



UNIVERSIDAD CENTRAL DE NICARAGUA (UCN)

**Can Prospective Memory be enhanced?
A study with Ericksonian Hypnosis**

DISSERTATION (Ph.D.)

Maria Cristina Guberti

12 July, 2020



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DISSERTATION

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Assurance Statement

I hereby declare on oath that I have written the submitted dissertation:

Can Prospective Memory be enhanced?

A study with Ericksonian Hypnosis

independently and without unauthorized assistance. I have not used other than the named tools and scripts. All used parts of other authors either literally or correspondingly are cited.

12 July, 2020

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A normal healthy person who possesses auto-noetic consciousness is capable of becoming aware of her own past as well as her own future; she is capable of mental time travel, roaming at will over what has happened as readily as over what might happen, independently of physical laws that govern the universe¹.

E. Tulving

¹Tulving E. (1985) Memory and consciousness, University of Toronto Tulving, in *Canadian Psychology/Psychologie Canadienne*, 26(1), 1-12, p.6.

Abstract

Prospective Memory has recently been studied as a memory system dependent on the frontal lobe which involves the ability to recall a planned action or a planned intention at some future point in time.

The discovery by the Harvard University of a special brain network concerning structures connected with the hippocampal formation- including medial prefrontal regions, posterior regions in the medial and lateral parietal cortex, lateral temporal cortex and the medial temporal lobe- responsible both for past recollections and future intentions is at the basis of the present study which explores the possibility of enhancing Prospective Memory using Ericksonian hypnosis as a means to access personal positive retrospective emotions and consolidate an emerging trace restoring forgotten learning strategies in future intentions.

The effect of hypnosis on the human brain has been demonstrated by detecting MRI changes in blood flow, indicating that hypnotized people experience an increase in connections between the dorsolateral prefrontal cortex involved in cognition, memory and decision-making and the insula which helps the mind connect with the body, being responsible for processing functions such as body control, emotion and empathy through its extensive connections to cortical and subcortical limbic structures.

The present research explores the possibility of enhancing the Prospective Memory system in 65-69 years old people using hypnotic sessions. A Treatment Group is confronted with a Control Group in a Pre-test/Post-test design measured through the normative standards of the self-rated Prospective Retrospective Memory Questionnaire scoring memory failures and confronted with an Autobiographic Memory Test measuring retrospective and prospective memory recollections. A Student's t- distribution for independent groups is used to compare the means of the Pre- test and Post- test in Treated vs Control Group.

Abbreviations:

PM: Prospective Memory

RM: Retrospective Memory

PRMQ: Prospective Retrospective Memory Questionnaire

AMT: Autobiographic Memory Test

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Table of Contents

Chapter 1: Scientific Overview and Background	1
1.1 Topic and Research Motivation	1
1.2 Problems and Benefits deriving from the Research	2
1.3 Most Important Terms	3
1.4 Status quo of the Field and Actual Findings	7
1.5 Connections to the most important Psychology Areas	10
1.6 Quotes from Primary Literature	12
1.7 First Wordings from the Hypotheses	14
1.8 Pre-view of the Chapters 2-4	16
Chapter 2: Scientific Literature	19
2.1 Scientific Relevant Literature in Prospective Memory	20
2.2 Professional Articles and most Important Findings	24
2.2.1 The Prospective Brain	26
2.2.2 Orientation of Constructive Memory and therapeutic Hypnosis	28
2.2.3 Prospective Memory in Mild Cognitive Impairment	31
2.3 Consequences of Literature Research	32
2.4 Checklist of the Definitions	34
2.5 Summaries of the Research Studies	37
Chapter 3: Expert Interviews	40
3.1 Qualitative Procedure: Expectations	40
3.2 Discussion of pros and cons of Selected Interviews	45
3.3 Results from the Selected Interviews	48
3.4 Summary and Evaluation	58

3.5 Influence of the Expert Interviews in the Development of the Hypotheses	60
3.6 Qualitative and Quantitative Methods	65
Chapter 4: Research Design	68
4.1 Summary of the Quantitative Methodological Approach	68
4.2 Statistically Testable Hypotheses	72
4.3 Test Instruments: Prospective Retrospective Memory Questionnaire	75
4.4 Statistical Analysis of the Data	81
4.5 Justification for the Questionnaire	83
4.6 Plan to find the Subjects: pros and cons	86
4.7 Pre-Test and Influence on the final Research Design	87
Chapter 5: Findings	89
5.1 Circumstances of the Data Collection	89
5.1.1 General Sessions	89
5.1.2 Treatment Group	97
5.2 Statistical Formula: Student's t- distribution for Independent Groups	100
5.3 Findings	105
5.4 Interpretation of the Measures of Significance	106
Chapter 6: Critical Reflections	110
6.1 Critical Reflections on the Methodological Approach	110
6.2 Data Analysis	113
6.3 Alternative Explanations	120
6.4 Alternative Interpretations	121
6.5 Findings: their Use in Practice	125
6.6 Recommendations for Future Research	128
Chapter 7: Summary	131
References	141

Chapter 1: Scientific Overview and Background

Positive effects of training and transfer suggest that neuroplasticity is preserved in later life and that even short 'doses' of memory training, particularly those that require older adults to learn and practice using deep elaborative encoding strategies, can improve older adults' memory to the level of younger adults².

F. Craik

1.1 Topic and Research Motivation

With this research I intend to study the possibility of enhancing the capacity of Prospective Memory (PM) in young-old people through the use of hypnosis. As a teacher, and hypnotic therapist, I have the utmost interest in researching on this matter as the use of mnemonic strategies can be of help both to students and to patients who often ask me how they can improve their Concentration and Memory through hypnosis.

Hypnosis is often thought of as an altered state of mind where the person is put into a state of unconsciousness close to sleep in which he/she loses the capacity of thinking in order to be manipulated by the hypnotist.

In recent years, researchers have demonstrated rather the opposite.

Hypnosis, although the root of the word comes from the Greek word meaning *sleep*, is a natural state of consciousness "a state of alert, attentive, receptive, integrated concentration" which is characterized, according to Spiegel³ by a "parallel awareness" in which the subject is active and can reach a focused, concentrated state of mind, detached from outside reality, which enables him/her to reach the inner capacity of visualization, a state of acute perception and

² Craik, F. Rose N. S. (2012). Memory encoding and aging: a neurocognitive perspective. *Neuroscience, Rev.* 36, 1729–1739 10.1016/j.neubiorev.2011.11.007. p. 1737.

³ Spiegel, H. (2006). *Forensic Psychology and Psychiatry*, 347, New York 10032, p. 73.

imagination, obtained through the creation of an emphatic relationship between a person and the therapist.

Memory and concentration failures, when caused by trauma and emotional problems, often impede new learnings and have a heavy impact on daily life. In these cases, it may affect working memory, and sometimes long- term and future, or prospective, memory. Sometimes people are impeded in concentration because of preceding failures in their lives, and the lack of self-esteem does not encourage the reaching of their goals. It is necessary to recover self- confidence through a process of reinforcing self- esteem.

Often, the importance of the judgement of other people carries a deep influence. Sometimes people are aware of their own talents, but they often give up what they would really like and resign their own goals. If hypnosis may help motivate people and make them able to improve concentration on their inner reality, a superior well-being is acquired.

The challenge of the present research proposal is to give an answer to the following questions:

1. Can the mind be capable of recalling meaningful autobiographic experiences and bring sensations and forgotten emotions to life, retrace paths which may reactivate autobiographic and semantic memory?
2. Can the mind give a new meaning to those emotions and organize information in order to improve performances of the present time, open a window on the past and allow new learnings?
3. Can a cognitive and emotional experience create new synapsis and induce neuronal plasticity? Is it possible to demonstrate that experience and learning can structurally alter gene expression as the Nobel laureate Erik Kandel⁴ suggested?

1.2 Problems and Benefits from the Research

The prerequisite for good memory and concentration is confidence and relaxation. Hypnosis has been proved a powerful tool that enables people to access the unconscious mind, in order to help and positively change the way people think about themselves and about their

⁴ Kandel, E.R. (1981). *Principles of Neural Science*, Fifth Edition March 24, Elsevier.

possibilities. The outcome of the present research is to help people make changes in their lives in order to reach a more successful state of mind and achieve better performances.

The challenge of the present study is to verify how the use visualization in a modified state of consciousness may help. A guided visualization, which is exactly calibrated on a particular person, using the perceptive appropriate channels -sight, sound, smell, touch, taste – can help the mind recreate the exact state which is needed, when a particular kind of familiar language is employed. Tracing back significant experiences of past life, bringing back forgotten sensations, emotions and successful recollections may add a new meaning and enhance a neural plasticity, restoring forgotten learning strategies and bring them to the present time, so as to allow a greater effectiveness in a desired performance or state of the mind.

The collected data and case studies will be used to define a model of learning activities and operational guidelines. Scientific publications and articles will follow this doctoral research in order to spread new information, with the aim of adding new material on the state of the field.

1.3 Most Important Terms

Hypnosis

Hypnosis is defined by The American Society of Clinical Hypnosis (ASCH) “a state of inner absorption, concentration and focused attention”⁵. Milton Erickson (1901-1980) provided an approach centred around the belief that each person holds, in the unconscious mind, a unique ability to heal and a creative power to solve problems. His most important legacy lies the importance of a therapeutic relationship and an extremely individual based approach, in which the emphasis is placed on the uniqueness of an individual and a therapeutic approach tailored to that uniqueness. The process of hypnosis involves deep relaxation of the mind and of the body, followed by an altered state of consciousness that leads to a heightened focus, resulting in a higher susceptibility to suggestion. New thought patterns, which can be visual or auditory, following the individual sensitivity to a particular channel, are offered in the form of allegorical

⁵ *American Society of Clinical Hypnosis (ASCH)*, founded by Milton Erickson in 1957, <http://www.asch.net>.

language through metaphors or posthypnotic suggestions, leading to behavioural change and altering cognitive processes and perceptions, having an effect at some later point in the future.

A 1996 National Institutes of Health Technology assessment Commission judged hypnosis an effective intervention for alleviating pain from cancer and other chronic conditions and a meta-analysis published in a recent special issue of the *International Journal of Clinical and Experimental Hypnosis*⁶, found that hypnotic suggestions relieved pain in subjects participating in 27 different experiments. Disorders such as obesity, insomnia, anxiety and hypertension showed greater improvement. The American Psychological Association has, since then, validated hypnosis as an adjunct procedure for the treatment of obesity and other disorders. Demeter et al., in experimental researches with memory,⁷ have demonstrated an increase of memory when meaningful cues are employed.

Life-long learning

It may be defined as an ability that can be encouraged through lifetime. Its emphasis lays in the process of learning: how to learn and the ability to go through learning.

According to this this developmental area, learning takes place throughout life, in a wide range of situations and is does not refer only to childhood or to the classroom. Lifelong learning has been defined as "all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competences within a personal, civic, social and/or employment-related perspective"⁸.

According to The European Commission, lifelong learning has mainly four objectives⁹:

“personal fulfillment, active citizenship, social inclusion and employability/adaptability” and calls for a learning that is flexible, diverse and available at different times and in different places”. This definition is based on Delors’ Report¹⁰ ‘s four “pillars” of education for "life-long

⁶ *International Journal of Clinical and Experimental Hypnosis* www.sunsite.utk.edu/IJCEH

⁷ Demeter, G., Szendi I., Juhász M., Kovács Z.A., Boncz I., Keresztes A., Pajkossy P., Racsmany M. (2016). Hypnosis and prospective memory, in *International Journal of Clinical and experimental Hypnosis*, pp. 200-212.

⁸ Commission of the European Communities. (2001, November 21) with the aim of making a European Area of Lifelong Learning a Reality.

⁹ *Lifelong Learning Programme 2007-2013* (LLP) supports education and permanent training, based on protocols n. 1720/2006/EC of the European Parliament and Counsel of November 2006.

¹⁰ *Delors ,Report* was a report created by the Delors Commission in 1996.

learners"¹¹ which are defined as: learning to know, learning to do, learning to live with others and learning to be. It promotes learning beyond traditional schooling, advocating a more complex life-wide dimension, including an extensive range of learning settings and contexts.

Scientific and technological innovation are responsible for the profound effects on how people deal with what is new in a society where knowledge and skills soon become obsolete. Individuals continuously feel the need to update their competences in a process of continuous learning in a growing aging society where people look at cognitive health and vitality as most important values. This research design is dedicated to young old adults (65-69 years of age) who will be confronted with learning new abilities and acquire better strategies to improve their memory.

Neural systems

They define circuits and systems that serve behavioral purposes. Neural systems refer to sensory systems, like vision or hearing, and motor systems which respond to the environment acquiring and processing information. Input and output systems are set by large numbers of cells and circuits which lie between them. These are collectively referred to as associational systems, and they carry out the most complex brain functions.

The hippocampus first records a memory of what is experienced as new and surprising. It is a temporary resting place for recording, learning and behaviour. According to E.L. Rossi's researches¹², during offline periods of sleep and dreaming, the human brain engages in a dialogue between hippocampus and cortex to replay, update and consolidate new memories and learning.

The cortex can be considered a slow learner, but stabilizes memories which can later be accessed even if the hippocampus is removed.

Brain plasticity occurs when new life experiences, especially when surprising and unexpected, can turn on "activity-dependent genes", important for making the proteins and generating the growth and transformations of the synaptic connections between neurons.

¹¹ Created by Leslie Watkins and used by Professor Clint Taylor (CSULA) and Superintendent for the Temple City Unified School District's mission statement in 1993.

¹² Rossi, E.L., Rossi K.L. (2008). *The new neuroscience of psychotherapy, therapeutic hypnosis and rehabilitation: a creative dialogue with our genes*, edited by The Milton H. Erickson Institute of the California Central Coast, p.12.

Research suggest that four weeks to four months are required to stabilize new neural networks encoding new memory, learning and behavior change.

Concentration

It is an attentional process which involves the ability to focus on a task, ignoring distractions. Concentration, or effortful awareness, differs from selective perception or the tendency not to notice and quickly forget stimuli that cause emotional discomfort and contrast with current beliefs. Divided attention, defines the ability to perform two or more concurrent skills.

Broadbent (1958)¹³ claimed the existence of a sensory buffer deriving from all the stimuli presented at any given time. On the basis of a physical characteristic, one of the inputs is selected for further processing by being allowed to pass through a “filter”. Due to the limited capacity of the human mind to process information, the filter prevents the information-processing system from becoming overloaded.

In 1973, Kahneman published *Attention and Effort*¹⁴, a theoretical approach known as the “capacity or resource theory”, according to which a person's ability to perform simultaneous tasks depends on how much "capacity" the jobs require.

Posner et al. in 1980¹⁵ introduced the “spotlight” metaphor. According to this theory an endogenous and conscious system is contraposed to an exogenous or unconscious system which accounts for the awareness to stimuli outside the field of view.

Posner and others claimed that attention moved around the visual field, independently of the actual gaze direction even if a focused visual attention within a given space, or spotlight was continually scanning the environment drawing attention to stimuli.

¹³ Broadbent, D. (1958). *Perception and Communication*. London: Pergamon Press.

¹⁴ Kahneman, D. (1973). *Attention and effort*, Prentice-Hall, Englewood Cliffs, New Jersey.

¹⁵ Posner, M.I., Snyder C.R., Davidson B.J. (1980). Attention and the detection of signals, *Journal of experimental psychology*, 109, 160-174.

Prospective memory (PM)

It is a recently studied memory system which involves remembering to perform a planned action or recall a planned intention at some future point in time.¹⁶ PM concerns memory tasks that are common in daily life and it concerns a great number of situations. It focuses on when to act, rather than to an informational content. Examples of highly important situations include a person remembering to take medication.

PM can be event-based or time-based. Event-based memory involves remembering to perform certain actions when specific circumstances occur. Time-based PM involves remembering to perform an action at a particular point in time. As PM involves remembering and fulfilling an intention, it requires episodic memory, declarative memory, and, according to some authors, retrospective memory. The frontal lobe, situated at the front of the cerebral hemisphere acts as supervisory system for executive functions.

1.4 Status quo of the Field and Actual Findings

Human memory is a complex system where information is at first encoded, then stored and retrieved. It is a faculty of the mind, mainly related to the limbic system.

New models have been being studied in recent years. From the well-known Atkinson- Shiffrin model¹⁷, also known as the “multi- store model” or “modal model” proposed in 1968, many authors have proposed more articulated kinds of schemes. The first model advocated three separate components namely: a sensory register, a short- term store and a long- term store memory.

In 1974 Baddeley and Hitch¹⁸ questioned the specific structure of the short-term store, stating that the system is subdivided into multiple components. Being made up of a sensory processor, a short- term or working memory, and long- term memory, it is responsible for the development of new information, language and personal identity. Information from the outside world is

¹⁶ McDaniel, M. A., & Einstein, G. O. (2007). *Prospective Memory: An overview and synthesis of an emerging field*, Sage Publications Ltd.

¹⁷ Atkinson, R.C.; Shiffrin, R.M. (1968). Human memory: A proposed system and its control processes. In Spence, K.W.; Spence, J.T. *The psychology of learning and motivation (Volume 2)*. New York: Academic Press. pp. 89–195.

¹⁸ Baddeley, A., Hitch G. (1974, 2017). Working Memory - *Psychology Unlocked*, 10 January 2017.

processed in the form of chemical and physical stimuli and is stored according to focus and intent.

While short-term memory has a limited capacity and duration for information to be retained, long-term memory can store large quantities of information for an unlimited time. While the material encoded by short-term memory is retrieved from previously stored information and is mainly acoustic, the information long-term memory encodes is mainly semantically stored according to the meaning or episodically stored along a spatial and temporal plane, allowing to recall specific events such as birthday parties or weddings.

Short-term memory is supported by patterns of neuronal communication dependent on the frontal lobe and parietal lobe and long-term memory is maintained in neuronal connections widely spread throughout the brain even if the hippocampus is essential both for learning and consolidating information.

Squire¹⁹ proposed a distinction between explicit and implicit functions, responsible for declarative and non-declarative systems. Explicit functions are responsive for declarative memory, containing the purposeful intention of memory retrieval and storage. Implicit functions are contained in an unconscious storage, and arouse specific responses not consciously activated: an example is given by procedural memory, which implies a gradual learning of skills that occur without conscious attention to learning.

According to Eysenck²⁰, memory can be corrupted by the manner information is encoded, stored and retrieved and the amount of attention which is given to new information can affect the information which is encoded by storage.

The possibility of interference of old information has been studied²¹. A retroactive interference refers to the difficulties of recalling old information due to new information storage while proactive interference happens when prior learning disrupts recall of new information. There are situations when information can make learning easier, as when new information integrates

¹⁹ Squire, L. R. (2009). Memory and brain systems: 1969–2009. *The Journal of Neuroscience*. 29 (41): 12711–12716. doi:10.1523/JNEUROSCI.3575-09.2009.

²⁰ Eysenck, M.W. (2012), *Fundamentals of cognition*, Psychology Press, New York.

²¹ Underwood, B.J. (1957). Interference and forgetting. *Psychological Review*. 64: 49.60 doi:10.1037/h0044616.

or provides associations with previous knowledge so that a positive transfer can activate new learning.

Individuals' performances on memory tasks that rely on frontal regions tend to decline with age. It may concern a temporal order, or a specific context where information is encoded²².

In recent years the function of sleep has been studied in relation to memory²³. According to Norwood et al., sleep helps memory consolidation. During sleep, the neural connections are strengthened. System consolidation takes place during slow-wave sleep. The hippocampus replays the events of the day for the neocortex which then processes memories, helping them store in the long-term memory.

Slow-wave sleep has a positive effect on declarative memory. According to a central model²⁴ the long-term memory storage improves thanks to an interaction between the hippocampal and neocortical networks. It has been shown that learning has a powerful impact on the brain, observed during slow-wave sleep. In fact, the density of human sleep spindles observed in subjects after learning a declarative memory task was higher than the signals observed in the control tasks which did not involve learning but only included similar visual stimulation and cognitively-demanding tasks.²⁵

A complex system can draw on the past recombining previous experiences – a constructive rather than a reproductive system gives evidence for simulation of future episodes. There is evidence that memories are constructed²⁶: "current hypotheses suggest that constructive processes allow individuals to simulate and imagine future episodes, happenings, and scenarios". People can construct their memories when they encode them and/or when they recall them.

²² Corkin, S., Amaral D.G., Gonzalez R.G., Johnson K.A., Hyman, B.T. (1997). H.M.'s medial temporal lobe lesion: findings from magnetic resonance imaging. *The Journal of Neuroscience*. 17: 3964–3979.

²³ Karriem-Norwood Varnada, M.D. (2014). *Sleep Deprivation and Memory Loss*, Web MD. Web MD LLC. Retrieved November 20.

²⁴ Steriade, M. (2006). Grouping of brain rhythms in corticothalamic systems. *Neuroscience*. 137 (4): 1087–1106. January 2006.

²⁵ Gais, S., Mölle M., Helms K., Born J. (2002). Learning-Dependent Increases in Sleep Spindle Density". *Journal of Neuroscience*, 22 (15): 6830–6834, 1 August.

²⁶ Ofengenden, T. (2014). Memory formation and belief. *Dialogues in Philosophy, Mental and Neuro Sciences*. 7 (2): 34–44.

1.5 Connections to the most important Psychology Areas

The Developmental Psychology of life-long learning owes its birth to cognitivism and constructivism.

Cognitivism

It derives its name from the Latin *cognoscere*, which refers to knowing, meaning information-processing psychological system derived from the investigation of thought and problem solving.

In the late 20-th century it replaced behaviorism and became the dominant paradigm in psychology for understanding mental functions. This was due Chomsky's criticism on language learning, claiming that internal mental states gave evidence for the process of learning mechanism, which could not be explained only through conditioning.

While behaviorists identified the existence of thinking with behavior, cognitivists claimed that the way people think has an effect on their behavior and therefore cannot be considered a behavior in itself. Cognitive development started with researches on attention, as an active process involving numerous outside stimuli and on the process of learning, involving attention towards the teacher and the way individual interest and effort relate to attention.

Psychologists were interested in the inner mechanisms of human thought and in the processes of knowing, conceptualizing the learning process. Cognitive psychologists focused on how information was received, processed and organized into existing patterns, on how people integrate new information and on how information was retrieved upon recall.

Cognitivists presupposed a specific form of mental activity, of the kind advanced by computationalism. They were interested in memory and the role it played in the process of learning, explaining the process of forgetting as an inability to retrieve information from memory, and memory loss as a mechanism used to eliminate irrelevant information on account of newly acquired information.

Constructivism

Constructivism resides in the belief of an active process of learning, implying that knowledge does not derive from authoritative sources but it is constructed by individuals or groups “making sense of their experiential worlds”²⁷, bringing together the act of learning from many different sources including life experiences.

In social constructivism learners are encouraged to arrive at their own versions of the truth, influenced by their backgrounds, or the way they conceive the world. Learners are seen as part of a specific culture inheriting specific systems, such as language, logic, and other important symbols systems together with their social meanings, acquired through social interactions with its members throughout their lives.

Young children develop their thinking abilities by interacting with their peers, with adults and the physical world. The background helps shaping their knowledge and values created and discovered by the learner during the learning process, emphasizing the importance of the active role of the learner in the learning process, unlike educational viewpoints of the past, where the responsibility rested with the teacher, and where the learner plays only a passive and receptive role.

In 1989 Von Glasersfeld²⁸ emphasized that learners constructed their own understanding, not simply mirroring and reflecting what they read, finding their own connections even when confronted with incomplete information, stating that the role of the teacher was to motivate the students to activate discussions and share the responsibility of working as a team in a cooperative way, interpreting and sharing knowledge and encouraging interpretations from different points of view, using everyone's contribution.

He contributed to the concept of motivation, stating that it was strongly dependent on the learner's confidence in his or her potential for learning. Learners gain confidence and motivation to face more complex challenges by experiencing the successful completion of challenging tasks.

²⁷ Yilmaz, S., Kaya Y. (2008). Constructivism: Its Theoretical Underpinnings, Variations, and Implications for Classroom Instruction". *Educational Horizons*. 86 (3): 161–172.

²⁸ Glasersfeld, von E. (1989). Cognition, Construction of Knowledge, and Teaching, *Synthese* 80(1), 121–140.

According to Glaserfeld, feelings of competence and self-confidence to solve new problems derived from first-hand experience of mastery of problems in the past.

1.6 Quotes from Primary Literature

The present research design will be carried through according to Milton Erickson's hypnosis and the latest neo-Ericksonian models and techniques especially based on the theoretical approach on hypnosis in a phenomenological perspective as presented by Professor F. Tarantino²⁹, General Psychology, Salento University, Italy.

Milton Erickson, an American psychiatrist and psychologist, is considered the "father of hypnotherapy", paving the way for modern hypnosis.

In the end of the 19th century and at the beginning of the 20th century, hypnotic inductions were rapid and directive, based on the model of the French neurologist Jean-Martin Charcot's work on hypnosis and hysteria. His method was based on explicit orders to the patient to enter a *trance* or change his/her own behavior. Direct hypnosis, though a powerful tool, often met with the patient's resistance. Milton Erickson introduced a more ethical and effective alternative method for clinical settings, based on a more respectful way of employing body language, stories, and metaphors.

Milton Erickson, due to his difficult state of health, suffering from polio from an early age, thought the psychologist had to create a close relationship with the patient in order to understand his/her condition.

Milton Erickson believed that the human mind naturally passes different states of consciousness during the day, in varying degrees, where people naturally reach a *trance* state without recognizing them as hypnotic phenomena. Such moments happen when people are removed

²⁹ Tarantino, F. (2001). *Fondamenti Fenomenologici nella psicoterapia ipnotica neo-ericksoniana*, in *XII Congresso Nazionale AMISI*, Milano.

Tarantino, F. (2015). *Con il cuore e con la mente. Per una prospettiva fenomenologica nelle psicoterapie*. Milella, Lecce.

from any other irrelevant stimuli as when the mind wanders during different activities, reading or listening, or being involved in physical exercise.

According to Ernest Rossi: "this understanding formed the underlying principles of his later studies of psychopathology as well as his development of the naturalistic and utilization approaches to therapeutic hypnosis."³⁰

Milton Erickson stated in his speeches and work that these states of the conscience happen in everyday life, when attention is focused on an unusual situation which holds the person's interest, so that an experience of the amazing and the unusual is felt. In these situations, people experience a state of *trance* and their cerebral hemispheres are activated, they appear absorbed and oblivious as if an inner search has to be carried on and completed on the unconscious level until a new idea or frame of reference emerge and reorient them³¹.

As Milton Erickson wrote: "We hypothesize that "in everyday life consciousness is in a continual state of flux between the general reality orientation and the momentary micro dynamics of *trance*".³²

Milton Erickson was interested in verbal and non-verbal techniques, claiming that the common experiences of wonderment and confusion confirm a state of *trance*. Milton Erickson was conscious of the existence of multiple states of the conscience at the same time in the same patient, and he often crossed the line between the hypnotic and awake state suggesting that the hypnotized patient was behaving "as if awake" and his inductions often took place during the course of a normal conversation. This led to define his hypnosis as "conversational" or "covert hypnosis".

Aware that the unconscious mind responds to metaphors, symbols, and contradictions, Erickson claimed that effective hypnotic suggestion should be "artfully vague", leaving space for the subject to fill in the gaps with his/her own unconscious understanding even when he/she is not consciously understanding of what is happening.

³⁰ Rossi, E.L., Rossi, K.L. (2008). *The new neuroscience of psychotherapy, therapeutic hypnosis and rehabilitation: a creative dialogue with our genes*, p.6.

³¹ Erickson, E.L., Rossi, K.L. (1976). Two-Level Communication and the Microdynamics of Trance and Suggestion, *The American Journal of Clinical Hypnosis*, Reprinted in *Collected Papers Vol.1*.

³² Erickson, E.L., Rossi, K.L. (1981). *Experiencing hypnosis*, Irvington, New York, p. 75.

Milton Erickson employed jokes, humor and puns in his conversations, encouraging change by taking people by surprise, taking advantage of moments of confusion when the patient could enter more easily a state of *trance* without resistance and was more inclined to draw upon unconscious learnings. In order to create confusion, he used ambiguous words, complex sentences, pattern interruption to induce trans derivational searches where vague suggestions induced the patient to process intensely in order to find his/her own meanings.

According to Milton Erickson, the skilled hypnotherapist, in order to produce the desired change, artfully constructed gaps of meaning in a way most suited to the individual subject, not intruding in his/her own beliefs.

In recent years, researchers have been interested in exploring the cerebral modifications caused by hypnosis. Data were collected showing how hypnosis is characterized by alpha frequencies, which is typical of relaxed waking states, especially on the temporal and central lobes. These frequencies, diffused to both hemispheres, lead to hypnotic activity producing a theta activation, which is typical of dreams and imaginative activities. Halsban et al.³³ reported that, while in hypnotic state, “a strong suggestibility can be observed and this can lead to the retrieval of suppressed memories”. This process, used in hypnotic therapy, might allow patients to retrieve a certain experience, along with all its perceptual and emotional components. Using PET, Positron Emission Tomography, the authors have also studied the process of learning, using a highly imaginative word recall test. Thanks to this brain imaging technique, it has been possible to identify active areas during hypnosis, showing a pronounced bilateral activity of occipital and prefrontal cortices.

1.7 First Wording of the Hypothesis

The challenge of this research design is to explore the possibility of validating one of the following Hypothesis, using a Treatment Group and a Control Group:

³³ Halsband, U., Mueller S., Hinterberger, T., Stickner S. (2009). *Plasticity changes in the brain in hypnosis and meditation. Contemporary Hypnosis, 26(4): 194–215.*

H₀ If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, no significant differences in *PM scores in PRMQ* will be observed in the Treated Group when confronted with the Control Group

H₁ If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, then significant differences in *PM scores in PRMQ* will be observed in the Treated Group when confronted with the Control Group

Experimental researches in PM started from the last decades of the 20th century³⁴ and very few ways of training can be found, in literature, at present. Conflicting views on the nature of this kind of memory are expressed by different authors: according to West and Craik³⁵, PM is mainly made up of retrospective elements, or linked to the past. According to Cohen³⁶, on the other hand, the core of PM is to be traced in the future. The complexity of the components of this memory makes the study particularly interesting.

Neuroscience research proves that neuroplasticity characterizes the human brain. In fact, the human brain has the capability to rewire if stimulated by positive thinking, as new experiences may affect its neural topography. If communication is endowed with an epigenetic power, then guided visualization with hypnosis may carry, with its metaphoric language, a message conveyed by images, sounds, music, paradoxes and analogies which can restore memories of smells, perfumes, tastes, sensations. Memory can restore lost emotions, thoughts, maybe sometimes also dissonant gradients of obscurity which can be integrated adding liveliness, color, emotions, states of relaxation and well-being through the implementation of strategies activated by imagination and can restore paths, sometimes forgotten in time. In this way, the experiences of the past can be transformed, in order to become meaningful, and illuminate the present.

The power of the use of imagination during guided visualization in producing new learning has already been demonstrated by some authors³⁷. In fact, imagination and perception of outward reality may produce similar processes in the cerebral cortex. This has been demonstrated through the use of the modification of local blood flow: visual learning and perception of the

³⁴ Brandimonte, M., Einstein G., McDaniel M.A. (1996). *Prospective Memory. Theory and Application*, LEA, New Jersey.

³⁵ West, R., F. Craik F.I.M. (1999). *Psychology and aging*, psycnet, apa. Org.

³⁶ Cohen, G. (1989). *Memory in the real world*. Hillsdale, N.J.: Lawrence Erlbaum Associates.

³⁷ Peter, B. (2000). *Hypnos*, XXVII, 3, ed. *Med. Monaco*.

material objects produce the same effect in brain cortex. The evoked potentials, measuring the electrical activity of brain structures, appear similar in different situations, as those of perception and imagination. This neurophysiologic equivalence leads to suppose that some states of the mind like imagined emotions, sensations or behaviors can produce the same effects which are experienced in real situations.

Micro cognitive and emotional experience can create new synapsis, the brain stem can bring back recalling of past successful movements. As the Nobel laureate Erik Kandel³⁸ demonstrated observing synaptic and behavioral changes, the specificity of nervous cells of the hippocampus does not depend on their intrinsic properties, but is given by their functional connections, both intrinsic and extrinsic, due to the fact that synapsis are plastic and the result of their modification eventually results in memory.

To transform experiences of the past, rewrite them and substitute them into new experiences which retrace them, may open a small window on new choices and possibilities. Each new present rewrites previous neuronal traces. Present time, like a lens, selects, puts together, organizes the past and gives it a new meaning, so that the future is the result of the regeneration of past and present. The human mind is capable of organizing information and see them in new ways. To let memories emerge means to give back the person a part of his/her own identity, trace connections of neural nets, consent new impulses and make new cortical organization possible.

The human mind is plastic. The brain is capable of learning through the whole duration of life. Neurons learn all through their existence. Even in old age neurons, if they are given the chance, can learn, and, by exercising, the mind remains young.

1.8 Preview of the Chapters 2-4

The purpose of this research intends to investigate how hypnosis can help in the process of learning new information and enhance PM.

³⁸ Kandel, E.R. et al. (1981). *Principles of Neural Science*, Elsevier, March 24.

Chapter 2 will explore the most relevant scientific literature on the use of PM and the most recent and important findings in this field will be discussed.

Chapter 3 will examine some expert selected interviews, the pros and cons and the results as well as the influence in the development of the hypotheses.

Chapter 4 will contain the research design and measure the hypotheses which will be statistically testable. The materials used in the design are:

- *Prospective Retrospective Memory Questionnaire*³⁹ *Pre-test and Post-test*: a self-rated questionnaire to exclude cognitive or mild cognitive impairment; it will provide a score for Prospective Memory failures in everyday life
- *Autobiographic Memory Test Pre-test and Post-test* as an objective measure will explore autobiographic memories of the past and future goals and the favorite sensory registers (visual/auditory/ kinesthetic) will be checked.

The research will be focused on memory failures shown by the Questionnaire. The treatment will be organized according to 2 steps:

Recalling autobiographical events in a state of relaxation to help bring back ancient memories: recollections, emotions, sensations, thoughts and desires linked to significant episodes of life, associated to scenes and images. These memories, often buried and forgotten can be brought to life when the mind is relaxed so that distant paths can be retraced.

Guided visualization to implement strategies with the aim of re- evocating and understanding events of the past which can be brought from “then” to now” and be re-associated and linked to future episodes. The imaginary mind re-builds thoughts and emotions and gives color and depth which can rewire and restructure dynamics of the past and provide a link with future episodes and desired states of the mind.

³⁹ Crawford, J.R., Maylor, E.A., Logie, R.H. (2000). The prospective and retrospective Memory Questionnaire (PRMQ), *Memory*, University of Aberdeen, Uk. *Memory*, 8, 311-321.

The investigation will be carried on by measuring the effectiveness of implementation of memory skills on adult subjects through a period of 7 weeks, and the results will be shown by the scores obtained during the evolution of main statistical parameters.

The data will be shown according to means, standard deviation and appropriate statistics inference. The collected data and case studies will be used to define a model of learning activities and operational guidelines.

Chapter 2 Scientific Literature

The intention slumbers on in the person concerned until the time for its execution approaches.

Then it awakes and impels him to perform the action⁴⁰.

S. Freud

2.1 Scientific Relevant Literature in Prospective Memory

In recent years scientific literature has shown a special interest in the field. The complexity of PM accounts for several studies, especially collected in a volume by Brandimonte, Einstein and Mc Daniel, the first authors who have been studying PM since their first publication in 1996⁴¹. According to the authors, PM refers to the intention of performing a definite action, its realization and the processes which are at the bases of the realization of these intentions. PM refers to the function of encoding, storage, and delayed retrieval of intended actions, while prospective remembering involves formation, retention, execution and evaluations or monitoring of planned actions. The functioning of PM relies upon a distributed network involving the rostral and dorsolateral part of the frontal cortex, parietal cortex, hippocampal complex and thalamus as has been demonstrated by a series of disfunctions of PM caused the injury of this network following extensive frontal lobe lesions as reported by psychiatric conditions involving the deficit of executive frontal lobe functions (Burgess 2000)⁴².

Recent theoretical models of PM consider the role of executive frontal system in carrying out appropriate responses and researchers have studied the working mechanisms involved in Prospective Memory, so that different theories have tried to explain the processes involved in Prospective memory tasks:

⁴⁰ Freud, S. (1952). *The Psychopathology of everyday life*, New York, NY: Mentor, p.79.

⁴¹ Brandimonte M., Einstein G., Mc Daniel M.A. (2016). *Prospective memory. Theory and Applications*, Routledge, New York.

⁴² Burgess, P.W., Veitch E. De Lacy Costello, Shallice T. (2000). The cognitive and neuroanatomical correlates of multitasking, *Neuropsychologia*, 38, 848-863.

1. PAM Preparatory Attentional and Memory theory⁴³. This theory involves the participation of 2 mechanisms in successful prospective memory performance⁴⁴. The first regards a monitoring process which starts when a person builds up an intention, similar to that used when maintaining attention, which is carried on until the stored intention is performed. The second working mechanism regards elements of retrospective memory processes⁴⁵, which differentiate between the intention and unwanted thoughts, maintaining the focus on the intention. This monitoring process is also needed to perform the action at the correct condition or time. Prospective Memory is more successful when complete attention is given to the desired task.

Further research by McDaniel et al. (1998) confirmed this theory and proved that better performances regard focused tasks.⁴⁶ Studies were conducted with subjects who completed a prospective memory task in either a condition where full attention was given or a condition where attention was divided among other tasks.

In other experiments Reese and Cherry (2002)⁴⁷ participants formed an intention but were distracted by a different task and when asked their thoughts, at the moment of interruption, only 2% reported that they were thinking of the original intention, demonstrating that there is not constant maintenance from the time of constructing the intention to acting upon it at the right circumstance. Further research was conducted by Einstein and McDaniel in 1990, due to the participants' statements that, during prospective memory tasks, their intention often came into mind, from time to time instead of being constantly monitored and consciously maintained⁴⁸.

⁴³ Smith, R. E. (2003). The cost of remembering to remember in event-based prospective memory: Investigating the capacity demands of delayed intention performance. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 29, 347-361.

⁴⁴ McDaniel, M. A., & Einstein, G. O. (2007). *Prospective memory: An overview and synthesis of an emerging field*, Sage Publications Ltd.

⁴⁵ Smith, R., Bayen, U. (2004). A multinomial model of event-based prospective memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 30, 756-777.

⁴⁶ McDaniel, M., Robinson, B., Einstein, P. (1998). Prospective remembering: Perceptually driven or conceptually driven processes? *Memory & Cognition*, 26, 121-134.

⁴⁷ Reese, C. M., Cherry, K. E. (2002). The effects of age, ability, and memory monitoring on prospective memory task performance. *Aging, Neuropsychology, and Cognition*, 9(2), 98-113.

⁴⁸ Einstein, G.O., McDaniel, M.A. (1990). Normal aging and prospective memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 16, 717-726.

2. Reflexive-associative theory was proposed in 2000 by McDaniel, M., & Einstein ⁴⁹, stating that, at the time people create an intention for a prospective memory task, they associate the target cue and the intended action, so that, when the target cue occurs, the automatic associative-memory system brings it back into conscious awareness and, as long as the target cue occurs, the association will initiate the retrieval of the intended action, even if the intention is not present in consciousness. The researchers found that intention retrieval is mediated by a reflexive-associative process when the target cue and the action are closely associated. As older subjects have greater difficulty binding several elements together in memory, they cannot fall back on a reflexive-associative process and are forced to dedicate more resources to the task.

3. Multi-process model was proposed by McDaniel and Einstein in 2005.⁵⁰ This model takes into account evidence for both monitoring and spontaneous retrieval processes. The model stated that prospective memory retrieval does not always need an active monitoring process but can occur spontaneously and multiple processes can be used for successful prospective memory performances, not only based on active monitoring, requiring attentional resources. This may allow other forms of processing which are required for different tasks during the retention interval.

The authors proposed that at least one of 4 conditions should be present for successful memory performance:

- the cue and target action are highly associated with each other,
- the stimulus is salient,
- the other processes performed during the period between cue and action of the prospective memory task maintain do not interfere with cue features,
- the intended action is simple.

⁴⁹ McDaniel, M., Einstein, G. (2000). Strategic and automatic processes in prospective memory retrieval: A multiprocess framework. *Applied Cognitive Psychology*, 14, S127-S144.

⁵⁰ Einstein, O., McDaniel, M. (2005). Prospective memory: Multiple retrieval processes. *Current Directions in Psychological Science*, 14, 286-290.

Further research demonstrated that although many aspects of prospective memory tasks are automatic, there is a small amount of processing as well⁵¹. In an experiment conducted by Einstein et al. (2005)⁵², they demonstrated that some participants performed slower on a filler task when performing a prospective memory task at the same time. Other participants showed nearly the same rate of success on the task, without being actively monitoring, demonstrating the use of multiple processes for prospective memory performance.

The authors demonstrated that the particular method that people use to help them remember to perform actions in the future depends on a variety of factors including the importance of the PM task, the characteristics of the target event and their relation to the target actions, the nature of the ongoing task, and individual differences.

As hypnosis weakens the executive control of behavior, reducing the connectivity between frontal lobe and other brain structures, disconnecting frontal lobe from the anterior cingulate cortex, a brain structure usually associated with conflict monitoring, it has been used to investigate the role of executive frontal system in performing a PM tasks.

According to researches with hypnosis⁵³, Wagstaff and Cole demonstrated that hypnosis provides fast and reversible changes of attentional and memory processing. Hypnosis has been used as a tool to attenuate the involvement of the executive system in performing a PM task. It has been demonstrated that hypnosis impairs the performance of executive tasks, leaving implicit sequences of learning, which rely on fronto-striatal networks intact or even enhanced. (Wagstaff G. F., Cole J.C., 2007).

Is there a link between past and future memories? Can past experiences be responsible for future performing of intentions? Can we use past recalls to improve future performances?

⁵¹ Einstein, O., McDaniel, M., Thomas, R., Mayfield, S., Shank, H., Morrisette, N., & Breneiser, J. (2005). Multiple processes in prospective memory retrieval: Factors determining monitoring versus spontaneous retrieval. *Journal of Experimental Psychology*, 134, 327-342.

⁵² Martin, T., McDaniel, M.A., Guynn, M.J., Houck, J.M., Woodruff, C.C., Bish, J.P., et al. (2007). Brain regions and their dynamics in prospective memory retrieval: A MEG study. *International Journal of Psychophysiology*, 64, 247–258.

⁵³ Wagstaff G. F., Cole J.C. (2007). Effect of hypnotic induction and hypnotic depth on phonemic fluency: a test on frontal inhibition account of hypnosis. *International Journal of Psychology and Psychological Therapy*. 7, 27-40.

In order to provide a response to the questions, 3 recent important publications have been taken into account for the present research design:

- D. Schacter et al. *Remembering the past to imagine the future: The Prospective Brain*⁵⁴

Studies on patients with memory impairments have provided evidences of a link between the processing of past and future events. Studies carried on by Daniel Schacter (2007) show how the human brain uses stored information from the past in order to imagine and predict future events due to the presence of a neural network where the same neural structures which are needed to remember the past are responsible for imagining the future. The following article demonstrates the existence of a neural signature that is specific to the construction of events in one's personal past or future.

- E. L. Rossi et al. *The Future Orientation of Constructive memory: An Evolutionary perspective on Therapeutic Hypnosis and brief psychotherapy*⁵⁵

Applications in therapeutic hypnosis have been published by Ernest L. Rossi (2008), who proposes a current theory of sleep and dreaming, focused on the future PM system, to show a new evolutionary perspective due to an activity-dependent gene expression and brain plasticity at the basis of adaptive behavior in psychotherapy.

- G. Emsaki et al. *Memory specificity training can improve working and Prospective Memory in amnesic, mild cognitive impairment*⁵⁶.

How can improvements on PM be measured? The PRMQ, Prospective Retrospective Memory Questionnaire, is the most widely known and internationally used Questionnaire, translated in many languages, which has been proved a reliable and validated tool.

⁵⁴ Schacter D., Addis D.R., Buckner R.L. (2007). Remembering the past to imagine the future: the prospective Brain, *Nature reviews, Neuroscience*, Vol. 8, September, Nature publishing group.

⁵⁵ Rossi E.L., Erickson-Klein, Rossi K., (2008). "The Future Orientation of Constructive memory: An Evolutionary perspective on Therapeutic Hypnosis and brief psychotherapy", *American Journal of Clinical Hypnosis* 50;4, April.

⁵⁶ Emsaki G., NeshatDoost H.T., Tavakoli M., Barekatin M., (2017). Memory specificity training can improve working and prospective memory in amnesic mild cognitive impairment, *Dement Neuropsychol*, September; 11 (3), pp. 255-261.

Up to now there are few applications on the improvement of PM measured with the PRMQ reported in literature, probably due to the difficulty of measuring the items. One of them is discussed at the end of the chapter.

2.2 Professional Articles and most Important Findings

Hypnosis and Memory

The use of hypnosis on short and long- term memory has been studied for many years with the aim of finding out the possibility of producing hypermnesia.

Hypnosis has long been considered a tool for bringing memories of the past to the present time with controversial results because researchers have been focusing on bringing back the accuracy of memories, with the aim of preserving and recovering past memories.

Demeter et al.⁵⁷ demonstrated that when the type of stimulus and memory tests are employed, recall tests for high-sense stimuli (e.g., poetry, meaningful pictures) with hypnosis almost always produce an increase of memory, but on the other hand, the same authors agree that the same effect is not produced by recognition tests for low-sense stimuli (e.g., nonsense syllables, word lists).

But memories are normally subject to fading and the way people remember events of the past depends on present state conditions, and only in recent years researchers are interested in finding means to study how memory can be used to help in future behaviors. Neuroscientists are now interested in documenting how brain systems are oriented in order to explore future life possibilities for adaptive behaviours to maintain accurate records of the past so that psychotherapists may operate with the applications of these results in order to improve memory especially in older adults.

⁵⁷ Demeter G., Szendi I., Juhász M., Kovács Z.A., Boncz I., Keresztes A., Pajkossy P., Racsmany M. (2016). Hypnosis and prospective memory, in *International Journal of Clinical and experimental Hypnosis*, pp. 200-212.

Hypnosis and brain activity

An interesting research has revealed the brain activity that underlies the hypnotic state.⁵⁸ Professor David Spiegel from the Department of Psychiatry & Behavioural Sciences, Stanford University School of Medicine, U.S.A. and collaborators employed functional magnetic resonance imaging to investigate activity and functional connectivity among networks in hypnosis, selecting 57 of 545 healthy subjects with the aim to demonstrate hypnosis as a neurobiological phenomenon. Using MRI, researchers measured the subjects' brain activity by detecting changes in blood flow. Each subject was scanned while resting, when recalling a memory, and when exposed to a message intended to induce a hypnotic trance.

Changes in neural activity were observed. They regarded focused attention, enhanced somatic and emotional control, lack of self-consciousness. Hypnotized people experienced an increase in connections between the dorsolateral prefrontal cortex which is used normally used to help plans and carry out tasks and the insula which helps the mind connect with the body. Since the role of the insula has been demonstrated as being involved in the processing of body control and experience, emotion, empathy, and time through its extensive connections to cortical and subcortical limbic structures⁵⁹, the increase in functional connectivity during hypnosis with the dorsolateral prefrontal cortex is of special interest. Related to its role in somatic assessment, the insular cortex is also involved in spatial and temporal aspects of pain processing as well as empathic perception of pain in others, which clarifies the potency of hypnosis in pain control⁶⁰. Insular cortex is involved in self-reflection, self-monitoring, and self-regulation⁶¹, the connection provides evidence for all thought processes that can be altered in hypnosis and in related dissociative states involving alterations in identity, memory, and consciousness. According to these observations, increased connectivity between the insular cortex and dorsolateral prefrontal cortex in hypnosis may reflect heightened ability to engage in tasks with reduced anxiety about possible alternatives.

⁵⁸ Spiegel D. (2017). Brain Activity and Functional Connectivity Associated with Hypnosis, *Cerebral Cortex*, Volume 27, Issue 8, August 2017, Pages 4083–4093.

⁵⁹ Menon V., Uddin LQ. (2010). Saliency, switching, attention and control: a network model of insula function. *Brain Struct Funct.* 214:655–667.

⁶⁰ Rainville P., Duncan G.H., Price D.D., Carrier B., Bushnell M.C. (1997). Pain affect encoded in human anterior cingulate but not somatosensory cortex. *Science* (New York, NY). 277:968–971.

⁶¹ Herwig U., Kaffenberger T., Schell C., Jancke L., Bruhl A.B. (2012). Neural activity associated with self-reflection. *BMC Neurosci.* 13:52.

A decrease in activity the dorsal anterior cingulate area was observed. As this part, the brain's salience network, is used by the person to decide whether a situation is worth worrying, this is consistent with previous observations that hypnosis invokes a suspension of critical judgment and ability to immerse oneself in a task while reducing awareness of alternatives⁶². It also likely reflects engagement in the hypnotic state and associated detachment from internal mental processes such as mind wandering and self-reflection.

People in hypnosis showed reduced connections between the task-oriented dorsolateral prefrontal cortex and the brain's default mode network, a region most active when a person is daydreaming rather than focusing on the outside world. As Spiegel explained, the decrease in connectivity likely represents a disconnect between someone's actions and their awareness of their actions. Such a disassociation allows the hypnotic subject to engage in activities suggested by a hypnotist without becoming self-conscious of the activity. According to the researchers, hypnotized persons are intensely focused but not worried about what they are doing. They are not worried about evaluating instructions, but are simply following the instructions, and they have a more direct connection between their minds and the physical function of their bodies.

These findings indicate that cross-network co-activation patterns are modulated by hypnosis. Decreased in activity in the dorsal anterior cingulate may reflect reduced context comparison and decreased attention to the external environment, while at the same time connectivity between the dorsolateral prefrontal cortex and the insula is up-regulated, which facilitates somatic surveillance. Disengagement between frontal attentional regions and striatum-based procedural regions under hypnosis has been showed to improve procedural learning explaining the separation of certain brain functions in hypnosis as well as integration of others.

2.2.1 The Prospective Brain

How does memory work to imagine future events? The research carried on by Daniel Schacter⁶³ shows how the human brain uses stored information from the past in order to imagine and

⁶² Tellegen A., Atkinson G. (1974). Openness to absorbing and self-altering experiences ("absorption"), a trait related to hypnotic susceptibility. *JAbnorm Psychol.* 83:268–277.

⁶³ Schacter D., Addis D.R., Buckner R.L. (2007), Remembering the past to imagine the future: the prospective Brain, *Nature reviews, Neuroscience*, Vol. 8, September, Nature publishing group.

predict future events. The same neural structures which are needed to remember the past are responsible for imagining the future. A special network regards structures related to each other and with the hippocampal formation and include medial prefrontal regions, posterior regions in the medial and lateral parietal cortex, lateral temporal cortex and the medial temporal lobe.

As early as 1985, Ingvar⁶⁴ published an article named *Memory of the future*. He stated that the human brain is capable of thinking about the future in the same way as it is capable of thinking about the past. In the same years Tulving postulated the existence of a “mental time travel”, an episodic memory whose function is that of remembering personal experiences, allowing people to engage in both the past and the future. He found that both episodic remembering and future thinking emerge relatively late in development, between approximately three and five years of age.

Recent works demonstrate the existence of some kind of memory of the future in animals as well: the way jays cache food seems to be reflecting planning schemes that are not simply the reflection of current motivational needs.

Studies involving patients with memory impairments have provided the indication of a link between the processing of past and future events as in Korsakoff's Amnesia, where marked deficiencies in personal planning have been noted. On the other hand, amnesic patients who showed a total loss of episodic memory after a head injury, have reported a 'blank' when asked about their personal future or past. Studies with patients having suffered suicidal depression, the link between the deficit to remember the past and imagine the future has also been reported.

Schacter's interesting article indicates that memory — especially episodic memory — is crucially involved in the ability to imagine past events, non-existent events and simulate future happenings and direct comparisons between imagining the future and remembering the past reveal greater activity during episodic thought about the future.

The research has involved different groups in which old subjects and young old adults were asked to generate past and future events. They were instructed to remember specific past

⁶⁴ Ingvar D.H. (1985). Memory of the future: an essay on the temporal organization of conscious awareness, *Hum. Neurobiol.* 4, 127–136.

events, imagine specific future events or imagine events that involved a familiar individual in response to event cues. They were asked to construct events and generate as much details as possible while fMRI neuroimaging registered the brain. Events were elicited by a cue word such as a noun, an emotional word or an event. The past or future event was silently remembered or imagined while lying inside a functional MRI scanner over a span of 10-20 seconds.

Schacter postulates the existence of a system that can flexibly recombine details from past events which explains a crucial adaptive function of memory and works to make information available for the simulation of future events, providing an important insight into the adaptive functions of memory.

2.2.2 Orientation of Constructive Memory and Therapeutic Hypnosis

In this research, Ernest Rossi proposes Milton Erickson's therapeutic hypnosis to facilitate the future oriented constructive function of memory and consciousness.

In this important application of therapeutic hypnosis, Ernest Rossi⁶⁵ explores the future, PM system. He compares retrospective memory system, on which theoretical therapeutic hypnosis was been originally based, with a future orientation of the brain's constructive memory system intended as complementary to the past record keeping function of memory. According to E. Rossi, this approach is an important focus for facilitating current problem solving in therapeutic hypnosis. This neural network, conceived as a "memory prediction framework" is intended as the basis of how past memories can be reorganized into new scenarios for current and future adaptive behaviour and provide the psychobiological basis of adaptive behaviour, which is responsible for activity-dependent gene expression and brain plasticity.

The research reports the case of one patient and illustrates how evolutionary PM can be used to solve problems in relation to past obstructive procrastination in order to promote present and future academic success.

⁶⁵ Rossi E.L., Erickson-Klein, Rossi K. (2008). The Future Orientation of Constructive memory: An Evolutionary perspective on Therapeutic Hypnosis and brief psychotherapy, *American Journal of Clinical Hypnosis* 50;4, April.

The adaptive function of dreams formulated in Ribeiro's central hypothesis on evolutionary theory of sleep and dreaming proposed in 2004⁶⁶ shows how dreams can be seen as probabilistic simulations of past events and future expectations, whose adaptive function is to construct and explore novel behaviours for future survival. Memories, which are processed during the cycle of waking, sleeping, and dreaming contribute to one of dreams' functions, which is to utilize memories processed during the circadian cycle for the creation of adaptive scenarios. Sleep and dreaming acquire the function of integrating past events with current new experiences to simulate and create the present and as a rehearsal for future adaptive behaviours. Two important phases of sleep account for these hypotheses:

1. Slow-wave (SW) sleep: it derives from rest in early reptiles as a quiescent, "offline state" which allows the consolidation of new memories and learning. It restores waking patterns of neuronal activity in which a cognitive implementation can take place.
2. Rapid-eye-movement (REM) dreaming, which is characterized by heightened cerebral activity. It derives from early birds and mammals as a post SW-sleep state. It allows memory consolidation by activating gene expressions which account for the proteins needed to generate the activity-dependent synaptic plasticity of neurons, producing neural correlates for adaptive behaviour.

REM states of dreaming have been evolved to prolong neuronal activity in order to generate memory reconstruction, demonstrating how the neocortex updates its models of the world, after having dialogued with the hippocampus to create new schemes for the future.

More recently Ji and Wilson, in 2007⁶⁷ confirmed new details about the way neurons of the neocortex and hippocampus engage in a dialogue to replay memories and integrate new learning during SW-sleep.

E.L. Rossi's psychotherapy regards the treatment of the problem of a graduate student, aged 29, and his oppositional tendency leading to procrastination that stopped him from finishing his doctoral thesis.

⁶⁶ Ribeiro S., (2004) Toward an evolutionary theory of sleep and dreams, *A MultiCiencia: Mente Humana*, 3, 1-20.

⁶⁷ Ji, D., Wilson M., (2007). Coordinated memory replay in the visual cortex and hippocampus during sleep, *Nature Neuroscience*, 10. 100-107.

After a few therapeutic sessions which led to no apparent change in his behaviour, he reports a restless night of “terrible dreams.” An expert author introduced an activity-dependent, ideodynamic, two-hand approach to therapeutic hypnosis utilizing the four-stage creative process proposed by E. Rossi, in 2002⁶⁸. The young man’s therapeutic process completed itself in about 20 minutes as indicated by Erickson’s report of 20 minutes as a typical time frame for “dreaming” during therapeutic hypnosis.

Before treatment the patient reports his terrible dream: “Dark water with all sorts of disgusting fecal matter floating slowly all over the place! Then I was boating with my girlfriend and we capsize and fall into the black water sinking and drowning. Everything is dark and I am in terror and fear. I suddenly realize I’m having a nightmare and finally wake up with my heart racing.”

After the treatment with hypnosis, 2 weeks later, the second dream shows the striking change:

“Beautiful large waves on the blue ocean. I was driving on the beach with my girlfriend and we almost got stuck in the wet sand. ‘Oh, shit, I yelled and slammed real hard down on the gas so we race safely up a hill together.”

The successful action and the inner work of therapeutic hypnosis which has been done in the previous session accounts for the change which occurs in this dream.

The second dream shows how therapeutic hypnosis heightened the patient’s mental activity level sufficiently to facilitate activity-dependent gene expression and brain plasticity on the molecular-genomic level.

A high activity level distinguishes this second dream from the first one of “slow floating feces,” sinking and drowning in the dark water and his fast slamming on the gas.

⁶⁸ Rossi E., (2002 *Mirror Neurons in Therapeutic Hypnosis*, Milton Erickson Foundation.

The four stages are: Preparation. Activating rapport zones with ideosensory action with scale 1 to 10 for initial experience of the problem. Incubation: facilitating Creative Replay via the Mirror neuron System and access current experience. Illumination: Observing consciousness and the Novelty-Numinosum-Neurogenesis Effect and constructing future mind. Verification: awakening with a Posthypnotic Suggestion for Periodic Ultradian Autosuggestion.

The research shows a therapeutic work which leads to a cognitive, experiential and behavioural change in which new skills are developed where permissive suggestions account for a creative process in the future.

2.2.3 Prospective Memory in Mild Cognitive Impairment

This research⁶⁹ refers to the use of PRMQ to score the results of patients' performances before and after the treatment with Memory Specificity Training (MEST).

The research involved 20 patients diagnosed with amnesic Mild Cognitive Impairment (MCI).

The subjects were chosen, holding a high-school level of education, excluding symptoms of dementia and absence of intellectual disability. They were randomly assigned to treatment or control group. The experimental group received 5 weekly 80- minute sessions, while the participants in the control group took part in two general placebo sessions. Participants were assessed before and after the treatment, and 3 months later with the Prospective and Retrospective Memory Questionnaire. Neuropsychological tests for patients with MCI average memory performance was considered 1.5 standard deviations below healthy individuals' performance with similar age and education.

During the patients' performances a reduction in specific memories was noted, as expected, which was due to the medial temporal lobe initial degeneration and atrophy. An enhanced activity in the medial temporal lobe was expected and FMRI studies had shown higher activity in the amygdala during recollection of emotional memories. Preceding research had confirmed an interaction between the amygdala and medial temporal lobe, especially concerning the hippocampus during triggering of emotional memories.

The 1st session provided a discussion on the treatment, brain plasticity and memory problems. Patients were instructed to produce extended, specific, and categorical recalls and were asked to report specific memories. In the following 3 sessions patients were asked to produce memories associated to positive, negative and neutral words. In the last session materials were

⁶⁹ Emsaki G., NeshatDoost H.T., Tavakoli M., Barekatin M., (2017). Memory specificity training can improve working and prospective memory in amnesic mild cognitive impairment, *Dement Neuropsychol*, September; 11 (3), 255-261.

revised and discussed. Patients were tested at the end and their results remained unchanged after 3 months.

The researchers observed hippocampus-related improvements of memory in response to cognitive stimulation. A form of activity-dependent brain plasticity was observed and both new synaptic connections and neurons were created. Structures and functions of neurons and circuits in the brain underwent a change in response to experiences even in older adults. Hippocampal neurogenesis occurred in response to a variety of sensory, motor, and cognitive stimuli.

This research showed significant differences in working memory, PM and autobiographical memory at post-test and follow up reports and an expected increase of the number of specific autobiographic memory recalls in the experimental group.

2.3 Consequence of Literature Search

For centuries hypnosis has been used as a mere tool to cause hypermnesia, especially used to go back to past situations.

Only in recent years therapeutic hypnosis is being conceived as a tool to promote positive changes and wellness in future situations involving a process of growth in which the person takes part in a constructive process of change to improve his/her own future life.

The consciousness of the subjectivity of perceiving past situations seems to be at the core of more recent research. If the perception people have of past events continually changes, according to experiences, the way they feel, the thoughts they have, people can experience different ways of remembering, different details, according to the relevance they give them at a particular moment of life.

An interesting research concerning psychotherapy has been reported by Ernest L. Rossi, in which the core brain system that is activated to remember past experiences, is used to envision the future. Important adaptive functions of memory have been shown by Daniel Schacter who has demonstrated, by means of a temporal resolution of functional fMRI, the presence of a core

brain system concerning the medial temporal system, long been considered a crucial element for remembering the past, demonstrating its ability to provide details that serve as the building blocks for future event simulations. The adaptive function of this system to integrate information about relationships and associations from past experiences has been used to construct mental simulations about future events.

The Multiprocess Model of PM proposed by Mc Daniel and Einstein throws light on the functioning of PM, suggesting that PM is supported by automatic processes activated when there is a strong association between the PM target event and the intended actions. Automatic processes occur when memories arise into consciousness involuntarily and without direct prompts to interrogate memory, involving a mental sequence which is felt as spontaneous remembering.

Research on successful PM performances have finally demonstrated the presence of retrospective memory components⁷⁰. Studies have shown that the person should not only remember what actions have to be performed, but also to perform the action when the appropriate event or time comes. For instance, remembering to give a message to a friend requires that the person remembers the message and the friend to whom it is to be given and that he/she performs the task in the appropriate context, or when he/she sees the friend.

But most laboratory tests do not include PM components, probably because it typically occurs through spontaneous remembering. Successful Prospective Memory performances also require the occurrence of an appropriate event that activates memory without the benefit of a specific external prompt.

How can PM be tested? Few specific tests have been used in clinical studies. One of them is the Prospective and Retrospective Memory Questionnaire PRMQ, a validated and reliable self-reporting test, which has been translated in many languages.

The PRMQ has been used in an interesting research by some Iranian scholars who studied the effects of MEST Memory Specificity Training, a cognitive method to enhance PM in Mild

⁷⁰ Einstein O., Mc Daniel M., (2016). Retrieval in Prospective Memory: theoretical approaches and some new empirical findings, in *Prospective memory, theory and applications*, in *Prospective memory, theory and applications*, p. 115.

Cognitive Impairment, reporting an increase of the number of specific autobiographic memory recalls.

2.4 Checklist of the Definitions

Prospective memory (PM) recent studies and clinical researches have demonstrated that it contains a retrospective component. Prospective memories can be considered to be the consequence of past recalls when an automatic associative process occurs. Event-based tasks and time-based tasks have been used in recent PM research both providing good accomplishments and no great differences in performances in young old and older adults. The PRMQ has been tested as a valid and reliable questionnaire in recent literature and a useful tool to measure PM before and after the procedure. Contemporary theories of PM assume both SAS and PAM involve the executive system or controlled attention, which proved critical in carrying on PM responses, whereas the Multiprocess Model proposes that automatic processes can trigger PM responses if the PM cue and the response are strongly associated.

In recent years Demeter et al.⁷¹ have come to the conclusion that hypnosis attenuates the executive cost of PM showing that executing prospective memory responses produced a significantly lower cost of ongoing responses in terms of response latency in the hypnotic state compared to wake condition.

Event based Prospective Memory performance has been studied in three conditions – baseline, expectation and execution - on 23 volunteers.

In the experiment, the authors used hypnosis as a tool to attenuate the involvement of the executive system in performing a PM task. They applied a PM task for a Positron Emission Tomography (PET) study. The procedure, involved participants to perform a task under three conditions: a baseline condition where only ongoing activities were performed, a prospective expectation condition where prospective cues were expected but were never presented, and an execution condition where prospective cues were actually presented.

⁷¹ Demeter, G., Szendi I., Juhász M., Kovács Z.A., Boncz I., Keresztes A., Pajkossy P., Racsmany M. (2016). Hypnosis and prospective memory, in *International Journal of Clinical and experimental Hypnosis*, pp. 200-212, p. 13.

The hypothesis regarded the executive monitoring of prospective cues shifting between ongoing and prospective responses, responsible for an extra load on ongoing task processing when participants were awake resulting in an increase of reaction times of the ongoing task. In accordance with the Multiprocess Model of PM (McDaniel & Einstein, 2000), they also assumed that hypnosis would decrease the involvement of executive system and participants would accomplish the task in a more automatic and faster way when they were put in a hypnotic trance.

Hypnotic and alert conditions were monitored in the baseline condition, demonstrating that hypnotic induction did not alter the average reaction time in the ongoing task.

The cost of executing a prospective cue while carrying out an ongoing task differed significantly in the hypnotic and alert conditions, suggesting that hypnosis attenuates the executive control of monitoring of prospective cues during the ongoing task, showing that decreasing the level of attentional control by hypnosis did not change the accuracy of PM responses, but attenuated the extra load of attentional control.

The authors' findings demonstrated that decreasing the level of attentional control by hypnosis did not change the accuracy of PM responses, but attenuated the extra load of attentional control measured by RTs.

Neural system and plasticity

According to neuropsychologists, brain plasticity occurs when new life experiences, especially when surprising and unexpected, can turn on activity-dependent genes, important for making the proteins, generating the growth and transformations of the synaptic connections between neurons.

E.L. Rossi has demonstrated in his publications⁷² the process by which the neural networks of the brain can produce a “molecular memory” when messenger molecules evoke a state-dependent memory, learning and behavior through a process which starts when some

⁷² Rossi E. (2002). The Psychobiology of Gene Expression: Neuroscience and Neurogenesis in *Therapeutic Hypnosis and the Healing Arts*, NY: WWW Norton Professional Books.

information from the outside world, encoded in the neurons of the cerebral cortex is transformed within the limbic-hypothalamus-pituitary system into the messenger molecules that travel through the blood stream to signal receptors on cells of the brain and body. Receptors on the surface of cells transmit the signal to the nucleus of the cell where target genes transcribe their code into messenger RNAs.

When significant novelty, environmental enrichment during the awake state, the zif-268 gene - an early gene associated with the generation of proteins and growth factors that facilitate brain plasticity - is expressed during the REM sleep⁷³.

As reported by E. Rossi, recent researches suggest that four weeks to four months are required to stabilize new neural networks encoding new memory and learning for the creation of new neural networks encoding memory, learning and behavior change in psychotherapy as well as in many activity-dependent processes of gene expression and protein synthesis.

Concentration and Attentional resources

Whether PM may contain a component that requires attentional resources has been object of controversial opinions. Research has been made in order to find out whether conceptually driven tasks may require attentional resources⁷⁴. On account that PM has much in common with retrospective retrieval processes, some authors have manipulated the level of processing given to the PM target at encoding to see whether or not PM requires attentional resources. In the encoding phase, two targets were embedded in a list of words for which one half of the subjects performed a semantic orientated task (adjective generation) and the other group performed a non-semantic orienting task (rhyme generation). Subjects were informed that two words would appear in a subsequent list for which pleasantness ratings would be collected and they should press a key on the keyboard upon encountering those words in the pleasantness rating task. After 3 distractor activities, the list of words was presented. To implement the divided attention condition, one half of the subjects were required to monitor an audio presentation of numbers. Semantic processing of the PM cues at encoding led to a higher proportion of PM responses

⁷³ E.L. Rossi, C. Rossi, (2008). *The new neuroscience of psychotherapy, therapeutic hypnosis & rehabilitation: a creative dialogue with our genes*, The Milton Erickson Institute of the California Central Coast, p. 25.

⁷⁴ Jacobi, L.L. & Whitehouse, K. (1989). An illusion of memory: false recognition influenced by unconscious perception, *Journal of Experimental Psychology: General*, 118, 126-135.

than did the non- semantic processing of the cues. This gives evidence to the fact that retrieval is conceptually mediated.

Hypnosis

The interest of the field of modern hypnosis is nowadays based on E.L. Rossi's assumptions on the new therapeutic hypnosis to solve life problems by facilitating future scenarios. According to E. Rossi, the distinction between the future oriented, constructive memory system, which has been investigated in current neuroscience, and the past, retrospective memory system that was based on the theoretical foundation of therapeutic hypnosis is at the basis of an evolutionary theory of sleep and dreaming. The dynamics of constructive, evolutionary orientation of activity-dependent gene expression and brain plasticity can be utilized to develop new skill sets which allow permissive suggestions to facilitate the creative process.

In his works Rossi claims the importance of epigenetics and psychosocial genomics in which many forms of psychobiological arousal and rest during the various states of waking, sleeping, and dreaming can evoke immediate-early genes, behavioral state-related gene expression, and activity-dependent gene expression to facilitate the synthesis of proteins and promote brain plasticity, problem solving, and healing.

2.5 Summaries of the Research Studies

In recent years, 3 influential theoretical models of PM consider the role of executive frontal system in carrying out appropriate prospective responses in several different ways. Both SAS and PAM assume that the involvement of the executive system or controlled attention is crucial in carrying out adequate PM responses whereas the Multiprocess Model proposes that the automatic processes can trigger PM responses if the PM cue and the response are strongly associated. Demeter et al. have given support to all three assumptions, showing that, decreasing the level of attentional control through hypnosis, the accuracy of PM responses did not change, but the extra load of attentional control is attenuated, allowing automatic and faster responses in the experimental group.

Recent studies in PM have shown there was a failure to find age differences despite reliable age differences on the retrospective memory event- based tasks of free recall and recognition. Both younger and older subjects remembered the content or retrospective memory component of the PM task, showing no differences on the age groups, demonstrating that no age deficit in PM occurs on the prospective spontaneous remembering processes that occurs in everyday retrospective memory situations.

PM tasks, even if time- based tasks, seemingly more dependent on self- initiated monitoring or retrieval processes have sometimes proved more difficult to perform in older subjects, since event- based tasks have a greater environmental support than do time- based events.

According to the authors, an important avenue for future research is to examine the effects of different types of planning activities, varying from a relatively automatic activation to more complex encoding operations that may produce a richer and more detailed memory representation.

The authors encourage new studies that lead to a constructive episodic simulation of future episodes, with the aim of “recombining details from past events, so that trace- dependent components of PM may interact with the cue-dependent components, allowing planning activities with specific retrieval conditions”⁷⁵.

The present research is focused on the possibility of improving concentration and PM through hypnosis, learning new skills and behaviors in order to find strategies to carry on intended intentions in the future.

The challenge proposed by the authors who first studied PM was to find out if PM contains retrospective components and the model shown by West and Craik⁷⁶, who has finally proposed this theory has since gained more evidence.

According to Brandimonte, Einstein, and Mc Daniel PM tasks are mainly made up of retrospective elements, linked to the past. The neural network postulated by D. Schacter gives

⁷⁵ Mantyla T. (2016). Activating Actions and Interrupting Intentions: Mechanisms of Retrieval Sensitizations in Prospective memory, in Brandimonte M. et al., (2016). *Prospective Memory Theory and Applications*, p. 109.

⁷⁶ West, R., F. Craik F.I.M. (1999). *Psychology and aging*, psycnet, apa. org.

evidence of a system able to recombine details from past events, working to make information available for the simulation of future events.

The aim of the project of the present PhD research uses hypnosis as a means to return to past situations as trace-dependent components which can be linked to cue-dependent situations in the future and find protocols taking into account the specificity of the subject as an individual, taking into account personal goals and intentions scored through the PRMQ.

Chapter 3 Expert Interviews

Cognitive evidence points toward a role for episodic future thinking in shaping and individual's sense of self and identity⁷⁷.

D. Schacter

3.1 Qualitative Expectations

The aim of this chapter is to collect information from different Universities and Institutes operating on Prospecting Memory and Hypnosis in order to define the methodology and the hypotheses of the present research. The chapter includes opinions, expert interviews and qualitative data from latest researches, case studies from written documents indicated by the experts.

Analyses of qualitative data include data examination, comparison and contrast, interpretation of patterns with similar data, expert contribution to evaluation covering meaningful and important issues. The importance of a qualitative procedure implies a final evaluation which takes into account new information concerning the hypotheses, approaches and training materials, timelines, and applicable standards. Evaluation during the research may be used to decide mid-course corrections or formative evaluation or to shed light on process evaluation.

In recent years an increase in the use of qualitative data in research designs has been observed. Among the most common methods of collecting data, are interviewing techniques such as focus groups and one-to-one interviews motivated by the desire to share and learn what the participants know and think about the research topic and to establish a relationship in order to exchange collected data.

According to Kairuz⁷⁸, focus groups interviews imply a group discussion in order to identify perceptions, thoughts of a selected group of people regarding a specific topic of investigation.

⁷⁷ Schacter, D. (2017). Episodic future thinking: mechanisms and functions", Roland G Benoit and Karl K. Szpunar, *Current Opinion in Behavioral Sciences*, Elsevier 17:41–50, p. 46.

⁷⁸ Kairuz, T., Crump K., O'Brien, A. (2007). Tools for data collection and analysis, *The Pharmaceutical Journal*, Vol. 278, pp. 371-377, (referred on 02/04/2008), available from www.pjonline.com

Usually more than 10 participants are recruited and a moderator guides the encounters according to parameters which are contingent to the research design.

The one- to- one interview, on the other hand, is not planned around a group and allows the participants to give more detailed responses to the questions asked and when the research involves different universities in different countries, recruiting participants speaking different languages is facilitated. It offers the advantage of eliciting a vivid picture of the participant's perspective on the research topic where the person being interviewed can be considered the expert and the interviewer assumes the role of the learner. It is an effective qualitative method for getting people to talk about their personal feelings, opinions, and experiences. During the present research the one-to -one interview will be used since it meets several requirements:

- it provides case studies from different written documents allowing the opportunity of addressing a partner researcher to specific documents on the subjects, publications and studies which sometimes have not yet been published;
- it provides opinions of the experts, which is a motivating aspect of the research, it provides support and experience of other collaborating authors;
- it allows meaningful data evidence coming from different approaches and from different Universities in different countries and different languages;
- it provides data analysis and interpretation, the opportunity to gather precise data about the case studies, and to go beyond data analysis which have been published. It offers interpretations about what people believe and what their motivations are;
- it leads to evaluation and redefinition of the hypotheses. Through confrontation and cooperation, new different perspectives and methodologies also define different social contexts which may lead to evaluation and ensure that important constructs and concepts be compared. Redefinition of the hypotheses is an important part of the planning process which concerns short- and long-term aims, and finally leads to dissemination and reporting of results.

The limitations of qualitative data concerning evaluation may include problems such as lack of generalizability, the difficulty and complexity of data analysis and interpretation.

Subsequent research evaluation may examine the long-term impact the research aims to attain and may encounter new hypotheses and propose new paths for future research.

This chapter deals with the meetings and answers of the experts of the field concerning Prospective Memory and presents the authors' findings.

The focus of these interviews is to confront different approaches to Memory improvement, applied treatments in young old adults and scientific laboratory researches in memory normal functioning, in order to get new insights and ideas for the hypotheses of the research design.

Since gathering evidence is one of the strengths of qualitative data, the chapter includes contextual data which gives evidence of reasons and methods behind the contents.

According to Babbie⁷⁹ three major categories of interviews can be identified: the standardized interview, the semi standardized interview and the unstandardized interview, according to the structure of the interview. The 3 kinds of interviews will be used in the next chapters of present research, with different aims.

1. Standardized or structured interviews

They require the use of an interview schedule containing structured questions with the same exact questions posed in the same order. According to Berg⁸⁰ this form of interviewing will lead to questions which can be compared. Standardized interviews generate predominately quantitative data but may also contain some qualitative questions. McKenna⁸¹ distinguishes between the interview schedule when the interview contains a set of predetermined questions and the interview guide which adopts a less formal approach to questioning and allows the interviewer to explore a number of different issues around a specific subject. Standardized interviews are organized around understandable and clear unambiguous questions, the PRMQ to collect data will be presented as an example;

2. Semi-standardized interviews

⁷⁹ Babbie E. (2007). *The Practice of Social Research*, Wadsworth, Belmont CA.

⁸⁰ Berg B.L. (2009). *Qualitative Research Methods for The SocialSciences*, Allyn and Bacon, Boston.

⁸¹ McKenna H., Hasson F., Keeney S. (2006). Surveys. In: Gerrish K, Lacey A, eds. *The Research Process in Nursing*, Blackwell Publishing, Oxford: 260–73.

Semi-standardized interviews offer a more flexible approach. According to Tod⁸² they are based on an interview schedule for predetermined topics, letting unanticipated responses and issues to emerge. The flexibility of the semi-standardized interview allows the exploration of spontaneous issues to be explored. The wording of questions is flexible and facilitates different levels of language to be used. The focus is on permitting the interviewee to tell his/ her own story besides answering a series of structured questions. Issues are explored from an individualistic perspective. A framework guides the interview process and reflects the expert's personal experiences of the topic. It facilitates the collection of more extended data than that obtained through formally structured questions, the AMT will provide an example;

3. Unstandardized interviews or unstructured interviews

They do not foresee a specific framework for questioning. During these interviews the participants have a conversation about a specific topic in response to the interviewer asking open-ended questions. According to Moyle⁸³ this kind of interview offers the advantage of following the direction of the participant's responses. This type of interview is non-directive and it usually comprises themes rather than specific questions. Unstandardized interviews are based on the assumption that little knowledge exists about the research, and they can be conducted when the aim is to add new information to the field.

One-to-one interviews are traditionally conducted face to face. This offers the researcher the opportunity to interpret non-verbal cues and enhance and increase the understanding of what is being said. Nowadays, telephone and email interviews are increasingly being used in qualitative research, since they imply more cost effective than face-to-face interviews. According to Meho⁸⁴ email interviewing offer a less intimidating and more sensitive approach to interviewing. Some potential problems associated with one-to-one interviewing, such as embarrassment and perceived status differences between the interviewer/interviewee may be reduced through the use of email interviewing.

⁸² Tod A. (2006). Interviewing. In: Gerrish K, Lacey A, eds., *The Research Process in Nursing*. Blackwell Publishing, Oxford: 337–52.

⁸³ Moyle W. (2002). Unstructured interviews: challenges when participants have a major depressive illness. *J Adv Nurs* 39(3): 266–73.

⁸⁴ Meho L.I. (2006). E-Mail Interviewing in Qualitative Research: A Methodological Discussion. *J Am Soc Inf Sci Technol* 57(10): 1284–95.

In recent years, different approaches and models have been dedicated to the functioning of the specific areas of the working of memory and different laboratories have been experimenting items on different memory areas. Simulating experiences that might occur in one's personal future, as well as the definition of cognitive and neuronal mechanisms and the specific cognitive processes that they support, especially for what concerns Prospective Memory are being supported by researches using neuroimaging methods, throwing light on new models on the working of the brain.

As the research evaluation of the present research design will take into account the improvement of Prospective Memory through a specific memory programme, it is important to determine the extent to which a change in an outcome can be attributed to a training programme or specific method, and to compare the results with different authors. Unfortunately, no extended programs can be found in clinical psychology on the use of hypnosis on Prospective Memory, so the authors have been interviewed either on hypnosis or on Prospective Memory and on the possibility of using hypnosis to improve Prospective Memory.

Some of the authors who have contributed to the latest research on hypnosis and to the working of memory have been contacted. Among the researchers who have been willing to collaborate to the present research and have kindly accepted to contribute to the present work are:

- Philippe Vernois, NLP Master Trainer and Teacher of Hypnosis WHO (World Hypnosis Organization), certified IN (International Association of NLP Institutes) and ICI (International Association of Coaching Institutes) President for France and co-founder of Psynapse Institute belonging to FFHTB (Fédération Française d'Hypnose et Thérapie Brève);
- Daniel Schacter, University Teacher Harvard University, Massachusetts, USA, Researcher on neuroimaging and memory brain functions;
- Golita Emsaki, PhD, University of Isfahan, Iran.

3.2 Discussion of pro and cons of Selected Interviews

➤ Philippe Vernois, Psynapse Institute

The project of this interview is to ask Philippe Vernois and his team in Tunis questions at the *Psynapse* Institute. As an international authority for hypnosis and a school trainer, it will be extremely interesting to have his opinions and suggestions about hypnosis, methods for induction and the possibility of enhancing future memories and concentration. Expectations regard his advice on hypnotic inductions and states of trance as well as the possibility of inducing future mnemonic strategies.

This interview will be conducted face-to-face and recorded. The aim is to provide knowledge sharing, opinions and advice for the final evaluation. The interview with Philip Vernois will provide ideas about the use of hypnotic inductions, the way to lead patients into trance and access their memories, to contact past emotions and retrieve past experiences. Here, no case studies on hypnosis are expected. During the interview 5 questions will be asked, according to the formulated hypotheses of the present research.

1. How can information be retrieved?

The purpose of this question is to explore the strategies people use to recall information. The question explores the possibility of using a state of trance to retrieve information which might be stored in past memories.

2. Which strategies can be used to retain the information?

This question refers to the channels people use to retain information. This question may confirm the possibility of using visual imagery to improve memory recollections, and so confirm H₁.

3. Can past memories be associated to future memories?

This question elicits the problem of the possibility of exploring a link between autobiographic past memories and future memories which might confirm the function of the brain network

which the latest scientific research D. Schacter have located in the subregions of the hippocampus and the possibility of confirming H_1 .

4. How can hypnotic inductions be carried on?

This question has the function of exploring inductions, the possibility of deepening a state of trance, the different strategies which might be employed in order to build up the training sessions for the research design.

5. How can past memories be used to improve future memories?

The question has the aim of confirming the possibility of excluding the null hypothesis, H_0 . The answer may add suggestions for the hypnotic sessions, and for the strategies to be used.

➤ Daniel Schacter, Harvard University, U.S.A.

Author of *Remembering the past to imagine the future: The Prospective Brain*⁸⁵, he will be contacted to get his personal opinions and latest laboratory researches on Prospective Memory and provide his advice for the present research.

The following interview has the aim of providing knowledge, obtain case studies from written documents, opinions, meaningful evidence, data analysis and interpretation as it might lead to evaluation and redefinition of the hypotheses. This interview aims at collecting scientific data on clinical cases. Professor Schacter has been addressed questions about the location and functions of brain areas and about the working of prospective memory, which also took into consideration the simulation of experiences with fMRI and neuroimaging research. This interview will not be of help for the present research for what concerns hypnotic inductions, as only guided visualizations have been used in his experiments. 4 questions will be asked:

1. How is future thinking related to Prospective Memory?

⁸⁵ Schacter, D., Addis D.R., Buckner R.L. (2007). Remembering the past to imagine the future: the prospective Brain, *Nature reviews, Neuroscience*, 8, September, Nature publishing group.

This question has the aim of confirming the possibility of excluding the null hypothesis. According to the hypothesis, a link between past memory and Prospective Memory has been considered, so if future thinking is not related to Prospective Memory then, Prospective Memory cannot be improved through hypnotic training.

2. Which brain regions are responsible for future thinking?

H₁ is based on the possibility of improving Prospective Memory through the use of Retrospective Memory. Further information about D. Schacter's important laboratory research work, especially concerning the brain network may confirm H₁ and add information on the functions and strategies which may be elicited in the experiment.

3. Which is the importance of episodic thinking?

Episodic specific thinking has been confirmed an important issue in his researches, thus adding the possibility of new elements for H₁ especially in respect to internal self- cued memories.

4. Can Prospective Memory be improved?

This question has the function of excluding the null hypothesis and confirm H₁.

➤ Golita Emsaki, University of Isfahan, Iran.

Author of *Memory specificity training can improve working and Prospective Memory in Amnesic, Mild Cognitive Impairment*⁸⁶, she will be contacted in order to receive further information concerning the use of the *Prospective Retrospective Memory Questionnaire* which has been used to test the patients before and after the experimentation, the final data and the way it has been administered.

This interview, according to the present approach offers knowledge sharing, offers case studies from written documents, provides opinions, allows meaningful data evidence, data analysis and interpretation, leads to evaluation and to redefinition of the hypothesis. The interview will be

⁸⁶ Emsaki, G., NeshatDoost H.T., Tavakoli M., Berekatain M. (2017). Memory specificity training can improve working and prospective memory in amnesic mild cognitive impairment, *Dement Neuropsychol*, September; 11 (3), 255-261.

addressed to Golita Emsaki about the experimentation on Mild Cognitive Impairment. It aims at providing data from qualitative and quantitative methodology obtained through the use of key words and autobiographic memory tests. The advantage of this interview lies in the use of the PRMQ to test Prospective Memory, without the use of hypnosis. 3 questions will be addressed to her.

1. Which was the role of MEmory Specificity Training?

Golita Emsaki's work on Mild Cognitive Impairment has demonstrated the possibility of Prospective Memory improvement. The author has been working with cue words demonstrating that Retrospective Memory is related to Prospective Memory, which is consistent with H_1 .

2. How was the Prospective Retrospective Memory Questionnaire used?

Golita Emsaki's research training work with Prospective Memory has been measured through the PRMQ. The possibility of measuring the scores can operationalize the hypothesis, so that the research design may confirm H_0 or H_1 .

3. What did the results demonstrate?

The results may give credit to the possibility of confirming improvements in Prospective Memory. The operationalization of Golita Emsaki's hypothesis demonstrate the possibility of obtaining measures through the PRMQ Questionnaire.

3.3 Results from the Selected Interviews

- Philippe Vernois, has been interviewed on 20 October 2018 at the *Psynapse* Institute, Tunis, Tunisia.

1. How can information be retrieved?

P.V. Past memories are subjective personal representations, linked to emotions. They can be retrieved through the senses: sight, touch, smell, taste and sound.

Subjective memories can be close to reality, but they do not necessarily refer to actual reality, our perceptions of past events depend on our present state of mind and how we feel and get back to them.

At times people complain about bad memory. This is due to physiological causes or poor use of strategies. People can use better strategies to get back to past experiences, to recall the emotions which went along with them and finally anchor them to a specific context, in order to retrieve them in a more efficient way.

When people recall memories in an efficient way, this strategy can be transferred to other experiences.

There are different modalities which can be used to recall past memories and associate them to eye movements in order to retrieve them. With ocular technique people can duplicate memories.

For what concerns the guided memory procedure, the subjects are asked specific questions which provide information of critical events and then they are encouraged to access additional related details. Subjects are instructed to visualize aspects of the original environmental setting connected also with thoughts, feelings and reactions they might have experienced at that time and mentally review the events from different perspectives and different temporal orders.

The use of imagery has been recognized as an important element in human cognition and memory. Imagery also plays a role in the representation of events in memory, in the rotation of objects and comparative judgements between images of objects as it provides specific relevance for the storage of personal experience in episodic memory.

Imagery production may be a useful strategy for the retrieval of incidentally acquired information due to the capacity of hypnosis to increase vividness.

2. Which strategies can be used to retain the information?

P.V. The person's own left side refers to actual memories and the person's own right refers to constructed memories, or extracted recollections.

Activity in the right hemisphere, the creative half of the brain, is being revealed when a right-handed person looks at his own right, while eyes moving on the person's own left suggest activity in the rational, left hemisphere, showing that the person is remembering the past, real details.

When a person goes back to his/her own your grandmother's kitchen, for example, the real situation should include the walls of the room. More often the recollection of the person goes back to a constructed memory, an extraction or a built memory which starts with a recollection, like a special smell in the kitchen, which does not refer to the actual facts, but with a special perception of the senses or an emotion which has been linked to it. Construction is useful to reconstruct memory.

3. Can past memories be associated to future memories?

P.V. Future memories can be compared to past memories and linked to them through the mechanism of anchorage. We can ask our unconscious memory to duplicate that memory. People can remember what they can do and repeat it, searching the experience of the skill in the past and encode it with eye movements.

Through the use of eye movements during a few minutes, the person can be brought back and replay what he/she can do. Training exercises can help to reactive that special ability. Through eye movements the person can visualize a special scene and retrieve the emotional memory. The person can contact the moment when he/she had an ability, and recall it at the present moment.

Emotions can be brought to the present state of mind: starting with the construction, the moment the person had this capacity, looking for the emotion which is connected, transposing it with eye movements to the present moment. This can be done in hypnosis as well or during the normal state of conscience.

If a person has lost the capacity of feeling joy, he can look back to a moment when he had this capacity, and feeling in the same way the person has felt at that past moment and anchor it to bring it here and now. Unconscious memory helps the person to secure memories, and gives the permission to use the skill. Unconscious is something always positive.

Through the use of hypnosis, the therapist can encourage the patient to go back and find a way of encoding a specific memory, recall the visual strategy, and amplify that memory, using colours, sounds, smells, tastes, and so on.

4. How can hypnotic inductions be carried on?

P.V. Induction is the way to bring someone to the hypnotic state. Focalization is induction and a state of trance can be brought about using a simple object, like a pen, or a glass, the person's own arm.

Hypnosis refers to a change of conscience, and it can be done in a great number of ways. When the hypnotist takes the person's arm and the person closes his eyes, he can close his/her eyes and feel the sensation of the arm inside. If the hypnotist lifts the arm again, the person can look inside himself/herself and feel a different sensation. When the person opens his/her eyes, he/she feels differently. And every time the sensation will be different, and the state of trance will be deeper every time.

A state of trance can be deepened as a person focuses more deeply inside himself/herself. The state of conscience can change as the person takes a glass in his/her hands as he/she goes back and down to the past, looks at the images as these images are coming back and the colours slightly deform. As he/she closes the eyes, and feels the sensations of the matter and the specificity of the matter, his/her representations will change. Different states of trance can be used to produce analgesia or anaesthesia.

5. How can past memories be used to improve future memories?

P.V. The hypnotist can ask the unconscious of the person to search for the strategy, and contact an emotional memory. The hypnotist works on a level where the conscious is not present any longer with intellectual interferences.

In post hypnotic inductions triggers can be used to retrieve an intention.

A flashing image can be used to remind the intention. The hypnotist can induce a state of trance (level 2) and ask the unconscious to provide a signal of alarm.

If the person has to take a medicine at 6 o'clock, the hypnotist will ask him to visualize the medicine, provide a picture which is meaningful to the person at that particular time of the day that the person can associate a strong emotion, for example the fading light of the sunset can be used as a trigger to retrieve the intention.

In the same way the picture of a list in a box can work as a trigger for telephone numbers which have been associated to an image; or the recollection of a basket in which the person has put fruits can work as a reminder to buy fruit at the supermarket.

Visualizing objects in a room will also retrieve the memory of a list: a visualization about entering a room and putting something in the right corner, something else in the left corner down and something in the corner high in the room and something else in the middle of the wall will help the person remember all the elements in the room.

➤ Daniel Schacter, Harvard University, USA.

An interview with Professor Daniel Schacter, from the Department of Psychology and Centre for Brain Science, Harvard University, Cambridge, USA, has thrown light on the latest researches regarding the field of neuroimaging in episodic future thinking.

Answering some questions by email he has been willing to discuss episodic future thinking. In his works he has defined it as the capacity to imagine or simulate experiences that might occur in one's personal future.

1. How is future thinking related to Prospective Memory?

D. S. Prospective Memory, as well as decision making, emotion regulation, and spatial navigation can be thought of as a cognitive and neural mechanism supporting episodic future thinking. A core brain network that underlies episodic future thinking has been identified through studies focused on neural mechanisms.

Dr Schacter provided an article⁸⁷ where he proposes a model for future thinking, distinguishing among four basic forms of future thinking:

⁸⁷ Schacter D. (2017). Episodic future thinking: mechanisms and functions, Roland G Benoit and Karl K. Szpunar, *Current Opinion in Behavioral Sciences*, Elsevier 17:41–50.

- simulation, or construction of a specific mental representation of the future;
- prediction, which refers to estimation of the likelihood of a future outcome;
- intention, or setting of a goal;
- planning, referring to the organization of steps to achieve a goal.

Each form of future thinking varies from episodic future thinking, which refers to specific autobiographical experiences that may happen - to a semantic or abstract state of the world that may occur in the future. According to a constructive episodic simulation hypothesis, episodic memory is responsible for future simulation by allowing people recombine elements of past experiences into representations of future events.

This also accounts for reductions in episodic detail for both past and future events which have been documented in various patient populations, including patients with depression, post-traumatic stress disorder and amnesic syndrome.

There is a higher-order or semantic organizational mechanism, a conceptual general order containing personal knowledge which organizes episodic future thoughts into event clusters which accounts for episodic future thinking.

2. Which regions are responsible for future thinking?

D.S. It has been demonstrated that the hippocampus, and its different subregions, is responsive to entirely novel events and accounts for specific episodic thinking.

FMRI studies have linked hippocampal activity during imagining to the process of scene construction encoding of episodic simulations into long-term memory and detail recombination. Evidence from thought sampling procedures indicates that episodic future thoughts occur frequently in everyday life. They serve a range of functions, including decision making, emotion regulation, intention formation, and planning, and recent work has both strengthened and broadened this evidence.

3. Which is the importance of specific episodic thinking?

D. S. People organize episodic future thoughts into event clusters that reflect the influence of higher schematic, conceptual order so that affective knowledge is felt as a stronger subjective sense of 'pre-experiencing' for future events that are associated with personal goals. Thus, the construction of episodic details and the integration of those details with higher-order autobiographical knowledge may represent distinct components of episodic future thinking.

In the article he has proved this approach is widely discussed. ESI, or Episodic Specificity Induction regards detailed interviews that encourage people to focus on retrieving specific episodic details of a past experience.

During a research, young and old participants viewed a videotape of people performing routine actions in a kitchen. Two groups received either an ESI or a control induction, providing their general impression of the video. The experimental group was encouraged to focus on specific episodic details of a past experience.

After each induction, participants received picture cues and either remembered a related past experience, imagined a related future experience, or described the picture. Protocols were scored for internal and external details using an Autobiographical Interview.

The research indicated that an ESI encouraged subsequent production of internal details on the memory and imagination tasks, showing no effects on internal details in the picture description task, nor in the production of external details.

4. Can Prospective Memory be improved?

D.S. There is scientific evidence both in older and younger adults that shows that episodic future thinking can boost prospective memory. The simulation of performing an upcoming intention improves the possibility that the intention will be actually carried out.

In the article, the beneficial effects have been shown in younger and older adults alike, despite the existence of episodic future thinking deficits in older adults. Researches show a functional benefit of episodic future thinking for Prospective Memory, suggesting a link between the two

forms of prospection, further supported by researches that revealed significant positive correlations between episodic future thinking and prospective memory abilities.

➤ Golita Emsaki, PhD researcher for the University of Isfahan, Iran.

Author of *Memory specificity training can improve working and Prospective Memory in Amnesic, Mild Cognitive Impairment* with H.T. NeshatDoost et al. *Dement Neuropsychology* Sept. 11 (3) 255-261, 2017, University of Isfahan, Iran.

At the University of Isfahan, Department of Psychology, Prof Hamid Taher Neshat-Doost, Professor of the Islamic Republic of Iran addresses me to the PhD researcher Golita Emsaki for the interview about the research.

Questions addressed to Golita Emsaki concerned the methods used in the experimentation.

1. Which was the role of MEemory Specificity Training?

G.E. MEST was used as cognitive training in patients with Amnesic Cognitive Impairment and was conducted by trained senior clinical psychologists.

The author directs me to a specific article describing the procedure⁸⁸.

The article describes an experimentation where the training package consisted of five weekly 80-minutes group sessions in one of the two groups. Training words were used to teach the participants how to deal with the questions. Session 1 outlined the aims and procedure of MEST. The session started with the definition of words such as autobiographical memory and recall, as well as indications for three types of autobiographical memory: specific, extended, and categoric. Examples of each of the recall types were written on a whiteboard.

Participants were told that the memory they recalled might refer to an important or trivial event that happened recently or a long time ago, but that it should be something that happened at a particular time on a particular day. Examples of acceptable and unacceptable responses were

⁸⁸ The procedure is fully described in Hamis Taher NeshatDoost et al., Enhancing Autobiographical Memory Specificity through cognitive training: an intervention for depression, University of Isfahan, aps, *Clinical Psychological Science*, 1 (1) 84-92, 2013.

given. Practice cues were given (gigantic, bag, and homework). Generated memories were tape recorded for coding. Specific memories were defined as events that lasted for one day or less. Nonspecific memories were coded as extended, like events that lasted for longer periods of time, or categoric memories, events that occurred repeatedly over a period of time.

If a participant failed to recall a memory or talked about things that were not memories, the response was classified as “no memory.”

Participants were presented with Persian cue words consisting of positive (for example party), negative (accident), and neutral words (class). Psychologists then selected six positive, six negative, and six neutral words with the highest emotionality ratings that were also balanced for frequency of use and length. The cue words were presented in written form, each on an A4 card, in a separate random order for each participant. Participants were instructed to read each word aloud, and they were then given 30 seconds in each case to retrieve a specific memory.

Each participant was given a pen and notebook they should use to summarize sessions and for homework tasks. At the end of the session, participants were given 10 cue words and were instructed to write down specific, extended, and categoric memories for each of the words during the next week as homework.

Session 2 started with a review of Session 1 and homework. Participants then were asked to give positive cue words. These words were written on the whiteboard, and participants were asked to provide a specific memory for each of the cue words.

Words during the sessions were generated by the patients themselves. Participants were asked to say as many positive words as they could and write the words on the blackboard, then participants were asked to generate a memory with each of the words.

Nonspecific memories, categoric or extended, were clarified, and the participants were encouraged to recall specific memories. Homework, at the end of the session consisted in 10 positive cue words and participants were asked to provide one specific memory for each of the words.

Sessions 3 consisted in negative cue words where participants had to recall negative memories and in Session 4 participants had to answer neutral cue words. Homework was associated to each exercise following the model of the session.

In Session 5 participants trained the different cue words: with the different types of autobiographical memory recall with positive, negative, and neutral cue words, and the difference between a memory and a nonmemory was again clarified.

Participants were tested individually in a classroom by researchers who ignored group status on three occasions: pretraining, post-training, and 2-month post-training follow-up.

2. How was the Prospective Retrospective Memory Questionnaire used?

G.E. The Questionnaire has been used for the part which concerns prospective memory. As the questionnaire concerns 16 questions, 8 questions deal with prospective memory, while the remaining 8 deal with retrospective memory. Prospective memory questions were used before and after the treatment and after a period of 3 months as follow up and showed that the experimental group indicated improvement in the sum of scores which assess prospective memory.

Golita Emsaki's former research, conducted in 2013 defines the MEST method used in a distressed sample of bereaved adolescent Afghan refugees. The importance of this study lies in the fact that the relationship between changes in Autobiographical Memory Specificity (AMS) and depression is being examined. Evidence demonstrates that Reduced AMS can be considered a cognitive marker and predictor of the course of depression as individuals with depression, all showed significant difficulties providing specific memories. Difficulties in imagining specific events in the future, rumination and a lack of exposure to negative memories and associated negative emotions were related to diminished positive social reinforcement and self-efficacy, feelings of hopelessness, and depressed mood, demonstrating that the difficulty of accessing negative memories, which, although unpleasant in the short term, was associated with well-being in the longer term.

This interesting research has indicated that reduced AMS is not a fixed feature of an individual's mnemonic style, but it can be modified by training programs.

3. What did the results demonstrate?

G. E. MEST resulted in greatly improving AMS, but there is the need for additional research to replicate the results.

The researchers investigated the impact of MEST on AMS. One research conducted on symptoms of depression in a distressed sample of bereaved adolescent Afghan refugees indicated that MEST was successful in significantly enhancing AMS in trained participants, while no significant change was observed in the control group, indicating that adolescents in the MEST group had significantly lower levels of depressive symptoms at the 2-month follow-up than did those in the control group, suggesting that MEST improves AMS, which in turn has a causal effect on improving depression symptomatology in the longer term, implying that MEST can improve depression symptoms.

3.4 Summary and Evaluation

Philippe Vernois has underlined the importance of emotions in the process of encoding, storing, and retrieval, stating that memories can be accessed through the same strategy which has been used during the encoding process. He has confirmed that emotions can be retrieved from past experience and be anchored to a specific context. As the use of imagery has been recognized as an important factor in human cognition and memory, visualization has been indicated as the strongest strategy which can be used to retrieve information. Through the use of hypnosis, the hypnotherapist can encourage the patient to go back to the same strategy which has been used for the encoding, usually the visual strategy, and amplify the memory, using colours, sounds, smells, tastes, and anchor the information during post hypnotic inductions so that triggers can be used to retrieve the intention. This interview has shed light on the procedures to administer hypnotic inductions and to the use of anchoring as a strategy to transfer past experiences to future ones, thus reinforcing the possibility of success in hypnotic inductions to enhance concentration and memory.

Daniel Schacter's research has demonstrated the importance of specific episodic memories in Prospective Memory. As scientific evidence both in older and younger adults has demonstrated

that episodic future thinking can improve Prospective Memory, the present research design will take into consideration the possibility of improvement of Prospective Memory through episodic future events, to be scored through the PRMQ. The discovery of the brain network system that mediates past and future thinking has thrown light on the mechanisms of the process of retrieval in Prospective Memory. His laboratory researches have demonstrated the presence of a core brain system that is activated while remembering the past, envisioning the future and during related forms of mental simulations. This network includes the medial prefrontal regions, posterior regions in the medial and lateral temporal cortex -extending into the precuneus and the retrosplenial cortex- the lateral temporal cortex and the medial temporal lobe. Regions within the core system have resulted functionally correlated with each other and with hippocampal formation, indicating the possibility of an adaptive function which integrates information about the relationships and associations from past experiences, allowing the construction of mental simulations about possible future events.

Moreover, scientific studies have indicated a link between two forms of prospection: episodic future thinking and prospective memory abilities, further supported by researches that indicated significant positive correlations between them. It has been demonstrated that the hippocampus, and its different subregions, is responsive for entirely novel events and accounts for specific episodic thinking. Episodic future thinking has also been linked to emotional regulation, partly on the basis of evidence of reduced specificity and vividness of episodic future thinking in anxious individuals with emotion regulation problems. This is consistent with a training programme based on episodic future thinking which may support the possibility of building hypnotic sessions that may help Prospective Memory to be enhanced. The relationship between Autobiographic Memory Specificity and Depression symptoms has been confirmed by Daniel Schacter's researches.

Golita Emsaki answered some questions and addressed me to different researches conducted by the University of Iran, where psychologists investigated improvements of Prospective Memory in Mild Cognitive Impairment through the use of MEST, MEmory Specificity Training, a cognitive method for training memory through the use of positive, negative and neutral cue words in order to enhance AMS Autobiographic Specific Memory, also indicating the reduction of specific memories related to symptoms of depression. The use of cue words during the sessions are interesting tools in the improvement of memory and of the ability to imagine the

future. This interview has furnished an example of the use of the standardized Prospective Retrospective Memory Questionnaire as a reliable and useful tool providing qualitative data for quantitative measures. Participants were asked to say how often each of the actions mentioned in the item happened to them on a five-point scale: very often, quite often, sometimes, rarely, never. Ratings were subsequently assigned numerical values of 5 (very often) to 1 (never) resulting in minimum and maximum possible total scores of 16 and 80, respectively.

Only prospective items have been tested in this Iranian research and neither general score memory nor the specific tripartite model has been used.

3.5 Influence of the Expert Interviews in the Development of the Hypotheses

The research by Golita Emsaki on Prospective Memory in Amnesic Cognitive Impairment has validated the use of the Questionnaire PRMQ in clinical studies. Her redirection to a research that establishes the relationship between Autobiographical Memory and Depression showed encouraging results suggesting a side effect on the improvement of Perspective Memory, also confirmed by D. Schacter's studies. In the design of the present research, the use of the PRMQ, designed with separate items regarding Prospective and Retrospective Memory may confirm D. Schacter's discovery of the brain network which is responsible both for Prospective and for Retrospective Memory.

In order to gain insight into a distinction between different kinds of performances in everyday life, the use of a self-rating questionnaire allows systematic study of memory failures through the subscales.

Philippe Verneis' interview confirms the importance of personal memories and emotions and of the sensory perceptions in retrieving and accessing past experience. The importance of emotions in retrieval processes has also been widely demonstrated in literature.

Emotional memories are vividly reactivated and remembered and positive memories seem to contain more sensory and contextual details than negative and neutral memories⁸⁹ as positive

⁸⁹ D'Argembeau, A. Comblain, C. Van der Linden, M. (2003). Phenomenal characteristics of autobiographical memories for positive, negative, and neutral events. *Applied Cognitive Psychology*. **17** (3): 281–294.

personality traits and self-esteem are related with a reactivation of positive memories and with the displaying of more resources to encode positive memories over negative ones. Positive memories appear to be more resistant to forgetting. Researches pointed out that the fading effect is less frequent with positive than with negative memories, leading to a better remembrance of positive recollections.

Emotions affect the way autobiographical memories are encoded and retrieved. Most emotional memories are the result of cued recall, in the same way as events connected to the senses may be used as a cue that can trigger emotional recall. According to Lerner⁹⁰, emotional memory adds credibility to the notion that thoughts can activate emotion in the same way as emotions can create cognitions.

According to the *encoding specificity principle*, proposed by Tulving⁹¹ memory processes information from the memory trace, connecting encoding and retrieval, considering similarities between the process of recognition and that of recall. Memory can be improved when information becomes available during the encoding phase through context cues. When external conditions involving emotional cues, present similarities to those in existence at the time memory was stored, memories are more easily retrieved. Specific encoding operations performed on what might determine what is stored provide effective cues in providing access to what is stored, thus accounting for effective retrieval.

The state of wellness which can be felt in hypnosis helping the person relax the mind and slow the process of thoughts, may help acquiring an improved ability to concentrate and focus on a trace which may help recollect memories and distant emotions. The possibility of access to personal positive emotions and focus on them may permit the emerging of a trace which may allow the connection with a future memory.

This may account for the research design and the possibility of using hypnosis to improve Prospective Memory and Concentration. This confirms the first wordings of the hypothesis and leads to the formulation of the 1st hypothesis:

⁹⁰ Lerner, J. Keltner, D. (2000). Beyond valence: Toward a model of emotion-specific influences on judgment and choice. *Cognition and Emotion*, 14(4), 473-493.

⁹¹ Tulving, E.; Thomson, M. (1973). Encoding specificity and retrieval processes in episodic memory, *Psychological Review*, 80(5), 352-373.

1st Hypothesis

- H₁: If Hypnotic Treatments are applied to reduce failures in memory daily life, then differences in the scores of Prospective Memory in PRMQ might be observed in the Treated Group when confronted with the means of a Control Group.

Considerations about the experts' interviews are leading to the necessity of testing internal or self- cued memories which might confirm an improvement in Prospective Memory performances. In the present research design, the tripartite model of the PRMQ with its subscales will be used to score autobiographic self- cued memories.

Consistent with the findings of the importance of specific and internal memories in Prospective and Retrospective Memory, the PRMQ offers the possibility of testing an equal number of daily failures regarding Self-cued Memory vs Environmentally-Cued Memory, and with Short-term versus Long-term Memory scales.

Memory traces are encoded at various places in the cortex, and the hippocampus, placed inside the medial temporal lobe helps to transfer short-term memory into long-term memory. Sensory memories are either filtered out and forgotten or transferred into long- term memory, provided that they are interesting and relevant for subsequent recall. Information from the senses, like smell, touch, hearing, taste and sight, are selected from the environment and filtered, perceived and then organised. At the cellular level, memory is expressed as changes to the structure and function of neurons.

According to Earhard⁹², memory traces furnish the link between encoding conditions and the retrieval environment, varying in the specificity of code which brings the retrieval information governing the effectiveness of the recovery of the stored information. Some researchers have devoted their studies differentiating between external and internal cues in order to find out which are more effective for retrieval. Recent experiments demonstrated that recall and recognition of items stored under identical encoding conditions are greatly influenced by the nature of information present in the retrieval environment, and those produced through active recoding of the trace are most relevant to determining its subsequent retrievability in different

⁹² Earhard M. (1969). *Storage and retrieval of words encoded in memory*. *Journal of Experimental Psychology*, 1969, 80, 412-418.

retrieval environments. Strong relationships between the cue and the target drive successful recall. When people create “focused” internal cues, they are more likely to regenerate those same cues later, and their cues become more effective. The effectiveness of external cues can be improved by combining them with implementation of intentions, a prospective memory strategy. Self-generated memory cues allow people to personally elaborate on abstract concepts, establish links to ideas in long-term memory, create unique and persistent retrieval routes, and ultimately sustain memory.

Since the short memory system holds a small amount of information memory for a few seconds, before storing the experience and eventually transmitting it to a long memory system which may permit the retrieval, short-term memory may act as a filter and temporary storage. Working memory has been studied by researchers as a theoretical framework that refers to structures and processes used for temporarily storing and manipulation of information as presented by Baddeley's influential 1986 model of working memory⁹³ and later proposed by Alan Baddeley and Graham Hitch in 1974. Since the encoding phase plays an important role in memory retrieval, it is likely that the special state of alert and focused concentration that emerges in a modified state of the consciousness may account for an endurable trace for later recall.

2nd Hypothesis

- H₂: If Hypnotic Treatments are applied to reduce failures in memory daily life, then differences in the scores of PRMQ might be observed in the Treated Group when confronted with the means of a Control Group in *Short-term Memory* scores of PRMQ;

The possibility of improving future memory performances has been confirmed by all the researchers interviewed. All the experts indicated and proved the importance of subjective episodic specific memories in Prospective Memory training, confirming the necessity of proceeding with an individual training which relates to autobiographical memory recollections.

⁹³ Baddeley, A., Hitch G. (2017). *Working Memory - Psychology Unlocked*, 10 January.

Conway and Pleydell⁹⁴ proposed that autobiographical memory is constructed within a Self-Memory System where episodes are based both on episodic and semantic memory, and recollected according to a model where the autobiographical knowledge interacts with the working self.

In this way, self-generated memory cues can create links to long-term memory, and ultimately support later retrieval. Self-generated cues are more effective at supporting retrieval and allow an easy access across environmental and mental contexts⁹⁵ when they are tied to personal experiences, they are distinctive, and strongly associated to the target information. They may be trained so that people can learn to generate stable cues, by the use of privileged accesses.

Autobiographical memory knowledge base is distributed through neural networks in the frontal, temporal and occipital lobes and it is organized around a hierarchical structure, containing lifetime periods, general events, and event-specific knowledge. Vividly detailed information about individual events, often in the form of visual images and sensory-perceptual features account for event-specific knowledge. This system is characterized by specific memories that resist decay⁹⁶ such as originating events, turning points, anchoring events and analogous events.

Autobiographical memory performs a self-representative function allowing the creation and maintenance of a coherent self-identity over time. A stable self-identity allows evaluation of past experiences, leading to self-insight and often self-growth. Past experiences provide a reference for solving current problems and a guide for present and future actions and create successful models of behaviour.

According to Daniel Schacter's researches, ESI, Episodic Specificity Induction was effective in encouraging subsequent production of internal details on memory and imagination tasks autobiographical knowledge represents a higher order of integration for the construction of episodic details in future thinking.

⁹⁴ Conway, M. A. Pleydell-Pearce C. W. (2000). The construction of autobiographical memories in the self-memory system. *Psychological Review*. 107 (2): 261–288.

⁹⁵ Tullis, J.G., Finley J.R. (2018). Self-Generated Memory Cues: Effective Tools for Learning, Training, and Remembering, *Behavioral and Brain Sciences* 1, Department of Educational Psychology, University of Arizona, U.S.A.

⁹⁶ Pillemer, D. B. (2001). Momentous events and the life story. *Review of General Psychology*. 5 (2): 123–134.

- H₃: If hypnotic treatments are applied to reduce failures in memory daily life, then differences in the scores of PRMQ will be observed in the treated group when confronted with the means of a control group in *Self- Cued Memory* scores of PRMQ;

The research design will confront the scores of the self- rated Questionnaire with the scores of an objective measure or Autobiographic Memory Test (AMT).

- H₄: If hypnotic treatments are applied to reduce failures in memory daily life, then differences in the scores of *PM* in AMT will be observed in the Treated Group when confronted with the means of a Control Group

All the hypotheses will be confronted with a null hypothesis and the use of a control group will define which of the hypotheses will be confirmed, considering Hypnotic Sessions and Prospective Memory as the independent and dependent variables to be operationalized and measured.

3.6 Qualitative and Quantitative Methods

Scientific research designs include qualitative and quantitative data for the final evaluation.

Quantitative data is a complementary approach to qualitative data collection in order to provide an understanding of the program's context and explain complex issues.

Quantitative data provide information that can be collected by surveys or questionnaires, pretests and posttests, observation, or review of existing documents and databases. Surveys can be self- or interviewer-administered and conducted face-to-face or by telephone, by mail, or online. Analysis of quantitative data involves statistical analysis, from basic descriptive statistics to complex analyses.

Quantitative methods refer to information that may be numerically measured. Quantitative data measure the depth and breadth of a scientific research. Quantitative data are collected before and after the research and show its outcomes and impact.

The strengths of quantitative data for evaluation purposes include their generalizability, especially when the sample represents a special target of the population, their consistency and precision, its validity and reliability.

The limitations of using quantitative data for evaluation can include poor response rates from surveys, difficulty in obtaining documents, and difficulties in valid measurement.

There are four main types of quantitative research designs: descriptive, correlational, quasi-experimental and experimental. The differences between the four types primarily relates to the degree the researcher design establishes a link between variables and the need of controlling them. Quantitative research designs are usually based on one of 4 approaches:

1. Descriptive Design describes the current status of a phenomenon. The researcher does not begin with a hypothesis, but develops the hypothesis after the data is collected. Data collection is devised as observational in nature and might be conducted with only one group;
2. Correlational Design explores the relationship between variables using statistical analyses. It does not take into account cause between the variables and it is also mostly observational in terms of data collection. It might allow for the investigation of a number of independent variables at the same time;
3. Quasi-Experimental Design establishes a cause-effect relationship between two or more variables. The independent variable is not manipulated and the researcher does not assign random groups. Control groups are only identified and exposed to the variable. Experimental research is conducted in situations which cannot be completely controlled or manipulated;
4. Experimental Designs, also known as true experimentation. This approach uses the scientific method to establish cause-effect relationship among variables, their effect being collected and analyzed. Researchers control variables except for the independent variable, which is being manipulated. According to Herbert W Seliger⁹⁷ this approach is

⁹⁷ Herbert, W. Seliger, Shohamy E., (1989). *Second Language Research Methods*, Oxford University Press.

based on control group design, in which one group receives treatment while the other, representing the same population as the experimental subjects, does not receive treatment.

In order to exclude the null hypothesis H_0 and confirm the reduction of failures in memory daily life through the use of hypnotic induction training, as stated in H_1 , and H_2 , the control group design appears as the most suitable one. In this experimental design, one group can be treated with hypnosis while the other group will be used as control group.

Chapter 4 Research Design

Experimental research is carefully constructed so that variables can be controlled and manipulated⁹⁸.

H. W. Seliger

4.1 Summary of the Quantitative Methodological Approach

In this research design the *Control Group Design*, a quantitative approach widely used in research experimental designs, will be used. One of the 2 groups, the Treatment group will receive treatment, while the other group will serve as Control Group. A pre-test and a post-test will be administered to both groups.

The presence of a Control Group will exclude confounding variables which may influence the results and ensure a strong level of internal validity. The principle behind this design involves randomly assigning subjects in two groups, the ultimate difference being that one group is being administered the treatment. A specific number of hypnotic inductions will represent the independent variable which may produce changes in the dependent variable, represented by Prospective Memory and its measurement refers to how the effects of the treatment will be evaluated.

The investigation will be carried out by measuring the effectiveness of implementation of memory skills on adult volunteers aged 65-69 years old through a period of 7 weeks, and the results will be shown by the scores obtained with the statistical parameters of the PRMQ Questionnaire⁹⁹, administered as a Pre-test and Post- test. The research design will compare data from the experimental group with data from the control group so that the independent variable will be tested by the presence of the control group¹⁰⁰.

⁹⁸ Seliger, H.W. Shohamy E., (1989). *Second Language Research Methods*, Oxford University Press, p.137.

⁹⁹ Crawford, J.R., Smith G., Maylor E.A., Della Sala S., Logie R.H. (2003). The Prospective and retrospective Memory Questionnaire: Normative data and latent structure in a large non-clinical sample, *Memory*, 11 (3) 261-275, Psychology Press.

¹⁰⁰ Bailey, R. A. (2008). *Design of Comparative Experiments*. Cambridge University Press. ISBN 978-0-521-68357-9.

RESEARCH DESIGN

			Treated Group	Control Group
Initial Phase	Pre-test	1 st session	PRMQ	Pre-test
		2 nd session	AMT	Pre-test
Experimental Phase	1 st Phase	3 rd session	Hypnotic session	
			Memory Strategies	
	4 th session	Hypnotic session		
		Memory Strategies		
	2 nd Phase	5 th session	Hypnotic session	
			Memory Strategies	
Final Evaluation	Post-test	6 th session	Hypnotic session	
			Memory Strategies	
		7 th session	PRMQ	Post-test
			AMT	Post-test
Conclusion		Statistical Analysis		

Phases of the Research Design

An Autobiographic Memory Test (AMT)¹⁰¹ will be administered to both groups to provide an external objective measure of control to the self-reported Questionnaire PRMQ.

The treatment will regard the re-evocation of autobiographical and significant positive emotional events, and the implementation of strategies based on meaningful sensory stimulus, while an active control group will ensure the isolation of the independent variable. During the research design memory strategies will be taught to both groups.

¹⁰¹ Williams, Broadbent (1986) Autobiographical Memory in suicide attempters, *Journal of Abnormal Psychology*, 95, 144-149.

Since the aim of the current study is to investigate the effect of hypnosis on memory and concentration and implement better strategies of learning, and the possibility of reactivating mental processes through the recollection of autobiographic memory will be explored.

A self-reported Questionnaire, the PRMQ will measure General Memory failures in daily life, Prospective and Retrospective Memory and specific memories failures.

The research design will be structured into 7 sessions.

During Hypnotic Sessions personal experiences will be evoked to help memories of past experiences through the use of images and inputs regarding preferred representational systems or sensory modalities in order to build up strategies for the mind to process and store new information through words which refer to the person's inner world.

As both storage and retrieval processes are concerned in memory problems, the dependent variable will be measured in order to find out whether hypnosis will work focusing attention and exclude the null hypothesis.

Hypnotic Inductions

Milton Erickson's approach will be used during the hypnotic sessions. The approach is centred around the belief that each person holds his/her own abilities and the hypnotherapist simply facilitates the individual and unique creative process of the unconscious mind in problem solving.

The inductions will be focused around 7 steps:

- Form the intention
- Induction of an altered state of consciousness through relaxation
- Recollection of past experiences (Autobiographic Memory Test) and sensitivity to modalities
- Deepening of the state of trance with inner focus and visualizations
- Building a mnemonic trace

- Post hypnotic suggestions
- Return to consciousness

For the present research inductions will be carried out linking the person's positive past experiences with future actions.

After entering in the first stage of hypnosis when an intention is formed, a state of relaxation will be induced. This phase is characterized by side to side eye movements deepening the modified state of consciousness to prepare the unconscious mind to be more receptive to new suggestions and behaviours. During the deepening of the trance, in-depth visualization will help the person focus on his/her own memories and recall strategies. Suggestions will fit in with the 'worldview' of the subject and will be designed to form a mnemonic trace. A post-hypnotic suggestion, either visual or auditory, reinforces the intention during the hypnotic process. The final stage will be devoted to the return to a normal state of consciousness.

The aim of the present design is to verify if hypnosis, through the use of a modified state of conscience, and focusing attention on the intention, may implement future strategies based on past positive memories and consolidate the trace of the intention to make it available for future daily activities.

4 individual hypnotic sessions will be organized

- 1st session: setting the goals, inducing relaxation, recollection of a past experience, going back to learning experiences;
- 2nd session: event-based induction related to the future intention, focus on positive emotions, finding a cue word and give a title to the scene;
- 3rd session: time-based induction related to the future intention, linking the emotion with the future experience;
- 4th session: anchoring the experience, post-hypnotic suggestions

4.2 Statistically Testable Hypotheses

This research design will measure the effects of Hypnotic Sessions, the independent variable, on Prospective Memory, the dependent variable, and demonstrate whether the variables are related to each other and the validity of the proposed hypothesis. As in the scientific method, an experiment is an empirical procedure that “arbitrates competing models or hypotheses”¹⁰², in order to obtain operational hypothesis, the relationship between the variables will be measured and the occurred measurement will be stated.

While the null hypothesis denies a relationship between Prospective Memory and a mnestic effect of the Hypnotic Sessions, the suggested hypothesis, admits the possibility of a relationship between the variables.

The proposed hypothesis concern the possibility of measuring the scores of Prospective Memory failures through the PRMQ after a set of training hypnotic sessions in the treated group and compare the scores at the end of the treatment with hypnosis with the scores of a non-treated group of 65-69 years old people with the same characteristics which will take into account the cognitive level proposed by the normative standards of the Questionnaire.

Since the special state of alert which emerges in a modified state of consciousness may account for an endurable trace for later recall and the encoding phase plays an important role in memory retrieval, the context imply the working of a Short Memory System mainly lying in the prefrontal cortex, responsible for a later storage of the experience to a long memory system relying on the hippocampus thus transferring short-memory recollections into long-term memory system which may permit a future retrieval.

Based on the assumption that the involvement of Hypnotic treatment Sessions with past positive experience of the self are constructed within a Self-Memory System¹⁰³ which performs a self-representative function allowing the creation and maintenance of a coherent self-identity over time where Autobiographical knowledge represents a higher order of integration for the

¹⁰² Cooperstock, F. I. (2009). General relativistic dynamics: extending Einstein's legacy throughout the universe, Online-Aug., Singapore: *World Scientific*. p. 12.

¹⁰³ Conway M.A., Pleydell-Pearce C.W. (2000). The Construction of Autobiographical Memories in the Self-Memory System *Psychol Rev*, Apr, 107(2):261-88.

construction of episodic details in future thinking organized around a hierarchical structure, 4 hypotheses will be tested regarding Prospective, Short-term and Self-cued Memories.

Since the PRMQ will test 6 kinds of memories -Prospective, Retrospective, Short-term, Long-term, Self-cued and Environmentally cued- the expected result of the experimentation is that hypnosis, due to effect on internal focus and the use of past autobiographical memories may result in having an effect on other kinds of memories, such as Short-term Memory and Self-cued Memory.

4 hypotheses are formulated where 3 hypotheses will be measured through the PRMQ and the 4th through the AMT.

1st Hypothesis: Prospective memory in PRMQ

- H₀ If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, no significant differences in the scores of the PRMQ will be observed in the Treated Group when confronted with a Control Group
- H₁ If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, then significant differences in the scores of the PRMQ will be observed in the Treated Group when confronted with a Control Group

2nd Hypothesis: Short-time memory in PRMQ

- H₀: If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, no significant differences in the Short-term scores of the PRMQ will be observed in the Treated Group when confronted with a Control Group
- H₁: If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, then significant differences in Short-term scores of the PRMQ will be observed in the Treated Group when confronted with a Control Group

3rd Hypothesis: Self-cued Memory in PRMQ

- H₀: If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, no significant differences in the scores of Self-Cued Memory in PRMQ will be observed in the Treated Group when confronted with a Control Group
- H₁: If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, then significant differences in the scores of Self -Cued Memory in PRMQ will be observed in the Treated Group when confronted with a Control Group

4th Hypothesis: PM scores in AMT

- H₀: If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, no differences in the scores of PM in AMT-measured by Personal Success-will be observed in the Treated Group when confronted with a Control Group
- H₁: If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, then significant differences in the scores of the PM in AMT –measured by personal Success-will be observed in the Treated Group when confronted with a Control Group

A control group will be used to compare the results and to confirm one of the hypotheses and exclude the other. For each of the 4 hypotheses, in order to exclude the null hypothesis, H₁ will have to confirm that the results are due only to hypnotic sessions.

The Student's t-distribution for independent samples will be used as a statistical procedure to determine whether the mean difference can be statistically significant. Each subject will be measured twice through a pre-test and a post-test and the means of the 2 groups will be compared.

The collected data will be used to define a model of learning activities and operational guidelines.

4.3 Test Instruments: Prospective Retrospective Memory Questionnaire and Autobiographic Memory Test

The Prospective and Retrospective Memory Questionnaire (PRMQ) was developed by Smith, Della Sala, Logie, & Maylor in 2000. It is a self-report Questionnaire which measures Prospective and Retrospective Memory failures in everyday life. It is made up of 16 items, 8 concerning Prospective Memory failures, and 8 items scoring Retrospective Memory failures.

As the present research has the aim of showing and determine differences between individuals' scores, the questionnaire can be administered before and after the sessions.

The PRMQ, has been standardized¹⁰⁴ by the same authors in a European context which provides the quantification of the data. 551 members of the adult male and female population, aged from 17 to 94 years, were tested from a wide variety of sources in two cities of the U.K. with a range of education from 4 to 20 years. It includes rural residents as well as urban dwellers from different kinds of organizations, community centers and recreational clubs.

The questionnaire was initially designed to measure self-reports of Prospective and Retrospective Memory in patients with Alzheimer's disease. It has been evaluated against 10 other competing models and used for a range of different demographics including gender, education, economic status, age and country of origin. Many studies have used versions of the PRMQ since it was created, as the PRMQ has then been proven a reliable and accurate method of testing memory.

The Questionnaire examines the cognitive mechanisms which might undergo a change during old age in a multidimensional perspective and shows how normal aging may be characterized by maintaining abilities, potentialities and resources.

The authors asked participants to rank how often memory failures occur during daily activities and the scores were measured with a 5- point Likert scale, ranging from very often, often,

¹⁰⁴ Crawford, J.R., Smith G., Maylor E.A., Della Sala S., Logie R.H. (2003). The Prospective and retrospective Memory Questionnaire: Normative data and latent structure in a large non-clinical sample, *Memory*, 11 (3) 261-275, Psychology Press.

occasionally, very rarely, never, with a minimum and maximum possible total score of 16 and 80, respectively.

	PRMQ	Very often	Quite often	Sometimes	Rarely	Never
1	Do you decide to do something in a few minutes' time and then forget to do it?					
2	Do you fail to recognize a place you have visited before?					
3	Do you fail to do something you were supposed to do a few minutes later even though it's there in front of you, like take a pill or turn off the kettle?					
4	Do you forget something you were told a few minutes before?					
5	Do you forget appointments if you are not prompted by someone else or by a reminder such as a calendar or a diary?					
6	Do you fail to recognize a character in a radio or television show from scene to scene?					
7	Do you forget to buy something you planned to buy, like a birthday card, even when you see the shop?					
8	Do you fail to recall things that have happened to you in the last few days?					
9	Do you repeat the same story to the same person on different occasions?					
10	Do you intend to take something with you, before leaving a room or going out, but minutes later leave it behind, even though it is there in front of you?					
11	Do you mislay something that you have just put down, like a magazine or glasses?					
12	Do you fail to mention or give something to a visitor that you were asked to pass on?					
13	Do you look at something without realizing you have seen it moments before?					
14	If you tried to contact a friend or relative who was out would you forget to try again later?					
15	Do you forget what you watched on tv the previous day?					
16	Do you forget to tell someone something you had meant to mention a few minutes ago?					

Prospective Retrospective Memory Questionnaire (PRMQ)

The total raw score of the test is given by the sum of the scores to the single items.

The PRMQ allows a systematic study to differentiate whether failures are prospective or retrospective and investigate whether different variables are associated with prospective or retrospective failures. The approach used in the PRMQ provides an internal correlation of the items which take into account the possibility of measuring each item with 3 different scores.

The PRMQ assesses three variables: prospective and retrospective memory; short-term memory vs long-term memory, and self-cued vs environmentally-cued memory.

Its novelty and importance lie in the fact that all previous works using self-reports of memory abilities had ignored to differentiate between Prospective and Retrospective Memory in the same questionnaire.

Tables have been constructed to convert raw scores on the PRMQ to T scores, which have a mean of 50 and a Standard Deviation of 10, in order to allow future research to compare the data.

8 of the items enquire about Prospective Memory and 8 about Retrospective Memory, while each of the item may test 3 different kinds of memory at the same time, or separately.

Many questions are used to test all possible combinations of the different memory types assessed by the PRMQ.

Each item can be categorized along 3 dimensions, so that 6 kinds of memories can be tested, each item containing 3 kinds of memories, indicating the possibility of showing improvements in General Memory, Prospective and Retrospective Memory but also, more specifically, internal memories scored in subscales.

The items have been designed to contain an equal number of items concerned with Self-cued memory or Environmentally-cued memory and with Short-term versus Long-term memory. In this way, each kind of memory item can be also scored independently from the others.

	PRMQ			
1	Do you decide to do something in a few minutes' time and then forget to do it?	Prospective	Short- term	Self- cued
2	Do you fail to recognize a place you have visited before?	Retrospective	Long- term	Environmentally- cued
3	Do you fail to do something you were supposed to do a few minutes later even though it's there in front of you, like take a pill or turn off the kettle?	Prospective	Short- term	Environmentally- cued
4	Do you forget something you were told a few minutes before?	Retrospective	Short- term	Self- cued
5	Do you forget appointments if you are not prompted by someone else or by a reminder such as a calendar or a diary?	Prospective	Long- term	Self- cued
6	Do you fail to recognize a character in a radio or television show from scene to scene?	Retrospective	Short- term	Environmentally- cued
7	Do you forget to buy something you planned to buy, like a birthday card, even when you see the shop?	Prospective	Long- term	Environmentally- cued
8	Do you fail to recall things that have happened to you in the last few days?	Retrospective	Long- term	Self- cued
9	Do you repeat the same story to the same person on different occasions?	Retrospective	Long- term	Environmentally- cued
10	Do you intend to take something with you, before leaving a room or going out, but minutes later leave it behind, even though it is there in front of you?	Prospective	Short- term	Environmentally- cued
11	Do you mislay something that you have just put down, like a magazine or glasses?	Retrospective	Short- term	Self- cued
12	Do you fail to mention or give something to a visitor that you were asked to pass on?	Prospective	Long- term	Environmentally- cued
13	Do you look at something without realizing you have seen it moments before?	Retrospective	Short- term	Environmentally- cued
14	If you tried to contact a friend or relative who was out would you forget to try again later?	Prospective	Long- term	Self- cued
15	Do you forget what you watched on tv the previous day?	Retrospective	Long- term	Self- cued
16	Do you forget to tell someone something you had meant to mention a few minutes ago?	Prospective	Short- term	Self- cued

<i>Prospective items</i>	
1	Do you decide to do something in a few minutes' time and then forget to do it?
2	Do you fail to do something you were supposed to do a few minutes later even though it's there in front of you, like take a pill or turn off the kettle?
3	Do you forget appointments if you are not prompted by someone else or by a reminder such as a calendar or diary?
4	Do you forget to buy something you planned to buy, like a birthday card, even when you see the shop?
5	Do you intend to take something with you, before leaving a room or going out, but minutes later leave it behind, even though it's there in front of you?
6	Do you fail to mention or give something to a visitor that you were asked to pass on?
7	If you tried to contact a friend or relative who was out, would you forget to try again later?
8	Do you forget to tell someone something you had meant to mention a few minutes ago?

<i>Retrospective items</i>	
2	Do you fail to recognize a place you have visited before?
4	Do you forget something you were told a few minutes before?
6	Do you fail to recognize a character in a radio or television show from scene to scene?
8	Do you fail to recall things that have happened to you in the last few days?
9	Do you repeat the same story to the same person on different occasions?
11	Do you mislay something that you have just put down, like a magazine or glasses?
13	Do you forget to buy something you planned to buy, like a birthday card, even when you see the shop?
15	Do you forget what you watched on tv the previous day?

<i>Short-term memory Items</i>	
1	Do you decide to do something in a few minutes' time and then forget to do it?
3	Do you fail to do something you were supposed to do a few minutes later even though it's there in front of you, like take a pill or turn off the kettle?
4	Do you forget something you were told a few minutes before?
6	Do you fail to recognize a character in a radio or television show from scene to scene?
10	Do you intend to take something with you, before leaving a room or going out, but minutes later leave it behind, even though it is there in front of you?
11	Do you mislay something that you have just put down, like a magazine or glasses?
13	Do you look at something without realizing you have seen it moments before?
16	Do you forget to tell someone something you had meant to mention a few minutes ago?

	<i>Long- term Memory items</i>
2	Do you fail to recognize a place you have visited before?
5	Do you forget appointments if you are not prompted by someone else or by a reminder such as a calendar or a diary?
7	Do you forget to buy something you planned to buy, like a birthday card, even when you see the shop?
8	Do you fail to recall things that have happened to you in the last few days?
9	Do you repeat the same story to the same person on different occasions?
12	Do you fail to mention or give something to a visitor that you were asked to pass on?
14	If you tried to contact a friend or relative who was out would you forget to try again later?
15	Do you forget what you watched on tv the previous day?

	<i>Self- cued Memory items</i>
1	Do you decide to do something in a few minutes' time and then forget to do it?
4	Do you forget something you were told a few minutes before?
5	Do you forget appointments if you are not prompted by someone else or by a reminder such as a calendar or a diary?
8	Do you fail to recall things that have happened to you in the last few days?
11	Do you intend to take something with you, before leaving a room or going out, but minutes later leave it behind, even though it is there in front of you?
14	If you tried to contact a friend or relative who was out would you forget to try again later?
15	Do you forget what you watched on tv the previous day?
16	Do you forget to tell someone something you had meant to mention a few minutes ago?

	<i>Environmentally- cued Memory items</i>
2	Do you fail to recognize a place you have visited before?
3	Do you fail to do something you were supposed to do a few minutes later even though it's there in front of you, like take a pill or turn off the kettle?
6	Do you fail to recognize a character in a radio or television show from scene to scene?
7	Do you forget to buy something you planned to buy, like a birthday card, even when you see the shop?
9	Do you repeat the same story to the same person on different occasions?
10	Do you intend to take something with you, before leaving a room or going out, but minutes later leave it behind, even though it is there in front of you?
12	Do you fail to mention or give something to a visitor that you were asked to pass on?
13	Do you look at something without realizing you have seen it moments before?

The Questionnaire offers the possibility of scoring memory failures and offer a score in order to demonstrate each of the hypothesis, also testing the scores of internal subscales.

4.4 Statistically Analysis of the Data

Statistical analysis of the research design can determine whether the suggested hypothesis will be confirmed so that either the effect of the intervention or the null hypothesis H_0 will be validated. As the PRMQ was elaborated after ten competing models of the latent structure of the PRMQ derived from theoretical and empirical sources and tested using confirmatory factor analysis¹⁰⁵, internal and external validity and reliability have been evaluated by the authors, as well as confidence limits on scores for each of the PMRQ scale were formed by obtaining the standard error of measurement for true scores.

The construction of the PRMQ has demonstrated to meet with the requirement of internal validity, as it refers to how the test measures the constructs it has to measure, and how well it reflects the reality it claims to represent. The PRMQ reflects face validity, in the appearance of the instrument, content validity for the adequacy of the domain of measurement, validity of content as it relates to criteria of importance, and validity of construct, which have been established through the relationship among latent variables.

The PRMQ also shows external validity, for its results can be generalized to and across different situations.

The PRMQ also shows its reliability as it refers to how dependably or consistently the test measures each kind of memory in case a person takes the test again to make sure that if he/ she will get a similar test score.

In statistics, Cronbach's alpha is a name used for tau-equivalent reliability as the estimate of the reliability of a psychometric test¹⁰⁶. Cronbach's alpha is linked to the intercorrelations among test items, and is thus known as an internal consistency estimate of reliability of test scores. Because intercorrelations among test items are maximized when all items measure the same construct, Cronbach's alpha is widely believed to indirectly indicate the degree to which a set of items measures a single unidimensional latent construct. As the final model of PRMQ consists of a General Memory Factor of Prospective and Retrospective Memory, the reliability of the

¹⁰⁵ Crawford, J.R., Smith G., Maylor E.A., Della Sala S., Logie R.H. (2003). The Prospective and retrospective Memory Questionnaire: Normative data and latent structure in a large non-clinical sample, *Memory*, 11 (3) 261-275, Psychology Press, p.263.

¹⁰⁶ Cronbach L.J. (1951). Coefficient alpha and the internal structure of tests, *Psychometrika*, 16 (3): 297–334.

PRMQ was estimated using Cronbach's alpha, and has been reported by the authors as 0.89 for the Total scale, 0.84 for the Prospective Scale and 0.80 for the Retrospective scale.

As an $\alpha < 0.5$ the test reliability is considered acceptable, the PRMQ 's reliability can be considered a good reliability of the test. Cronbach's alpha also has a theoretical relation with factor analysis. As shown by Zinbarg, Revelle, Yovel and Li¹⁰⁷, alpha may be expressed as a function of the parameters of the hierarchical factor analysis model which allows for a general factor that is common to all of the items of a measure in addition to group factors that are common to some but not all of the items of a measure.

Independent samples of t- test¹⁰⁸ revealed that the mean scores for females and males did not differ significantly on the Total scale ($t=1.23$, $p=0.22$) or Prospective scale ($t=0.47$, $p=0.64$). An effect on gender was observed only for the Retrospective subscale: $t=2.73$, $p < .01$ females reported fewer memory lapses than males. However, as the effect size was very modest with gender, accounting for only 1.3% of the variance, the authors concluded that age and gender did not influence PRMQ scores, thus simplifying the presentation and interpretation of normative data.

Tables have been provided to facilitate the interpretation of scores on the PRMQ, as well as tables to allow users to assess the reliability and abnormality of differences between an individual's scores on the Prospective and Retrospective scales, and to allow the calculation of the subscales and comparison of the scores of Short vs Long- term memory, Self-cued vs Environmentally-cued Memory. Tables provide the scores for the standard error of measurement, the discrepancies on the percentage of population between T scores on the Prospective and Retrospective scales.

¹⁰⁷ Zinbarg, R., Revelle W., Yovel I., Li W. (2005). Cronbach's, Revelle's, and McDonald's: their relations with each other and two alternative conceptualizations of reliability, *Psychometrika*, 70: 123–133.

¹⁰⁸ Smith, G., Della Sala S., Logie R.H., Maylor E.A. (2003). Prospective and retrospective memory in normal ageing and dementia: a questionnaire study, *Memory* 8, 311-321.

4.5 Justification for the Questionnaire

The PRMQ has proved an accurate measure of internal consistency in the general adult population and can be used as a tool to confirm or disconfirm the suggested hypothesis.

The PRMQ tests General Memory, both Retrospective and Prospective. The items have been built with an internal consistency provided by Cronbach's alpha which defines the intercorrelations among test items, as an internal consistency estimate of reliability of test scores. Intercorrelations between the items measured for the first time by a Questionnaire proves consistent with D. Schacter's researches on the brain network which has indicated intercorrelations between brain structures which are responsible both for Retrospective and Prospective Memory, as the functions regarding prospective and retrospective areas regard the same subregions of the human brain.

The link between past and future memories has also been indicated by various authors¹⁰⁹, demonstrating that Prospective Memory is not independent from Retrospective Memory.

The Questionnaire has proved a useful instrument to tests 6 types of memories, so that the sum of each item indicates the score for the specific memory.

One of the limits of the PRMQ relies on self-report, the form of the Questionnaire in fact reports how participants interpret the questions, how they perceive the strength of their own memory, and the willingness of participants to be truthful.

In confirming that age did not influence the scores of the PRMQ, the questionnaire has shown consistency with a view to life-long learning. Developmental psychology has been examining those competences that can be maintained and proved to be a strength in old age. These competences might compensate the declining abilities. Many researches have demonstrated that some abilities can be retained and represent a strength on which the person can rely to face everyday situations in advancing years.

¹⁰⁹ Einstein, O., Mc Daniel M., (2016). Retrieval in Prospective Memory: theoretical approaches and some new empirical findings, in *Prospective memory, theory and applications*, p.115.

A distinction between fluid and crystallized intelligence, originally identified by Raymond Cattell¹¹⁰ and developed by Cattell's student, John L. Horn, has defined fluid intelligence as the capacity to reason, analyze and solve problems in nonfamiliar situations and find solutions to new problems, independently from knowledge of the past. Crystallized intelligence has been defined as the ability to use skills, knowledge, and experience and relies on accessing information from long-term memory. Crystallized intelligence is the product of educational and cultural experience in interaction with fluid intelligence. Crystallized intelligence is one's lifetime of intellectual achievement, as demonstrated through one's vocabulary and general knowledge which is maintained through old age and even improves, as experiences tend to expand one's knowledge.

If fluid intelligence declines in adult age, crystallized intelligence is maintained. These competences, if efficiently used, may compensate even the decline of some abilities and changes which may happen during old age.

As the PRMQ is a measure of self-rated memory failures, they cannot be treated as it were a direct measure of memory performance, there is the need, as confirmed in modern neuropsychological research, to employ multiple indicators of the constructs¹¹¹. For this reason, in the present research design, the use of measures of control will be supplemented through the use of an AMT¹¹², scoring the number of specific prospective and retrospective memories through pre-test and post-test. The AMT was initially developed by William Broadbent in 1986 and many versions have been used by researchers since then. In the present research design participants will be presented with a series of cue words, for which they will be asked to produce a specific memory. Memories will be scored according to level of specificity¹¹³, differentiating

¹¹⁰ Cattell, R. B. (1971). *Abilities: Their structure, growth, and action*. New York: Houghton Mifflin. ISBN 0-395-04275-5.

¹¹¹ Crawford, J.R., Parker D.M. (1992). *A handbook neuropsychological assessment*. Hove, UK: Lawrence Erlbaum Associated Ltd.

¹¹² Williams J.M., Broadbent K. (1986). Autobiographical Memory in suicide attempters, *Journal of Abnormal Psychology*, 95, 144-149.

¹¹³ Griffith J.W., Sumner J.A., Raes F., Barnhofer T., Debeer E., Hermans D. (2012). Current psychometric and methodological issues in the measurement of over-general autobiographical memory. *J Behav Ther Exp Psychiatry* 2012; 43: S21–S31. pmid:23200427. According to the review by Griffith et al. most studies use a time limit of either 30 or 60 seconds, while in some studies, however, there is no time limit and the participant sets his or her own response pace. AMT procedures with shorter response time limits may be viewed as more demanding because individuals are required to generate a specific memory more quickly.

Specific Memories, Extended Memories, Categorical Memories, Semantic Associates and No Memory.

Since the needs for the experimentation regard the necessity of accessing personal past memories, the AMT may provide different experiences which can be used for the hypnotic individual inductions as well as for the active control group and general sessions.

The items are devised to access specific personal experiences regarding the most common important events in life, ranging from the first learning experiences, holidays or journeys, anniversaries, friends and pets and free time. A prospective column will be added to test future goals in order to increase motivation for the experiment and as objective measure for prospective memory scores.

<i>Autobiographic Memory Test (A.M.T) Pre-test</i>							
		Specific Memories Score:4	Extended Memories Score:3	Categorical Memories Score: 2	Semantic Associates Score: 1	No Memory Score:0	Total Score
1.	Learning Experience						
2	Birthday /Anniversary						
3	Holiday/Journey						
4	Pet						
5	A special Friend						
6	News/Message						
7	A special Place						
8	Music/Concert/Song						
9	Book/Film						
10	Personal Success						

Autobiographic Memory Test

All items will measure Retrospective Memory, with the exception of *Personal Success* which will offer the scores for the 4th hypothesis. The scores will be measured during the pre-test and the post- test, where PM will be measured by *Personal Success*” assessed retrospectively.

4.6 Plan to find the Subjects: Pros and Cons

Participants will be recruited among acquaintances, and people voluntarily participating. Since the PRMQ Questionnaire is a self- report questionnaire, it is important for the participants to be responsible, motivated and active persons interested in improving their memory.

A profiling memory score will be announced through the web to find a consistent number of participants. Landing pages, articles and ads will be spread to announce the experimentation.

The advantage of recruiting the subjects through the web is to find an acceptable number of participants of the same age for the research design. They will also be motivated with the proposal of the test to know their memory scores and to participate to the experiment. The disadvantage may be provided by the number of drop-outs in the course of the experiment.

Memory Profiles for the participants will be designed, taking into account the scores of the PRMQ for General Memory, Prospective and Retrospective Memory, Short and Long- term Memory, Self-cued and Environmentally-cued subscales. Profiles will be arranged in order to inform the participants about the abilities which might be improved, according to the scores obtained in the PRMQ.

The normative data for the standard levels of the PRMQ will be used to exclude impairments in order to obtain the same standard level between the participants.

Scales can be used as a tool to interpretation of scores and also to set inclusion or exclusion criteria. Participants will be randomly assigned to groups.

4.7 Pre-Test and Influence on the final Research Design

Pre-test PRMQ will be used as a diagnostic test regarding inclusion or exclusion criteria for the research purposes. A significant number of subjects will be enlisted, possibly 50. The subjects will be asked to complete the Questionnaire PRMQ to test General Memory, Prospective and Retrospective Memory scores. Prospective and Retrospective items will determine the Raw scores for each kind of memory.

The PRMQ accounts for average memory performance on neuropsychological tests as in patients with Memory Cognitive Impairment where the standard deviation is calculated with 1.5 below¹¹⁴.

Normative scores will be accepted for the experimentation, excluding deviation standards. The PRMQ will be used a pre-test to enlist participants with the same characteristics, and so exclude initial differences between the groups.

A random selection and assignment to groups will follow. The means of the raw scores of each group will ensure the same initial memory levels of the participants. An active control group will be matched to the training group on key characteristics such as General Memory, Prospective and Retrospective scores and age.

The control group will have the aim to verify that the effects are linked to the hypnotic training rather than to other variables. The control group as well as the training group will be offered sessions to discuss memory strategies and resources such as the need to keep an updated calendar, an agenda and reminders.

Since inclusion of a control group will determine whether a treatment under investigation has a significant effect on an experimental group, so that the possibility of making an erroneous conclusion is reduced. The environment and conditions of the experiment will be maintained equivalent for both groups in order to state whether differences between groups may actually due to the difference in treatments or to the difference in environment.

¹¹⁴ Petersen, R.C., Smith G.E., Waring S.C., Ivnik R.J., Tangelos E.G., Kokmen E. (1999). Mild Cognitive Impairment: clinical characterization and outcome, *Arch Neurol.*, 56(3):303-8.

This research design will compare the final post-test results between the two groups through the use of PRMQ Questionnaire and AMT, providing an idea of the overall effectiveness of the intervention. The present research design will account for the changes in both groups from pre-test to post-test, to verify whether one, both or neither has been improving over time and the scores in the pre-test groups will ensure that the randomization process was effective. The efficacy of the treatment will be determined by the results shown by a significant difference in the group given the treatment measured through Student's t-distribution test for independent groups.

Chapter 5 Findings

No two people are exactly alike. No therapeutic session can be exactly the same. Each therapeutic session is a unique piece of self- development in the genesis of new consciousness and self- identity in the patient and therapist¹¹⁵.

E. L. Rossi

5.1 Circumstances of the Data Collection

A wide campaign on the internet has been used, though dedicated psychology sites and social networks. Some articles have been spread to describe the functioning of memory, with the aim of advertising the research. In order to create motivation for the participants and a memory profile was proposed as a result of an initial test. The research has been conducted in Ravenna, in the North of Italy. 6 kinds of memory and concentration were tested using all the items of the PRMQ.

After the campaign 61 people aged 65-69 have been recruited.

5.1.1. General Sessions

SESSION 1: PRMQ

All the participants were invited to complete the PRMQ testing Prospective and Retrospective Memory, Short-term and Long-term Memory, Self-cued and Environmentally-cued Memory.

After the session the data were collected.

5 Profiles had been created from the PRMQ and Profile 3 has been used to select the subjects, in order to ensure the same level of memory abilities. The PRMQ has been used to select the

¹¹⁵ Rossi E.L. (2008). *The new Neuroscience of Psychotherapy, Therapeutic Hypnosis and Rehabilitation: a creative Dialogue with our genes*, the Milton Erickson Institute of the Californian Central Cost, 2008, p. 6.

participants for the experimentation in order to exclude people above and below the normative standard of the population for the Questionnaire¹¹⁶.

PROFILE 1 Excellent memory. No dispersions. Excellent use of memory to build long-term plans. The memory of the past is extremely well structured with excellent access to personal memories and environmental circumstances. You are able to keep constant and well-focused attention levels.
16 to 19/80

PROFILE 2 Very good memory, minimal dispersion. Good use of memory to build long-term plans. The memory of the past is well structured with good access to personal memories and environmental circumstances. You are able to keep constant and focused attention levels.
20 to 23/80

PROFILE 3 *Average memory capability, with some dispersions. Discrete use of memory to build long-term plans. The memory of the past highlights some difficulties to access personal memories and environmental circumstances. Your attention levels are not always constantly focused.*
24 to 40/80

PROFILE 4 Difficulties in planning. The memory of the past is relatively confused with difficulties to access personal memories and environmental circumstances. Difficulties in maintaining constant and focused attention levels.
41 to 50/80

PROFILE 5 Severe memory problems. Memories of the past and environmental circumstances may be impaired as well as personal planning. Very poor attention levels.
51 to 80/80

¹¹⁶ Smith, R., & Bayen, U. (2004). A multinomial model of event-based prospective memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 30. 756-777.

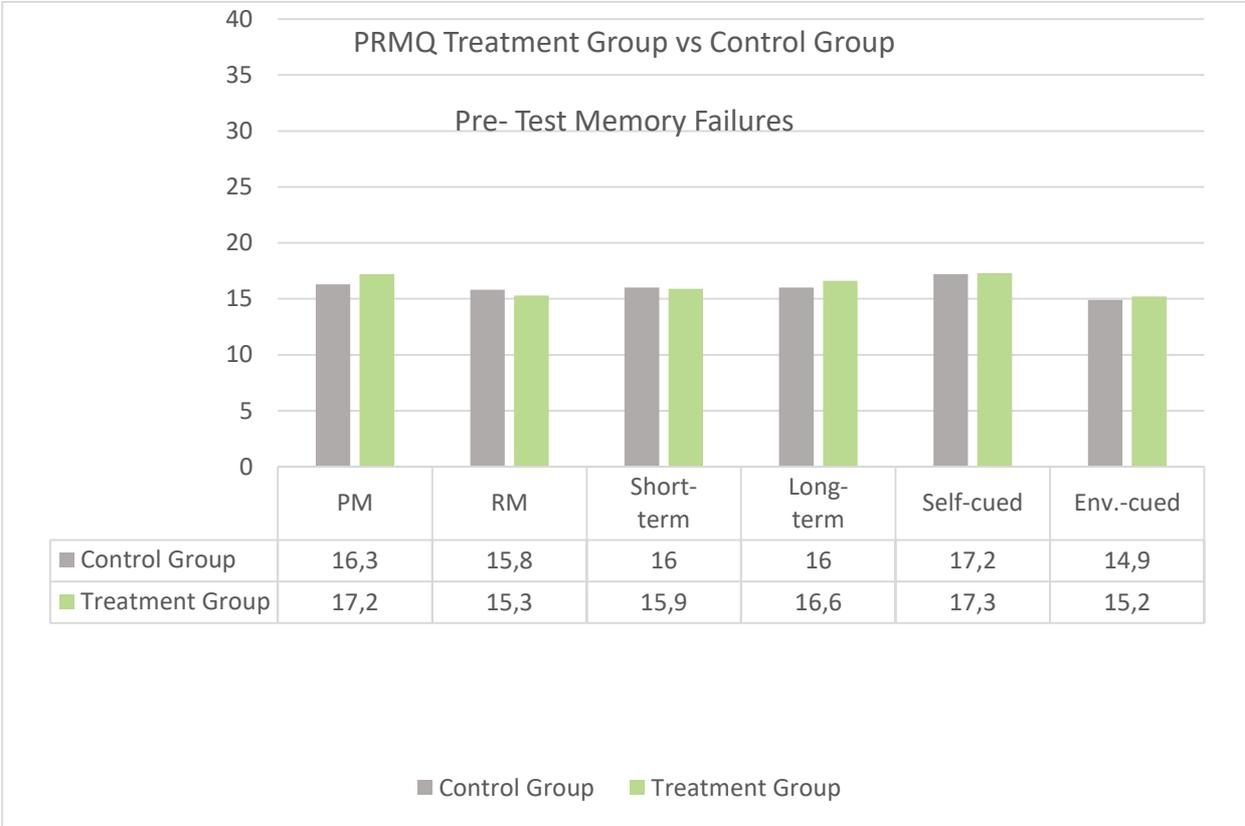
Memory Profiles: Profile 3 reflects the normative data of the Questionnaire. Smith, R., & Bayen, U. (2004). A multinomial model of event-based prospective memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 30. 756-777.

2 groups have been formed, using a random assignment with a cut off limit of acceptance both in Prospective and in Retrospective Memory, fixed between 12 and 20 for each raw score, for a total of 24/80 to 40/80, fitting the requirements of the third profile for General Memory scores. 6 people have been excluded from the experiment as they did not fit in the parameters of inclusion, presenting difficulties and failings over average standard population, 3 people have been excluded since they resulted above the standards. With the exclusion of 9 people the participants were 52. The participants were asked to complete the experiment, which would last 6 more weeks, including 1 session for AMT, with 4 sessions dedicated to treatment/or control, and the final post-session to complete PRMQ post-test and AMT. 26 people were randomly assigned to each group.

Random Assignment											
	Treatment Group	Age	Gender		School Years		Control Group	Age	Gender		School Years
1.	C.D.	65	M		17	1.	C.M.	65		F	13
2.	S.G.	69		F	8	2.	A.C.	65		F	13
3.	M.M.	66		F	12	3.	C.C.	66		F	17
4.	M.G.	65		F	17	4.	M.G.	69	M		17
5.	S.S.	68	M		17	5.	M.S.	68	M		13
6.	C.G.	66		F	14	6.	A.B.	66		F	17
7.	S.T.	67	M		13	7.	G.F.	67		F	17
8.	I.P.	65		F	13	8.	M.D.	68	M		17
9.	G.C.	65	M		13	9.	S.P.	67		F	17
10.	F.G	66	M		17	10.	D.C.	66	M		17
11.	D.V.	65		F	16	11.	O.C.	68	M		8
12.	O.F.	69		F	8	12.	M.L.	69	M		17
13.	E.A.	65	M		17	13.	T.D.	65		F	17
14.	R.B.	67		F	17	14.	A.O.	66	M		13
15.	G.N.	69	M		13	15.	L.S.	65		F	15
16.	F.T.	66	M		17	16.	L.Z.	65	M		8
17.	R.S.	65	M		17	17.	L.G.	67	M		8
18.	F.A.	67	M		13	18.	A.F.	65		F	8
19.	G.B.	65	M		8	19.	R.R.	65	M		16
20.	P.C.	66		F	8	20.	M.B.	65		F	17
21.	F.S.	65		F	17	21.	M.D.	66		F	17
22.	G.S.	69		F	8	22.	A.H.	67	M		13
23.	R.R.	67	M		17	23.	S.B.	65	M		13
24.	M.M.	69		F	8	24.	F.D.	69	M		8
25.	T.G.	68	M		8	25.	M.C.	65	M		8
26.	D.R.	69	M		17	26.	S. Z.	69		F	8
		66,6	14	12	13,4		26	66,4	14	12	13,5

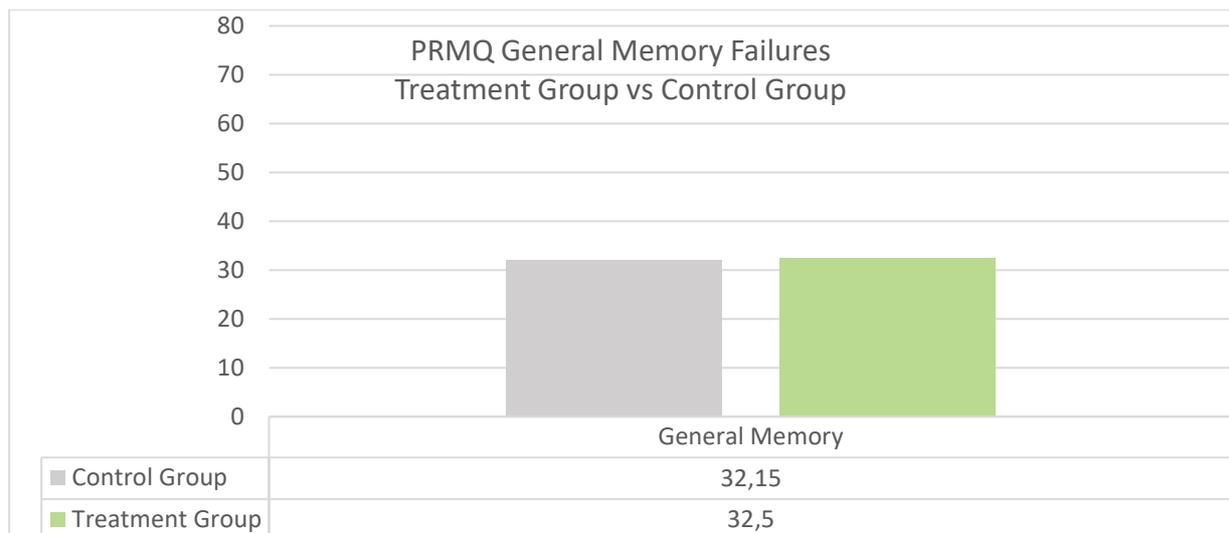
Random assignment of the 2 Groups

The two groups proved equivalent for age, gender and school years. The scores proved equivalent for Prospective and Retrospective Memory, Short and Long- term Memory, Self-cued and Environmentally- cued memories.



Control/Treatment Group: Memory Failures

The means of the 2 groups have been confronted as fitting the parameters of the normative data for the PRMQ. The 2 groups have presented equivalent General Memory Scores.



Control/Treatment Group: General Memory Failures

SESSION 2: Autobiographic Memory Test (AMT)

An Autobiographic Memory Test¹¹⁷ has been administered during the first session to both groups as a control objective measure and to increase the evidence¹¹⁸ of the results.

All participants were presented with cue words in a written form, each on an A4 card and they were instructed to read each word and were given 2 minutes for each item to retrieve specific memories. The concept of Autobiographic Memory was introduced and defined as a mental representation of the events of one's past, containing episodic memories and self-referential semantic information. The concept of "Event-specific knowledge" was introduced as a vividly detailed information about events, occurring in the form of visual images and sensory-perceptual features. Each memory was coded according to its level of specificity, scored from 4 to 1.

The function of the AMT served different aims:

¹¹⁷ Ros L., Romero D., Ricarte J.J., Serrano J.P., Nieto M., Latorre J.M. (2018). *Measurement of over general autobiographical memory: Psychometric properties of the autobiographical memory test in young and older populations*, Department of Psychology, University of Castilla La Mancha, Albacete, Spain. *PLOS ONE* April 19, 1-18.

¹¹⁸ Crawford, J.R., Smith G., Maylor E.A., Della Sala S., Logie R.H. (2003). The Prospective and Retrospective Memory Questionnaire: Normative data and latent structure in a large non-clinical sample, *Memory*, 11 (3) 261-275, Psychology Press, p. 273.

1. to provide a positive, relaxing and friendly atmosphere for the participants and a motivation for the experiment;
2. to recollect the most positive past memories;
3. to provide examples of positive memories for the following encounters;
4. to provide objective measures for Retrospective Memory other than the self-rated Questionnaire;
5. to obtain a different measure for Prospective Memory other than the self-rated PRMQ;
6. to provide a goal for memory improvement;
7. to provide positive experiences for the Treatment Group to work on during the Hypnotic Sessions

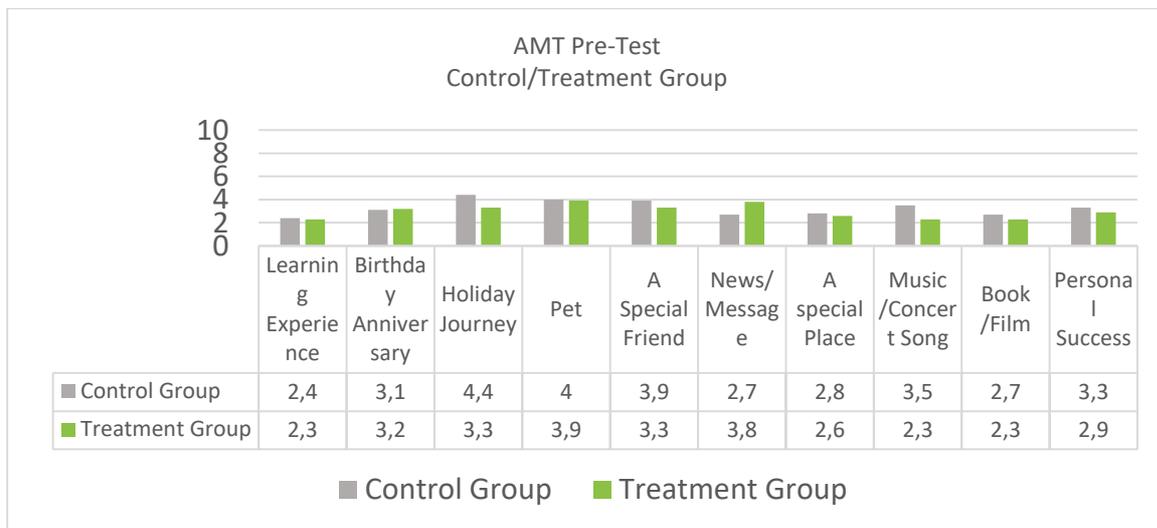
The AMT test was devised to help participants recall the most important experiences in their lives and to understand the way they had experienced the world, their sensory channels, sensations, emotions, feelings, and to establish an emphatic connection so that the people could feel at ease and behave as active participants in this experience. Favorite sensory registers (visual/auditory/ kinesthetic) were checked as favourite representational channels in order to provide the material for individualized hypnotic inductions.

Participants were asked to generate different specific memories that had happened on a particular day. They were told that the memory they recalled could be an important or trivial event that happened at a particular time, on a particular day. Prior to the test, the concept of specific memory was explained by use of examples.

Specific memories were considered as memories lasting less than 24 hours. General memories were differentiated as *Extended*, *Categoric* or *Semantic* memories. *No memories* included memories referring to an event already mentioned in a previous cue word, or no responses to the cue word.

The AMT was made up of 10 items, 9 items tested Retrospective Memories and 1 item (Personal Success) tested Prospective Memories.

The same pattern of cue words was to be used the post-test as an additional control measure to the PRMQ for PM.



AMT Control/Treatment Groups

SESSION 3: Subscales in PRMQ

All participants met once a week during 1 hour for 4 weeks. Memory Profiles distribution. Participants were introduced to notions about memory subscales of the PRMQ which had been measured in their profiles. They were told about the general design of the research.

- How is Prospective Memory working and which is its function?
- Is Prospective Memory related to Retrospective Memory?
- Which is the role of Short- term and Long-term Memories?
- Which is the importance of concentrating upon a task?
- What is Self-cued Memory?
- Is Environmentally- cued Memory important?
- Can people use strategies to improve their memories?

SESSION 4: Concentration difficulties and Memory failures

All participants were asked to write down concentration difficulties they thought might be responsible for their memory failures and discuss among them, keeping in mind their memory goals. The assumption was that shared knowledge could build up an atmosphere of cooperation.

- Which are the situations people can find hard to concentrate on, like following a discussion or reading a book?
- Are there external/internal factors which can affect concentration?
- May physical problems, like pain, headache, lack of sleep interfere with focusing and concentrating? Can distress or worrying have a negative impact?
- Does enthusiasm, motivation or feeling confident play a part?
- Does calm and relaxation help finding concentration?
- Is performing a new task challenging or stressful?
- Which is the role of environment? Can noise, or light or temperature have an impact?

SESSION 5: Memory strategies

Participants discussed different strategies to improve Prospective Memory. The assumption was that shared knowledge might help them reinforce their strategies.

- How can Concentration and Prospective Memory be improved? Can you think of strategies?
- Which are the areas that may perpetuate difficulties in memory and concentration?
- Do you use relaxation techniques to manage anxiety, or sleep?
- Can negative thinking have an impact?

- Is graduating task an interesting strategy? Do you set limits on mental tasks and plan breaks in between?
- Is setting more achievable goals important?
- Is stopping and concentrate and be alert important? Do you focus on one thing at once?

SESSION 6: Resources

Participants were elicited to discuss the possibilities of using resources to improve Prospective Memory:

- Is keeping a list an interesting strategy?
- Do you use a diary, a calendar or post-it notes? Do you plan activities?
- Do you use technological aids?
- Do you record lectures or seminars and conversations?
- Do you rehearse and repeat things to remember them?
- Do you summarize key points straight away afterwards?
- Do you group things together into categories in order to remember them well?

SESSION 7: PRMQ and AMT

PRMQ and AMT were administered to all participants as post-tests.

5.1.2 Treatment Group

Participants of the Treatment Group were invited individually for hypnotic inductions. Besides participating to the common activities together with the Control Group, all the participants of the Treatment Group were dedicated 1 session a week individually with hypnotic sessions. Events listed in AMT were used and visual/auditive significant events linked to autobiographical

memories were revived during the hypnotic sessions through the use of analogic and familiar language and linked to future experiences.

SESSION 3 Setting the goals and link a past experience to a future intention

Participants of the Treatment Group were individually encouraged to focus on their memory failures they had identified in the PRMQ. Personal goals were discussed individually.

A first hypnotic induction was based on a positive memory of the past, chosen among the AMT learning past experiences and connected to a future intention. Participants were induced towards a state of relaxation in order to access their memories. Experiences like the first time they learned how to ride a bike, or the moment they learned how to write were selected from the AMT first experiences. Participants were focused on wellbeing and happiness of those first experiences and taught to transfer it to a future intention, perform the future intention, anchor the positive feeling and remember to perform it in the future.

SESSION 4 Focus on positive emotions, find the cue word for an event-based intention

During the second hypnotic session, attention was drawn on the details of the chosen situation from a positive experience from AMT, one which was particularly significant and related to a significantly strong emotion. Trance deepeners were used to provide a medium level of the trance. An event-based induction was chosen and linked to the future intention. Participants were trained to stop on the scene and breathe deeply, observe the scene and concentrate on the positive emotions. The scene was fixed in their minds and they were asked to find cue word to express happiness and think of a title to the scene as an anchor to future intention.

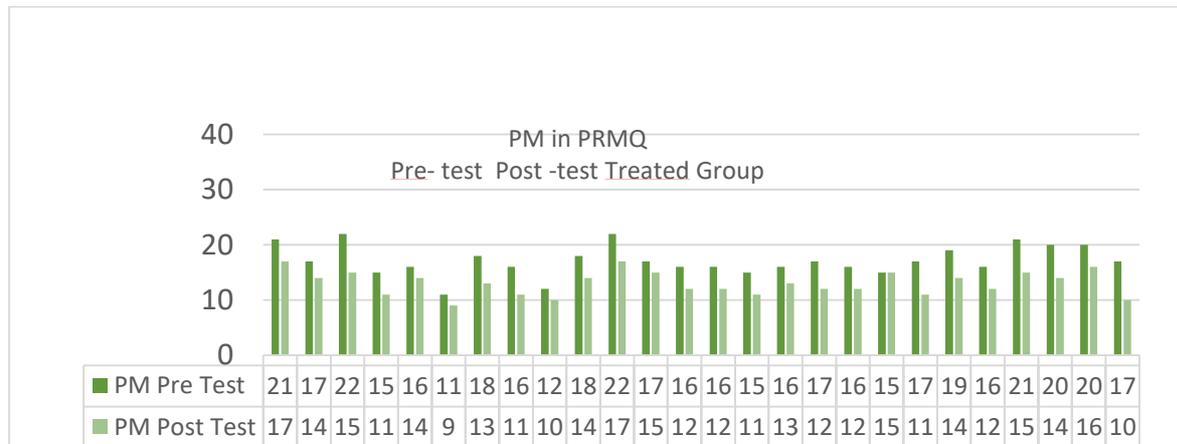
SESSION 5 Linking the emotion to a time-based intention

A time-based past emotion was identified from the AMT test and linked to a future experience, chosen as one of the personal goals. Attention and internal focus were on the scene, sight, sounds, smells, touch, taste and the associated feelings. Participants were taught to focus on the time of the past experience. The set of items from the PRMQ failures which had previously been identified were linked with positive past time-based emotions. The emotions connected with past experiences were transferred to a future time-based situation and the future intention actually performed and positive future suggestions were given.

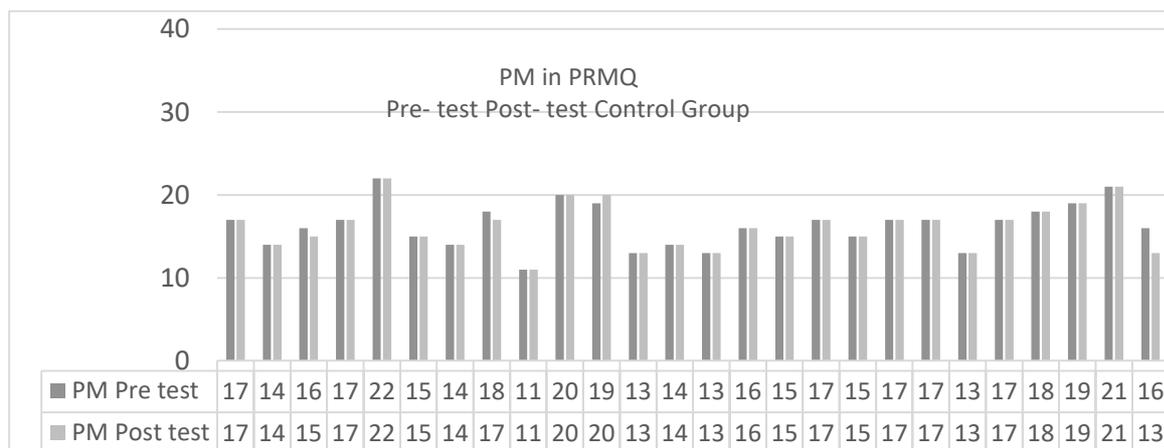
SESSION 6 Anchoring the experience and post-hypnotic suggestions

Participants concentrated on personal success items in the AMT. A link with past experiences was created using visual/auditive strategies. The scene was anchored to a state of wellness. Post-hypnotic suggestions facilitated the link with positive emotions and the actual performance of the future intention was encouraged reinforced through post-hypnotic suggestions.

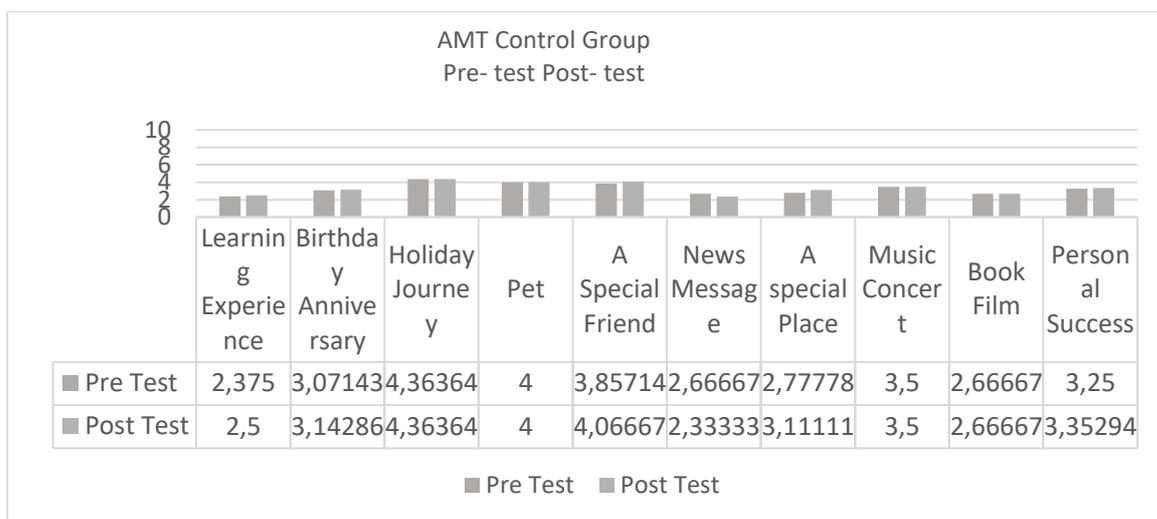
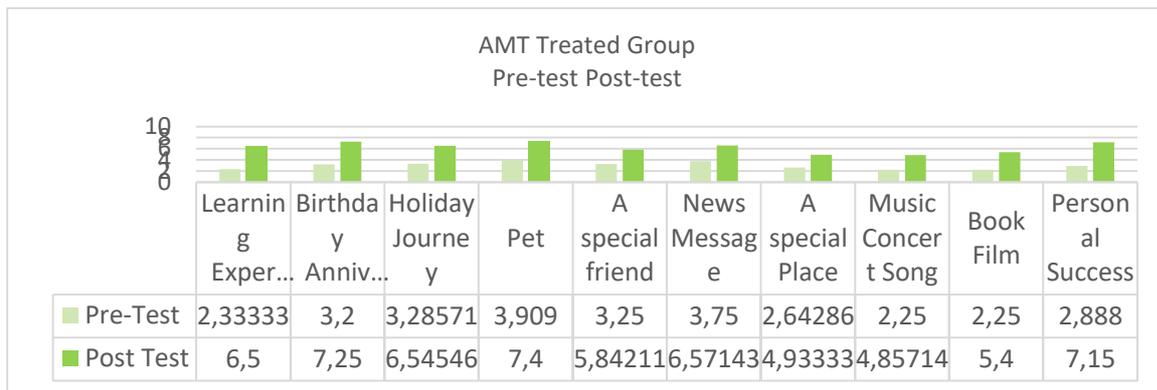
After the 7th session the data of PRMQ and AMT of the 2 groups were organized in charts, with the scores of Control Group and Treatment Group Pre-test and Post-test.



Treated Group: PM Pre-test Post-test



Control Group: PM Pre-test Post-test



AMT: Treatment/Control Groups: Pre-test Post-test

5.2. Statistical Formula: Student's t-distribution for Independent Groups

The Control Group Design for Independent Samples t-test was used to compare the means for the two groups in order to test the 4 hypotheses. Participant's memory failures shown in PRMQ were measured using the Pre-test and Post-test scores where the dependent variable, Prospective Memory, was measured through PRMQ scores after the independent variable of the Hypnotic Induction had been operationalized into 4 Hypnotic Sessions for the 4 hypotheses.

The analysis has been used to determine if there was a significant difference between the means of the two groups and so calculate evidences against the null hypothesis. The Independent

Samples t Test compared the means of two independent groups in order to determine whether there is a statistical evidence that the means of the 2 groups are significantly different.

Then significance of the t test is given by the magnitude of the t value calculated as:

$$t = \frac{m_a - m_b}{\sqrt{\frac{(n_a - 1)\sigma_a^2 + (n_b - 1)\sigma_b^2}{(n_a + n_b - 2)}}} \sqrt{\frac{n_a n_b}{n_a + n_b}}$$

Here m_a and m_b are the means of the differences between the Post-test and the Pre-test of the Treated Group and the Control Group, respectively.

n_a and n_b are the number of the samples of the Control and the treatment Group degrees of freedom and σ_a and σ_b are the standard deviation of the differences of the 2 groups.

The t critical value with 2 tails defines the value for which there is a probability of 5 % (2.5% for each tail) of finding a $|t| \geq t_{cr}$.

The t score resulted significant for each of the hypothesis. The final result of the t value was compared to the critical value (CV) for the degrees of freedom, resulting in 2.06. The table below includes also the mean of the differences of the 2 groups and the standard deviation error associated to the means.

1 st Hypothesis <i>Prospective Memory in PRMQ</i>					
	Total Group	Number of subjects	Mean	t Student	Remarks
Treated Group	Pre-test	26	4.1±0.3	11.29 $\alpha = 0.05$	<i>Significant</i> H_0 is rejected
	Post-test	26			
Control Group	Pre-test	26	0.2±0.1		
	Post-test	26			

2 nd Hypothesis <i>Short-term Memory in PRMQ</i>					
	Total Group	Number of subjects	Mean	t Student	Remarks
Treated Group	Pre-test	26	3.3±0,3	9.14 α= 0.05	<i>Significant</i> H ₀ is rejected
	Post-test	26			
Control Group	Pre-test	26	0.2±0.1		
	Post-test	26			

3 rd Hypothesis <i>Self-cued Memory in PRMQ</i>					
	Total Group	Number of subjects	Mean	t Student	Remarks
Treated Group	Pre-test	26	3.8±0.4	9,03 α= 0.05	<i>Significant</i> H ₀ is rejected
	Post-test	26			
Control Group	Pre-test	26	0.3±0.1		
	Post-test	26			

4 th Hypothesis <i>PM scores in AMT</i>					
	Total Group	Number of subjects	Mean	t Student	Remarks
Treated Group	Pre-test	26	3.2±0.6	5,26 α= 0.05	Significant H ₀ is rejected
	Post-test	26			
Control Group	Pre-test	26	0.2±0.1		
	Post-test	26			

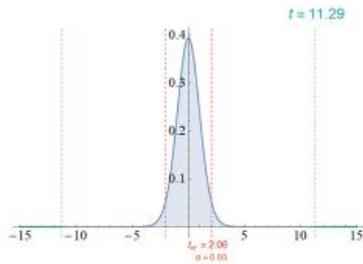
1st Hypothesis

PM Failures: Control/Treated Groups

t= 11,29 $\alpha = 0.05$

Critical Value of t distribution 2.06

H₀ is rejected



Control Group: 3 subjects had less memory failures in the Post-test (participants n.3, n.8, n.26), while 1 subjects presented higher memory scores (**16.3±0.5 to 16.1±0.5**)

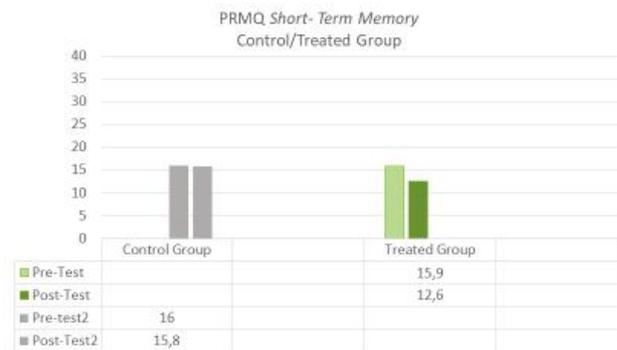
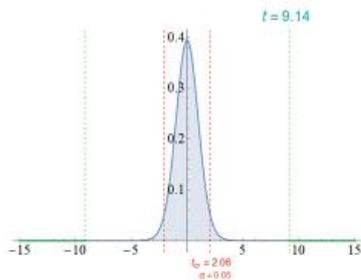
Treated Group: all the subjects with the exception of 1 subject (n. 19) showed a reduction of the memory prospective failures (**17.2 ± 0.5 to 13.0± 0.4**)

2nd Hypothesis Short- Term Memory
Treated/Control Groups

t= 9.14 $\alpha = 0.05$

Critical Value of t distribution 2.06

H₀ is rejected



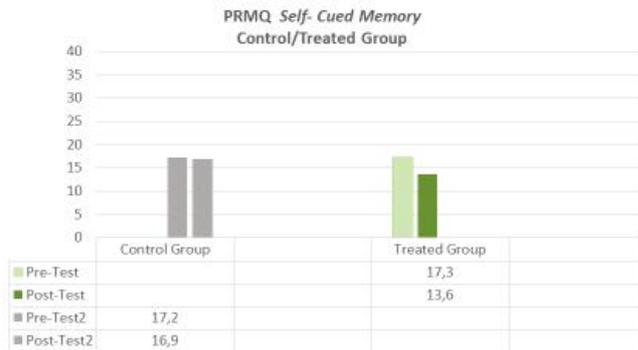
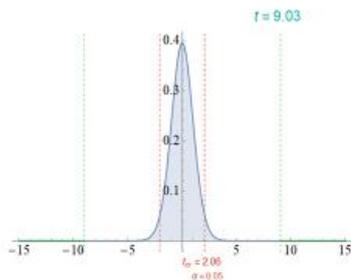
Control Group. 5 subjects showed less memory failures in the Post-test (n. 3,8,11,13,22) and 1 presented higher memory score for the failures (n. 26). All the others participants maintained the same scores (**16.0 ±0.4 to 15.8 ±0.4**)

Treated Group: presented less memory failures with the exception of 2 subjects (n. 6, n. 19) (**15.9±0.6 to 12.6±0.4**)

3rd Hypothesis Self-Cued Memory
Treated group/Control Group

t= 9.03 $\alpha = 0.05$
Critical Value of t distribution 2.06

H_0 is rejected



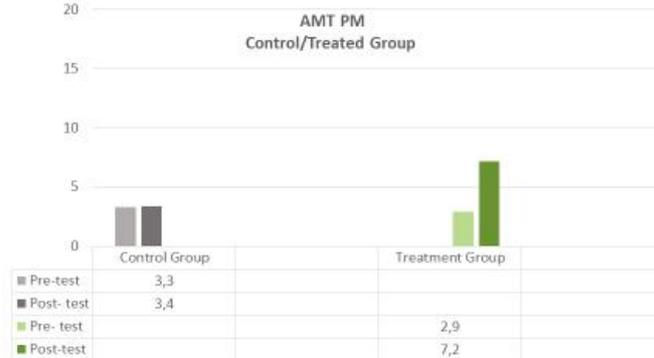
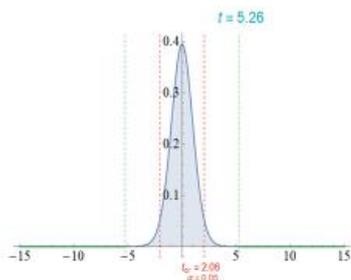
Control Group: 4 subjects had less memory failures, presenting an improvement in Post-test scores (n.3, n.11,n.13,n.26), while the others results remained the same. 17.2 ± 0.4 to 16.9 ± 0.4 (improved 3, 11, 13, 26). **17.2 ± 0.4 to 16.9 ± 0.4**

Treated Group: all the participants improved memory failures, with the exception of 1 subject who failed to have improving results in the test (n. 19). **17.3 ± 0.5 to 13.6 ± 0.4**

4th Hypothesis
PM in AMT
Personal Success

t= 5.26 $\alpha = 0.05$
Critical Value of t distribution 2.06

H_0 is rejected



Control Group: only 3 subjects showing improvements in the score (n.5, n.15 and n. 22) the others maintained the same score. (**3.3 ± 0.2 to 3.4 ± 0.2**)

Treated Group: the PM scores showed an increase of the specific Prospective Memories also in the participant who did not show less failures in the PRMQ post- test (n.19), while some participants failed to show improvements (n.3, n.8, n. 12, N. 15, n. 24) for the specific item. (**2.9 ± 0.2 to 7.2 ± 0.39**)

Student's t-distribution for df= 25 degrees of freedom. The red lines represent t_{cr} for $\alpha=0.05$. The green lines indicate the t value. $t_{cr}= 2.06$ Null hypotheses are rejected.

5.3 Findings

The data collected in the present study regarded the results of PRMQ and the AMT. As the aim of the research was to assess the effectiveness of Hypnotic Sessions to improve Prospective Memory, the scores of the Pre-test and of the Post-test of each participant have been scored both by the self-reported test PRMQ measuring memory failures and by a more objective measure as a control objective measure for memory recollections.

The t value was obtained by the differences between Pre- test and Post- test of the Treated Group and the differences between the Pre- test and Post-test of the Control Group, evaluating the effectiveness of the treatment.

As the critical values of t student analysis for the degrees of freedom were collocated on 2.06 the 4 null hypotheses have been rejected. In the Treated Group failures significantly decreased while in the Control Group memory failures did not undergo a significant change.

The Treated group demonstrated a significant decrease of memory failures in Prospective Memory, Short-term and Self-cued Memory. The measures of significance were confirmed by the Autobiographic Memory Test which showed an increase of memories in the Prospective Memory item AMT in the 4th hypothesis.

As the frontal lobe is responsible for Prospective Memory and important areas of the Short-term working memory lie in the pre frontal cortex and can be activated by event-based tasks, it is worth to be researched whether the improving of Short-term memory can be associated to an improving of Prospective Memory. As areas of the Autobiographic memory are distributed through neural networks in the frontal, temporal and occipital lobes, the improving of Self-cued memory might also be associated to the improving of prospective and short-term memories.

5.4 Interpretation of the Measures of Significance

<p>H₀ If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, no significant differences in <i>PM scores in PRMQ</i> will be observed in the Treated Group when confronted with the Control Group</p>	<p>$H_0: \mu_1 = \mu_2$</p> <ul style="list-style-type: none"> the mean of <i>PM in PRMQ</i> in the Treated Group is equal to the mean of <i>PM in PRMQ</i> in the Control Group
<p>H₁ If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, then significant differences in <i>PM scores in PRMQ</i> will be observed in the Treated Group when confronted with the Control Group</p>	<p>$H_1: \mu_1 \neq \mu_2$</p> <ul style="list-style-type: none"> the mean of <i>PM in PRMQ</i> in the Groups is different, and the <i>t</i> value is statistically significant $t = \frac{m_a - m_b}{\sqrt{\frac{(n_a - 1)\sigma_a^2 + (n_b - 1)\sigma_b^2}{(n_a + n_b - 2)}}} \sqrt{\frac{n_a n_b}{n_a + n_b}}$

Self-rated items scores in PRMQ were compared for both groups for Pre-test and Post- test memory failures. In the Treated Group, all the subjects with the exception of 1 subject (n. 19) showed a reduction of the memory prospective failures. The mean for PM failures passed from 17.2 ± 0.5 to 13.0 ± 0.4 .

In the Control Group PM scores of the mean in the Pre-test passed from Pre-test 16.3 ± 0.5 to Post-test 16.1 ± 0.5 . 4 subjects had different scores in the Post- test: 3 subjects had less memory failures in the Post- test (participants n.3, n.8, n.26), while 1 subjects presented higher memory failure score in the Post- test (n.11), showing some improvement in PM in 3 subjects and a decrease in PM in 1.

The mean of the 2 groups resulting from the difference between Pre-test and Post- test was $4,1 \pm 0.3$ including the standard error of the mean for the Treated Group and 0.2 ± 0.1 for the Control Group. The final value of the *t* scores results in 11,29, with $\alpha = 0.05$ for the critical value of 2.06. and H_0 is rejected.

<p>H_0 If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, no significant differences in <i>Short-term Memory scores in PRMQ</i> will be observed in the Treated Group when confronted with the Control Group</p>	<p>$H_0: \mu_1 = \mu_2$</p> <ul style="list-style-type: none"> the mean of <i>Short-term Memory in PRMQ</i> in the Treated Group is equal to the mean of Short-term Memory in PRMQ in the Control Group
<p>H_1 If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, then significant differences in <i>Short-term Memory scores in PRMQ</i> will be observed in the Treated Group when confronted with the Control Group</p>	<p>$H_1: \mu_1 \neq \mu_2$</p> <ul style="list-style-type: none"> the mean of the <i>Short-term Memory in PRMQ</i> in the Groups is different, and the t value is statistically significant $t = \frac{m_a - m_b}{\sqrt{\frac{(n_a - 1)\sigma_a^2 + (n_b - 1)\sigma_b^2}{(n_a + n_b - 2)}}} \sqrt{\frac{n_a n_b}{n_a + n_b}}$

The Treated Group presented less memory failures in the Post-test compared with the Pre-test for the items concerning Short-term Memory, with the exception of 2 subjects (n. 6, n. 19). The failures passed from 15.9 ± 0.6 in the Pre-test to 12.6 ± 0.4 with a mean of the differences of 3.3 ± 0.3 .

The Control Group showed less memory failures in 5 subjects in the Post-test (n. 3,8,11,13,22) and 1 presented higher memory score for the failures (n. 26). All the others participants maintained the same scores. The mean score passed from 16.0 ± 0.4 to 15.8 ± 0.4 in post-test scores.

The mean of the 2 groups results in $3,3 \pm 0,3$ for the Treatment Group and $0,2 \pm 0,1$ for the Control Group and the value of the t results in 9,13 for $\alpha=0.05$ and CV 2.06 and H_0 is rejected.

<p>H₀ If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, no significant differences in <i>Self-Cued Memory scores in PRMQ</i> will be observed in the Treated Group when confronted with the Control Group</p>	<p>H₀: $\mu_1 = \mu_2$</p> <ul style="list-style-type: none"> the mean of <i>Self-cued Memory in PRMQ</i> in the Treated Group is equal to the mean of <i>Self-cued Memory in PRMQ</i> in the Control Group
<p>H₁ If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, then significant differences in <i>Self-Cued Memory scores in PRMQ</i> will be observed in the Treated Group when confronted with the Control Group</p>	<p>H₁: $\mu_1 \neq \mu_2$</p> <ul style="list-style-type: none"> the mean of <i>Self-cued Memory in PRMQ</i> in the Groups is different, and the <i>t</i> value is statistically significant $t = \frac{m_a - m_b}{\sqrt{\frac{(n_a - 1)\sigma_a^2 + (n_b - 1)\sigma_b^2}{(n_a + n_b - 2)}}} \sqrt{\frac{n_a n_b}{n_a + n_b}}$

In the Treated Group in PRMQ all the participants improved memory failures, with the exception of 1 subject who failed to have improving results in the Post-test (n. 19). Memory failures passed from 17.3±0.5 in the pre-test to 13.6±0.4 in the post-test. The mean of the differences PRMQ was 3.8±0.5.

In the Control Group 4 subjects had less memory failures, presenting an improvement in Post-test scores (n.3, n.11, n.13, n.26), while the remaining results remained unchanged. 17.2±0.4 to 16.9±0.4 (improved 3, 11, 13, 26). The mean for the treated group is 3.8 ±0,4 and for control group 0.3 ±0.1, resulting in t 9,03 for α=0.05 and CV 2.06 and H₀ is rejected.

<p>H₀ If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, no differences in <i>PM scores in AMT</i>-measured by Personal Success-will be observed in the Treated Group when confronted with the Control Group</p>	<p>H₀: $\mu_1 = \mu_2$</p> <ul style="list-style-type: none"> the mean of the <i>PM in AMT</i> in the Treated Group is equal to the mean of <i>PM in AMT</i> in the Control Group
<p>H₁ If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, then significant differences in <i>PM scores in AMT</i> –measured by personal Success-will be observed in the Treated Group when confronted with the Control Group</p>	<p>H₁: $\mu_1 \neq \mu_2$</p> <ul style="list-style-type: none"> the mean of the <i>PM in AMT</i> in the Groups is different, and the <i>t</i> value is statistically significant $t = \frac{m_a - m_b}{\sqrt{\frac{(n_a - 1)\sigma_a^2 + (n_b - 1)\sigma_b^2}{(n_a + n_b - 2)}}} \sqrt{\frac{n_a n_b}{n_a + n_b}}$

In the Treated Group *Personal Success* passed from 2.9 ± 0.2 Pre-test in PM to 7.2 ± 0.3 in Post-test. The PM scores in AMT showed an increase of the specific Prospective Memories also in the participant who did not show less failures in the PRMQ Post- test (n.19), while some participants failed to show improvements (n.3, n.8. n. 12. N. 15, n. 24) in the specific item. AMT confirmed the difficulties in PRMQ Self-Cued memories in remembering specific memories in Pre-test. Experiences linked to the self in the past were difficult to bring back to the mind, as they tended to be scored as extended or categoric memories.

The Control Group scored in Pre-test 3.3 ± 0.2 to Post- test 3.4 ± 0.2 in Prospective Memory, with only 3 subjects showing improvements in the score (n.5, n.15 and n. 22) the others maintained the same score.

The mean for the treated group results in 3.2 ± 0.6 and for control group 0.2 ± 0.1 with t value 5,26 for $\alpha=0.05$ and CV 2.06 and H_0 is rejected.

Chapter 6 **Critical reflection**

Cognitive evidence points toward a role for episodic future thinking in shaping an individual's sense of self and identity¹¹⁹.

D. Schacter

6.1 Critical Reflections on the Methodological Approach

The need to study and evaluate PM is at the basis of this research design which has involved recent studies and laboratory discoveries. Different Universities and Institutes operating on Prospective Memory and Hypnosis have been contacted and data has been collected through one-to one interview in order to define the methodology and hypotheses of the present research.

The present design has confirmed Philippe Vernois' s observations on the importance of personal autobiographical memories, emotions and sensory perceptions in retrieving and accessing past experiences as well as the importance of visualization as a strategy to be used in hypnotic inductions and a powerful means to retrieve an intention. The importance of using vividly detailed information linked to personal past events in the form of visual images and sensory-perceptual features containing short-lived and focused images has proved essential as well as the retrieval of strong and vivid personal emotions of past memories when anchored to a specific context.

D. Schacter's important laboratory researches on successful Prospective Memory performances have demonstrated the presence of Retrospective Memory components through a core brain network that underlies episodic future thinking, identified through studies focused on neural mechanisms, showing how the brain network is responsible both for Prospective and Retrospective Memory, thus validating the process of association past experiences to future situations.

¹¹⁹ Schacter, D. (2017). Episodic future thinking: mechanisms and functions, Roland G Benoit and Karl K. Szpunar, *Current Opinion in Behavioral Sciences*, 17:41–50, Elsevier, p. 46.

The possibility of improving future memory performances has been confirmed by all the researchers interviewed. All the experts indicated and proved the importance of subjective episodic specific memories in Prospective Memory training, confirming the necessity of proceeding with an individual training which relates to autobiographical memory recollections.

The present design, which adds evidence to the possibility of using an automatic associative process to past recollections to help spontaneous retrieval of the intention and enhance Prospective Memory, is consistent with the Multi-process Model proposed by McDaniel and Einstein, stating that Prospective Memory retrieval does not always need an active monitoring process but can occur spontaneously, as the occurrence of a cue can cause the intention to be retrieved.

E. Tulving's Encoding Specificity Principle has proved the importance of a memory trace caused by an event-specific knowledge which determines the effectiveness of retrieval triggering of emotional memories when they are personal, specific, vivid and strongly associated with the target. According to the encoding specificity principle, memory processes information from the memory trace, connecting encoding and retrieval and considering similarities between the process of recognition and that of recall.

The principle was later confirmed by D. Schacter's work on episodic future thinking on Prospective Memory demonstrating how cues can trigger emotional memories- when external conditions involve emotional cues and present similarities to those in existence at the time memory was stored - allowing an effective retrieval due to a brain network concerning structures connected with the hippocampal formation responsible both for past recollections and future intentions.

Prospective Retrospective Memory Questionnaire has been used to score Prospective Memory, confirming Dr Golita Emsaki's use of the instrument as a valid tool for measurement. Autobiographic Memory Test has also confirmed its validity in memory training in the use of cue words as a means to elicit access to past memories and the retrieval of future intentions.

In the present research design, the tripartite model of the PRMQ with its subscales has been used to score different kinds of memories contained in the Questionnaire.

Consistent with the findings of the importance of specific and internal memories in Prospective and Retrospective Memory, the PRMQ has proved a valid test for scoring daily failures in Self-cued vs Environmentally-Cued Memory, and Short-term versus Long-term Memory scales.

The present design has tested the possibility of improving future memory performances as stated by all the researchers interviewed and subjective episodic specific memories in Prospective Memory training, confirming the necessity of proceeding with an individual training which relates to autobiographical memory recollections.

The working of hypnosis and its involvement with prefrontal cortex has been widely studied by Spiegel. Using MRI, researchers measured the subjects' brain activity by detecting changes in blood flow showing that hypnotized people experience an increase in connections between the dorsolateral prefrontal cortex and the insula, responsible for helping the mind connect with the body.

Since the inner process of focalization implicit in hypnotic induction seems to account for the importance of attentional and concentration processes present during the context in memory-dependant patterns of neuronal communication present on the frontal lobe, the presence of an encoding phase plays an important role in memory retrieval, allowing a Short-memory System to provide a trace for a later future retrieval.

Based on the assumption that the involvement of Hypnotic treatment Sessions with past positive experience of the self are constructed within a Self-Memory System which performs a self-representative function allowing the creation and maintenance of a coherent self-identity over time where Autobiographical knowledge represents a higher order of integration for the construction of episodic details in future thinking, 4 hypotheses have tested regarding Prospective, Short-term and Self-cued Memories.

The methodological approach of the present design has tested Prospective Memory in a Treated and Control Group of participants aged 65-69, randomly chosen and the scores have been

obtained by a pre-test post-test design using PRMQ and AMT. The results have been obtained through the Student's t-distribution for independent samples, taking into account the differences of the mean of pre-test and post-test scores of each group. The scores of the Groups have been confronted and the results showed the means, the error of the mean and the value of t- distribution confronted with the critical value for each hypothesis in order to confirm or reject them.

Prospective Memory has been tested with PRMQ and AMT, confronting memory failures and memory recollections in the Groups. PRMQ scores have been obtained by self-rating PRMQ and AMT has been scored by the researcher. A self-reported Questionnaire, the PRMQ measures General Memory failures in daily life, Prospective and Retrospective Memory and specific memories failures through subscales.

The confrontation of the Treated/Control Groups, has allowed to exclude variables, such as spontaneous incidental retrieval. A random assignation of the participants presenting the same conditions, such as age, gender, education and cognitive memory abilities, has allowed the reduction of the number of failures due to casual retrievals of the intentions.

A four weeks treatment with hypnosis has been based on E.L. Rossi's researches on brain plasticity indicating that four weeks to four months are required to stabilize new neural networks to encode new memory and learning for the creation of new neural networks to generate learning and behavior change in psychotherapy.

6.2 Data Analysis

Observations concerning the present research design:

- PRMQ and AMT Post-tests were completed by all participants after the 4 sessions, confirming interest and motivation in all the participants;
- no differences in participation or motivation between men and women have been noticed

- no differences from different education levels were observed for what concerned participation to the General Sessions and final results to the tests.

General Sessions concerning both groups emphasized:

- the importance of setting individual goals in the experimentation. At the beginning of the General Sessions all the participants of the two Groups were asked to set their own personal memory goals and write them in AMT in the PM column “personal success”. This was used as motivation, both to continue the experimentation and to reflect on how these goals might be reached. The results of writing personal aims led to more specific and detailed future performances such as “remember where I put my sunglasses when I go out at 5 for my walk” or “remember to water the plants in the morning at 9 o’clock”, or “remember to write the emails at 7 before dinner”;
- General Sessions gave the participants the occasion to discuss about Prospective Memory and provided information also about Retrospective, Short and Long-term Memory, Self-cued and Environmentally -cued memories;
- discussions about the reasons of memory failures as well as the importance of concentration on the specific context, psychological implications such as anxieties and the role of the environment were discussed in the groups during the sessions and were used to set up an atmosphere of cooperation in the groups;
- discussions about strategies and resources that might be employed contributed to create a general understanding about memory and a further motivation to the sessions.

Observations concerning the Treated Group:

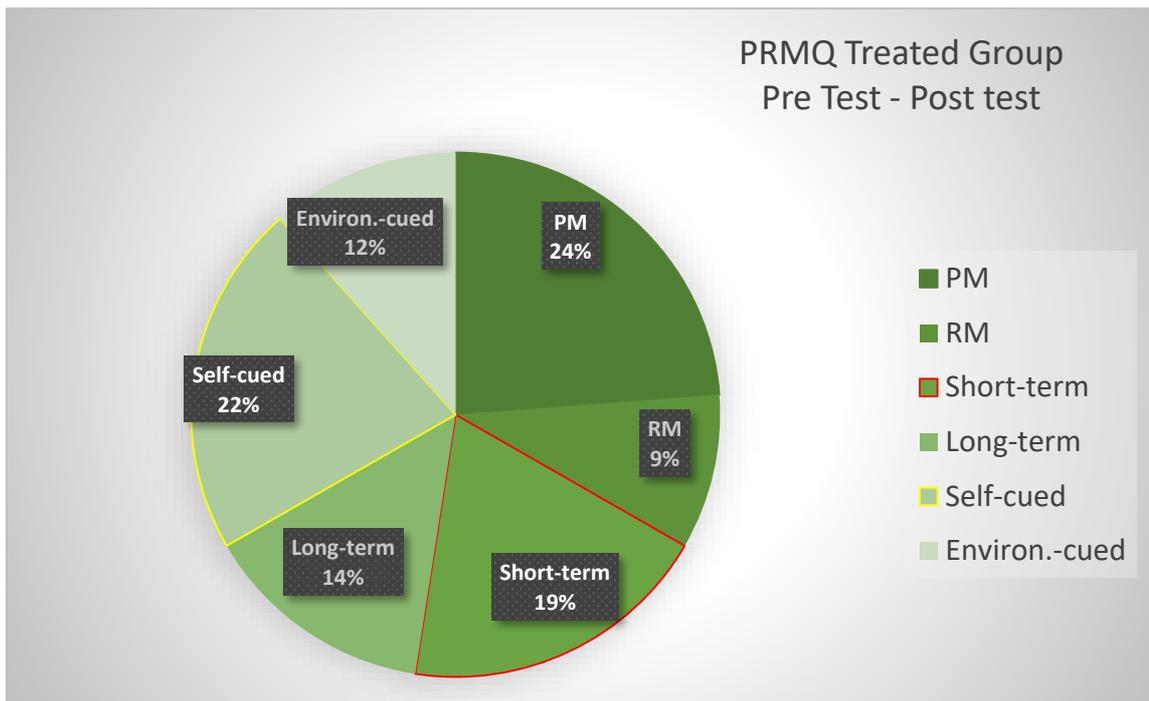
- the Ericksonian indirect hypnotic method was used to induce a hypnotic state: the state of medium trance was characterized by relaxed posture, slowed breathing, rapid eye movements and it was reached by all participants;
- consistently with Philippe Vernois's interview, emotions about specific events emerged in the form of visual images and sensory-perceptual features. All participants went back to significant episodes in their past experiences, characterized by meaningful episodes linked to strong emotions;
- autobiographic specific memories consistent with D. Golita Emsaki's work in Memory Specificity Training showed the importance of subjective episodic specific memories in Prospective Memory training;
- during the storage process emotions have been associated to positive emotion and wellness associated to a specific context, so that "focused" cues could emerge;
- during the hypnotic sessions a memory trace was created, confirming D. Schacter's work on episodic future thinking and Tulving's encoding specificity principle determining the effectiveness of retrieval;
- during the process of retrieval cues triggered specific, vivid emotional memories, strongly associated with the target. Emotions proved essential in the process of retrieval and they could be anchored to a specific context, displaying the same strategy of the encoding process of the past recollections, confirming Philippe Vernois' s observations;
- in post-hypnotic suggestions "focused" cues were used as anchors to retrieve the desired initial future intention

Self-evaluation rates in the PRMQ gave evidence for the differences in the Post-test Questionnaire when confronted with the Pre-test. Significant differences were observed in the participants who were assigned to the Treatment Group. Treated participants presented fewer memory failures in daily activities concerning Prospective, Short-term and Self-cued Memory.

Observations concerning the Hypotheses:

4 hypotheses were confronted with the null hypothesis and a Student's t- distribution for independent samples was calculated:

- 1st Hypothesis: the data of the Post-test in PRMQ confirmed a significant decrease in Prospective Memory failures when compared with the Pre-test in the Treatment Group, while the scores in the Post-test of the Control Group showed almost no differences. The results presented significant differences in the scores as confirmed by the Student's t- distribution $t=11,29$ for $\alpha = 0.05$ with t_{Cr} value 2.06, rejecting the null hypothesis and confirming H_1 . The difference between Post-test and Pre-test in PM in the Treated Group when compared with RM, Short-time, Long-time, Self-cued and Environmentally- cued Memories resulted in 24%;
- 2nd Hypothesis: the data of the Post-test in PRMQ confirmed a significant decrease in Short-term Memory failures when compared with the Pre-test in the Treatment Group, while the scores in the Post-test of the Control Group showed almost no differences. The results presented significant differences in the scores, as confirmed by the Student's t- distribution $t=9.14$ for $\alpha = 0.05$ with t_{Cr} value 2.06, rejecting the null hypothesis and confirming H_1 . The difference between Post-test and Pre-test in Short-term Memory in the Treated Group when compared with PM, RM, Long-term, Self-cued and Environmentally- cued Memories resulted in 19%;
- 3rd Hypothesis: the data of the Post-test in PRMQ confirmed a significant decrease in Self-cued Memory failures when compared with the Pre-test in the Treatment Group, while the scores in the Post-test of the Control Group showed almost no differences. The results presented significant differences in the scores as confirmed by the Student's t- distribution $t=9.03$ for $\alpha = 0.05$ with t_{Cr} value 2.06, rejecting the null hypothesis and confirming H_1 . The difference between Post-test and Pre-test in Self-cued Memory in the Treated Group when compared with PM, RM, Short-term, Long-term, and Environmentally- cued resulted in 22%.



PRMQ: difference of the means between Pre-test and Post-test for each Memory System

The significant difference between the mean scores in PRMQ demonstrated the validity of the suggested Hypothesis in H₁ stating the effectiveness of 4 hypnotic sessions in helping the participants improve their Prospective Memory. Significant decrease in memory failures were also observed in Short-term and Self-cued Memory subscales, confirming the validity of the suggested hypothesis in H₂ and H₃.

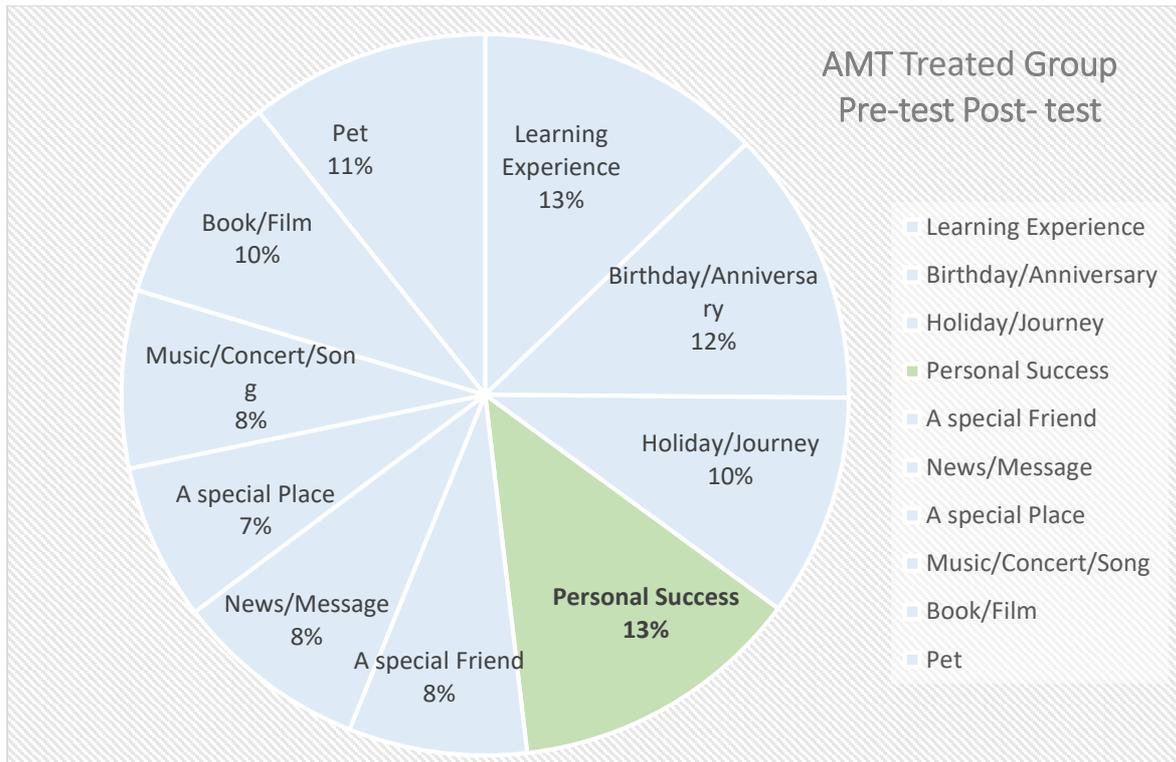
Since the PRMQ relied on self-report and it is limited by how participants interpreted the questions and perceived the strength of their own memory as well as the willingness to be truthful, an AMT has been administered to offer a more objective measure.

AMT offered the possibility of recalling and testing specific positive memories and score them according to specificity, differentiating them as Specific, Extended and Categorical memories, Semantic Associates and No Memories.

The test provided motivation and allowed the participants to work on memory failures through positive recollections for both Groups, allowing the access to positive emotions during the Hypnotic inductions in the Treatment Group.

A Student's t-distribution for independent samples for AMT demonstrated an increase of memory recollections for future intentions in the Treated Group when compared to the Control Group, confirming the results of PM in PRMQ.

- 4th Hypothesis: the data of the Post-test in AMT confirmed a significant increase in PM when compared with the Pre-test in the Treatment Group, while the scores in the Post-test of the Control Group showed almost no differences, thus confirming the scores of the self-rate PRM Questionnaire. The results presented significant differences in the scores as confirmed by the Student's t- distribution $t=5.26$ for $\alpha = 0.05$ with t_{Cr} value 2.06, rejecting the null hypothesis and confirming H_1 . The difference between Post-test and Pre-test in PM personal Success in the Treated Group when compared with Learning experience, Birthday/Anniversary, Holiday/Journey, A special Friend, News/Message, A special Place, Music/Concert/Song, Book/Film, and Pet resulted in 13%.
- A significant improvement was observed among the Treated participants in terms on wellbeing and satisfaction. All of them reported having experienced interest and motivation and were satisfied with the results. Almost no progress was observed in the Control Group.



AMT: difference of the means between Pre-test and Post-test in AMT for each Category

It can be concluded that the therapeutic use of 4 individual hypnotic sessions as the independent variable of the design, marked the difference between the Treated Group and the Control Group performances. As demonstrated by the results, the Treated Group showed significant decrease in failures in Prospective Memory and significant increase in the score of AMT recollections when confronted with the Control Group. Although the participants of the Control Group also showed some improvements, they were not exceeding the critical value in the t test in the PRMQ nor in the AMT although some recollections emerged in AMT after the General Sessions when difficulties, strategies and resources had been discussed. The high values of the statistic t exceeding the critical t value for statistical significance demonstrated that the 'net' difference between the scores for each participant was relatively large, and validates the evidence that the intervention variable or the treatment was effective.

Observations about the subscales:

- The results in subscales Short-term and Self- cued memories in PRMQ confirmed in the Control group the lack of significant improvements, presenting some fewer failures in the General Memory scores, thus adding evidence of a slight effect in memory improvements after the General Sessions. AMT showed a slightly greater number of recollections in the Control Group than the PRMQ, thus adding evidence for the increasing number of recollections after the General Sessions.
- In both groups Self- cued Memory presented more failures than the other memories in the Pre-test. The difficulties of recollecting specific episodes concerning autobiographic memories from the past was also observed in AMT. In the Treated group memory failures significantly improved.

6.3 Alternative Explanations

During the General Sessions participants were informed about the aim of the research concerning the study of Prospective Memory, the Pre-test ad the Post-test, the organization of the General Sessions and the topics of each session.

The participants were not informed that two groups had been randomly formed. Only the participants of the Treated Group were informed that they were to receive Hypnotic Treatments and that the research would confirm or disconfirm the effect of employing memory strategies with or without hypnotic individual treatment. All the participants of the Treated Group received the information about hypnotic sessions and they all agreed to participate and to keep the individual sessions confidential.

Only at the end of the sessions, participants not receiving the hypnotic treatment were informed they would receive the same treatment at a later time if they wanted. A general cooperative atmosphere was built to improve motivation.

The complete knowledge of the general design leads to reflect on the different motivation for the two groups.

Although the Control Group was encouraged to recall past memories during the General Sessions together with the Treated Group, the Control group lacked the individual treatment.

The participants of the Treated Group were aware of receiving different separate treatments and showed greater motivation to the experimentation. Their participation to the General Sessions was different in the number of questions they asked and in the way they cooperated with the other participants.

The Treated Group showed wellbeing and relaxation, thus contributing to a more relaxed atmosphere to the General Sessions and were more confident about the results.

6.4 Alternative Interpretations

A critical aspect with Pretest-Posttest designs is that it shows internal validity but sacrifices external validity. While the internal validity of the design is strong, because the Pre-test ensures that the groups are equivalent, there is no way of judging whether the process of Pre-testing actually influenced the results because there is no baseline measurement with group that remained untreated. For example, some participants given the PRMQ and AMT Pre-test may have been inspired to try a little harder in memorizing their daily activities and increasing performances in event-based or time-based future intentions to encompass other people.

This design allows a number of distinct analyses, encouraging future research to filter out confounding variables.

➤ Motivation

Motivation can be considered one of the variables. While the Control Group might have found benefit in the General Sessions, as they reflected and discussed about problems and strategies to employ in dealing memory failures, the Treated Group had the advantage of the individual sessions which presented a strong appeal to individual confidential rapport which might have led to a desire to show better scores. Having been informed that the Hypnotic sessions were confidential might have led participants to a greater motivation than participants of the Control Group, making them more willing to continue the experiment. It cannot be excluded that

individual attention and treatment during the hypnotic sessions might have increased commitment and willingness to reach better performances.

➤ The creation of the Rapport

The creation of an individual rapport facilitating the effect of relaxation during hypnotic sessions implies the activation of mirror neurons in brain processes. It refers to a feeling of strong connection leading to trust. It may have a deep influence on unconscious communication.

It cannot be excluded that the creation of an intimate connection leading to a positive feeling of self-improvement, which underlies the recollections of past episodes, may encourage more optimistic feelings which may also lead to a better concentration and focus on future goals. The inner focus, which is part of the trance, may help increasing concentration on the context and eventually lead to improvements in Short-term Memory performances. In the same way, focusing the attention on inner past experiences and emotions may be responsible for the improvement in self-recollections.

The personal narration which has characterized personal sessions and the vividness of specific episodes as well as the Hypnotic Treatments resulting in bringing long forgotten memories to light might also lead to a general improvement in memory recollections. When linked to future intentions, memories of the past may result in a stronger motivation for new intentions to be remembered. The significant decrease of PM failures in the Treated Group seems to confirm that emotions linked with recollections may generate the link with future intentions and may also be responsible for the increasing number of successful experiences both in AMT Prospective recollections and in PRMQ decreasing failures.

➤ Associative effects of memory past recollections in Short-time and Self-cued Memory

The formation of associative memories concerning past recollections and future intentions which may form a trace for the future performance to be triggered relies on learning strategies involving the relationship between unconnected items in prefrontal cortex and striatum. The neuroanatomical structures that govern associative memory and consolidation that are especially related to episodic memory are found in the medial temporal lobe and the main locations of the hippocampus and its surrounding structures.

When novel information is acquired, and strengthened through the process of consolidation, is eventually stored in Long-term memory. The prefrontal cortex, responsible for the Short-term Memory system, which relies on the hippocampus to transfer the short-memory recollections into Long-term memory, may also be responsible for a generalizing effect of the memory, transferring knowledge across multiple situations. As Long-term memory is maintained in neuronal connections widely spread throughout the brain and the hippocampus is essential both for learning and consolidating information, a generalizing effect of memory recollections from the past may explain emerging memories linked to the self. Hypnotic inductions may trigger past recollections and help with a cascading effect the emerging of other memories.

In this way, the recollection from the past of a long-forgotten song may be responsible for emerging memories linked to recollections of a special place or a special friend. In the same way the recollection of a special birthday may produce the recollection of a pet as a birthday present or bring the mind to a special place linked to a journey on a special occasion. The recollection of a story read in a book may transport the mind to a special place or a special friend in the same way as the recollection of a message may bring the memory back to a special friend.

A possible generalizing effect of the memories observed in AMT confirm autobiographic improvement scores in items referring to personal events such as learning experiences, especially regarding the emerging of first-time experiences, like learning the alphabet, reading and riding a bike or driving a car. The recollection of birthdays and anniversaries also emerging from infancy and adolescence, referring to special occasions or special presents, may be responsible of experiences of journeys and holidays from the past bringing emotions of freedom and romantic recollections.

In the Treated Group, AMT confirmed recollections especially for Learning Experiences, Birthdays/Anniversaries and Holiday/Journey confirming the improving of Prospective and Retrospective Memory as well as recollections referring to Self-cued past experiences, confirming the increase of autobiographic memories linked to the self.

PRMQ

Some items can be grouped and may lead to a generalizing effect

- Items 3,7,10 are more concerned with the observation and concentration on the context (event- based tasks)
- Items 1,5,12,14,16 are more concerned with activities to be done at a later time (time- based tasks)

Items n.3,7,10 suggest an event-based future intention. Item n. 3 “I have to remember to take the pills and that’s why I put them in front of me” proposes a similar situation to that of item n. 7 “ I have to remember to buy a birthday card, so when I see the shop I will remember to buy it” and item 10 “ I have to remember to take something with me when I go out, like for example my sunglasses, and I put them in a place where I can see them”. They all imply attention to the context. These items regard an event-based memory performance connected with the frontal lobe. During the retrieval phase an internal dialogue within the brain structures like and hippocampus and sub-hippocampus may trigger the intention and transform them into performance.

Items n.1, 5, 12,14, 16 refer to something to do at a later time. In order to be remembered they need an internal connection with something to be done at a later time.

In item 1 “I have to do something at a later time, like writing some emails” involve the front lobe for future intentions, and during the retrieval phase, the parietal lobe to construct the internal dialogue within the brain structures that may trigger the intention and transform them into performance.

The structure of PRMQ does not allow the scoring of a balanced number of event- based and time- based tasks to measure an exact counting of time-based and event-based failures. But the tendency seems to account for more difficulties in Prospective Memory time-based items rather than event-based. This is consistent with AMT confirming more difficulties in performances with time- based tasks by older participants on the basis that more attentional resources and attentional shifting are needed for these tasks and may account for poorer performances in the time-based tasks.

AMT

The data obtained calculating the difference between Pre-test and Post-test scoring showed a general increase in the outcome of positive intentions that can be observed in the Treated Group both for the first 9 items referring to Prospective Memory and to the last one *personal success* referring to Prospective Memory.

AMT reported more successful retrieval of the intentions when they were event-based, like remembering where they put the mobile phone or the magazine they were reading a few moments ago, rather than time-based personal intentions.

➤ Generalizing effect of future intentions

Future memories of personal success in Post- tests confirmed the retrieval of both event- based and time-based intentions in PRMQ and AMT. A generalizing effect of time- based memories may explain the positive outcome of similar performances like finding the sun glasses before going out and finding the keys before leaving, since they seem to refer to an inner timing associated to the moment of leaving home. In the same way, the retrieval of intentions such as remembering to buy fruit at the supermarket while buying other things may be linked to buying a birthday card in a shop passing by, seeming to reflect a better focus on the context.

AMT showed increasing positive outcomes for Prospective Memory confirming PRMQ. While in PRMQ participants had to answer set questions already printed for them in the Questionnaire, in AMT Pre-test the participants were requested to access their own positive memories and to set their own goals for future successful intentions, to be tested afterwards in the Post-test. In AMT participants might have been more motivated because, as they reported, the goals were their own.

6.5 Findings: their Use in Practice

The improvement of PM emerging from PRMQ and AMT Post-tests highlights the importance of the use Hypnotic Sessions as a memory training method to access emotions associated to positive past events in order to perform future intentions. Setting the proper encoding

conditions of the context through cues and focusing on what makes recollection possible enhances the possibility for future positive retrievals of the intentions.

PM guidelines for hypnotic practice:

- Focus on a desired future intention and use hypnotic medium trance to access a personal episode connected to a strong positive emotion of wellness, peace, joy and beauty

Setting a future intention helps concentration on a desired state. A medium hypnotic trance should be reached through relaxation of the body, absorption of awareness and a dissociation from surroundings. A strongly significant personal episode connected with strong positive emotions related to the future intention should emerge from the past;

- Let vivid details emerge according to favourite channels

Visual/ auditory or kinaesthetic strategies should support the recollection in order to let the scene come to the fore. Ask the participant to experience the episode using the same favourite strategies, involving the sensory perceptive apparatus, through the use of deepeners enjoying a feeling of deep calmness and relaxation;

- Provide a trace - event-based/time-based- as a link for the specific future intention

A memory trace whether event-based or time-based should be built in order to create a strong link with the future performance, a key word may be associated to the episode to provide a strong association with the context, whether connected to a place or a time of the day, allowing a regression to a specific moment in the past with increased attention and heightened concentration;

- Anchor the positive feeling

The positive emotion should be linked to a physical sensation, like deep breathing, or experiencing a special gesture to be recalled during the performance;

- Vividly retrieve and perform the future intention

The future intention should be retrieved, visualized and experienced, feeling the same positive emotion and of relaxation and joy as that experience in the past. The specific action should be vividly performed in all its details;

- Provide post hypnotic suggestions to consolidate the future intention

A post-hypnotic suggestion linked to confidence and success for the newly acquired skill should be linked to the actual performance and transferred to future performances;

- Return to consciousness

Slowly regain consciousness of the normal waking consciousness and state of alert.

These observations lead to the necessity of considering the importance of 3 important phases of the future intention:

1. Encoding phase of the intention: setting the goal and visualize the intention using vividly detailed information about specific events in the form of visual, auditory and kinaesthetic images and evoke sensory-perceptual features to let autobiographic memories containing focused cues may emerge, bringing the emotions of the episode to the surface;
2. Storage of the future intention: recollection through past memories event-based and time-based, providing the trace through key words facilitating the access to specific episodic memories, increasing internal memories. During the storage process emotions can be linked to a specific context, anchoring a trace which will determine the effectiveness of the retrieval;
3. Retrieval of the future intention: retrieve the desired intention triggered by emotional memories strongly associated with the target and perform the intention, consolidating the performance through post-hypnotic suggestions.

The improving of concentration and memory may enhance successful desired performances and help a deeper understanding of one's own potentialities. A new feeling of confidence accompanied by a lowered level of stress and anxiety may pave the way for the mind to perform future intentions.

Encouraging feelings of wellness, relaxation and self-confidence have been observed in the Treated Group.

6.6 Recommendations for Future Research

The inner process of focalization implicit in hypnotic inductions seem to account for the importance of attentional and concentration processes present during the context in memory-dependant patterns of neuronal communication present on the frontal lobe. The present design has highlighted the decreasing of PM failures, Short and Self-cued memories failures in PRMQ as well as an increase of PM recollections in AMT.

The involvement of hypnosis on the pre-frontal cortex seems to encourage the increase of those memories mainly linked to the same areas. Since the pre-frontal cortex is responsible for the planning activities involved in Prospective Memory and important areas of the Short-term working memory lie in the pre frontal cortex and can be activated by event-based tasks, it is for future research to consider the possibility of a positive correlation between the improving of Short-term Memory when associated to an improving of Prospective Memory. Since areas of the Autobiographic Memory are distributed through neural networks in the frontal, temporal and occipital lobes, the improving of Self-cued memory might also be positively correlated to the improving of Prospective Memory.

The results of the PRMQ for what concerns the significant Short Memory scores in the Post- Test seem to confirm that there might be a relationship between encoding and concentration, since concentration might influence the encoding stage during the process through sensory registers and allow the storing of memories in a Long-term Memory register from which future intentions can be retrieved. It is for a future research to determine whether, with hypnotic treatment, PM positively correlates with other memories. These results should encourage Therapists and Counsellors to master hypnotic practices as a focused approach to wellness and indicate the possibility of enhancing PM when normal aging may be responsible for memory failures in daily activities.

In a growing aging society confronted with the need of providing cognitive health and vitality as most important values, learning new abilities and acquire better strategies to improve memory recollections can be considered an important challenge for operators to acquire. Neuroscience

has proved that neuroplasticity characterizes human brain at all ages when the brain is stimulated by positive thinking, since new experiences may affect its neural topography.

Enhancing PM through a specific training may be useful in different situations. Since PM is significantly impaired in cognitive decline and memory training programs have proved to be useful, the use of hypnosis can provide an additional application with the possibility of extending the significant results of Golita Emsaki's researches on Mild Cognitive Impairment in older adults through the use of Memory Training.

Future research may confirm the validity of the use of hypnosis as a memory training program when memory failures are responsible for episodic memory and cognitive functions impairment. Since memory disorders are often the results of damage to structures that hinder the storage, retention and recollection of memories and may lead to the first stages of Alzheimer disease, combined memory programs in dedicated spaces can help people maintain a good quality of life to compensate memory disorders.

Recent projects supported by regional health services to help people with disabling diseases like Alzheimer have been carried out in Italy, stimulating a new conscience for psychological wellness in old age.

Much attention has been focused on providing wellbeing to people affected with memory disorders and new centers in Italy have been opened to provide dedicated spaces. Gardens have been created to reduce behavioural problems and space/time confusion, to promote wellbeing, encourage the cultivation of plants and stimulate remote memories. Therapeutic places have been planned to encourage shared moments with other people and families and promote freedom of movement, leisure activities and contact with nature.

Institutions throughout Italy are applying practices in patients that are treated and institutionalized to provide places to stimulate senses through coloured and aromatic areas to guarantee an activation for cognitive abilities. Green spaces have been thought for old people to move and help residual skills and slow down cognitive decline. Paved driveways have been projected and courtyards to walk on with plants are being produced in Compiano, since 2017 near Parma, where guided paths allow people to move without obstacles.

In the north of Italy in Monza Brianza *Il Paese Ritrovato* (The Rediscovered Country) is the first organized village for Alzheimer. It has been opened in 2018 by a group of 54 professionals among which health professionals such as doctors, therapists, psychologists, professional educators, nurses, physiotherapists and volunteers, working with the aim of helping people whose cognitive functions and decay are slowing down. The village offers autonomous residents with Alzheimer or dementia the opportunity to lead a normal life feeling at home and receiving the necessary attentions. The village is organized with shops, bars and minimarkets, church and a theatre where people can maintain residual abilities assisting films, plays and board games. Healing gardens like flower gardens for long walks and an artists' garden for rest support training memory programs to encourage and contribute to a better quality of life.

Chapter 7 Summary

Prospective Memory refers to a memory system which involves several phases: encoding a future intention, retention interval, retrieval, performance at some future time and evaluation of the action.

Recent research focus on memory tasks that are common in daily life, distinguishing between event-based tasks when they involve remembering to perform certain actions when specific circumstances occur and time-based tasks when they involve remembering to perform an action at a particular point in time.

The frontal lobe, situated at the front of the cerebral hemisphere, acts as supervisory system for executive functions and is responsible for Prospective Memory. Different kinds of memories are required in PM such as episodic memory, declarative memory, retrospective memory, and supervisory executive functions. While the median frontal lobe keeps attention focused on the planned action, the prefrontal cortex helps planning and carry out tasks. Cues that trigger an intended action, especially when visual or spatial, are recognized in the parietal lobe which becomes involved in temporal monitoring during time-based Prospective Memory tasks. The hippocampus, housed deep inside the medial temporal lobe plays an extensive role in Prospective Memory retrieval and is responsible for searching the intended action among other memories. This region is thought to support relational processes, crucial for recombining stored information into future event simulations.

The Multiprocess Model of Prospective Memory proposed by Mc Daniel and Einstein has thrown light on the functioning of the Prospective Memory system, suggesting that it is supported by automatic processes which occur when memories, mainly made up of retrospective elements, linked to the past, arise into consciousness involuntarily, involving a mental sequence which is felt as spontaneous remembering and is activated when a strong association between the target event and the intended actions occurs. Encoding an environmental cue in which the Prospective Memory intention needs to be executed may be responsible for the increase of prospective remembering, causing spontaneous retrieval stimulating monitoring for detecting subsequent opportunities to execute the intention.

The present research design has explored the possibility of enhancing Prospective Memory using Ericksonian hypnosis as a means to access personal positive retrospective emotions and consolidate the emerging trace which may allow the connection with prospective memories.

Hypnosis, with its emphasis on inner focus and absorption, has proved a powerful tool to enable people access past recollections. The effect of Hypnosis has been measured on the human brain by detecting MRI changes in blood flow, demonstrating that hypnotized people experience an increase in connections between the dorsolateral prefrontal cortex involved in cognition, memory and decision-making and the insula which helps the mind connect with the body, being responsible for processing functions such as body control, emotion and empathy through its extensive connections to cortical and subcortical limbic structures. It has also been demonstrated that people in a state of trance experienced a decrease in activity in an area called the dorsal anterior cingulate and reduced connections between the task-oriented dorsolateral prefrontal cortex and the brain's default mode network, a region most active when a person is daydreaming rather than focusing on the outside world.

The state of trance is characterized by a degree of increased receptiveness and responsiveness in which inner experiential perceptions are given as much significance as is generally given only to external reality. Milton Erickson's extremely individual based approach, in which the emphasis is placed on the uniqueness of the individual and on a therapeutic approach tailored to that uniqueness, has helped hypnosis become an important tool in several fields. The state of wellness which can be felt in hypnosis, helping the person relax the mind and slow the process of thoughts, may be responsible for an improved ability to concentrate and focus on a trace which may help recollect memories and distant emotions.

Different Universities and Institutions have been contacted and data analysis on the use of hypnosis and Prospective Memory have been collected through one-to one interview with experts operating in different countries, including the Harvard University, U.S.A, the University of Isfahan, Iran and *Psynapse* Institute in Tunis.

Professor Daniel Schacter, Professor at Harvard University, U.S.A, has confirmed the possibility of improving PM. His laboratory researches using fMRI have proved the presence of a core brain system that is activated while remembering past experiences. The brain network includes the medial prefrontal regions, posterior regions in the medial and lateral temporal cortex -extending

into the precuneus and the retrosplenial cortex- the lateral temporal cortex and the medial temporal lobe. Regions within the core system have resulted functionally correlated with each other and with hippocampal formation, indicating the possibility of an adaptive function which integrates information about the relationships and associations from past experiences, allowing the construction of mental simulations about possible future events, as well as envisioning the future during related forms of mental simulations.

Laboratory researches presented by D. Schacter have proved how Prospective Memory requires Retrospective Memory since the brain system functions adaptively to integrate information about the relationships and associations from past experiences. Daniel Schacter's research has highlighted the importance of specific episodic memories in Prospective Memory, revealing strong evidence of overlap between the brain systems while remembering the past and imagining the future. Each form of future thinking varies from episodic future thinking, which refers to specific autobiographical experiences that may happen - to a semantic or abstract state of the world that may occur in the future.

According to a constructive episodic simulation hypothesis, episodic memory is responsible for future simulation by allowing people recombine elements of past experiences into representations of future events. This also accounts for reductions in episodic detail for both past and future events which have been documented in various patient populations, including patients with depression, post-traumatic stress disorder and amnesic syndrome.

Professor NeshatDoost H.T. and Golita Emsaki, University of Isfahan, have been contacted to confirm the use of Prospective Retrospective Questionnaire (PRMQ) and Autobiographical Memory Test (AMT) as means to score memory improvements. Their researches confirmed the possibility of improving Prospective Memory in amnesic Mild Cognitive Impairment. The use of cue words during the sessions proved interesting instruments for the improvement of Prospective Memory, measuring the ability to imagine the future and confirming the use of the standardized Prospective Retrospective Memory Questionnaire as a reliable and useful tool providing qualitative data for quantitative measures, and validating the use of the Questionnaire PRMQ and AMT in clinical studies.

Philippe Vernois and collaborators of the *Psynapse Institute* in Tunis has indicated the importance of sensory perceptions, personal memories and emotions in retrieving and

accessing past experiences. Confirming the importance of positive emotions in retrieval memory processes he has underlined the importance of the individual strategy in the process of encoding, to be used as a trigger to retrieve a future intention.

The observations, interviews and publications presented and suggested by the interviewed authors and the results of the latest literature researches on prospective thinking and Prospective Memory studies have confirmed the possibility of improving future memory performances. All the experts indicated and proved the importance of subjective episodic specific memories in Prospective Memory training, confirming the necessity of proceeding with an individual training which relates to autobiographical memory recollections.

A procedure based on 4 individual Hypnotic Sessions has been chosen to test Prospective Memory through a pre-test post- test design, using hypnotic medium trance as a means to return to past situations as trace-dependent components to be linked to cue-dependent situations in the future for a constructive episodic simulation of future episodes. The duration of 4 weeks treatment has been based on L. E. Rossi's statements about a specific period of 4 weeks to 4 months required to stabilize new neural networks encoding new memory and learning.

Based on the assumption that the encoding phase plays an important role in memory retrieval, the special state of alert and focused concentration that emerges in a modified state of consciousness may account for an enduring trace for later recall since the inner process of focalization implicit in hypnotic induction seem to account for the importance of attentional and concentration processes present during the context in memory- dependant patterns of neuronal communication present on the frontal lobe.

Attention and focused concentration on the context imply the working of a short memory system which precedes the storage of the experience responsible for transmitting it to a long memory system which may permit the retrieval.

The use of Hypnotic Sessions based on past positive experiences of the self involves a Self-Memory System which performs a self-representative function allowing the creation and maintenance of a coherent self-identity over time where autobiographical knowledge

represents a higher order of integration for the construction of episodic details in future thinking.

Consistent with the findings of the importance of specific and internal memories in Prospective and Retrospective Memory, the Prospective Retrospective Memory Questionnaire (PRMQ), a self-rating questionnaire offers the possibility of testing daily failures regarding both Prospective and Retrospective Memories, testing the Prospective and Retrospective systems through 2 subscales: Self-cued vs Environmentally-Cued Memory and Short-term versus Long-term Memory.

4 Hypotheses have been considered in the present research design and verified against the null hypothesis. In order to measure PM as the dependent variable where Hypnotic Treatment is to be considered as the independent variable, a Treatment Group and a Control Group have been randomly formed.

1st Hypothesis:

- H₀: If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, no significant differences in PM scores in PRMQ will be observed in the Treated Group when confronted with the Control Group;
- H₁: If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, then significant differences in PM scores in PRMQ will be observed in the Treated Group when confronted with the Control Group.

2nd Hypothesis:

- H₀: If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, no significant differences in Short-term Memory scores in PRMQ will be observed in the Treated Group when confronted with the Control Group;
- H₁: If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, then significant differences in Short-term Memory scores in PRMQ will be observed in the Treated Group when confronted with the Control Group.

3rd Hypothesis:

- H₀: If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, no significant differences in Self-Cued Memory scores in PRMQ will be observed in the Treated Group when confronted with the Control Group;
- H₁: If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, then significant differences in Self -Cued Memory scores in PRMQ will be observed in the Treated Group when confronted with the Control Group.

Since the PRMQ is a measure of self-rated memory failures and scores cannot be treated as direct measures of memory performances, an Autobiographic Memory Test (AMT) has been administered to both groups to provide an external objective measure of control.

AMT has been used to score specific prospective and retrospective memories through pre-test and post-test scores. In the present research design participants were presented with a series of cue words, for which they were asked to produce specific positive emotional memories. Memories were scored according to a level of specificity, differentiating Specific Memories, Extended Memories, Categorical Memories, Semantic Associates and No Memory.

4th Hypothesis:

- H₀: If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, no differences in PM scores in AMT- measured by Personal Success-will be observed in the Treated Group when confronted with the Control Group
- H₁: If 4 Hypnotic Treatments are applied to reduce failures in Prospective Memory, then significant differences in PM scores in AMT –measured by personal Success- will be observed in the Treated Group when confronted with the Control Group

Participants aged 65-69 years of age were randomly assigned and recruited on the basis of equivalent characteristics such as age, gender and education. The Pre-test has shown equivalent General Memory, Prospective and Retrospective Memory, Short-term and Long -term Memory, Self-cued and Environmentally -cued Memory. A final evaluation included PRMQ and AMT Post-Tests.

A wide campaign on the internet has been used, through dedicated psychology sites and social networks. Some articles have been spread to describe the functioning of memory, with the aim of advertising the research. In order to create motivation for the participants a Memory Profile was proposed as a result of an initial test. The research has been conducted in Ravenna, in the North of Italy. After the campaign 61 people aged 65-69 have been assigned to the design.

5 profiles had been created from the PRMQ and Profile 3 has been used to select the subjects, in order to ensure the same level of memory abilities. The PRMQ normative scores have been used to select the participants for the experimentation in order to exclude people above and below the normative standard of the population for the Questionnaire.

2 groups have been formed, using a random assignment with a cut off limit of acceptance both in Prospective and in Retrospective Memory, fixed between 12 and 20 for each raw score, for a total of 24/80 to 40/80, fitting the requirements of the Profile 3 for General Memory scores.

6 people have been excluded from the experiment since they did not fit in the parameters of inclusion, presenting difficulties and failings over average standard population, 3 people have been excluded since they resulted above the standards. With the exclusion of 9 people the participants were 52. The participants were asked to complete the experiment, which would last 6 more weeks, including 1 session for AMT, with 4 sessions dedicated to Treatment or Control, and the final post-session to complete PRMQ post-test and AMT. 26 people were randomly assigned to each group.

The general design included 7 Sessions with an Initial Phase in which the Treatment Group and the Control Group completed PRMQ and AMT pre-tests, an Experimental Phase concerning 4 General Sessions for both groups including notions on Subscales in PRMQ, Concentration difficulties, Memory failures, Memory strategies and Resources.

The treatment with Hypnotic Sessions regarded the re-evocation of autobiographical and significant positive emotional events, and the implementation of strategies based on meaningful sensory stimuli, while the Control Group ensured the isolation of the independent variable. During the research design memory strategies were taught to both groups during 4 general Sessions once a week with one session discussion about mnemonic strategies while the Treated Group received hypnotic individual sessions.

All the hypotheses were tested using a Student's t- distribution for independent groups, taking into account the differences of the mean of Pre-test and Post-test of each group. The results have been based on the memory failures of the PRMQ and confronted with AMT, identifying past recollections and future intentions.

The data of the Post-test in PRMQ confirmed a significant decrease in Prospective Memory failures when compared with the Pre-test in the Treatment Group, while the scores in the Post-test of the Control Group showed almost no differences. Short-term memory and Self-cued memories were tested. The final result of the t value was compared to the critical value for the degrees of freedom C_r value of t distribution 2.06, $\alpha = 0.05$.

- 1st Hypothesis: the data of the Post-test in PRMQ confirmed a significant decrease in PM failures when compared with the Pre-test in the Treated Group. The Student's t- distribution for independent samples confronting Treatment/Control Groups resulted in $t=11,29$, rejecting H_0 ;
- 2nd Hypothesis: the data of the Post-test in PRMQ confirmed a significant decrease in Self-cued Memory failures when compared with the Pre-test in the Treatment Group. The Student's t- distribution for independent samples confronting Treatment/Control Groups resulted in $t= 9.14$, rejecting H_0 ;
- 3rd Hypothesis: the data of the Post-test in PRMQ confirmed a significant decrease in Self-cued Memory failures when compared with the Pre-test in the Treatment Group. The Student's t- distribution for independent samples confronting Treatment/Control Groups resulted in $t= 9.03$, rejecting H_0 ;
- 4th Hypothesis: the data of the Post-test confirmed a significant increase in PM when compared with the Pre-test in the Treatment Group. The Student's t- distribution for independent samples confronting Treatment/Control Groups resulted in $t= 5.26$, rejecting H_0 and confirming the scores of the self-rate PRMQ.

The significant difference between the mean scores of Pre-test and Post-test in PM on the PRMQ in the Treatment Group when confronted with the Control Group, demonstrated that the Hypnotic Treatment was effective in helping the participants decreasing daily prospective

memory failures and that significant decrease in memory failures were to be observed also in Short-term and Self-cued memory subscales. The measures of significance were confirmed by the Autobiographic Memory Test which showed an increase of PM as shown in the 4th Hypothesis.

PM GUIDELINES FOR HYPNOTIC PRACTICE

- Focus on a desired future intention and use hypnotic medium trance to access a personal episode connected with strong positive emotions: wellness, peace, joy and beauty
- Let vivid details emerge according to favourite channels
- Provide a trace - event-based/time-based- as a link specific for the future intention
- Anchor the positive feeling
- Vividly retrieve and perform the future intention
- Provide a post hypnotic suggestion to consolidate the future intention
- Return to consciousness

The results of the present research show the possibility of enhancing PM when normal aging may be responsible for memory failures in daily activities. In a growing aging society confronted with the need of providing cognitive health and vitality, learning new abilities and acquire better strategies to improve memory recollections can be considered an important challenge for operators to acquire. Neuroscience has proved that neuroplasticity characterizes human brain at all ages when the brain is stimulated by positive thinking, since new experiences may affect its neural topography.

Enhancing PM through a specific training may be useful in different situations. Since PM is significantly impaired in cognitive decline and memory programs have proved to be useful, the use of hypnosis can provide an additional application and the possibility of extending the use of Memory Training to memory disorders which are often the results of damage to structures that

hinder the storage, retention and recollection of memories and may lead to the first stages of Alzheimer disease.

In Italy a new conscience has been stimulated with projects supported by regional health services to help people with disabling diseases like Alzheimer. Much attention has been focused on providing wellbeing to people affected with memory disorders and new centers have been opened to provide dedicated spaces. Gardens have been created to reduce behavioural problems and space/time confusion, to promote wellbeing, encourage the cultivation of plants and stimulate remote memories. Therapeutic places have been planned to encourage shared moments with other people and families and promote freedom of movement, leisure activities and contact with nature. Green spaces have been thought for old people to move, help residual skills and slow down cognitive decline. In Compiano, since 2017 near Parma, guided paths allow people to move without obstacles.

In the north of Italy in Monza Brianza *Il Paese Ritrovato* (The Rediscovered Country) the first organized village for Alzheimer has been opened in 2018 by a group of 54 health professionals working with the aim of helping people whose cognitive functions and decay are slowing down.

Future research may confirm the validity of the use of hypnosis as a memory training program when memory failures are responsible for episodic memory and cognitive functions impairment and combined with memory programs in dedicated spaces to help people maintain a good quality of life and help compensate memory disorders.

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