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Review Article

The state of consciousness: From perceptual alterations to dissociative forms. Analysis of neurobiological and clinical profiles

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Abstract

Consciousness, understood as the state of vigilance of the mind or the state of being conscious and present with respect to ourselves and the surrounding environment, allows us to interact at every level, unless there is a precise cause capable of interfering with and altering the functional state of our consciousness. This paper investigates the main hypotheses of alteration, up to the most dysfunctional and pathological forms of psychotic pictures.

Contents of the manuscript

The state of consciousness

The term *consciousness* indicates the presence of the mind in objective reality on which 'awareness' intervenes, giving it meaning and significance, reaching that state of 'known unity' of what is in the intellect [1].

The term derives from the Latin "conscientia", in turn derived from "conscire", which is "to be aware", "to know" and indicates the awareness that the person has of himself and of his mental contents. In this sense the term "consciousness" is generically assumed not as the first stage of immediate apprehension of an objective reality, but as a synonym of "awareness" in its reference to "the totality of the experiences lived, at a given moment or for a certain period of time". Etymology shows how the two terms consciousness and awareness have a different chronological origin, and how at the beginning there was no need to distinguish between the meaning of consciousness and "being aware":

the term "coscienza" enters the Italian language in the 13th century, deriving from the Latin "conscientia", while the term "consapevolezza" enters the Italian language in the 17th century, deriving from the Italian "consapevole" [2,3].

Depending on the field in which it is observed, "consciousness" is understood in the following ways: in neurology, it is the state of vigilance of the mind as opposed to coma; in psychology, it is the state or act of being conscious, as opposed to unconscious: subjective experience of events or sensations; in psychiatry, as the psychic function capable of understanding, defining and separating the ego from the external world; in ethics, as the ability to distinguish good and evil in order to behave accordingly, as opposed to unconsciousness; in philosophy, it acquires a theoretical value in those authors who understand consciousness as interiority and make the return to consciousness of recollection within oneself, the privileged tool to grasp fundamental truths, otherwise inaccessible [4].

Consciousness (in Freudian formulation, in German

Bewusstsein) is a quality of mind that usually includes other qualities such as subjectivity, self-awareness, knowledge and the ability to identify the relationships between oneself and one's surroundings. In common parlance, consciousness is understood as awareness of one's surroundings and the ability to interact with them; this is in contrast to unconsciousness. The expression 'levels of consciousness' indicates that consciousness seems to vary according to different mental states (such as imagination and daydreaming). Unconsciousness is defined, by negation, as the mental state in which consciousness is absent. In some strands of thought, especially religious ones, consciousness is not extinguished after death and is present even before birth. But, just beyond common perception, consciousness is very difficult to define or identify. Many cultural and religious traditions locate consciousness in a soul separate from the body. In contrast, many scientists and philosophers consider consciousness to be something inseparable from the neural functions of the brain. However, if classical psychology revolved around consciousness, to the point of inducing Wundt to define psychology itself as the science of facts and states of consciousness, in the following decades various researchers, among whom Külpe, investigated above all the dynamic processes of consciousness and perceptual processes, from the Gestalt school to the cognitive-behavioural and constructivist schools [5,6].

In these studies, activation is a biological function, consisting of the state of vigilance of the central nervous system, understood as the optimal state of consciousness for the performance of certain tasks; if, however, activation is the general state of the organism, vigilance is the ability to keep the state of consciousness active. The main theoretical models are [7,8]:

1) **The 'Arousal theory of activation'**: According to this theory, the person is motivated to reach and maintain an optimal level of 'arousal' (physiological activation threshold). Thus, if it is too low, he seeks stimulation; if it is too high, he seeks a way to relax (Palomba). In neuropsychology, arousal is therefore a temporary condition of the nervous system, in response to a significant stimulus of varying intensity, internal or external, of a general state of arousal, characterised by an increased attentional-cognitive state of vigilance and prompt reaction to external stimuli. During arousal, both the central nervous system and the peripheral and vegetative ones are involved, with a consequent increase in heart rate and blood pressure, in order to generate a general condition of greater sensory alertness, mobility and readiness of reflexes throughout the body. In fact, many experimental studies show a functional inverted U-shaped relationship between activation and performance: the best human performance is obtained at intermediate levels of arousal, while reduced arousal (as in sleep or deep relaxation) or excessive arousal (as in panic attacks) is incompatible with good cognitive functioning. Medium arousal therefore produces a state of consciousness of full alertness and motivation towards the task at hand. The psychologist Eysenck has identified in the spontaneous tendencies to search for an optimal level of arousal, a real dimension of personality related to introversion/extroversion:

introverted subjects have a basal level of arousal that is already quite high, and would therefore tend to reduce the excessive increase in activation through diversified forms of social and cognitive avoidance of further stimuli. Extroverts, on the other hand, have a lower level of arousal and try to raise it through the search for exciting stimuli of various kinds. Emotions and feelings, according to some authors, are linked to an increase in the level of arousal and prompt behaviour aimed at restoring homeostasis. Thus, the underlying mood would be determined by events of modest hedonic significance involving a low level of arousal, which does not produce a behavioural response.

2) **The 'sleep-wake theory of vigilance'**: According to this theory, sleep is not a loss of consciousness but a precise process of regeneration of the organism where consciousness is always active, following five phases (1- Light Non-REM, 2- Intermediate Non-REM, 1- Deep Non-REM and 1- Deep REM), which alternates throughout sleep for about 3 or 4 times.

Alterations in the state of consciousness

The *altered state of consciousness* corresponds to a state of consciousness with different dynamic characteristics than the lucid waking state. It can be defined in opposition to the latter, considering the waking state as the ordinary one, which the subject recognises as "normal", because it corresponds to the psychic and physical dynamics of thoughts, sensations and feelings, with which the subject is most familiar or which he has experienced most of his life. The use of the term "altered" could generate the misunderstanding that we are dealing with a pathological state, but this is only true in certain cases (i.e. when the functional alteration affects the cognitive processes of memory, reasoning and perception, as well as identity and psychophysical faculties in general); it has therefore been proposed to use the term "non-ordinary state of consciousness" [9].

It is not possible to define the waking state in a clear-cut manner, as it is subjective and does not correspond to exact parameters, but rather can be identified in a range of values relating to various parameters, including age, gender and state of psychophysical health. The normality of the ordinary state of consciousness is dictated by biological and cultural needs, and this ordinariness may therefore vary according to the cultural or environmental context in different parts of the world. Usually, the waking state is considered to be the ordinary state of consciousness because it corresponds to a balance between the amount of information reaching the brain and the amount of information the brain itself is able to process. However, this is not a parameter to characterise it intrinsically, as it only emphasises the ability to maintain control over the flow of information, without defining the quality of processing. The waking state (or ordinary state of consciousness) is only one of the many possible structures that the mind assumes. It may vary in intensity and/or quality over the course of a day, or a lifetime, of the subject concerned [10].

Altered states of consciousness, being influenced by multiple factors, can be provoked by numerous causes or

concomitant causes, and as for the waking state, correspond to a wide range of parameters/values [6,7]. Some of these states are:

1. **Falling in love:** In the human species, it is a drive that provokes a variety of feelings and behaviours characterised by strong emotional involvement with another person, which, depending on the case, is associated with intense sexual attraction. The anthropologist Fisher discovered, using brain MRI on people in love, that falling in love is a drive that activates parts of the deep brain with the production of characteristic hormones and can be traced back to three separate specific mental states that are more or less simultaneous or consequential: sexual desire (oestrogen, endogenous, endorphins), romantic love (dopamine, norepinephrine, serotonin), attachment (oxytocin, vasopressin). Sexual desire is characterised by promiscuity, romantic love by exclusivity, and attachment by the desire for closeness, which can also be acted out with different partners at the same time. Falling in love can last up to several years and is the cause of great pleasure as well as great pain and is present in almost all ancient and modern cultures with different cultural emphases. Psychologists in general have not given a particular role to falling in love and have usually seen it as a sign of immaturity. Within the framework of modern psychological theories, character and personality disorders are unequivocally referred to a defect in personal maturation, that is to say to a 'halt' in development, or even to a 'regression', and thus to the persistence of early infantile or adolescent phases in adult life; phases characterised by dependence, the need for confirmation, the inability to resolve the debt with the past, to separate from mother or father or family, the inability to become autonomous. And falling in love has itself been seen as a regression, as a return to a state of dependence no longer on the mother, but on someone who has taken her place. The lover is, in Freud's eyes, an individual animated only by the need to satisfy his sexual needs; to do this adequately he has learned, by falling in love, to maintain a stable relationship with his 'sexual object'. According to Freud, love derives directly from the sexual drive and dies with its extinction. It survives only when sexuality is 'sublimated', i.e. controlled, and the relationship is filled with extrinsic factors: affection, mutual aid, esteem. In fact, once the sexual goal has been reached, love could end, if this does not happen it is because the individual, according to Freud, 'can safely rely on the resurgence of need, and this is the first reason for making a lasting investment in the sexual object and for loving it even in the intervals of time when passion does not manifest itself...'; and this, consequently, happens in the case where love is unilateral, i.e. not reciprocated by the beloved subject: dependence on it cannot end. For Freud, then, love is a control over the partner dictated by selfish needs. In Freud's wake, most psychoanalytic theorists, both men and women, have described love as a subjective mystification (sublimation) intended to cover a primary sexual need. For Fromm, falling in love is a state of madness and the two lovers realise a two-way egoism. Couple love is not a sui generis force, it is not a paradigm of search and adventure, it is only a minor expression of the more general need for security. Jung's conception is much more in-depth and sees in the

love encounter a process of growth, maturation, enrichment thanks to the reunion with one's own animus (in the female) or with one's own soul (in the male). A similar concept will be supported by Winnicott with the concept of transitional object that allows the transition from one state to another state of one's identity. Neurophysiological studies have confirmed that in the early stages of the love process there are particular experiences and therefore an expression such as falling in love is justified. Research has also tried to explain each of these experiences by particular neurotransmitters. According to some, at the first meeting, the midbrain, the area of the brain that controls visual and auditory reflexes, begins to release dopamine, a neurotransmitter that produces pleasure and euphoria. The hypothalamus, on the other hand, commands the body to send signals of attraction and pleasure. As the relationship continues, dopamine levels increase and the levels of two other dopamine-related neurotransmitters increase: norepinephrine and phenylethylamine. As the relationship deepens, the hypothalamus stimulates the production of oxytocin, which stimulates feelings of tenderness and warmth. Another hormone, vasopressin, which is linked to memory, encourages fidelity and monogamy. After a period of 18 to 30 months from the beginning of the relationship, however, the brain has become accustomed to the "cocktail" of chemicals and no longer reacts as it did before. We can therefore consider the falling in love phase to be over. Recent studies have, however, denied that there is a physiological time limit to falling in love. Falling in love is not just a set of emotions, sensations, perceptions and impulses as appears from neurophysiological studies but a complex process in which two individuals enter into a relationship, transform themselves and create a new society and a new life project. It is therefore a complex process in which there are obligatory stages such as telling each other one's whole life story so that the other can get to know him and understand how he has seen the world. In this way, lovers come to love not only the person as he or she is today, but as he or she was as a child, as an adolescent, in his or her joy and sorrow [11-17].

2. **Hypnosis:** Hypnosis is a psychosomatic phenomenon that can be caused by suggestion due to an image or sound that the subject perceives intensely; it involves both the physical and psychological dimensions of the subject to which it is subjected; it is a particular condition of "functioning" of the individual that allows to influence both his psychophysical condition and his behavioural conditions. Hypnosis is a condition very similar to sleep, artificially provoked by an operator or by the subject himself (self-hypnosis) who, being in this state, is as if deprived of consciousness and will. The substantial difference between hypnosis and sleep is that sleep is a condition of reduced concentration (the subject's consciousness is obscured), whereas in hypnosis concentration is increased and this normally allows the subject to be receptive to suggestions. The discipline that uses hypnosis in therapy is called hypnotherapy. Some of the techniques used in hypnotherapy cross the border of science and are pseudoscientific, as they are not always scientifically based. Hypnosis, understood as the potential of the human mind, appears to have been used since ancient times; Musès (1972)



wrote that he had found an ancient recording of a hypnotic session in the engraving of an Egyptian stele dating from the reign of Ramesses XI of the 20th Egyptian dynasty, around 3,000 years ago. The first attempt to scientifically consider hypnosis came in 1772 with Mesmer, who gave a scientific-naturalistic explanation, believing that organic phenomena were influenced by gravitational magnetism and that illness was caused by the alteration in the body of a fluid needed to connect humans to the celestial bodies: healing could be achieved by applying magnets to the body that rebalanced the biocosmic fluid. Mesmer understood the value of the therapeutic link and reduced the use of magnets in favour of relationships, but few understood its importance and hypnosis was delegated to street theatres who encouraged its popular use. Mesmer formulated the theory of animal magnetism in 1779, according to which a magnetic fluid permeated the universe and formed the basis of the interconnection between creatures, and health depended on its proper circulation, while disease was caused by its alteration. His therapies were initially met with a mixture of success and criticism, but his theories were condemned by the Academy of Sciences and the Faculty of Medicine in Paris in 1784. An important revision of Mesmer's theories was proposed by the English physician Braid, who gave a physiological interpretation to the phenomenon studied and introduced the term hypnosis in addition to the term neuro-hypnotism in his work published in 1843, in order to overcome the Mesmerian hypothesis of the magnetic fluid and introduce the theory that hypnotic phenomena depended exclusively on an impression on the nerve centres. Subsequent developments in the interpretation of hypnosis are due to the work of Liébeault, a doctor from Nancy, and Bernheim, a famous Parisian neurologist. Together they founded the Nancy School. The Nancy School had to oppose studies and theories on hypnosis to the Charcot School, which operated at the Salpêtrière Hospital in Paris. Whereas the Nancy school considered hypnosis to be a normal psychological phenomenon and all its phenomena could be explained by suggestion, Charcot considered hypnosis to be a pathological phenomenon, an artificial hysterical neurosis. Hypnosis also had applications in surgery: the first to experiment with hypnosis for surgical analgesia were Elliotson and Forbes in England. On 12 April 1829, Cloquet performed the first operation under hypnotic anaesthesia in France, removing a breast from a hypnotised patient, who felt no pain and had no memory of the operation when she woke up. In 1830, Dudet extracted the first tooth under hypnotic anaesthesia, and in 1880 Liébeault produced total analgesia in a 22-hour labour. S. Freud also worked on hypnosis, but the transience of the therapeutic results, the laboriousness of hypnotic procedures, the limitation of therapeutic applications and, perhaps not least, his identification of a 'mysterious element' of a sexual nature, led Freud to abandon hypnosis and create a new method: psychoanalysis. With Charcot's death in 1893 and the beginning of psychoanalysis, a period of decline began for hypnosis. Interest in hypnosis was reawakened during the First World War, when it was used to treat traumatic war neuroses, but it was not until after the Second World War that the scientific community's attitude towards hypnosis improved. In particular, it was during this period that M. Erickson, taking up

the lesson of one of Charcot's pupils, Leguirec, developed a hypnotherapy called "Ericksonian hypnosis", defining it as a special psychological and neuro-physiological condition in which the person functions in a special way, a way in which the person can think, act and behave as in the normal state of consciousness or even better, thanks to the intensity of his attention and the strong reduction of distractions. This type of hypnosis is very similar to a normal conversation and induces a hypnotic trance in the subject. Since the second half of the 20th century, there has been a growing interest in hypnosis, and in particular in recent years, new opportunities for study have been created by the development of brain imaging techniques, which make it possible to visualise changes in brain activity during a state of hypnosis. The subject in hypnosis can alter his perception of the external world; he can perceive stimuli that are not actually there and fail to perceive those that are present; he can distort perceptions of stimuli that actually exist, creating illusions. Thus it becomes possible to perceive, for example, a non-existent smell, light or noise, or to perceive as pleasant a very annoying smell, such as that of ammonia, as ringing a low-pitched sound, green as red colour, or to develop insensitivity in every sense organ. In hypnosis, it is possible to modify the sensory experience, the experience of the bodily scheme and in particular pain control. The subject in hypnosis can easily direct his introspection in the different sectors of his organism, he can amplify or reduce the sensations that come from inside his body, he can alter the perceptible physiological parameters such as heartbeat, respiratory rate, skin temperature. For example, suggestions of cold and heat can lead to vasoconstriction and vasodilation respectively. Simple suggestions to increase or decrease the frequency of the heartbeat and breathing, to increase or decrease the arterial tension, or to increase or decrease muscle fatigue and anxiety or to calm down, are also capable of actually causing an increase or decrease in the frequency of the pulse, breathing or arterial tension. With hypnosis it is possible to enter one's own history and change the criteria for processing the incoming information; it is possible to change the meanings that the subject has given to his experiences in the past by making use of the alternatives he possessed. It is possible to obtain changes in the continuity of memory (partial or total amnesia). On the other hand, it has been proven that the possibility of remembering past events of which one has no memory is almost nil: investigations have shown that such therapies are often the cause of false memories or inaccurate memories, dictated by the patient's imagination or misinterpretation. Through hypnosis the subject can learn to dampen his emotional resonance. The ego-sense can be detached from a wide variety of types of information and situations to which it is normally applied. In a subject in age regression, the emergence of a memory with a particularly affecting affective tone may be experienced not as its own experience but simply as neutral information drawn from memory. The sense of the Ego may also be detached from one's own body as is the case with the non-perception of pain. In hypnosis there is the possibility of altering the quality and quantity of the control of voluntary musculature, motility and in particular of modifying certain modes of functioning of our organism, believed to be beyond any voluntary control, such as those of the

neurovegetative system, the neuroendocrine system and the immune system. All the behavioural possibilities listed above cannot of course be thought of as achievable at the same level by all subjects, at least immediately, as genetic predisposition and learning times are involved [18–26].

3. **Sleepwalking:** Somnambulism is a sleep disorder characterised by simple or complex motor activities, often finalized, of an automatic type and covered by amnesia (there is rarely a dreamlike memory). In the DSM-5 it is coded as Non-REM parasomnia, the age group between 7 and 14 years is the most affected (almost one in three children) and the incidence tends to disappear after adolescence. Opinions are divided on the causes, although technically there is a hyperexcitability of the cerebral cortex which on the one hand prevents deep sleep and on the other keeps the wakefulness and sleep mechanisms active. More recent studies have identified the cause of sleepwalking as a genetic alteration in chromosome 20. The gene responsible, however, has not yet been identified. In children, on the other hand, the explanations seem to be psychological in nature and seem linked to an attempt to process the tensions typical of their age. Since it is not a disease, but only a disorder, it can be treated with specific drugs and psychological sessions can be used to identify the possible causes. However, it is commonly believed that there is no effective treatment. It is often thought that waking up sleepwalkers is very dangerous. In reality, the real danger is to let the sleepwalker sleep, because he or she may harm himself or herself unconsciously, for example by going out of the house, onto the balcony or into the street. Another controversial pathological hypothesis is the performance of sexual acts during sleep (sexual somnambulism or sexsomnia or parasomnia Non-REM of a sexual nature), in which the somnambulist performs one or more sexual acts totally unconsciously [27–29].

4. **Oneiric state or dream:** This is a psychic phenomenon linked to sleep, in particular to the REM phase, characterised by the perception of images and sounds recognised as apparently real by the dreaming subject. The study and analysis of dreams lead to the recognition of a type of mental functioning with laws and mechanisms that differ from the conscious thought processes that are studied in traditional psychology. The art of divination that claims to interpret dreams is called oniromancy; while the ability to become aware of dreams is called ‘lucid dreaming’. In the 20th century, S. Freud in his famous work “The Interpretation of Dreams” attempted to explain this mode of functioning of the psychic apparatus by describing the psychology of dream processes and divided the functioning of the psychic apparatus into two forms, which he called the primary process and the secondary process. According to this classical psychoanalytic theory, the dream is the hallucinatory realisation during sleep of a desire that remained unfulfilled during daytime life. After Freud, many analysts of various currents became interested in dreams. Original contributions were made in 1952 by Fairbairn, for whom the dream would be a schizoid phenomenon, to be interpreted in the light of Klein’s theory of partial objects, emphasising the symbiotic aspect of the personality. Bonime in 1962 proposed a theory of dreaming based on the idea that dreaming is a self-deception aimed at

preserving and reinforcing a model of life, emphasising the social behavioural aspect of personality. There is no universally accepted biological definition of dreams. In general, there is a strong correspondence with the REM phase, in which the electroencephalogram shows brain activity comparable to that during wakefulness. The dreams we are able to remember that did not occur during REM phase are more mundane by comparison. Combining the research of Hobson and Solms, the ‘continual-activation theory’ of dreaming presented by Zhang proposes that dreaming is a result of brain activation and synthesis at the same time, since dreaming and the REM phase of sleep are controlled by different brain mechanisms. Zhang hypothesised that the functions of sleep are a kind of transfer of information from short-term to long-term memory, although there is no absolute certainty about the theory of memory ‘consolidation’. Non-REM sleep deals with conscious-relative memory, and REM sleep deals with relative and unconscious memory (procedural memory). Zhang assumed that, during REM sleep, the unconscious part of the brain is busy processing procedural memory; meanwhile, the level of activity in the conscious part of the brain drops to a very low level as contributions from the sensorium are basically disconnected. This causes the ‘continuous-activation’ mechanism that generates a flood of data from the stored memory to the conscious part of the brain. Zhang proposes that, with the involvement of the thinking and associative systems, dreaming causes the dreamer’s brain to maintain the same memory until its next insertion occurs. This would explain why dreams have both the characteristics of continuity (within a dream) and sudden changes (between two dreams). Tarnow suggested that dreams are a form of continuous stimulation of long-term memory throughout life. The strangeness of dreams is due to the configuration of long-term memory, mindful of Penfield and Rasmussen’s findings that electrical stimulation of the cerebral cortex gives rise to sensory experiences quite similar to dreams. A 2001 study showed evidence that the illogical locations, characters and flows of dreams can help the brain to fortify the chaining and consolidation of semantic memory. This may actually occur because during the REM phase the flow of information between the hippocampus and cortex is reduced. Increased levels of the stress hormone Cortisol also cause communication to decrease (often during REM sleep). One stage of memory consolidation is the linking of distant but related memories [28,30–34].

5. **State of coma:** Coma (from the Greek κόμα, ‘sleep’) is a state of unconsciousness known since ancient times. With this term, Hippocrates referred to ‘the corpse in lethargic sleep’, referring to comatose subjects who appeared in a state of deep sleep from which they could not be awakened. More recently, in 1966, Plum and Posner, US neurologists, defined coma as ‘Unarousable unresponsiveness in which the subjects lie with eyes closed’. In neurology, ‘coma’ is defined as a profound state of unconsciousness that can be caused by intoxication (drugs, alcohol, toxins), metabolic disorders (hypoglycaemia, hyperglycaemia, ketoacidosis) or damage to the central nervous system (stroke, head injury, hypoxia). The severity of coma is measured using a number of measurement scales: the simplified scale, tiered scales, and scoring scales. The most widely used of the scoring scales is the Glasgow Coma

Scale (GCS), proposed in 1974 by neurosurgeons Teasdale and Jennet. The scale, based on the patient's responses to various stimuli (painful, verbal), establishes a degree of altered state of consciousness, with a score ranging from 3 (deep coma) to 15 (patient awake and conscious). Use of the scale requires assessment of eye opening (Eyes, score 1 - 4), motor response (Motor, score 1 - 6), and verbal response (Verbal, score 1 - 5). A patient with GCS score ≤ 8 (E 1, M 5, V 2) is a comatose patient, who does not open his eyes after verbal or painful stimulus. These patients have to be intubated and undergo mechanical ventilation in the intensive care unit because they lack airway protection reflexes, a situation induced by brainstem damage. The GCS was initially used to assess the level of consciousness after head injury. Later, its use was extended to all acute patients with both medical and traumatic conditions. In hospitals, in Intensive Care Units, GCS is used to monitor the clinical neurological condition of patients with acute brain injury. However, the difference between coma and the soporific and stuporous state is the inability of a comatose subject to open his or her eyes after a verbal or painful stimulus. In a patient in a soporific state, unconsciousness recedes after a verbal stimulus (opening of the eyes), in a patient in a stuporous state unconsciousness recedes after a painful stimulus. Coma is also different from the vegetative state that can sometimes follow it. A patient in a vegetative state has lost cognitive neurological functions and awareness of the environment around him, but retains non-cognitive functions and the sleep/wake cycle; he may have spontaneous movements and open his eyes when stimulated, but does not speak or obey commands. Patients in a vegetative state may appear somewhat normal: they may occasionally grimace, laugh, cry or snore. Coma does not indicate brain death, i.e. irreversible cessation of all brain functions, and it may happen that a comatose patient is able to breathe on his own. It is different from sleep, which is a self-limiting process, whereas it is not possible to 'wake' a comatose person at will [35].

6. **Meditation:** Meditation is, in general, a practice that is used to achieve greater mastery of the activities of the mind, so that it becomes capable of concentrating on a single thought, on a lofty concept, or on a precise element of reality, ceasing its usual background chatter and becoming absolutely quiet, peaceful. Related to meditation is contemplation, by which is meant the ability to let the mind rest in its natural state. It is therefore a practice aimed at self-realisation, which can have a religious, spiritual, philosophical purpose, or with a view to improving psychophysical conditions. This practice, in different forms, has been recognised for many centuries as an integral part of all major religious traditions. In the field of psychosynthesis it is defined as a state of consciousness that can be achieved by voluntarily directing our attention towards a specific object (reflective meditation) or by complete absence of thoughts (receptive meditation): in reflexive meditation the object of meditation can be anything (generally, visualisations of elements relating to the inner world or simple objects are used in practice to achieve a greater state of concentration and pondering and is a type of meditation often used in Western culture); recessive meditation aims at the absence of thoughts and allows the mind to reach a level

of awareness without thoughts, that is free from the psychic activity of the human being, sometimes chaotic and confusing (it is a type of meditation in many Eastern philosophies and religions). Perez-De-Albeniz and Holmes, in particular, have identified the following components in common with all meditative methods: relaxation, concentration, altered state of consciousness, suspension of logical and rational thought processes, presence of an attitude of self-awareness and self-observation. Yi-Yuan recently deduced that mental processes, awareness and attention are aspects of life that can be exercised just like muscles. In psychotherapy, mindfulness meditation techniques are used to increase patients' awareness and have a variety of applications, including the prevention of depressive relapses and the treatment of anxiety disorders [36-41].

7. **Psychedelic alteration caused by hallucinogenic substances:** A psychedelic experience or alteration specifically indicates a modification of the psycho-physical state of consciousness due to the intake of hallucinogenic substances, in particular psychedelics such as LSD, mescaline, DMT and psilocybin. The effects of psychedelic substances are manifold and sometimes, being set and setting dependent, unforeseen. The reactions of inexperienced individuals during a trip can be dangerous both to their own safety and to that of others. The effects of the substance(s) on the individual also depend on the physical and psychological condition of the person, the place and context in which the substance is taken, the quantity and quality of the substance, and whether the person has a tolerance to the substance. Cultural contexts can also lead to different experiences, different interpretations and different ways of putting experiences into words. Shulgin proposed the following scale of intensity: a) "Level (-) or baseline", no effect; b) "Level (+/-)", alertness; c) "Level (+/-)", alertness; d) "Level (+/-)", no effect. (b) "Level (+/-)", state of alertness; c) "Level (+)", state of quantifiable alteration; d) "Level (++)", loss of control; e) "Level (+++)", total involvement in the experience; f) "Level (++++)", state of transcendence or mystical experience [42].

8. **Torpor:** It is a decrease in alertness, with drowsiness, slowing of thoughts and disturbance of concentration and spatial-temporal disorientation, caused by a specific psychological or physical state [10].

9. **Twilight state:** It is a narrowing of the field of consciousness, with interruption of relations with the environment, except for mechanical actions, such as walking or performing elementary gestures, typical in forms of toxic intoxication, epileptic fugue and psychotic states [10].

10. **Confusional state:** It is a severe destructuring of consciousness, no longer able to organise perceptual experiences into a coherent whole, to the point of making the subject unable to realise what is going on in his mind, resulting from the use of alcoholic and narcotic substances, but also nutritional deficiencies, drug abuse, lack of sleep, low glucose enzyme levels, dementia, vascular diseases, systemic infections, electrolyte imbalance, fever and neuroncological and metastatic pathologies [10].

11. Maladaptive daydreaming or compulsive imagination disorder: It is a disordered form of dissociative absorption associated with vivid and excessive fantasy activity that often involves elaborate and imaginative scenarios. It can cause distress, can replace human interaction and can interfere with normal functioning such as social life or work. People suffering from maladaptive daydreaming may spend more than half their days in 'vivid alternative universes'. Complex, imaginary worlds and daydreaming stories are a relief for moments of anxiety or boredom; daydreaming for these reasons is not inherently unhealthy. It is only when the imagined features replace or exceed the real ones when they can be dubbed maladaptive. It is usually associated with stereotypical movements, such as walking back and forth or rocking, and, often, the presence of musical stimulation. Daydreaming, a form of normal dissociation associated with absorption, is a widespread mental activity experienced by almost everyone; however, some individuals have the ability to daydream so vividly that they feel a sense of presence in the imagined environment. This experience is said to be extremely rewarding to the extent that some who experience it develop a compulsion to repeat it that is often described as an addiction. The general symptom is extremely vivid fantasies with 'story-like characteristics', such as the characters, plots and settings of daydreaming. The characters may be real people the dreamer knows, or has invented, and the same applies to the settings and plots. Media sources, such as films, video games and music, are probably the main influences in the life of a maladaptive dreamer, which is why these fantasies are often shaped like a novel or a film. In addition, time spent in a maladaptive daydream may cause the daydreamer to walk, fiddle with something in his or her hand or rock back and forth. Sufferers are usually very mentally and emotionally involved in their fantasies, causing them to react physically by gesticulating, laughing, talking and making faces that fit whatever fantasy scenario they find themselves in. Maladaptive daydreaming is not, however, related to psychosis, as daydreams do not correspond to reality and maladaptive daydreamers are aware of this; on the other hand, psychotic people cannot differentiate fantasy from reality, while maladaptive daydreamers always know the difference between what is in their mind and what is actually happening in the world. Although it is not yet officially recognised as a pathological condition, those studied report higher rates of attention deficit and obsessive-compulsive symptoms [43-48].

Sense-perceptual disorders

Sensation' is the first step in the perceptual process. Sensations use the sense organs to detect external stimuli, place them in space-time parameters and re-elaborate them, becoming "perception" (passive) or "mental representations" (active), understood as the product of the reactivation of past perceptual experiences, in the absence of sensory stimuli, and are voluntary, subjective, also linked to the imagination, are imprecise, vague, and require the use of memory and the retrieval of stored data. From a neurobiological point of view, the pathogenetic processes involved in sense-perceptual distortions must also be taken into account in the evaluation, i.e. the hyperactivity of the dopaminergic neurotransmitter in

the mesolimbic area and the alteration of consciousness with a reduction in the action of the higher centres on the lower ones [49].

Among the "sense-perceptual disorders" fall into two macrocategories [50,51].

Perceptual falsifications

Perceptual falsifications are false perceptions related to an external stimulus (output)

a) Illusions: They are visual distortions of perceived objects that derive from the distorted changes of concrete perceptions, and these outputs congregate with the psyche to create a whole, which are completely at variance with reality. They can affect any sensory organ and are not psychopathological because they can occur even in the absence of a mental deficit. However, in the vast majority of cases they are related to states of intoxication by psychoactive substances, dementia, disorders of consciousness and exhaustion. There are three subtypes of delusions: "completion or inattention delusions" (they can be physiological or integrative and consist of a fragmentary perception without meaning being slightly altered by the use of memory or imagination, so that it becomes meaningful); "emotional or affective" (they are short-term, have to do with the phobic mood state and vanish when the phobia fades, as for example happens when a child wakes up late at night and taken by fear mistakes a towel hanging on the wall for a ghost); "pareidolics or paraidolics (very frequent in children and characterised by a combination of perception and imagination when faced with an enigmatic stimulus, such as comparing the shapes of clouds we see with animals that come to mind. The person experiencing them admits that the stimulus does not really exist, but cannot deny what they see. They are involuntary and accepted with passivity).

b) Hallucinations: These are perceptions without object endowed with physical forms, they are subjective and cannot be shared. They are false perceptions that do not correspond at all to reality, but appear as original and occur concomitantly with real perceptions. They occur in the absence of external stimuli, are automatic, are perceived as a sensation, affect behaviour and are independent of an abnormal psychic state. Often, the patient is not convinced that others can share his or her experience; in fact, hallucinatory phenomena are subjective and cannot be shared with others. Hallucinations may be reported by the subject out of unawareness of their bizarre nature. Such phenomena come from 'inside', even though they are experienced as coming from 'outside'. Hallucinations frequently occur in cases of epilepsy, tumours and severe vascular diseases, personality disorders, bipolarism, severe depression, dissociative disorders and psychosis; they can be triggered by strong emotions, psychopathologies and neurological disorders. Hallucinations can be categorised according to the sense organ involved (sight, hearing, smell, taste, touch) including the soma in its complexity, intensity, emotional involvement, consequences on behaviour and level of awareness. Hallucinations can be simple and elementary (e.g. whistles and buzzing, flashes and circles of light) and complex

or integrated (e.g. sounds, 3D visions, epidermal sensations, paresthesias, delusions, circadian rhythm alterations, convulsions). Finally, there are 'functional hallucinations' (i.e. those involving the same sense organ, e.g. hearing water flowing from the tap is functional to the sense of hearing, so the hallucination is auditory) and 'reflex hallucinations' (i.e. those caused by sensory stimulation of another sensory organ, e.g. hearing water flowing from the tap is functional to the sense of hearing, but the sense of sight is stimulated, so a sensory channel inadequate to the situation. Reflex hallucinations produce synesthesia: a stimulus in one sense-perceptual channel triggers a hallucination in another). There are also some very specific forms of hallucinations: Hypnagogic and hypnopompic hallucinations, which represent the 'state of consciousness in the waking and sleeping phase' (they occur in falling asleep -hypnagogic- or on awakening -hypnopompic-, and can be visual, auditory and tactile); Flashbacks, which occur in the form of memories of a given event, with intense emotional and sensory involvement (affecting patients with post-traumatic stress disorder, anxious patients incapable of self-control and hallucinogenic drug abusers); The phantom limb phenomenon, in which the patient feels that he has a limb that has been amputated either because the afferent nerves that innervated it are compromised (the subject is aware of the existence of that limb and describes thermal sensations, tactile proprioception and pain referring to that missing limb).

c) **Pseudo-hallucinations:** They come from one's own mind and do not show signs of delirium. These are hallucinogenic-type sense-perceptual disturbances that come from one's own mind (internal voices are heard and one's own thoughts are listened to), are not psychopathological and do not show signs of delirium, although they are particularly intense and vivid. They are experienced in full consciousness, recognised as surreal perceptions, and are subjective and automatic. Among the pseudo-hallucinations there is a very particular and pathological form: the 'Kandisky-Clerambault pseudo-hallucinations', identified as a syndrome of a hallucinatory-paranoid nature and characterised by psychotic symptoms, bipolarity and obsessions perceived by the patient as not his own and influenced by forces external to him.

d) **Hallucinosis:** Psychosensory deficits caused by neurovegetative dysfunction or hyperesthesia. They are elementary perceptions and differ from psychotic hallucinations. They are independent of hallucinations, distort environmental perception and are revealed when the eyes are closed. They occur in cases of alcoholism, LSD and ketamine abuse (anaesthetics that cause hallucinosis in high doses), brainstem damage, temporal and occipital damage and prolonged insomnia.

Sensory dysfunctions

These include alterations in intensity or quantity (hyperesthesia or high intensity of sensations, or hypoesthesia or reduced/absent perception of intensity), quality, space and time. For example: Macropsy/micropsy: objects are perceived as larger or smaller; Dyschromatopsia: colour changes of objects; Palinacusia: auditory hallucination in which a correctly perceived word is heard over and over again for a certain time,

as if it were a kind of echo; Dismegalopsia: objects perceived larger on both sides; Xanthopsy: yellow vision of white objects and violet vision of dark objects; Erythroptopsia: red vision of objects; Chloropsia: green vision of objects; Porropsia: illusion that objects move away and shrink; Paraprosopia: illusion that people's faces take on a monstrous appearance; Alloesthesia: objects placed on the left are perceived on the right; Metamorphopsia: changes in the shape of objects; Teleopsia: objects appear distant; Pelopsia: objects appear close; Hyperschemazia / Hyposchemazia / Aschemazia: amplified perception/reduced perception/absence of perception of body parts; Paraschemazia: body parts are perceived distorted from the rest of the body; Hemiasomatognosia: loss of one side of the body, such that the person acts as if half of the body is missing.

Dissociative disorders

Dissociative disorders are conditions involving a discontinuity in the normal integration of consciousness, identity, memory, emotions, perception, behaviour and motor control. Individuals with dissociative disorders use dissociation, as a defence mechanism, pathologically and involuntarily. Such disorders may be triggered by psychological trauma, but some, such as depersonalisation or derealisation disorder, may be preceded by stress, psychoactive substance use, or no identifiable cause [7].

Dissociative disorders included within the DSM-V diagnostic manual [7,29,52-56] are:

1. **Dissociative identity disorder:** The diagnostic criteria for DDI are: the presence of two or more distinct identities or personality states, each with its own relatively constant ways of perceiving, relating to, and thinking about oneself and one's environment; at least two or more of these identities or personality states recurrently assume control of the person's behaviour; inability to recall important personal information that cannot be explained by a trivial tendency to forget; the alteration is due neither to the direct physiological effects of a substance nor to a general medical condition. This disorder seems to represent the precipitate of a failure in the processes of integration between the various aspects of memory, consciousness and identity associated with severe trauma; the alternation of different personality states may cause diagnostic confusion due to the emergence of symptomatic formations of discontinuity of consciousness common to other psychopathologies, as well as a wide range of 'secondary symptoms' (anxious, obsessive-compulsive, depressive, phobic, psychotropic substance abuse symptoms, eating disorders, antisocial behaviour, etc.) on which clinicians often focus) on which clinicians often erroneously focus, inevitably leading to incorrect diagnoses and ineffective treatments.

2. **Dissociative fugue:** This is a sudden, unexpected departure from one's environment, with inability to remember one's past, confusion about one's identity and partial or complete assumption of a new personality. It is a very rare disorder that appears to be related to traumatic experiences (natural disasters, wars, repeated sexual violence and abuse during childhood) that produce an altered state of consciousness

'dominated by the will to escape the trauma and forget'. It has a very limited duration, usually resolving within hours or a few days. Cases lasting several months have been described, with movements of up to several kilometres. Sometimes there may be residual amnesia due to the traumatic events that often precede and are therefore closely related to the onset of the clinical picture.

3. **Dissociative amnesia or psychogenic amnesia:** It is the sudden loss of memories, even important ones, belonging to one's own personal history and can be systematic (in which the patient has no memories with respect to a particular, specific person), generalised (the patient seems unable to remember everything about his or her entire life), continuous (the patient is unable to remember events subsequent to a specific moment in time, up to and including the present), selective (the patient does not remember a series of events related to a specific period of time, although he/she can remember others within the same period) or circumscribed (the subject is unable to remember all the events related to a circumscribed period of his/her life, generally related to the hours following the traumatic event, from a psychological point of view). The mental process underlying amnesia is defined as state-dependent learning, in the sense that information encoded in a certain state of mind can be recalled only if the person is in that same state. An example of state-dependent learning is the "hypnotic state" described by Breuer, i.e., a state of consciousness analogous to that provoked by hypnosis, in which the contents of consciousness enter into little or no associative link with the rest of mental life; it would have the effect of forming separate groups of associations. In this case, cognitive and affective contents cut off from "associative relations" because of their traumatic nature (although not immediately remembered during states of ordinary consciousness) can re-emerge, reproducing a mental condition similar to the original one. Another mental condition that justifies difficulties in recalling the memory of a traumatic event (an abuse or an accident) is peritraumatic dissociation, characterised by a sense of loss, confusion, disorientation, and altered perception of time. This is a response aimed at remedying the feeling of helplessness and the devastating sensations and emotions that accompany a traumatic event, through a process of separation of memories connected to painful mental states, in respect of which the subject is only able to produce partial memories later. Dissociative amnesia therefore takes the form of a failure to consciously retrieve affective content, which is acted out or emerges at the level of consciousness causing inexplicable states of physiological hyperactivation, or through intrusive images (flashbacks). Such emotions seem to be responsible for a compulsive tendency to repeat traumatic experiences. In general, these amnesias occur following a stressful event, are of variable duration, and may recur in the presence of chronic traumatic circumstances.

4. **Depersonalisation disorder:** Conceptualised for the first time in the DSM-II (APA, 1968) as depersonalisation neurosis, Depersonalisation Disorder is a typical dissociative disorder characterised by feelings of estrangement from oneself, which are accompanied by the experience of being

outside the body and by chronic emotional flatness. There are various forms through which the feeling of detachment from oneself manifests itself, including: the experience of being outside the body; the loss of sensitivity of parts of the body; a distorted perception of the body; the feeling of being invisible; the inability to recognise oneself in the mirror; a sense of detachment from one's own emotions; the feeling of watching a film about oneself; the sense of unreality; the feeling of being split into a participating and an observing part; the presence of interactive dialogues with an imaginary person. Depending on the severity and intensity with which the symptoms listed above occur, one can distinguish mild depersonalisation, which is particularly common among the general population, from severe depersonalisation. Mild depersonalisation is a transient response to intense anxiety in a stressful or life-threatening situation. In severe conditions it is instead a syndrome capable of provoking intense states of anxiety and anguish linked precisely to the deficit of integration of traumatic emotions within an associative system, typical of a stable and cohesive Self. This is what happens, for example, in those who were repeatedly sexually abused in childhood. It has been found that among psychiatric patients depersonalisation is most often diagnosed as a symptom associated with other disorders such as schizophrenia, dissociative identity disorder, depression, anxiety disorders, rather than as a pure disorder.

5. **Derealisation disorder:** Derealisation, which may or may not be accompanied by depersonalisation, is a dissociative symptom consisting of the sensation of perceiving in a distorted way the world outside the subject and, sometimes, of perceiving known individuals as strangers. It can be triggered by panic or certain psychoactive substances. The sufferer cannot fully describe the feeling of derealisation and uses 'as if' to describe what is happening to him or her. The world appears to the subject as devoid of emotional colouring: even familiar surroundings are perceived as alien, and the subject often reports visual disturbances of blurred vision. He may have the sense of dreaming or of looking at life as if he were watching a film (visual derealisation): this disturbance may last from a few minutes to several hours. Bauer in 1984, later Sierra and Berrios, hypothesized that derealization is, like the related depersonalization, a phenomenon determined by a temporal-limbic disconnection. According to the Ericksonian theory, derealization is a dissociative process that presents analogies with hypnotic trance. According to this model, the panic crisis in fact closely resembles all the characteristics of the hypnotic trance, only that instead of being positive and healthy as are the natural self-induced trances or those supervised by the hypnotherapist, in this pseudo-pathological trance the mechanisms of derealisation/ depersonalisation and uncriticality (to give a few examples) are manifested, giving rise to that vicious circle that those who suffer from this sensation know well and that for those who suffer from panic disorder, then leads to the panic crisis.

The recommended treatment for "Dissociative Disorders" is psychotherapy, with the main aim of leading the patient towards a better integrated functioning. The therapist promotes the idea that all alternative identities represent



attempts at adaptation to cope with or master the difficulties encountered by the patient, and acts by helping the identities to get to know each other, accepting each other as legitimate parts of the self and negotiating to resolve their conflicts. In addition to individual psychotherapy, patients can benefit from specific interventions such as Dialectical Behavioural Therapy (DBT), desensitisation and reprocessing through eye movements, sensorimotor psychotherapy, and group therapies. Linehan's Dialectical Behavioural Therapy (BDT) is an integrated cognitive-behavioural oriented treatment that involves strengthening those skills in which the patient is deficient, in particular the regulation of his or her intense negative emotions, and seems to be particularly suitable for people who present with self-harming and suicidal acts. The basis of treatment is to help patients minimise behaviours that are dangerous to themselves or others or that make them vulnerable to victimisation by others. Such behaviours include suicidal and para-suicidal behaviours, substance and alcohol abuse, violent relationships, eating disorders, violence or aggression, and high-risk behaviours. Eye Movement Desensitisation and Reprocessing (EMDR) is very helpful in modifying distortions in self-representation and facilitating integration. EMDR allows the patient to approach the pain in a safe way by temporarily deactivating the attachment system and consequently activating an exploratory attitude. Sensorimotor psychotherapy helps the patient recover the ability to regulate those uncontrolled body states that contribute to dissociation. In some cases, for a limited time, individual therapy can be complemented with group psychotherapy in order to help the patient develop skills on trauma, dissociation, assist in the development of specific skills (e.g., coping strategies, social skills, and symptom management), and allow him/her to understand that he/she is not alone in dealing with dissociative symptoms and traumatic memories. Groups provide support, the opportunity to focus on the development of interpersonal functions, and reinforce the goals of individual therapy. It is essential that these groups are time-limited, well-structured and clearly focused. Pharmacotherapy is not a treatment of choice as there are no drugs available that can electively act on dissociative symptoms. Pharmacological therapy is justified to reduce anxiety-depressive symptoms, irritability, impulsivity, insomnia, with the aim of achieving emotional stabilisation. Among the most commonly used: SSRI antidepressant drugs, most often used to treat depressive symptoms and/or symptoms of post-traumatic stress disorder; anxiolytics used mainly as a short-term approach to treat anxiety; neuroleptics or antipsychotic drugs, in particular the new atypical antipsychotics have been used in relatively low doses to successfully treat hyperarousal, thought disorganisation, intrusive symptoms of PTSD, as well as chronic anxiety, insomnia and irritability. Psychiatric admissions may be necessary to help patients during particularly difficult periods. However, cognitive-behavioural therapy is the treatment of choice to help patients explore and modify dysfunctional belief systems based on the trauma they have experienced and to master stressful experiences and impulsive behaviour. Cognitive-behavioural techniques are in fact particularly useful in controlling certain symptoms, such as: the management of anxiety activations and fits of rage, the

restructuring of negative thoughts, and the improvement of interpersonal communication. The aim of the treatment is to achieve more integrated functioning by working on dissociated mental processes. From the perspective of cognitive-evolutionary therapy, it is now agreed that complex trauma-related disorders, including dissociative disorders, are most appropriately treated in sequences of phases. The most common structure in the field consists of three phases. In the first phase, the priority is safety, stabilisation and strengthening of the patient, with a view to working through the traumatic material and managing problematic personalities. Objectives include maintaining personal safety, symptom control, modulation of affect, stress tolerance, improvement of basic life functions, and development of interpersonal skills. Psycho-education is often used, advising the patient on specific readings, providing information and explanations with the aim of 'normalising' their experience. The therapeutic relationship becomes the ground for corrective emotional experiences of the attachment system and the experience of new collaborative and equal forms of interpersonal relationships. In the second phase the patient is helped to process the painful episodes of his past, and to bear the pain of losses and other negative consequences of trauma. The work of this phase is to remember, tolerate, process and integrate the intense past events by planning strategies to maintain control over the emerging traumatic material. The exploration and integration of traumatic memories can be defined as a form of exposure therapy that allows the patient to transform traumatic memories in order to integrate personalities or achieve interaction between them. The processes of the second phase allow the patient to understand that traumatic experiences belong to the past, to understand their impact on one's life, to develop a more complete and coherent personal history and sense of self. Cognitive restructuring of traumatic experiences and recognition of the adaptive responses the patient had during those experiences are used to counteract irrational guilt and shame. In the third phase, patients begin to experience a stable and solid sense of self and new feelings about how to relate to others and the outside world. They gain a sense of coherence in their history that is also related to the problems they face in the present, they begin to turn their attention away from their traumatic past, directing their energy to living in the present and developing future perspectives [1,7,57].

Strategic psychotherapy can also be a functional orientation for dissociative conditions, also because of the strategies of the theoretical model [58].

Conclusions

States of consciousness allow us to interact with our environment and to be present to ourselves: if this does not happen, because an alteration occurs, our plane of reality is also compromised [59]. On the basis of the alteration it is then possible to assess the severity of the impairment, also in function of the individual cognitive processes [1,7,10,60,61] and of the morbid conditions in comorbidity or as a consequence of them [62-87], but also of previous psychological traumas [88,89] and of the subject's defence mechanisms [90].

According to the theoretical model underlying the PICI-1



questionnaire (TA version) [91,92] and its first revision [93], dissociative disorders fall within a specific personality disorder in terms of symptoms and nosography, as well as representing individual traits of other morbid conditions of the borderline and psychotic groups. In the light of this, all dissociative hypotheses regarding alleged mystical and occult experiences, such as near-death experiences and projection of the spiritual and soul body, also play a central role [94-97].

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