

**CONSORTIUM SATELLITE MEETING
2024**



University School for
Advanced Studies IUSS in Pavia

April 8, 2024



**Clinical services for
psychosis: is there room
for pragmatic language
assessment and
rehabilitation?**

Marta Bosia
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bosia.marta@hsr.it

Roadmap

Neurophysiological
Signature

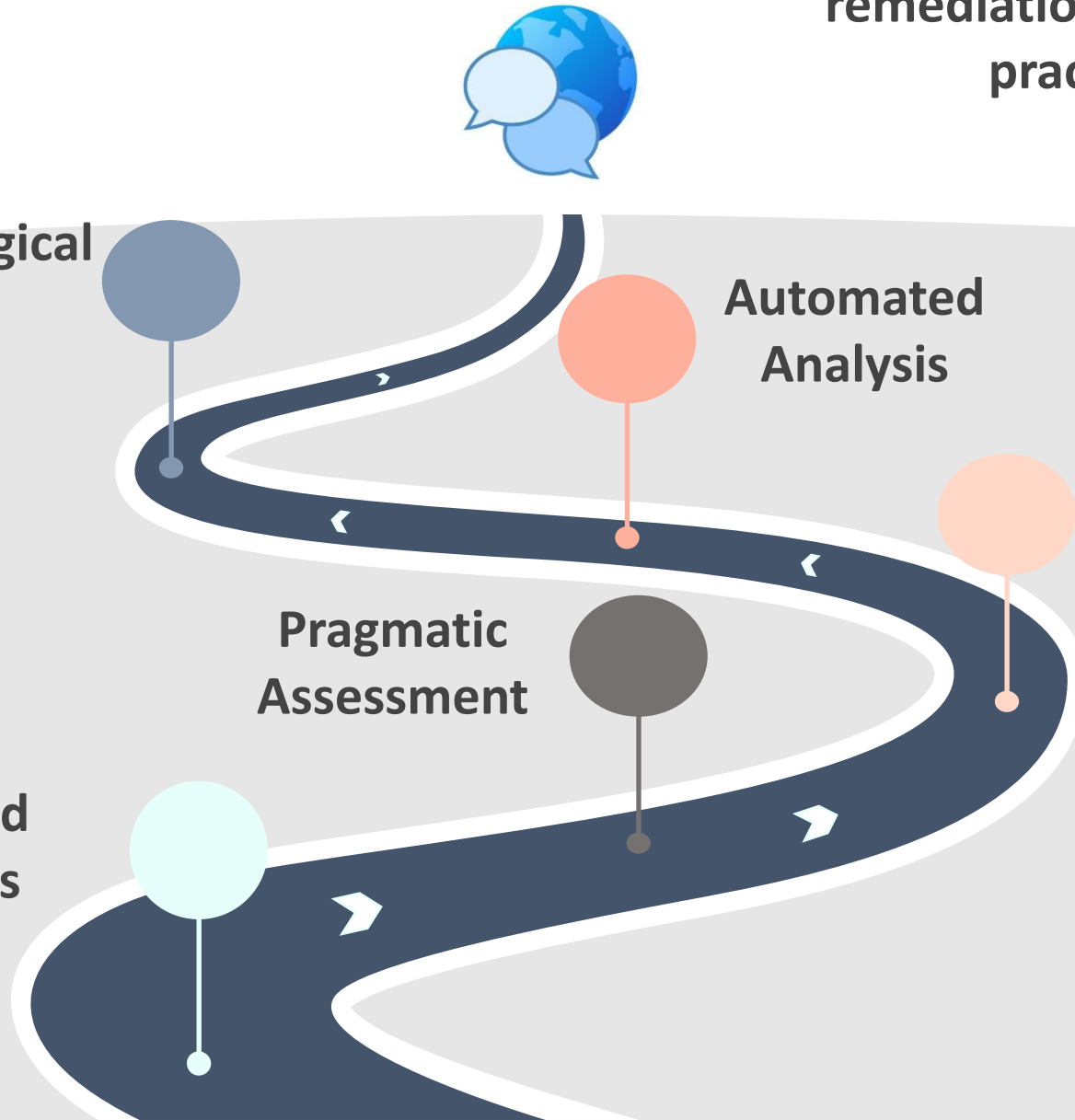
Language assessment and
remediation in clinical
practice

Automated
Analysis

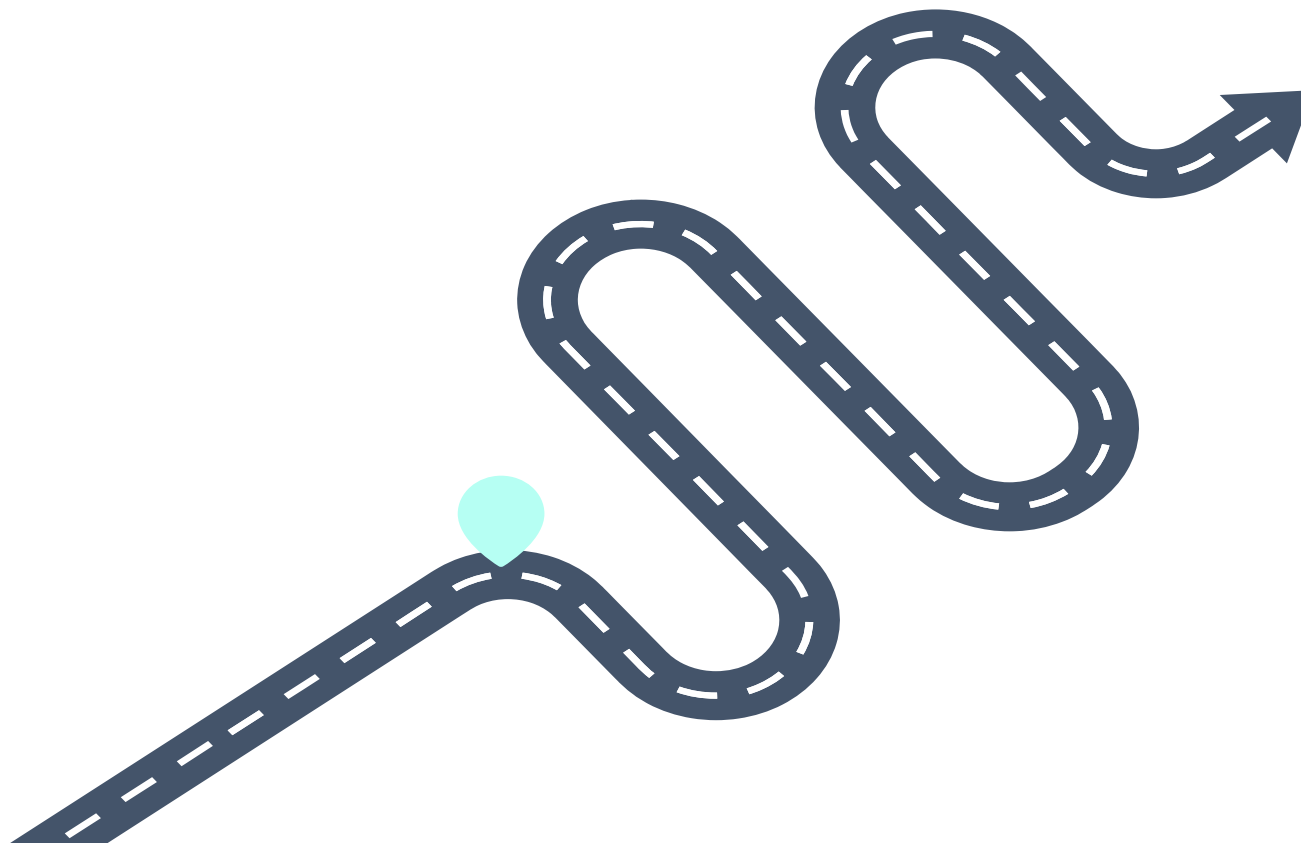
Pragmatic
Remediation

Pragmatic
Assessment

Syntax and
Semantics



Syntax and Semantics



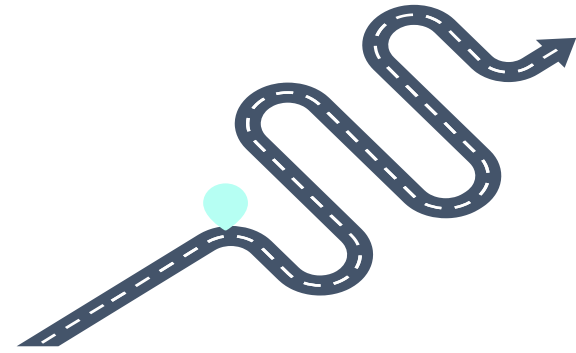
SYNTAX AND SEMANTICS

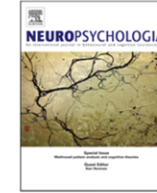


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IUSS
Scuola Universitaria Superiore Pavia



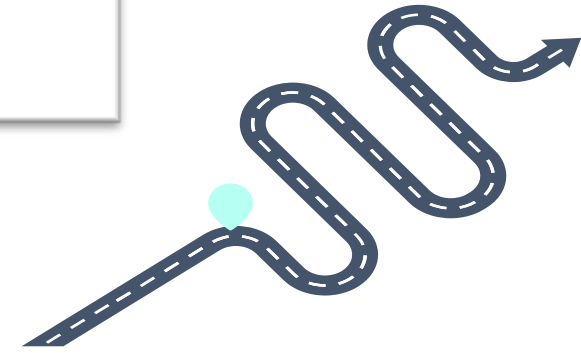
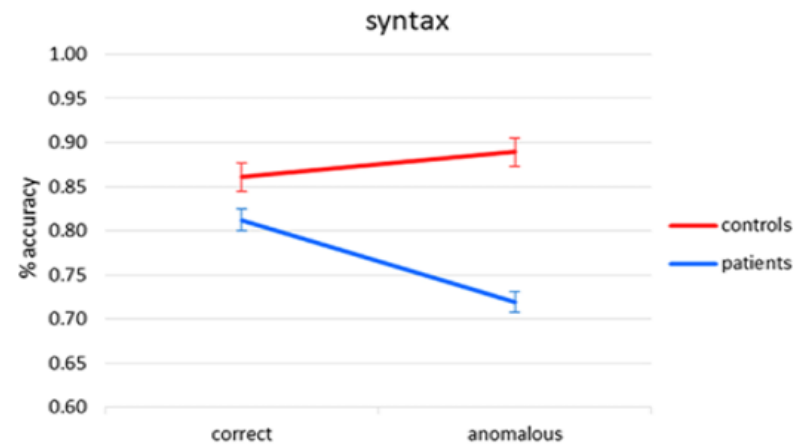
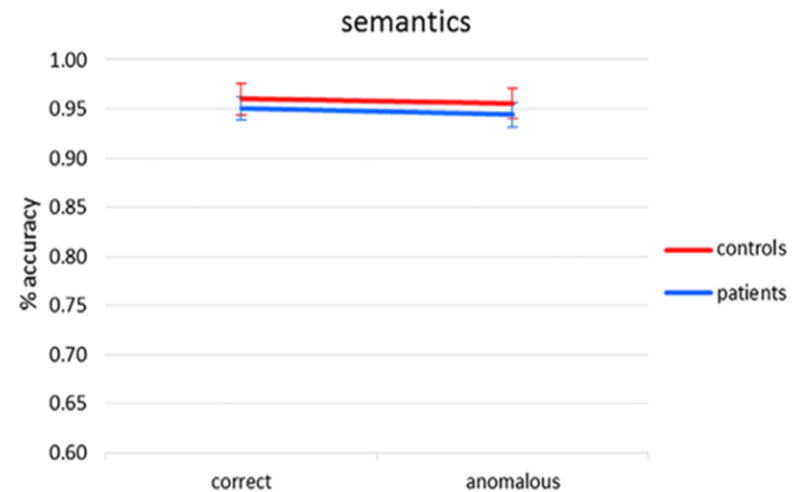


Detecting syntactic and semantic anomalies in schizophrenia

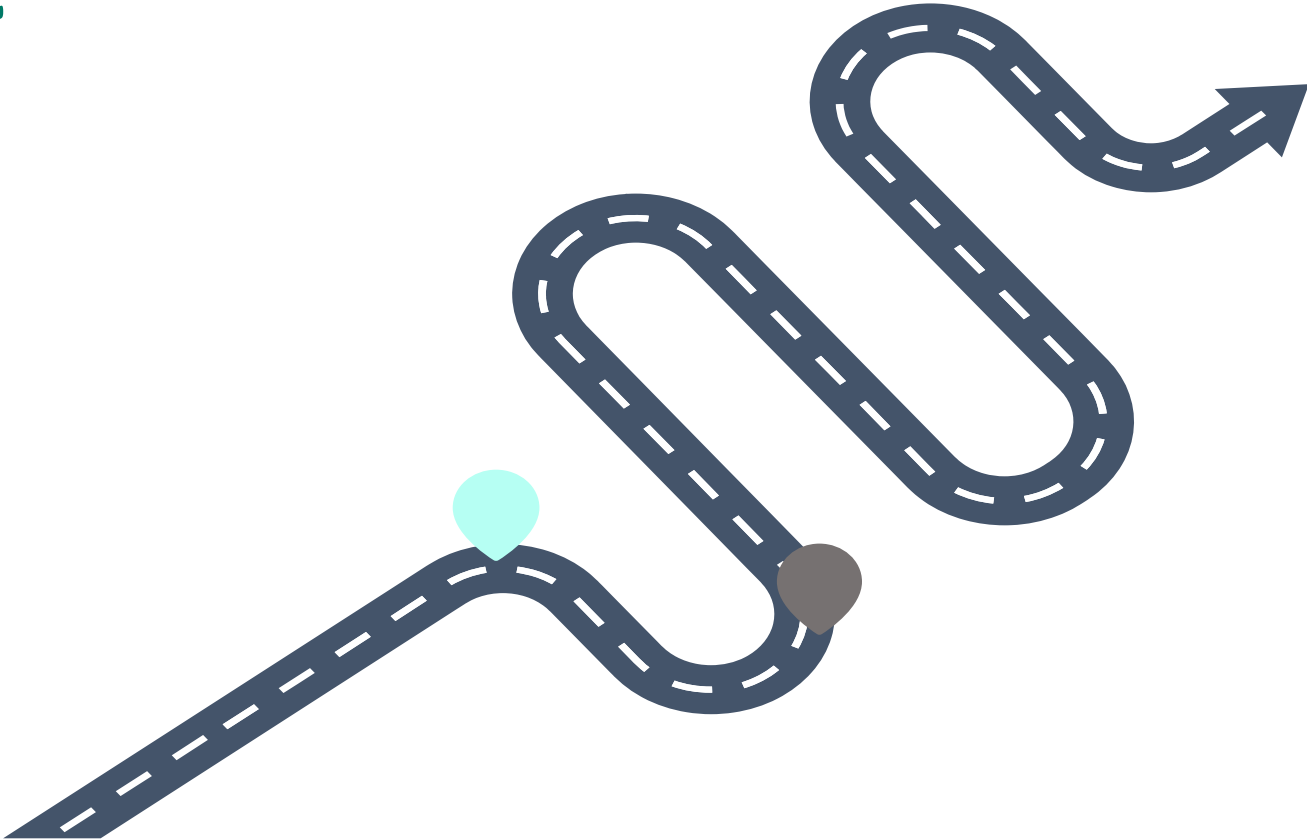


Andrea Moro^a, Valentina Bambini^{a,*}, Marta Bosia^{b,c}, Simona Anselmetti^c,
Roberta Riccaboni^c, Stefano F. Cappa^{a,d}, Enrico Smeraldi^{b,c}, Roberto Cavallaro^c

^a Center for Neurocognition, Epistemology and theoretical Syntax (NETS), Institute for Advanced Study (IUSS), Pavia, Italy



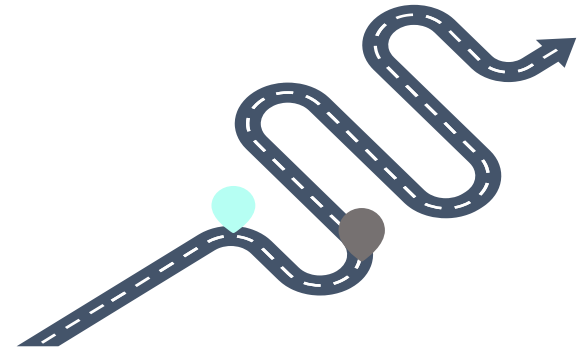
Pragmatic Assessment



Pragmatics is the most sophisticated aspect of human communicative abilities, it allows to:

- Understand utterances beyond the literal meaning
- Fill in the gap between what is said and what is meant
- Understand the speaker's intentions
- In the broader perspective, **communicate and understand each other**

Cummings et al., 2017





Available online at www.sciencedirect.com

ScienceDirect

Comprehensive Psychiatry 71 (2016) 106–120

COMPREHENSIVE PSYCHIATRY

www.elsevier.com/locate/comppsy

The communicative impairment as a core feature of schizophrenia: Frequency of pragmatic deficit, cognitive substrates, and relation with quality of life

Valentina Bambini^{a,*}, Giorgio Arcara^b, Margherita Bechi^c, Mariachiara
Roberto Cavallaro^{c,1}, Marta Bosia^{c,d,1}

^aCenter for Neurocognition, Epistemology and theoretical Syntax, Scuola Universitaria Superiore IUSS Pavia, Piazza
^bIRCCS Fondazione Ospedale San Camillo, Via Alberoni 70, Lido di Venezia (Venezia),
^cDepartment of Clinical Neurosciences, IRCCS San Raffaele Scientific Institute, Via Stamira d'Ancona 2
^dVita Salute San Raffaele University, Via Olgettina, 58, 20132, Milano, Italy

96% of patients fall below cutoff
in at least one pragmatic task, and
77% in the global pragmatic
measure.

Direct impact on Quality of Life

Case	Interview	Description	Narratives	Figurative Language 1	Humor	Figurative Language 2	Pragmatic Production	Pragmatic Comprehension	APACS Total
01	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
02	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
03	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
04	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
05	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
06	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
07	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
08	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
09	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
10	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
11	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
12	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
13	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
14	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
15	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
16	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
17	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
18	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
19	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
20	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
21	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
22	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
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24	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
25	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
26	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
27	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
28	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
29	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
30	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
31	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
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33	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
34	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
35	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
36	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
37	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
38	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
39	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
40	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
42	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
43	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
44	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
45	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
46	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit
47	Deficit	No Deficit	Deficit	No Deficit	No Deficit	No Deficit	Deficit	Deficit	Deficit

	Interview	Description	Narratives	Figurative Language 1	Humor	Figurative Language 2	Pragmatic Production	Pragmatic Comprehension	APACS Total
Deficit	0.62	0.13	0.62	0.19	0.43	0.64	0.77	0.6	0.77
No Deficit	0.38	0.87	0.38	0.81	0.57	0.36	0.23	0.4	0.23



Communication in schizophrenia, between pragmatics, cognition and social cognition

Marta Bosia,^{1,2} Giorgio Arcara,³ Mariachiara Buonocore,¹ Margherita Bechi,¹ Andrea Moro,² Roberto Cavallaro¹ & Valentina Bambini²

Pragmatic abilities across symptoms dimensions in schizophrenia

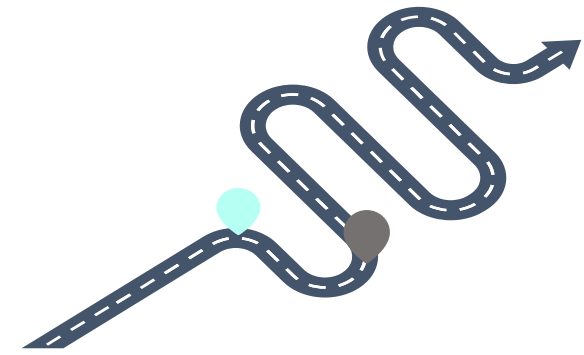
Marta Bosia, Giorgio Arcara, Andrea Moro, Roberto Cavallaro, Valentina Bambini

Studi italiani di linguistica teorica e applicata XLIV, 3 (2015), pp. 473-485

Diffuse correlations with neurocognitive domains

Strong correlation, but not overlap, with Theory of Mind

No global correlation with symptoms domains

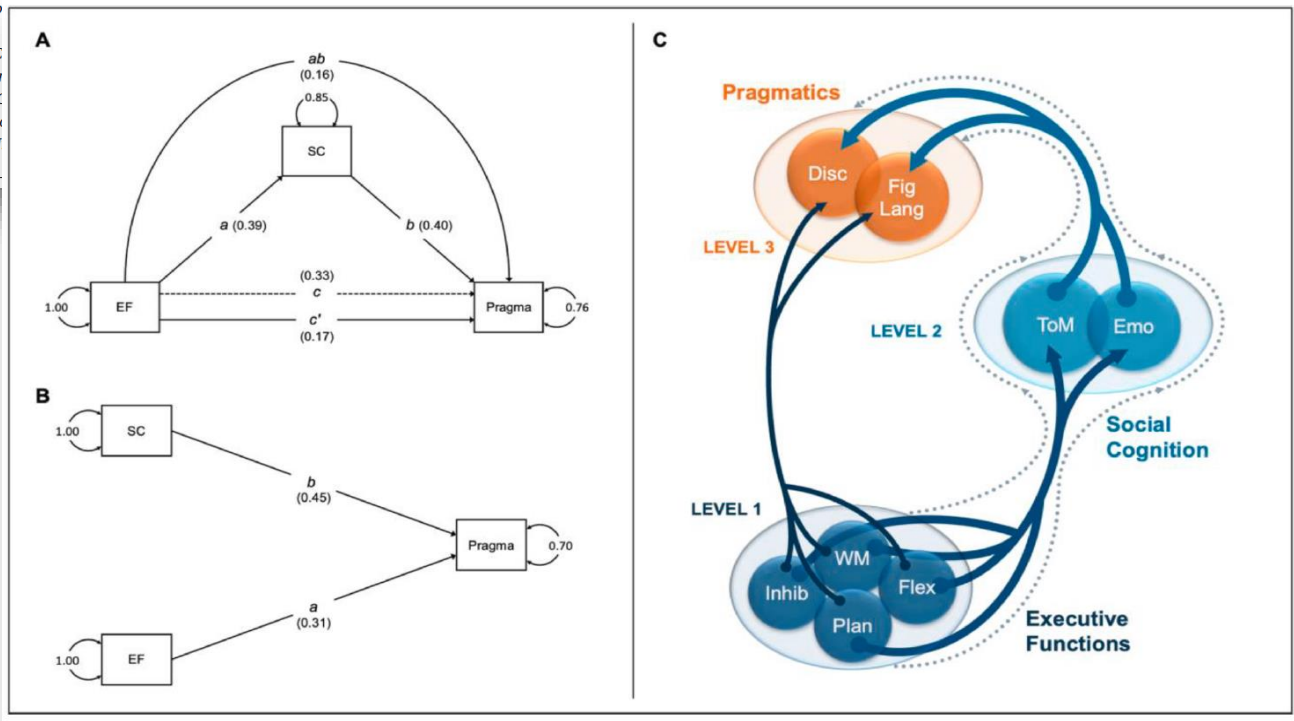




Weighing the role of social cognition and executive functioning in pragmatics in the schizophrenia spectrum: A systematic review and meta-analysis

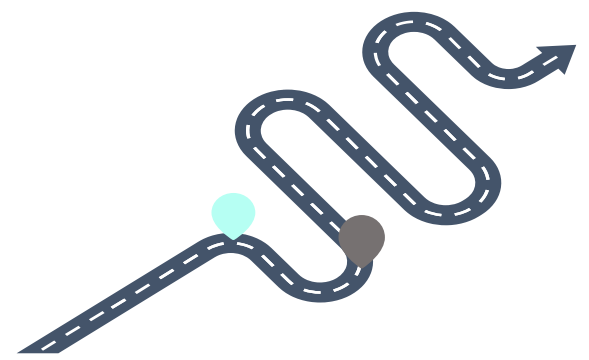
Federico Frau^{a,*}, Chiara Cerami^{b,c}, Alessandra Dodich^d, Marta Bosia^{e,f}, Valentina Bambini^a

^a Laboratory of Neurolinguistics and Exp Italy
^b IUSS Cognitive Neuroscience (ICoN) C
^c Dementia Research Center, IRCCS Mor
^d Center for Mind/Brain Sciences-CIMEC
^e School of Medicine, Vita-Salute San Ra
^f Schizophrenia Research and Clinical U



Social cognition and executive functions both play a role in pragmatics, yet at different levels

Pragmatic impairment in schizophrenia cannot be reduced to deficits in executive functions and social cognition





Communicative-Pragmatic Abilities Mediate the Relationship Between Cognition and Daily Functioning in Schizophrenia

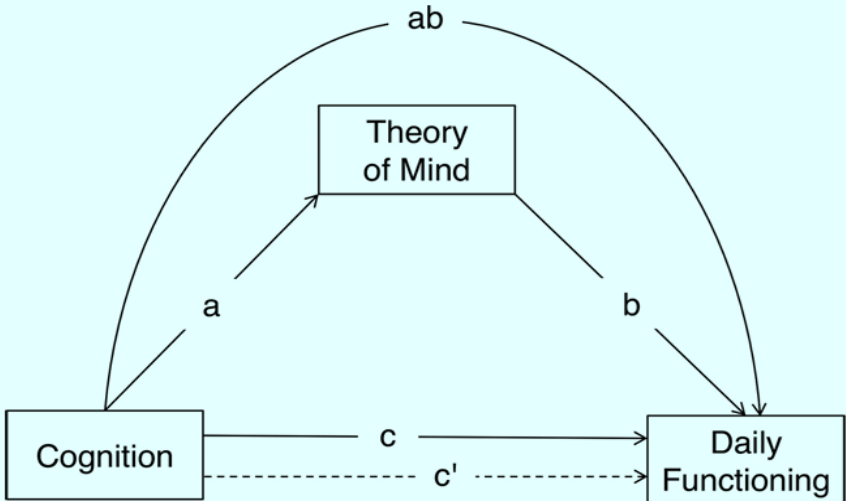
Giulia Agostoni^{1, 2}, Valentina Bambini³, Margherita Bechi², Mariachiara Buonocore², Marco Spangaro^{1, 2}, Federica Repaci¹, Federica Cocchi², Laura Bianchi², Carmelo Guglielmino², Jacopo Sapienza^{4, 2}, Roberto Cavallaro^{4, 2}, and Marta Bosia^{4, 2}

² Department

³ Center for Neurocognition, Epi

Figure 1

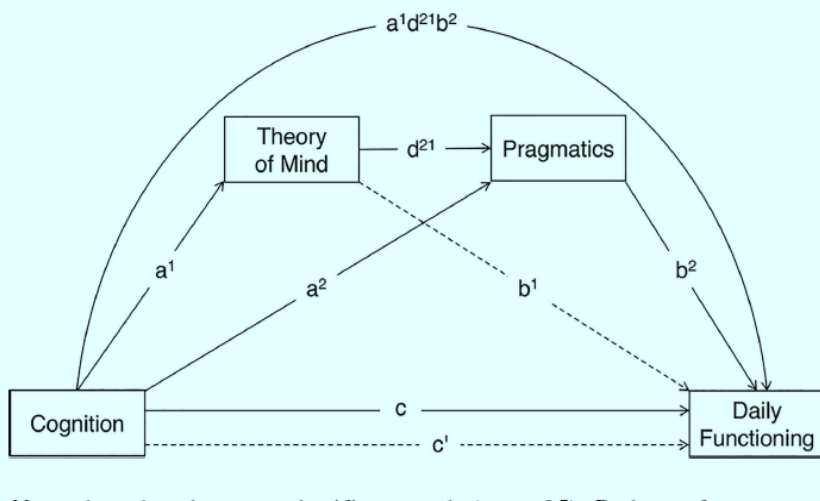
Estimated Mediation Model of the Effect of Cognitive Abilities on Daily Functioning Through Theory of Mind



Note. * = Significant confidence intervals at 95% ($p < .05$). Path c refers to total direct effect; Path c' refers to direct effect after including mediators. Cognition = BACS Cognitive Index; Theory of mind = PST total score; Daily functioning = QLS total score.

Figure 2

Estimated Mediation Model of the Effect of Cognitive Abilities on Daily Functioning Through Theory of Mind and Pragmatics





Note. dotted path = nonsignificant path ($p > .05$). Path c refers to total direct effect; Path c' refers to direct effect after including mediators. Cognition = BACS Cognitive Index; Theory of mind = PST total score; Pragmatics = APACS Total score; Daily functioning = QLS total score. * Significant confidence intervals at 95% ($p < .05$).



Neuropsychologia
Volume 139, 2 March 2020, 107332

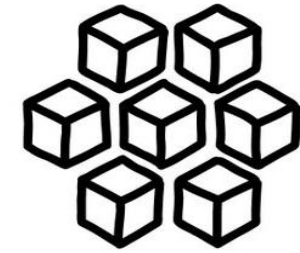


A leopard cannot change its spots: A novel pragmatic account of concretism in schizophrenia

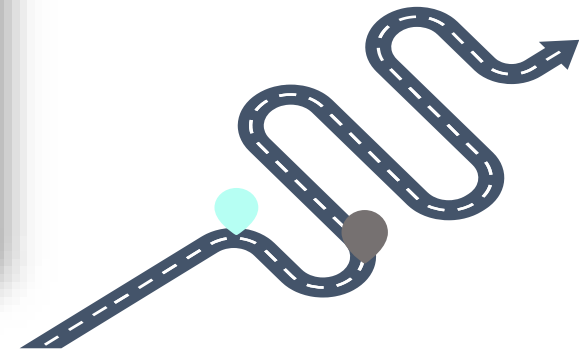
Valentina Bambini ^a  , Giorgio Arcara ^b, Francesca Bosinelli ^c, Mariachiara Buonocore ^c, Margherita Bechi ^c, Roberto Cavallaro ^{d, c}, Marta Bosia ^{d, c}

Highlights

- We assessed concretism in schizophrenia with fine-grained figurative language tasks.
- Although diffuse, concretism was modulated by figurative type and task format.
- Proverbs in the verbal-explanation task were especially challenging.
- Metaphors in the multiple-choice task were associated with quality of life.
- Impairment in figurative language was connected with formal thought disorder and IQ.



Fine-grained

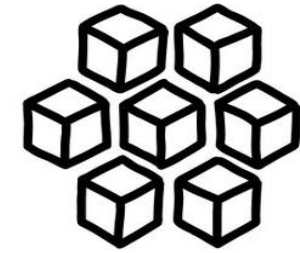
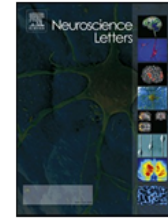




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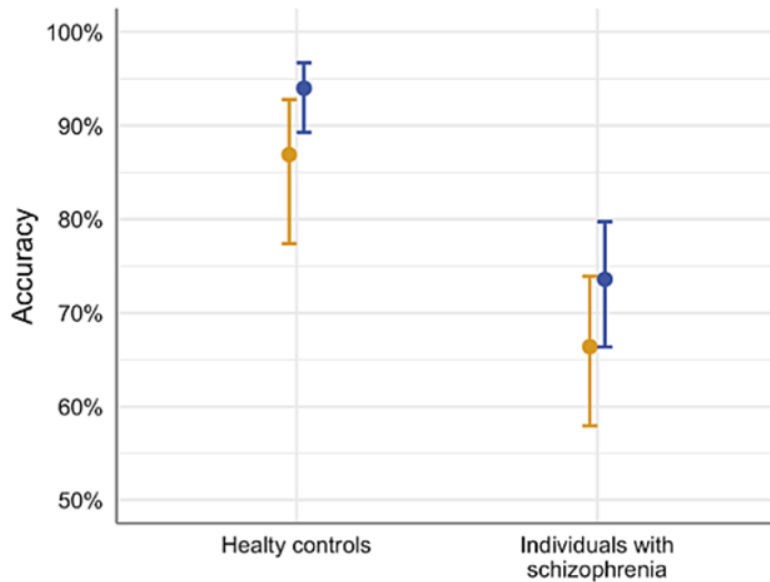
Fine-grained

The cognitive architecture of verbal humor in schizophrenia

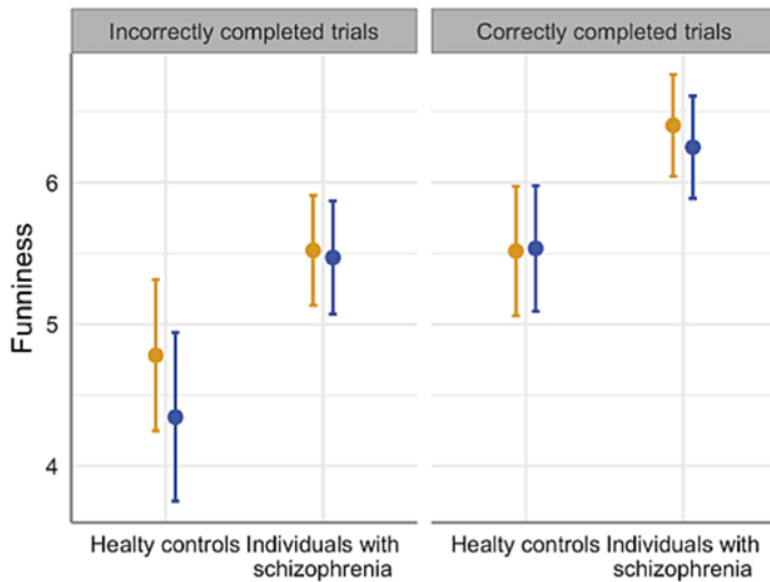
Giulia Agostoni^{a,b}, Luca Bischetti^{c,*}, Federica Repaci^b, Margherita Bechi^b, Marco Spangaro^b, Irene Ceccato^d, Elena Cavallini^e, Luca Fiorentino^e, Francesca Martini^b, Jacopo Sapienza^{b,c}, Mariachiara Buonocore^b, Michele Francesco D’Incalci^a, Federica Cocchi^b, Carmelo Guglielmino^b, Roberto Cavallaro^{a,b}, Marta Bosia^{a,b}, Valentina Bambini^c

^a Vita-Salute San Raffaele I
^b Schizophrenia Research a
^c Neurolinguistics and Expe
^d Department of Psychologi
^e Department of Brain and i

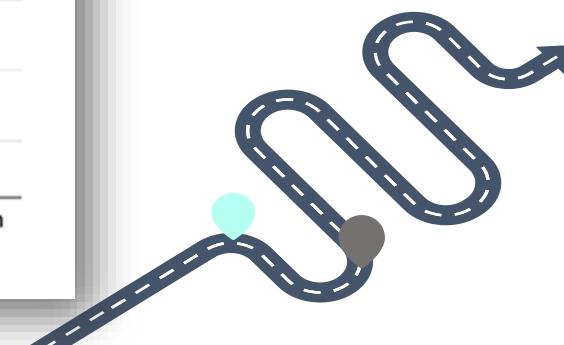
B) Models on accuracy



C) Models on funniness



Group Type Mental jokes Phonological jokes



Promoting
clinical
feasibility



RICERCA
FINALIZZATA 2018

Assessment and treatment of communicative pragmatic abilities in neurological and psychiatric disorders: feasibility and clinical efficacy (PATHS)

Assessment of pragmatic abilities and cognitive substrates (APACS) brief remote: a novel tool for the rapid and tele-evaluation of pragmatic skills in Italian

Original Paper | Published: 23 July 2023

[Luca Bischetti](#), [Chiara Pompei](#), [Biagio Scalingi](#), [Federico Frau](#), [Marta Bosia](#), [Giorgio Arcara](#) & [Valentina](#)

[Bambini](#)

Bischetti et al. 2023. Assessment of pragmatic abilities and cognitive substrates (APACS) brief remote: a novel tool for the rapid and tele-evaluation of pragmatic skills in Italian. Lang Resources & Evaluation.

APACS Brief Remote

4 min.

Interview

- Semi-structured interview on 1 autobiographic topic (i.e., childhood)
- Checklist (4 items) on difficulties in discourse pragmatics

2 min.

Narratives

- 1 short story based on a real news article
- 6 comprehension questions (general topic, specific details, figurative expressions)

1.5 min.

Figurative Language 1

- 3 items (1 metaphor, 1 idiom, 1 proverb)
- Multiple-choice sentence matching task (3 options: figurative, literal, and unrelated interpretations)

1.5 min.

Humor

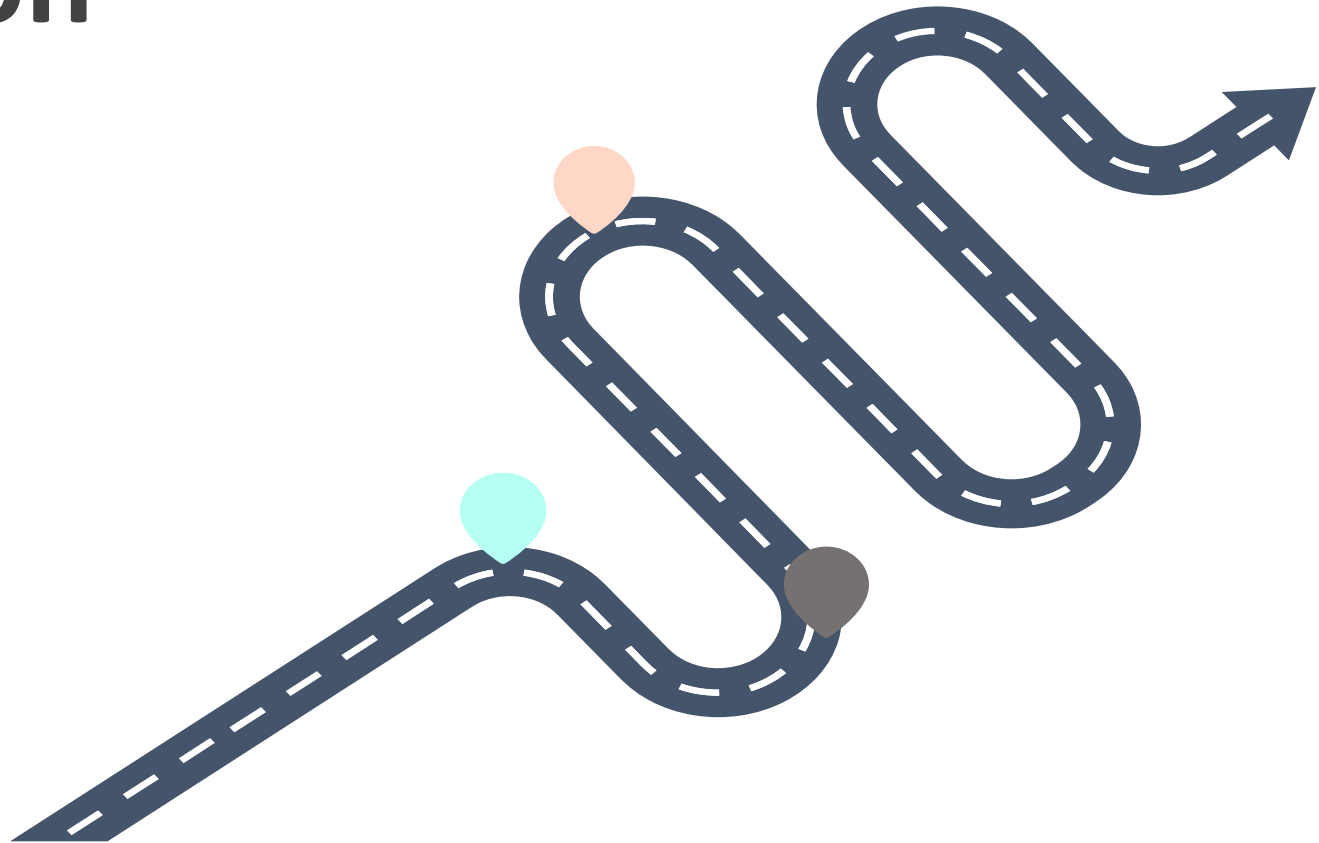
- 2 short stories
- Multiple-choice sentence completion task (3 options: humorous, plausible, and unrelated interpretations)

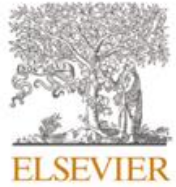
1 min.

Figurative Language 2

- 3 items (1 metaphor, 1 idiom, 1 proverb)
- Verbal explanation task

Pragmatic Remediation





It is time to address language disorders in schizophrenia: A RCT on the efficacy of a novel training targeting the pragmatics of communication (Pragmacom)

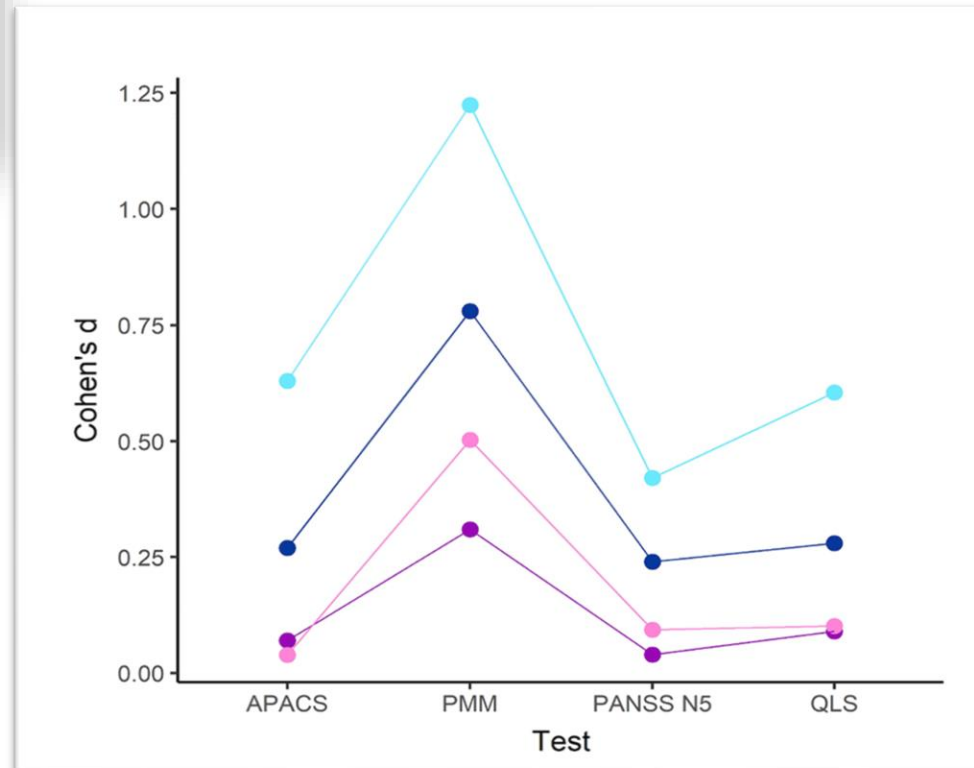
Valentina Bambini ^{a,*}, Giulia Agostoni ^{b,c,1}, Mariachiara Buonocore ^{c,1}, Elisabetta Tonini ^a, Margherita Bechi ^c, Ilaria Ferri ^c, Jacopo Sapienza ^{c,d}, Francesca Martini ^c, Federica Cuoco ^c, Federica Cocchi ^c, Luca Bischetti ^a, Roberto Cavallaro ^{c,d}, Marta Bosia ^{c,d}

Enhancement of general pragmatic competence

Improvement in metaphor comprehension

Reduction of concretism (PANSS)

Positive effect on Quality of Life





The Fragility of Metaphors (FraMe): learning, loosing, and how to train them



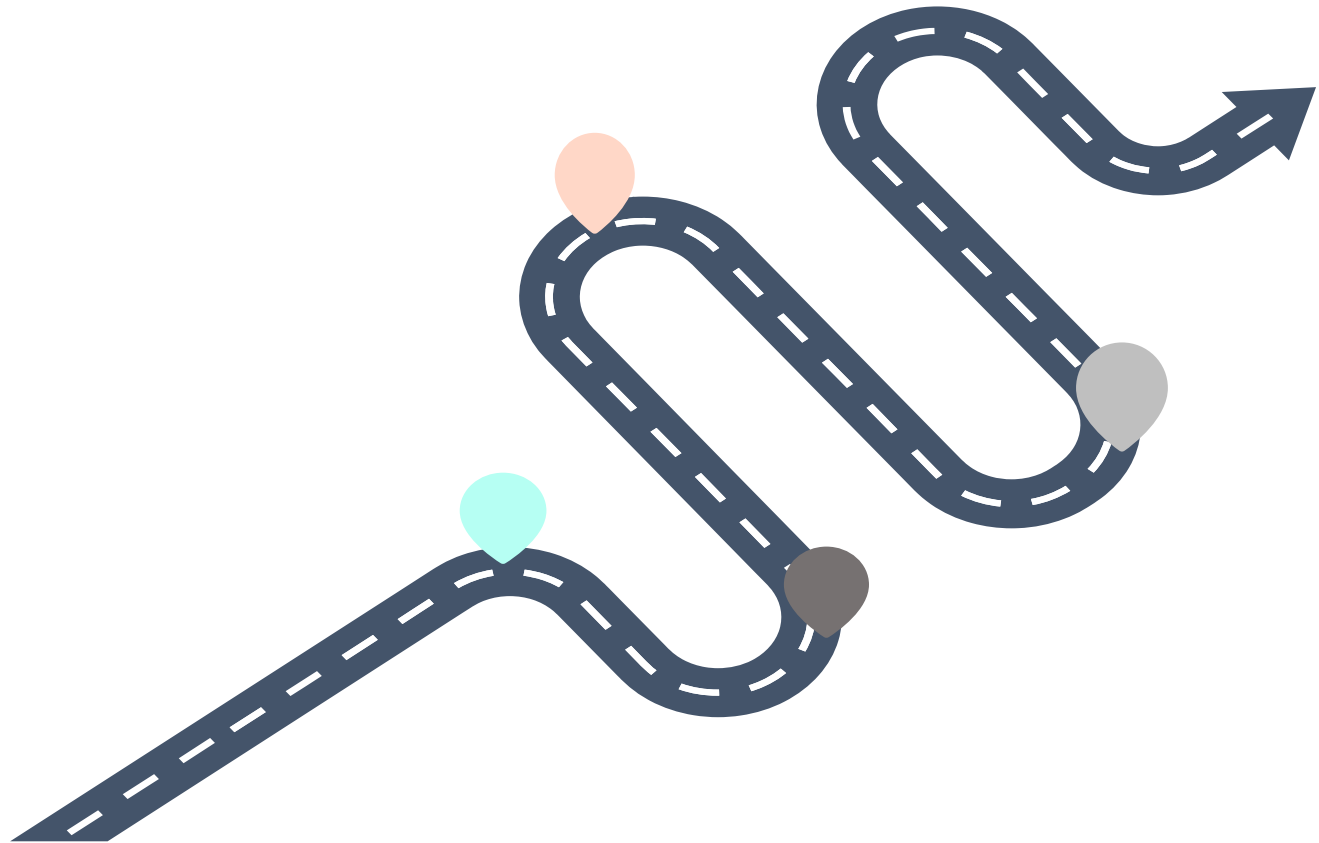
INVOLVE
Including Neuropragmatic Vulnerabilities To Optimize Life And Vocational Engagement
Agostoni G. 2024 submitted to CARIPLO Young Researcher Grant



PRAGMAWORK
A WORK CONTEXT ADJUSTED
PRAGMATIC REMEDIATION PROGRAM
FOR PEOPLE IN JOB SUPPORTING
SERVICES



Automated Analysis



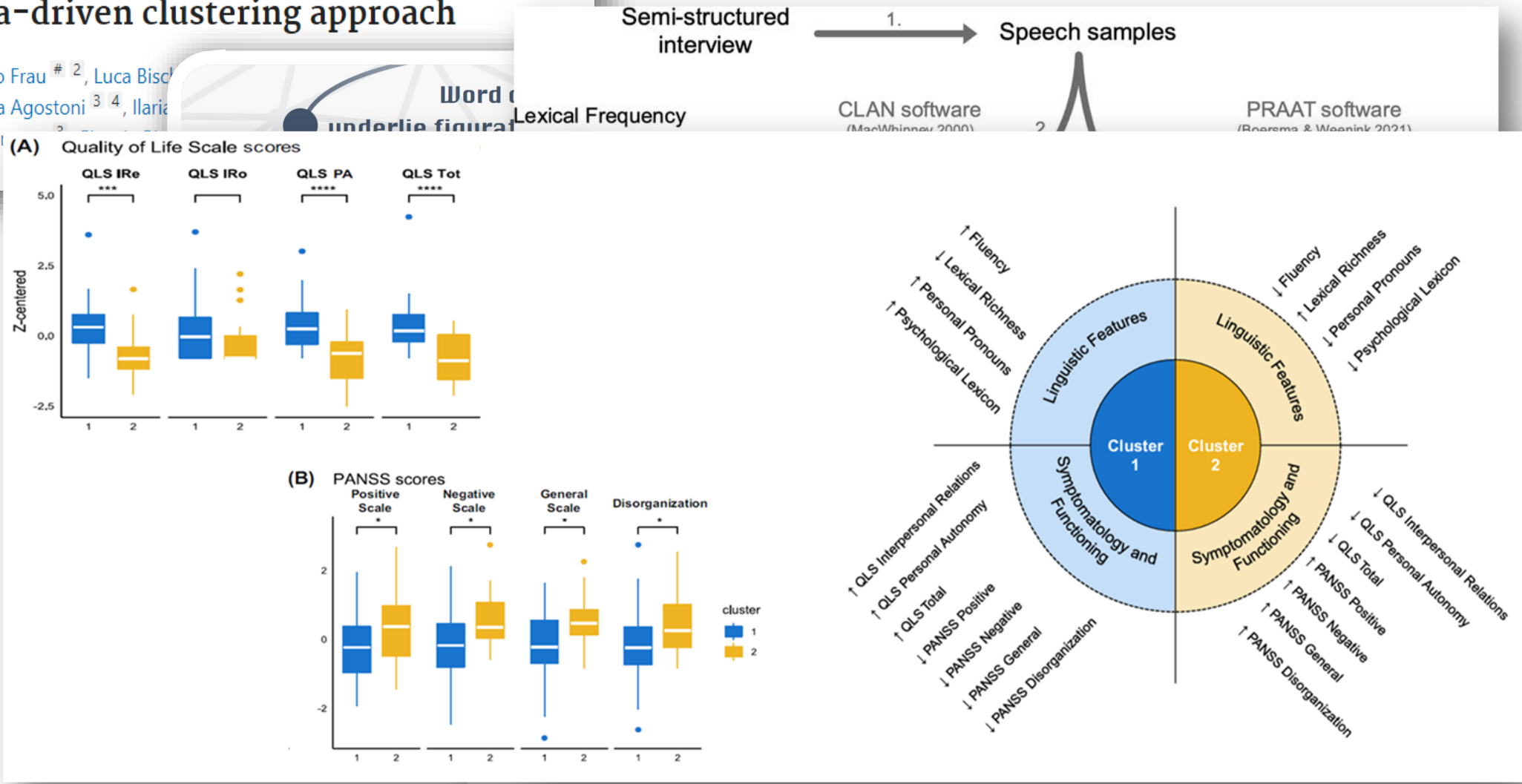
AUTOMATED ANALYSIS

> Schizophrenia (Heidelb). 2022 Nov 29;8(1):102. doi: 10.1038/s41537-022-00306-z.

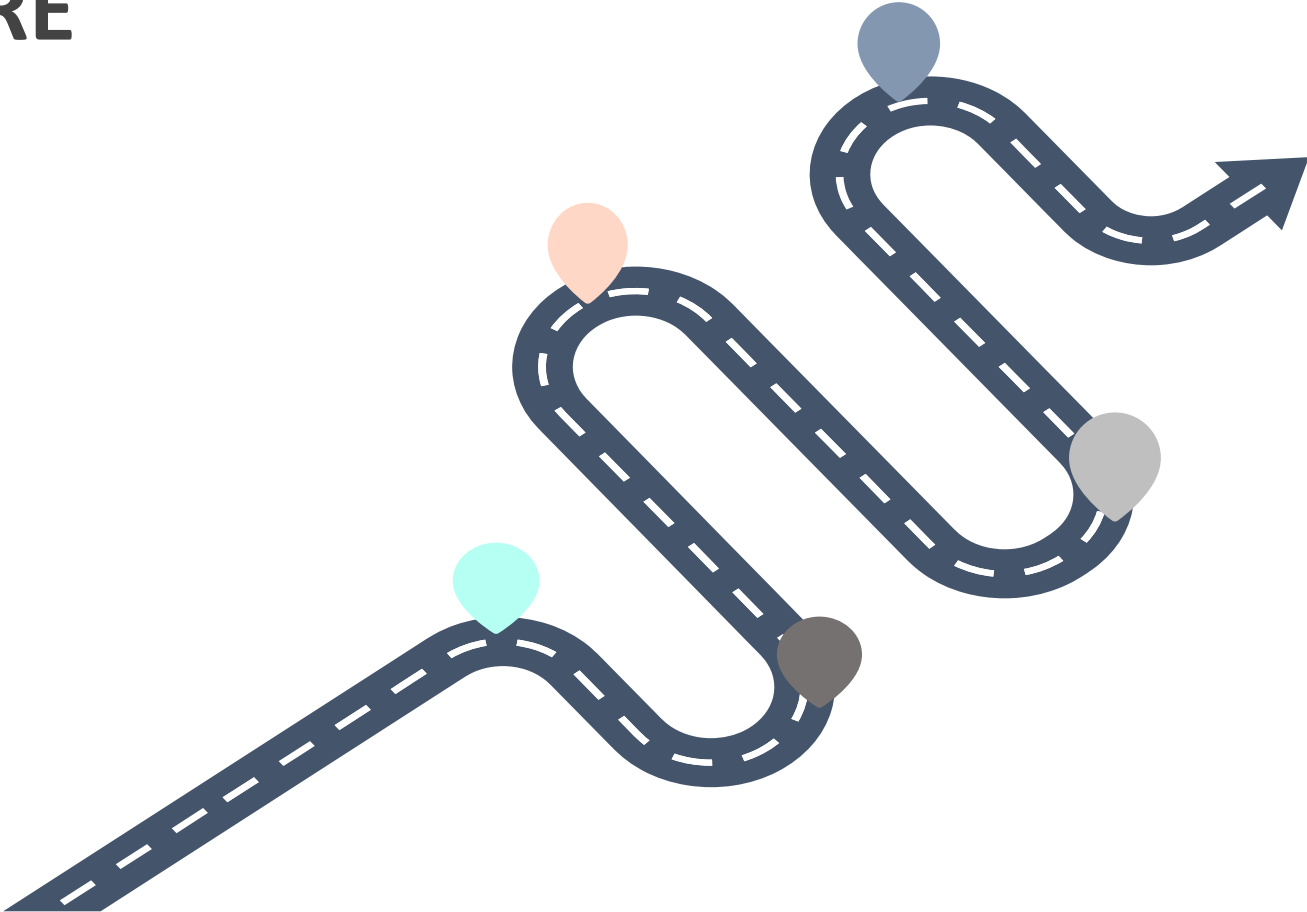
Deconstructing heterogeneity in schizophrenia through language: a semi-automated linguistic analysis and data-driven clustering approach

Valentina Bambini # 1, Federico Frau # 2, Luca Biscardi # 3, Mariachiara Buonocore # 3, Giulia Agostoni # 3, 4, Ilaria Franceschi # 3, Francesca Martini # 3, Marco Sparano # 3, Marta Bosia # 3, 4

From building blocks of language to pragmatics

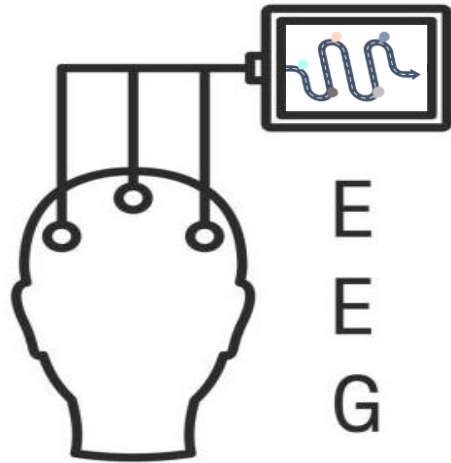


NEUROPHYSIOLOGICAL SIGNATURE





Identify neurophysiological correlates of pragmatic abilities.



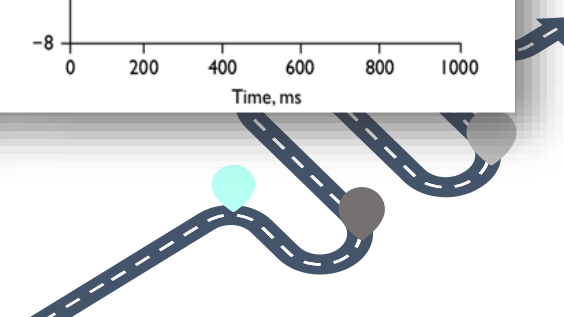
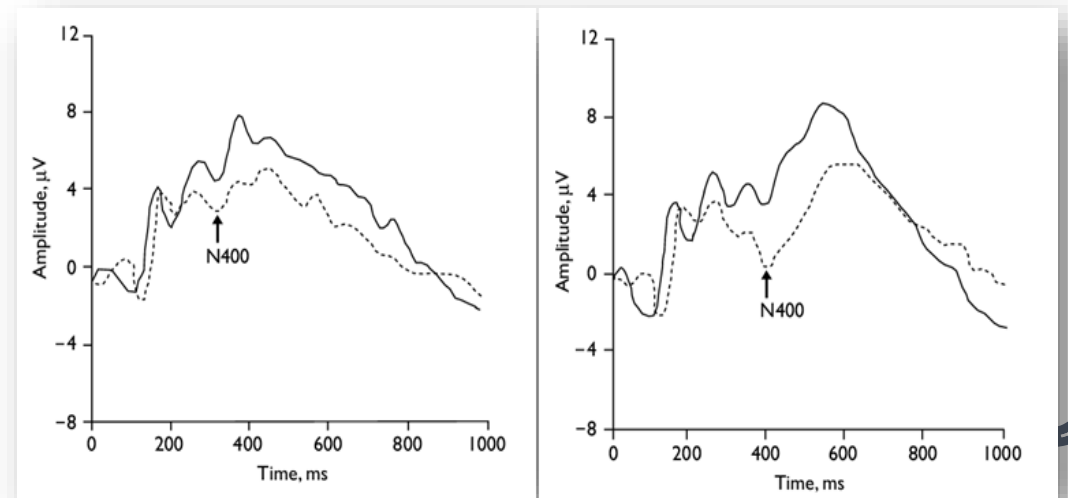
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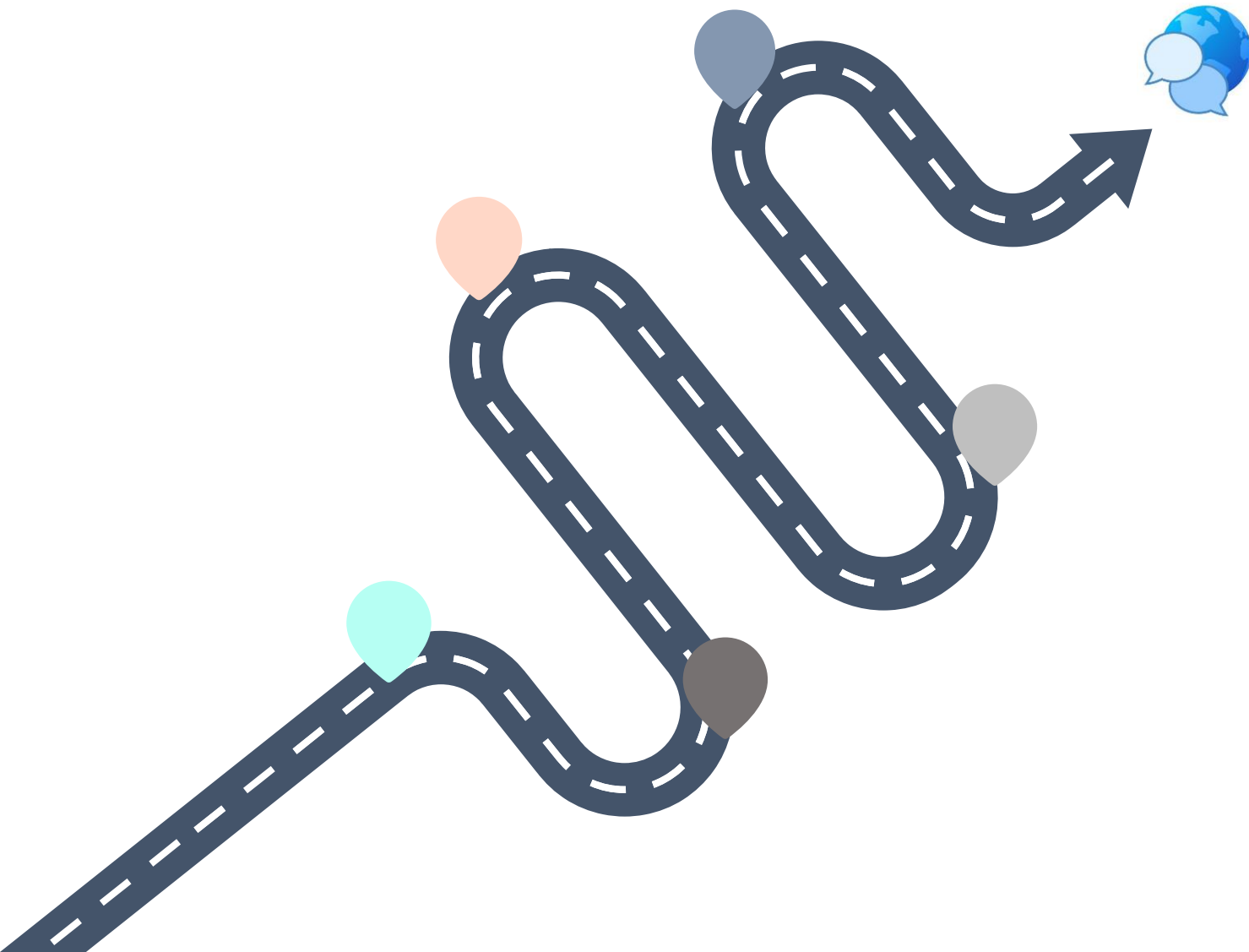
To test if the altered neurophysiological patterns associated to the fragility of metaphor comprehension in schizophrenia can be restored through a rehabilitative training.

 **Electric brain: neurophysiological correlates of pragmatics in schizophrenia** 

G. Agostoni ^{a,b}, S. Zago ^c, M. Bechi ^b, Sapienza ^b, F. Repaci ^b, R. Cavallaro ^{a,b}, V. Bambini ^d, G. Arcara ^c, M. Bosia ^{a,b}

^a Vita-Salute San Raffaele University, Milan, Italy; ^b IRCCS San Raffaele Scientific Institute, Milan, Italy; ^c IRCCS San Camillo, Venice, Italy; ^d IUSS - School of Advanced Studies, Pavia, Italy

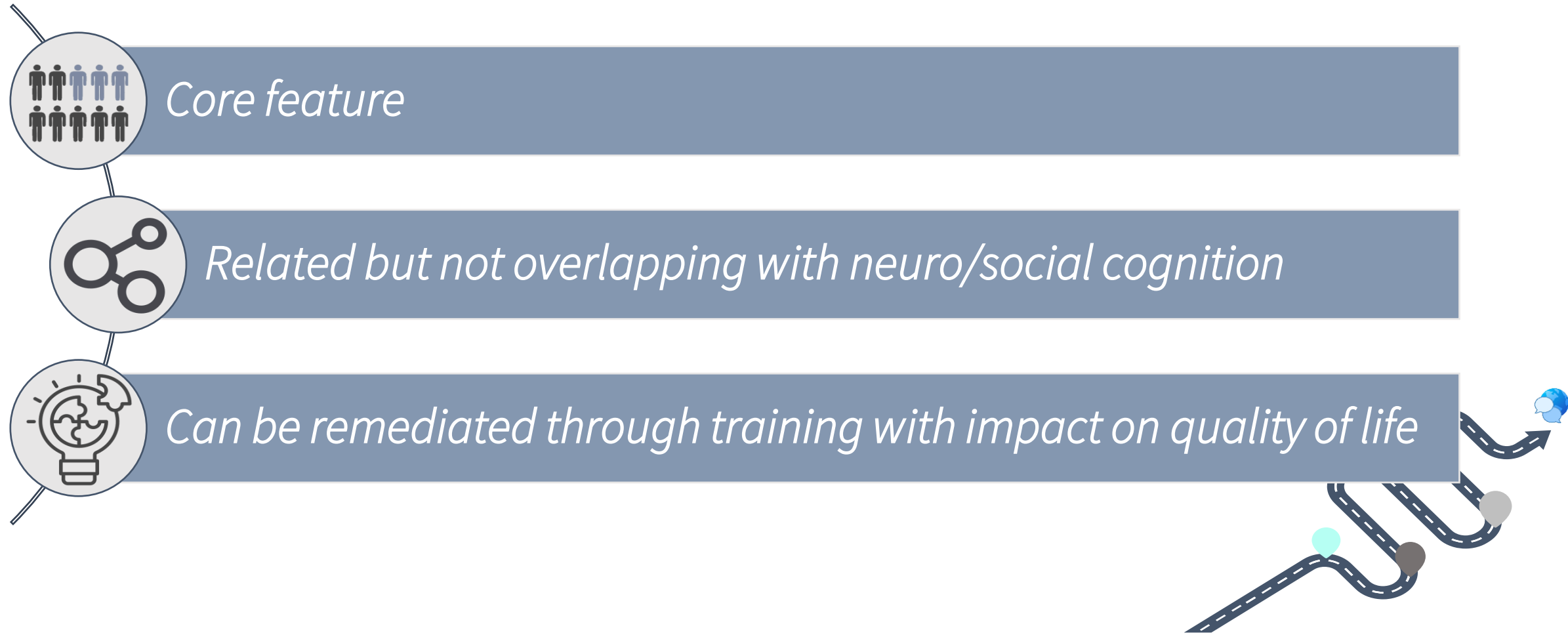




Language assessment and remediation in clinical practice

TAKE HOME MESSAGE

Pragmatic language disorder in schizophrenia:



NEXT CHALLENGES

Finegrained profiles through automated analysis



Optimize individualized remediation

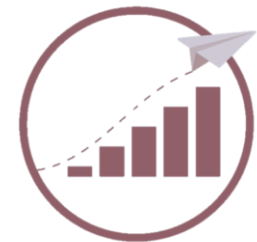
Neurophysiological markers



Potential strategies (i.e. TMS)



Better Functional Outcome



Thanks to



Schizophrenia Research and Clinical Unit

R. Cavallaro

G. Agostoni

C. Ave

G. Bigai

M. Bechi

L. Bianchi

M. Buonocore

F. Cocchi

C. Congedo

M.F. D'Incalci

A. Fortunato

C. Guglielmino

A. Marchesi

F. Martini

D. Nocera

F. Pacchioni

C. Passani

F. Repaci

J. Sapienza

M. Spangaro

All the trainees



and thank you.

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