Sociology Study, Mar.-Apr. 2023, Vol. 13, No. 2, 49-62
doi: 10.17265/2159-5526/2023.02.001

Strategies for Countering Freezing in Police Operational Activities

Franco Posa, Jessica Leone, Francesco Sclavi
NeuroIntelligence, Private Institute of Research in Forensic Neuroscience and Criminology, Varese, Italy
Nicolas Poncini, Christian Musso
Department of Public Security Chiasso Local Police—Region I, Chiasso, Switzerland

Abstract: The term "freezing" refers to an innate defensive reaction characterized by the sudden cessation of all movements (Stote & Fanselow, 2004; Eilam, 2005). The freezing effect involving a police officer exposes him to a risk to himself and others. Materials and Methods: 400 anonymous questionnaires administered to law enforcement personnel in Switzerland were evaluated with the aim of testing their knowledge about the freezing phenomenon. In addition, semi-structured interviews involving police personnel were conducted. The authors also analyzed two cases of police officers who had experienced freezing. Results and Conclusions: From the results obtained, it emerges that freezing is not known to most of the police officers interviewed. Therefore, specific and innovative training seems to be necessary. The authors described the brain mechanisms that are involved in freezing. Innovative integrated training modules have been proposed by applying some neuroscientific knowledge, particularly using the potential of mirror neurons. The authors propose a strategy for supporting police officers who have experienced an episode of freezing. The ultimate goal is to provide more scientific tools to protect police officers and civilians.

Keywords: freezing, police, survey

Introduction

Freezing effect can be described as a sudden reactive and defensive emotional state with respect to a dangerous situation. Among the different clinical signs and symptoms, the most frequent is the appearance of bradycardia (slowing of the heart rate), which leads to immobilization.

The above reaction may be present in human beings when they are suddenly and unexpectedly forced to react to an alarm situation that endangers their safety.

This claim originates from neuroscientific evidence that has made it possible to identify the innumerable brain and hormonal systems that are activated in response to a sudden and unexpected dangerous situation.

Franco Posa, MSc, Scientific Director, NeuroIntelligence, Private Institute of Research in Forensic Neuroscience and Criminology, Varese, Italy.
Nicolas Poncini, police commander, Department of Public Security Chiasso Local Police—Region I, Chiasso, Switzerland.
Jessica Leone, Bachelor's degree in Law, Collaborator, NeuroIntelligence, Private Institute of Research in Forensic Neuroscience and Criminology, Varese, Italy.
Christian Musso, police officer, vice commander, Department of Public Security Chiasso Local Police—Region I, Chiasso, Switzerland.
Francesco Sclavi, MSc, Honorary President, NeuroIntelligence, Private Institute of Research in Forensic Neuroscience and Criminology, Varese, Italy.

The adaptive “Fight or Flight” system is compromised in its regulatory system leading to the possible freezing response.

Scientific studies (Leach, 2004) have shown how 75% of subjects who find themselves in a sudden situation of danger to themselves end up experiencing a state of freezing.

According to these studies, only 15% of subjects react with useful rationality to protect themselves, while 5% of these also maintain sufficient reasoning ability.

The freezing effect can remain effective in human beings for a highly variable period that is between thirty seconds and thirty minutes.

This variable is determined by multiple intrinsic and extrinsic factors i.e. being part of one’s innate predisposition and training gained from personal and professional experiences.

An attack response usually occurs when the subject has reasonable confidence that he or she can maintain partial or total safety.

This awareness may come from learning systems, specific trainings and, even earlier, through basic knowledge of certain brain mechanisms.

It is apparent that this reaction is predominantly supported by the ability to reason, which will then have to be maintained intact and effective.

Obviously, there is ample scientific evidence that such a response corresponds to the production of certain hormones capable of stimulating muscle strength, reflexes and reactive capacity.

We now know the brain areas that are activated and the brain assets that we can maintain in a state of alertness to deal with such situations (amygdala function, hormonal interference, mirror neurons). Equally reasoned reaction is the development of an escape strategy.

The freezing effect is considered particularly impairing because it results not only in an inability to use voluntary striated muscles but also sustains an obvious unfavorable slowdown in the activity of many parts of the brain.

The freezing reaction is thus processed by the subject involved as the only possibility of protecting themselves.

The motivations behind a freezing reaction are many and varied.

Among the first motivations are a total absence of strategy, the rapidity of the events, and the effect of a sudden appearance of danger. In addition, the establishment of a denial mechanism may be an unfavorable factor that is triggered by a conscious loss of the ability to protect oneself.

It is worth mentioning what are the reasons that support the emergence of a state of “freezing”.

Freezing can be behaviorally interpreted as a biologically predisposed situation for the purpose of defense and protection of one’s own safety.

Freezing often turns out to be the only opportunity for defense.

The consequences of this inadequate response are many. Beyond the danger to one’s life, those who have experienced a state of freezing often experience a feeling of failure with a sense of guilt that is difficult to manage.

Among the mechanisms we consider reactive to such a situation often occurs the realization that one is “a wrong and inadequate person”.

Another unfavorable effect is to perceive a feeling of total helplessness, that is, of having lost the possibility of reacting appropriately to a suddenly dangerous situation.

Should the person who has experienced freezing find himself or herself the victim of a dangerous situation, a mechanism of resistance to sharing the event will then be activated.

A possible development of a post-freezing state is also the appearance of psychological distress or even psychiatric disorders.

To conclude, the freezing effect is to be considered as a normal reaction of a person with normal capabilities who suddenly has to face an abnormal event without having acquired adequate training.

In particular professional, military and police contexts, it is essential to deal with the topic in order to identify its risk factors and, most importantly, strategies to counter it.

Adaptation System (Fight or Flight)

All living things, starting with single-celled ones, can be involved in a situation that requires an attack or escape response. This system of adaptation is intended to protect the survival of the individual and the group. Therefore, some aspects of this mechanism can be described from the earliest weeks of life. Fear can be defined as an emotion that is indispensable for the protection of survival, as it allows us to assess the direct consequences of an environmental but mostly personal threat. It is a system that allows us to prepare to face an external stimulus that poses a danger. The activation of the defense system (fear system, rage system) triggers an alarm mechanism (Panksepp, 2005) involving structures such as the anteroventral hypothalamus, which when stimulated triggers the attack, flight and immobilization reaction. The hypothalamus-adrenal axis is involved to reach an appropriate response preparation through the production of adrenaline. The hormone, capable of regulating the attack phase, is also essential for the return to a basal homeostatic system. Reactions to fear include vasoconstriction, peripheral vasodilation, altered heart rate, changes in respiratory rate, changes in blood pressure, altered pupils, sweating, muscle and visceral contraction. This mechanism can also turn into motor blockade, loss of consciousness or even syncope. This type of inappropriate reaction, when it involves police officers, clearly becomes quite dangerous not just for the officer but for others as well.

The perception of danger leads to a rapid modification of certain behaviors. Emotionality, with a perception of fear, is among the first warning signals perceived by the subject involved. The activation of the sympathetic/parasympathetic system is also known to occur. Behaviorally, the subject may respond by fleeing, attacking, or freezing. The fear system has been well described in brain neuroimaging studies, which also helped find a connection with anxiety disorder (Panksepp, 2005).

Neuronal circuits that support emotional responses, including fear, have been described in studies of the neurophysiology of emotions (Ledoux, 1996; 2000; 1989).

Among the earliest descriptions of a nerve center in charge of the conscious responses and physiological responses to fear, Papez's theory should be mentioned (Papez, 1995).

Among the linking structures, the amygdala, which plays a primary role in decoding sensory stimuli and preparing somatic and vegetative responses, was identified (see Figure 1). The central role of the amygdala made it possible to confirm how an emotion can be perceived in response to external stimuli without the involvement of any cortical brain area. The functioning of fear is based on two modes:

- A slow, indirect type of response with characteristics of accuracy in the response;
- A coarse, very rapid and direct response.

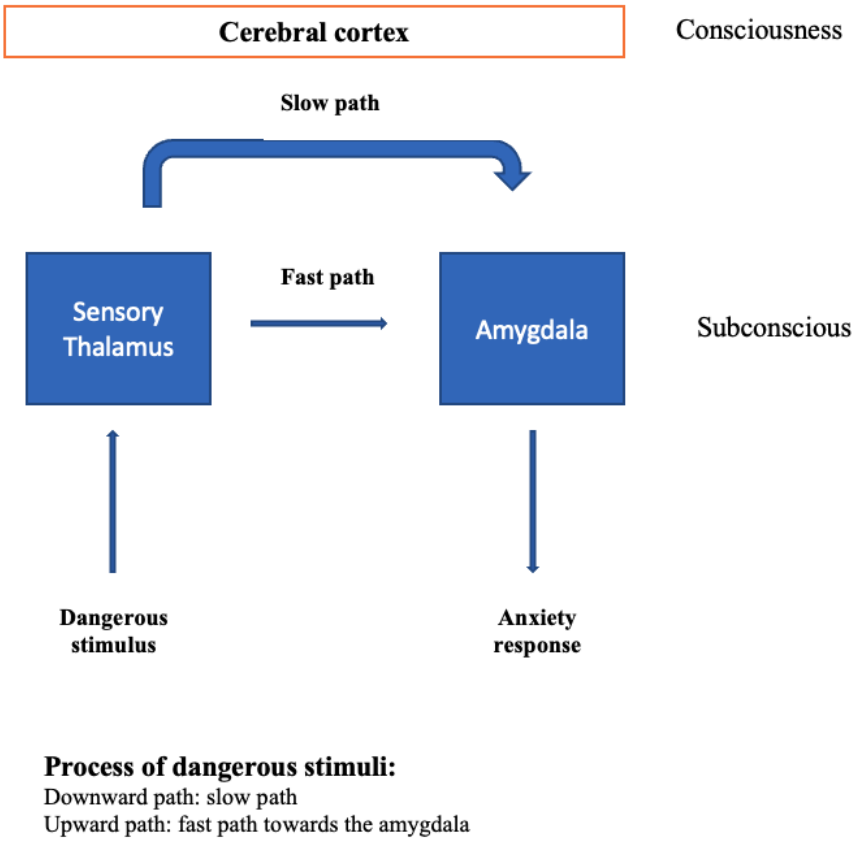

Figure 1. Role of the amygdala.

When danger reaches consciousness, the indirect pathway that transmits the emotional event to the amygdala is involved. In this case, there will be involvement of the cerebral cortex. Other authors have hypothesized a different mechanism of fear perception (Panksepp, 2005), a circuit termed “royal road”. This system has been hypothesized to be a communication mechanism between the amygdala and the periaqueductal gray region of the midbrain. This system of coordinating physiological and emotional behaviors results in generating a fear response with a high anxiety state.

The amygdala receives information from the basolateral complex capable of receiving information directed to the thalamus. This structure is also connected with several cortical areas, the parahippocampal gyrus, cingulate gyrus and orbitofrontal cortex. The amygdala connects motor and premotor cortical areas by controlling behavioral responses with particular influence in the regulation of facial expressions. The latter are particularly identifiable in freezing-type events.

All the information we have described reaches the central nucleus, which in turn is connected to the target areas. The connection is made through the terminal stria and the mid-basal hypothalamus, which are essential for neuroendocrine response and automaticity. Avoidance responses are handled by the orbitofrontal cortex. Learning abilities that are intended to condition the operator are evidently related to the orbitofrontal area. Damage to this area or to the amygdala interferes with or abolishes the stimulus-reward response.

Even in the presence of an injury, it is still possible to identify a previously learned behavior. These aspects are influential in integrated training courses aimed at police personnel and all operators who need to

respond appropriately to imminent danger and self-protection. When training police officers, it is necessary to consider the role of the hippocampus. This area of the brain has the function of processing incoming information and comparing it with information held in memory. By harnessing this mechanism, an inappropriate response to a sudden alarm or danger can be avoided. Neuroscience has made it possible to confirm that the unconscious assessment of an impending danger begins before the conscious one. Unconscious responses are stored in different brain areas compared to the memory and awareness of a fear already experienced. This knowledge justifies once again the necessary innovation in the training of police personnel to enable them to avoid emotional responses, especially peripheral ones.

Neurophysiological Bases of Freezing

Avoiding a freezing incident is one of the goals that professional training must achieve. Ascertaining whether there is a high susceptibility of the police officer to freezing is another indispensable training goal.

The professional operator affected by freezing proves to be an easy target, and in post-freezing he or she may have an inadequate response to danger that is dangerous to him or herself and others.

An assessment of susceptibility to freezing may be integrated into personnel selection procedures. This type of assessment becomes more valuable when selecting operational personnel assigned to special tasks.

In training, the operator is able to memorize the correct methodology for dealing with critical activities that could lead to freezing. In this sense, a distinction must be made between emotional memory, also called implicit memory, and rational memory, also called explicit memory. The former causes a conditioned reflex to the emotional stimulus. It is therefore an emotional reaction in the absence of cognitive evaluation. When using explicit-type memory, on the other hand, the operator is aware of what the meaning of the perceived stimulus is. These storage systems have been identified in the hippocampus and in the network consisting of amygdala and prefrontal cortex. These mechanisms, in some cases, lose synchronization. Emotional memory often prevails to cope with stimuli for survival. Abnormal functioning of the amygdala interferes with emotional type memory but does not interfere with the memory of emotion. Injuries of the temporal-medial lobe and hippocampus interfere with explicit memories but do not affect implicit memory (Bechara et al., 1995).

Operators with a recurrent anxious state have an altered signal that results in increased sensitivity in perceiving the difference between the observed and expected body state. Some authors have identified the anterior insula as the anatomical site for this process (Paulus & Stein, 2006). It follows that in cases where there is a perception of inevitability of the event, a high state of anxiety develops with avoidance behaviors. Using fMRI, it was possible to identify how the anticipatory component of anxiety originates in the insular cortex and the medial prefrontal area enclosed in the anterior cingulate gyrus cortex (Simmons et al., 2011). A dangerous stimulus justifies an emotional state of fear. The experience may be very different from one subject to another: psychomotor agitation, decision to attack, escape, and possible psychophysiological reactions involving the autonomic nervous system. Fear is thus a fundamental emotion for the survival of the individual.

Any kind of alteration of the described mechanism may therefore lead to an undesirable effect of temporary freezing. During the training of police personnel, it will be necessary to identify the subject’s predisposition to phobia. This is an exaggerated response with respect to the magnitude of the danger, situation, or people to be confronted, assessed by the operator in an excessive and inadequate manner when compared to the assessment of a socio-cultural group of belonging. Without referring to actual psychiatric pathologies, it is still correct to assess in the professional the possibility of a phobia, especially if not yet recognized as such.

Another assessment to take into account is the one referring to anticipatory anxiety, which can be the premise for a real phobia.

The police officer's psychophysical distress corresponds to anticipatory anxiety that is triggered in anticipation of even a lethal consequence. Among the protective systems in these situations it is possible to identify freezing episodes. Among police officers who have experienced freezing a real phobia may arise, understood as avoidance of a situation, even an imaginary one, in which danger could be perceived again. In the case of pathological fear, avoidance or freezing is not functional for the individual's survival.

Freezing can thus be interpreted as a mechanism for suspending anticipatory anxiety or phobia. When the fear is disproportionate to the event that the operator faces we must then consider the possible defense mechanism called freezing.

The more the fear is perceived as invasive towards one's own safety, the more likely it will be interpreted as not eliminable. Extreme avoidance towards an unmanageable fear may therefore result in a freezing episode. In police officers, the high state of anticipatory anxiety is often related to the operational situation. Last but not least, it is necessary to mention the possible genetic predisposition towards anticipatory anxiety state and phobias. Genetic predisposition can be seen as a kind of scaffolding that is gradually structured by learning, including professional learning. In the stages of operator selection and training courses, it is necessary to consider that what is innate and what is learned are two mechanisms that coexist with each other in the same subject.

Given that all behavioral decisions are also related to learned reactions, it is evident how effective the training strategy can be for counteracting freezing.

Observational learning is thus one of the strategies that can be applied for the acquisition of appropriate behavioral skills in operational contexts. According to the formulation based on bifactorial theory (Mowrer, 1939), phobic responses originate from a process of classical or Pavlovian conditioning. The fear of a neutral stimulus associated with a fear-triggering event can be elaborated as a response to escape or avoid the conditioned stimulus.

As described in the literature, the latter type of learning is called operant conditioning, where the response is maintained with reinforcement produced by its consequences (Hofmann, 2008).

Learning avoidance behavior, with respect to a dangerous stimulus, reduces anticipatory anxiety, increasing the likelihood of activating avoidant behavior. Through classical conditioning, the concept of equipotentiality of a conditioned stimulus could be challenged. Not all stimuli have the same probability of becoming conditioned stimuli, but some stimuli have a higher intrinsic probability (preparedness theory). In a cognitivist view, one can identify possible biases in the information processing that supports fear. Two cognitive biases can be distinguished: interpretation of a dangerous world and underestimation of one's abilities in dealing with danger (Price, 1986).

The evaluation of danger thus falls into a vicious circle that will lead to the result of continuous confirmation of the dangerousness of the situation. The phenomena of selective attention are also influenced by signals from the surroundings, which can enhance certain dysfunctional patterns. The perception of stimuli interpreted as dangerous, unpredictable, and uncontrollable may give rise to a cognitive vulnerability that could facilitate abnormal reactions such as freezing.

The concept of homeostasis (Cannon, 1929), understood as the maintenance of stability between the internal and external environment, is also central to investigating the possible onset of freezing episodes.

Retraction (feedback) circuits, understood as biological events, are able to ensure homeostasis during a phase of perceived danger. The operation of this mechanism involves the presence of a receptor sensitive to changes in the internal medium, an integration and control center, and a response regulation center. The last response, which possesses an effector-type mechanism, aims to restore homeostasis.

When this mechanism experiences alterations in its function, the occurrence of a freezing-type response is possible. The experience of panic involves the so-called homeostatic brain, leading to an intense emotional reaction or one that spirals out of control, as in the case of freezing.

In some cases these episodes represent an acute psychophysical reaction, sometimes comparable to a reflex. The neurofunctional bases of these abnormal reactions also reside in the brainstem.

Materials and Methods

A computer-based questionnaire was administered to police officers in order to assess their knowledge of freezing. 400 responses were obtained.

Of these, 349 (87.2%) were men and 51 (12.8%) were women (see Figure 2).

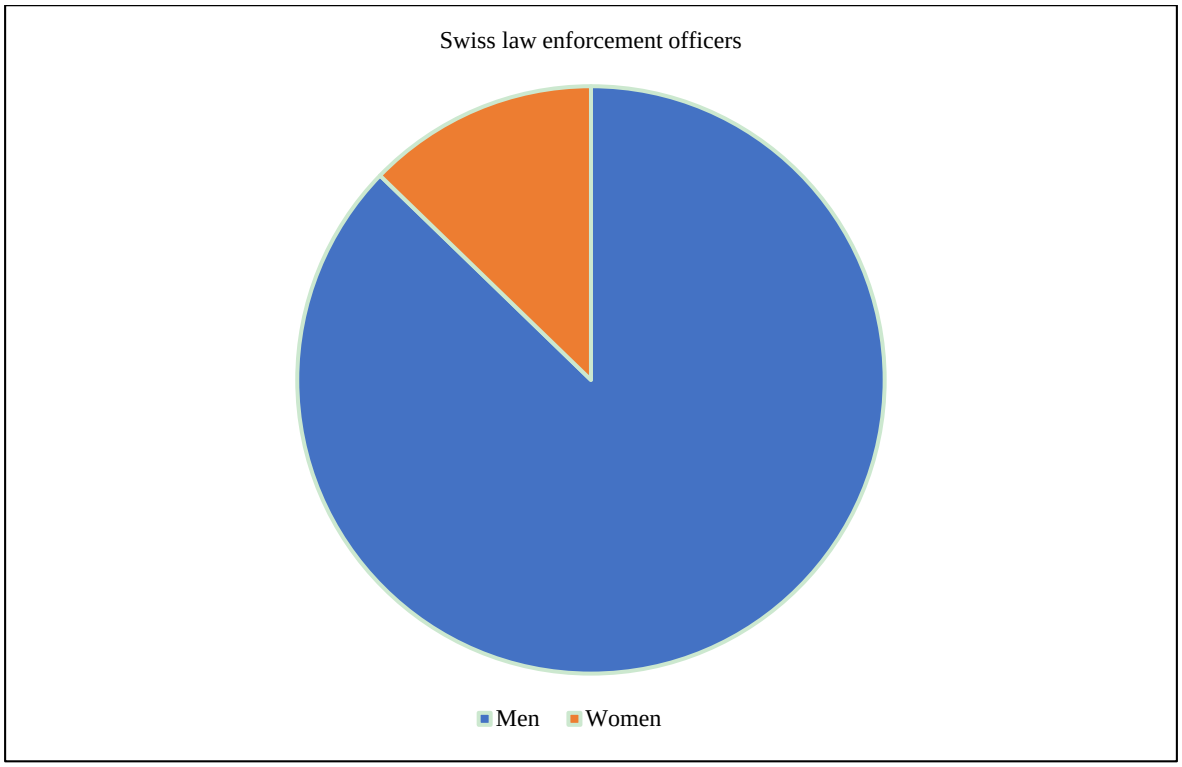

Figure 2. Gender of law enforcement officers.

230 (57.5%) agents reported knowing about freezing, including 35 (15.2%) women and 195 (84.8%) men.

170 (42.5%) agents, including 16 (9.4%) women and 154 (90.6%) men, reported not knowing about freezing (see Figure 3).

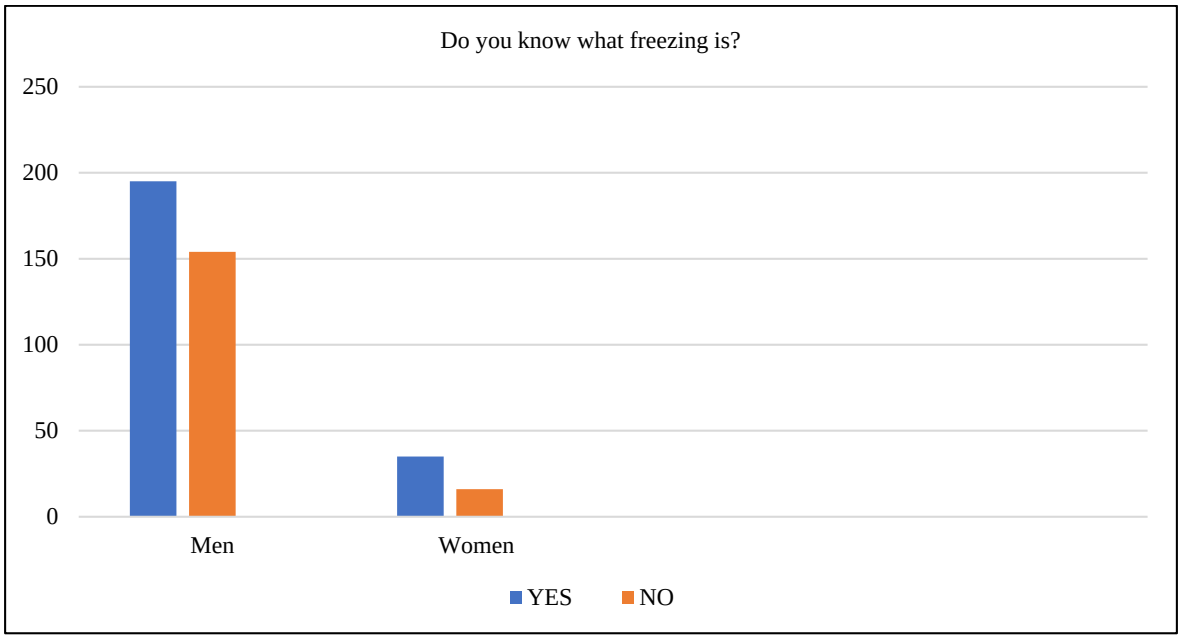

Figure 3. Law enforcement officers' knowing about freezing.

A total of 119 (29.7%) officers witnessed a freezing episode, including 8 (6.7%) women and 111 (93.3%) men. 281 (70.3%) officers, including 43 (15.3%) women and 238 (84.7%) men, never witnessed a freezing episode (see Figure 4).

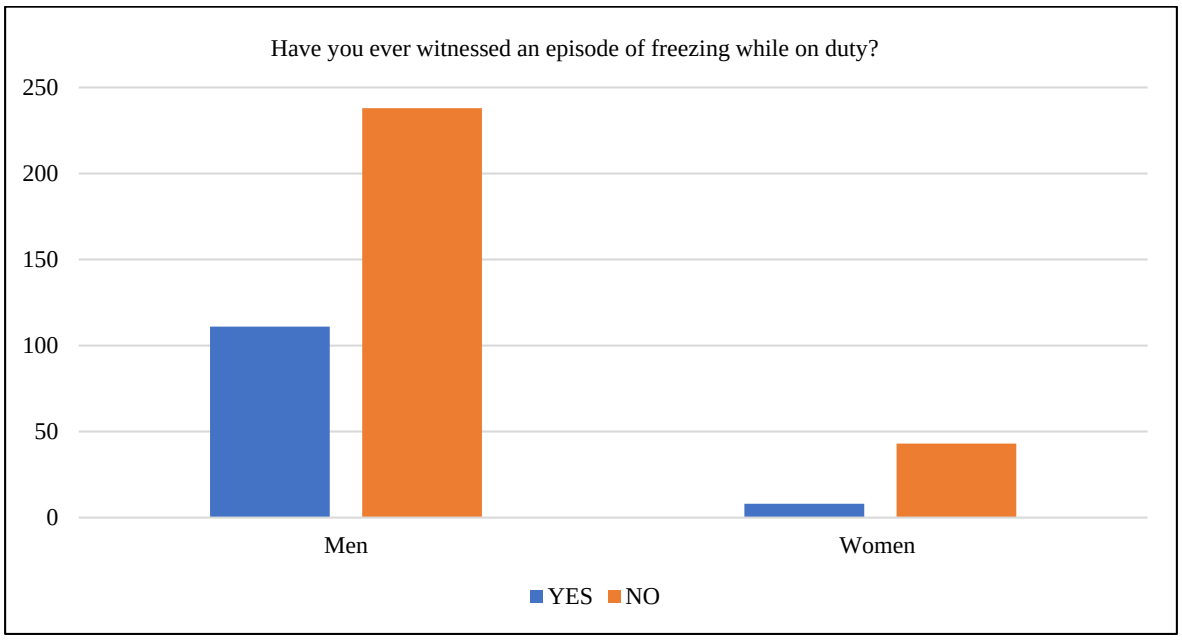

Figure 4. Law enforcement officers' responses to whether they have witnessed a freezing episode.

26 (6.5%) officers, including 0 (0%) women and 26 (100%) men, reported experiencing a freezing episode.

374 officers (93.5%) reported never having experienced a freezing episode, including 51 (13.6%) women and 323 (86.4%) men (see Figure 5).

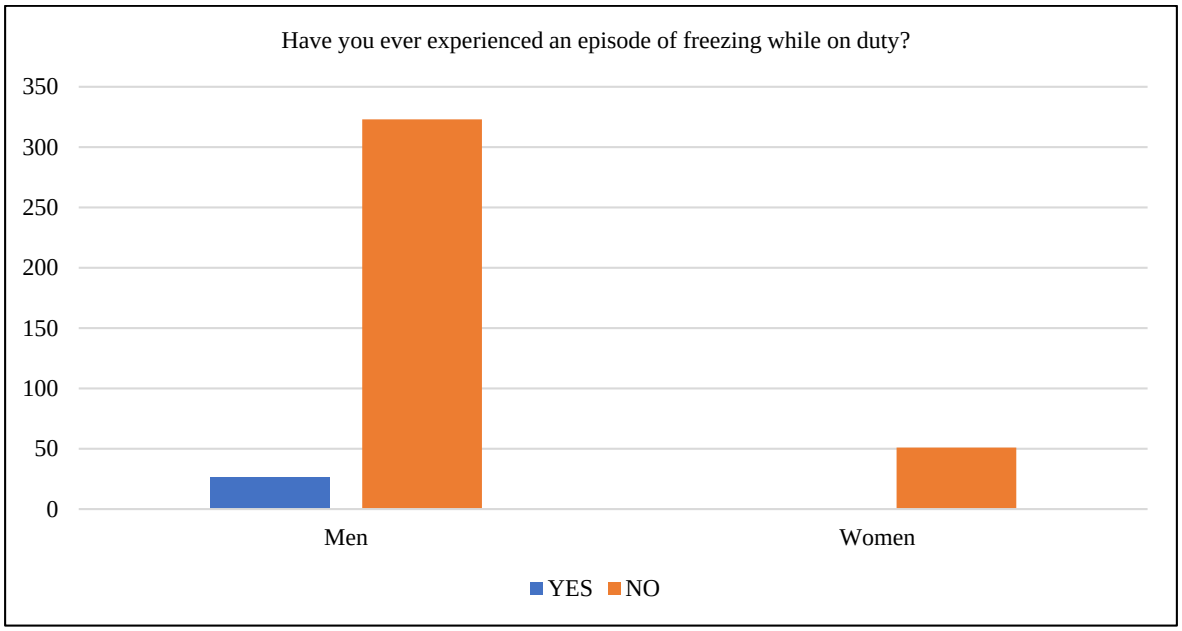

Figure 5. Law enforcement officers' responses to whether they have experienced a freezing episode.

334 (83.5%) officers, including 45 (13.5%) women and 289 (86.5%) men, stated that they thought that training aimed at countering freezing would be useful.

On the other hand, 66 (16.5%) officers, including 6 (9%) women and 60 (91%) men, stated that they did not think that training aimed at countering freezing would be useful (see Figure 6).

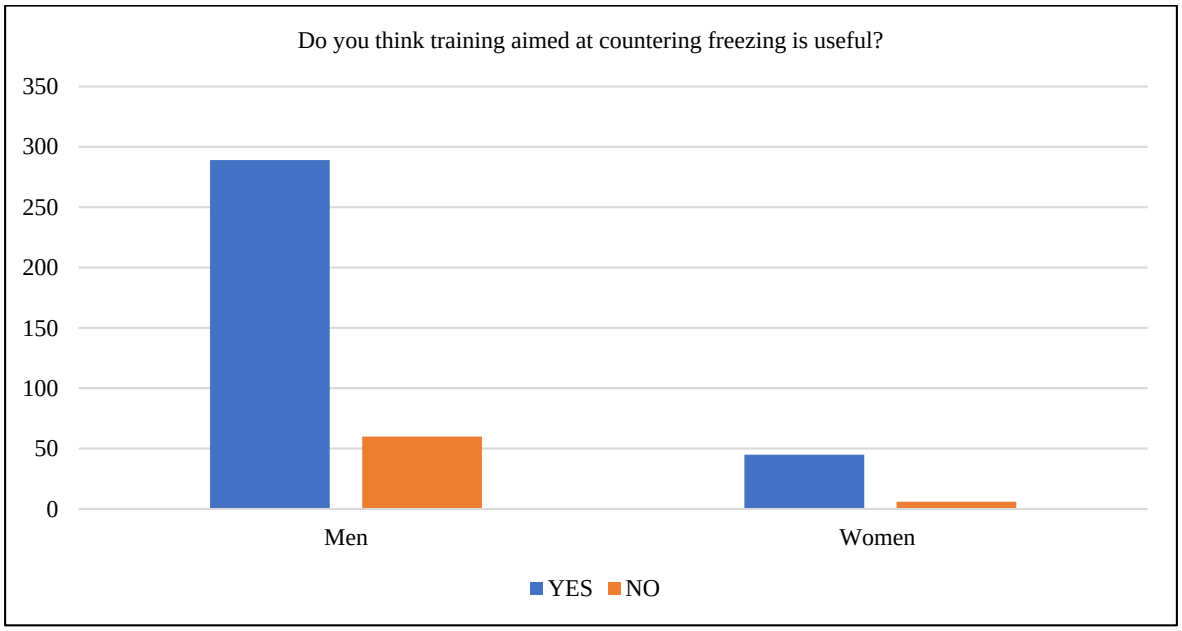

Figure 6. Law enforcement officers' responses to whether they think training aimed at countering freezing is useful.

Innovative Strategies in Professional Training

Often the operator has had to deal with freezing situations without them being identified and recognized as such. Identifying them is important not only in the professional context but also in the extraprofessional one.

This is a non-negligible element since the event in extraprofessional situations could be considered an element of risk for the same situation in the professional setting.

Another prognostic value is the age at which the event first appeared. Raising awareness in this case means not neglecting the reporting of a freezing event even if it occurred in adolescence or in any way outside of operational activities.

Including elements of recognition of the event in the training modules and making people understand the importance of reporting it becomes essential.

Every situation and every operator is different, which is why it is necessary for the topic to be addressed in a group training and possibly in an individual setting.

Being able to discuss each individual case will then be effective and fruitful.

A very innovative aspect is the knowledge of the basic principles that support the effectiveness of mirror neurons in professional contexts. Through knowledge of the functions of these neurons, it is possible to understand the actions and emotions of others. Observing others' actions or experiencing others' emotions is no different from our own actions or our own way of experiencing emotions. Building on this principle, seeing freezing episodes or being able to reproduce them experimentally in training will certainly lead to an advantage. Among the different functions of mirror neurons, we know what relationship they have towards a specific and responsive sensorimotor or sensor-visceromotor response to certain emotional situations. It is crucial to ascertain how much the activity of these neurons allows us to observe and understand what others perform. The operator, through this knowledge, will be able to assess the intention of an action and the sequence of physical movements that make it up. Recognizing the link between a subject's action and its relationship to his or her mental state (desires or intentions) allows for an understanding of the link between action and mental state, possibly explaining its execution. As described by some authors (Rizzolatti & Sinigaglia, 2019),

> Suppose you see someone extending his hand towards a glass. If you are asked if you understood what he is doing, it is likely that your answer will be something like: yes, of course, he takes a glass. You may also add: he takes it to drink or he takes it to put it in the sink.

It is clear how much the action allows one or more purposes of the same action to be identified.

At this point, thanks to integrated neuroscientific training, the operator will be able to understand the motivation that the subject has in performing an action directed towards obtaining a purpose. It is also possible to speak of a basic understanding of action when a purpose referring to the action is identified without necessarily having knowledge of the motivations that lead to its execution (Rizzolatti & Sinigaglia, 2019). Another concept that supports the value of neuroscientific training comes from the knowledge that those who observe the planning or execution of an action can also trigger a response of the same kind. Observation of an action can impact the choice of an operational response and vice versa (Brass, Ruby, & Spengler, 2009; Kilner, Paulignan, & Blakemore, 2003; Rizzolatti & Craighero, 2004). Such observations allow to respond to the observed action through sight. A mirror-like response has been found to be adequate to ensure that anticipation is ready and accurate (Flanagan & Johansson, 2003; Costantini, Ambrosini, Scorolli, & Borghi, 2011).

It has been shown that readiness and accuracy in anticipating an action that is observed is diminished if the ability to retrieve motor representations regarding the observed action and to capture its direction and purpose is even temporarily lacking (Costantini, Ambrosini, Cardellicchio, & Sinigaglia, 2014).

Consequently, we have the possibility of approaching an action through either a basic understanding or through full understanding that allows us to recognize a mental state of the subject ready to perform an action.

Given the results of the tests, it is evident how important integrated and innovative multidisciplinary training useful for recognizing and countering freezing is.

Even in police personnel selection procedures, it is possible to objectively test for readiness for freezing.

New strategies originate from knowledge of brain mechanisms involved in freezing. Each of our training proposals is consistent with neuroscientific evidence in the literature.

A training module devoted to explaining the brain systems that are activated or altered during freezing is an indispensable first step.

In a schematic and simple way, knowledge of these mechanisms allows the police officer to understand the value of such knowledge.

From a training point of view, through the use of the potential that mirror neurons offer us, it is possible to structure exercises for memorization and repetition of professional situations that may involve the operator in cases of freezing.

Starting from a “basic understanding” and then arriving at a “full understanding” of an action, exploiting the potential of mirror neurons, it is possible to identify and perceive the purpose of an action that we see performed by the subject we observe (Rizzolatti & Sinigaglia, 2019).

The effectiveness of this strategy has also been documented with the use of fMRI, which is useful for exploring brain function in subjects who see an action performed by others (Brass, Schmitt, Spengler, & Gergely, 2007).

This strategy has also been confirmed effective in fMRI studies performed at the Max Planck Institute in Leipzig aimed at assessing brain response in subjects viewing hand movements under different conditions (Catmur et al., 2008). Given the results of these studies, it is evident what value there is in observing in detail (i.e. hands) in police operational activities. Through the activation of mirror neurons and inferential integration, it is possible for the observer to perceive the purpose of the observed action.

Some fMRI results showed that subjects who merely observed actions, even if unusual and sudden, went through an increase in the activity of the inferior frontal gyrus. This anatomical area of the brain is to be particularly rich in “mirror” properties.

In these studies, subjects who had to judge the purpose of the action as either ordinary or unusual show an increase in the posterior portion of the right STS (superior temporal sulcus), the posterior portion of the cingulate cortex and the mesial prefrontal cortex (de Lange, Spronk, Willems, Toni, & Bekkering, 2008).

Based on this neuroscientific evidence, we can confirm the advantage in using certain tests in personnel selection as well.

Training and testing for susceptibility to freezing will include simple, noninvasive tests consisting of subjecting the subject to viewing operational scenes, repeating them, and objectively assessing his or her responsiveness.

Any assessments in fMRI are left only for studied cases for scientific and research purposes.

When the operator observes sudden or unusual actions, the mirror neurons intervene in favor of rapid processing of the visually perceived information, allowing the assessment of possible motivational reasons for the behavior of the subject being confronted (Brass et al., 2007).

The effectiveness of this type of innovative training is verified by reassessing behavioral responses during and at the end of the course.

Another scientifically verified benefit about this type of training is that mirror responses are effective in evaluating actions as well as others' emotions. Once again, one can come to an understanding of emotions through what is called a "basic and full understanding". Among the training objectives, it is necessary to consider the ability that the observer will have to acquire to identify the type of emotion felt by the person being confronted. Capacity that will have to be activated in cases where the circumstances inducing a behavior are sudden and unforeseen. This situation corresponds to a sudden action and emotion that may result in a freezing episode. Mirror responses, during the observation of emotional expressions, result in sensory alteration that is also visceromotor. These types of responses are capable of activating certain vegetative and motor reactions such as fear in the observer.

This mechanism turns out to be important for two reasons: the observer who knows the action of the mirror neurons will indeed be able to perceive the meaning of visceromotor responses (Coplan & Goldie, 2011) and adjust the response accordingly.

Even before the acquisition of this ability, the operator will have the advantage of being able to avoid the freezing episode as much as possible due to the correct interpretation of the emotionality of the observed subject. This type of effect, comparable to the so-called "emotional contagion", allows for the perception and sharing of an emotional state, distracting the operator from the possible onset of freezing mechanisms.

The basic understanding of others' emotions thus influences the observer's ability to respond. These capacities will be greater in operators who have undergone a cognitive and training course of these mechanisms. From a neuroscientific perspective (Shamay-Tsoory, Tomer, Berger, Goldsher, & Aharon-Peretz, 2005), recognition of the areas involved in this mechanism is only partial. The value of this training course may be verified through the objective measurement of some of the responses given by the operator, such as the assessment of fear management and other inappropriate reactions (flight, avoidance or freezing).

In the case of police officers, it is necessary to consider "affective" mentalization processes. Perceptual judgment may in fact be modulated by a bias effect sustained by two factors present in operational activities (Niedenthal, Mermillod, Maringer, & Hess, 2010). A first factor is the intensity with which emotion is expressed by the subject in front of us.

This is even more significant when we are faced with an ambiguous representation (inadequate visibility, face coverage or lack of brightness).

A second factor is the offensive potential that the operator possesses. This capacity interferes in affective mentalization.

In the operational phase, mirror neurons will be able to assist the operator in making the most appropriate strategic decision.

What has been described has been identified through fMRI study of a brain area referred to as the dorsocentral portion of the insula (Di Cesare, Di Dio, Marchi, & Rizzolatti, 2015).

Mirror responses located in this brain area are different if the observer perceives a gentle or energetic form of the observed subject. In the aforementioned studies, it was seen that the observer perceives the action of the one being observed as if it were an action performed by him/herself. The observer will therefore be able to perceive the content and form of an observed action. The identification of expressions and gestures will then be able to correspond to an appropriate mirror response.

Enabling the operator to recognize intrinsic and extrinsic physical and mental stressors is obviously one of the skills to be acquired.

Operators who have experienced an episode of freezing need psychological support that is essential for rapid reworking of the incident.

Providing the professional with a support network, even anonymously, to ensure an effective approach and reframing of events is also an added value in countering a professional experience so that it does not become the cause of greater psychological distress. Rapid supportive intervention and a multidisciplinary specialist strategy are unquestionably effective tools.

Conclusions

In view of the results obtained through the questionnaires presented to police officers, it was evident that there is little knowledge of the phenomenon called freezing.

For that reason, we evaluated the currently known brain mechanisms that promote the onset of the phenomenon called freezing. Such evidence was confirmed by neuroscientific and fMRI imaging elements in the literature.

In this paper, an integrated and innovative neuroscience-based training is proposed. The potential of mirror neurons for sensitization, contrast and support towards freezing episodes is exploited. The review of the scientific literature to date confirms the usefulness of training that includes new strategies such as the use of "mirror" neurons.

The importance of immediate, specialized and multidisciplinary support of operators involved in a freezing episode is also highlighted.

This study also aims to protect law enforcement officers who are confronted with freezing with appropriate and scientifically validated strategies.

Conflict of Interest Statement

We declare that we have no conflict of interest with respect to this academic paper.

We have no financial or personal relationships with individuals or organizations that could influence our work, including employment, consultancies, honoraria, stock ownership, or any other financial or non-financial interests. Furthermore, we have no competing interests, such as political or personal beliefs, that could potentially bias the results or interpretation of this study. We have conducted this research with the utmost objectivity and integrity, and have no conflicts to disclose.

References

Bechara, A., Tranel, D., Damasio, H., Adolphs, R., Rockland, C., & Damasio, A. R. (1995). Double dissociation of conditioning and declarative knowledge relative to the amygdala and hippocampus in humans. *Science (New York, N.Y.), 269*(5227), 1115-1118.

Brass, M., Ruby, P., & Spengler, S. (2009). Inhibition of imitative behaviour and social cognition. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences, 364*(1528), 2359-2367.

Brass, M., Schmitt, R. M., Spengler, S., & Gergely, G. (2007). Investigating action understanding: Inferential processes versus action simulation. *Current Biology: CB, 17*(24), 2117-2121.

Cannon, W. B. (1929). *Bodily changes in pain, hunger, fear and rage*. New York: Appleton.

Catmur, C., Gillmeister, H., Bird, G., Liepelt, R., Brass, M., & Heyes, C. (2008). Through the looking glass: Counter-mirror activation following incompatible sensorimotor learning. *European Journal of Neuroscience, 28*(6), 1208-1215.

Coplan, A., & Goldie, P. (2011). *Empathy: Philosophical and psychological perspectives*. Oxford: Oxford University Press.

Costantini, M., Ambrosini, E., Cardellicchio, P., & Sinigaglia, C. (2014). How your hand drives my eyes. *Social Cognitive and Affective Neuroscience, 9*(5), 705-711.

Costantini, M., Ambrosini, E., Scorolli, C., & Borghi, A. M. (2011). When objects are close to me: Affordances in the peripersonal space. *Psychonomic Bulletin & Review, 18*(2), 302-308.

de Lange, F. P., Spronk, M., Willems, R. M., Toni, I., & Bekkering, H. (2008). Complementary systems for understanding action intentions. *Current Biology: CB, 18*(6), 454-457.

Di Cesare, G., Di Dio, C., Marchi, M., & Rizzolatti, G. (2015). Expressing our internal states and understanding those of others. *Proceedings of the National Academy of Sciences, 112*(33), 10331-10335.

Eilam, D. (2005). Die hard: A blend of freezing and fleeing as a dynamic defense—Implications for the control of defensive behavior. *Neuroscience and Biobehavioral Reviews, 29*(8), 1181-1191.

Flanagan, J. R., & Johansson, R. S. (2003). Action plans used in action observation. *Nature, 424*(6950), 769-771.

Hofmann, S. G. (2008). Cognitive processes during fear acquisition and extinction in animals and humans: Implications for exposure therapy of anxiety disorders. *Clinical Psychology Review, 28*(2), 199-210.

Kilner, J. M., Paulignan, Y., & Blakemore, S. J. (2003). An interference effect of observed biological movement on action. *Current Biology: CB, 13*(6), 522-525.

Leach, J. (2004). Why people 'freeze' in an emergency: Temporal and cognitive constraints on survival responses. *Aviation, Space, and Environmental Medicine, 75*(6), 539-542.

Ledoux, J. E. (1989). Cognitive-emotional interactions in the brain. *Cognition and Emotion, 3*(4), 267-289.

Ledoux, J. E. (1996). *The emotional brain: The mysterious underpinnings of emotional life*. New York: Simon & Schuster.

Ledoux, J. E. (2000). Emotion circuits in the brain. *Annual Review of Neuroscience, 23*, 155-184.

Mowrer, O. H. (1939). A stimulus-response analysis of anxiety and its role as a reinforcing agent. *Psychological Review, 46*(6), 553-565.

Niedenthal, P. M., Mermillod, M., Maringer, M., & Hess, U. (2010). The Simulation of Smiles (SIMS) model: Embodied simulation and the meaning of facial expression. *The Behavioral and Brain Sciences, 33*(6), 417-433; discussion 433-480.

Panksepp, J. (2005). Affective consciousness: Core emotional feelings in animals and humans. *Consciousness and Cognition, 14*(1), 30-80.

Papez, J. W. (1995). A proposed mechanism of emotion. 1937. *The Journal of Neuropsychiatry and Clinical Neurosciences, 7*(1), 103-112.

Paulus, M. P., & Stein, M. B. (2006). An insular view of anxiety. *Biological Psychiatry, 60*(4), 383-387.

Price, J. (1986). Anxiety disorders and phobias. A cognitive perspective. By Aaron T. Beck and Gary Emery. (Basic Books, New York, 1985.). *Journal of Biosocial Science, 18*(3), 374-375.

Rizzolatti, G., & Craighero, L. (2004). The mirror-neuron system. *Annual Review of Neuroscience, 27*(1), 169-192.

Rizzolatti, G., & Sinigaglia, C. (2019). *Specchi nel cervello*. Milano: Raffaello Cortina Editore.

Shamay-Tsoory, S. G., Tomer, R., Berger, B. D., Goldsher, D., & Aharon-Peretz, J. (2005). Impaired "affective theory of mind" is associated with right ventromedial prefrontal damage. *Cognitive and Behavioral Neurology: Official Journal of the Society for Behavioral and Cognitive Neurology, 18*(1), 55-67.

Simmons, A. N., Stein, M. B., Strigo, I. A., Arce, E., Hitchcock, C., & Paulus, M. P. (2011). Anxiety positive subjects show altered processing in the anterior insula during anticipation of negative stimuli. *Human Brain Mapping, 32*(11), 1836-1846.

Stote, D. L., & Fanselow, M. S. (2004). NMDA receptor modulation of incidental learning in Pavlovian context conditioning. *Behavioral Neuroscience, 118*(1), 253-257.