

# THE ROLE OF THE LORENTZ TRANSFORMATION IN THE EVOLUTION OF THE INTEGRATION OF MIND-BODY HYPNOTHERAPY WITH MATHEMATICS AND PHYSICS

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## Abstract

The Lorentz Transformation is discussed in the context of the continuing integration of mind- body Hypnotherapy with mathematics and physics. The relationship between the implications of the Lorentz Transformation and quantum entanglement are explored from the perspectives of the implied directive and set theory. An integrative orientation is employed to explore how the Lorentz Transformation can be utilized to enhance safety, trust and depth in the treatment of trauma and addiction. The core focus of attention is designed around two major areas; the first is the expansion of trust in the professional providing the treatment to utilize frame of reference, relativity, the appreciation of time and space, and dimensions; the second is the transformation of consciousness in terms of issues of capacity, abandonment and alienation.

## Introduction

From a western perspective, the roots of efforts to integrate mathematics, physics and psychology can be traced to Poincaré's

four stage creative process (Poincare, 1905, Rossi, 1996). These four stages were; preparation; incubation; verification and integration. These stages represented an implicit trust of the unconscious mind and the resources contained therein, especially those of creativity and intuition, which were later to become cornerstones of Jung's depth psychology. These four stages can be recognized in the thought experiments of Galileo, Newton, and Einstein, which were instrumental in the development of the laws of gravitation and special relativity (Capra, 1975, Greene, 1999, Isaacson, 2006).

The integration of mathematics, physics, and psychology was initiated by the collaboration of Pauli and Jung (Jung, 1952, Miller, 2009, Pauli, 1952). Jung contributed the perspective of depth psychology, which he had discovered and developed. In his work with Pauli, Jung focused on the role of opposites, which corresponded to both Bohr's complementarity principle and Heisenberg's uncertainty principle. In addition, his intuition suggested that synchronicity challenged some of the causality aspects of physics, implying other possibilities for the subsets of connection, and reflected a number of subsets of time that may have corresponded to the quantum principle of superposition and Tibetan Mahayana Buddhism (Cox and Forshaw, 2011, Tulku, 1979). These subsets could be explored and accessed through working with the unconscious and its resources. Pauli maintained that quantum mechanics was incomplete and that it needed psychology to complete itself, as evidenced by the consistent dreams provided by his unconscious whose symbolism consistently involved quantum variables and p(Mroilclers,se2s009).

Erickson's resistance protocol (Erickson, 1964, Gregory, 2011, Gregory and Gregory, 2014) reflected the implicit utilization of a number of quantum principles and variables. These included; quantum entanglement, superposition, momentum, uncertainty, time, space, and position. Erickson's appreciation of resistance as a force with momentum was a core component of the processes, which included the appreciation of the role of quantum variables that transformed resistance into receptivity through the utilization of validation, opposites, uncertainty and the creative focusing of attention. These states of receptivity implied the facilitation of subsets of safety, the possibilities for developing trust with the unconscious and connections with capacity for responding to life challenges.

Mindell (Mindell, 2000) stressed the role of the shamanic perspective and appreciation of 'dreaming' in the integration of psychology and physics, while contrasting the perspectives of classical physics and quantum physics. Mindell appreciated the possibilities mathematics contained, implicitly incorporating aspects of relativity, multi embedded metaphors and indirect associative focusing (Erickson and Rossi, 1979, Lankton and Lankton, 1983) for facilitating the transformation of consciousness (Isaacson, 2006, Mindell, 2000).

Goswamy (1993, 1999, 2015) emphasized the role of creativity and the appreciation of a consciousness of non locality which reflected quantum states of interconnectedness.

Rossi and Rossi (Rossi and Rossi, 2015) identified how the interference patterns in self-reflective dreaming were similar to the interference patterns of the double-slit experiment for electrons. Rossi and Rossi also noted how Bayesian probability and its application to quantum physics was very similar to the concept of expectancy in hypnosis.

Aspects of relativity and quantum concepts and variables have been incorporated in the treatment of trauma and couples through the utilization of;

- interpersonal technique
- transderivational searches
- set theory, yes sets, response sets
- seeding
- pacing
- opposites

(Bandler and Grinder, 1979, Erickson, 1964, Erickson and Rossi, 1979, Gregory, 2011, 2015, Gregory and Gregory, 2014, Grove, 1989, Phillips, 1997, Rossi and Rossi, 2015).

### **Lorentz Transformation**

The Lorentz transformation is named after the Dutch physicist Hendrik Lorentz. It was derived after a series of attempts by Lorentz and others to resolve problems with the symmetries of the Maxwell equations. Utilizing the relativity principle, Poincare corrected

Lorentz's original calculations and later Minkowski developed a geometric model and an equation that described the interaction of the four dimensions the transformation included (Einstein, 1916, Isaacson, 2006, Staley, 2009). The Maxwell equations, which are partial differential equations, describe how magnetic and electric fields are generated and altered by each other. As such they underlie the behavior of electrons, functioning as subsets for the sources of comfort, and potential metaphorical bridges for the treatment of depth and safety issues in the treatment of trauma and addiction. Previously the Galilean transformations had been utilized to address the symmetries of Maxwell's equations, but unfortunately had yielded unsatisfactory results. The transformation explained how the speed of light was independent of an observer's reference frame and was developed prior to Einstein's special relativity principle, but was instrumental in the development of special relativity by Einstein (Isaacson, 2006). Further, the transformation played an integral role in the Dirac equation which integrated special relativity

with quantum mechanics, paving the way for numerous technological advances in electronics processing devices. The measurements of the transformation describe how measurements of space and time by two observers in different reference frames dealing with uniform motion are related. In doing so, this, along with special relativity, proved that time was not absolute, but relative. The relativity of time meant that time would be experienced differently by observers in different reference frames. These different experiences of time are called time dilation. The effects of time dilation become more pronounced as the speed approaches the speed of light, which carries a number of important implications for treatment that will be discussed in the next section. In addition, it showed that space and time were connected, which is consistent with Mahayana Tibetan Buddhist teachings on the connections between time and space (Tulku, 1979). It implicitly provided another subset for the sources and capacity for connection, primary aspects in the treatment of trauma and addiction, especially in regard to the polarity subset of old and new connections, and the resources that facilitate the transformation of such connections. Figure 1 below contains the mathematics of the transformation.

These are the simplest forms. The Lorentz transformation for frames in standard configuration can be shown to be:

$$t' = \gamma \left( t - \frac{vx}{c^2} \right)$$

$$x' = \gamma (x - vt)$$

$$y' = y$$

$$z' = z$$

where:

- $v$  is the relative velocity between frames in the  $x$ -direction,
- $c$  is the speed of light,
- $\gamma = \frac{1}{\sqrt{1 - \beta^2}}$  is the Lorentz factor (Greek lowercase gamma),
- $\beta = \frac{v}{c}$  is the velocity coefficient (Greek lowercase beta), again for the  $x$ -direction.

The main implications of the Lorentz transformation include;

- One's frame of reference(position) is critical to one's experience of time.
- Time and motion are connected.
- We need time.
- Time is a fundamental variable in one's life experience.
- Time and space are connected.
- Time and space are subsets of the sources for connection.
- Time and space are connected to light.

The Lorentz Transformation, when trusted and appreciated by the professional providing the treatment, can be utilized symbolically to *creatively focus and direct attention*. The transformation can be thought of as a vector pointing the consciousness of the professional providing treatment in the direction of facilitating a yes set regarding the different variables affecting the treatment of trauma and addiction.

The Lorentz Transformation can be applied from the following perspectives:

- Frame of reference
- Expansion of trust
- Depth and safety
- Consciousness for containment
- Relativity
- Four dimensions
- Subset of connection
- Appreciation of time, space and light
- Symmetry

Following the template provided by Erickson in the Erickson Resistance Protocol (Erickson, 1964, Gregory, 2011, Gregory and Gregory, 2014), the client's experience relative to the trauma and/or addiction is sufficiently validated in order to facilitate a transformation of the client's resistance into one of receptivity, response attentiveness, or response set (Erickson and Rossi, 1979, Lynn and Sherman, 1990). In the next stage the professional utilizes one of the above eight themes to *focus attention*.

### **Frame of reference**

The Lorentz transformation, Einstein's theory for special relativity and the Dirac equation which integrated special relativity with quantum mechanics are dependent on utilization of the *reference frames* of different observers (Isaacson, 2006, Tyapkin, 1996). The transformation can serve as a mathematical validation for the *value* of reframing, which was one of the cornerstones of Erickson and Rossi's utilization approach, as it supported the expansion of trust within the professional providing the treatment (Erickson and Rossi, 1979, Rosen, 1982, Rossi, 1996, 2002). The intent of reframing was to interrupt chronic, maladaptive patterns of behavior by creatively introducing *novelty* to secure attention and develop rapport. Simultaneously, reframing facilitated patients experiencing symptoms and experiences as opportunities for transformation of victim states, which was consistent with the Taoist principle of yin/yang (Jou, 1985, Yang, 1981) and the Tibetan Buddhist approach to subsets of knowledge (Tulku, 1979).

The core of the Lorentz transformation, the frame of reference, is applied not only to alter the client's frame of reference, but to begin utilizing the *frame of reference* as both a *metaphor* and *container* to activate unconscious healing processes and neurogenesis. The primary focus is around the seeding (Zeig, 1985) of the patient's relationships with time and position. Some examples of questions to be asked include;

What was your experience of time?

Did you ever replay the experience in slow motion?

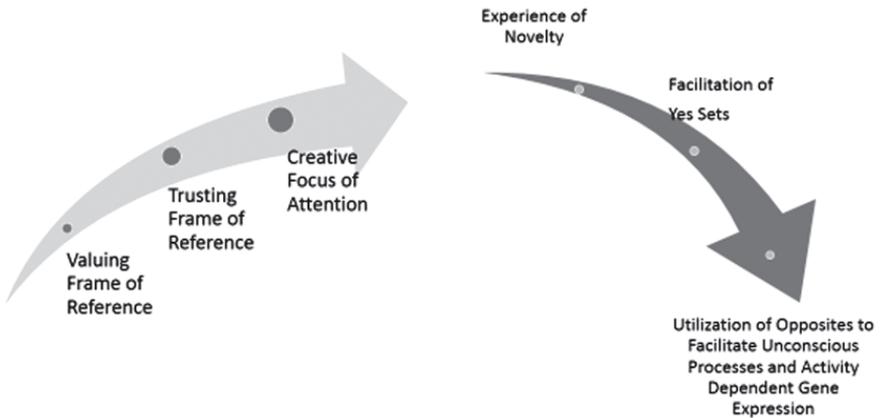
Did you ever replay the experience at an accelerated speed? Did you ever replay the experience backwards?

Have you imagined being in the future and looking back at the experience?

Have you ever observed the experience from above, or below, or any one of a multitude of different angles?

Questions like the ones above, when *delivered slowly* with *trust of their value*, can facilitate novelty in the patient. The experience of novelty in general can interrupt rigid, chronic patterns of processing experience that sustain positions of helplessness, hopelessness and victimhood and replace them with experiences of receptiveness, curiosity and hope which can facilitate unconscious healing processes, activity dependent gene expression and neurogenesis (Erickson and Rossi, 1979, Rossi, 2002, Matthews and Butler, 2011). Most patients are either *fused* with their frame of reference and/or *unaware of the possibilities and implications of frame of reference* (Erickson and Rossi, 1979, 1982). Novelty in terms of one's frame of reference begins the development of a *yes set* (Erickson and Rossi, 1979) for frame of reference, in addition to opening up possibilities for new forms of comfort in relationship to position, space and time, all important factors in the treatment of trauma and addiction. Figure 2 below illustrates the progression of stages in the application of frame of reference.

## Progression of Stages of Application of Frame of Reference



The Lorentz transformation can serve as one of the subsets of the sources of both appreciation and expanded trust in the process of the transformation of consciousness within the professional. Expanded trust serves as a major part of the internal psychic structures within the professional that facilitate containment in the treatment of trauma and addiction (Gregory, 2007, Gregory and Gregory, 2014, Grove, 1989). The utilization of set theory to organize and orient the professional's thinking in appreciating the pacing of the mind/ gene search algorithms that support neurogenesis, the reorganization of positions, and the activation of courage can be a valuable aid in the expansion of trust within the professional in the treatment of trauma and abuse (Dunham, 1991, Gregory, 2015, Rossi and Rossi, 2013). By thinking in terms of the set and subsets of the possibilities around which to focus attention in the treatment of trauma and addiction, especially by including quantum variables (Erickson, 1964, Gregory, 2011, Gregory and Gregory, 2014), the professional can be more creative in utilizing the opposites of knowing/not knowing, past/present/ healthy/unhealthy to facilitate unconscious healing processes. It is the valuing of appreciation that supports the utilization of creativity by nurturing curiosity, which expands time and reduces anxiety and pressure. See Figure 3 below. Consciousness of Appreciation

## Consciousness of Appreciation



The valuing of *appreciation*, sources of comfort and of time can enhance the utilization of creativity in focusing attention, which nurtures the rebuilding of self worth. The valuing of appreciation within the professional represents a progression in consciousness from recognition to trust, and then on to appreciation as a way of supporting the focusing of attention. In this context, the professional is appreciating frame of reference as a variable to focus attention around.

A main consequence of appreciating frame of reference is that the professional can utilize frame of reference as a central organizing theme with regard to time and space, not only as frame of reference in general. This supports the expansion of trust within the professional. The general case would be looking at an experience not primarily as a threat or an indication of impending doom, but an opportunity. When this appreciation is combined with trust and

creativity with respect to frame of reference, there may be a significant reduction of anxiety and pressure within the professional.

## Expansion of trust

Patients receiving treatment for addiction and trauma issues are generally suffering from multiple, overlapping impairments to trusting self, others, and the world, leading to significant limitations in terms of safety. These safety limitations interfere with experience, self expression, sensitivity to others, and behavioral choices (Erickson and Rossi, 1979, Gregory, 2007, Grove, 1989, Levine, 1997, Phillips, 1997). There is often significant negative momentum of multiple components of the unhealthy self or shadow ( Gregory and Gregory, 2014, Grove 1989, Jung, 1916, Levine, 1997) that require the professional to have expanded levels of trust in the unconscious and its resources in order to facilitate containment, transformation and neurogenesis (Erickson and Rossi, 1979, Gregory, 2007, Rosen, 1982, Rossi, 2002). These levels of trust correlate to the levels of safety required by patients to address their rigid dysfunctional patterns and learned limitations (Erickson and Rossi, 1979. Rosen, 1982).

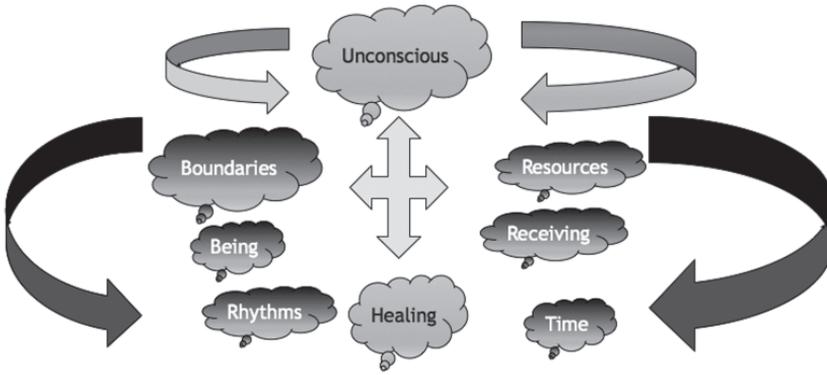
The aspects of the Lorentz transformation that can support the expansion of trust are;

- Frame of reference
- Relativity
- Four dimensions
- Deeper levels of appreciation of time by space by their connections to light
- Symmetry

These variables, mathematically validated by the transformation, represent and reflect *expanded depth* as they are essential to quantum processes. When trusted by the professional, these five aspects can be utilized creatively.

Figures 4-9 below describes the evolution of trust in the treatment and the integration of the implications of the Lorentz transformation in that evolution. These represent an internal progression of trust expansion necessary for containment for resistance complexes and exacerbated affect states (Lankton and Lankton, 1983, Zeig, 1985) and may be analogous to the evolution of nature's development of complex proteins (Loewenstein, 1999).

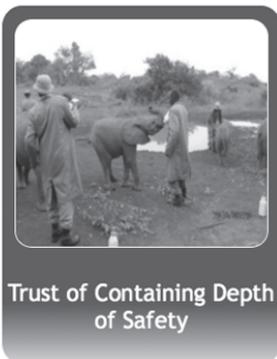
## Reorientation of Trust



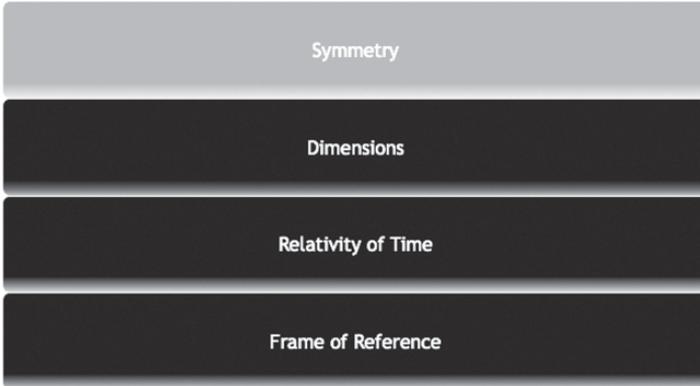
## Trust of Rhythms



## New Forms of Comfort in Terms of Trust



## Lorentz Transformation - Components



### Depth and Safety

The treatment of cases involving trauma and/or addiction includes an appreciation of depth and safety issues that reflects the consciousness of the professional providing the treatment (Erickson and Rossi, 1979, Erickson and Rossi, 2009, Grove and Panzer, 1989, Phillips, 1997, Rosen, 1982). The first level of safety is facilitated by the curiosity, mirroring, validation, and empathy of the professional. The second stage is primarily focused around accessing, learning to recognize, and receive direction and comfort from the unconscious which facilitates trust in the unconscious and the multitude of processes under its direction. Erickson would often work with patients for up to seven hours in order to facilitate sufficient levels of safety, trust, and depth before initiating treatment. This may correspond to the first stage of Poincaré's four stage creative process (Poincaré, 1905, Rossi, 2002).

When a patient is responsive to the utilization of the interspersal technique (Erickson and Rossi, 1979, Zeig, 1985) which incorporates indirect associative focusing and may include multi-embedded metaphor (Lankton and Lankton, 1983) around the variables of the Lorentz transformation this implies that the patient is responsive at a deeper level, in that these variables are operating on a quantum

level. The patient's behavior indicates that on an unconscious level that the patient has recognized the value and possibilities of the variable being utilized as a point of focus as a source of comfort, problem solving and neurogenesis. Once this has been recognized by the professional, attention can continue to be creatively focused utilizing the principles of group theory and symmetry involving permutations that sustain a core structure (Ash and Gross, 2008, Erickson, 1964, Gregory, 2011, 2015). This will be discussed further in the symmetry section.

The Lorentz transformation is a mathematical representation of the role and value of quantum variables in the context of different reference frames, uniform motion, and the resulting time dilation, which substantiates that time is relative. The most important variable in the transformation is light, since time and space are intrinsically tied to light and its speed. Symbolically and metaphorically light represents a profound level of depth, significantly more than the molecular level fear operates on, probably on the magnitude of at least  $10^{-4}$ . As such, a yes set (Erickson and Rossi, 1979) for light, which Erickson employed in his progression of relaxation, comfort, enjoyment and delight, complemented by a creative utilization of the interspersal approach (Erickson and Rossi, 1979), can serve as a container for the fear operating in trauma.

When the depth is appreciated, it can be mirrored and nurtured (Erickson and Rossi, 1976, Kohut, 1973), and explored in terms of capacity, and related to temporal and spatial issues.

### **Consciousness for Containment**

Consciousness regarding containment has progressively evolved since the early stages of the development of hypnosis (Rossi, 1996, Tinterow, 1970). In its infancy hypnosis recognized that containment could be achieved through both active and passive approaches, which was later recognized and incorporated by Pavlov and Hull respectively. Within mainstream psychoanalysis occurred from the perspectives of psychodynamics, cognitive behaviorism, humanistic, gestalt, Ericksonian, and depth psychology (Beck, 1976, Erickson, 1964, Erickson and Rossi, 1979, Jung, 1916, 1923, 1960, Masterson, 1981, Perls, 1973, Rogers, 1961, Winnecott, 1965). Erickson (Erickson and Rossi, 1976, 1979, 1982, Rossi, 1996) developed a variety of methods

to contain rigid, dysfunctional patterns in the treatment of trauma in order to sfaccioiluitsatheeaunincgonp-rocesses which included confusion, shock, indirect suggestions, ordeals, and the utilization of resistance.

The utilization of the variables and parameters of the Lorentz transformation may support the subsets of containment strategies by offering patients through the interspersal technique and basic accessing questions (Rossi, 1986) an experience of novelty that can activate mind/gene search algorithms regarding the value and potential sources of comfort and problem solving connected to the transformation's variables and parameters.

By adding on an appreciation of frame of reference, four dimensions, symmetry, and relativity, the Lorentz transformation provides the professional with four additional variables to utilize to expand trust in focusing attention, one of the primary prerequisites for containment (Erickson and Rossi, 1979, Gelfand et al., 1963, Masterson, 1981).

## **Relativity**

The Lorentz Transformation is a mathematical validation of relativity, describing the interaction between space, time, and motion, three primary variables in the treatment of trauma and addiction. As a validation of relativity of time, in that frame of reference is one of the determining factors, along with the speed of light. The appreciation of frame of reference can be utilized to explore the patient's relationship with time, and the possibilities for either expanding time or shifting one's frozen position in time. This validation further enhances trust and creativity in the focusing of attention, a primary variable in the treatment process (Erickson, 1964, Erickson and Rossi, 1979, Gregory, 2011, Gregory and Gregory, 2014, Grove and Panzer, 1989).

In both trauma and addiction, the patient's relationship with time is impaired and disharmonious. In the case of addiction, gratification must be immediate, with limited or no tolerance for patience or waiting. The patient lacks consciousness that includes strategic thinking incorporating time parameters (Erickson, 1986, Erickson and Rossi, 1979, Miller, 2009, Nakken, 1988, Rossi, 2002). Within addiction processes, time is condensed into the immediate mo-

ment, with the implication that time is something to be subjugated without consideration for its capacity to provide comfort and nurture (Bradshaw, 1985, Nakken, 1988, Tulku, 1979). In cases involving trauma, time is condensed in a different way, with the patient being frozen in  $t-1$ , the moment just prior to the trauma (Erickson and Rossi, 1982, Grove and Panzer, 1989, Levine, 1997). In the treatment of both, time is expanded through focusing attention with curiosity, which values the need for time, complemented by the appreciation of both motion and direction, both core aspects of the Lorentz transformation. The utilization of time and space to engage the polarity of 'frozen' in time vs. thawing time, space or perception has been addressed from both western and eastern perspectives (Erickson and Rossi, 1982, Tulku, 1979). Although both perspectives come from vastly different directions, both utilize the creative focusing of attention while simultaneously appreciating the role of novelty to activate processes that transform consciousness.

#### **Four dimensions**

The Lorentz transformation is based on the appreciation that four dimensions are fundamental to the understanding of the relativity of time, and the factor by which time is dilated (Einstein, 1915, Isaacson, 2006, Scott, 1999). Prior to the transformation's discovery, Newtonian mechanics was governed by only three dimensions, with time being excluded (Isaacson, 2006, Greene, 1999). Minkowski's equation further solidified the relevance of appreciating the need for a four dimensional understanding of reality, while reinforcing the connection and implied dependency between space and time (add Minkowski reference here (Tulku, 1979).

The Lorentz transformation implies that dimensions have value, and can be considered and utilized as subsets for sources of comfort (Dunham, 1991, Erickson and Rossi, 1979, Gregory, 2011, 2015). With that, dimensions can be explored to establish yes sets for the professional. (Erickson and Rossi, 1979). These yes sets for dimensions can then be utilized with metaphor, indirect associative focusing and the interspersal approach to focus attention that activates unconscious search programs (Abbott, 1884, Erickson and Rossi, 1979). The utilization of height, horizontal, vertical and time dimensions can provide space that is critical in dealing with the fused states of trauma and addiction.

Utilizing a mathematical perspective prior to the development of the Lorentz transformation, Abbott (Abbott, 1884) creatively utilized metaphor to illustrate the limitations of experience, so prevalent in the treatment of trauma and addiction, from the perspective of geometric shapes. He contrasted the difference between points (zero dimensions), lines (one dimension), and geometric shapes (two dimensions). He did this through the personification of straight lines, triangles, square and pentagons and circles. Circles were given the highest social status because of their lack of angles. He showed how dramatic the change in experience could be by introducing a third dimension, which he called Spaceland and was the world of spheres, in contrast to two dimensions which was called Flatland. From our perspective of life on the ground, with our position being a combination of latitude and longitude, this would correspond to the adding of the height dimensions in powers of ten, and then adding on the time component to get a fourth dimension.

When dimensions are trusted and appreciated by the professional as doorways for focusing attention, questions can be asked that introduce novelty, depotentiating rigid patterns of experience. Examples of these questions include;

In examining and exploring thoughts, feelings or experiences that you have been or felt victimized by; have you considered?

Whether certain thoughts come from certain directions (north, south, east, west)?

- Do they come as points, planes (circles, squares, triangles)?
- Do they come in straight lines, or curves or waves?
- Do they drop, like raindrops or snowflakes, or come in as bird droppings, or bombs?
- When they arrive do they pass on along, or go in circles, spiral down, or get stuck in certain parts of your body?
- What is the spacial relationship between you and any given thought, feeling or experience? Are you bigger or smaller than them?
- Have you ever considered yourself either dramatically bigger or smaller than them on scales of ten or a hundred?

- What happened as you drew the relationship with crayons or pencils?
- Have you ever imagined an interaction from 10 or 100 feet above the interaction

### **Subsets of connection**

The absence of connection, or connection with unhealthy parts of the self, is a fundamental dynamic of treatment and healing processes (Erickson, 1964, Kohut, 1977, Masterson, 1981, Rosen, 1982, Rossi, 1986). As themes these include; alienation or disconnection from self; fusion with the false and narcissistic selves; disconnection from the healing unconscious and its resources; disconnection from persons and the world. Rossi (Rossi, 1986, 1996, 2002) recognized and highlighted the numerous subsets and physiological processes that underlay and supported the psychological healing processes of the unconscious referenced by others (Erickson, 1964, Jung, 1916, Kohut, 1977). The application of the implied directive with the interspersal technique and metaphor (Erickson and Rossi, 1979, Lankton and Lankton, 1983) can support the building of yes sets and connections with these subsets and resource networks to address issues of capacity and trust. At deeper levels, these physiological networks are supported by quantum variables and processes that have both mathematical and experimental validation (Greene, 2004, Gregory, 2011, 2015, TCL, 1996).

Quantum entanglement, and the role of electrons in the ATP process can be utilized by professionals incorporating metaphor, the interspersal technique, and indirect associative focusing to symbolically address levels of depth. The Lorentz transformation, when incorporated into the Dirac equation, supports the role and implied capacity of the principle of entanglement. When the unconscious responds to professional interventions it implies a connection has been made at a deeper level, which validates the patient's capacity for connection, simultaneously opening up the possibilities for exploring the set of all connections (Dunham, 1991, Goswamy, 2015, Gregory, 2011, 2015) on both conscious and unconscious levels. In addition, it implies the patient is not in a hopeless state of abandonment and alienation.

Inasmuch as the Lorentz transformation connects and unifies space and time, it also connects space and time to light, appreciating the connection and supporting the expanding of the trust of space and time as potential sources of comfort. In addition, this implies that in some fundamental sense that they are *dependent* on light, which implicitly validates the value of dependency and its potential as a source of comfort (Erickson, 1964, Jung, 1916, Masterson, 1981, Tulku, 1979). The latter concept is consistent with Tibetan Buddhist thought (Tulku, 1979).

### Symmetry

Originally symmetry referred to a static sense of balance that reflected a balance between sides, that functioned as a subset of harmony. The understanding of symmetry was significantly expanded with the advent of group theory. Groups theory involves hidden patterns of structure and an appreciation of opposites, and was developed by Galois around 1830 (du Sautoy, 2008, Livio, 2005). This expansion recognized symmetries as *actions* between elements of a group that preserved its structure and that equations being addressed by Galois and others had unique compositions of permutations which maintained the laws of the solution of the equation being addressed. These actions are mirror, rotations, glide and translation symmetries.

Any mathematical system that wishes to be considered a group is *dependent* on obeying the rules of closure, associativity, identity and inverses (Ash and Gross, 2006, du Sautoy, 2009). The Lorentz group is the group of all Lorentz transformations of Minkowski spacetime, and is denoted by  $O(1,3)$  for the general Lorentz group and  $SO+(1,3)$  for the restricted group, which describes the identity element.

Symmetries in general, and the symmetries of the Lorentz transformation reflect and express a consciousness that appreciates the role and value of *dependencies* in the transformation of consciousness. The appreciation of dependencies can be found in both eastern and western cultures in diverse areas of study that include martial arts, classical music, psychodynamic psychotherapy, hypnotherapy and Tibetan Buddhist thought (Erickson, 1964, Kaplan, 1978, Levitin, 1985, Masterson, 1981, Tulku, 1979, Yang, 1981). Erickson utilized this appreciation of dependencies on multiple levels

in his treatment strategies in the February man case (Erickson and Rossi, 1982).

By reinforcing and validating dependency mathematically, the Lorentz transformation serves as a symbol that can counteract the negative affects, especially judgment often associated with needs in the treatment of trauma and addiction. In addition, the transformation completes the implied polarity of healthy vs. unhealthy dependencies, opening up new areas to explore as sources of comfort. The needs affected by the negative judgments on dependencies that are reflected by the defenses of splitting, repression, and avoidance include but are not limited to; attention, containment, comfort, reassurance, and compassion. When negative judgments about dependency are transformed on unconscious levels, safety is enhanced on deeper levels.

Applications of the implications and value of the Lorentz transformation can be found in the Erickson resistance protocol (Erickson, 1964). The primary ways Erickson's work represented an application of the transformation were in his utilization of opposites, permutations and his appreciation of dependency, time, and connection. The following passages from the protocol reflect the application of the transformation and are followed by additional commentary.

"Since you have come for therapy and you state that you are a fault-finding, uncooperative

patient, let me explain some things before we begin. So that I can have your attention, just sit with your feet flat on the floor with your hands on your thighs, just don't let your hands touch each other in any way.

Now so that you will sit still while I talk, just look at that paperweight, just an ordinary handy thing. By looking at it you will hold your eyes still, and that will hold your head still and that will hold your ears still, and it's your ears I'm talking to. (Erickson, 1958, 1980, p. 302)"

In the above section Erickson is demonstrating an appreciation of dependency around the holding of attention for containment, and an appreciation of creative permutations of the need and capacity for connection.

“Now I don’t really care if you listen to me with your conscious mind, because it doesn’t understand your problem anyway, or you wouldn’t be here, so I just want to talk to your unconscious mind because it’s here and close enough to hear me, so you can let your conscious mind listen to the street noises or the plane’s overhead or the typing in the next room. Or you can think about any thought that comes into your conscious mind, systematic thoughts, random thought because all I want to do is talk to your unconscious mind, and it will listen to me, because it is within hearing distance even if your conscious mind does get bored. Just be comfortable while I am talking to your unconscious mind, since I don’t care what your conscious mind does (Erickson, 1958/ 1980, p. 302).”

In this section Erickson is demonstrating an appreciation of dependency on the unconscious, the utilization of polarities, creative utilizations of permutations around the quantum theme of possibilities to hold and contain attention, and appreciation of the need for time through pacing.

“Now, to meet your needs, I am going to ask that yes or no question, and be prepared to be pleased to let your unconscious mind answer, and in doing so either to share the answer with your conscious mind or to withhold it, whatever your unconscious mind thinks to be the better course. The essential thing, of course, is the answer, not the sharing nor the withholding. This is because any withholding will actually be only for the immediate present, since the therapeutic gains you will make will eventually disclose the answer to you at the time your unconscious minds regards as most suitable and helpful to you. Thus you can look forward to knowing the answer sooner or later, and your conscious desires, and well as your unconscious desires, are the seeking of therapy and the meeting of your needs in the right way at the right time.” (Erickson, 1958/ 1980, p.304)

In this section Erickson is demonstrating an appreciation of time through pacing, an appreciation of creative permutations for dealing with polarities, and a valuing of a positive dependency on the unconscious.

“Before I ask that question, I would like to suggest two possibilities. (1) Your conscious mind might want to know the answer. (2) Your unconscious mind might not want you to know the answer. My

feeling, and I think you will agree, is that you came here for therapy for reasons out of the reach of your conscious mind. Therefore I think that we should approach this matter of the question I am going to put to your unconscious mind for its own answer in such a way that your own deep unconscious wishes to withhold the answer or to share the answer with your conscious mind are adequately protected and respected. (Erickson, 1958/ 1980, p. 304).

In other words, I will ask a question to which only your unconscious mind can give the answer, and concerning which your conscious mind can only guess if it does at all; maybe correctly, maybe wrongly, or maybe have only some kind of opinion, but if so, only an opinion, not an answer.

An unconscious response is different, because you do not know what it is to be. You have to wait for it to happen, and consciously you cannot know whether it will be yes or no. It does not need to be in accord with the conscious answer that can be present simultaneously with your unconscious mind's thinking. You will have to wait, and perhaps wait and wait, to let it happen. And it will happen in its own time and at its own speed. (Erickson, 1958/ 1980, p. 305).

In these last three sections Erickson is continuing his application of creative permutations around the polarities of conscious/unconscious and knowing/not knowing. While doing this he is appreciating time, Heisenberg's uncertainty principle, and implicitly validating the Tibetan Buddhist concept of the knowledge behind or within the not knowing (Tulku, 1979).

## **Summary**

The Lorentz transformation is discussed in the context of applying many of its primary components in the transformation of consciousness in the treatment of addiction and trauma. The appreciation of the implications of frame of reference, relativity, dimension and symmetry is utilized to support the expansion of trust within the professional. This supports the creative focusing of attention in order to facilitate, novelty, safety, depth, and activity dependent gene expression. The role and utilization of quantum variables in treatment is further developed by including the role of light, and its dependency relationship with time and space. Parallels

and application are drawn through the comparison of the Erickson resistance proto- col with Tibetan Buddhist meditation practices with regard to the valuing of space and time.

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