

A REVIEW OF NEAR DEATH EXPERIENCES

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Abstract—Near death experiences (NDEs) have been reported throughout time in essentially all cultures. The contents of modern NDEs is independent of gender, age, and profession. The frequency of occurrence is estimated to lie between 10 and 50 percent of all near-death situations. This frequency could be higher still, perhaps even 100 percent, were it not for the dreamlike and dissociative character of the experience and the amnesia-prone participation of the temporal lobe causing a clear tendency to forget the NDE. A number of similar elements are common to NDEs, such as an out-of-body experience (OBE) in which the physical body and its surroundings are observed from various external vantage points, often from above. Numerous cases exist in which the reality of the OBE-observation can be independently verified, by external conditions, situations, people, objects, etc. Even previously non-religious ND experiencers subsequently show a markedly decreased fear of death and a corresponding increase in belief in life after death. Certain elements of NDE-like experiences can be induced by, for example, electrical stimulation of the right temporal lobe or the use of hallucinogenic substances. It is possible that hallucinogenic transmitters (and endorphins) of the brain itself play a role in the NDE. Nevertheless, there are NDE-elements, such as the frequently reported life-review and certainly the acquisition of external, verifiable information concerning the physical surroundings during the experience, that cannot be explained by physiological causes. Wish-fulfillment, death-denial or other defense mechanisms of the brain are also not adequate explanations. The large body of NDE data now accumulated point to genuine evidence for a non-physical reality and paranormal capacities of the human being.

Introduction

To this day mainstream science ignores, rejects or isolates paranormal and religious (mystical) experiences which threaten scientific biases and the "common-sense conception" of the world. This suppression correlates with the denial of death, which also threatens all human efforts, and especially with the scientific devaluation of religions and their conviction of life after death.

The psychiatrist and psychotherapist Stanislav Grof, who once prepared incurable cancer patients for their deaths by evoking near-death like experiences with LSD (3), comments on this official suppression:

In connection with our success- and efficiency-oriented philosophy, aging and dying are not integrated parts of life, but a defeat and a painful reminder of our limits in controlling nature. Dangerously ill or dying people in our culture are considered, and see themselves, as losers.

Contemporary medicine is a slave to technical procedures and overspecialized body-mechanics and has forgotten the holistic aspect of real healing. Its conception of dying is dominated by the effort to overcome and postpone death at any price. Fighting for the mechanical prolongation of life, the quality of the patient's last days and his psychic and spiritual longings do not receive enough attention. We see the tendency to shut out the old and dying people from family and daily life and to pack them off in nursing homes and hospitals, where human contacts are compromised by complicated instruments: oxygen chambers, infusion tubes, monitors of vital functions, etc. (4, p.7-8; my transl.).

Meanwhile, accompanying dying people is a new scientific field of business; but professionals in this area seldom systematically address the point of whether there is life after death. This question seems not to be answerable scientifically, therefore it is left to the dying individual or the priests. But in recent years the (completely unsuspected) records of near-death experiences (NDEs) have shown that there is a scientific, neurobiological basis for the belief in life after death. Especially the growing paranormal capacities of the dying suggest the existence of a time- and space-transcending, and therefore immortal, soul. But what are the results of the NDE- research?

Elements of the NDE

As a consequence of modern resuscitation-techniques NDEs have become more and more frequent; popular publications (11; 12, 13; 14; 15; 16 etc.), lectures and workshops — especially from Elisabeth Kübler-Ross — have attracted the interest of many people. About ten years ago science began to examine this phenomenon systematically. Participating in the "International Association for Near-Death Studies" (IANDS), which was founded in 1977, well-known scientists — especially psychologists, psychiatrists and medical doctors of other specialties, parapsychologists, philosophers and scientists of religion — began their studies (14; 17; 18; 19; 22; 41 etc.). The psychiatrist, Bruce Greyson (University of Connecticut), is president of the American parent-IANDS, which publishes the quarterly "Journal of Near-Death Studies" (JNDS). Worldwide the IANDS has more than 1,000 paying members and a growing number of scientific study groups (20a-i; 21a-m; 22a-x; 151a-i).

Meanwhile roughly one hundred studies have been published, mostly done by psychiatrists, psychologists, cardiologists and pediatricians (11; 12; 14; 20a-i; 21a-m; 22a-x; 23-31; 42; 152; 153; 156; 157; 158, 159, etc.). They showed that up to one third of all people who were nearly dead have had an NDE. A representative poll of the well-known Gallup Institute confirmed these numbers: about 34% of all adult Americans who at sometime in their life were resuscitated have had an NDE (32).

Studies comparing content and frequency of so-called *deathbed-visions* in different cultures have had similar results: From 20 to 67% of conscious dying subjects saw deceased human beings and/or landscapes from beyond and experienced heightened sensations. (35-36). Other facts support these figures: Paranormal NDE-elements, for example, are quite frequent even in normal

consciousness; up to half of the normal Western population is estimated to have experienced them in their lives (22b-g; 37-40). Especially the frequency of spontaneous (i.e., not experienced in conditions of imminent danger) out-of-body-experiences (OBE) is quite similar to the NDE-incidence: approximately 28% of the population of Western societies. OBEs actually resemble NDEs in many aspects and are their most important component (22b-c; 37; 139).

Other facts speak in favor of a still higher incidence of NDEs. They also illustrate some special results of the research work in recent years:

- 1) Fearing disbelief (as having hallucinated) many NDEers keep their experiences secret, even from their family members (13; 15; 17; 24; 41; 153).
- 2) In European hospitals nobody systematically inquires about NDEs; only in Holland have some hospitals participated in a study (13; 42; 152; 153).
- 3) Like dreams, NDEs are quite often dissociated activities of the brain and can only be remembered when the normal consciousness has access to them (22a; 30; 43; 44; 118; 147; 149). Actually in Western societies there exists a tendency to take refuge with unconsciousness when confronted with the fear of death. Just this reaction psychodynamically is nothing else than a dissociation. Since dissociation normally is associated with amnesia, we are amnesiac for most of our dreams and NDEs (22b, 22v, 22w). Therefore some NDEers remember their experience only under hypnosis (22d) or months to years later, when they come into contact with an appropriate association (for example another NDEer) (22d-e; 43).
- 4) Temporolimbic epilepsy sometimes activates NDE-elements and is also accompanied by an amnesia of variant depth (22a; 108; 148). Since the NDE neurophysiologically seems to be connected with the temporolimbic region, an amnesia can be expected. This is confirmed by the fact that we observe a significant increase of psychical (psi or ESP) capacities after the NDE, which are possibly triggered by or located in the temporolimbic area (22a; 45).
- 5) The fact that also those people who were nearly dead without having a NDE experience an increase of psi-capacities signals a forgotten/suppressed (partial) NDE even in their cases (22b).
- 6) Perhaps particularly negative NDEs are suppressed (6; 21n; 55; 155).
- 7) Most NDEs are of short duration; their remembrance should therefore be expected to be poor because research has shown that NDE-remembrance increases statistically significantly with the duration of the experience (220).
- 8) Especially old people, who are predisposed to near-death situations, have a reduced capacity to perceive during the NDE and to remember it (220).

- 9) The accuracy of the memory of NDE-details decreases statistically significantly with the time between the NDE and its remembrance (22e; 220).
- 10) Certain personalities are embarrassed about the occurrence of an NDE. They fight against imminent death and so restrain their consciousness from experiencing an NDE (22b; 29; 30).
- 11) Many people with life-threatening illnesses are under the influence of anesthetics or psychotropic drugs. These medicaments interfere with perception during an NDE or block it completely (13; 220; 41). Altogether these facts demonstrate that possibly the majority of those who once (or several times) were nearly dead experience an NDE.

Now, are there any personality traits that predispose some people to experience an NDE? Astonishingly, sociological, demographic or psychological variables do not influence the occurrence of the NDE (13; 17; 18; 22d; 31; 41; 43; 48; 57, etc.). Also, even very young children experience NDEs (32). NDEs and OBEs do not signal any psychopathology; people with mental diseases do not experience them more frequently than normal human beings. On the contrary NDEers and OBEers are possibly mentally healthier as a group (18; 41; 43; 69, etc.).

And when do NDEs happen? NDEs are experienced at the moment of real or anticipated death, i.e., before biological death (17; 21a; 22f). They are triggered by various situations such as accident, life-threatening illnesses, suicide attempts, operations or births (13; 22b; 25; 27; 34; 43; 49, etc.) which do not influence the content of the NDE (41; 43). Quite often the NDEers are clinically dead, i.e., without heartbeat and respiration. Some NDEs occur during an isoelectric EEG (13; 17; 22g; 50), some others even in the morgue (after giving up resuscitation) (15; 51). This is possible because the definite moment of biological death cannot be exactly determined and the latter quite often is insufficiently diagnosed (13; 43; 52-54; 154). Finally up to 37% of NDE-like experiences occur in non-life threatening illnesses/accidents or are not associated with physical illnesses/accidents (21m).

Actually the contention that death means mere unconsciousness is purely theory, because this can neither be experienced nor verified (110). The last thing we know from a dying person is his NDE! Only the brain knows exactly the "point of no return" (of biological death). Pictures are the primary language of the brain, representing all somatic and psychic processes. The brain is able to control these pictures effectively (via biofeedback, imagination or autogenetic training). The NDE as a visual experience provides the most objective information about the imminent moment of biological death!

What does the NDEer experience directly before his irreversible death? In a more or less chronological order and a descending order of frequency the NDE consists of the following elements:

- 1) Increase of mood with feelings of euphoria, happiness, joy, well-being, ease, etc. (25; 29; 49; 51; 56; 57; 324, etc.).

- 2) Out-of-body-experience (OBE) with the dying person looking down on his physical body. His rational consciousness continues working during this state and sometimes undertakes different tests to verify this new existence. Even blind people can see during the OBE — and their perceptions can be verified! Upon leaving the body the OBEer suddenly loses any pain; as an OBEer, he can pass through and see through physical objects and sometimes verifiably read the thoughts of other people (13; 17; 43, etc.).
- 3) Entering a tunnel-like dark transition zone (13; 29; 49, etc.).
- 4) Perception of a golden light which emanates infinite love, evoking enormous happiness in the NDEer. He sometimes merges with this light and then has the mystical feeling of omniscience and all-oneness (11; 17; 22d; 22h; 48; 49; 51; 156; 157; 159, etc.).
- 5) Perception of a heavenly or hellish landscape (11; 22d; 22m; 56; 58; 155, etc.).
- 6) Encounter with deceased relatives, religious figures or beings of light with whom the dying person communicates telepathically; these figures often initiate the dying person's return (22b; 22m; 41; 159, etc.).

During this or the above mentioned earlier stages, certain other NDE-elements may appear:

- 7) Experience of a life-review with known and unknown verifiable details of one's life, whereby the NDEer observes himself acting and feeling again all specifics of a situation, including those of all other participants. This entails an unequivocal ethical evaluation of all thoughts, words and deeds under a normative measure of love (19; 26; 27; 29, etc.).
- 8) Precognition: parts of the OBEer's or the world's future are seen (13; 21b; 22p; 41).
- 9) Different temporal perception: time slows down and simultaneously thought and picture frequency speeds up (17; 49).
- 10) Sometimes, almost from the beginning, some kind of (heavenly) music is heard (11; 29; 49).

Some other rare elements, not covered here are described in NDE literature. The number of details of an NDE correlates with its depth, i.e., with the imminence of actual or expected death (17; 24; 41; 59). At the end of his experience the NDEer has to return into his body. This happens very quickly. Often he is reluctant to return (11; 13; 30; 43; 58, etc.).

With a frequency from about 0 to 25% the *NDEs* are *negative*: The NDEer also experiences an OBE and a dark transition zone, but under unpleasant feelings of fear or panic. He then encounters bad forces or beings and enters a hellish environment (6; 13; 17; 21n; 22g; 22x; 25; 49; 51; 55; 128; 155, etc.).

Surprisingly extensive changes in personality can occur after a NDE. The NDEer can go through such a revolution of values and opinions that after-

wards he is at odds with his environment, where his old values are still operative. Divorces, career changes and a significant psychosocial stress can result. He can experience a phenomenon called "culture-shock," which is well known from people who immigrate into a new culture (13; 22i; 220). Some NDEers actually develop depressions from being forced to return to this "vale of tears" called earth (22i; 220).

What are the new positive values NDEers bring with them?

- 1) In different controlled studies a statistically significant decrease of fear of death (as the supposed end) was found, which was an effect of the NDE and not merely a consequence of having been nearly dead (13; 14; 15; 17; 27; 61; 156; 157; 158, etc.). At the same time a decrease of neurotic (life) anxieties is observed (18; 27).
- 2) After an NDE, all NDEers are absolutely certain that there is life after death (11; 12; 13; 17; 18; 22b; 60; 158, etc.). One observed consequence: some NDEers mourn less because they know that there is life after death(41).
- 3) We found a distinct increase of religiousness, consisting in the above mentioned two points and the real knowledge of the existence of (a) God (and other religious beings) which is often obtained by contacting religious beings (of light). Furthermore, a priority of religious/ethical values in this life and the life beyond emerge from an NDE (13; 17; 22i; 25; 61, etc.).

These are the following values:

- 4) Unconditional love for all human beings and all things (13; 17; 22i; 22f; 51, etc.);
- 5) More harmony, tolerance and sympathy with other humans together with a high evaluation of human relationships (17; 18; 220; 27, etc.);
- 6) Engagement in social-charitable activities (17; 61, etc.);
- 7) Turning away from materialistic, external or superficial values, prestige and competitive struggle lose importance (13; 18; etc.);
- 8) Higher evaluation of the self together with more joy of life and more self-reliance (18; 19; 27, etc.);
- 9) Enhanced perception of the brevity and preciousness of one's own lifetime (13; 27, etc.);
- 10) Higher evaluation of the harmony with nature (13; 18, etc.);
- 11) A feeling of higher responsibility for one's life, resulting especially from the life-review (13; 17; 19, etc.);
- 12) Higher esteem of knowledge of oneself and wisdom (13; 17; 18, etc.);
- 13) Distinct increase of psychical (PSI or ESP) capacities, especially of healing abilities (17; 22b; 41 etc.);
- 14) Higher evaluation of noetic qualities (17; 41, etc.);
- 15) Healing of psychic or psychiatric diseases, especially of addictions (13; 17; 27; 41; 141, etc.);

- 16) NDEs have shown to be the best prevention against suicide; in particular the real knowledge of a life after death and the firmly established religious/ethical values resulting from the life review seem to contribute to this effect (17; 27; 29; 30; 43; 61, etc.);
- 17) Sometimes a complete turn-around of criminals is observed (13; 17; 20a; 21b, 21c; 21d);
- 18) Finally the NDEers develop a feeling of being elected and become a kind of missionary for the knowledge and values learned through their NDEs (17; 19; 27; 30; 43, etc.). Actually all of these changes are consequences of the NDE (49). These changes seem to correlate with the extent of the NDE and degree of imminent death (17; 18; 22b; 49).

Most astonishing is not just the frequency and structural similarity of all NDEs in the United States and Western Europe, independent of sociological, demographic and psychological variables, but that *similar experiences with the same effects have been made for thousands of years across completely different cultures* (17; 34; 58; 68; 123-125; 129). The Gilgamesh epic, the oldest written testimony of mankind, contains a near-death experience:

Gilgamesh... began... his search for the other world. A long time afterwards he discovered behind the oceans at the edge of this world the river Chubur, the last barrier before the kingdom of the dead.

Gilgamesh left the world and crawled through a dark endless tunnel. It was a long, uncomfortable way... but at last he saw light at the end of the dark tube. He came to the exit of the tunnel and saw a splendid garden. The trees carried pearls and jewels and over all a wonderful light emitted its rays. Gilgamesh wanted to rest in the other world. But the sungod sent him back through the tunnel into this life.

There he met Enkidu, who at first had experienced misfortune. Thousands of mag-gots had molested him in another part of the other world. They had buried themselves painfully into his body, until there was left only a shadow without flesh. Finally a friendly god gave him back his body in order to be able to leave the hell and tell his friend Gilgamesh of the horror of hell in full detail. (62, p.8; my transl.).

Also the medieval Christian-Catholic religion recognized the NDEs. The first case records stem from Pope Gregory the Great (5th Century A. D.) (17; 58).

The Chinese and Japanese Amida-Buddhists were more focused on the enlightening NDEs and their artificial induction via meditation; but they also knew hellish NDEs. These Buddhists compiled the second NDE-case collection in the 7th Century A.D. Comments in this collection sometimes reach the level of the near-death research of our days (22j; 22k).

Finally, the NDEs of modern non-Western/Non-Christian cultures are essentially comparable with those of the industrial countries in so far as they are interpreted as other-world-contact and result in an intensified religious life. This applies for example to the inhabitants of Papua New Guinea with some interesting differences: tunnel and light-phenomena (sometimes also the OBE) seem to be absent, heaven and hell correspond to their different religious concepts, and the life-review is replaced by a trial. The NDE content is shaped dif-

ferently, according to the particular religion, culture and mentality (17; 64; 65; 66; 67; 68).

The American anthropologist, D. Shields, found that 95% of 57 non-Western cultures today are familiar with OBEs, the most important component of the NDE (43). Interestingly enough, no review of a former life is described in the NDEs of culture believing in reincarnation. This could be an indication that the concept of reincarnation is a misinterpretation of the contact with the (former) life of another deceased human being (143; 144).

How can these universal, similarly structured and interpreted experiences of so many human beings throughout time and all cultures be explained? At first there is a clear indication, that all conceptions of God originate in the NDE: it is a fact that the most common NDE-element — the light of the other world — becomes a *sungod* for Gilgamesh, a divine Bodhisattva for the Amida-Buddhist, the God of love (and of light) for the Christian and even causes the unbelieving scientist or rationalist to believe in divine forces.

Historical Perspective

With the minds of all NDEers throughout the history of mankind interpreting the NDE unequivocally as proof for life after death, could this be reality? Is this similar interpretation together with the similar structure and the similar effects — i.e., the changes of personality in the direction of an enforcement of the religious/ethical aspects of man — not good evidence for a biological (and genetical) basis for the NDE and thereby all (mystical) religious experiences? I will attempt to answer these very important questions by first falsifying the arguments of the skeptics.

- 1) NDEs are not a sign of a psychic disorder of the NDEer (see above).
- 2) NDEs are not products of a larger capacity for imagination on behalf of the NDEer. Actually neither the NDEers nor the OBEers have a larger capacity for imagination than the general population (22d; 22i; 22k; 72; 75; 76; 77, etc.).
- 3) Before the NDE, NDEers (most likely) do not have a higher hypnotizability or influence susceptibility than the general population. The latter possibility only increases after the NDE (22f; 43; 74, etc.).
- 4) NDEs are not the result of previous knowledge about the NDE. Even children who have never heard about NDEs have similarly structured near-death experiences. Sometimes these children are too young to even speak, and therefore could have never heard of NDEs (13; 16; 22d; 24; 25; 43; 78; 324, etc.). Even if the children have learned from certain (religious) expectations of their parents, their NDEs do not correspond to their parents' beliefs (6; 15; 17; 22c; 22i; 49; 65; 324, etc.). Different studies have actually shown that most NDEers do not have any prior information about NDEs (17; 18; 43; 49; 57, etc.). Even those who have previous knowledge of NDEs do not necessarily experience a correlation between previous beliefs and the actual content and shapes of their NDE (57).

- 5) NDEs are not the result of fulfilling a desire. Desires are always idiosyncratic while NDEs and have many common elements, independent of the belief-system of the NDEer (13; 17; 43; 48; 51, etc.). In many cases the NDEs evidently do not correlate with the desires of the experiencers (13; 16; 221; 22m; 34; 41; 49; 50, etc.). NDEs are also experienced in those cases where the patients are sure to recover again, i.e., against their own desires and expectations (6; 34).

The verifiable OBE-perceptions of resuscitation and other objects and events can be differentiated from previous personal conceptions (15). Quite often the NDEer did not know or know about the deceased ones who appeared in the NDE, so that could not have been a desired experience (22d; 51; 78). Fulfilling a desire is usually a flight from reality but a NDEer having an OBE is confronting himself with a frightful situation (13; 18; 50). Besides, just a flight from reality would never result in such massive positive changes of personality (13; 17; 50). Particularly the culture-shock phenomenon contradicts the supposition of fulfilling a desire, because we usually only desire pleasant things. Finally a psychological explanation can only say something about the mechanism but nothing about the reality of an experience (25; 57; see below).

- 6) The NDE is not merely an archetype of the Jungian collective unconscious. This model is only a controversial undemonstrable theory and therefore explains something unknown by some other unknown thing (13; 43; 47; 79). In dreams for example, we do not find an NDE-archetype. This also could not explain the verifiable OBE-perceptions (13). Interestingly, C. G. Jung himself had an NDE which changed his life and strengthened his belief in life after death (34; 43). Possibly the other world is even a source of all of our symbols (17).
- 7) The NDE is not a birth-recall. Actually the NDE is just the opposite of a birth experience: an easy-floating trip through the tunnel does not resemble the painful passage through the birth-canal. The obstetrician is experienced as a threat and not as a wonderful light. Birth is always painful while the peak experience of an NDE is characterized by painlessness. The birth hypothesis also cannot explain the appearance of deceased people. In general perception during birth is by no means as differentiated as perception during a NDE. Finally, cesarean sections should also entail other NDEs that have not been observed. Altogether, the birth hypothesis reduces all religious/mystical experiences to kinds of birth recall that are surely untenable (13; 18, etc.).
- 8) Psychological theories cannot say anything about the objective reality of the NDE. Many psychologists forget this when they try to reduce the NDE to purely theoretical contentions (25; 50; 47; 79). Concerning the most important theories, the following must be said: Palmer postulates that the imminent death threatens the body and self-concept of a human being. The OBE then reestablishes self-identity via primary process. This theory can neither explain the perspective above nor the verifiable

perceptions during the OBE (73). Especially the fact that the OBEer regards the threatening thing (i.e., the seemingly dead body) itself without fear, is the opposite of what could be expected if the NDE were merely a flight away from an awful reality. When do we want to flee into the direction of danger? Actually NDE-OBEs are rather blocked by fear of one's own death (50). To explain the mystical NDE-elements as regression into the state before ego-differentiation is already phenomenologically wrong, because the whole NDE is experienced with a completely intact ego-identity. Also the concept of depersonalization cannot explain the NDE which by definition is not depersonalization (13; 17; 25; 28; 43, etc.).

- 9) The NDE (OBE) cannot be explained by subliminal perception. This is defined as acoustic perception of emotionally important and especially threatening information during operations or in coma. The concomitant helplessness and feeling of distorted reality of one's own experiences in this state contribute to the appearance of psychophysiological disturbances afterwards. Even pain is suddenly again perceived (15; 53; 80; 81; 82; 83; 84). Contrary to this, the NDE (OBE) is characterized mainly by optical perceptions of important and less important things in a state of very rational (OBE) control and absolute certainty of the reality that one sees. During this experience the NDEer experiences complete painlessness. The psychic aftereffects are primarily positive (see above).
- 10) The statement that NDEs contain perceptions of (this and another) reality cannot be falsified. The reason is that the current definition of a hallucination is grounded on an antiquated reality-concept (of a simple realism) (77; 116). Also, the perception-psychological assumptions of this definition after which reality is imaged in the brain via our sense organs are wrong (22a; 77; 86; 87, etc.). The fact is that we do not even know the neurophysiological correlates of hallucinations (77; see below). We know reality only by its image in our brain; this image however is very selective, dependent on our state of consciousness. This reality is never objective. Therefore in the conventional psychiatric sense all perceptions are illusions. Physical and epistemologically standard NDEs, however, open a reality which exists as surely as nuclear particles or the feeling of love exist (43; 76; 77; 86; 87; 88; 89; 90; 91; 92, etc.).
- 11) The verifiable perceptions of the NDEer's real surroundings, the thoughts of people present, his own past, the imminent death (in a scenic form) and sometimes also of the future are by definition not hallucinations. These perceptions are first of all perceptions of the external and bodily reality which are already in the terminology of conventional psychiatry no hallucinations (70; 77; 79).

The other NDE-elements can also be distinguished from usual hallucinations and also therefore from dreams which by definition are hallucinations in the sleeping state (76-77; 86):

- a) While they are always individually unique, NDEs show a surprising similarity (6; 15; 77; 87, etc.);
- b) Hallucinations of mentally ill people can clearly be distinguished from the contents of an NDE (24; 34; 50; 65; 93); 80% of hallucinations have a negative content while about 90% of the NDEs are positive (34; 94);
- c) Usually it requires long-lasting hallucinations to have a psychopathological effect (77; 132) while just one short NDE may entail great changes of personality in the direction of mental health;
- d) Scientists who have experienced hallucinations differentiate clearly between NDEs, dreams and hallucinations (22a; 49; 43; 51, et ~.);
- e) The OBE is no heautoskopik hallucination (13; 43; 50, etc.), sometimes it can be verified experimentally (43; 50; 70);
- f) The fact that at the moment (or hour) of death dying people sometimes can be seen far away from their deathbed by living, mentally healthy human beings, indicates a kind of real appearance (35) which can be compared to the appearance of deceased ones in the NDE. This also correlates with the imminent death of the NDEer. If the NDEer sees living persons in this phase of his NDE, their appearance correlates quite often with the imminent death of the seemingly living person (13; 16; 78). The fact that the unknown deceased one looks the way he looked when he was living also indicates a paranormal process and possibly an appearance of a ghost (13; 35, etc.);
- g) The existence of an elevated hallucination index does not increase the frequency of NDEs (34; 50; 65).

The intercultural, inter- and intra-individual differences between NDEs whose content, interpretation and effects clearly correlate with culture, religion and (therefore) mentality of the experiencer do not speak immediately for their hallucinative character. There could simply be other different worlds. A correlation does not say something about the cause (17; 22d; 22j; 22k; 58; 64). Scientifically this problem cannot be solved as easily as some people want (see point 10):

It seems reasonable to assume that in ancient times those who suffered a near-fatal injury or became seriously ill and appeared dead, but later revived bearing spectacular accounts, would have been regarded uncritically as revealing something of the hidden mysteries of death. This raises the intriguing possibility that some and perhaps much of the folklore imagery of the after-life could be derived by NDEs, and that cultural expectations not only determine NDE imagery but are themselves also derived from it (57, p. 612; my italics).

In the light of results of parapsychological research on the mechanisms of extrasensory perception (ESP) (95; 96; 97) an intermediate position might be correct: the other world's pictures of NDEs consist of a mixture of individual hallucinations and true ESP, the latter representing — perhaps still on the level

of human images — the different "mansions in the house of God" that Jesus mentioned (John 14, 2).

In any case the astonishing uniformity of the near-death experiences of mankind refers to the importance of religious values and other worldly conceptions of humans. This uniformity and many other facts even speak for a biological (and genetic) base of (this) religious experience and therefore religiosity in general. What do we then know about the neurophysiology of the NDE — and can this knowledge help our understanding of the meaning of this universal experience?

In principle the significance of neurophysiological findings is limited. They are only correlates of the NDE which cannot say anything about its objective reality nor its meaning for the NDEer. Actually it is not clear if the neurophysiological correlates, for instance of schizophrenia, are cause or consequence of this disease. Then each physiological correlate of the color red, for example, is only secondary; we would not understand it without knowing first what red is. Finally we cannot reduce one perception (of the color red or the appearance of a deceased person) to another (neurophysiological) perception because both are only perceptions. So physically and neurophysiologically neither the color red nor the deceased person exist; colors, forms, smells, joy, love and pain are unknown in these disciplines, like the NDE they (seem to) exist only in our brain. If we would know all neurophysiological processes of the perception of the rising sun, nowhere would a light emerge. We would only remain in the description of material particles and fields of energy (22a; 22n; 43; 45; 50; 77; 85; 98).

Neurophysiology of the NDE

In so far as neither the physiological base of hallucinations nor the complex states of consciousness like schizophrenia, depression and fear (not to mention love or dreams) are really known after years of research (22a; 77), our knowledge of the neurophysiology of NDEs is very small, particularly because NDEs have only been discussed and investigated for a short time.

What we know is the following: *certainly the NDE is based on a functioning brain*, working in an Altered State of Consciousness (ASC) during the NDE. Especially the psychical (PSI or ESP) capacities are increased in this state of mind. Indeed an isoelectric EEG does not exclude discharges of deeper brain structures (13; 99). Actually many NDEs are experienced by persons only experiencing imminent death, i.e., not clinical death, and therefore without damage to brain functions (21a; 21m). Furthermore, some elements — especially the PSI components — of the NDE are more or less common for human beings who are not at all near death; some can be caused by hallucinogens (LSD, ketamine) or electrical stimulation of the brain (3; 17; 55; 87; 100; 101; 102; 140).

Neither hypoxia nor hypercapnia are necessary to cause an NDE. However both are often present (in a combination) and the latter can cause some NDE-

elements artificially. Actually NDEs can be found with normal, increased or decreased $p\text{CO}_2$ and $p\text{O}_2$ (3; 15; 17; 18; 21a; 21m; 22a; 22f; 25; 43; 57, etc.).

We do not know NDE-specific transmitter-constellations. There are only two important assumptions. First: *Endorphins/enkephalins* could play a role; but the evidence is contradictory. These substances on the one hand do not have an hallucinogenic effect (13; 15; 22a; 22n; 59; 91; 103; 118; 146). On the other hand they participate in many important experiences of man so that their activation during the NDE is not exceptional (22a; 22n; 87; 91; 103). Assumptions concerning the participation of *serotonin* are safer. LSD and ketamine (possibly also hypercapnia), for example, inhibit neurons in the midbrain which contain serotonin; this inhibition again activates the temporolimbic system whose epileptogen discharges could be the common final pathway of all neurophysiological mechanisms (22a; 22f; 22n; 24; 101; 102; 104).

Actually the temporolimbic region contains numerous endorphin/enkephalin receptors (22a; 22n). Furthermore, the long-term memory may be located here (105). Then the electrical stimulation of the temporal lobe could evoke fragments of a life review, *déjà-vu* phenomena and also an OBE (17; 22a; 22f; 43; 87; 100; 106; 148). In a small case study, OBEs, *déjà-vu* phenomena and other psychical (PSI or ESP) elements of NDEs were associated with possible temporal lobe symptoms (PTLS). Quite often, patients with these symptoms hear sounds which sometimes resemble the initial sounds of NDEs. Even in a religious conversion, feelings of blessedness and all-oneness are described in connection with temporal lobe symptomatology (15; 22a; 26; 43; 45; 85; 98; 100; 106; 107; 108). NDEers *in* and *after* the NDE show a significant increase of psychical (PSI or ESP) capacities which are possibly located in the temporolimbic system (see above) (22a; 22b). Finally antiepileptic medication like sedatives and hypnotics often interfere with the genesis of NDEs that can be explained by their influence on the limbic system (15; 22c; 220; 57; 104; 109).

However, this interference does not always take place. NDEs have occurred under the influence of these medications (22h; 29; 43, etc.). We should not forget that all meaningful human behavior is connected with the temporolimbic region. Its activation during the NDE is nothing special (22a). Finally, temporal lobe epilepsies usually do not have any similarity with NDEs; their symptoms, on the contrary, are emotionally negative, idiosyncratic, and uncontrollably automatic. Furthermore, the NDE does not show all the sensorial, motorial, autonomic and (gustatory, olfactorial, haptic and thermic) hallucinative symptoms of the temporal lobe epilepsy. The visual hallucinations of this disease are visual disturbances and not intact images as in NDE perceptions. An isoelectric EEG is inconceivable with a temporal lobe epilepsy but has been observed during some NDEs (13; 15; 17; 18; 22a; 50; 100; 108; 110, etc.). *So NDEs are not temporal lobe epilepsies; some indices however point at a special participation of the temporolimbic system.*

By no means can the NDE be psychopathologized on the grounds of the above mentioned neurophysiological assumptions. While some critics main-

tain that the NDE is a dysfunction of the brain, this would entail a dysfunctional, confused/incoherent and individually different experience which has destabilizing, disintegrating and psychopathologizing effects for the experiencer. But the NDE is just the opposite: it constitutes a completely unexpected peak capacity of the human brain and has psychohygienic/psychotherapeutic effects which exceed those of many psychotherapies.

In the light of their complexity, their relative uniform structure and their enormous efficiency it can be postulated that the NDE neurophysiologically consists of a controlled, selective activation of certain (though mainly unknown) biologically founded hierarchical neuronal structures (22a). However the fact is that quite different causes (i.e., acute bronchial asthma, postpartal embolism, intracerebral bleeding, operation, birth, coma or pure psychological expectation of imminent death) with different neurophysiological correlates always produce very similar NDEs. This indicates the participation of a determined brain-structure otherwise we would expect an individually different unstructured organic psychosyndrome.

Furthermore, the fact that hallucinogens can produce NDE-like experiences under certain psychic and therefore neurophysiological conditions (setting) (3; 21c; 102; 140; 142) confirms the existence of a specific neuro-biological involvement in the NDE. The psychiatrist Stanislav Grof experimented with LSD-induced NDE-like experiences on incurable cancer patients. The patients, like the normal NDEer, lost their fear of death, became more positive in their outlook, came out of depression, and experienced a release of pain (3). That is the reason why in many cultures hallucinogens taken during the ritual of initiation are also used to assist entrance into the world of the gods, religious experiences of death and the other world (13; 17, etc.).

Just as synthetic morphine-antagonists proved the existence of endogenous opiates and their neurons and receptors, the effects of LSD and other hallucinogens are a clear indication for the existence of endogenous hallucinogens. Scientists have just discovered, isolated, coded and cloned the gene which produces the receptors for hashish in the human brain (198) — a strong indication for the existence of endogenous hashish, which has been discovered just some weeks ago (162). Also derivatives of tryptophan, the precursors of serotonin, are potent psychedelics (178; 150). The release of these endogenous hallucinogens during an NDE then has to happen within a complex hierarchical, neuronal structure which produces at the moment of death the specific and complex pattern of the NDE.

The fact is that the mystical quality and the effects of the NDE can be compared with the religious-mystical experiences of all cultures of mankind and therefore constitutes the continuously reproduced base of the other world-conceptions of all religions (3; 57; 68; 102; 106; 111; 112; 113; 114; 115; 116; 117; 118; 119; 120; 121; 122; 123; 124; 125; 126; 133; 134; 135, 160; 161, etc.) and the neuro-biologically-based core of all religious experiences on the whole (17; 43; 57; 87).

Moreover, the implicit statement of nearly all religious experiences to represent the reality of another world cannot be falsified by neurophysiological correlates. Even if someone would label all of these religious experiences as a psychopathological, antiquated concept of reality and a definition of hallucinations based on this concept, the universal occurrence and psychohygienic effects of these experiences with whole systems of meaning (i.e. religions) founded upon them would always demonstrate the opposite (17). Dr. V. M. Neppe, Director of the Division of Neuropsychiatry at the University of Washington School of Medicine, sums it up as follows:

... these results... may imply that there is an organic base which allows the experiencing of an endogenous or exogenous reality which others, by virtue of their more conventional pattern of functioning, may not be able to experience... the same common pattern of functioning that predisposed the percipients to gustatory or haptic hallucinations deriving from within the brain may allow the experiencing of a different kind of reality deriving exogenously (i.e., outside the brain) and manifesting as SPE (subjective paranormal experience, my suppl.) (45, p.11 - 12).

On the other hand in the "British Medical Journal" the psychiatrist L. Appleby concedes:

Explanations have included the spiritual, the psychoanalytical, and the purely neurological, all sharing only one attribute: each requires a form of faith. And, though the features of the near death experience are reproduced in drug-induced states, this points to a physiological substrate rather than to their etiology (98, p. 976).

Concluding Remarks

As a human experience (127) the NDEs really demonstrate the maximum capacity of the brain. In most cases we observe an exceptional increase of psychical (PSI or ESP) capacities (50; 55; 62; 130; 131; 136; 137; 138). This sudden and completely unexpected increase of extrasensory and extracorporeal perception just directly before biological death indicates clearly that the brain prepares the dying human being for another life, a life beyond the body and consequently one with extrasensory perception. That is the neuro-biologically founded interpretation of the NDE, confirmed by the brain of all NDEers.

Therefore, all other (reductionistic) interpretations, products of the normal waking consciousness as only one state of mind, might be more or less rational illusions which have to be left behind when death is coming. At this point an altered state of consciousness and understanding begins.

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