effect upon the mucous membranes of the nasopharynx...” “Excessive intake and expulsion of air even in adults will quickly dry mucous membranes”...“The nasal mucous membrane must withstand the impact of respired air laden with bacteria, dust particles and gases”...“When for any reason drying is produced in the mucous membrane, the cilia tend to lose their function and soon die” ...“This state of gelatinous mass of mucous constitutes a most hospitable culture medium for bacteria”...“The consequences of this are not infrequently lethal”...“crying with tears, on the other hand, serves to keep the mucous membrane wet and to assist in maintaining its function”...“Those who were not so able would be more likely to succumb more frequently at all ages and leave the perpetuation of the species to those who could weep”.

In our opinion, the nasopharynx wetting theory loses ground because: 1) Newborns present no emotional tearing during their first weeks of life. Therefore, according to the Montagu hypothesis, they would be almost completely defenseless in one of the most dangerous moments of their lives. 2) Crying dries the trachea, the vocal cords, the oropharynx and the mouth, but not the rhinopharynx or the nose. When we swallow tears we wet the nose, rhinopharynx and esophagus, but not the vocal cords. 3) Many mammals bleat, bellow, roar, etc., loudly and prolongedly but have not developed concomitant lacrimal hypersecretion. 4) Human beings have speaking aloud for a lengthy period of time.

The clearance theory

The purpose of tearing is to clear out toxic substances produced in stressful situations. Thus, Retana (10) says that “in a situation of organic intoxi-

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cation, it is necessary to set in operation a drain valve. Tear contains several poisoning substances, originated by emotional tensions, which our organism needs to give away". "The lack of tears closes the gate to a healthy way of detoxication". But it was Frey (11, 12) who expounded this hypothesis more extensively: "Like the excretory processes of exhaling, urinating, perspiring, and defecating, emotional tearing may play a vital role in maintaining homeostasis by removing waste and harmful substances"... "Perhaps the reason people feel better after crying is that they may be removing in their tears chemicals that build up as a result of emotional stress".

The clearance theory has several weaknesses. 1) Toxic substances in emotional tearing have never been identified in a laboratory. The compositional differences between reflex and emotional tearing are minimal and insignificant (Frey, 13); 2) The small amount of blood passing through the lacrimal glands in comparison to the five liters contained in the human body limit any possible clearing effect tearing could have. Our kidneys are the most vascularized organs in the body, filtering 1.2 liters of blood per minute, and are anatomically adapted to clear our blood. Even supposing these substances slowly deposited onto the lacrimal tissues to be disposed of later, this hypothesis could then only be applied to crying after prolonged suffering, and not to the weeping produced immediately after short stimuli and for a brief period of time; 3) Breathing, urinating, defecation, and even perspiration eliminate excreta from the body, but lacrimation produces a fluid which is mostly reabsorbed and reintegrated to the body.

The smoke/farewell theory

MacLean (14) surmises that when prehistoric man began to use fire in farewell and cremation ceremonies they linked the reflex tears induced by the smoke with the act of separation, and thus began to relate familial or personal separations with tearing.

The smoke/farewell theory, if true, should very strongly associate tearing with the three most widespread approaches to fire and smoke, i.e., cooking (for instance, hunger, satisfaction after eating), heating (cold, shivering, suffocation, fever) and fire-keeping (diligence, observation, carrying things to and fro). But in none

of these situations have human beings developed tearing. It does not seem logical to relate tearing to such exceptional events involving smoke/separation, and not the frequent, almost everyday, human associations.

The suffering symbol theory

The theory we offer here for the first time holds that emotional tearing is originally an intercommunicative facial manifestation, that uses reflex tears as a symbol through which the subject informs us that he/she is suffering and needs help.

Till two centuries ago, basal tearing remained completely unknown. The only kind of tear our primitive ancestors knew since the dawn of human culture were reflex tears. Since these reflected very disturbing ocular problems and pain (ulcers, acute conjunctivitis, foreign bodies) they came to symbolise suffering in the same way that displaying teeth symbolises attack.

Thus, when human beings needed to convey psychic suffering they used the symbol of physical suffering i.e., tearing. Primitive man could have chosen any other frequent and disturbing cause of pain for instance, the temporary lameness produced by a wound on the sole of the foot. Nowadays, using this symbol of physical pain to convey sadness or fear may seem ridiculous, but no more than hypersecreting tears.

Very likely, man chose lacrimal hypersecretion as a symbol of suffering for three main reasons: the high frequency of reflex tearing, its conspicuous location on the face, and its unmistakability (since tears did not depend on facial muscular contractions, they could not be confused with any other mimic, grimace or expression).

Most gestures and mannerisms are concentrated on the face because it is here where the main source of information (the eyes) and attack (the mouth) lies. Consequently, when animals meet they look at each other's faces first and keep them under continuous observation. Therefore, the casual location of reflex tearing on the face could not be missed to express suffering.

In order to differentiate this symbolic tearing (which we now call emotional tearing) from reflex tearing, the first was accompanied by a different, distinct assembly: body and facial expressions of defenselessness (aged face, closed eyes) and a phonic call for atten-

tion (cry). Eyebrows and cheeks tend to droop in the elderly so these expressions came to symbolise defenselessness, lack of aggressiveness, and sadness. Closed or almost closed eyes happen in non-attentive states, in sleep, in defeat, and in death, thus expressing the impossibility of lack of disposition to aggression, or the need for help.

Mandibular, ocular and facial signal codes of interrelation were already present in very primitive beings, and reached high levels of development in mammals, especially human beings. When mammals appeared on the earth 200 million years ago, they developed a rich facial musculature, mainly peribuccal and periocular. They soon began using these muscles not only to suck or to protect their eyes, but also to communicate with other animals of the same species through facial contortions and grimaces. Since the facial muscles are limited, to create mimetic codes that would express a wide range of emotions it was necessary to combine muscular contractions in various intensities and degrees. This is how it became possible to express laughter, smiling, sadness, happiness, fury, anxiety, disdain, ecstasy, hate, surprise, love, anger, attention, and so on, with very slight changes on the face. These slight modifications are unconsciously deciphered and processed by the observer, who then assigns a certain meaning to them. Thus, both expressions – facial and lacrimal – benefited from this situation: facial grimaces needed reflex tearing to express unmistakable psychological suffering, and when emotional tearing began, tears needed special facial grimaces so as not to be confused with reflex tearing.

Later on, several modifications and additions were made to this combination of basic symbols to express different states of mind such as fear, solitude, danger, depression, pain, anguish, and others in which the only common feature was a need for help.

Biological origins of offering-help emotional tearing

The symbol inversion theory

This theory, expounded by one of us (15), suggests that offering-help or empathetic crying appeared in

the human species many millenia after requesting-help crying, because of any of the six theories mentioned above, or any other still to be disclosed. To express empathy humanity used the requesting-help core symbol (tears), but some facial signs were added or taken away to convey a diametrically opposed emotion: offering-help, solidarity, and empathy.

In a further stage, and as humanity evolved, enriching its mental concepts, feelings and thoughts, there was a need to develop new words and body language. These words and mimicry would express and convey our state of mind to others and would exaggerate, or shade other emotions. Since human beings only had a limited number of facial expressions to mirror myriad feelings, when they wanted to express an offering-help emotion they took advantage of an existing mannerism: tear hypersecretion.

However, in order not to confuse offering-help from requesting-help other corporeal signs were changed (phonic, mimic...) in different forms and degrees depending on the emotions the subject wanted to communicate.

Therefore, the simulation of an aged face and a phonic call, frequent in many requesting-help tearing cases, were changed in most kinds of offering-help tearing to a more relaxed facial musculature and a phonic block (becoming speechless from emotion, overcoming a lump in the throat).

The requesting/offering-help dipole is not the only one that conveys opposed feelings using one basic sign to which different mannerisms, grimaces and gestures are added. We could apply this principle to the aggression/acceptation dipole as well: bared teeth. Since animals bite when attacked displayed teeth became the symbol of aggression and defense. Consequently, in many species, when two animals meet they show their potential for aggression or defense by baring their teeth. Different body and facial language accompanied this display, depending on the feelings they wanted to communicate. When the need to express acceptance arose in man – a feeling completely opposed to aggression – they still bared their teeth but the mimicry was modified so that it would result in a smile or laughter.

A final remark is that the same core expression can only be applied to either very similar phenom-

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ena or diametrically opposed ones – for instance, teeth for aggression/acceptation, tears for requesting/offering help. If the same core symbol were applied to expressions that are not related to the dipole in question, it could only lead to confusion in the communication between animals or between humans.

ACKNOWLEDGEMENTS

This article was funded in part by a grant from Fundación Rizal. Madrid, Spain.

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