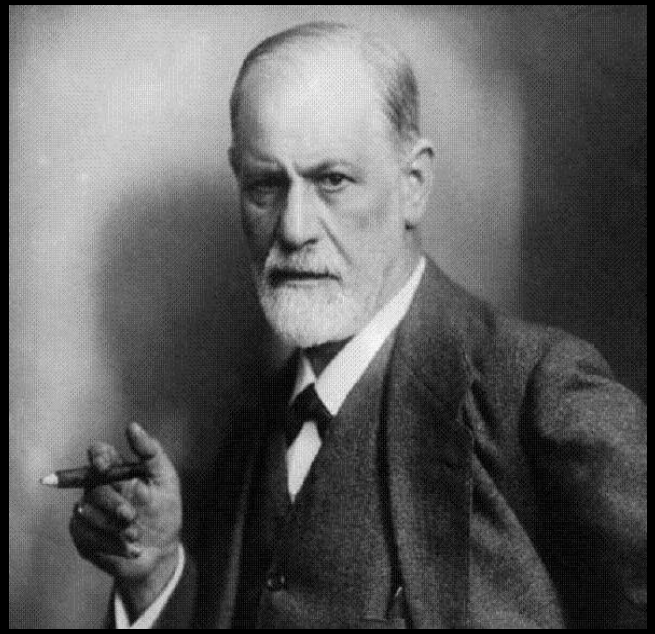
Mind Mapping Using Words

Sidarta Ribeiro

Universidade Federal do Rio Grande do Norte

The Psychoanalytic Method:

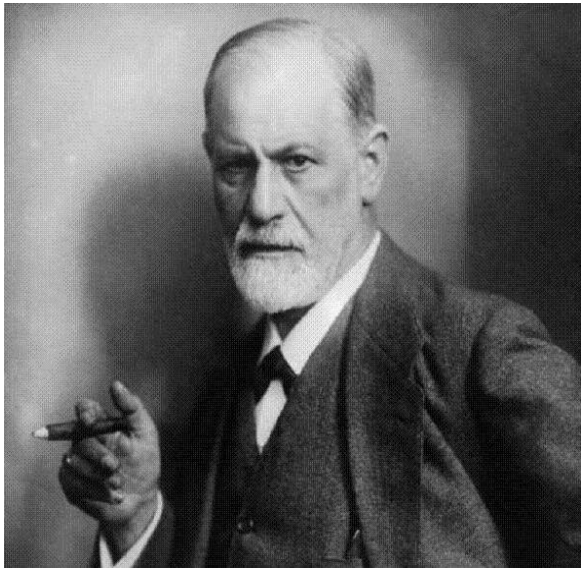
Free Association, Dream interpretation, Mind Mapping with Words



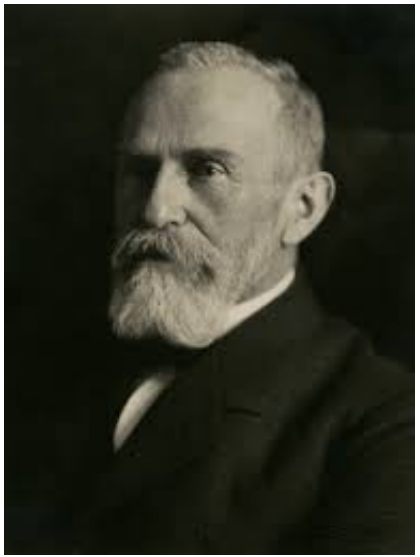
Sigmund Freud

The psychoanalytic setting

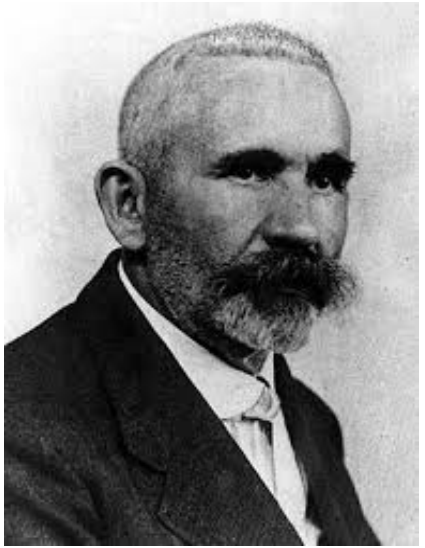
There are major similarities between dream and psychosis



Freud



Bleuler

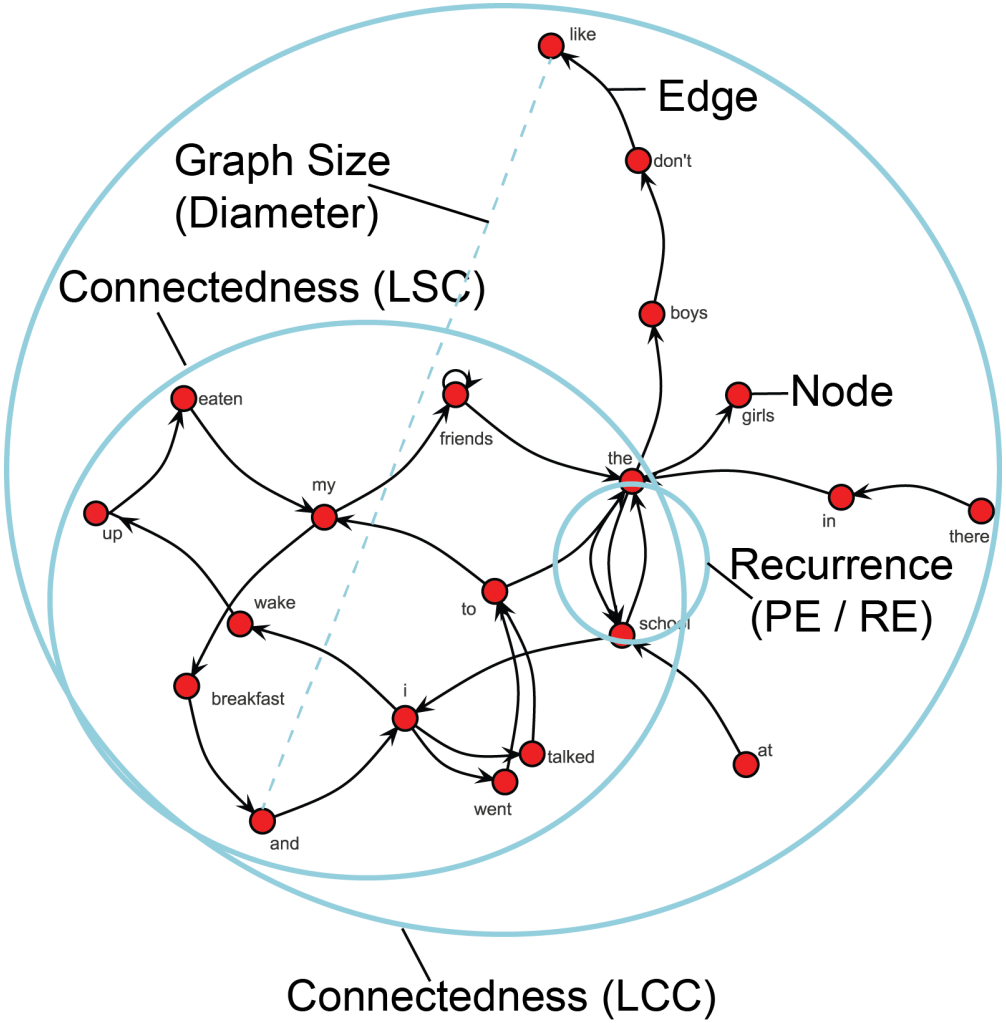


Kraepelin

Psychosis occurs in schizophrenia and bipolar disorder with language symptoms:

Thought disorganization, Flight of thoughts, Alogia, Logorrhea, Word salad

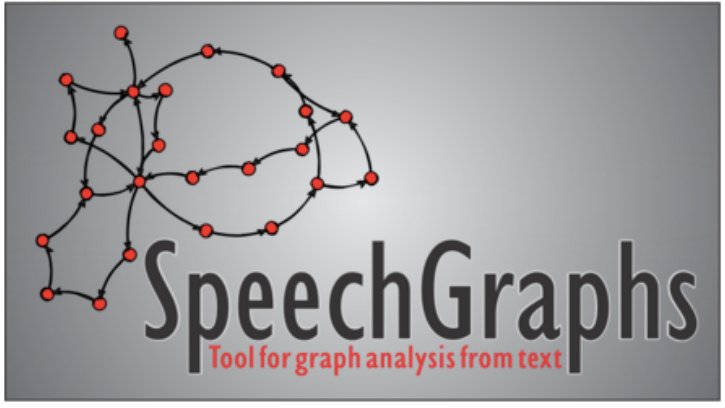
Graph Attributes



SPEECHGRAPHS

Introduction

The SpeechGraph software is a graph-theoretical analysis tool that uses text as input and graph features as output. SpeechGraph can run on many different platforms such as Linux, Windows and OSX.



Logo by G. M. Silva

Documentation

We provide a User Guide as a PDF inside the software package, with a thorough explanation of all software functions. Alternatively, you can download it here.

Download

You can download the latest version of the SpeechGraphs tool right here. The current sofware version is 1.0.

LAST ENTRIES

2016-02-05| Pós-graduação em Bioinformática está com inscrições abertas para mestrado e doutorado

2016-01-18| Hippocampal Respiration-Driven Rhythm Distinct from Theta Oscillations in Awake Mice

2016-01-04| Instituto do Cérebro e de Medicina Tropical promovem ação científica e cultural de combate ao Aedes

2015-12-04| Instituto do Cérebro participa de reunião sobre Aedes aegypti em Brasília

2015-12-02| FUNPEC assina contrato para construção do Instituto do Cérebro

2015-12-01| Simpósio sobre Cognição Imune e Neural inicia programação nesta quinta-feira, 3

2015-11-30| Grid Cells and Place Cells: An Integrated View of their Navigational and Memory Function

2015-11-26| Lia Bevilaqua explica como o cérebro pode se "viciar" em aprender

2015-11-24| Impaired Processing in the Primary Auditory Cortex of an Animal Model of Autism

2015-11-18| Marcos Romualdo Costa fala sobre Neurociência

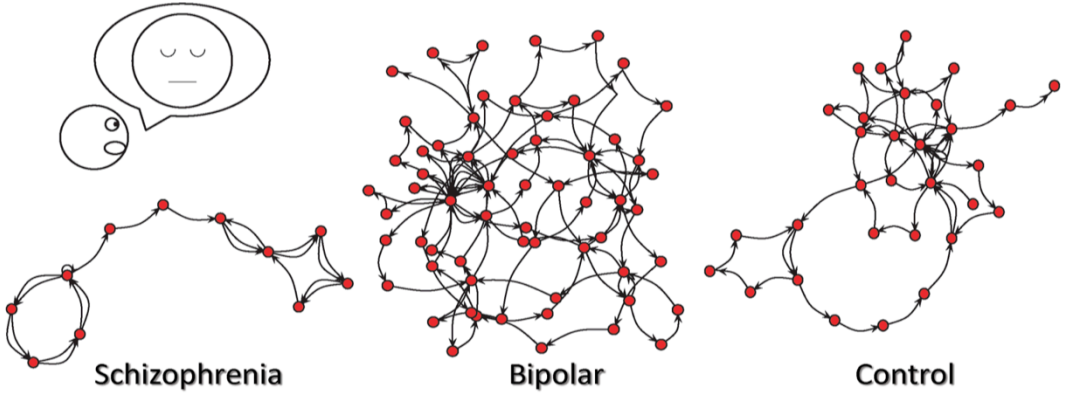
2015-11-12| Instituto do Cérebro abre

SCIENTIFIC REPORTS

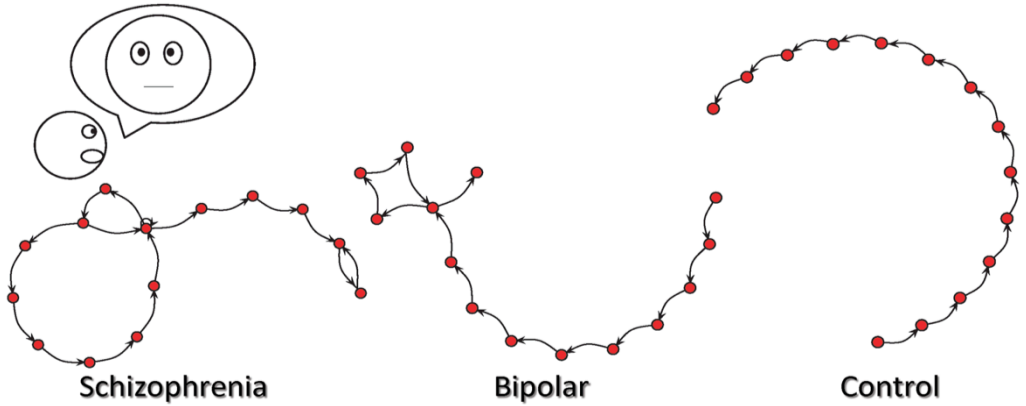
Graph analysis of dream reports is especially informative about psychosis

Natália B. Mota[1], Raimundo Furtado[1], Pedro P. C. Maia[1], Mauro Copelli[2]* & Sidarta Ribeiro[1]*

Dream Report



Waking Report

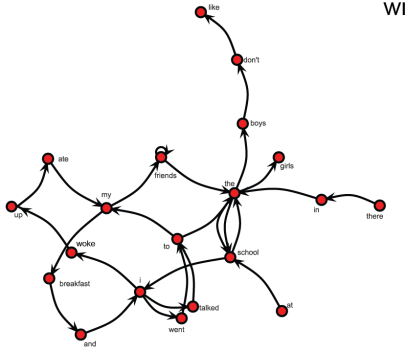


Moving window averages to control for verbosity differences

I woke up, ate my breakfast and I went to the school. There, in the school, I talked to my friends, friends, the girls. At school the boys don't like to play with me. At home I studied, ate my dinner and went to sleep.

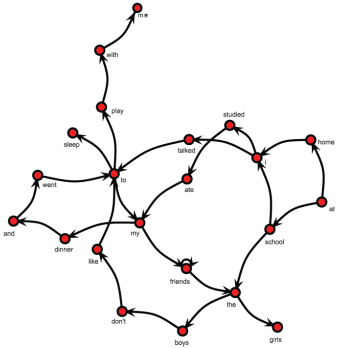
window k

window k+1

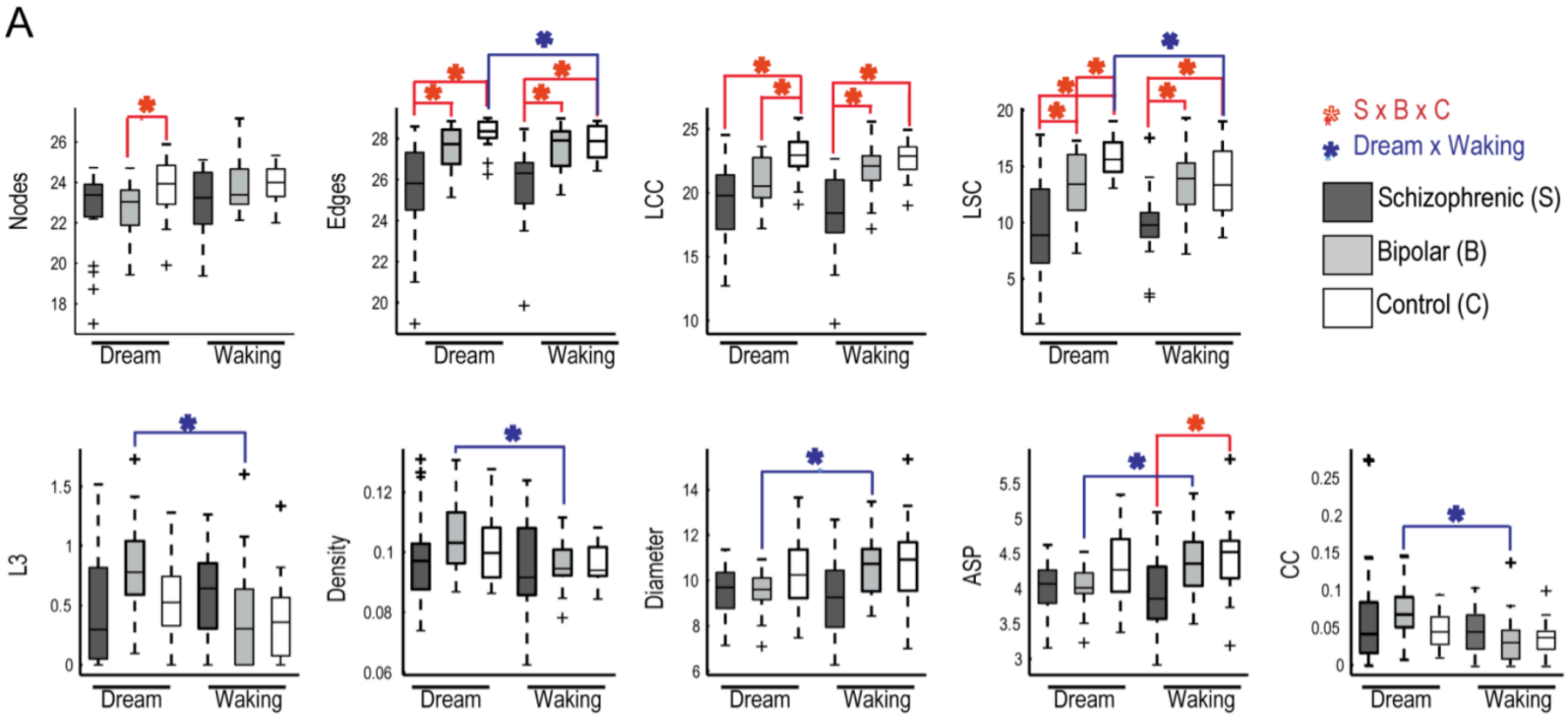


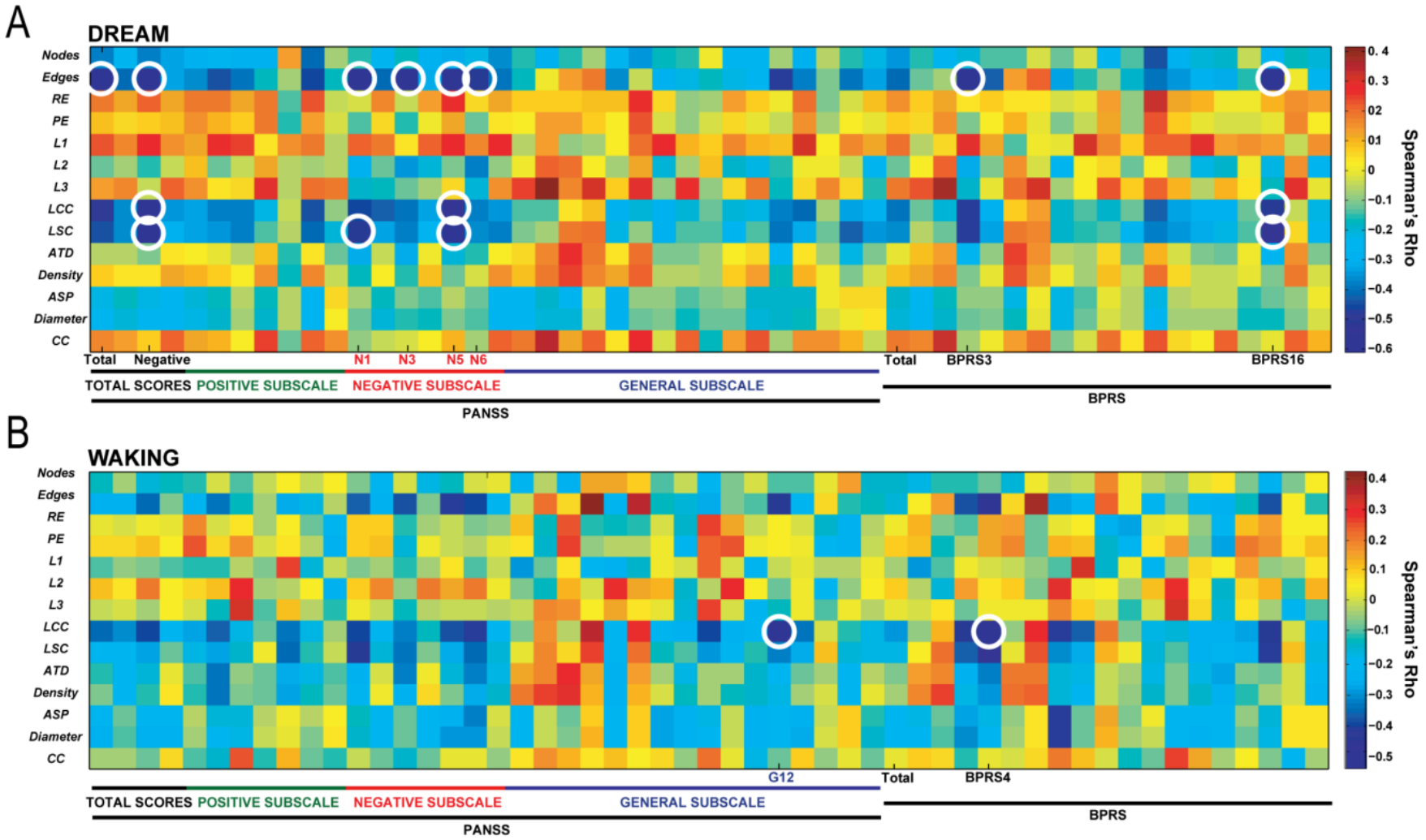
graph for window k

$$\text{Mean value} = \frac{\sum_{k=1}^{n} \text{Graph attribute value per window}}{\text{Number of windows}}$$



graph for window k+1


A
Nodes
Edges
LCC
LSC
L3
Density
Diameter
ASP
CC
Dream
Waking
S x B x C
Dream x Waking
Schizophrenic (S)
Bipolar (B)
Control (C)


A
DREAM
Nodes
Edges
RE
PE
L1
L2
L3
LCC
LSC
ATD
Density
ASP
Diameter
CC
Total
Negative
N1
N3
N5
N6
Total
BPRS3
BPRS16
TOTAL SCORES
POSITIVE SUBSCALE
NEGATIVE SUBSCALE
GENERAL SUBSCALE
PANSS
BPRS
Spearman's Rho
0. 4
0. 3
02
01
0
−0.1
−0.2
−0.3
−0.4
−0.5
−0.6
B
WAKING
Nodes
Edges
RE
PE
L1
L2
L3
LCC
LSC
ATD
Density
ASP
Diameter
CC
G12
Total
BPRS4
TOTAL SCORES
POSITIVE SUBSCALE
NEGATIVE SUBSCALE
GENERAL SUBSCALE
PANSS
BPRS
Spearman's Rho
0.4
0.3
0.2
0.1
0
−0.1
−0.2
−0.3
−0.4
−0.5

How specially informative are the dream reports?

Sample:

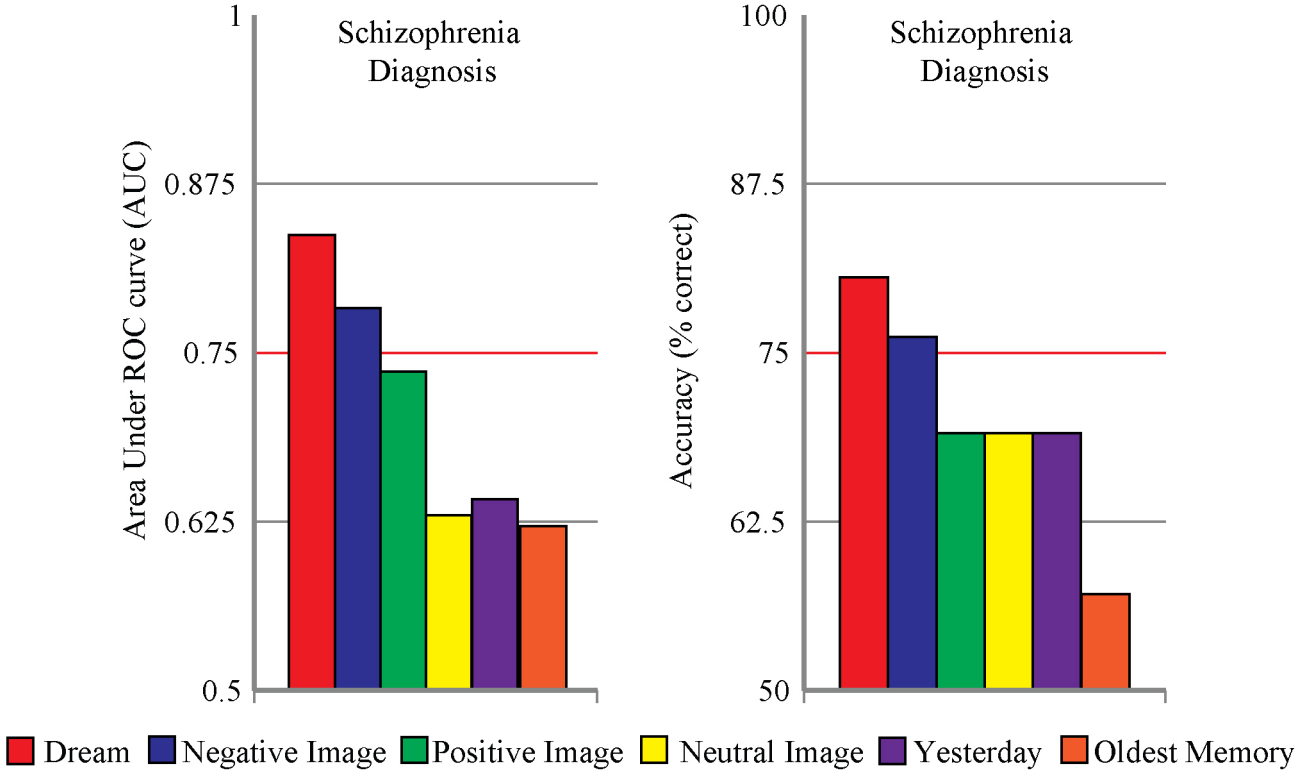
21 subjects on first psychotic episode, ages 14.95 ± 3.21

Followed for 6 months and then diagnosed with either schizophrenia or bipolar disorder

21 well-matched healthy subjects

Reports:

1. Dream
2. Negative image
3. Positive image
4. Neutral image
5. Yesterday memory
6. Oldest memory



Mota, Copelli and Ribeiro (submitted)

I woke up, ate my breakfast and I went to the school. There, in the school, I talked to my friends, friends, the girls. At school the boys don't like

There, I up, ate my school and I to the . At woke in the girls. school, I breakfast to my friends, friends, boys the went school the talked don't like

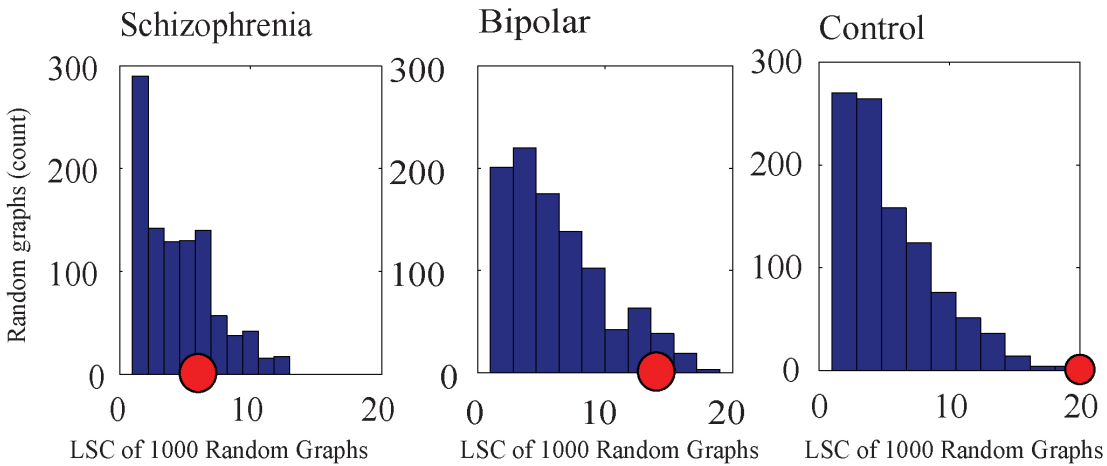
friends, There, I ate my school I to breakfast the . At woke in the girls up, I to my and friends, boys the went school the talked school, don't like

shuffle

shuffle

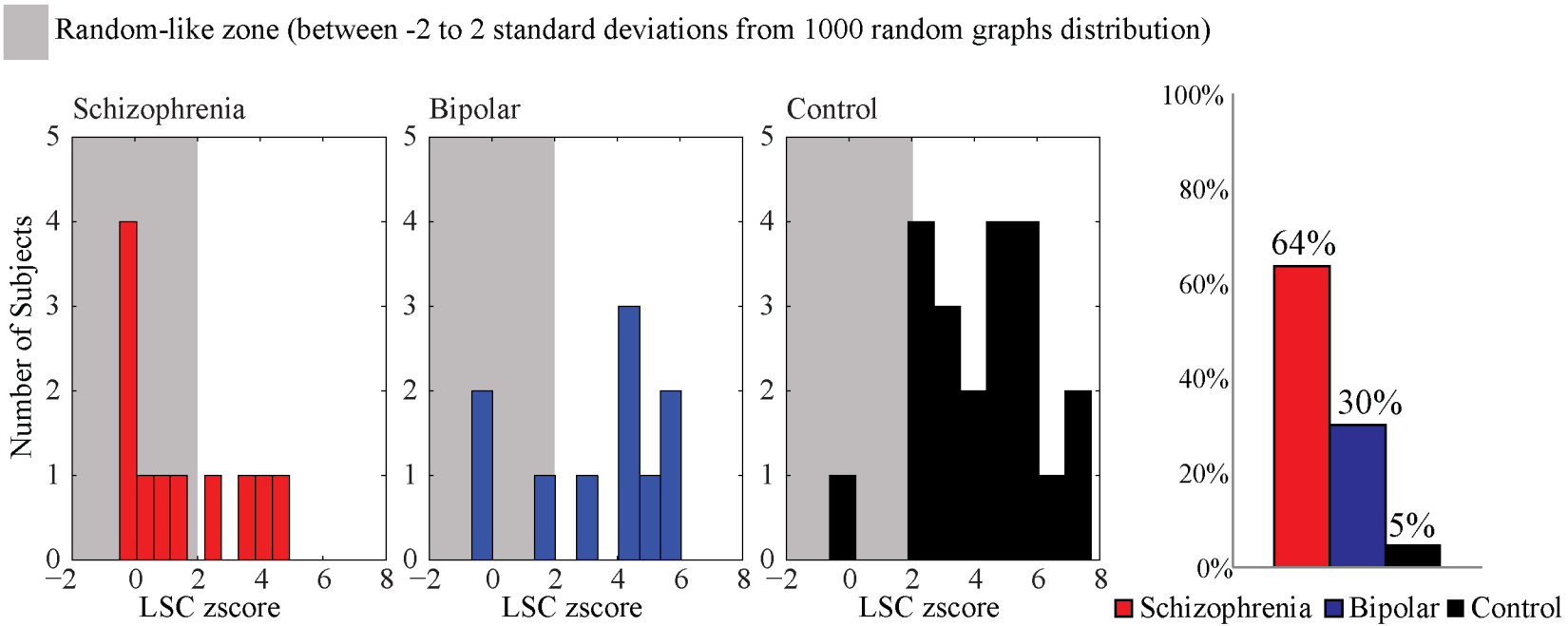
1,000 x Random Graphs
(shuffling edges)

Original graph from one example of each diagnostic group



Mota, Copelli and Ribeiro (submitted)

Measuring word salad

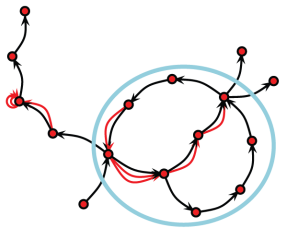


Mota, Copelli and Ribeiro (submitted)

Comparison of typical and atypical development

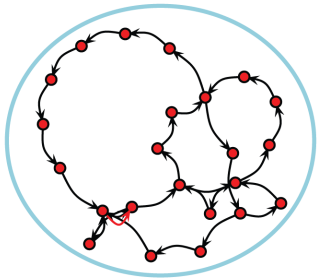
Healthy subjects

Child



Nodes = 16 RE = 8 LSC = 9

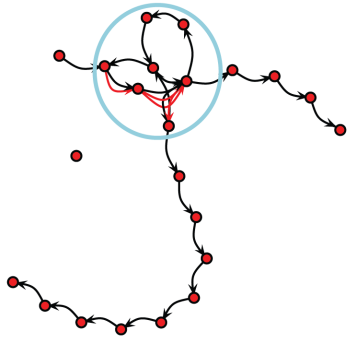
Adult



Nodes = 23 RE = 1 LSC = 23

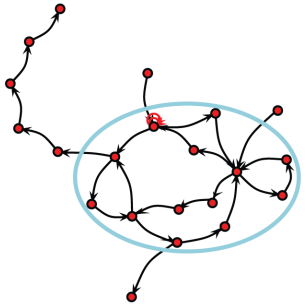
Psychotic subjects

Child



Nodes = 22 RE = 4 LSC = 7

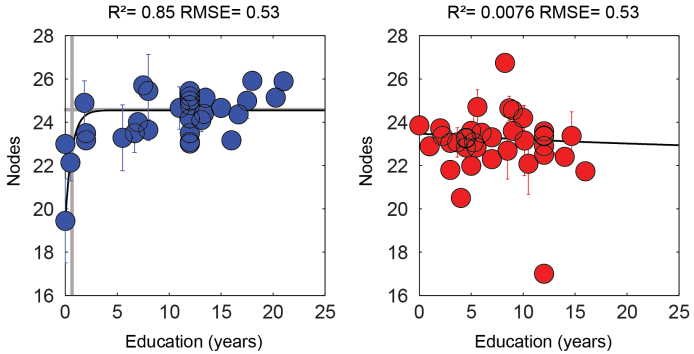
Adult



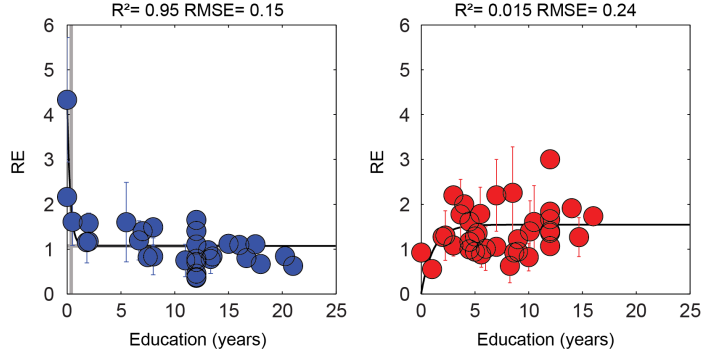
Nodes = 21 RE = 2 LSC = 13

Mota, Pinheiro et al (in preparation)

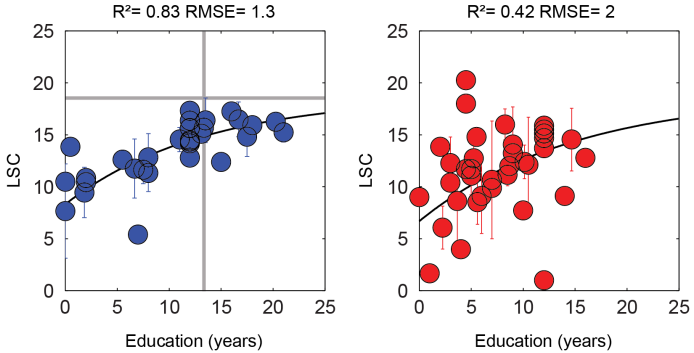
Lexical Diversity



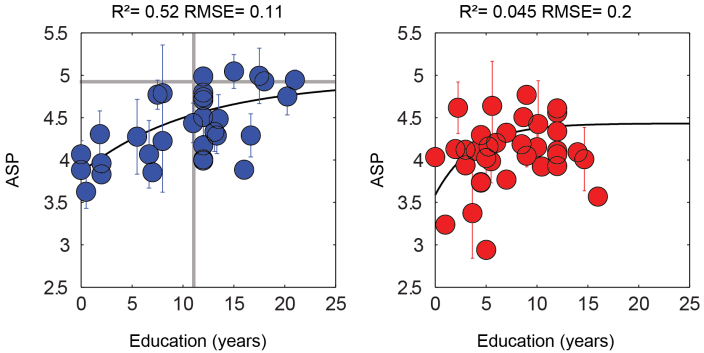
Short-Range Recurrence



Long-Range Recurrence



Graph Size

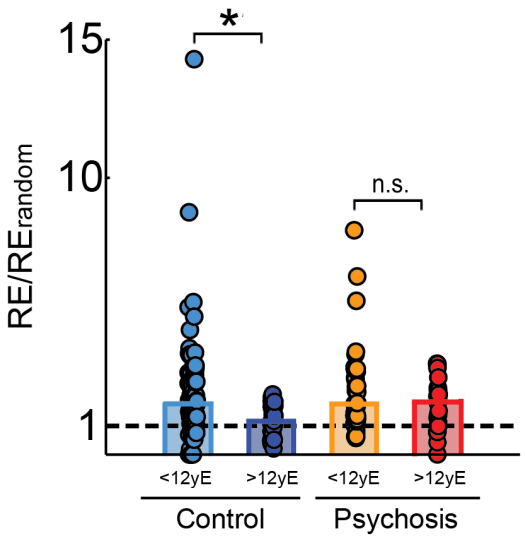


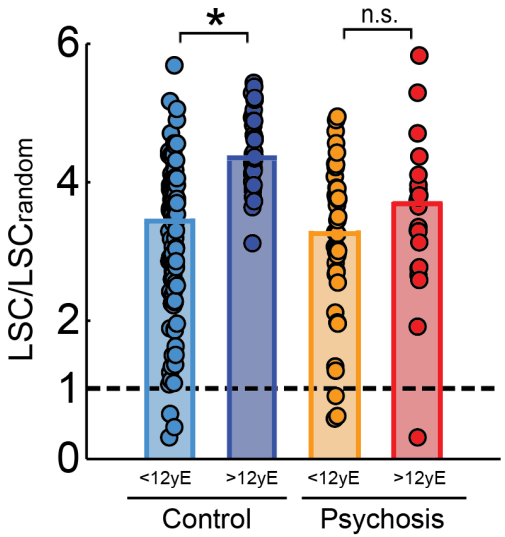
Control Psychosis Fit (Model: f(t) = c+(a-c)(1-exp(-t/τ))) = a (asymptotic value) = τ (characteristic time)

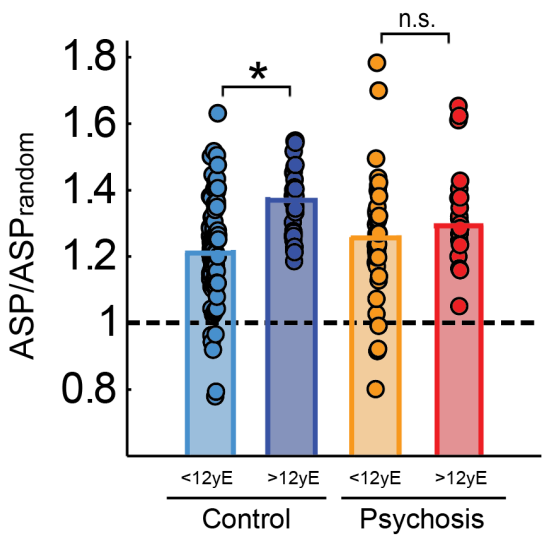
Mota, Pinheiro et al (in preparation)

Measuring word salad

yE = years of Education







Mota, Pinheiro et al (in preparation)

Could psychosis represent a trace of the immature human mind also at the historical level?

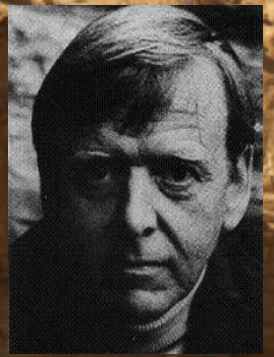
Could early literature be structurally similar to psychotic language?

Do graph attributes change over time as civilizations mature, like they change as individuals mature?

MELANIE KLEIN

Envy and Gratitude

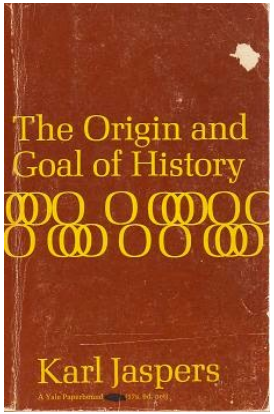
& Other Works 1946-1963

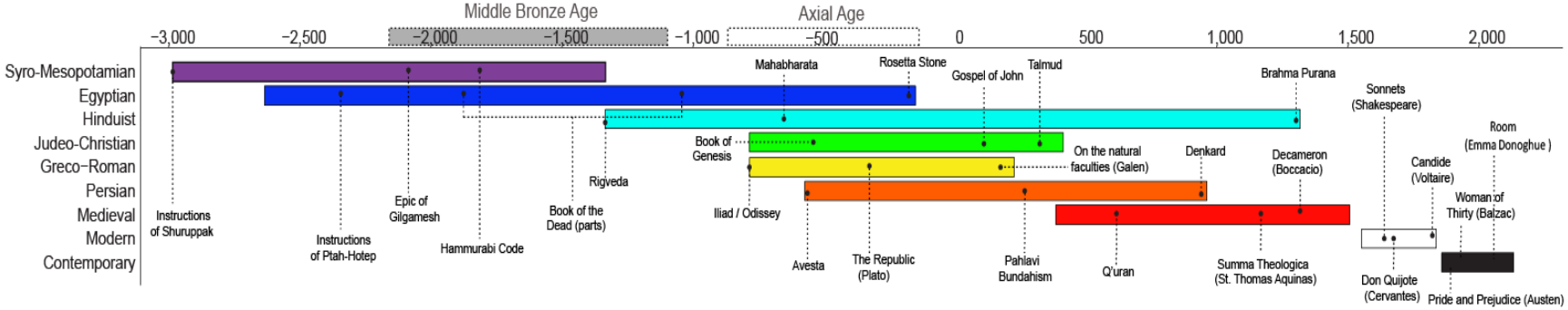


JULIAN JAYNES

THE ORIGIN OF CONSCIOUSNESS IN THE BREAK-DOWN OF THE BICAMERAL MIND

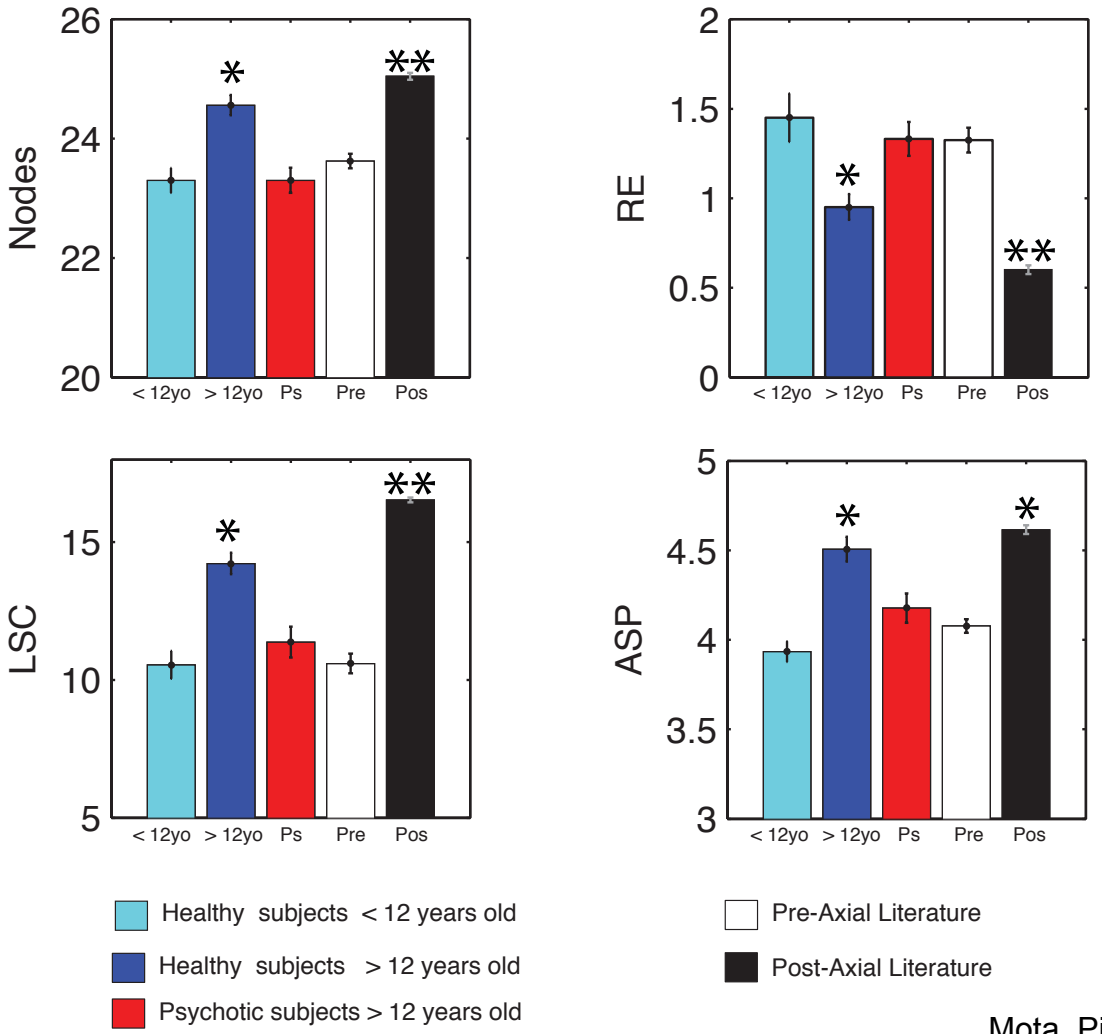
The Axial Age (800-200 ACE) as the coming of age of human consciousness



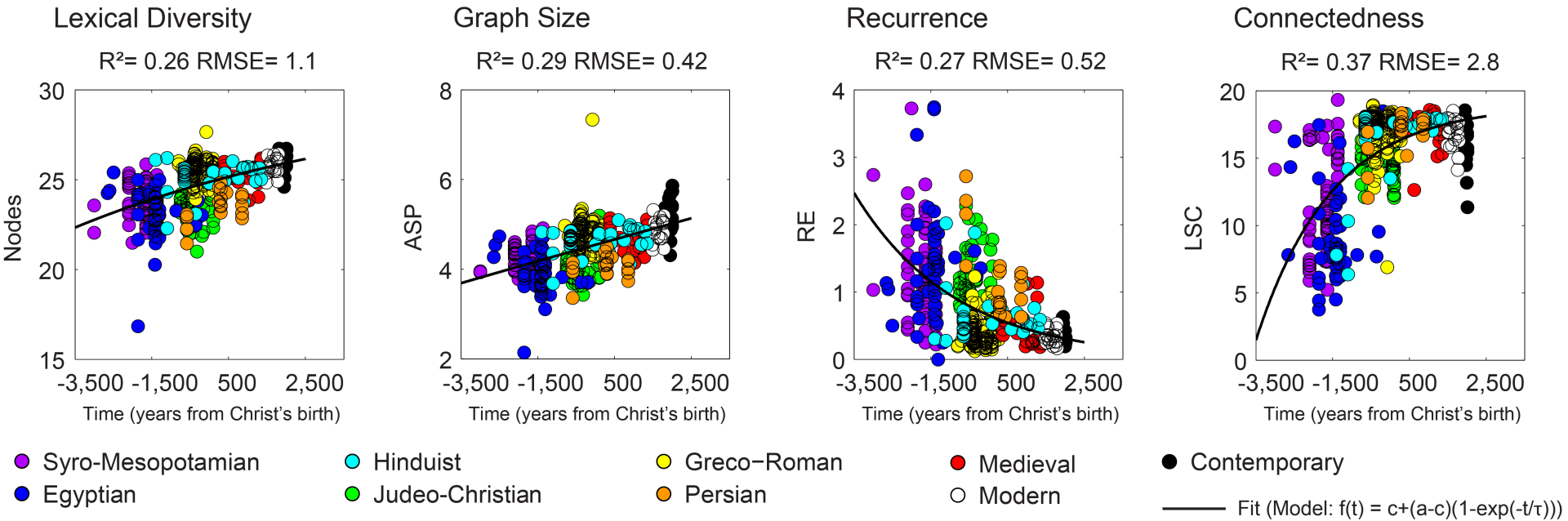


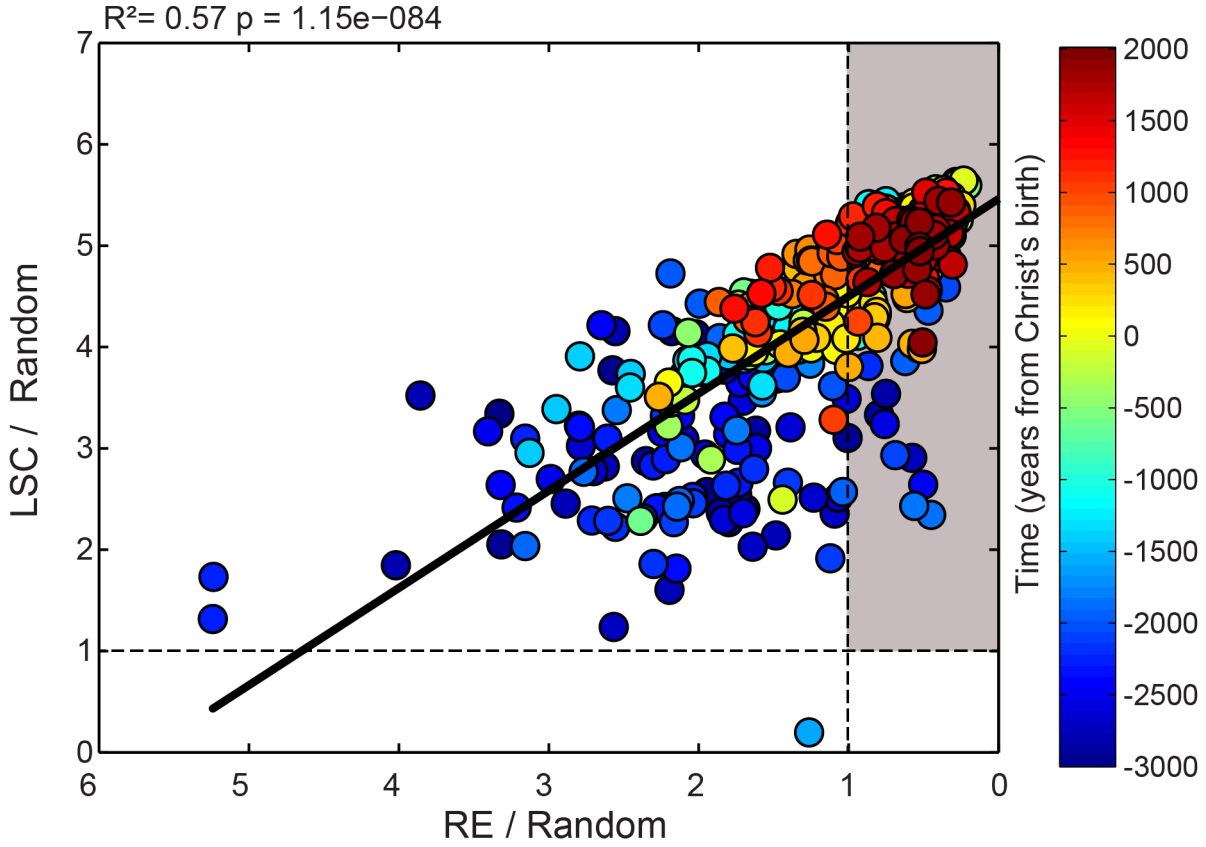
709 texts between -3,000 BCE and 2010 ACE

Syro-Mesopotamian (63); Egyptian (49); Judeo-Christian (76); Hinduism (37); Greco-Roman (134); Persian (19) Medieval (20); Modern (20); Contemporaneous (31)

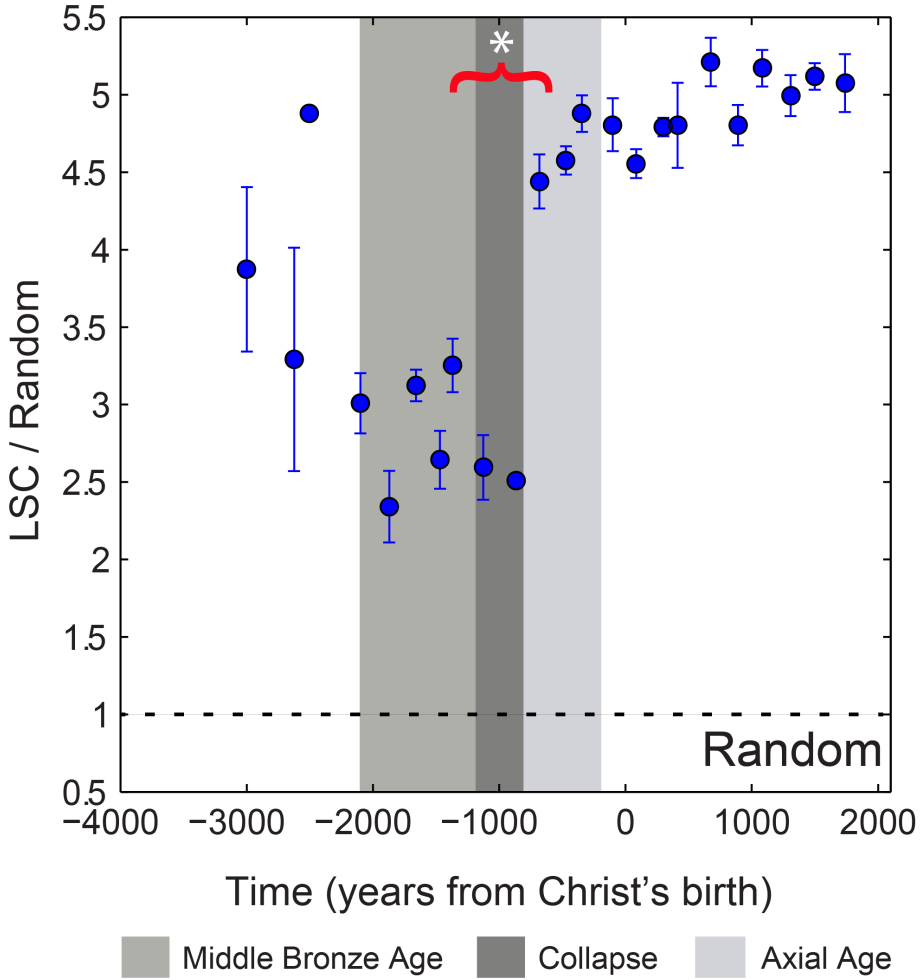


Mota, Pinheiro et al (in preparation)


Lexical Diversity
R²= 0.26 RMSE= 1.1
Nodes
30
25
20
15
-3,500 -1,500 500 2,500
Time (years from Christ's birth)
Graph Size
R²= 0.29 RMSE= 0.42
ASP
8
6
4
2
-3,500 -1,500 500 2,500
Time (years from Christ's birth)
Recurrence
R²= 0.27 RMSE= 0.52
RE
4
3
2
1
0
-3,500 -1,500 500 2,500
Time (years from Christ's birth)
Connectedness
R²= 0.37 RMSE= 2.8
LSC
20
15
10
5
0
-3,500 -1,500 500 2,500
Time (years from Christ's birth)
Syro-Mesopotamian
Egyptian
Hinduist
Judeo-Christian
Greco−Roman
Persian
Medieval
Modern
Contemporary
Fit (Model: f(t) = c+(a-c)(1-exp(-t/τ)))



Mota, Pinheiro et al (in preparation)



Mota, Pinheiro et al (in preparation)

Structural randomness seems to be an immature trace of language, individually as well as historically

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NeuroMat

FAPERN
Fundação de Apoio à Pesquisa do Estado do Rio Grande do Norte

CNPq
Conselho Nacional de Desenvolvimento Científico e Tecnológico

CAPES

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Onofre Lopes

The Electronic Text Corpus of Sumerian Literature

Digital Egypt for Universities

Project Gutenburg

CNPq
FACEPE
FAPERN

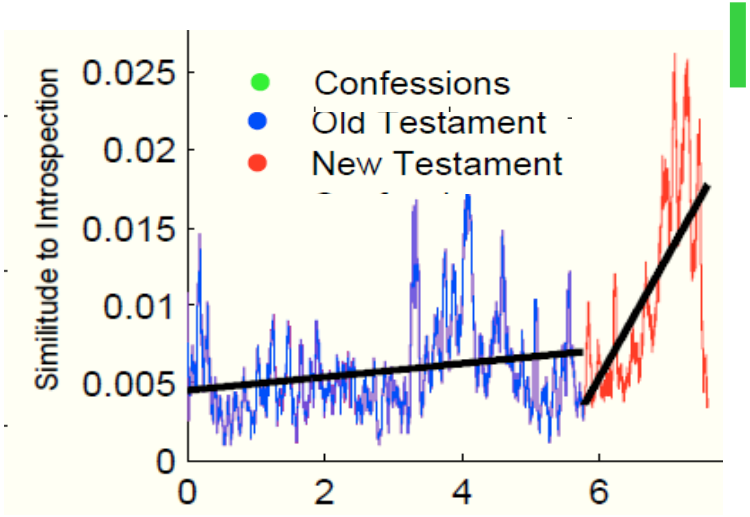
CAPES

Front. Integr. Neurosci., 24 September 2012 | doi: 10.3389/fnint.2012.00080

A quantitative philology of introspection

Carlos G. Diuk[1*†], D. Fernandez Slezak[2†], I. Raskovsky[2], M. Sigman[3] and G. A. Cecchi[4]

Judeo-Christian



Greco-Roman