

Sante De Sanctis' contribution to the study of dreams between '800 and '900 century: The originality of the integrated method

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Summary. The article reviews and analyzes Sante De Sanctis' - an illustrious psychologist, psychiatrist and founder of the discipline of psychology in Italy - research on dream. The analysis of his study of dreams demonstrates how De Sanctis was the only Italian scholar to have broadened the experimental paradigm of Wundtian psychology using an original pluralistic method integrated with a theoretical perspective based on the study of the psychophysical reality of individuals in their totality. De Sanctis' scientific work on dreams, documented in important national and international articles and monographs published in the 18th and 19th century, appears to exemplify his modern conceptualization of clinical-differential psychological research.

Keywords: History of Psychology, Psychology of Dream, Sante De Sanctis, Methods of Experimental Psychology, General and Differential Psychology of Dreams

1. Introduction

Sante De Sanctis (1862-1935), psychologist and psychiatrist, is one of the most representative figures in Italian scientific psychology (Cimino & Lombardo, 2004; Lombardo & Cicciola, 2006). De Sanctis is considered to be one of the discipline's founders and primary actors in the period between the two world wars; he held an important role in the history of psychology in Italy due to his extensive publications and continuous institutional activity. The scientific study of dream was probably the area that, more than any other, made it possible for De Sanctis to become internationally known due to his study of dreams in accordance with the canons of modern scientific psychology (Lombardo & Foschi, 2008; Ferreri, 2008).

Between the 19th and 20th century the interpretation of dreams gradually shifted from being based on mystical-religious theories to becoming the subject of "scientific" studies conducted by physicians, intellectuals and philosophers. Carroy, Ohayon and Plas (2006) highlighted, in a review of numerous scholars, the lengthy process of secularization of dreams that took place between the end of 19th century and beginning of the 20th century. The Freudian myth of psychoanalysis according to which psychoanalysis was the first psychological study of dreams, while the pre-psychoanalytic study of dreams was essentially interpreted as being somatic or medical, has also been critiqued as part of this review. It is only recently, however, that some historical works have brought light to the numerous studies on sleep

carried out in accordance with the original psychological canons before the appearance of the psychoanalytic model (e.g., Foschi & Lombardo, 2008; Pigman, 2002).

For Sante De Sanctis the first sources of inspiration for the scientific analysis of dreams came from the tradition initiated by Jean-Martin Charcot (1825-1893) in Paris at Salpêtrière. The relevance assigned to research on dreams in France is evident in the 1851 faculty search promoted by the Department of Philosophy at the Academy of Moral and Political Sciences that proposed a competition on the theory of sleep and dreams from a psychological perspective (see Hervey de Saint-Denys, 1867/1977; see Schwartz, 2000). The search reflects the gradual change in epistemological perspective in the study of dreams that was taking place at that time (Schwartz, 2000).

Numerous contributions to the science of dreams were published during the following years, some of them directly discussing the theories proposed by participants of the competition (e.g. Delboeuf, 1885/1993; Hervey de Saint-Denys, 1867/1977; Macario, 1857/1978; Maury, 1861/1862). At that time, the introspective dream report was considered as a precious and valid testimony of what had been perceived, felt, or thought by the dreamer. Researchers were studying the phenomenological descriptive features of dreams rather than their meaning for a particular dreamer, and various experiments were designed to determine what independent factors might influence the content of dreams (Schwartz, 2000).

Sleep and dreams in France was studied by two categories of professionals and amateurs (Carroy, 2010). Among the first Philippe Chaslin (1857-1923), René Artigues (1853-1921), Jean-Martin Charcot and Pierre Janet (1859-1947) framed dreams within a diagnostic perspective (see Saussure, 1926). The famous neurologist Jean-Martin Charcot and his studies tried to individuate a differential framework of dreams in a comparison of hysterics and epileptics. In the "Tuesday Lessons" (Leçons du mardi à la Salpêtrière 1887-1888, 1888-1889) the French neurologist insisted that dreams in hysterics were characterized by terrifying

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zooscopic images and highlighted the similarities with the dreams of alcoholics. Pierre Janet's studies confirmed this peculiarity as well as the presence of persecutory dreams and insomnia in hysterics. Janet did not carry out a systematic study dedicated to the topic, but addressed the question of dreams based on paralysis and fixed ideas in "L'etat mental des hysteriques" (1894). Janet observed that the reported content of dreams in hysterical patients was strongly correlated with paralysis; one example was his patient Justine who woke up with one arm in a state of contraction after having dreamt. A second consideration was the recurrence of dreams in patients: hysterics repeatedly had the same dreams for several consecutive days. This supported the theory of fixation in hysteria.

Carroy (2012) shows how, in the first half of the nineteenth century, the psychology of dreaming that was emerging in France was used to defend an advanced idea of psychology. In France the dream and the subconscious are placed at the center of a general psychology rather than medical psychology (Carroy, 2012).

Alfred Maury (1817-1892) was one of the first in France to make systematic observations of his dreams using direct introspective method and he also used experimental methodology in the study of dreams (Pigman, 2002; Carroy, 2010). The scholar, a supporter of the "in two" observation method, used the same olfactory stimulants on himself to induce dream content (Maury, 1878). Maury's method, based on the notion that the dreams have a somatic origin, is included amongst the physiological theories along with Mary Whiton Calkins' work (1863-1930) (Cimino & Lombardo, 2004). Maury was a "dreaming scientist" as Hervey de Saint-Denys (1822-1892). Hervey de Saint-Denys and Gabriel Tarde (1843-1904) used Maury's method and dedicated themselves to the systematic collection of their own dreams. Hervey de Saint-Denys transcribed his dreams upon waken for about 1946 nights while Gabriel Tarde collected his dreams between 1870 and 1872; the dreams were published in an unedited text published in 2009 by Carroy. Hervey de Saint-Denys, despite his affirmation of the close correlation between sleep and dreams, declared that he did not want to focus on the physiological processes that occurred in the nervous system (Hervey de Saint-Denys, 1867). Joseph Delboeuf (1831-1896) and Philippe Tissie's (1852-1935) work was also in agreement with Maury's method (Carroy, 2010). Delboeuf and Tissie used the direct introspective method. Delboeuf used the collection of his own dreams in an attempt to confirm or contradict the theories put forth by contemporary scholars in the field. His work addressed questions including the relationship between dreams and memory and the analysis of the differentiation of dreams and hypnosis. Delboeuf was a scholar midway between being a dreaming scientist and a scientific dreamer.

Tissie, however, proposed a physiological psychology of dreams within an organic perspective that, starting with Pierre Jean George Cabanis' (1757-1808) theory, considered dreams to be a process generated by external and internal stimuli. Tissie's approach was also important in the psychotherapeutic use of dreams. The psychology of dreams of Tissie was probably an anticipation of psychoanalysis.

The French psychologist Nicolae Vaschide (1874-1907) addressed the question of method in the study of dreams in his 1911 work *Le sommeil et les rêves* [Sleep and dreams]. According to Vaschide the experimental methods applied

to dreams could be classified as: subjective or direct introspective methods (Maury, Hervey de Saint Denys); objective methods (Calkins, Mourly, Vold); eclectic methods (De Sanctis); and inquiry or questionnaires (Jatrow, Child, Heerwagen). In his 1911 work *Vaschide*, analyzing the various methods used by his colleagues, attributed the merit of having used an "eclectic" method to De Sanctis by which Vaschide meant that several methodologies were used simultaneously.

A first analysis of works by the authors cited above leads to the classification of studies within two perspectives: one that emphasized the organic aspects and one that emphasized the more specifically mental aspects (Carroy, 2010).

Various studies on sleep and dreams were also carried out in Germany at the time. Many of the internationally recognized studies that were also cited by De Sanctis were primarily based on psychophysiological techniques and tried to identify the process of sleep and dreams through the use, for example, of the sleep cycle.

Amongst Emil Kraepelin's students, Friedrich Heerwagen (1864-1941), a German physician, conducted various statistical studies on sleep that led to a publication in Wilhelm Wundt's (1832-1920) publication *Philosophische Studien* (Heerwagen, 1889). The research was in general based on the use of questionnaires, statistical techniques and the analysis of the sleep cycle. Heerwagen, together with Eduard Robert Michelson (1861-1944), continued the research on sleep and dreams at the University of Dorpat (Estonia) using a primarily psychological and psychophysiological method (Weber & Burgmair, 2009).

As in France, the first psychophysiological studies in Germany that analyzed variations in sleep and dream in relation to the physiological causes that impact the organism gradually left room for oniric theories that saw dreams as the result of mental apparatus (cf. Cimino & Lombardo, 2004). Heinrich Spitta, a philosopher and psychologist at Tübingen (1849-1929) was one of the primary scholars in the German school. Spitta adopted two of Maury's techniques: the use of a sleep diary and provoking or stimulating the sleeper. Spitta gave great importance to the analysis of the neurophysiological processes and defined oniric phenomena as being created by external stimuli as well as by internal cerebral activity, underlining the importance of intrapsychological factors in the formation of the dream.

Both Sigmund Freud (1856-1939) and Sante De Sanctis cited the internationally renowned philosopher Karl Albert Scherner (1825-1889) for his 1861 work *Leben des Traums* (The Life of the Dream). Scherner developed an interpretative theory of the scenes of dreams and was amongst the first to highlight their symbolic value. According to his theory the dreamer transforms the perception of wakefulness in fantasy that is expressed through oniric images.

Literature from the United States was analyzed only in the review of Hendrika Vande Kemp (1981) which regarded the works on the dream published between 1860 and 1910. Mary Whiton Calkins is the most representative American dreams scholar and known for the article "Statistics of Dreams" published in 1893.

Studies of dreams in Italy primarily focused on the dream as an analogy to suggestion and hypnosis or as an altered state of consciousness (Benini, 1898; Bonatelli, 1880; Dandolo, 1889; De Sarlo, 1887; Tebaldi & Tonnini 1887). De Sanctis was the first Italian scholar to become internationally renowned as a scholar of dreams. His role was

recognized by James M. Baldwin (1861-1934) and George Frederick Stout (1860-1944) who in the heading "Dream" published in the Dictionary of Philosophy and Psychology defined De Sanctis 1899 work as one of the best studies on dreams. In fact, as has already been noted in the literature (Carroy, 2006, Lombardo & Foschi, 2008), in criticizing the subjectivism of Maury and Freud developed a study based on a research paradigm that was firmly rooted in experimental psychology. Ellenberger (1970) had also noted the substantial difference between the psychology of dreams proposed by De Sanctis and the introspective approach used by Maury and Hervey de Saint-Denis that created a situation intended to confirm the hypotheses of the "scientist dreamer". De Sanctis, then, is recognized as being one of the authors that contradict the "myth" of the primogeniture of psychoanalysis in the study of dreams (Pigman, 2002). Nonetheless, De Sanctis' research, cited in the secondary literature in the field, has not been the object of systematic studies that completely reconstruct the value of the proposed theoretical-methodological model. De Sanctis began with a patient and extensive collection of data and physiological and psychological facts tied to dreams that made it possible to have an ample set of cases that not only focused on psychopathology, but also made it possible to analyze a multiplicity of normal individuals at different points of development ranging from infancy to adulthood. His methodological "integralism" also appears important in that it makes it possible to analyze both the psychophysiology tied to oniric activity and the mental content of dreams, connecting the oniric consciousness with the waking consciousness. Within the international landscape De Sanctis can be considered a "mediator" between the physiological theories of dreams, which he addressed in his early psychopathological research, and the more strictly psychological conceptualization that De Sanctis gradually integrated into his research in which he used an innovative "integral" methodology.

2. Dreams and psychopathology

The scientific study of dreams that De Sanctis began in the 1896 was done in accordance with an experimental research method that can be traced to the clinical-differential approach that later characterized his work internationally (De Sanctis, 1898 a).

In reference to both the primary and secondary literature, the various scholars that addressed the psychology of dreams (Baldwin, 1911; Ellenberger, 1970; Ferenczi, 1908; Lombardo & Foschi, 2006; Pigman, 2002) have brought to light the originality and systemic nature of De Sanctis' studies. In particular, as reconstructed by Lombardo and Foschi's (2011), it is possible to distinguish — on the basis of the theoretical methodological approach used — three periods in the research De Sanctis conducted over a 40 year period, from 1896 (after his study trip to Paris) to 1933 (shortly before his death): the first, which runs from 1896 to 1899 can be characterized as a psycho-pathological differential approach; during the second period, from 1899 to the early 1900s, the analysis of the differential psychology of dreams was an independent focus of study; and the third period, from 1913 to 1933, was characterized by psychophysiological studies on the relationship between sleep and dreams using a critique of the psychoanalytic interpretation of dreams as a starting point. During each phase De

Sanctis' scientific output was characterized by a pluralistic methodology that utilized different methods to develop differential studies of sleep in an integrated fashion (Lombardo & Foschi, 2008).

The research tradition that Charcot inaugurated at Salpêtrière and his "Leçons du Mardi" (1888-1889: 292-294, 372) inspired De Sanctis' first studies on dreams in which he made a further differentiation on the basis of content of the dreams of individuals with hysteria and epilepsy in effort to develop classical nosographical psychiatry (see De Sanctis, 1896a). At Salpêtrière De Sanctis met students and colleagues of the neurologist Jean-Martin Charcot. These individuals included Chaslin and Louis Séglas (1856-1939), with whom De Sanctis created a lasting scientific relationship as evident in the correspondence between them (see Letters from Chaslin, 1893-1919; Letters from Séglas, 1898-1919). In his systematic observations of clinical cases, De Sanctis also reported patients' reports about their dreams, including distressing and persecutory nightmares of hysterical men and women.

The clinical-psychopathological tradition also led to the examination of life histories and patients' unconscious manifestations such as facial mimicry and automatism, connecting them with dream-based phenomena and identifying the "dream stigmata" of the different pathologies. In his research on dreams, De Sanctis also considered the work of Pierre Janet who brought into evidence the dreams in his analysis of paralysis and fixed ideas (Janet, 1894).

De Sanctis published the first volume dedicated to the study of dreams, *Il sonno e i sogni nell'isterismo e nell'epilessia* [Sleep and dreams in hysteria and epilepsy] (1896), directly after his return to Italy, which earned him a professorship in psychiatry and clinical psychiatry. The methodology used in this case was based on the systematic observation of dreams differentiated using Maury's direct introspective method (Maury, 1861). Maury's model was frequently used in the study of dreams at the time. De Sanctis' critique of Maury held that the wait needed to have certain dreams was sufficient to induce the kind of dream that would confirm the experimenter-dreamer's theory (Ellenberger, 1970). Aware of this limit, De Sanctis preferred to use the method proposed by Calkins based on the guided stimulation of the sleeper and the analysis of the reports provided by the subjects of the experiment. De Sanctis retained that Calkins Statistics of dreams (1893) was the best experimental work on dreams; as is known, Calkins analyzed the contents and frequencies of the dreams of two subjects, one male and one female, for eight weeks. The study participants wrote down the contents of their dreams after having been awakened by an alarm at regular intervals during the night. As early as 1896, De Sanctis maintained the importance of using various methods including, in addition to those mentioned by Calkins, the collection of data on the contents of dreams by means of specifically designed questionnaires based on the model proposed by Francis Galton in 1883. In addition to Galton, De Sanctis cited other authors such as Friedrich Heerwagen, Joseph Jastrow (1863-1944), who collected statistics on the dreams of 183 blind individuals and Charles Child (1849-1902) who in 1882, in the *American Journal of Psychology*, published the analysis of data on unconscious brain activity gathered through a questionnaire administered to 200 students (Child, 1882).

On the basis of up to date international literature, De Sanctis developed questionnaires to identify the frequency

and contents of dreams in relation to psychopathological states. The results were divided into sub-groups: the difference in the content and process of sleep and dreams was, for example, underscored in the greater search for richness in the visual element of dreams in individuals with hysteria in comparison to those with epilepsy.

The study of dreams was later applied to criminals, leading to the writing of *I sogni nei delinquenti* [The dreams of delinquents] in 1896. The author's analysis was in line with the contemporary studies of criminal anthropologists like Cesare Lombroso (1835-1909) and Luigi Ferri (1856-1929) who had explored the correlation of the criminal's emotionality and dreams. Lombroso, who was among the first to address the topic, had demonstrated a high level of agitation in delinquents' dreams after the commission of a crime while Ferri had found apathetic impassibility in the sleep of murderers. Consequently, De Sanctis' 1891 study in the penal reformatory of Orvieto explored prisoners' emotionality through the analysis of the content and frequency of their dreams. This research demonstrated the generally low level of affective content in the dreams of criminals in comparison to normal individuals. The prospect of analyzing dreams in order to shed light on the criminal personality was used as an example in the evaluation, carried out in cooperation with Enrico Morselli (Morselli & De Sanctis, 1903) of the personality of the well-known Calabrian criminal, Giuseppe Musolino, who, on the basis of the psycho-physiological and anthropological examinations, was judged capable of standing trial. This analysis of dreams showed that the criminal had a lively world of dreams and very high frequency of emotionally intense dreams.

The study of emotions became so central to De Sanctis that he addressed the argument in the article entitled *Emozioni e Sogno* [Emotions and the Dream] in 1896 within which he explored emotion in dreams and in the waking state, both in normal and abnormal individuals. In this case, De Sanctis' broadening of the field was already evident as he distanced himself from an exclusively psychopathological focus to analyze the emotionality of dreams in people in general. This broadening of perspective led De Sanctis to investigate the general causes of dream activity, identifying the physiological, biological, pathological, and external causes, underlining the importance of hereditary dispositions that, he felt, left traces in the nervous system. By analyzing the differences in the emotional content of the dream during sleep and upon waking, De Sanctis demonstrated the presence of two specific mental states: the waking consciousness and the sleeping consciousness. Some emotions that were "both strong and deep, exciting and depressing" were provoked in the subject during sleep by means of the "sensitive excitation method" that consisted of stimulating the subject's auditory, olfactory, and gustatory senses (De Sanctis, 1896). Movement, breathing, and the words that represent emotions were subsequently analyzed by the use of a survey method during the two mental states of waking consciousness and sleeping consciousness. The sleeping consciousness was considered the basis of organic emotionality while the waking consciousness was influenced by education. In the case of pathology, however, there was no real delimitation between sleep consciousness and waking consciousness. Even in these early writings De Sanctis' psychological analysis did not limit itself to the psycho-physiological and behavioral analysis of the dreamer, but included the examination of other states of consciousness.

In 1897 De Sanctis proposed an investigation of the transition of emotion from the waking consciousness to the sleeping consciousness, retaining that dreams could induce a psychopathic state (*Sui rapporti etilogici tra sogni e pazzia. Deliri e psicosi dei sogni* [The etiological relationship between dreams and madness. Delirium and psychosis of dreams]). De Sanctis concluded that in psychotic and paranoid patients dreams could be considered similar to a psychic trauma. The study of dreams in different psychopathologies led De Sanctis to retain, in the previously cited monograph from 1896, "that while before the nervous outbreak some ill people dreamed little or dreamed about indifferent things, as soon as they fell ill they presented the (above-mentioned) characteristics during the happenings of the night" (De Sanctis, 1896: 70).

This conceptualization connects to the idea according to which dreams, in individuals with hysteria, epileptics, neuropaths, and the mad in general, represents the "sleep equivalent" of psychopathology (De Sanctis, 1898).

3. Towards a general and differential psychology of dreams

The 1899 monograph *I sogni. Studi psicologici e clinici di un alienista* [Dreams. An alienist's psychological and clinical studies] takes up the previously addressed research topics in a broad and complete manner (De Sanctis 1896 a,b, 1897 a b, 1898 a,b,c) and including studies of normal subjects. According to De Sanctis the objective of psychology was that of finding connections based on empirical data upon which to progressively construct a theory of dreams without relying upon preconceptions. This is the reason for broadening the research perspective from abnormal subjects to the sane and animals in accordance with a persistent methodological pluralism that integrated the clinical knowledge from his medical-psychiatric training with Galtonian psychometric instruments.

The transition from psychopathology to psychology of dreams from the individual standpoint is explained in the preface to the work by the scholar: "... there was no literature research aimed to study the dreams from the individual psychology point of view; I basically intended to fill this gap" (De Sanctis, 1899: 6).

In the monograph De Sanctis conducts an analysis of comparative psychology according to a model of evolutionism that led him to take care of the study of dreams in animals and in normal individuals and to analyze dreams in different stages of development by conducting studies on childhood, adulthood and old age.

Particularly original appears to be the study of dreams in animals. The evolutionary perspective differed individuals and species on the basis of the stage of development reached and comparatively examined the differences in the various human and animal species. The characters of the animals represented the lowest level of evolution, while men represented the highest point in the natural scale. In the theory of evolution, psychic activity therefore represented the last level of the evolutionary process of the species and should be studied like any other natural phenomenon. This perspective influenced the beginnings of the scientific study on psychic phenomena and therefore studies on the dream.

The dream in this case is related to the movements carried out by the animals during sleep. De Sanctis underlines

Figure 1. De Sanctis, S. (1899). *I sogni. Studi psicologici e clinici di un alienista* [Dreams. Some Psychological and Clinical Studies of an Alienist]. Turin: Bocca, p. 135.

I SOGNI DEGLI ADULTI 135

SOGNI DELLE PERSONE ADULTE NORMALI
Uomini 185 - Donne 55

Questioni proposte	RISPOSTE	UOMINI	Percentuale	DONNE	Percentuale
I - Frequenza dei sogni.	Sognano sempre . . .	22	13.33	18	32.73
	Sognano spesso . . .	45	27.27	25	45.45
	Sognano raramente. Non sognano mai; o non sanno dare alcun ragguaglio sui sogni.	83	50.30	7	12.73
II - Vivacità dei sogni.	Hanno i sogni vivaci.	56	37.33	33	66 —
	Hanno i sogni scoloriti.	94	62.67	17	34 —
III - Contatto abituale dei sogni.	Fanno sogni complicati . . .	70	46.67	27	54 —
	Fanno sogni strani . . .	28	18.67	6	12 —
	Fanno sogni semplici . . .	52	34.67	17	34 —
IV - Rapporti di contenuto tra la vita del sogno e i fatti della veglia.	Ammettono che il rapporto vi sia quasi sempre . . .	128	85.33	36	72 —
	Ammettono che molte volte il rapporto non vi sia . . .	22	14.67	14	28 —
V - Memoria dei sogni.	Mantengono ricordo dettagliato dei propri sogni . . .	35	23.33	21	42 —
	Ne mantengono ricordo sommario . . .	83	56.33	24	48 —
	Non ne mantengono abitualmente ricordo alcuno . . .	32	21.33	6	10 —

that while there is a difference of degree between the dream of men and the dream of animals there is instead no difference of nature. The naturalistic perspective in fact saw the opportunity to study empirically psychic phenomena in all their forms and therefore both in humans and animals.

The further study relates the dream with the different stages of development of the individual taking care of dreaming in infants and children, adults and elders.

Even the study of the dream of the children appeared at the time as an area understudied. De Sanctis noted however that it was possible to identify dream phenomena even at an early age. The author also links the development of intelligence with the vividness of dreams. The relationship between dream and brain development was visible also in the elders. In this case De Sanctis emphasizes that in the senile brain the associative links become weaker.

A specific space is also given to the study of normal adult individuals. In this case emerges a comparative model of dream analysis by gender. As demonstrated in the table reproduced below, the differential study of dreams involved the use of questionnaires covering brain activity during sleep that were constructed on the basis of the characteristics of different groups that had been analyzed (De Sanctis, 1899). This was done in order to describe the form and contents of dreams in different sub-groups.

De Sanctis repeated Heerwagen and Calkins methodology and administered five "questions" to the subjects. The questions shed light not only on the frequency and liveliness of dreams, but also on the regular content of dreams, the relationship between dream content and daily life, and the type of memory upon waking up. The memory type was evaluated on the basis of being either present, or absent and the level of detail of the memory when present.

In addition to the qualitative evaluation of the habitual content of dreams, De Sanctis organized subjects' responses in a numerical form. This quantification of the data enabled the analysis of frequency, liveliness and the correlation between the content of dreams and real life events (see Figure 1). De Sanctis also used a method based on the induction of dreams: he provoked various forms of stimulation, such as

olfactory, gustatory, auditory, thermal, muscular, and pain, in the sleeping subject in order to observe the eventual positive effects on sleep and dreaming. For example, De Sanctis used the sound from "a small music box" (De Sanctis, 1899) in the full silence of the night or had the subject inhale smells including pleasant perfumes such as violet. In this important work De Sanctis repeated the studies proposed by Morly Vold (1850-1907). Vold was a Norwegian pioneer in the psychology of dreams, who used experiments to study adults of both sexes and the influence of muscular and visual stimuli in the dream in relation to the dreamer's position. Vold also analyzed the perception of shape, dimension and color of visual stimuli presented prior to falling asleep (Vold, 1910). Vold demonstrated that the experiment's success depended on a certain number of factors including the dreamer's general disposition (as was also verified by De Sanctis), the subject's health and fatigue at the time of falling asleep and the conditions in which the experiment was carried out. The connection between the two scholars can be seen not only in the use of a common method, but also in the numerous letters that Vold wrote to De Sanctis between 1899 and 1910 (see Letters from Vold, 1899, 1908, 1909, 1910).

In the first part of the monograph thus it is shown a perspective of a comparative study between man and animals and an analysis aimed at studying normal people (children, adults and elders) that should be seen as the study of differential psychology.

Later De Sanctis deals with the analysis of pathological cases resuming previous studies (neurotics, psychotics, epileptics, criminals).

These studies led De Sanctis to consider how it is possible to modify sleeping activity through emotional stimulus. Within this framework, emotions, despite showing continuity between sleep and wakefulness, connected themselves with different mental representations in the two states of consciousness. Experimental dreams made it possible to validate this theoretical model of the representative and affective formations of wakefulness and sleep; in fact, stimulating the subject with pleasant smells while asleep most of the time led to dreams with a pleasing "moral" content. In the dream the pleasant olfactory sensation was transformed into a sensation connected to moral, rather than physiological representations, processes that De Sanctis defined as "transfer" or rather the transition from the physiological to the psychological (see Lombardo & Foschi, 2008).

In the 1899 monograph on dreams one also notes an in-depth exploration of the psychophysiology of the dreamer through the analysis of changes in breathing, circulation and temperature. In this, De Sanctis was consistent with the most up to date literature produced by European physiologist and neuropathologists at the time (see Mosso, 1893; Dubois, 1898; Howell, 1897). Mosso and others maintained that sleep was the product of a decrease in the stimulation of nervous system or processes of auto-intoxication accumulated during the day that wavered in the morphological changes of the dendrites, as claimed by the French physician Mathias Duval (1844-1907) and the Spanish histologist Santiago Ramón y Cajal (1852-1934). Some histologists, including Ernesto Lugaro (1870-1940), claimed to have verified a shortening of the dendrites during wakefulness as they appeared to lengthen during sleep (see Lugaro, 1898). All of these studies pointed towards a decrease in circulation during sleep and a possible histological modification of

Figure 2. De Sanctis, S., & Neyroz, U. (1902). Experimental Investigations Concerning the Depth of Sleep. *Psychological Review*, 9, 254-82.

TABLE IV.—NORMAL SUBJECT G. N., MALE.

Hour of Sleep	Subcon. Reaction	Waking Point	Dreams.	Hour of Sleep	Subcon. Reaction	Waking Point	Dreams.
0.10	25	30	—	4	40	70	+
0.20	30	40	—	4.15	20	50	+
0.30	40	50	+	4.30	45	30	+
0.40	60	70	+	4.45	40	50	+
0.50	50	65	+	5	30	45	+
1	65	65, 15	?	5.15	20	30	+
1.15	40	40, 60, 10	+	5.30	30	60	+
1.30	35	60	+	5.45	40	40, 40	+
1.45	30	40	—	6	20	35	+
2	30	40	+	6.15	40	65	+
2.15	40	40, 40	—	6.30	30	60	+
2.30	50	75	+	6.45	35	55	—
2.45	25	40	+	7	20	25	—
3	35	35, 35	+	7.15	15	20	+
3.15	25	60	+	7.30	15	20	+
3.30	40	50	+	7.45	10	15	—
3.45	45	55	+				

the neurons that strove to identify the morphological equivalent of thought.

During sleep De Sanctis observed an increase in the response threshold that corresponded to the phases of sleep and was subject to other studies conducted in collaboration with Umberto Neyroz (1877-1941). Their collaboration led to an important international article published in 1902 in *Psychological Review* (De Sanctis & Neyroz, 1902). The article presented a study of normal and abnormal (primarily epileptic) subjects conducted the year before in the Psychiatric Clinic of the University of Rome. Some of the most important tables are reproduced below in order to better illustrate the experimental design of the research.

Figure 2 presents the subject's reactions following the application of tactile and pressure stimuli as measured by Hermann Adolf Griesbach's (1854-1941) aesthesiometer. The aesthesiometer was used to stimulate a single point on the skin that made the subject wake up without producing any feeling of pain. The researchers used this instrument to induce excitement in the subject while measuring the intensity of a sub-conscious reaction to the stimulus, which was inferred from the presence of reflexive movements in the sleeping subject, or a conscious reaction that comprised the subject's awakening. The table also shows the hour in which the reaction took place, the intensity of the pressure necessary for the subconscious and conscious reaction and the subject's memory upon waking up about the presence or absence of dreams (see Foschi, Lombardo & Morgese, 2015).

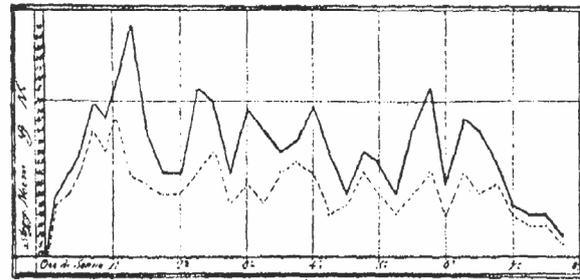
The graph in Figure 3 represents the depth of sleep as a solid line that shows the subject's waking "points" as noted in the previous table. The curve on the sub-conscious reactions is drawn as a dashed line.

The analysis of various subjects demonstrates that sleep was deeper in the first half of the second hour of data collection, while memories of dreams seems to be more vivid and easier to recall in the morning, during the last hours of sleep just before waking up. The authors' research then focused on the abnormal subjects.

The graph in figure 4 shows a greater depth of sleep for

Figure 3. De Sanctis, S., & Neyroz, U. (1902). Experimental Investigations Concerning the Depth of Sleep. *Psychological Review*.

FIG. 4.



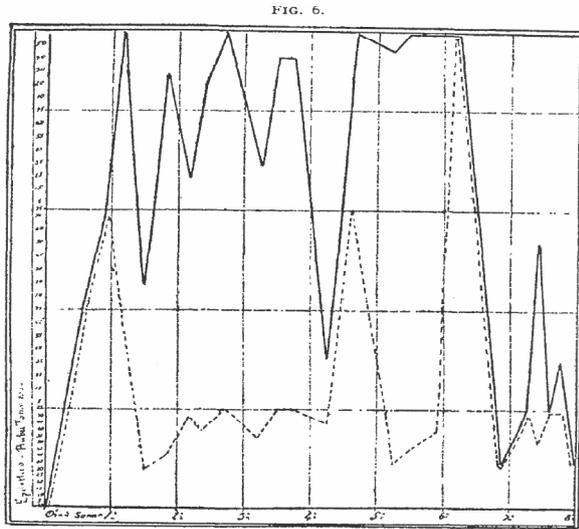
the epileptic subject in comparison to normal subjects, both in relation to conscious reactions and subconscious reactions; this finding was later supported by other studies on abnormal subjects. The authors also found a lower level regularity in the subconscious reactions of pathological subjects in comparison to normal subjects. These studies do not describe sleep activity in detail due to the difficulty that these subjects had in remembering their dreams and the content of those dreams. The authors' observations generally demonstrate that the few dreams that were described occurred during the first half of sleep and not in the morning as in normal subjects. In 1905 Edouard Claparede (1873-1940) referred to De Sanctis and Neyroz's studies and to De Sanctis' previous monograph, *Die Träume* [The dreams], in *Esquisse d'une théorie biologique du sommeil* [Outline of a biological theory of sleep], which examined the biological theories of sleep and focused on the depth of sleep waves. Claparede agreed with De Sanctis and Neyroz in regards to the depth of the waves, which seems to reach its peak between the second and third hour and diminishes between the fourth and fifth hour, after which one observes dream activity as preceded by an increase in the wave. Boris Sidis (1867-1923) an illustrious Russian American psychologist, in "An Experimental Study of Sleep" published in 1908, cited De Sanctis and Neyroz's work (1902) along with William Henry Howell's (1860-1945) physiological theories. Sidis covered this literature in the theoretical part, which illustrated the primary studies conducted on sleep prior to 1908 (Kemp, 1981).

4. The differential psychophysiology of sleep and dreams

Between 1901 and 1913 De Sanctis did not publish anything specifically dedicated to the study of sleep; the topic was picked back up in 1914 in two important works: *La psicoanalisi e il suo valore come metodo dell'onirologia scientifica* [Psychoanalysis and its value as a method for the scientific study of sleep] and *L'interpretazione dei sogni* [The interpretation of dreams]. In these works De Sanctis critically analyzed, in accordance with scientific methodology, the hermeneutic procedures adopted in psychoanalysis by Freud and his students (De Sanctis, 1914a,b). Freud, as early as 1899 in *Die Traumdeutung*, demonstrated his knowledge of De Sanctis' *I Sogni* by citing it in reference to the relationship between dreams and madness. In 1909, in his afterword,

Figure 4. De Sanctis, S., & Neyroz, U. (1902). Experimental Investigations Concerning the Depth of Sleep. Psychological Review.

T. R.: epileptic subject



presumably after having read the German translation of De Sanctis' *Die Traume* [The dream] (De Sanctis, 1901), Freud considered De Sanctis' research to lack an explicit theory of sleep and to be "extraordinarily poor in terms of ideas" (Freud, 1909). In the psychoanalytic field, Sandor Ferenczi (1873-1933), in *La mia amicizia con Miksa Shacter. Scritti preanalitici 1899-1908* [My friendship with Miksa Shacter: Pre-analytic Writings 1899-1908], reviewed *I Sogni* and defined Sante De Sanctis' work on dreams as exhausting and systematic, criticizing him for the lack of homogeneity in the treatment of arguments, but also praising him for his critical equilibrium in a field saturated by researchers.

In the essay *La psico-analisi e il suo valore come metodo dell'oniologia scientifica* [Psychoanalysis and Its Importance as a Method of Scientific Oneirology] (1914 a) De Sanctis recognized the legitimacy of the psychoanalytic method and considered it comparable to the clinical method or a remote anamnestic reconstruction. De Sanctis further underlined the importance of keeping the two phases of the proceedings—research or the collection of information and interpretation or reconstruction—separate. This recommendation appeared important since the subject who, during psychoanalysis was asked to free associate in a very passive state, could be subject to suggestion in recalling his or her dream. The criticism of the psychoanalytic method, as asserted in the subsequent article *L'interpretazione dei sogni* [The Interpretation of Dreams] (1914), also deals with the symbolism of sleep used by some psychoanalysts and the nearly exclusively sexual interpretation that, in this field, characterized the unconscious desire represented in the dream. De Sanctis criticized this uni-laterality and retained that the interpretation of the dream depends on a series of factors: the dreamer's base state (past experience, intelligence, character, old habits) plus the momentary state (aspirations, passions, health, the condition of organs and body parts) plus the current experiences induced by external conditions (during sleep) = dream (De Sanctis, 1914: 374). In the proposed psychological model the dream de-

Figure 5. De Sanctis, S. (1922). *Psychologie des Traumes* [Psychology of dreams]. In G. Kafka (Ed.), *Handbuch der vergleichenden Psychologie* [Handbook of comparative psychology], (Vol.3). München: Reinhardt, 2006.

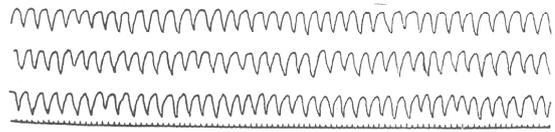


FIGURA 1.1
Pneumogramma toracico nel sonno di una donna trentenne normale (21 aprile 1915, ore 12.15 a.m.) di A. Mendicini, effettuato con uno pneumografo di Brondgeest. La forma delle curve è tipica del sonno (Marey, *La méthode graphique*), dato che essa si mantiene costante in tutti i pneumogrammi rilevati nel sonno mentre non compare nel pneumogramma dello stato di veglia. Nell'uno e nell'altro caso il soggetto era spesso in posizione supina. Inoltre, alcune curve del sonno sono state rilevate la stessa sera in immediata concomitanza alle curve della veglia, senza che ci fosse una qualche minima variazione nella disposizione degli strumenti.

rives from the dreamer as an "entire person" and should be studied in relation to the sleeper's experiences, habits and physiological conditions as a whole; dreams cannot be interpreted on the basis of references to specific symbolism.

In addition to the psychoanalytic method the author proposed the use of other methods such as self-reports, direct introspection, surveys, and methods for testing and verifying data such as observation and laboratory experiments (De Sanctis, 1916). In the 1916 article *Il sogno: struttura e dinamica* [The dream: structure and dynamics] De Sanctis maintained that the methods for studying dreams were the same as those of general and differential psychology. The dream is considered the symbol of representative-affective states that are common to all individuals, while at the same time being the representation of individual characteristics of the person, differentiated on the basis of age, sex, fantasy, work habits, and the eventual presence of illness.

I metodi oniologici [Methods for the study of sleep] (De Sanctis, 1920) is one of the contributions from this period, it is characterized by a vast scientific production, that has to date been misunderstood despite its indisputable interest. This article provides a systematic presentation of the methods for studying sleep in differentiated research within

Figure 6. De Sanctis, S. (1922). *Psychologie des Traumes* [Psychology of dreams]. In G. Kafka (Ed.), *Handbuch der vergleichenden Psychologie* [Handbook of comparative psychology], (Vol.3). München: Reinhardt, 2006.

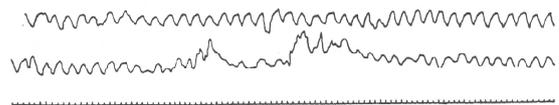


FIGURA 1.2
Pneumogramma toracico di donna trentenne rilevato nella prima ora di sonno (21 aprile 1915, ore 12.55 a.m.). Risveglio spontaneo, di circa 15 secondi, verso la fine della curva, dopo il quale la curva diviene regolare. Il soggetto conferma nel colloquio che stava sognando. Le irregolarità della curva, probabilmente, sono troppo significative rispetto a quello che poteva essere attribuito all'insieme dell'attività onirica. La frequenza (24 respiri al minuto) non è aumentata. Nella porzione di curva che si leva al di sopra dell'ascissa, appaiono tre respiri superficiali, come si nota nella curva stessa, stabiliti durante lo stato cosciente dell'intermezzo di attesa.

which the elements contribute to the development of scientific knowledge of sleep activity and an individuals' mental life in general in an integrated manner. This methodological choice stems from a severe critique both of those who deduce general conclusions from limited data and those who use only one method that does not collect the various psycho-physical aspects of the dreamer; the criticism targets those who only use a direct or subjective introspective method based on self-observation, a method used by authors such as Vold, Maury and Marcel Foucault (1865-1947) (professor of philosophy at the University of Montpellier), as well as the use of the clinical-hermeneutic method by psychoanalysts. The psychoanalytic method is defined as introspection while the subject is in a passive state. Consequently, this method differs from that used by authors such as Calkins, Jastrow and Child, who also used the introspective method, in that it does not explain a given dream but rather interprets the dreamer's entire subconscious.

In this period (1913-1933) particular importance was given to methods of external observation or rather the measurement of physiological psychology through the analysis of respiration, heartbeat and facial expressions. De Sanctis and his student Antonio Mendicini (1890-1938) used these methods in their pneumographic research on sleeping subjects. The primary methods of this period also include experimental methods based on the manipulation and induction of dreams by means of stimulation and interventions within the sleeper's environment, both during sleep and immediately after (dream reconstruction). In this sense De Sanctis tried to self-induce complex dreams, such as erotic dreams, based on the belief that if he was able to "construct" dreams, to produce them at will, then it would be possible to fully understand the dynamics of sleep. In fact, De Sanctis tried by repeating out loud the name of a woman for about 12 minutes before falling asleep. The first night he did not have any erotic dreams. But, the induction experiment was repeated for several nights; the dream was only "produced" after having stopped the pre-sleep exercises and, three days after suspending the exercise, De Sanctis "independently" had a dream in which the woman was a protagonist. On the basis of this experience De Sanctis became convinced that the waking consciousness was not capable of controlling the sleeping consciousness, which showed that it processed daily stimuli with an "independent" delay time, automatically creating representations in dreams. This showed that dreams could not be produced at will, but there was proof of a connection between the waking consciousness and the sleeping consciousness.

One of the contributions from this period, *Psychologie des Traumes* [Psychology of Dreams] from 1922, gives a central role to the study of the physiological conditions of sleep that are necessary in order to understand sleep activity. In the monograph De Sanctis presents the most up to date literature from European physiologists and neuropathologists, takes up and organizes the research themes that had been subject to extensive experimental study both by himself and his colleagues in order to create theoretical framework for the study of sleep and dreams. This included the studies on respiration, circulation and metabolism during sleep as well as the work carried out with Neyroz on the depth of sleep and Mendicini's experiments from a few years before that brought to light the presence of phases of synchronization and desynchronization of breathing during sleep. In 1915, in the Experimental Psychology Laboratory

in Rome directed by De Sanctis, Mendicini had in fact studied the respiratory rhythm of a normal woman using a thoracic pneumograph, later maintaining in an article published in the *Archivio Generale di Neurologia e Psichiatria* [General Archive of Neurology and Psychiatry] that in many cases breathing became deeper and more frequent during deep sleep (Mendicini, 1920).

The thoracic pneumograph states evident in Figure 5 demonstrate a constant and uniform breathing rhythm without alterations that are typical of the waking state and shows a synchronization phase in the breathing rhythm.

In the pneumogram in Figure 6 one notes, however, anomalies in the respiratory rhythm and the woman's spontaneous awakening towards the end of the curve, which demonstrates the existence of desynchronized respiration that is characteristics of specific phases of sleep. The authors used these experiments to maintain that breathing anomalies often present themselves during dreams and that this phenomena was evident in melancholic subjects in whom irregular respiration was evident during unpleasant dreams.

In addition to the analysis of respiratory functions De Sanctis studied the metabolism of sleep connecting it to the increase in the sensory threshold that, nonetheless, did not implicate the end of mental activity; it should be noted that some of the metabolic changes during sleep are due sleep activity. In this case De Sanctis picked up on the studies by Tissié who supported the passive theory of sleep according to which sleep activity modified the metabolism leading to oxidization and fatigue (Tissié, 1890). This state manifested itself in correspondence with movements and, even more so, the muscular movements that one can see in the dreamer.

The theories on metabolism led scholars of the period, including Henri Piéron (1881-1964), to retain that sleep was generated by the production of fatigue inducing substances while awake. Despite accepting the probable presence of a sleep-inducing substance, De Sanctis emphasized that this did not abolish the consciousness during sleep and could produce lucid dreams. Some had tried to find the precise location of the toxic agents, but did not get any reliable results; this led to further histological research, including Lugaro's work (Lugaro, 1898) on the same theme. De Sanctis preferred a biological reading to this histological theory of sleep; at the time the biological view was also supported by Claparede who saw a cyclical pattern in sleep that was akin to all vital phenomena that carry out an adaptive function. In *Esquisse d'une theorie biologique du sommeil* [Outline of a biological theory of sleep] (1905) Claparede considered sleep to be an active function of biological origin that was functional to the acquisition of vital forces and adaptation.

These studies nonetheless confirmed the presence of continuous cerebral activity that led De Sanctis to ask questions about the physiological condition of the dream. He considered the co-existence of old cerebral segments in the cerebral cortex that are also present in animals, with new structures that characterize human consciousness. It is in these old formations that are active without being controlled by the conscience that De Sanctis, as we will see, traced the origins of dreams.

The psycho-physiological analysis of dreams is described extensively in *Nuovi contributi alla psicofisiologia del sogno* [New contributions to the psychophysiology of dreams] published in 1933 in the *Rivista di Psicologia* (29: 12-32) and briefly as an international contribution in "The Psychophys-

iology of the Dream” published in 1934 in *Character and Personality* (2: 269-87). In this case dreams were neuro-physiologically tied to “cues coming from the formations in the brainstem”. In fact, instinctive activity dominates in sleep and brainstem functioning is more active during sleep than while awake. According to De Sanctis “...dreams (as recounted upon awakening) coincide with cortical activity in the moment in which this moves in a certain direction, when the functional regime of the basal ganglia changes; that is when, whether for rhythmic biological law (in sleep), or the occasional prevention by nature, the functional regime of the vast apparatus of the basal ganglia, the cerebellum and the diencephalon, which serves to bring together the regulatory centers for muscle tone, resting activity and consequently instinct and emotions. The cortex comments on the sleep discourse, rather late and always inexact, with the cues that derive from the brainstem formations (De Sanctis, 1933: 170).

The elements of sleep that derive from the oldest neuro-physiological structures are processed by more evolved and recent structures. In turn, these structures that constitute the brainstem and the cerebral cortex lead to the creation of two distinct formations: the “sleeping consciousness”, which represents the subconscious as systematized while dreaming, and the “waking consciousness” (see Foschi, Lombardo & Morgese, 2015). The sleeping consciousness associated with the first development of the nervous system depends on the brainstem, which is active from birth for biological reasons that enable the development of an “undifferentiated subconscious” that is present in the deep sleep—dominated by instinctive activity—of newborns and adults. “Undifferentiated energy”, or a base-situation on which to build the subject’s affective and representational differences, is present in the state of deep sleep. The dream’s origins then can be found in the old brain structures such as the brainstem and is later “commented on” by means of the telencephalon and the cerebral cortex that, by imposing order on the chaotic cues within the consciousness, allow the dream to serve an important adaptive evolutionary function within the individual. This explains why children, due to the incomplete development of the cortex, have difficulty remembering their dreams (De Sanctis, 1933).

After De Sanctis’ death in 1935 his studies on sleep and dreams conducted in the Experimental Psychology Laboratory in Rome were not taken up either by his successor at the institute and the laboratory, Mario Ponzio (1882-1969), or by other research centers in Italy.

In 20th century the psychoanalytic area became a primary sector in the studies of dreams. Also today the Traumdeutung is often adopted to confirm or to oppose one’s own hypothesis of research (see Hobson, 1988, 2002; Solms, 1997, Solms and Turnbull, 2002).

The spread of the Freudian model has overshadowed other research on dreams and have only recently been reconsidered (Carroy, Ohayon & Plas, 2006; Foschi & Lombardo, 2008; Pigman, 2002). De Sanctis’ psychology of dreams was undervalued, considered irrelevant and associated with a psychiatric background in line with a Freudian historiographical perspective (David, 1990).

Still in 20 century the modern psychophysiology of dreams has spread only after the end of the Second World War making an experimental research on dreams and sleep. The development of experimental research on the dream is also due to the discovery of the EEG. Starting from these

new methods of investigation scholars ignored previous research on the dream.

It was only later, in 1949, that Giuseppe Moruzzi (1910-1986) and Horace Winchell Magoun (1907-1991), in demonstrating the existence of the ascending reticular system as the center of wakefulness, hypothesized that sleep was an expression of the reduction in the tonic flow of impulses within the system; on this basis, taking advantage of the discovery of the EEG, a new line of neurophysiological and physiological study of sleep emerged that took into consideration the tradition of De Sanctis’ studies. Despite the fact that the Sanctis’ psycho-physiological model of dreams was, in our opinion, the product of a modern conceptualization of psycho-physiological experimentation, De Sanctis’ studies were misunderstood and ignored in research. The perspectives opened up by De Sanctis’ research on sleep and dreams, which contained ideas on the function of mental life, appear to be so innovative that they lead one to think that they anticipated Hobson and McCarley’s (1977) Activation-Synthesis Model, which, after forty years, seems to have taken back up De Sanctis’ ideas. Hobson remembers De Sanctis as a scholar of dreams in animals, even citing the title of his works incorrectly (Hobson, 1988).

Ellenberger (1970) had already noted a substantial difference between De Sanctis’ psychology of dreams and the psychology of dreams of those who, like Maury or Hervey de Saint-Denys, had been carrying out introspective researches. From this perspective, the Italian scholar was above all a passing figure, a ‘scientist of the dream’ who not only criticized the subjectivism of the ‘dreaming scientists’ like Maury or Freud (see Carroy, 2006), but aimed at developing a psychology of dreams that was based upon a paradigm of research deeply rooted in the ‘new psychology’ and upon an integrated method.

5. Conclusion

In general, one can affirm that the methodological integralism that De Sanctis made constant reference to in his research was very consonant with a more general conceptualization of scientific psychology. De Sanctis saw scientific psychology as an analytic science that found its own synthetic declination within specific disciplines. General psychology, in particular, has its methodological basis in the differential experimental approach (De Sanctis, 1929-1930).

Together with other second generation psychologists like Binet, Külpe, Münsterberg, Stern, Claparède, and Ebbinghaus, De Sanctis is the only Italian scholar to have expanded the Wundtian experimental paradigm within this generalist perspective, developing a wider discipline founded on the progressive theoretical integration of research on individual psychophysical reality, studied with the use of multiple methods that were appropriate for the diverse applied contexts (Cimino & Lombardo, 2004). In terms of homogeneity with this modern and 20th century conceptualization of scientific psychology, for De Sanctis even the study of dreams appears to be founded on the same pluralistic methodological line that in general characterizes his experimental and differential psychology: within this framework all of the methods are used in an integrated manner, both qualitative methods of observation, which are divided in introspective methods or internal observation and external observation, and quantitative laboratory methods including the psycho-physiological method and the disintegrative methods (which is sub-divided in the anatomical-physiological method and

psychological disintegrative methods such as hypnosis and psychoanalysis) (De Sanctis, 1929-1930). Dreams, according to the psychological model that De Sanctis proposed, arise from "the whole person" and should be studied in relation to the totality of experiences, of habits, and of the physiological and psychological conditions of the sleeper; for this reason dreams cannot be interpreted on the basis of specific dream symbolism or studied unilaterally using only one methodological approach, whether clinical or experimental, as was typically done by De Sanctis' contemporaries. Even in this applied area then, the complex and articulate psychophysical reality was studied using multiple methods (De Sanctis, 1912) that, together, could provide an integrated system of knowledge about the mental life of individuals.

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