



The Development of a Quantum-based Ontology for the Description of the Reality Experienced in NDEs by Using Computerized NLP Analytics

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Abstract

According to the survival hypothesis, a person's personality and consciousness survive the death of the physical body. Ontology is a well-established theoretical branch of philosophy concerned with representations of reality. This research proposes the use of computer natural language processing (NLP), databases, structured query language and near-death experiences (NDEs) narratives to develop a quantum ontology based on the quantum hologram theory of physics and consciousness. This research proposes the use of a quantum ontology to represent the incomprehensible aspects of near-death experiences. The research demonstrates how to validate ontology constructs within a quantum ontology, demonstrating the methodology's potential for the development of a consciousness model based on the quantum paradigm.

Key Words: Near Death Studies, Ontological Models for Consciousness, Quantum Ontology, Computerized Natural Language Processing, Consciousness, Quantum Paradigms for Consciousness, Analytics for Consciousness Research.

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Introduction

Near-death experiences (NDEs) are extremely brief accounts of people who have been clinically dead for an extended period of time and then spontaneously resurrected or revived with the memory of what they experienced during that time period. According to Greyson (2010), numerous individuals who have had NDEs have described vivid mental clarity, exceptional sensory imagery, a vivid memory of the experience, and an experience that is more real than their daily lives.

Hernandez et al. (2018) have proposed an ontology to represent consciousness in non-ordinary states of consciousness including NDEs and other non-human intelligence contact modalities. Hernandez et al. (2018) hypothesize that the quantum hologram theory of physics and consciousness (QHTC) provides a rudimentary

explanation of this consciousness ontology. According to Hernandez et al. (2018), the different types of non-human intelligence contacts including NDEs are interrelated (Mitchell 1999). Many NDE experiences have reported contacts with forms of non-human intelligence that are perceived as religious figures.

Many people experience NDEs and there seems to be a consistency across NDE experiences for their main characteristics, these fit the ontology proposed by Hernandez et al. (2018). The objective of this research is the development of a research methodology as the main framework for NDE and consciousness research.

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This research focuses on the validation of a select number of ontology constructs within a quantum ontology based on the quantum hologram theory of physics and consciousness proposed by Hernandez et. al (2018) to show the potential of this methodology in NDE and consciousness research. There is a need for the development of an ontology that will assist NDE researchers in mapping the various experiences into an ontology that will assist researchers in establishing the representation of the reality perceived during NDE experiences.

Certain aspects of the NDE experiences appear to be connected to the individual's belief system, which may include religious beliefs (Badham 1997). For instance, a Christian may perceive Jesus or God in white light, whereas an atheist may perceive a non-human intelligent being, a Muslim may perceive Mohammad and a Buddhist may perceive Buddha. At some point, deceased loved ones are frequently present as well. Additionally, it appears that a person's beliefs contribute to why some individuals have a negative NDE, for example, some have claimed to go to hell, but this seems to be related to a state of mind more than a physical place.

This ontology would only help us to understand better NDEs experiences, but it could help us to better understand consciousness. The quantum consciousness model can be validated and extended with the development of this ontology, ontological constructs are representations of emotions, thoughts, and feelings during the NDE experiences that can be used to represent aspects of consciousness that cannot be interpreted otherwise.

Ontology

Ontology is a branch of metaphysics in philosophy concerned with what exists, including the possible relationships between objects, their categorization, structure, properties, similarities, states, and changes. Ontology is a well-established theoretical branch of philosophy that studies how reality is represented. Throughout history, numerous ontologies have emerged. Ontologism, according to Mylopoulos (1998), is classified into four types: static, dynamic, intentional, and social. Each of these categories is devoted to a specific concept encountered in everyday life. Static ontologies are concerned with the existence and properties of things. Dynamic ontologies extend static ontologies by focusing on concepts such as events and processes, or on how concepts change over time in the real world. While intentional ontologies seek to

explain abstract concepts such as goals and objectives, social ontologies place a premium on concepts such as values and beliefs.

The concept of ontology originated from ancient Greece to designate the study of existence, the categorization, and the relationship of objects or things (Grimm et al., 2011). It has since evolved into the knowledge representation models of a domain (Grimm et al., 2011). An ontology can be described as a simplified, specific, and abstract view of a reality of a particular subject area (Grimm et al., 2011; Silva & Rafael, 2017). This representation can be of concepts, objects, and other components of interest in a specified subject area and their relationship with one another, expressed formally. Ontologies contribute to construct a shared understanding of a subject domain (Grimm et al., 2011; Gruber, 1993, 1995), and the literature informs us of some of the important aspects of ontologies (Grimm et al., 2011; Silva & Rafael, 2017). The ontology must provide a knowledge representation language on the basis of based on formal semantics and logic to ensure that the specifications of domain knowledge are interpreted semantically and logically correct. Ontologies are captured as a general abstract conceptual model, identifying the concepts and their relationships in a particular context. It specifies the knowledge of a particular subject domain area.

Ontologies can be categorized into domain, mid-level, and upper ontologies on the basis of their abstraction levels (Obrst, 2010). The highest level includes the upper or universal ontologies, which are domain-independent and provide the basis for more general knowledge representation. Mid-level ontologies are less abstract while still extending to multiple domain ontologies but still providing specific representations of theoretical concepts contained in upper ontologies. They are in the middle, between the very general upper ontology and the very specific domain ontology. As such, the distinction between mid-level and upper ontologies is epistemological. At the other end, a domain ontology contains specific concepts for a defined and limited domain, and it will present how the divergent concepts that define a domain are related to one another.

As indicated by (Keet, 2020), there are several specific approaches for ontology development. Notwithstanding, after reviewing the available documentation for these approaches, it remained difficult to identify a specific set of instructions that could be followed to proceed with the design phase. The level of details that could be found made it



difficult to implement them at the time the study was ready to proceed.

The ADL ontology is an illustration of an ontology used to describe reality (Min et al., 2017). For instance, using an ontology-guided machine learning method, the ADL ontology can be used to predict cancer patients' performance on Activities of Daily Living. However, in recent years, interest in and applicability of ontologies has expanded far beyond metaphysics. Numerous attempts have been made in the case of NDEs to establish an ontology capable of describing the reality experienced by NDE individuals. Rominger (2010) attempted to describe an ontology for NDE experiences through the use of art; he even proposed using art as a methodology for NDE ontology research.

Unintelligibility Approach and Quantum Ontology

Philosophers correctly identified the central, fundamental impediments to legitimate rational inquiry into life after death. This section discusses a novel new rational method proposed by Moody (2020) and Valverde & Swanson (2020), which builds on David Hume's and more recent analytic philosophers' arguments.

Moody (2020) encountered cases which led him to accept that consciousness does apparently transcend bodily death. He stated that his position was taken after a series of cases in which physicians reported that they empathically participated in their critically ill patients' NDEs. In Moody (2020) that logical principles related to unintelligibility enables us to reason cogently about life after death.

Moody (2020) suggests that the universe may be unintelligible. If we imagine the universe continuing indefinitely in space, this also makes no sense. In either case, it results in illegibility. According to Moody (2020), the primary impediment to rational investigation of life after death can be overcome through an unintelligible logic. Linguists classify languages according to their degree of intelligibility. The continuum spans highly literal language, less understandable figurative language, and meaningless and unintelligible language. Additionally, unintelligible language can induce profound alternate states of consciousness, including what appear to be transcendent ecstasies. Moody (2020) taught logic and way of thinking logically about unintelligible language and ideas for fifty years. In that time, he learned that writing original examples of difference patterns of

unintelligible language helped students integrate this knowledge. Moody (2020) believes that unintelligibility can be taught by exercise to actually reformat the mind.

Physicists complain that a third logic—neither true nor false—is required to adequately describe the bizarre results of quantum theory. Quantum theory is unintelligible and has been used to explain NDE life reviews. Due to the volume of instantaneous and empathic information recalled during near-death life reviews, near-death life reviews pose a significant challenge to current memory research. For the first time, advances in quantum physics and consciousness research support a fully realisable quantum biomechanical basis for near-death life reviews (Beck & Colli, 2003). The quantum consciousness paradigm can be used to describe the incomprehensible nature of NDE experiences, particularly their sense of timelessness and oneness with the universe. NDE experiences exemplify the recognition of the interconnectedness of everything, with the quantum principle of 'entanglement' implying that the artificial distinction between 'objectivity' and 'subjectivity' is a sham. Rather than that, there is a meaningful connection between conscious experiences in the inner and outer worlds, with neither existing independently of the other (Walton 2017). Tyler (2015), for instance, proposes a set of constructs for describing NDE stories based on a quantum ontology. These constructs include those for unity, complex interconnectivity, and extinguish ability. Quantum consciousness paradigms can be used to explain consciousness (Valverde 2018) and provide the incomprehensible aspect required for describing NDE experiences and mapping them to a unified model of quantum consciousness.

Several research attempts have been conducted in the past to link NDE experiences with the quantum consciousness paradigm. Haridas (2017), hypothesizes the quantum origin of the soul as the source of energy for human consciousness that is revealed in NDE experiences.

Gaiseanu (2017) theorizes that information is the fundamental component of the universe and that this is of binary nature (matter/antimatter). This information is embedded in the quantum field. He suggests that the mind is of informational nature and that the physical body is also information that is created on a temporal basis to associate/connect into to the matter/antimatter binary system of the universe. He states that NDEs demonstrate the information disembodiment from nonliving matter



(brain), time retrovision to infancy, peace, detachment, and absorbing tube.

Pereira & Reddy (2017) explains that the soul has been hypothesised to refer to an indefinite, unstructured, massless energy composed of electromagnetic radiations that is contained within a living cell's cytoskeletal network. The soul is a coherent, imperceptible, uncontainable, and recyclable support pathway that utilises energy to propagate consciousness within the cell while also performing its functions. Pereira & Reddy (2017) use the quantum consciousness paradigm to provide an explanation for non-local consciousness or disembodiment observed during near-death experiences. Pereira & Reddy (2017) hypothesises the presence of two distinct forms of consciousness: bodily consciousness, which manages functions exclusively at the cellular level, and functional consciousness, which is embodied but can disembodie and perform non-locally; the two distinct forms of consciousness represent the overall state of consciousness. Pereira & Reddy (2017) explain that the non-locality of subjective experiences observed in near-death situations can be attributed to quantum physics in particular quantum entanglement between the two forms of consciousness. Pereira & Reddy (2017) support the QHTC theory by explaining that NDEs demonstrate the capability of holographically storing information within a void or vacuum with the ability to create memories independent of the brain and body. This is also supported by Peinkhofer, Dreier & Kondziella (2019) that suggest that new models to explain NDEs extend previous neural network theories and include aspects of evolutionary and quantum theories. Lake (2017) explains that non-locality of consciousness is critical to explain the manifestation of the body-brain-environment system.

Oneness Theory of the Mind

Are there many minds? Is there a single universal mind with which connect all individual minds? Perhaps we should agree with many other great thinkers at this point and opt for the idea that there is only one universal mind with which connect all individual minds. As an analogy, it would be similar to what happens to the rays of the sun are seen from different windows of the same building. Each person can look from one of them, but really all observers are seeing the same light from the sun. In our case, it would be a single universal mind to which we look through different windows, our own individual minds.

Ordinarily we live in the belief be far apart from each other, but the truth is that we are united by many things over which we suspected, including the laws and vibratory field. Although the vacuum created to be separate unites us, this gap that we have discovered so full of vibration field. Therefore, from this postulate it exists a single universal mind, which lie in the vacuum itself, in the vibrational realm and the realm beyond the vibrating, the essential field. There is a universal mind, and we showed ourselves to it.

The universe can interpret as a matter-mind continuum. There is a universal mind which everything and everyone is connected, a single universal mind with which connect all our individual minds (Bruza & Ramm 2019). Erwin Schrödinger (1887-1961), one of the fathers of quantum physics, Nobel Prize in Physics for his wave theory in his book "Mind and Matter" where concludes Erwin Schrödinger (1959) in one of its chapters:

"What we build in our minds cannot have a dictatorial power over our minds, cannot question it or destroy it. Some of you say, I'm sure, that this is mysticism. Thus, while recognizing that the theories of physics are always relative terms-for basics- depend on certain assumptions, we can say, or so I believe, that current theories of physics strongly suggest the indestructibility of Mind versus time."

David Bohm (1990) also holds, for whom matter, and mind derive from the same multidimensional reality. In a given time, just when we get aware of something now, this could correspond to the order explained, while implicate order is beyond this phenomenon and connects with an order within the vibrational, within the phenomenon of the field. David Bohm is the author of the concept of holomovement, according to which postulate the universe is movement in an interconnected, holistic and unitary process, in which everything is connected to everything through the implicate order and explained, and through a holomovement is the unity of the whole cosmos, the whole universe.

Therefore this oneness of mind is what emerges from matter-mind continuum have argued, and is the basis of theories of, among others, of Erwin Schrödinger and David Bohm. Similar views also agree Eastern and Western mystics, they feel attached to the One, God, as the center of everything. We can say that we are in the center of the cosmos and any point on Earth could be zero kilometer, because the earth is roughly a sphere, and at any



point we, random, put our finger and we could say that geographically is the center the earth. In the same way we could say that any of us is the center of the cosmos, because we are connected to the cosmos, the center of this unit through consciousness. In Ptolemaic times Earth was considered the center of the universe. Ptolemy said so, and also that the sun, moon and stars revolved around it. Later Galileo, Kepler, Copernicus and Newton showed that the earth is a planet revolving around a star called sun, which is not the greatest, and that is far from the center of the universe. With these concepts in which the matter is a matter-mind continuum, that the universe is a matter-mind continuum and that we connect with the universal mind and that everything is a holistic unit. As David Bohm says, the just as we who are here right now, we could say that we are in the center of the earth's surface we could also say that we are in the center of the cosmos, attached to the center of the cosmos through this vision of consciousness, consciousness through which we see things through which we see ourselves.

Bohm's states "I see myself, I see all that I have around me through this consciousness, but this consciousness has deep roots in the center of the universe, some roots in the vibrational and vibrational beyond, in the field where the vibrational essential is generated". Therefore, we, through this awareness, we are connected to the center of the cosmos, the center of the unit, and thus become, somehow, like Ptolemy said to be the center of the cosmos. As it can be seen, physics and psychology are speaking of full consciousness and this new vision of consciousness shows us very clearly the transpersonal and perennial projection of the psyche.

Carl Jung (1936) established that all humans share a common unconscious. This implies that everyone on the planet shares the same mind. This is demonstrated by accounts of shared mythology and symbols throughout the world. This collectivity is a global manifestation of the unconscious mind of the human body, in which billions of cells share a common signal. Human consciousness is a field of electromagnetic energy, which may account for a variety of paranormal phenomena such as telepathy and clairvoyance.

The universe, nature and creation become conscious of itself (self-conscious) through self-reflexive brain and generating state. The union of different brains in one system creates a supra-consciousness or superior knowledge in network system. Individuals

who are not only "individual" but also "social" consciousness would be those precursors are called to produce real social change.

Consciousness is defined as sensory perception of sights, sounds and smells that are close to us. But our consciousness includes many more perceptions. Any person through introspection be able to perceive first lot of bodily sensations such as temperature, touch, different pressure points on your body, release tension, the rhythm of your breathing or the beating of his own heart, saliva, the texture of his clothes, itching, pain, etc. Besides these different physical perceptions, through an even deeper concentration will become aware of your mental and emotional state, you perceive the constant variety of thoughts and different emotional states they generate from the joy caused by a memory spontaneous happy moments childhood to sudden sadness at the thought of a tragic event. It will become aware of vague emotions like irritation, excitement or boredom. The person can achieve an even more abstract perception being aware of time, mortality itself or the continuity of its consciousness and individuality of your conscious self. This personal perception of inner experience itself is particularly evident in the moments of greatest emotional intensity however is always present to some extent in current and even bored with our lives now.

Unity is a fundamental ontological construct of the NDE ontology. The unity of mind that can be supported with NDE ontological research as this paper demonstrates.

Ontology for Non-ordinary States of Consciousness Realities

Hernandez et al. (2018) proposed an ontology for non-ordinary states of consciousness, arguing that one of the keys to comprehending "Consciousness" is comprehending contact with Non-Human Intelligence (NHI) via what they refer to as "Contact Modalities." They define Non-Human Intelligence's various modes of contact as:

- NDE contact
- Unidentified Aerial Phenomenon (UAP) contact
- Out of Body Experience (OBE) contact
- Shamanic Hallucinogenic contact
- Channeling of Non-Human Intelligence
- Spirit/Ghost communications
- Remote Viewing contact

Hernandez et al. (2018) hypothesise that all of these



"contact modalities" are connected via what is commonly referred to as "consciousness," and that advanced physics, specifically the QHTC theory can begin to provide a foundational understanding of the relationships between diverse paranormal "contact modalities" (Mitchell 1999). Certain features of these contact modalities appear to have quantum-like holographic properties that correspond with some of the basic principles from quantum theory. These include: 1) Non-locality, coherence, and instantaneous information exchange in a timeless and placeless dimension; and 2) Experiments which demonstrate quantum entanglement such as "telepathy" that demonstrate that this phenomenon is not affected by distance (outside space) (Grinberg-Zylberbaum Delaflorc & Arellano, 1993) and "precognition" that can provide information of future events (outside time) (Paul 2019).

Numerous authors have proposed that consciousness be represented using quantum ontology. Quantum ontology has been proposed as a way to represent not only objective worlds, but also subjective ones. The Syntergic Theory of Grinberg-Zylberbaum (1997) explains that human beings interact with an informational matrix or informational field that encompasses and involves everything and that contains all the information in each of its portions. It is a holographic matrix, there are no objects separated from each other, but rather an extraordinary informational field of enormous complexity. According to Grinberg-Zylberbaum (1997), our brain interacts with that informational field that in quantum cognition is classified as a quantum field, current physicists speak of a zero-point energy field and Grinberg's Syntergic Theory (1997) calls it a syntergic field. According to this theory, the brain interacts with this field and from this interaction, as a final result of brain processing, perceptual reality appears, which we perceive as we know it, that is, objects, shapes, colors and textures.

Grinberg-Zylberbaum (1997) expresses that: "the term experience is an inclusive whole, even of consciousness". Everything we feel, see, hear; all our emotions, bodily sensations, thoughts, images, are experiences.". Grinberg-Zylberbaum (1997) no longer refers to technique, not memory or learning, not to psychological maturation or seniority. Consciousness is the experience of awareness. The neologism of synergy arises from the words synthesis and energy.

According to Grinberg-Zylberbaum (1997), quantum learning is the consequence of the interrelation of the individual with the environment and of their energy fields with each other, determined by qualitative-quantitative energy changes, generated in the central nervous system; giving rise to associations between the new chaotizing incentives and the existing fields, unleashing chaos in the middle of the field formed by the previous concepts, to generate a new conceptual field, through an entropic process.

Grinberg-Zylberbaum (1997) states that our personal identity has to do with the level of consciousness from which we operate. There is a correspondence between the levels of consciousness and ways of knowing and since reality is a way of knowing, then reality is a level of consciousness. Grinberg-Zylberbaum (1997) states that reality is not ideal, it is not material, it is not spiritual, it is not concrete, it is not mechanistic, reality is a level of consciousness and only that level is real. Grinberg-Zylberbaum (1997) continues to explain that although reality is inexpressible, it is experienceable. Grinberg-Zylberbaum (1997) explains that reality and perception are the same.

Ruyant (2010) argues that quantum ontology can be used to model consciousness and thus account for the existence of a continuum between conscious and unconscious states. Quantum ontology has been applied to the study of consciousness in the field of psychology. Valadas Ponte and Schäfer (2013) make ontological comparisons between quantum physics and Carl Gustav Jung's psychology. They argue that the empirical world is an outgrowth of a cosmic realm of potentiality, the manifestations of which manifest in the external world as physical structures and in our minds as archetypal concepts.

Quantum ontology has already been applied to research on NDEs. Tyler (2015), for example, describes NDE experiences through the lens of a quantum ontology that incorporates concepts such as unity, complex interconnectivity, and extinguish ability. Due to the volume of instantaneous and empathic information recall during NDEs, reviews pose a challenge to current memory research in cases of life review during NDEs.

Table 1 shows the constructs for the quantum ontology for contact experiences with non-human intelligent beings (NHI) as proposed by Hernandez et al. (2018). In this paper, a research study would be conducted to validate some of these constructs.



Table 1. Quantum Ontology for the Types of Contact Experiences with Non-Human Intelligent (NHI) Beings in non-ordinary States of Consciousness (Hernandez et al. 2018).

Construct Element	Description
Physical	NHI contact experience occurring while in your physical body
Consciousness separated	Consciousness is separated from your body at the time of the NHI contact experience
Thoughts sped up	While in this non-ordinary state of consciousness, your thoughts are sped up
More vivid reality	While in this non-ordinary state of consciousness, your senses are more vivid than usual.
Separation from body	While in these non-ordinary states, you feel separated from your body. For example, you may lose awareness of your body and clearly feel that you exist outside of your body.
Relief or Calmness	While in these non-ordinary states of consciousness, you have a feeling of peace or pleasantness.
Unusual Brightness	While in these non-ordinary states of consciousness, you see or feel as if you are surrounded by a brilliant light.
Encounter with mystical being or presence	While in these non-ordinary states of consciousness, you seem to encounter a mystical being or presence, or hear an unidentifiable voice.
Contact with deceased or religious spirits	While in these non-ordinary states of consciousness, you see deceased or religious spirits.
Past Events	While in these non-ordinary states of consciousness, your past comes back to you.
Enter some other, unearthly world	While in these non-ordinary states of consciousness, you seem to enter some other, unearthly world.
Time seems to speed up or slow down	While in these non-ordinary states of consciousness, time seems to speed up or slow down.
Sense of harmony or unity with the universe	While in these non-ordinary states of consciousness, you feel a sense of harmony or unity with the universe.
Sense of understanding everything	While in these non-ordinary states of consciousness, you suddenly seem to understand everything.
Multi-dimensional experience	While in these non-ordinary states of consciousness, multi-dimensional experience seems real to you.
Timelessness	While in these non-ordinary states of consciousness, you perceive that time does not exist.

Research Methodology

Based on the research of Dr. Jeffrey Long's Near-death Experience Research Foundation (<https://www.nderf.org/>), an NDE database was created. This database contains 4267 records of

near-death experiences (NDEs) gathered for research purposes. Dr. Jeffrey Long is an author and researcher specialising in near-death experiences in the United States (NDEs). Long, a physician by training, practises radiation oncology at a Louisiana hospital. Long is the author of *The Afterlife's Evidence* (Long & Perry 2010). He founded the Near-death Experience Research Foundation to document and research near-death experiences. The research employs a multi-step methodology, as illustrated in Figure 1, based on the Culmone et al. (2014) framework, which collects data via a MySQL database and then maps it to potential quantum ontology constructs. Hernandez et al. (2018)'s quantum matrix-type reality would serve as a starting point for this research. The mapping will be accomplished using SQL (Structure Query Language) statements that retrieve data that corresponds to the meaning of the ontological construct under examination. Human recognition is required to confirm that the data retrieved accurately represents the ontological construct under examination.

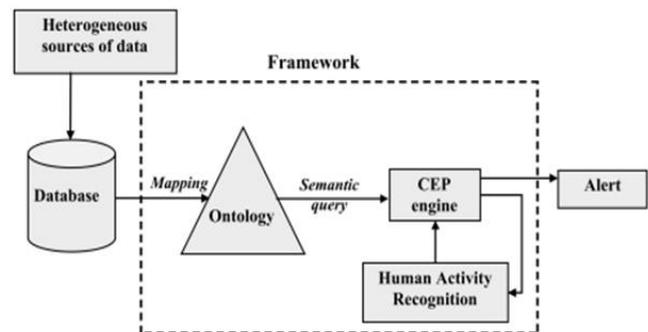


Figure 1. Research framework Source: Culmone et al., 2004

Das et al. (2004) introduced a set of SQL operators that can perform ontology-based semantic matching and the implementation of ontology related functionality on Oracle RDBMS. They also use some examples to illustrate the use of this matching operations. For example, they apply it on Homeland Security to detect terrorism. The instance they give is to query out the two people who live together. One rents a truck and another one buys fertilizer. The query and the table are in the following figure. The result shows the suspicious activities involving a combination of different actions.



Person_name	Address	Activity	Object
John Buck	Addr1	Rent	Ford F-150
Jane Doe	Addr1	Buy	Ammonium Nitrate
...

```

SELECT *
FROM ACTIVITY x, ACTIVITY y
WHERE
  x.Activity = 'Rent' AND
  y.Activity = 'Buy' AND
  ONT_RELATED(x.object, 'IS A', 'Truck',
              'vehicle_ontology') = 1 AND
  ONT_RELATED(y.object, 'IS A', 'Fertilizer',
              'chemical_ontology')=1 AND
  x.Address = y.Address;
    
```

Figure 2. SQL for ontology construction, Source: Das et al., 2004

Andreasen et al. (2001) introduced similarity upon an ontology. First they introduced a shortest-path approach to similarity based on the key ordering relation in the ontology. Secondly they introduced an alternative approach for devising a similarity measure based on the notion of shared nodes corresponding to lattice join in the lattice of the arguments of the similarity function.

Kaladzavi et al. (2015) develop SPAROL queries in the Protégé environment to extract data. Using some predicates as owl: disjoint With, owl: equivalent Class, owl: has Value, respectively, helped us return (if any) disjoint concepts, equal concepts, and lastly accurate property values. The following query is an example that can return data of any given community, organized activities, resources used and roles played by actors.

```

PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX ontoSOC: <http://maroua-univ/ns/ontosoc#>
SELECT ?Communities ?Activity ?task ?person ?tools
WHERE {?task ontoSOC:isUsedBy ?tools
      OPTIONAL { ?Activity ontoSOC:isRealizeBy ?task }
      OPTIONAL { ?task ontoSOC:isPlayedBy ?person }
      OPTIONAL { ?task ontoSOC:isCreatedBy ?Communities }
} ORDER BY ?Communities
    
```

Figure 3. SPAROL Example, source Kaladzavi et al., 2015

To analyse the large volume of records, we used a natural language processing (NLP) approach inspired by Siddiqi and Sharan's work (2015). NLP can be used to solve a variety of problems, including language translation and text analysis (Navlani, 2019). The purpose of this analysis is to connect words with ontology constructs using N-gram word frequency analysis. Frequency analysis is a statistical method for determining the frequency

with which a given word or group of words appears in a text. For instance, the construct sense of unity can be associated with emotions expressed through the words connected, one, calm, and wholeness, among others. Text analysis has already been used for NDE research, Charland-Verville et al. (2020) performed a user-independent statistical text examination of freely expressed NDEs narratives to capture the phenomenology of such a subjective and complex phenomenon. The study included 158 participants with a firsthand retrospective narrative of their self-reported NDE that was analyzed using an automated text-mining method and 30 most frequent words were identified.

By connecting words to constructs, we can measure the level of connection by calculating metrics such as F-measure, Accuracy, Precision and Recall. (Kasteren et al., 2011) These metrics help identify the level of correlation between an ontological construct and the data being analysed.

F-Measure become a popular evaluation metrics for the evaluation of classification problems (Sokolova & Lapalme, 2009). This is used by first determining the precision and recall value of the results of a classification to assess performance (Hand, Christen, & Kirielle, 2021; Tharwat, 2020). Precision is defined as the number of correctly classified positive examples, or true positives (TP), divided by the number of examples erroneously labelled by the system as positive, these are the false positive results (FP). The TP number is an indication of the classification capacity of the queries. The higher the TP number, the better. While a coin toss or random sample could be expected to provide 50%, a F-Measure above 0,5 would indicate a better classification than random. False positives are classification errors. Recall is a measure of the repeatability of the classification process. Recall is calculated by using the number of correctly classified positive examples divided by the number of positive examples in the data. F-Measures provide a measure of the retrieval of positive examples in a classification problem but neglect the correct classification of negative examples (Salguero et al. 2018). This study used the F-Measure, which has the following formula:

$$F - Measure = 2 \times \frac{(TN \times TP)}{(TN + TP)}$$

Accuracy is a performance metric, consisting of the ratio of correctly predicted observations to total



observations.

$$Accuracy = \frac{(TN + TP)}{(TN + TP + FP + FN)}$$

The collected data would then be used to identify and validate a set of constructs, which would then be presented as an ontological grammar that could be used to map any NDE. The primary goal would be to gain a better understanding of the afterlife's reality.

Results

The research validates the following ontological constructs from quantum ontology proposed by Hernandez et. al (2018): the encounter with a mystical being or presence, the sense of

understanding everything and the sense of harmony or unity with the universe.

The first construct validated is the sense of harmony or unity with the universe. To validate this construct, those who had experiences NDEs were asked, "What emotions did you feel?," with the aim of capturing all the emotions relating to a sense of harmony and unity. The first step was to list a set of keywords of emotions that relate to unity to construct an SQL statement that could help calculate different metrics to understand if this construct is supported by the answers to this question. The list of keywords that represent emotions that could be perceived as a sense of harmony or unity and the frequency of their occurrence after a computer language processing analysis of the 4079 answers is depicted in figure 4.

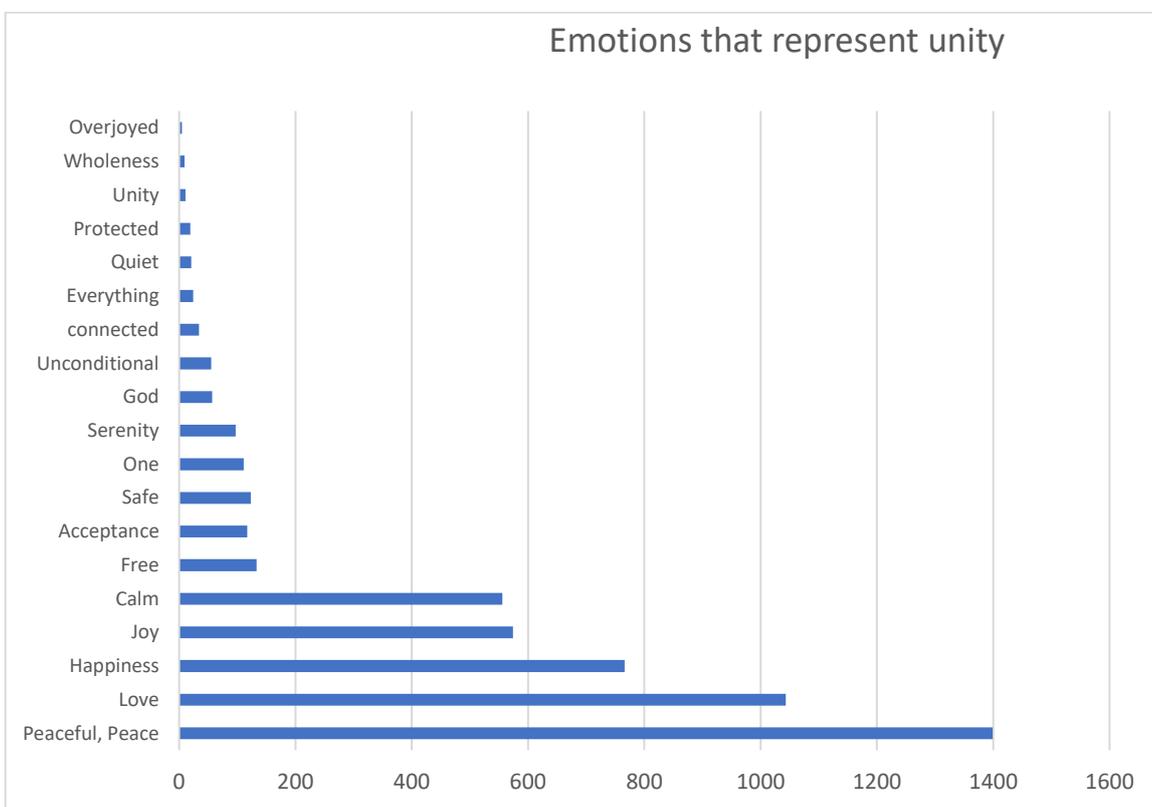


Figure 4. Emotions that represent unity and frequency that was found in the responses

An SQL statement was generated based on the keywords depicted in figure 2 in order to retrieve all the responses that contain these keywords. This was done in order to determine how many of those with NDEs felt a sense of harmony or unity. Several metrics were calculated to evaluate if the responses support the unity ontological construct and are shown in table 2.

Table 2. Metrics for the SQL statement for unity emotions

Accuracy	Precision	Recall	F-measure
71.95%	0.9826	0.9869	0.9848

The 71.95% accuracy represents the percentage of responses that reflected the emotions in the keyword list and that represent the feeling of a sense of harmony or unity. The precision represents the ability of the SQL statement to correctly label positive and negative responses. A precision of



0.9826 is considered very high and demonstrates the ability of the SQL statement to find nearly all the positive answers. Positive answers are those retrieved by the SQL that reflect the sense of harmony or unity construct. An F-measure close to one also reflects the accuracy of the SQL statement in retrieving positive answers.

The second construct validated was the sense of understanding everything, which represents the experience of a knowledge of the universe. In order to validate this concept of the construct, two questions were asked to the NDE experiencers:

1. Did you suddenly seem to understand everything? For this question the possible answers were: Everything about the universe, everything about myself or others, everything but not universe, myself or others, uncertain, no.

The results of the answers to this question are shown in the table below. Out of the 4140 responses, 2995 had positive responses (Everything about the universe, everything about myself or others, everything but not universe, myself or others) or about 72.3%. This represents a high percentage of NDEs that included the feeling of knowing everything either about the universe, themselves or

others, or everything but not the universe, themselves or others. This high percentage of positive responses supports the unity construct for the representation of knowledge of creation.

Table 3. Breakdown of the responses for the questions about the understanding of everything

Everything about the universe	1343
Everything about myself or others	1281
Everything but not universe, myself or others	371
Uncertain	57
No	1090

Those who responded positively to the above question, were then asked “Explain understand everything.” This follow-up question was formulated in order to understand the kinds of knowledge experienced in the perception of understanding of everything. A set of keywords that represent “understanding everything” was found in the answers with the help of data clustering and selected for the construction of an SQL statement that could be used to measure the level of presentation of the understand everything construct captured by this question. 1108 respondents explained the meaning of the “knowledge of everything.” A list of keywords from these responses and the computer language processing frequency analysis of their appearance is presented below in figure 5.

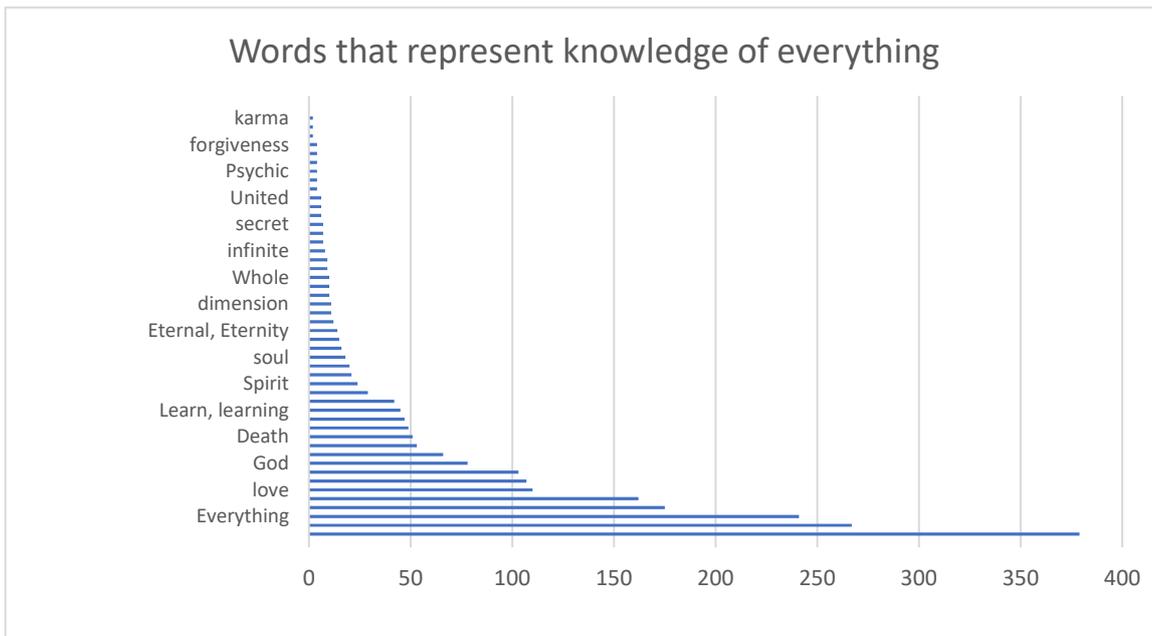


Figure 5. Keywords that can be used to represent the knowledge of everything

An SQL statement was generated and used on the keywords depicted in figure 3 in order to retrieve

those responses that contain words representing the knowledge of everything. The metrics in table 4



were calculated to evaluate if the responses support the knowledge of everything ontological construct.

Table 4. Metrics for the SQL statement for knowledge of everything

Accuracy	Precision	Recall	F-measure
85.92%	0.9422	0.9977	0.969

The accuracy of 85.92% represents the percentage of responses that reflected the keywords in the list and that represent the Sense of understanding everything. The precision, recall and F-measure are close to one, which gives a strong indication that the SQL statement made of the keywords was able to retrieve experiences that support the knowledge of everything represented in the Sense of understanding everything.

The third construct validated was the Encounter with a mystical being or presence that represents the NDE of encountering a mystical being or presence or hearing an unidentifiable voice. To validate this concept of the construct, two questions were formulated to NDE experiencers:

1. Did you seem to encounter a mystical being or presence? For these the possible answers were: Definite being, or voice clearly of mystical or other-worldly origin, Unidentifiable voice and Neither.

The results of the answers for this question in the table below. Out of the 2751 responses, 2995 had

positive responses (Definite being, or voice clearly of mystical or other-worldly origin, Unidentifiable voice) or about 66.2%. This represents a high percentage of NDEs that included the feeling of encountering a mystical being or presence or hearing an unidentifiable voice. The high percentage supports the Encounter with mystical being or presence construct.

Table 5. Breakdown of the responses for the questions about the understanding of everything

Definite being, or voice clearly of mystical or other-worldly origin	1639
Unidentifiable voice	179
Neither	933

As part of the research, for those with positive responses to the question mentioned above, a follow up prompts, “Describe mystical being,” was formulated to understand the perception of this mystical being. A set of keywords that represent mystical beings was found in the answers with the help of computer language processing and selected for the construction of a SQL statement that could be used to measure the level of presentation of this construct captured in this question. 918 respondents described the mystical being with a list of keywords detected by using computer language processing and frequency of appearance, this is described below in figure 6.

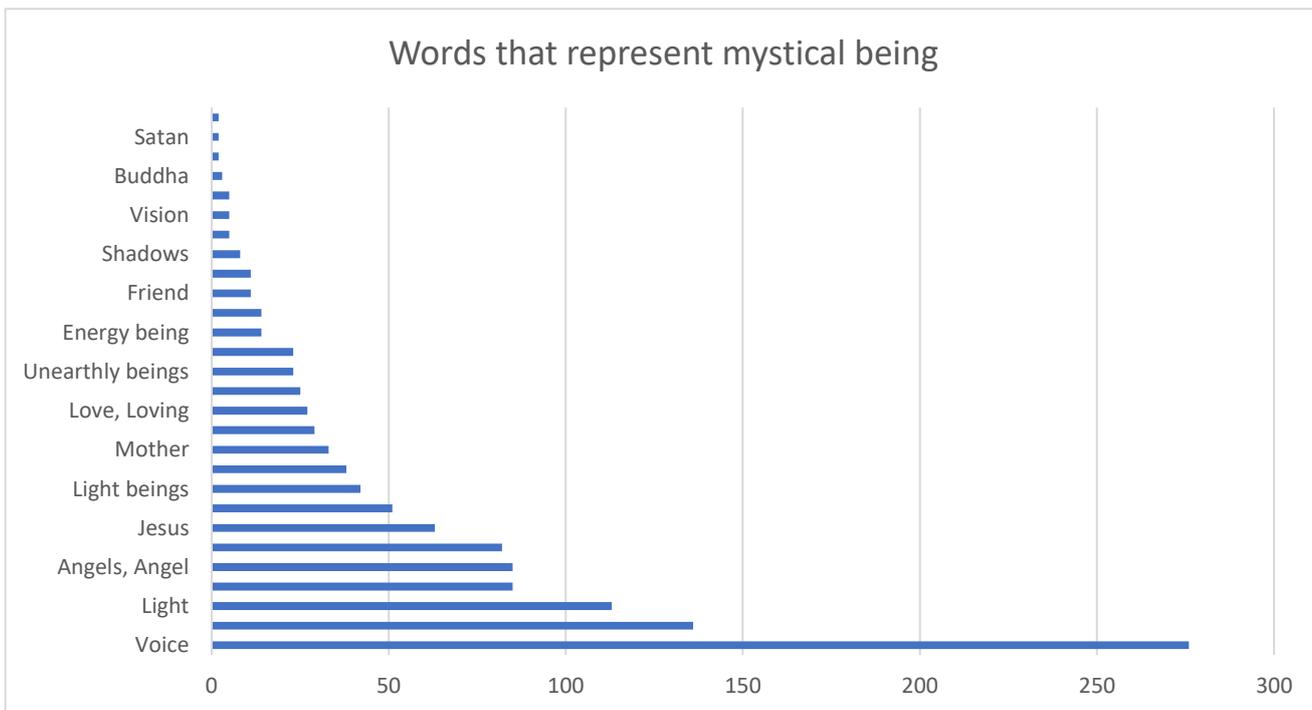


Figure 6. Keywords that can be used to represent the mystical being



An SQL statement was generated and used on the keywords depicted in figure 8 to retrieve those responses that contain these words. The metrics in table 6 were calculated to evaluate if the responses support the Encounter with mystical being or presence ontological construct.

Table 6. Metrics for the SQL statement for Encounter with mystical being or presence construct

Accuracy	Precision	Recall	F-measure
76.57%	0.9829	0.985	0.984

The accuracy of 76.57% represents the percentage of responses that reflected the keywords in the list and that represent the Encounter with mystical being or presence construct. The precision, recall and F-measure are close to one, giving a strong indication that the SQL statement made of the keywords was able to retrieve experiences that support the Encounter with mystical being or presence construct.

Conclusions

The development of an ontology that can be used to describe the entire range of NDEs is challenging, but a quantum ontology has been used in the past to represent the life review of NDEs and shows great potential for the use of this ontology for other types of NDEs (Beck & Colli, 2003). This paper proposes a research methodology for the validation of the following constructs within NDEs: encounters with a mystical being or presence, the sense of understanding everything and sense of harmony or unity. (Valverde 2018; Tyler 2015). A database populated with 4079 descriptions of NDEs compiled by Dr. Long (<https://www.nderf.org/>) was used to support these ontological constructs with the use of SQL statements, computerized natural language processing analysis and metrics that show strong evidence that the unity construct within the quantum ontology proposed by Hernandez et. al (2018) can be used to represent NDEs.

Results of this research can be considered positive to support the proposed ontological constructs given than the metrics presented show a percentage higher than 50% that suggests that results correlate at a higher level than chance. The positive results of this research also suggest the applicability of this method to other, related types of experiences. As noted above, Hernandez et al. (2018) argue that quantum matrix ontology can describe a range of

Non-Human Intelligence contact modalities, including NDEs, Unidentified Aerial Phenomena (UAPs), and Out of Body Experiences (OBEs). OBEs, in particular, appear to share many of the quantum ontology constructs associated with NDEs, including, of course, separation from the body, as well as timelessness, a sense of understanding everything, and calmness, among others. The Out of Body Experience Research Foundation (OBERF, oberf.org) has a sizeable dataset that would be suitable for analysis using the research methodology developed in this paper. A valuable future research project would involve the use of SQL statements and metrics to validate these ontological constructs using the OBERF dataset.

Future research would also explore the possibility to use the synergetic theory to explain consciousness. According to the theory, the human brain is capable of generating a hypercomplex field of interactions as a result of all of its neuronal elements being activated. The "neuronal field" is the name given to this interaction matrix. Unification of neuronal activity is one of the effects of its activation. The neuronal field is hypothesised to cause a distortion in the fundamental space—time structure, and the reality of our perceptions is the perception of this distortion. The theory explains that this interaction matrix is the unity, it appears that the death of the human body increases the neurosynergetic energy of the human consciousness until the point that brings our consciousness to the unity, this can explain the emotions and feelings of unity that is presented in this paper (Grinberg-Zylberbaum 1997). This future research can incorporate the use of this theory to explain how ontological constructs represent those aspects of consciousness that are perceived and that become our reality.

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