

# Dream Coding: Re-writing dream reports as an object of textual analysis

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## ABSTRACT

*Marco Zanasi's idea of coding and studying dream reports of his patients at Tor Vergata University Hospital Psychiatric Unit started a team research on a challenging hypothesis: Is there any correlation between linguistic realization of dream reports and the psychopathology from which the dreamer is suffering? So far, analyses of dream reports have focused mainly on actants, settings, and descriptors of emotional condition during the oneiric activity. The goal of the research is to verify a set of linguistic features that can be significantly correlated to the type of psychopathology on a statistical basis. Numerous aspects, both theoretical and methodological, are discussed in this paper, ranging from the nature of the variation of language to be investigated to the tag set to be used in corpus preparation for computer analysis.*

## 1. Preliminaries

In the long lasting tradition of study of dreams Aserinsky and Kleitman (1953) brought about a paradigmatic revolution. Before their seminal study, dreams were regarded as an exclusively mental phenomenon and the psychodynamic approach was considered as the only possible framework to study them. When they revealed the neurophysiological correlates of dream (REM phase) a radical change occurred: dreams have been construed as an extremely complex psychic phenomenon and have been deemed crucial to the understanding of body-mind relationship.

The large amount of data gathered in the last sixty years of research in neurosciences disclosed the existence of specific neural networks involved in generating oneiric activity. These networks are composed of the associative areas and of limbic and paralimbic structures,

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<sup>1</sup> The contents of this paper have been discussed and organised together by the co-authors. However, Marco Zanasi was in charge of sections 1 and 5, Sergio Pizziconi section 3, and Daniele Silvi of sections 2 and 4.

including significant portions of cognitive areas that allow for dramatization and narrative capabilities to present oneiric tales, which usually sketch the dreamer's conscious conceptions and concerns. However, neural networks of oneiric activity alone cannot account for neither the narrative nature of dream, nor the oneiric contents.

Jung's hypothesis of the dream as a self-representation seems to earn reliability. Among other tenets of Jungian perspective: a dream would be a wide-open window onto the deep psyche; it is a sensible, precious indicator of alterations in the deepest structures of the psyche and the soma; it is a text produced by the dreamer's unconscious while sleeping (Jung 1945).

The Jungian view makes no difference between latent and manifest meanings. The apparent unreadability of a dream is related to the allegorical, allusive, opaque language being used by the unconscious in the oneiric narrative. Many studies and experimental research (among others: Dorus, Dorus, & Rechtschaffen 1971; Foulkes 1985; Hall 1966; Meier 1993; Snyder 1970; Strauch & Meier 1996) agree that the contents of dream reports, both in REM and NREM phases, are mostly represented by a coherent, reasonable simulation of real world.

Our application of the Jungian paradigm brings us to distinguish three "objects" of the oneiric activity:

the oneiric experience, namely what happens when we dream while sleeping;

the memory of the dream, namely what is retained of the experience, which is already a text whether reported or not; finally,

the dream report, that is, the narrative generated when telling the oneiric experience.

Regardless of the linguistic substance of the memory of the dream, when we deal with the dream report we apparently handle an object that has lost part of its vagueness and that can be studied thanks to the mediation of language that has generated:

- A representation of that experience;
- A coherent narratological structure with formally defined boundaries in time and space;
- A narrative<sup>2</sup> with a beginning, a main central body, and a conclusion.

Therefore, the dream becomes a text as soon as the initial experience of it has ended and we are able to reflect on it as "something that happened" to us (Kilroe 2000). This is the same as with any other waking experience.

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<sup>2</sup> The word "narrative" refers to a perceived sequence of events linked together not in a random way (Toolan 1988).

It is in this sense that dream is to be considered as a real literary text to which analyses on style, narratology and structure can be applied. A verbal report of the oneiric datum is the only available means to represent the oneiric experience. Many studies<sup>3</sup> proved dream reports being faithful representations of dreams on the basis of at least two types of evidence: dream contents display strict analogy with waking thoughts, stimuli provoked during sleep are embedded in the oneiric activity and reported.

Naturally, the transposition of the original oneiric experience into a system of linguistic representation, leads to the intersemiotic translation issues. What is retained and what is transformed? Can we identify in the dream report unmodified invariants of the oneiric experience? Assuming that we can, how could they be linked to the dreamer's deepest psychic motions if they have been definitively modified by the verbal filter used in producing the dream report?

As suggested by Chatman (1978) in any narrative can be distinguished a story and a discourse. Put it simply, the former is the chain of events and tells us what is the narrative about; the latter is the linguistic realization, the expression of the plot, so it is centred around how it is told.

We believe that by applying text analysis to the dream as a graphical expression of an unconscious language, it will be possible to extract important pieces of information from material apparently as chaotic and unstructured as dreams. Our general hypothesis can, hence, be stated with the following question: Is there any correlation between the linguistic realization of dream reports and the psychopathology from which the dreamer is suffering?

## **2. Project procedures**

The goal of Dream Coding is to collect, transcribe, catalogue, file, study, and comment on dreams reported by selected patients at Tor Vergata University Hospital in Rome. In the group of observed patients, different psychopathological statuses are represented.

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<sup>3</sup> There are numerous studies suggesting the belief that reported dreams are a faithful representation of the dream itself. Jung presupposed the adequacy of the dream report as a valid object of textual inquiry (Jung 1945). Numerous studies of analysis of contents of dreams show that oneiric content is, in general, analogous to waking thoughts (Kramer, Roth, & Czaya 1975). Experiments in which stimuli administered during sleep were shown to have been incorporated into the dreams suggest a relationship between the oneiric experience and the reported dream. (Kramer, Kinney, & Scharf 1983). Other research has suggested that there is a significant similarity between oneiric experience and the reported dream (Roffwarg, Dement, Muzio & Fisher 1962; Taub, Kramer, Arand, & Jacobs 1978). More recently, Kramer (1993) hypothesized that verbal accounts accurately represent the original oneiric event.

The aim of the project is to build up a code that enables a different reading of the reports that patients make of their dreams. A code that in the future could also provide new tools for initial and on-going diagnoses of the psychopathology affecting the patients.

Experimental and control subjects have been asked to report the last dream they remembered. Their narratives have been audio-recorded. All participants signed an informed consent form approved by the Ethical Committee (that is, the IRB Institutional Review Board) of the University of Rome, Tor Vergata.

Audio-recordings have been transcribed as faithfully as possible. The values of a few socio-demographic and clinical variables accompany each transcription.

The analysis of dream reports has been carried out with digitalized textual analysis techniques (Gigliozzi 2003; Zanasi *et al.* 2005; 2008; 2010; 2011). Transcribed reports must go through two structuring processes in order to generate a “structured text”: normalization of some phenomena (*e.g.*, prosodic and other phonological features); tagging of items to be counted (*e.g.*, verb tense, aspect, and mood, pronouns...). We have used XML markers using the international guidelines listed as TEI P5 (Text Encoding Initiative). The literature on the corpus design of spoken language has been retained as a general framework in order to give the material gathered the maximum intelligibility in the phase of diffusion of the results. It should be clear that in this early stage of the research, any proposed solution is to be considered a temporary one, a starting-step toward the verification of the linguistic and psychological hypotheses. In the light of the first findings, the encoding tags and rules will be surely emended and better adapted to dream reports.

The way we treated silence is one example of how the transcription of spoken texts has been carried out. Patients who recount dreams usually pause from time to time. We are not referring to the kind of pausing in spoken realization which is paralleled by the different signs of punctuation in written language. Most likely because they are not telling their dreams spontaneously, but after being prompted to, they often stop—probably recalling the images of their oneiric activities. Obviously it would be hard to make a clear, sharp difference between these two kinds of pausing. Therefore we have decided to create symbols different from the usual annotation of short, medium, and long pauses. The new set of symbols is shown in Tab. 1. All usual prosodic pauses will be marked as a short pause (#), while a longer silence—which is the kind that is more specific to dream reporting—will be marked by (##) and (###) according to duration.

**Tab. 1 Scale of silence**

Type	Duration	Symbol in transcripts
Short	$0 < d \leq 2$	#
Medium	$0 < d \leq 4$	##
Long	$4 < d$	###

In the analytical process, the items marked by the researcher are found and counted up with TAPoR (Textual Analysis Portal for Research) a software used for textual analysis. Its output is frequencies of items and lexical statistics. Examples of computed statistics: Token, type, *hapax*, frequency lists, concordances, word distribution in text, lexicon increase, Z score, and other statistical indexes (Herdann, Kurtosi,...)

In this phase, we compared to our control sample (251 patients: 147 female and 104 males; mean age = 40.4, Standard Deviation = 3.23), the dreams collected from two DSM-IV psychopathologic categories: bipolar disorders and psychotic disorders. 56 dreams were collected from the bipolar group (56 patients: 29 female and 27 male; mean age = 51.2, SD = 3.44) and 47 dreams were collected from the psychotic group (47 patients: 22 females and 25 male; mean age = 38.0, SD = 3.42). We used a T test for the statistical analysis of the data ( $P = .01$ ).

### **3. Linguistic Approach**

This research project represents more than a challenge to the linguist for the theoretical and methodological implications linked to the definition itself of the object<sup>4</sup> of study. On one hand, it is clearly different from those language deviations (e.g. aphasia, acquired dyslexia) when they are determined by injuries or any other physical or biochemical change in brain physiology. Changes like these would affect Saussure's *langue* or Chomsky's competence. On the contrary, the group of speakers we observed in the preliminary stage of the research still speak a language which appears as normal (in a statistical sense<sup>5</sup>) spoken Italian. As we will see below, going through a few examples of dream reports gathered and transcribed by the Psychiatric Unit of Tor Vergata, they display neither unparalleled syntactic structures nor fancy lexical choices. Therefore, the experimental

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<sup>4</sup> Here "object" is to be intended as in the opposition *objet* vs *matière* that has been outlined in chapters 2 and 3 of the introduction to the *Cours de linguistique générale* (Saussure 1922). Consequently, the transcribed texts of dream reports will be the *matière* of the study, whereas the language variation to be investigated is the *objet*.

<sup>5</sup> The adjective "normal" will be used in this section exclusively with this meaning.

subjects use the *langue* and competence of normal Italian speakers, but with some specific selections.

On the other hand, the object of study is not simply connected to Saussure’s *parole* or Chomsky’s performance. It is not connected to the specificity of the spoken means of communication and is not affected by the communicative situation. These dimensions seem to constrain patients’ linguistic choices independently from their clinical status. The way patients report dreams must also be independent from those variables (*e.g.*, time, space, gender, age, social groups, and professional and work activity) that characterize the variation of language typically studied in sociolinguistics. This variation can be traced back to the intersubjectivity that affects speakers’ (writers’) personal history, social background, socialization, and education. Random contact with other people suffering from the same pathologies might not have engendered a linguistic variety. Moreover, it cannot be considered to be the result of stylistic choices like in literary works, because of the presumed intentionality that determines a writer’s linguistic choices. The intention to dissimulate a psychopathology is a possibility but the number of patients and the focus on the linguistic form rather than the contents of the dream recounts make its effect negligible.

In many respects, the object of study is closer to interlanguages, namely the linguistic system that learners dynamically build as they get more and more competent in a foreign language they are learning<sup>6</sup>. It is not surprising that the type of data arrays that we expect to find are those shown in Tab. 2, in which the first columns represent groups of patients with their pathologies and the last represents the linguistic choices of the control group. Each row indicates, instead, a specific linguistic choice in the form of a rewrite rule:  $R \rightarrow x$ . For instance, “Tense is rewritten as present/past/future”.

**Tab. 2 Sample data array**

	<b>Psychopathologies</b>				<b>Normal</b>
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>Italian</b>

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<sup>6</sup> Using a computer-technology metaphor to clarify the meaning of this distinction, we would say that language variation caused by brain injuries affects the hardware of a computer; whereas, sociolinguistic variation affects the software. The variation to be investigated in our research would affect something in between the first two elements, which we could identify as the operative system. The biochemical alterations linked to some psychopathologies can effectively be taken into account in the metaphor considering the interaction that an operative system has both with the hardware and the software of a computer framework. If the main hypothesis of this research were verified, a wider discussion on language production could be stimulated considering the theoretical import in postulating the presence of this middle stage of language processing, especially under the light of the most recent work by Italian scholar Moro (2006), who gives us evidence on the correlation of language production and specific activation areas of the brain.

<b>R → x</b>	p <sub>1x</sub>	p <sub>2x</sub>	p <sub>3x</sub>	p <sub>4x</sub>	p <sub>sx</sub>
<b>R → y</b>	p <sub>1y</sub>	p <sub>2y</sub>	p <sub>3y</sub>	p <sub>4y</sub>	p <sub>sy</sub>
<b>R → z</b>	p <sub>1z</sub>	p <sub>2z</sub>	p <sub>3z</sub>	p <sub>4z</sub>	p <sub>sz</sub>
<b>R → w</b>	p <sub>1w</sub>	p <sub>2w</sub>	p <sub>3w</sub>	p <sub>4w</sub>	p <sub>sw</sub>

This data array parallels those generated in Klein and Dittmar's *Varietätengrammatik* (Klein 1988, Dittmar 1989, and Klein and Dittmar 1979). In the research carried out by both the authors the varieties to be described were the interlanguages spoken by four different groups of immigrants in Heidelberg, Germany (see Table 3). In one of the data results the block of rewrite rules in the first column presented the entry NP and the following rewrites: NP→(Mod) N; NP→Det (Mod) N; NP→Quant (Mod) N; NP→Num (Mod) N; NP→(other structures). The term of comparison was, of course, the frequencies of the same NP in a corpus of spoken German recorded among L1 speakers in Heidelberg.

**Tab. 3. German learners' interlanguages**

	Interlanguages				L1
	I	II	III	IV	HD
<b>NP→(Mod) N</b>	0.59	0.52	0.48	0.34	0.34
<b>NP→Det (Mod) N</b>	0.19	0.30	0.32	0.50	0.55
<b>NP→Quant (Mod)N</b>	0.07	0.08	0.08	0.06	0.05
<b>NP→Num (Mod) N</b>	0.14	0.10	0.11	0.09	0.04
<b>NP→(other structures)</b>	0.00	0.00	0.01	0.01	0.02

Whereas this array shows that the more accurate the interlanguage is the closer the frequency of each linguistic choice gets to the native speakers', in the data array displayed in Table 2, there is no expected order between different psychopathologies. Nevertheless, in a second stage of our research, it will be plausible to think to possible variation of the frequency of each linguistic choice within the same pathologies to be ordered according to different level of severity of the disorder.

Some variables will be assessed in a dynamic way according to the three modalities below.

1. Mark-up of a switch from one value to other(s). For instance, switches occur from present to past and vice versa—see sample text (3) below.

2. Mark-up of co-occurrences of specific values in different variables. For instance, we are assessing the significance of the co-occurrence of passive diathesis and repetition of subject personal pronoun *io* (*I* in English), which would be usually omitted in Italian being a PRO-drop language, to stress a particular representation of agentivity in the sentence.
3. Mark-up of co-occurrence of specific values in a linguistic (*strictu sensu*) variable with occurrence of specific values in other textual and paralinguistic variables. The latter is, for instance, emphasis; the former is either the content categories used to analyse dream reports and listed by Domhoff and Schneider (1998)<sup>7</sup>, or figurative units<sup>8</sup>, or so-called stanzas already used in discourse analysis of narrative (Gee 1998).

In this section, some examples of the dream reports collected in our corpus are shown to describe the type of material we are dealing with and a few linguistic features, not all of them that we are marking. Some quantitative results are reported in the next section. Dreams can be as short as Sample (1) below.

*Sample 1*

**Ho sognato il mio ragazzo che cercava di chiedermi aiuto.**  
 [I] dreamed [of] my boy[friend] who tried to ask me [for] help

But they can be more wordy like in Sample (2) in which pauses have been noted according to our scale of silence and other spoken language features have been marked. In this report two *che*'s (*that*), with a double underline, are to be evaluated as fillers and not as conjunctions. The presence of a pause before them supports this evaluation, turning what could be interpreted as a hypotactical structure into a juxtaposition. In the first stage of the research, features characterizing spoken language, such as fillers and false starts (single underline), will be marked with the intent to help performing other evaluations.

*Sample 2*

**Ho sognato che # andavo al mare # c'era una festa ## o una cosa del**  
 [I] dreamed that [I] was going to the sea there was a party or one thing of the

**genere ### il sogno di questa notte è che andavo a questa festa # che incontravo**  
 kind the dream of this night is that [I] went to this party that [I] met

**tutti i miei parenti solo da parte di mio padre ## però alcuni non li riconoscevo #**  
 all my relatives only from the side of my father but a few [I] didn't know

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<sup>7</sup> A few examples will clarify the type of categorization. About the characters in the reported dream, the authors list: animal, male/female, familiarity, friends, and family; about settings: indoor, familiar setting.

<sup>8</sup> In figurative arts studies, a *figurative unit* is the set of iconic devices used to give shape and colour to the so-called *theme*. Courtès (1986) proved that it is an effective analytical tool in studying popular tales. This is one of the qualitative aspects which will be investigated.



**altri # ehm # mi ricordo** che c'era questa casa # c'era questa casa  
*others ahem [I]remember that there was this house there was this house*

**dove c'era questa festa # che** era una casa popolare  
*where there was this party that was a house poor*

**quindi però era molto grande**  
*hence but [it]was very large*

Sample (3) shows verb-tense switching from indicative imperfect to indicative present. This variable has proved to be correlated to the respective ages of those reporting their dreams. (Zanasi *et al.* 2005) revealed that the old either use present tense or past tense but seldom switch, while the young never stick to one tense and always switch.

*Sample (3) [verb tenses: **present; past-imperfect**]*  
**Camminavo per strada e incontro** mia nipote  
*[I] was walking in [the] street and meet my niece*

**che non vedo da tanto tempo**  
*whom [I] don't see from long time*

**ed era con un'amica e aveva i capelli tutti lunghi mossi castani**  
*and [she] was with a friend[FEM.] and had hair very long wavy brown*

**era giù e io le chiedo perché [...]**  
*[she] was down and I her ask why [...]*

Discrepancies in cohesion and coherence might, of course, be justified by the fragmented nature of contents in both the experience and the report of dreams. Yet, as shown in the other sample texts, they do not seem to be so frequent and everywhere as they are in sample (4).

Sample (4)

**Io mi ricordo praticamente come se io visitassi varie stanze**  
*I remember (say like) as if I visited several rooms*

**dove vedevo dei cadaveri dove il mio corpo mi sembrava fossi io morta**  
*where [I] saw some corpses where my body seemed to me it was I dead*

**insomma però io ero viva e vedevo questi ## questi miei corpi morti.**  
*well but I was alive and saw these these my bodies dead.*

The last two examples show the use of metaphoric discourse with two different meanings. In sample (5) a metaphor is used in an odd way. The analogy between the swarm of bees and the attack of the dolls is not based on the central, prototypically speaking, features of the number of elements involved. This patient refers probably to the kind of alternating movement of bees flying around a flower, which is a feature not as central as the former.

Sample (5)

**Ho avuto un sogno e c'era una coppia di bamboline**  
*I had a dream and there was a pair of little dolls*

**come uno sciame di api** che si avvicinava vicino vicino a me e  
*like a swarm of bees that came over close close to me and*

**il diavolo ha detto io prendo te [...]**  
*the devil said I take you [...]*

Instead, in sample (6) we have marked four examples of the type of metaphors that Lakoff and Johnson (1980) regard as central in the connection between mind, body, and language.

*Sample (6)*

**Camminavo per strada e incontro mia nipote che non vedo da tanto**  
*[I] was walking in [the] street and [I] meet my niece whom [I] don't see from long*

**tempo [...] era giù e io le chiedo perché piangeva [...]**  
*time [...] [she] was down and I her ask why [she] wept [...]*

**io cercavo di giustificare Erica [...] cercavo di trovare giustificazioni al fatto**  
*I tried to justify Erica [...] [I] tried to find justifications to the fact*

**che lei e la cugina non si vedevano e**  
*that she and the cousin did not see and*

**a me urtava questa cosa che lei piangesse.**  
*to me this thing hit that she cried*

In the first metaphoric element, single underline, the emotional state of the dreamer's niece is described referring to the scheme that HAPPY IS UP, SAD IS DOWN. "Trovare giustificazioni" refers to the scheme that CAUSES AND EXPLANATIONS ARE HIDDEN OBJECTS. In the third example, dotted underline, the use of the verb *vedere* (to see), meaning 'to meet', pertains to the scheme that SEEING IS TOUCHING. The fourth and last example shows the use of the verb *urtare* (to hit) meaning 'to annoy, irritate, disturb', brings up to the scheme that EMOTIONAL EFFECT IS PHYSICAL CONTACT.

#### 4. Statistic treatment of dream reports with TAPoR

As briefly stated above TAPoR is designed to process texts that have been marked-up semantically or descriptively and allows the researcher to profit extensively from an XML encoding. The portal has been referred to as a gateway to several tools for subtle, deep text analyses. It supplies the researcher with sample texts to be used in experimental stages. Texts cover a wide scope of topics such as history, law, literature, etc.

Using a text marked-up with XML, rather than simple plain text, was essential for our analysis, since it allowed us to underline and register aspects that would otherwise go unaccounted for; as Gigliozzi puts it, "The first steps towards the computation of a text consists of identifying the elements that may be counted within it" (2003 our translation).

The analysis of macroscopic constants, just like fingerprints, allows us to identify a systematic use of certain forms or patterns of language. These aspects (subordinate and main clauses, proper names, pronouns, etc) are statistically measurable and identifiable only by means of a specific XML encoding, using the tags described in the previous sections.

**Table 4. Word frequencies and three semantic items**

	<b>% type over Token</b>	<b>T/t</b>	<b>% Hapax</b>	<i>Mamma/Madre</i> (Mom/mother)	<i>Papà/Padre</i> (Dad/father)	<i>Amicizia</i> (Friendship)
<b>Bipolar Disorders</b>	29,46	3,39	18,14	6 (0,18 %)	9 (0,27 %)	8 (0,24 %)
<b>Psychotic Disorders</b>	38,75	2,58	25,68	5 (0,38 %)	4 (0,30 %)	0
<b>Controls</b>	15,92	6,28	9,61	68 (0,19 %)	49 (0,14 %)	76 (0,22 %)

In our statistical analysis, we have computed and evaluated the list of frequencies of words. Before describing the ratios—type/Token, Token/type, *hapax*/Token—a brief example of the way certain semantic features have been included in the analysis, might help to understand the scope of the research project as a whole, and the variety of relationships which can be established between psychological and linguistic data. Amongst the words repeated most frequently, those referring to the lemma *amicizia* (friendship) showed an interesting distribution. Whilst present with similar frequencies in the dream reports of persons in the control and bipolar disorder group (0.22% and 0.24% respectively), it was never observed in the dream reports of the psychotic disorder patients. This finding leads to an appealing correlation between affective deficits in psychotic patients and thus their lack of themes featuring emotions.

The calculation of types and tokens is one of the quantitative analysis applied to the oneiric text. Taken alone, these values may appear uninteresting but acquire significance when related to each other: type-Token, Token-type, and *hapax*/Token ratios. We used a T test for the statistical analysis of the data.

Type-Token ratio. As a preliminary result, both psychopathologic categories showed a significant difference with the control group ( $P = .01$ ). Patients with psychotic disorders, more so than patients with bipolar disorders, showed a greater type-Token ratio compared to the control subjects. Therefore the dream narrations of the psychopathologic patients appear to be more complex and varied.

The Token/type ratio (T/t) is another parameter useful to evaluate the variability and complexity of the text's vocabulary. Obviously a narrative text will be easy or difficult to read

also according to the linguistic and lexical skills of the reader. Nevertheless, similarly to the list of frequencies, after viewing the distribution of the statistical sample, it will be best to establish high and low cut-off values in order to quantify these results. On the other hand, if the oneiric text is characterized by a non-linear narrative sequence, i.e. changing topics, this could raise the denominator type and thus the text could be erroneously interpreted as complex.

Both psychopathologic categories showed a significant difference with the control group ( $P = .01$ ). These preliminary results showed a lower T/t ratio among patients with psychotic disorders, more so than patients with bipolar disorders, compared to the control subjects. Therefore the dream narrations of the psychopathologic patients appear to be more complex and varied.

The number of *hapax* was calculated as well. The *hapax*/Token ratio does not necessarily turn out to be consistent with the Token/type and type/Token ratios, but when it does, like in this study, it gives further consistency to the results.

As a preliminary result, both psychopathologic categories showed a significant difference with the control group ( $P = .01$ ). Patients with psychotic disorders, more so than patients with bipolar disorders, showed a greater *hapax*/Token ratio compared to the control subjects. Therefore the dream narrations of the psychopathologic patients appear to be more complex and varied.

## **5. Discussion**

Although our research is at a preliminary stage, the statistical results on text analysis obtained so far allow us to make a few considerations. The first noticeable aspect is that differences between dreams of psychopathologic patients and controls are observed, which suggests the existence of specific features most likely correlated to the illness. We also observe a scale of narration complexity progressively decreasing from psychotic to bipolar patients and to controls. Since the patients recruited are in a remission phase, we may hypothesize that the variations observed are expression of the underlying pathology and thus not due to delusions, hallucinations, hypomania, mania and depression.

It is clear that oral narration usually determines a wider use of repetitions rather than pronominal or synonymic substitutions, which are common in written language. This is particularly true in written Italian where diffused and shared style conventions negatively sanction repetitions. This also applies to the system of adjectives, that will be more repetitive in spoken rather than written narration, since gestures and voice intonation can contribute to

the speaker's intentions of expressivity. Nevertheless, the statistical linguistic ratios obtained so far show a wider range of variety in the narratives in both psychopathologic groups when compared to the control group. But the higher percentage of *hapax legomena* on the overall list of types, suggested the research team to investigate the nature of the wider variety with a closer analysis of the textuality.

For such an accurate analysis the research group has started to define new sets of features to be marked-up in dreams reports. The marking will allow the computer-aided analyses on semantics, syntax, rhetorical organization, metaphorical references and text architecture. Under the notation of "text architecture" we have included items such as coherence, cohesion and anaphoric chains.

The non-coherent and often non-cohesive structure of many patients' dreams shows to be relevant to determine what the ratios indicate as a richer lexicon. The consistent, abrupt introduction of NEW pieces of information, especially when correlated with the formal features, is likely to be one of the most significant differences between the control persons and patients, as well as between persons of the first two large psychopathologic categories analyzed here, bipolar disorders and psychotic disorders.

Our research is an ongoing project that aims to amplify samples and evaluate the possible influences of pharmacological treatments on the oneiric characteristics being analyzed.

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