DETECTING HISTORICAL TEXT REUSE

From a research question to the right model

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WHO AM I?

WHO AM I?

- 2001-2002: Head of Quality Assurance department in a software company;
- 2006: Diploma in Computer Science on big scale co-occurrence analysis;
- 2007: Consultant for several SMEs in IT sector;
- 2008: Technical project management of the eAQUA project;
- 2011: PI and project manager of the eTRACES project;
- 2013: PhD in Digital Humanities on Text Reuse;
- 2014: Head of Early Career Research Group eTRAP at the University of Göttingen.

Electronic Text Reuse Acquisition Project (eTRAP)

Interdisciplinary Early Career Research Group funded by the German Ministry of Education & Research (BMBF).

Budget: €1.6M.
Duration: March 2015 – February 2019. Research since October 2015.
Team: 4 core staff; 5-9 research & student assistants; Bachelor, Masters and PhD thesis students.

- Interdisciplinary: Classics, Computer Science, German Literature, Mathematics, Philosophy, Cognitive Psychology and Literature Studies.
- International: Currently from eight nationalities.

WHAT IS TEXT REUSE?

TEXT REUSE

Text reuse = spoken and written repetition of text across time and space.

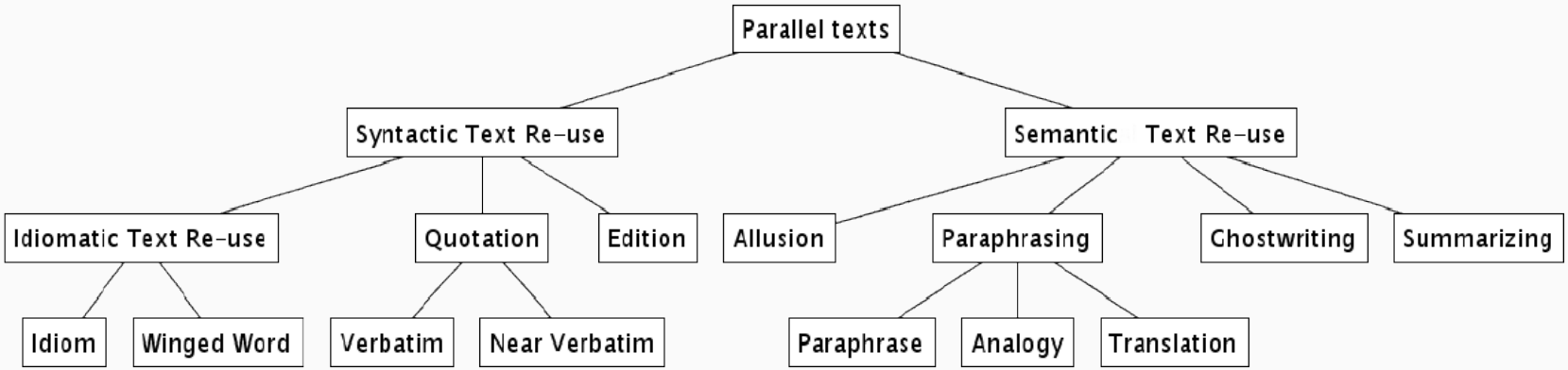


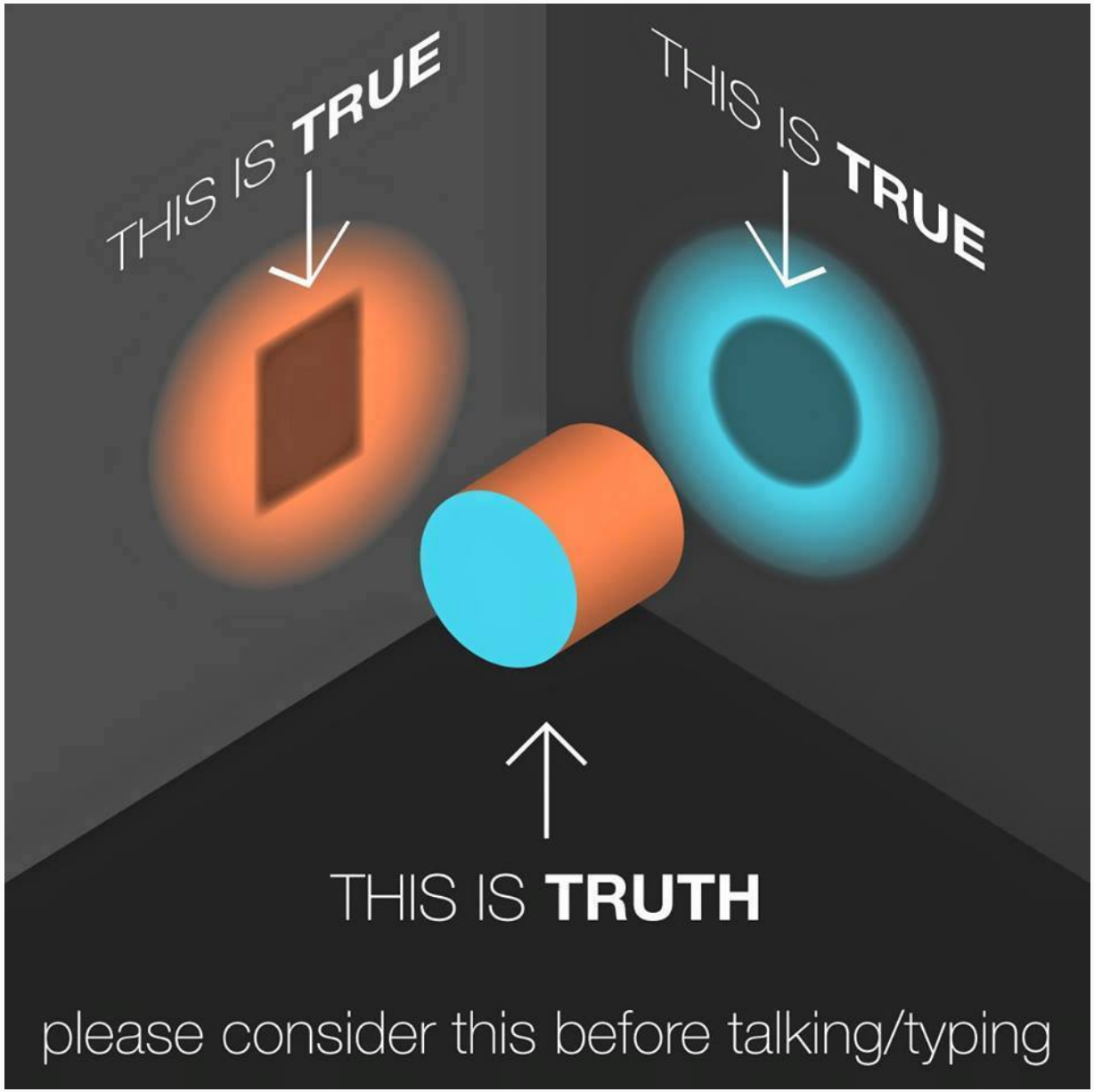
Figure 1: Text reuse styles.

TEXT AS A MOSAIC OF QUOTATIONS

"[...] a text is [...] a multidimensional space in which a variety of writings, none of them original, blend and clash. The text is a tissue of quotations drawn from the innumerable centres of culture... the writer can only imitate a gesture that is always anterior, never original. His only power is to mix writings [...]." (Barthes, 1977, pp. 146-47)

"[...] any text is constructed as a mosaic of quotations [...]." (Kristeva, 1980, p.66)

WHAT DO YOU ASSOCIATE WITH TEXT REUSE AND INTERTEXTUALITY?



EXPECTATIONS OF A COMPUTER SCIENTIST: OVERSIMPLIFICATION

EXPECTATIONS OF A HUMANIST: OVERSIMPLIFICATION

TEXT REUSE FOR HUMANITIES AND COMPUTER SCIENCE

Question:
Why is text reuse detection relevant for Humanities and Computer Science?

- Humanities:
  - Lines of transmission and textual criticism.
  - Transmissions of ideas & thoughts under different circumstances and conditions.
- Computer Science:
  - Text decontamination for stylometry and authorship attribution, dating of texts.
  - Text Mining, Corpus Linguistics.

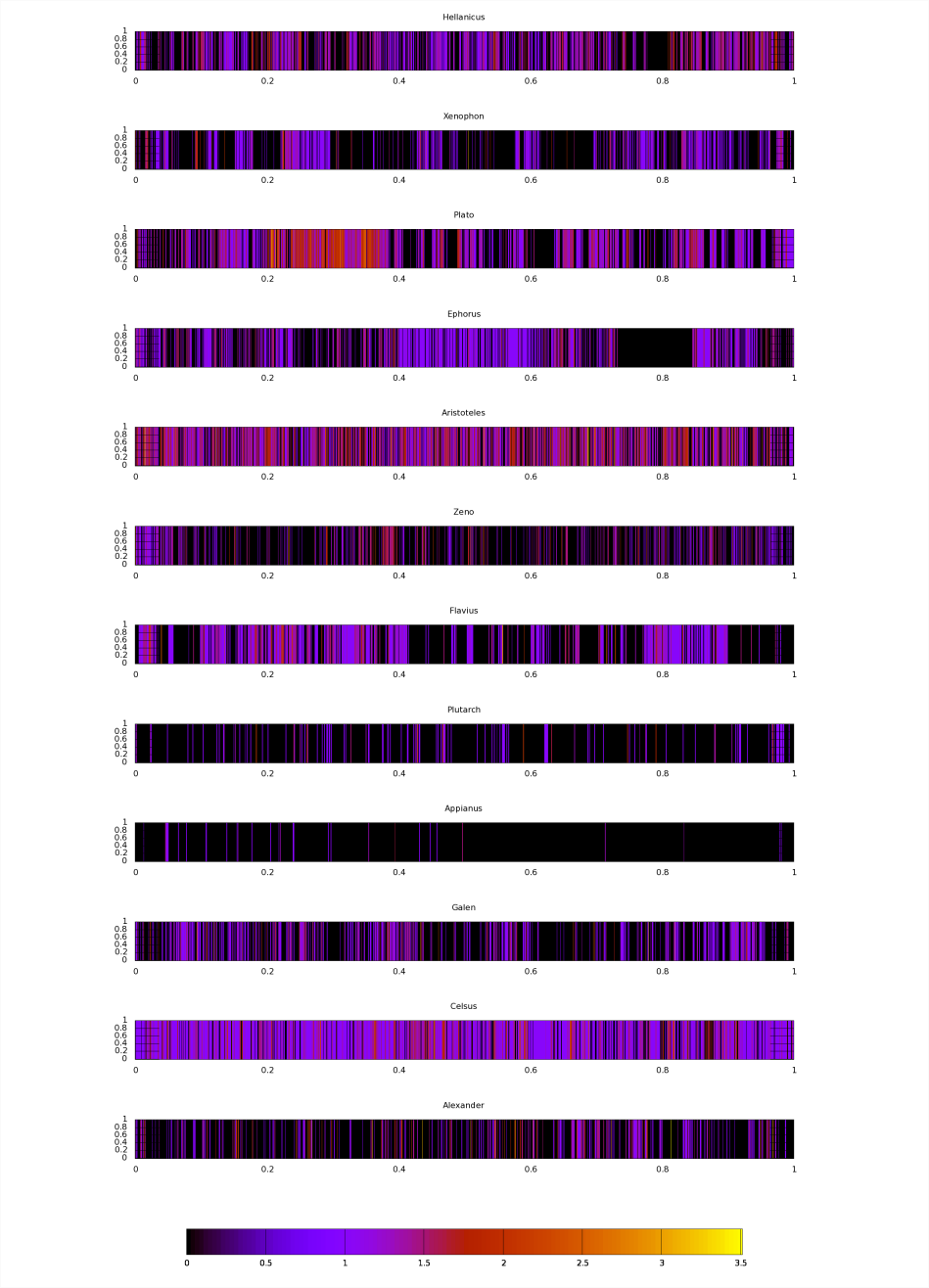
BIG (HUMANITIES) DATA

Ulrike Rieß (*Big Data bestimmt die IT-Welt*):

- Large amounts of data that can't be processed and analysed manually;
- Less structured data, e.g. in comparison to databases and data warehouse systems;
- Heterogeneous and distributed data across resources.

Information overload = large amounts of data (Big Data).
Information poverty = noisy, fragmentary (Humanities Data).

TEMPERATURE MAP



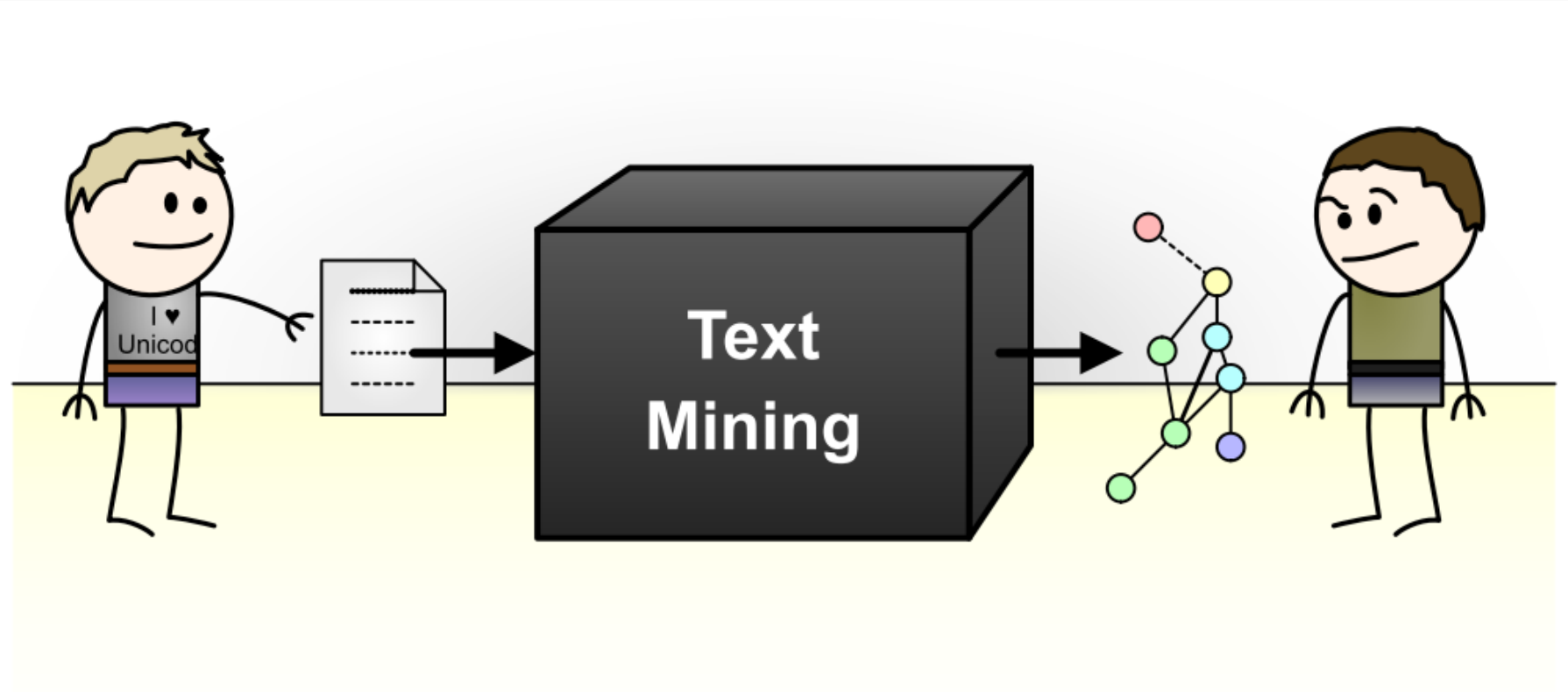
ACID PARADIGM

ACID PARADIGM

ACID for the Digital Humanities:

- **A**cceptance
- **C**omplexity
- **I**nteroperability
- **D**iversity

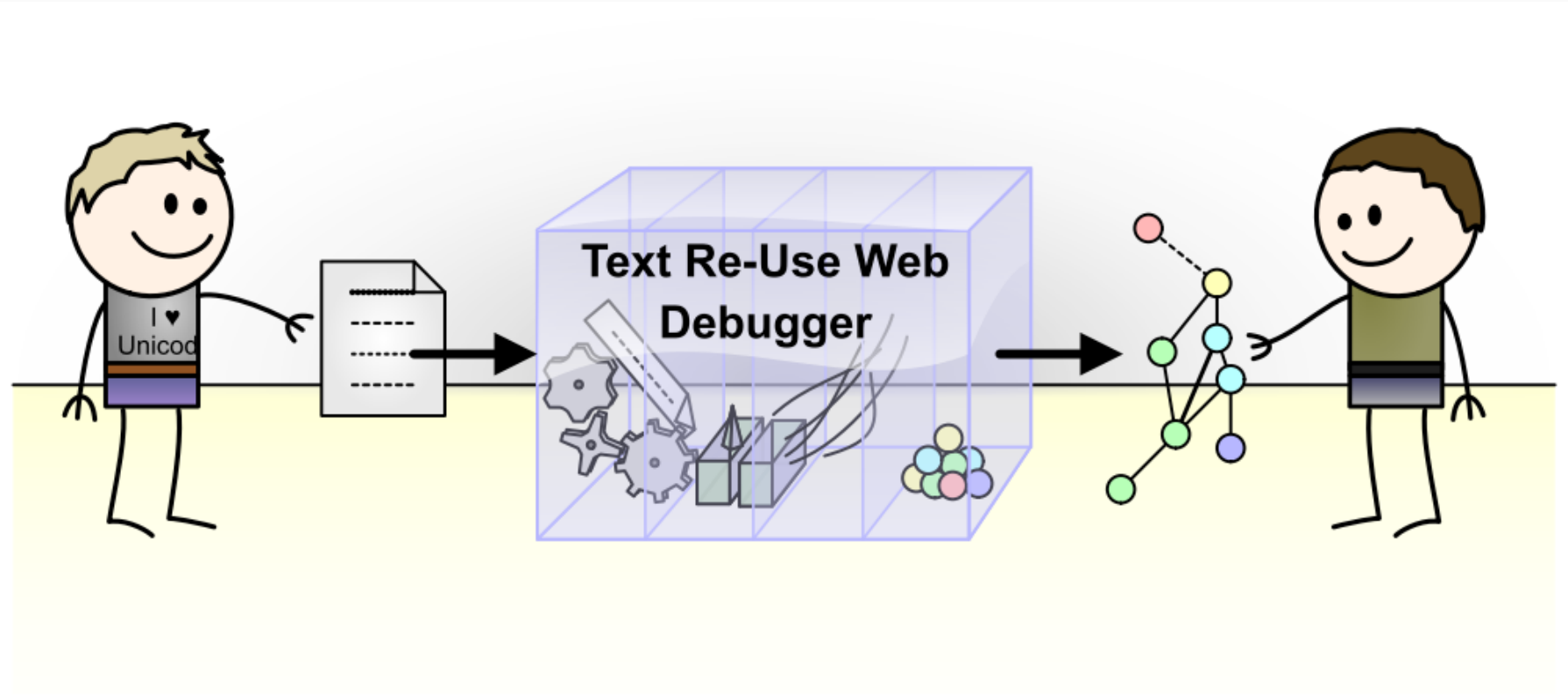
ACID FOR THE DIGITAL HUMANITIES: ACCEPTANCE I



ACID FOR THE DIGITAL HUMANITIES: ACCEPTANCE II

How to be accepted by humanists if text mining is a black box we can't look into?

ACID FOR THE DIGITAL HUMANITIES: ACCEPTANCE III



Transparency: How to provide user-friendly insights into complex mining techniques and machine learning?

ACID FOR THE DIGITAL HUMANITIES: ACCEPTANCE IV

Step 0: Searching

Please select a Corpus:* bible

Please select the number of displayed sentences: 20

Input the Word you are searching for:* God

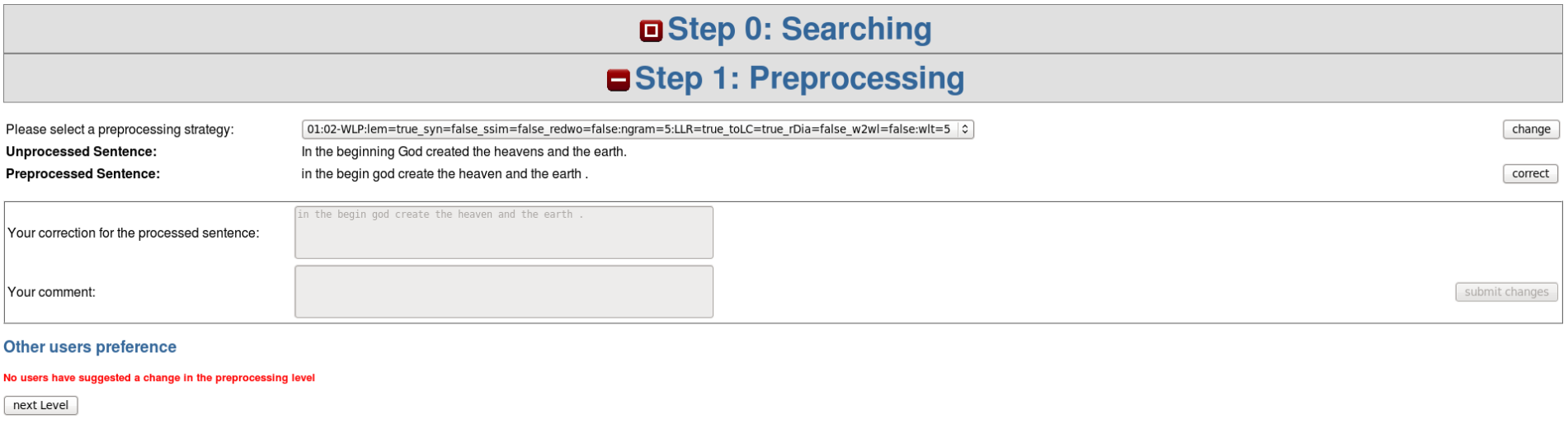
Fields with * are necessary

Trace

In the beginning God created the heavens and the earth.	Trace
And the earth was waste and void; and darkness was upon the face of the deep: and the Spirit of God moved upon the face of the waters.	Trace
And God said, Let there be light: and there was light.	Trace
And God saw the light, that it was good: and God divided the light from the darkness.	Trace
And God called the light Day, and the darkness he called Night. And there was evening and there was morning, one day.	Trace
And God said, Let there be a firmament in the midst of the waters, and let it divide the waters from the waters.	Trace
And God made the firmament, and divided the waters which were under the firmament from the waters which were above the firmament: and it was so.	Trace
And God called the firmament Heaven. And there was evening and there was morning, a second day.	Trace
And God said, Let the waters under the heavens be gathered together unto one place, and let the dry land appear: and it was so.	Trace
And God called the dry land Earth; and the gathering together of the waters called he Seas: and God saw that it was good.	Trace
And God said, Let the earth put forth grass, herbs yielding seed, and fruit-trees bearing fruit after their kind, wherein is the seed thereof, upon the earth: and it was so.	Trace
And the earth brought forth grass, herbs yielding seed after their kind, and trees bearing fruit, wherein is the seed thereof, after their kind: and God saw that it was good.	Trace
And God said, Let there be lights in the firmament of heaven to divide the day from the night; and let them be for signs, and for seasons, and for days and years:	Trace
And God made the two great lights; the greater light to rule the day, and the lesser light to rule the night: he made the stars also.	Trace
And God set them in the firmament of heaven to give light upon the earth,	Trace
and to rule over the day and over the night, and to divide the light from the darkness: and God saw that it was good.	Trace
And God said, Let the waters swarm with swarms of living creatures, and let birds fly above the earth in the open firmament of heaven.	Trace
And God created the great sea-monsters, and every living creature that moveth, wherewith the waters swarmed, after their kind, and every winged bird after its kind: and God saw that it was good.	Trace
And God blessed them, saying, Be fruitful, and multiply, and fill the waters in the seas, and let birds multiply on the earth.	Trace
And God said, Let the earth bring forth living creatures after their kind, cattle, and creeping things, and beasts of the earth after their kind: and it was so.	Trace

prev 0 1 2 3 4 5 6 ... 1146 next

ACID FOR THE DIGITAL HUMANITIES: ACCEPTANCE V



ACID FOR THE DIGITAL HUMANITIES: ACCEPTANCE VI

Step 0: Searching

Step 1: Preprocessing

Step 2: Featuring

Please select a training strategy: Bi Gram Shingling Training change

Preprocessed sentence: in the begin god create the heaven and the earth .

Position	Feature
0	in the
1	the begin

Position	Feature
2	begin god
3	god create

Position	Feature
4	create the
5	the heaven

Position	Feature
6	heaven and
7	and the

Position	Feature
8	the earth
9	earth .

next Level

ACID FOR THE DIGITAL HUMANITIES: ACCEPTANCE VII

Step 3: Selecting

Please select a selecting strategy: Local Max Feature Frequency Selector:FeatDens=0.8 change

Agenda

word = This word belongs to the fingerprint
word = This word originally doesn't belong to the fingerprint but was selected by the user to belong to the fingerprint
word = This word doesn't belong to the fingerprint
word = This word originally belonged to the fingerprint but was selected by the user to not belong to the fingerprint

initial configuration: in the the begin begin god god create create the the heaven heaven and and the the earth earth .

current configuration: in the the begin begin god god create create the the heaven heaven and and the the earth earth .

selected features <--> not selected features

in the
the begin
god create
the heaven
heaven and
and the
the earth
earth .

begin god
create the

submit changes

next Level

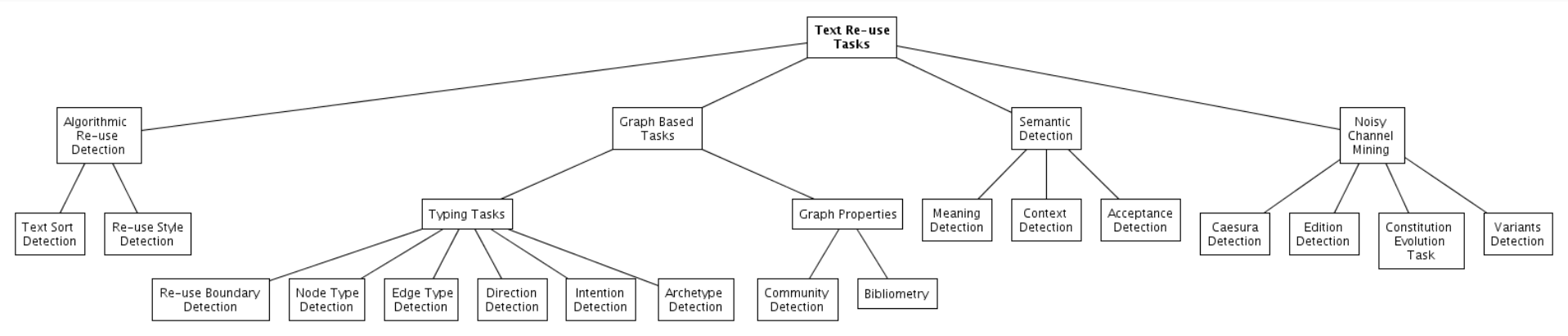
Other users preference

Feature	users selected	users not selected
in the	0	1
the begin	1	0
begin god	1	0
god create	1	0
create the	0	1
the heaven	1	0
heaven and	1	0
and the	0	1
the earth	1	0
earth .	0	1

Statistics

Feature	Selected Features	Total number of features
in the	27114	32227
the begin	470	480
begin god	0	5
god create	27	45
create the	17	38
the heaven	1624	1695
heaven and	389	398
and the	31808	40850
the earth	4776	5222
earth .	1030	1040

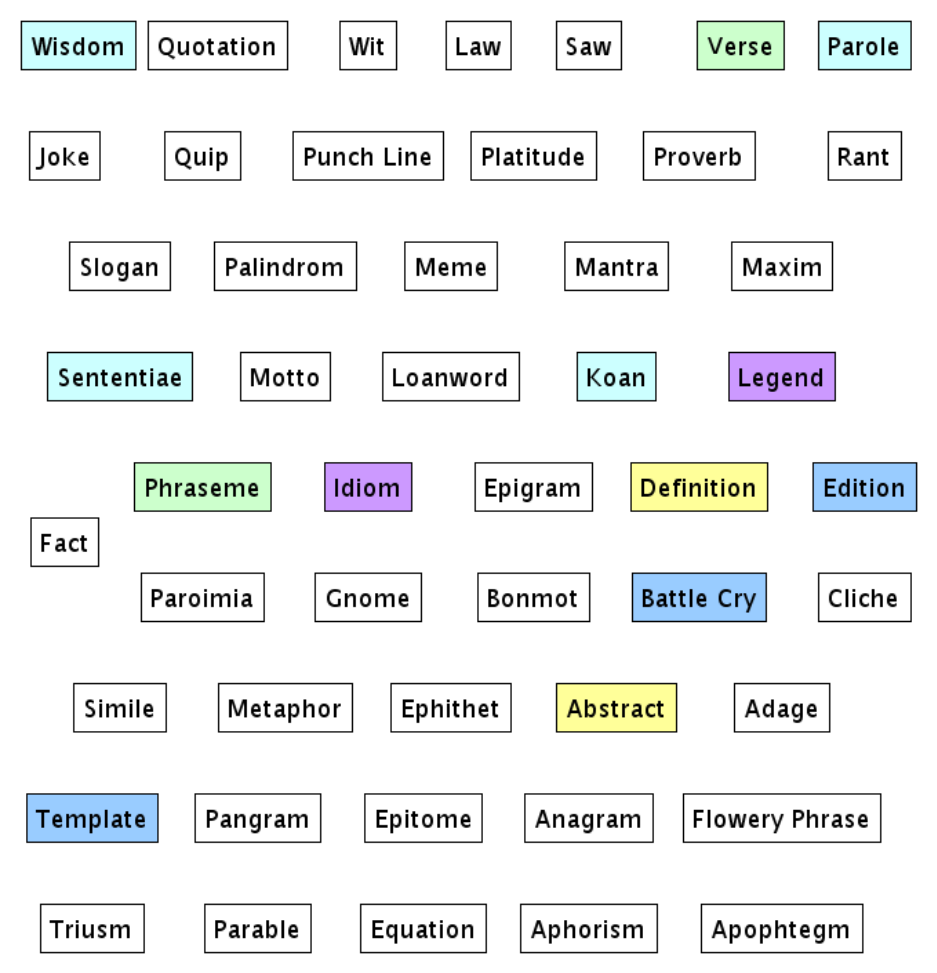
ACID FOR THE DIGITAL HUMANITIES: COMPLEXITY



ACID FOR THE DIGITAL HUMANITIES: INTEROPERABILITY

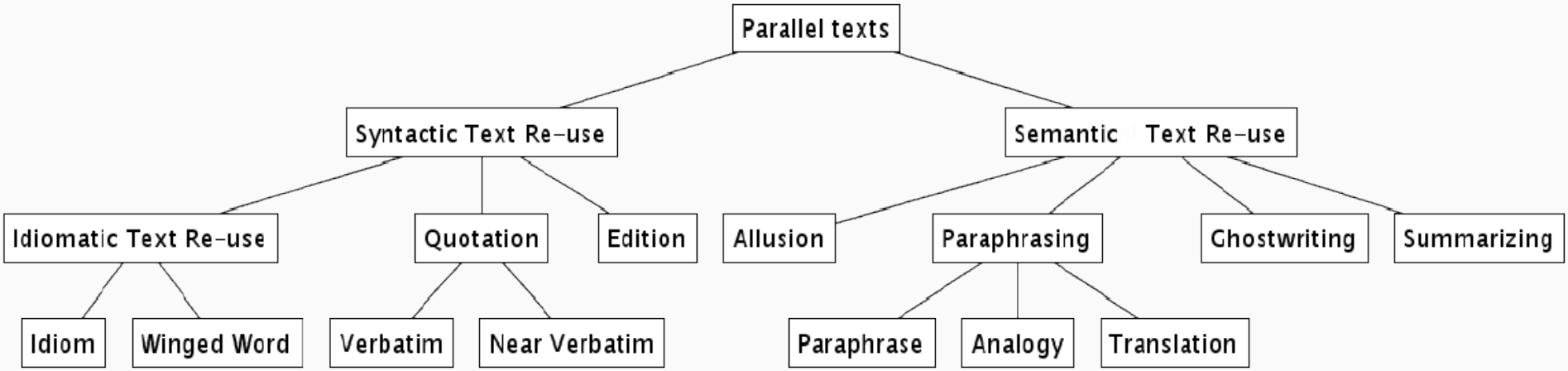
cit-quote-bibl	blockquote	bibl without quote
<cit> <quote> du/o ku/nes a)rgoi\ ei(/ponto </quote> <bibl n="Hom. Od. 2.11"> Od. 2.11 </bibl> </cit>	<quote rend="blockquote"> <line> a)gxou= d' i(stame/nh e)/pea ptero/enta proshu/da <bibl n="Hom. Il. 4.92">Il. 4.92</bibl> </line><line> a)ll' a)/ge nu=n ma/stiga kai\ h(ni/a sigalo/enta <bibl n="Hom. Il. 5.226">Il. 5.226</bibl> </line> </quote>	 [...]a)nti\ tou= proe/pinon. kuri/ws ga/r e)sti tou=to propi/nein, to\ e(te/rw| pro\ e(autou= dou=nai piei=n. kai (*)odusseu\s de\ para\ tw=| *(omh/rw| <bibl n="Hom. Od. 13.57">Od. 13.57</bibl> [...]

DIVERSITY (REUSE TYPES)



- **Stability** (yellow)
- **Purpose** (green)
- **Size of text reuse** (blue)
- **Classification** (light blue)
- **Degree of distribution** (purple)
- Written and oral transmission

DIVERSITY (REUSE STYLES)



KEY PROBLEM

Question:

The distribution of **Reuse Types** and **Reuse Styles** is often unknown - which model(s) should be chosen?

TRACER: DISSEMINATION

Webpage: `http://www.etrap.eu/research/tracer`
Repository: `http://vcs.etrap.eu/tracer-framework/tracer.git`
Upcoming tutorials:

- **DATeCH 2017** (May 2017): pre-conference workshop, Göttingen, Germany.
- Three more tutorials in 2017 pending confirmation.

COMPARISON OF LUKE & MARK

TRACER: OVERVIEW

TRACER: suite of 700 algorithms developed by Marco Büchler.
Command line environment with no GUI.

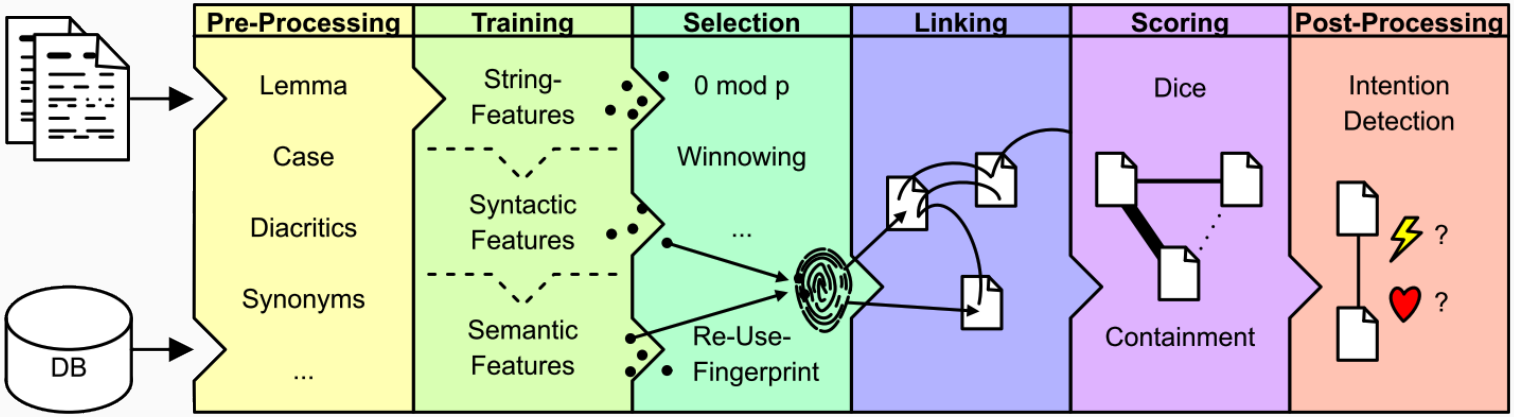
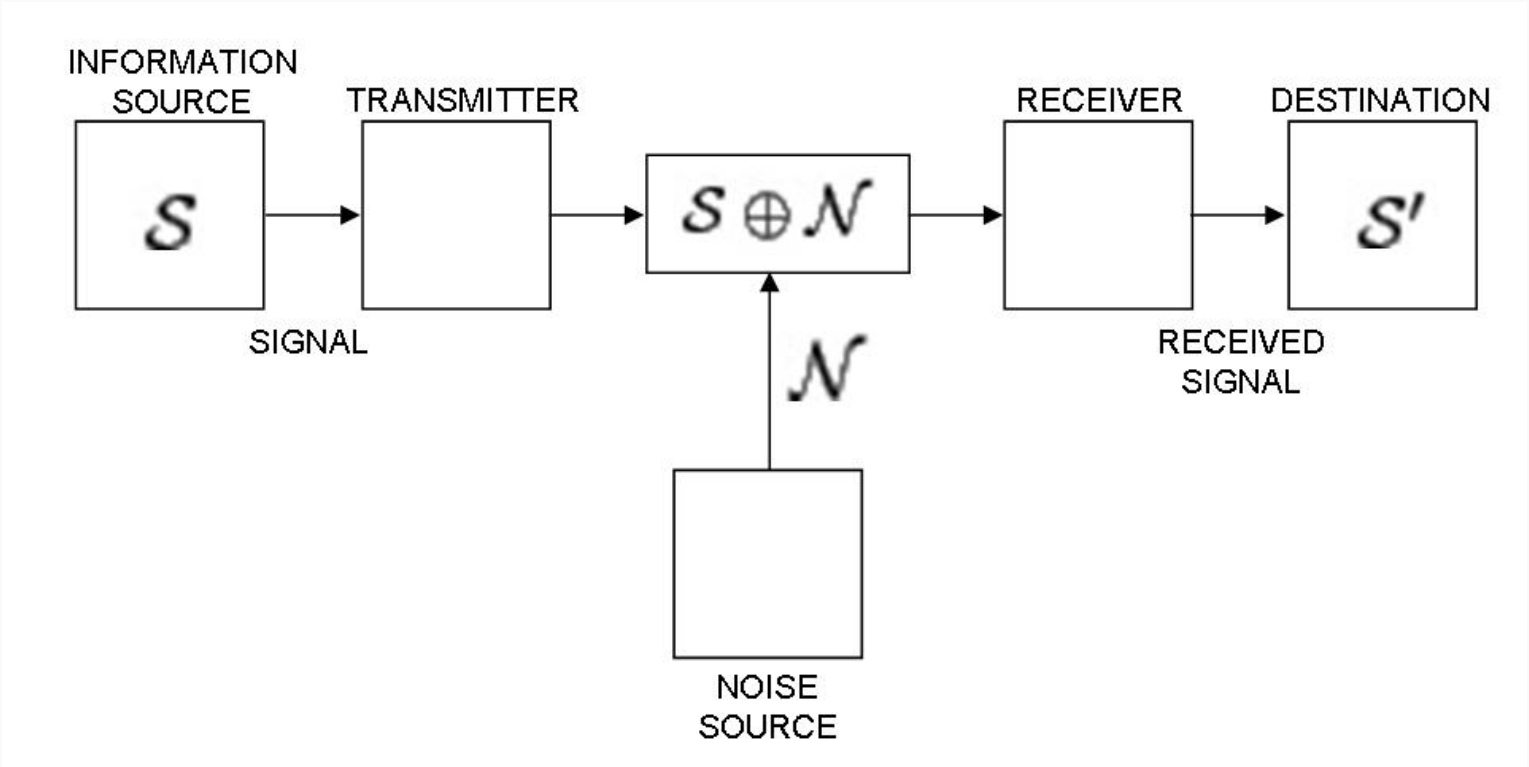


Figure 2: Detection task in six steps. More than 1M permutations of implementations of different levels are possible.

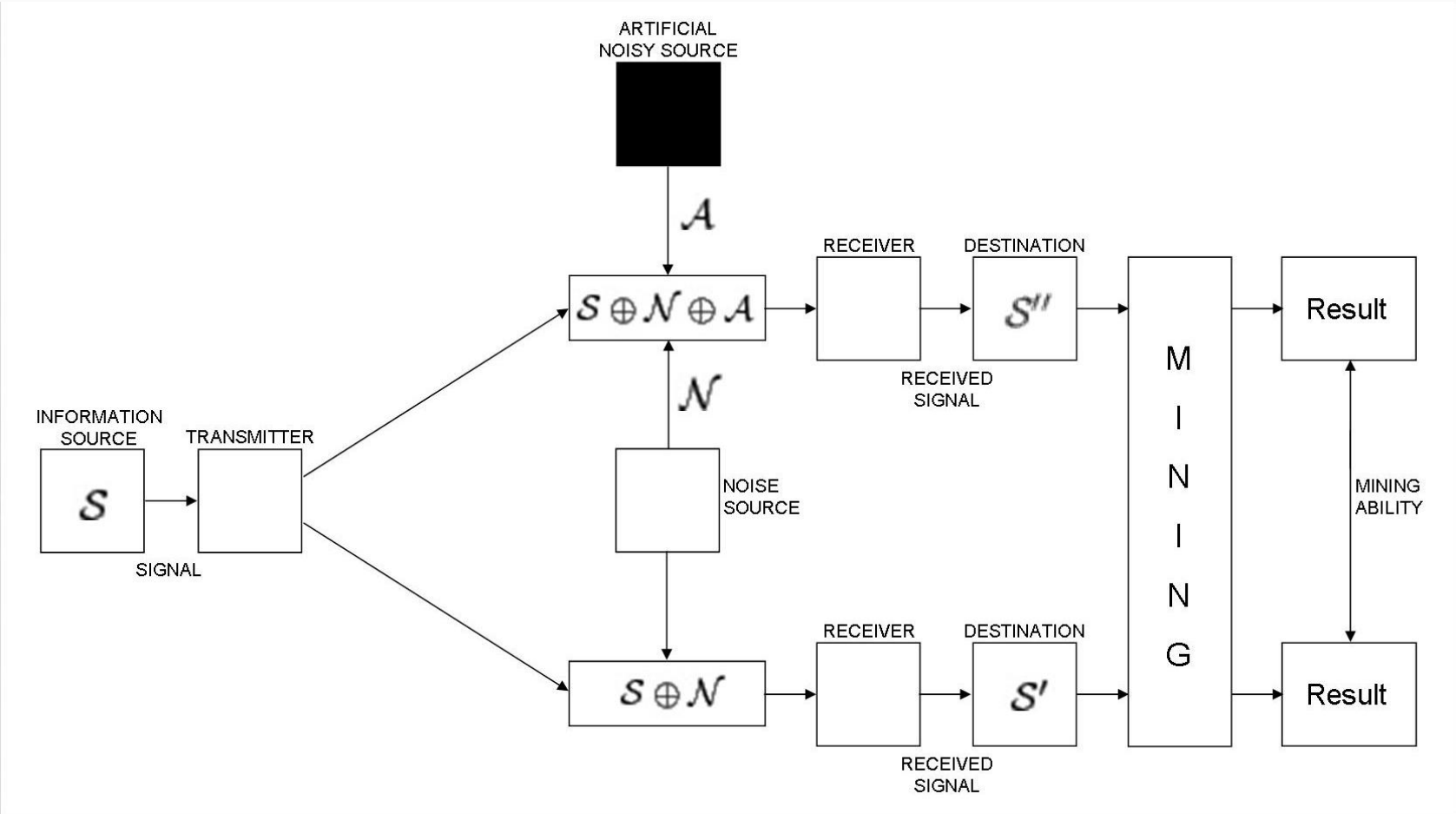
TRACER is language-independent.
Tested on: Ancient Greek, Arabic, Coptic, English, German, Hebrew, Latin, Tibetan.

AUTOMATIC EVALUATION

Basic idea: Embed historical text reuse in Shannon's **Noisy Channel** theorem.



METHODOLOGY: NOISY CHANNEL EVALUATION I



Hint: The results are ALWAYS compared between the natural texts and the randomised texts as a whole.

METHODOLOGY: NOISY CHANNEL EVALUATION II

Signal-Noise-Ratio *adapted* from signal- and satellite techniques:

$$SNR = \frac{P_{signal}}{P_{noise}}$$

Signal-Noise-Ratio *scaled*, unit is dB:

$$SNR_{db} = 10.log_{10}\left(\frac{P_{signal}}{P_{noise}}\right)$$

Mining Ability (in dB): The Mining Ability describes the power of a method to make distinctions between natural-language structures/patterns and random noise given a model with the same parameters.

$$L_{Quant}(\Theta) = 10.log_{10}\frac{|E_{D_s,\phi_\Theta}|}{max(1,|E_{D_s^m},\phi_\Theta|)}dB$$

METHODOLOGY: NOISY CHANNEL EVALUATION III

Motivation for randomisation by **Word Shuffling**:

1. Syntax and distributional semantics are randomised and ”destroyed”.
2. Distributions of words and sentence lengths remain unchanged; changes JUST and ONLY depend on destruction of 1) and are not induced by changes of distributions.
3. Easy measurement of ”randomness” of the randomising method with the entropy test:

$$\Delta H^n = H_{max} - H^n$$

Die Wahl von $n \in [180, 183]$ sichert eine Genauigkeit von $\Delta H^n \leq 10^{-3}$ Bit für den Entropietest.

METHODOLOGY: TEXT REUSE COMPRESSION

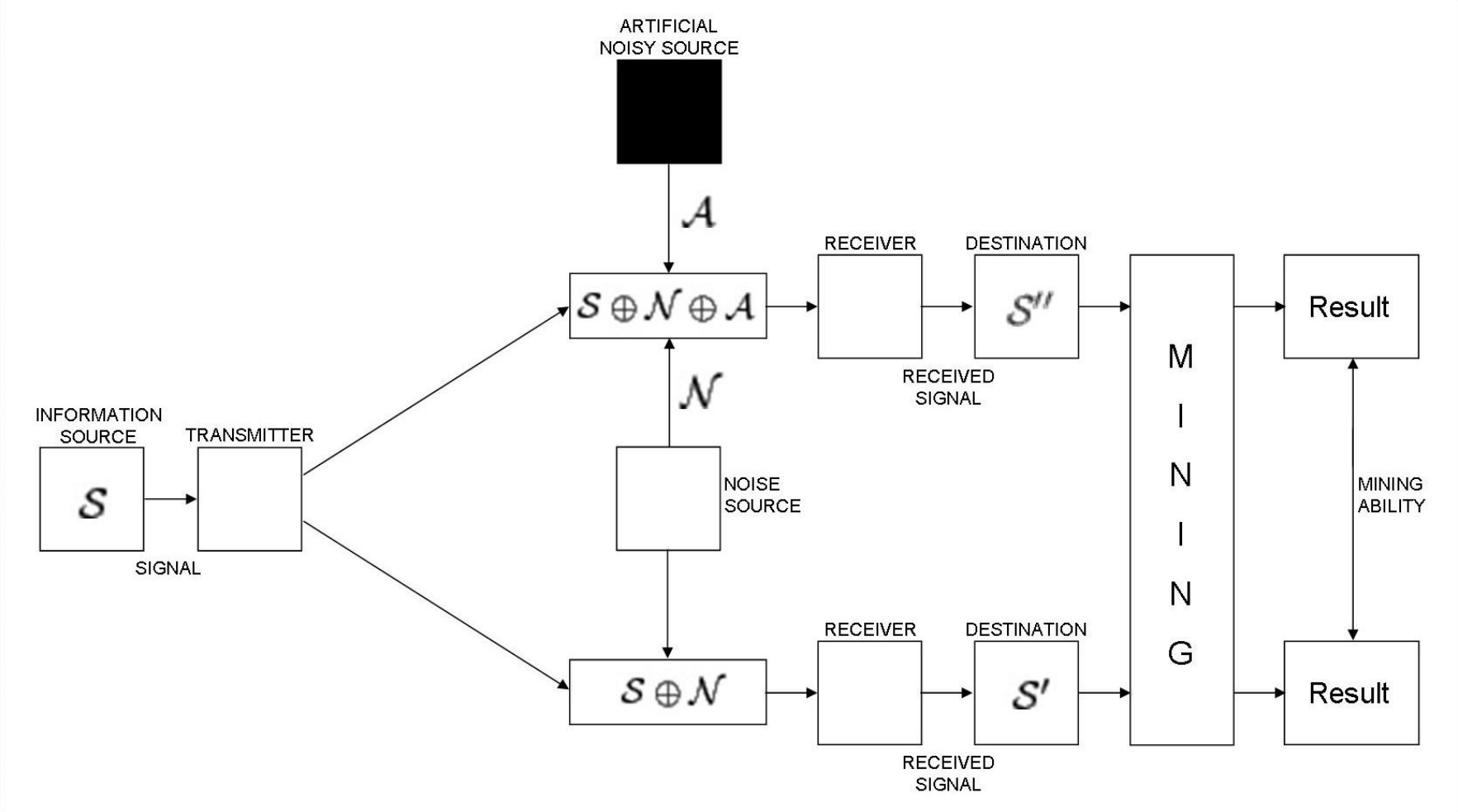
1. eTRAP works on text reuse.
2. eTRAP works on text reuse.
3. eTRAP works on text reuse.
4. eTRAP works on text reuse.
5. eTRAP works on text reuse.
6. ...

$$
\begin{array}{c} \\ s_1 \\ s_2 \\ s_3 \\ s_4 \\ s_5 \end{array}
\begin{array}{c}
\begin{array}{ccccc} s_1 & s_2 & s_3 & s_4 & s_5 \end{array} \\
\begin{pmatrix}
0.00 & 1.00 & 1.00 & 1.00 & 1.00 \\
1.00 & 0.00 & 1.00 & 1.00 & 1.00 \\
1.00 & 1.00 & 0.00 & 1.00 & 1.00 \\
1.00 & 1.00 & 1.00 & 0.00 & 1.00 \\
1.00 & 1.00 & 1.00 & 1.00 & 0.00
\end{pmatrix}
\end{array}
$$

$$\mathcal{C}_\Theta = \frac{n \cdot (n-1)}{n^2} = 1 - \frac{1}{n}$$

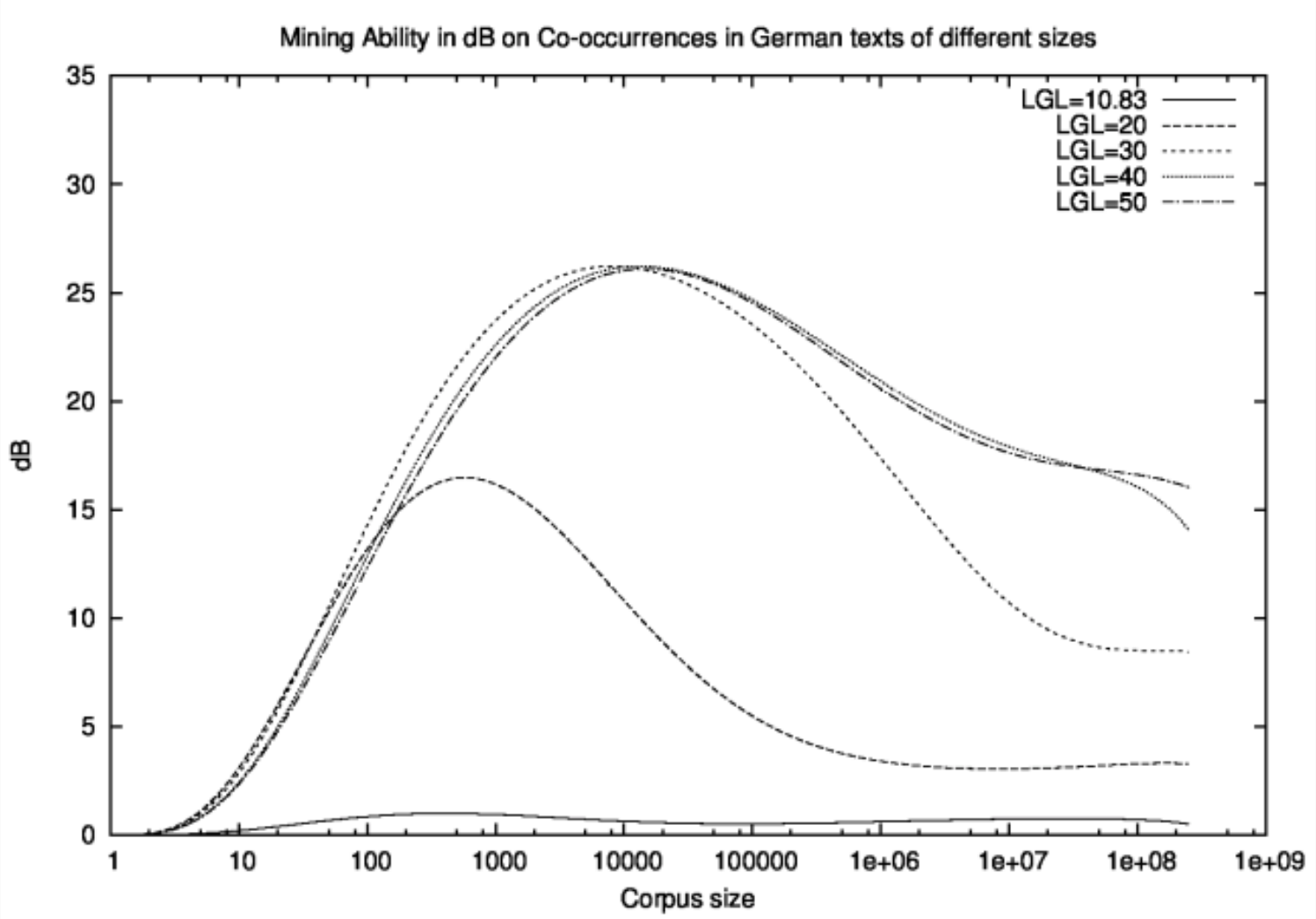
$$C_\Theta = \frac{\sum_{j=1}^{m} \sum_{i=1}^{n} \theta_\Theta(s_i, s_j)}{n * m}$$

RANDOMNESS & STRUCTURE



Question: Why is the result of a randomised Digital Library typically not empty?

RANDOMNESS & STRUCTURE: IMPACT



Corpus size in sentences (average sentence length is ca. 18 words). LGL is the threshold for the Log-Likelihood-Ratio.

TEXT REUSE IN ENGLISH BIBLE VERSIONS: SETUP

Segmentation: disjoint and verse-wise segmentation.

		Featuring		
		Trigram	Bigram	Word
Preprocess.	Base	S_{11}	S_{21}	S_{31}
	StringSim	S_{12}	S_{22}	S_{23}
	Lemma	S_{13}	S_{23}	S_{33}
	Lemma+Syn	S_{14}	S_{24}	S_{34}

Selection: max pruning with a Feature Density of 0.8;

Linking: Inter- Digital Library Linking (different Bible editions);

Scoring: *Broder's Resemblance* with a threshold of 0.6;

Post-processing: not used.

TEXT REUSE IN ENGLISH BIBLE VERSIONS: RESULTS – RECALL

	Trigram Shingling				Bigram Shingling				Word based Featuring			
	S_{11}	S_{12}	S_{13}	S_{14}	S_{21}	S_{22}	S_{23}	S_{24}	S_{31}	S_{32}	S_{33}	S_{34}
ASV vs. BBE	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.09	0.10	0.11	0.12
ASV vs. DBY	0.16	0.17	0.17	0.17	0.28	0.30	0.30	0.31	0.70	0.72	0.73	0.74
ASV vs. KJV	0.36	0.38	0.37	0.38	0.53	0.56	0.55	0.56	0.86	0.88	0.88	0.88
ASV vs. WEB	0.32	0.34	0.32	0.33	0.46	0.48	0.47	0.47	0.76	0.79	0.77	0.77
ASV vs. WBS	0.27	0.29	0.28	0.29	0.44	0.46	0.46	0.46	0.82	0.84	0.84	0.85
ASV vs. YLT	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.18	0.21	0.25	0.26

TEXT REUSE IN ENGLISH BIBLE VERSIONS: RECALL VS. TEXT REUSE COMPRESSION

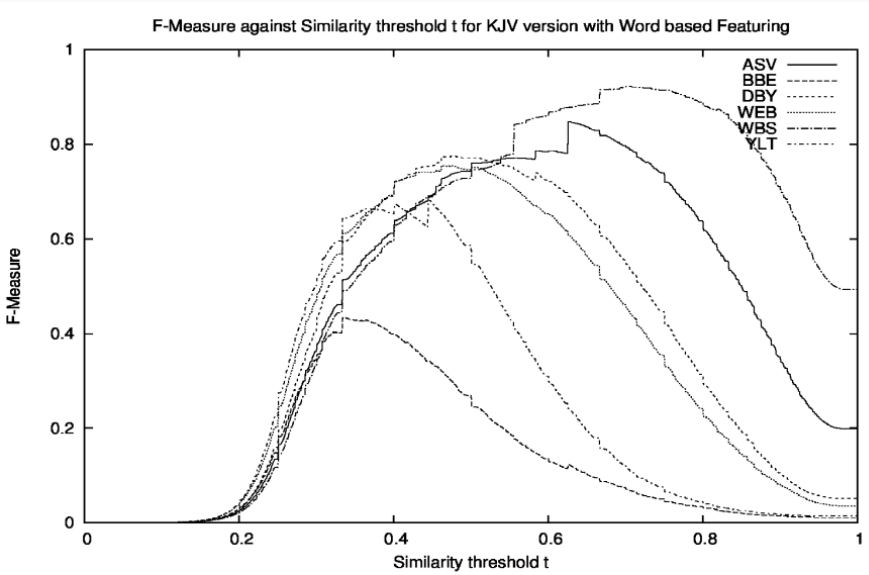
With

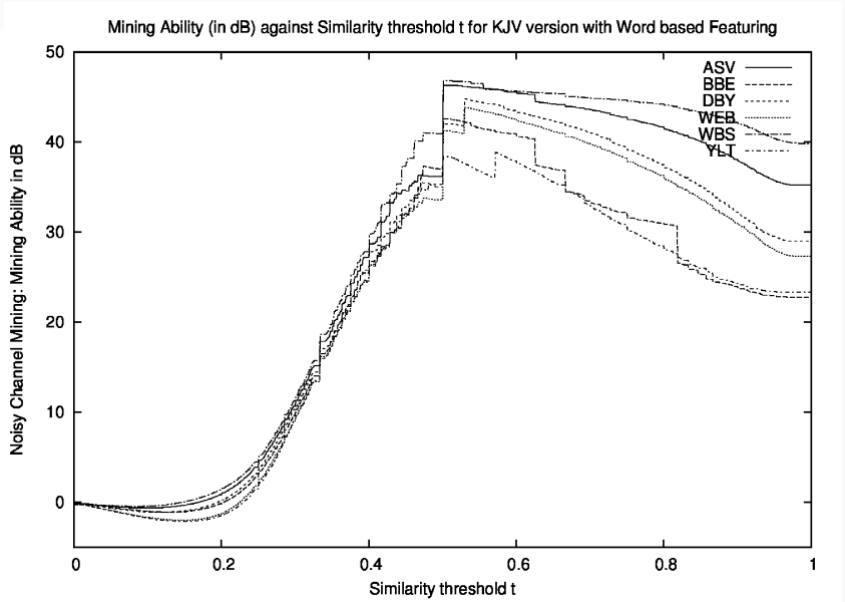
	Trigram Shingling				Bigram Shingling				Word based Featuring			
	S_{11}	S_{12}	S_{13}	S_{14}	S_{21}	S_{22}	S_{23}	S_{24}	S_{31}	S_{32}	S_{33}	S_{34}
ASV vs. BBE	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.09	0.10	0.11	0.12
ASV vs. DBY	0.16	0.17	0.17	0.17	0.28	0.30	0.30	0.31	0.70	0.72	0.73	0.74
ASV vs. KJV	0.36	0.38	0.37	0.38	0.53	0.56	0.55	0.56	0.86	0.88	0.88	0.88
ASV vs. WEB	0.32	0.34	0.32	0.33	0.46	0.48	0.47	0.47	0.76	0.79	0.77	0.77
ASV vs. WBS	0.27	0.29	0.28	0.29	0.44	0.46	0.46	0.46	0.82	0.84	0.84	0.85
ASV vs. YLT	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.18	0.21	0.25	0.26
BBE vs. ASV	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.09	0.10	0.11	0.12
BBE vs. DBY	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.07	0.08	0.08	0.10
BBE vs. KJV	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.08	0.09	0.10	0.11
BBE vs. WEB	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.11	0.12	0.13	0.15
BBE vs. WBS	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.10	0.10	0.11	0.13
BBE vs. YLT	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.04
DBY vs. ASV	0.16	0.17	0.17	0.17	0.28	0.30	0.30	0.31	0.70	0.72	0.73	0.74
DBY vs. BBE	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.07	0.08	0.08	0.10
DBY vs. KJV	0.12	0.13	0.12	0.13	0.22	0.24	0.23	0.24	0.62	0.65	0.65	0.66
DBY vs. WEB	0.07	0.08	0.07	0.08	0.14	0.15	0.14	0.15	0.46	0.49	0.49	0.51
DBY vs. WBS	0.12	0.13	0.12	0.13	0.22	0.24	0.23	0.24	0.64	0.67	0.67	0.68
DBY vs. YLT	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.18	0.21	0.26	0.27
KJV vs. ASV	0.36	0.38	0.37	0.38	0.53	0.56	0.55	0.56	0.86	0.88	0.88	0.88
KJV vs. BBE	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.08	0.09	0.10	0.11
KJV vs. DBY	0.12	0.13	0.12	0.13	0.22	0.24	0.23	0.24	0.62	0.65	0.65	0.66
KJV vs. WEB	0.10	0.11	0.10	0.10	0.18	0.20	0.19	0.19	0.51	0.55	0.53	0.55
KJV vs. WBS	0.75	0.78	0.76	0.77	0.89	0.91	0.90	0.90	0.99	0.99	0.99	0.99
KJV vs. YLT	0.01	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.14	0.16	0.19	0.20
WEB vs. ASV	0.32	0.34	0.32	0.33	0.46	0.48	0.47	0.47	0.76	0.79	0.77	0.77
WEB vs. BBE	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.11	0.12	0.13	0.15
WEB vs. DBY	0.07	0.08	0.07	0.08	0.14	0.15	0.14	0.15	0.46	0.49	0.49	0.51
WEB vs. KJV	0.10	0.11	0.10	0.10	0.18	0.20	0.19	0.19	0.51	0.55	0.53	0.55
WEB vs. WBS	0.11	0.12	0.11	0.12	0.20	0.22	0.21	0.21	0.56	0.60	0.59	0.60
WEB vs. YLT	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.10	0.12	0.15	0.16
WBS vs. ASV	0.27	0.29	0.28	0.29	0.44	0.46	0.46	0.46	0.82	0.84	0.84	0.85
WBS vs. BBE	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.10	0.10	0.11	0.13
WBS vs. DBY	0.12	0.13	0.12	0.13	0.22	0.24	0.23	0.24	0.64	0.67	0.67	0.68
WBS vs. KJV	0.75	0.78	0.76	0.77	0.89	0.91	0.90	0.90	0.99	0.99	0.99	0.99
WBS vs. WEB	0.11	0.12	0.11	0.12	0.20	0.22	0.21	0.21	0.56	0.60	0.59	0.60
WBS vs. YLT	0.01	0.02	0.02	0.01	0.02	0.03	0.03	0.03	0.15	0.17	0.21	0.22
YLT vs. ASV	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.18	0.21	0.25	0.26
YLT vs. BBE	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.04
YLT vs. DBY	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.18	0.21	0.26	0.27
YLT vs. KJV	0.01	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.14	0.16	0.19	0.20
YLT vs. WEB	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.10	0.12	0.15	0.16
YLT vs. WBS	0.01	0.02	0.02	0.01	0.02	0.03	0.03	0.03	0.15	0.17	0.21	0.22

Without

	Trigram Shingling				Bigram Shingling				Word based Featuring			
	S_{11}	S_{12}	S_{13}	S_{14}	S_{21}	S_{22}	S_{23}	S_{24}	S_{31}	S_{32}	S_{33}	S_{34}
ASV vs. BBE	6.16	6.15	6.16	6.18	6.02	6.01	6.01	5.99	5.42	5.39	5.37	5.33
ASV vs. DBY	5.22	5.19	5.20	5.19	4.98	4.96	4.97	4.95	4.60	4.58	4.58	4.57
ASV vs. KJV	4.97	4.95	4.96	4.95	4.80	4.78	4.79	4.78	4.49	4.47	4.47	4.47
ASV vs. WEB	5.03	5.00	5.02	5.02	4.86	4.84	4.86	4.86	4.60	4.59	4.59	4.59
ASV vs. WBS	5.10	5.07	5.08	5.08	4.89	4.87	4.88	4.87	4.58	4.56	4.56	4.56
ASV vs. YLT	6.34	6.26	6.30	6.29	6.08	6.01	6.05	6.03	5.00	4.95	4.92	4.91
BBE vs. ASV	6.16	6.15	6.16	6.18	6.02	6.01	6.01	5.99	5.42	5.39	5.37	5.33
BBE vs. DBY	6.42	6.36	6.41	6.41	6.24	6.20	6.22	6.20	5.51	5.47	5.44	5.42
BBE vs. KJV	6.35	6.30	6.34	6.32	6.00	5.97	5.99	5.97	5.26	5.23	5.00	4.98
BBE vs. WEB	6.17	6.16	6.17	6.18	6.01	6.00	6.00	6.01	5.30	5.27	5.26	5.22
BBE vs. WBS	5.75	5.74	5.75	5.74	5.55	5.54	5.55	5.54	4.94	4.93	4.83	4.82
BBE vs. YLT	6.86	6.77	6.84	6.85	6.68	6.62	6.66	6.66	5.99	5.94	5.92	5.92
DBY vs. ASV	5.22	5.19	5.20	5.19	4.98	4.96	4.97	4.95	4.60	4.58	4.58	4.57
DBY vs. BBE	6.42	6.36	6.41	6.41	6.24	6.20	6.22	6.20	5.51	5.47	5.44	5.42
DBY vs. KJV	5.49	5.45	5.46	5.44	5.21	5.18	5.19	5.18	4.72	4.70	4.70	4.69
DBY vs. WEB	5.69	5.65	5.67	5.65	5.42	5.39	5.40	5.38	4.85	4.82	4.82	4.80
DBY vs. WBS	5.49	5.45	5.46	5.44	5.21	5.17	5.18	5.17	4.63	4.61	4.61	4.60
DBY vs. YLT	6.38	6.31	6.33	6.32	6.15	6.08	6.09	6.07	5.26	5.19	5.13	5.10
KJV vs. ASV	4.97	4.95	4.96	4.95	4.80	4.78	4.79	4.78	4.49	4.47	4.47	4.47
KJV vs. BBE	6.35	6.30	6.34	6.32	6.00	5.97	5.99	5.97	5.26	5.23	5.00	4.98
KJV vs. DBY	5.49	5.45	5.46	5.44	5.21	5.18	5.19	5.18	4.72	4.70	4.70	4.69
KJV vs. WEB	5.57	5.52	5.55	5.55	5.31	5.27	5.29	5.28	4.81	4.78	4.79	4.78
KJV vs. WBS	4.63	4.61	4.63	4.62	4.55	4.53	4.54	4.54	4.41	4.41	4.41	4.41
KJV vs. YLT	6.39	6.33	6.39	6.39	6.16	6.09	6.15	6.14	5.41	5.33	5.28	5.26
WEB vs. ASV	5.03	5.00	5.02	5.02	4.86	4.84	4.86	4.86	4.60	4.59	4.59	4.59
WEB vs. BBE	6.17	6.16	6.17	6.18	6.01	6.00	6.00	6.01	5.30	5.27	5.26	5.22
WEB vs. DBY	5.69	5.65	5.67	5.65	5.42	5.39	5.40	5.38	4.85	4.82	4.82	4.80
WEB vs. KJV	5.57	5.52	5.55	5.55	5.31	5.27	5.29	5.28	4.81	4.78	4.79	4.78
WEB vs. WBS	5.52	5.48	5.51	5.50	5.26	5.22	5.24	5.23	4.75	4.72	4.73	4.72
WEB vs. YLT	6.38	6.30	6.34	6.33	6.23	6.16	6.17	6.15	5.51	5.44	5.36	5.33
WBS vs. ASV	5.10	5.07	5.08	5.08	4.89	4.87	4.88	4.87	4.58	4.56	4.56	4.56
WBS vs. BBE	5.75	5.74	5.75	5.74	5.55	5.54	5.55	5.54	4.94	4.93	4.83	4.82
WBS vs. DBY	5.49	5.45	5.46	5.44	5.21	5.17	5.18	5.17	4.63	4.61	4.61	4.60
WBS vs. KJV	4.63	4.61	4.63	4.62	4.55	4.53	4.54	4.54	4.41	4.41	4.41	4.41
WBS vs. WEB	5.52	5.48	5.51	5.50	5.26	5.22	5.24	5.23	4.75	4.72	4.73	4.72
WBS vs. YLT	6.25	6.22	6.24	6.34	6.06	6.02	6.04	6.08	5.35	5.29	5.23	5.21
YLT vs. ASV	6.34	6.26	6.30	6.29	6.08	6.01	6.05	6.03	5.00	4.95	4.92	4.91
YLT vs. BBE	6.86	6.77	6.84	6.85	6.68	6.62	6.66	6.66	5.99	5.94	5.92	5.92
YLT vs. DBY	6.38	6.31	6.33	6.32	6.15	6.08	6.09	6.07	5.26	5.19	5.13	5.10
YLT vs. KJV	6.39	6.33	6.39	6.39	6.16	6.09	6.15	6.14	5.41	5.33	5.28	5.26
YLT vs. WEB	6.38	6.30	6.34	6.33	6.23	6.16	6.17	6.15	5.51	5.44	5.36	5.33
YLT vs. WBS	6.25	6.22	6.24	6.34	6.06	6.02	6.04	6.08	5.35	5.29	5.23	5.21

TEXT REUSE IN ENGLISH BIBLE VERSIONS: F-MEASURE VS. NOISY CHANNEL EVAL. I





F-Measure: WBS, ASV, DBY, WEB, YLT, BBE

NCE: WBS, ASV, DBY, WEB, BBE, YLT

INTERDISCIPLINARY CONCEPT OF ETRAP

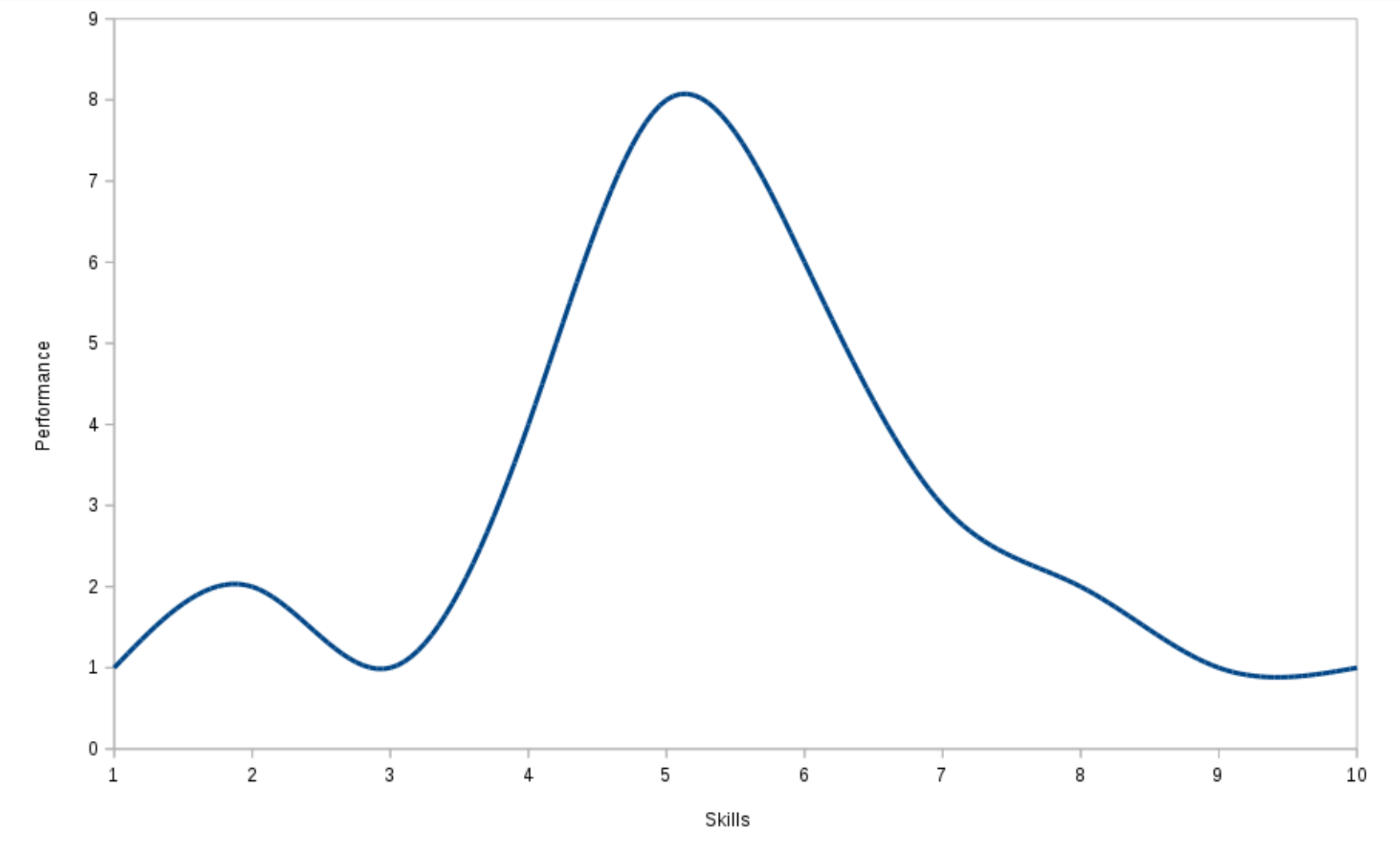
PROFESSIONAL TEAM COACHING OF ETRAP

Professional team coaching for effective group dynamic:

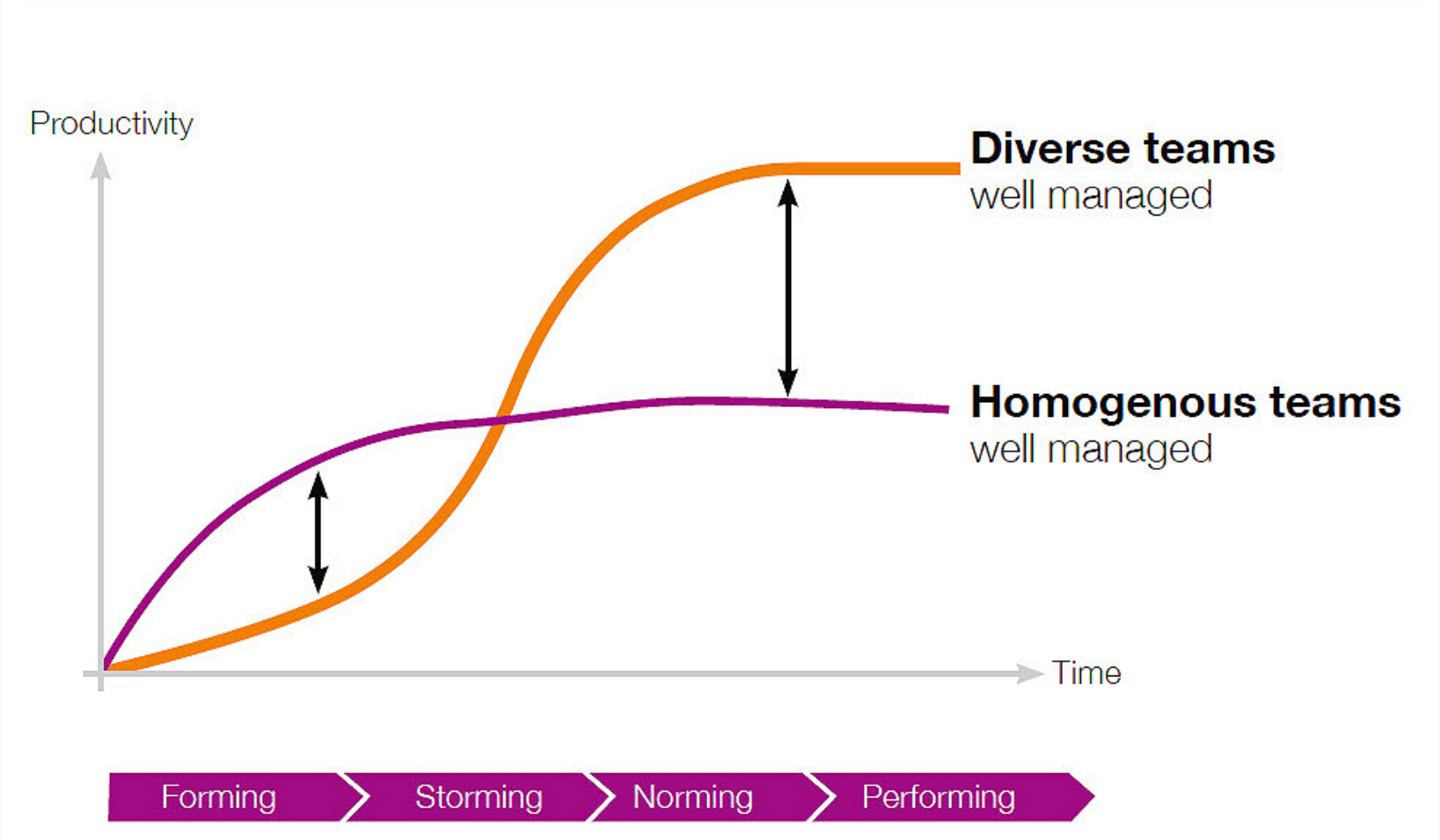
- Effective communication;
- Making the most of strengths;
- Effective delegation.

coach evolve lead
inspeyer

STRENGTHEN YOUR STRENGTHS OR YOUR WEAKNESSES?

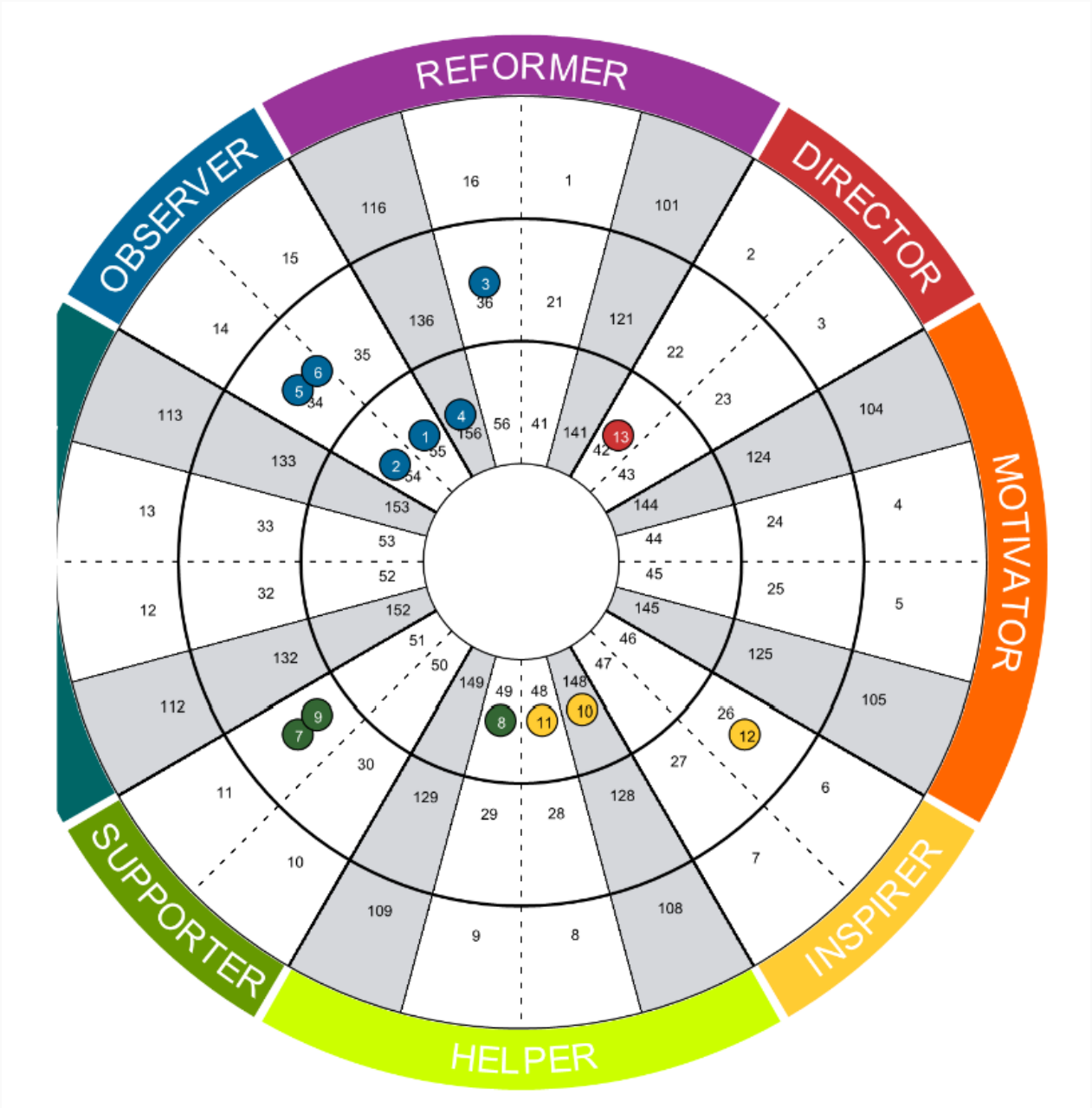


BUILDING A HIGH PERFORMANCE TEAM



TEAM TRAINING WITH PERSONALITY PROFILES

BUILDING A HIGH PERFORMANCE TEAM BY DIVERSITY OF SKILLS



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