



2024 CONSORTIUM SATELLITE MEETING, PAVIA

***Language and Communication Disturbances in
Schizophrenia Spectrum Disorders:
The Role of Different Modalities of Cognitive Remediation Interventions***

**Stefano Barlati
Pavia, April 8th, 2024**

***Language and Communication Disturbances In
Schizophrenia Spectrum Disorders:
The Role of Different Modalities of Cognitive Remediation Interventions***

- ***LANGUAGE DISORDERS IN SCHIZOPHRENIA (SCZ)***
- ***COGNITIVE FUNCTIONING IN SCZ***
- ***LANGUAGE DISORDERS IN SCZ: FOCUS ON COGNITIVE FUNCTIONING***
- ***LANGUAGE DISORDERS IN SCZ: FOCUS ON REHABILITATION INTERVENTIONS***
 - ***Cognitive Rehabilitation in SCZ***
 - ***Rehabilitation Interventions for Language Disorders in SCZ***
- ***CONCLUSIONS, FUTURE DIRECTIONS, AND RESEARCH PROPOSALS***

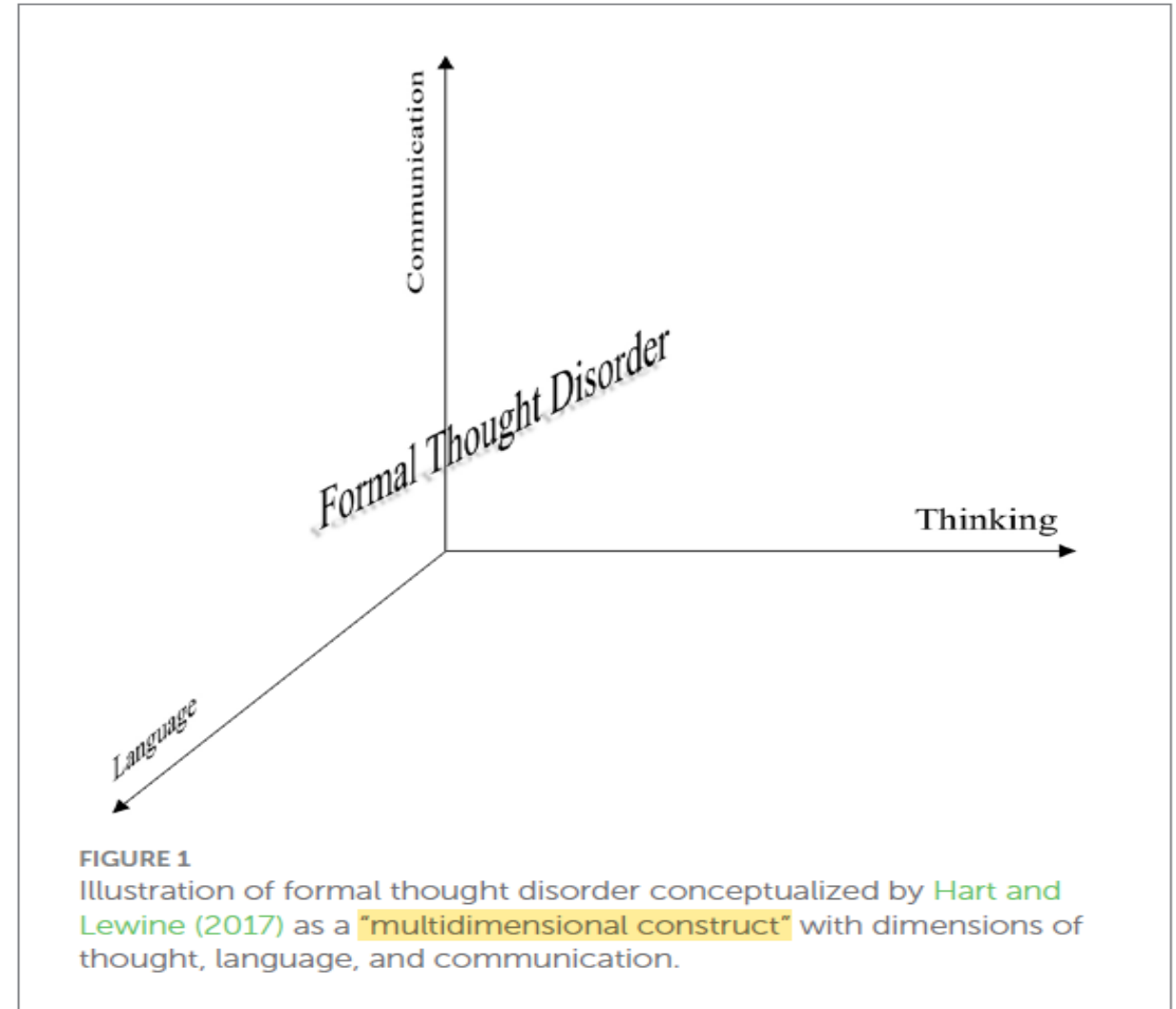
LANGUAGE DISORDERS IN SCZ

What is the evidence for language ability in people with schizophrenia?

- Language disorders (LDs) are **a core feature of SCZ**, with **more than 70%** of individuals showing linguistic and communicative impairments (*Bambini V et al., 2016; Parola A et al., 2018*).
- **LDs affect all levels of linguistic processing**, from the “building blocks” of language, including **speech characteristics (eg. incoherent), grammatical structures, and lexical components**, up to more sophisticated aspects such as **pragmatic** interpretation (*Covington MA et al., 2005*).
- SCZ has been associated with altered pausing and prosody, reduced grammatical processing skills, diminished lexical richness (e.g., lower type-token ratio), and **defective semantic processes** (*Parola A et al, 2020; Spitzer M et al., 1994; Moro A et al., 2015; Barattieri di San Pietro et al., 2022*).
- Impairment in the **ability to manage discourse and conversation**, as well as to **understand non-literal expressions** (*Perlini C et al., 2018; Bambini V., et al. 2020; Mashal N et al., 2013*).
- **LDs show extensive correlations with cognition** (*Bambini V et al., 2016; Parola A et al., 2018*) and have been **linked to both positive** (in particular, formal thought disorder and disorganization) and **negative** (especially poverty of speech) **symptoms** (*Parola A et al, 2020; Manschreck TC et al., 1984; Minzenberg MJ et al., 2002; Lucarini, V et al., 2022*).
- LDs are associated with **reduced daily functioning** (*Bambini V et al., 2016; Bowie CR & Harvey PD, 2008*). LDs have been shown to impact especially **community integration, interpersonal relations**, and social functioning at large (*Agostoni G. et al. 2021; Muralidharan A et al., 2018*).

What is the evidence for language ability in people with schizophrenia?

- **Speech disorders, as part of SCZ, have been described since its nosological differentiation.**
- Disorders in the formation and expression of thoughts represent **primary elements of SCZ**, associating with deficits in social functioning, cognitive deficits, and poor clinical prognosis, with predictive potential independent of neurocognitive factors.



Formal Thought Disorders: The Psychopathological Perspective

- Since the 1970s, clinical and research settings pay attention to the impairment of verbal communication in SCZ.
- **LDs were considered as a part of psychopathologic expression of SCZ.**
- **Positive FTD (Pos-FTD):** accelerated thought process, disturbance in staying on topic, loosening in thought process, idiosyncratic word use, neologisms, and illogical thinking.
- **Negative FTD (Neg-FTD):** poverty of speech, poverty in content of speech, and disruption in the flow of speech.

| Positive psychotic symptoms | Positive disorganization symptoms | Negative symptoms |
|---|--|--|
| <ul style="list-style-type: none"> • Hallucinations • Delusions | <ul style="list-style-type: none"> • Disorganized speech, thought, language • Thought disorder characterization: thought blocking, loosening of associations, tangentiality • Disorganized behavior | <ul style="list-style-type: none"> • Alogia (poverty of speech) • Flat affect • Poor attention • Avolition (loss of motivation) • Anhedonia (lack of pleasure) • Loss of social interest • Attentional deficits |

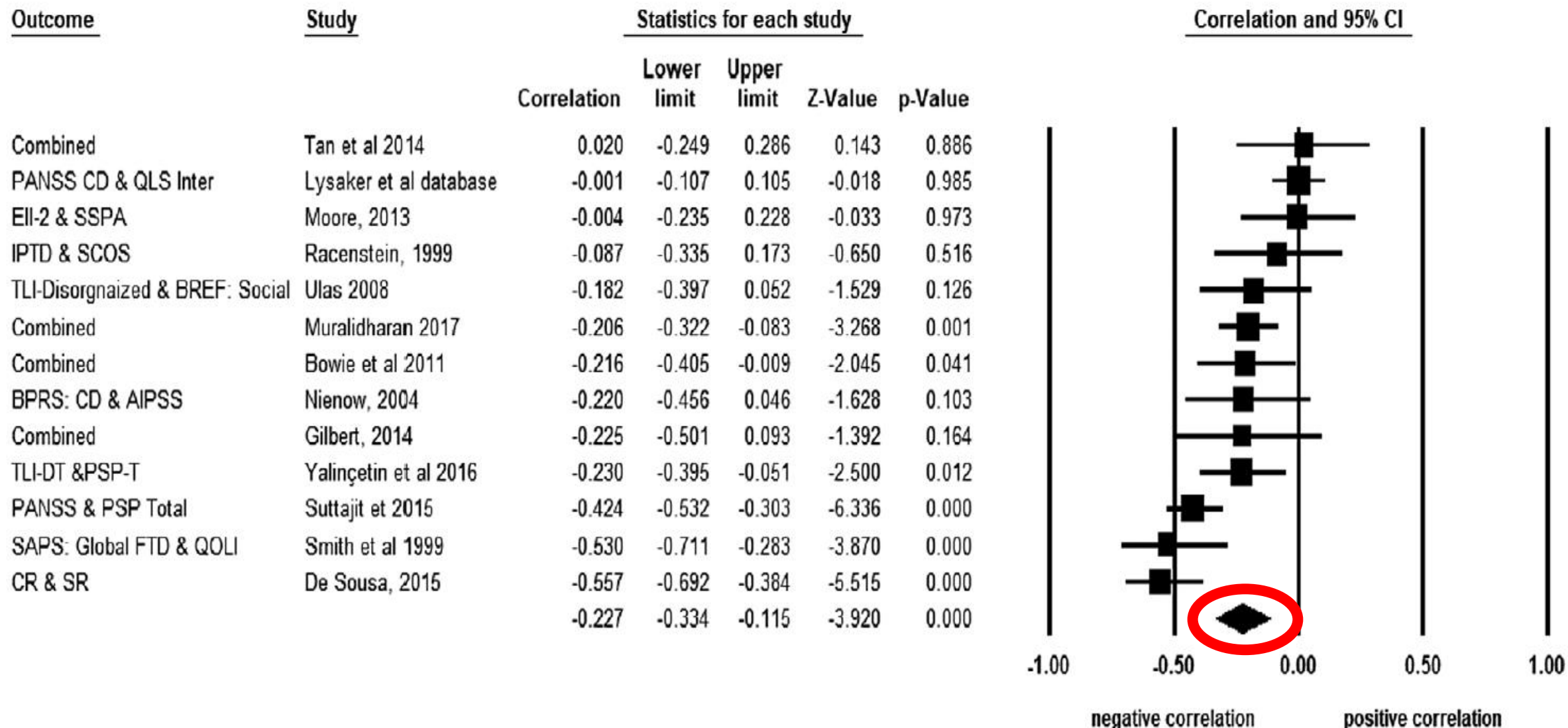
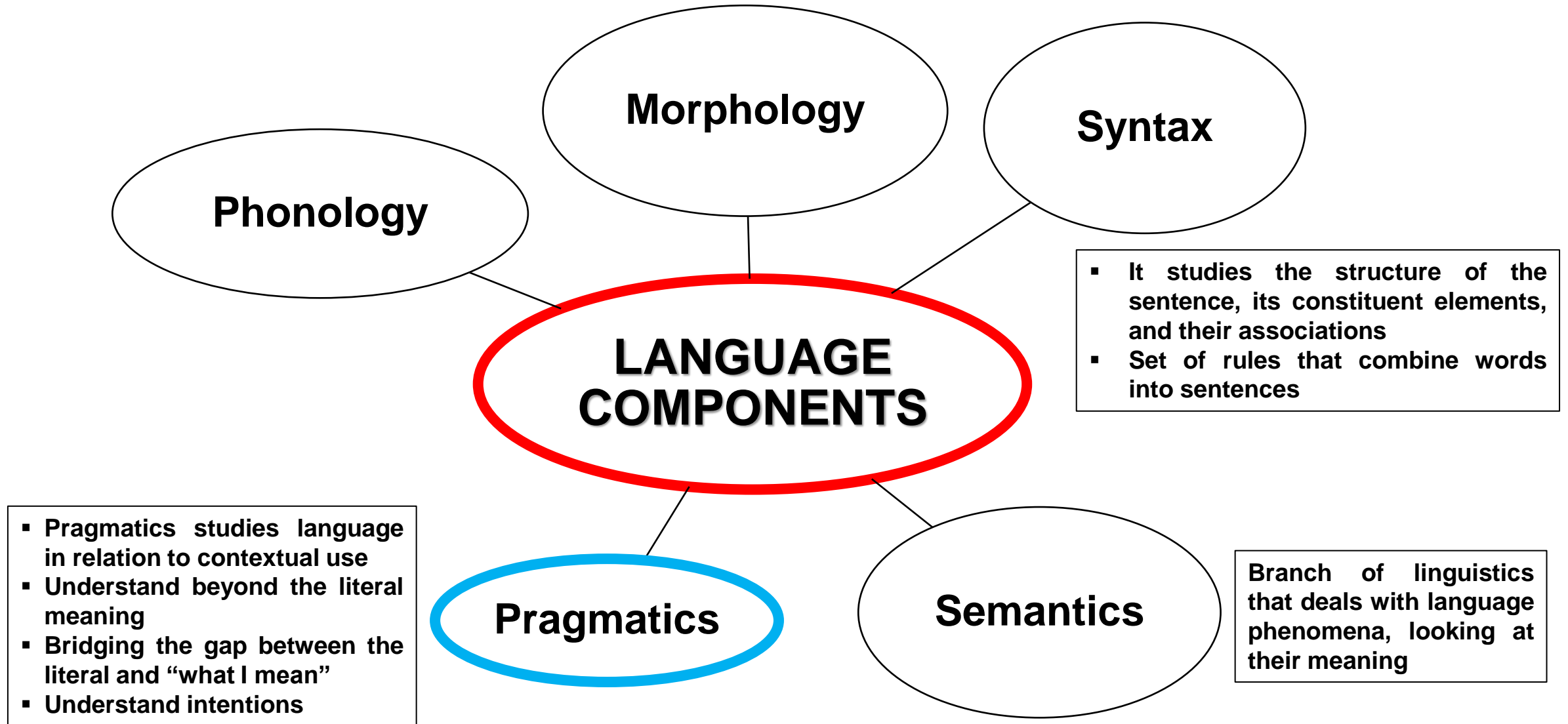


Figure 2. Forest plot of studies included in the meta-analysis examining the relationship between FTD and social functioning ($k=13$).

Language Disorders: The Neurolinguistic perspective



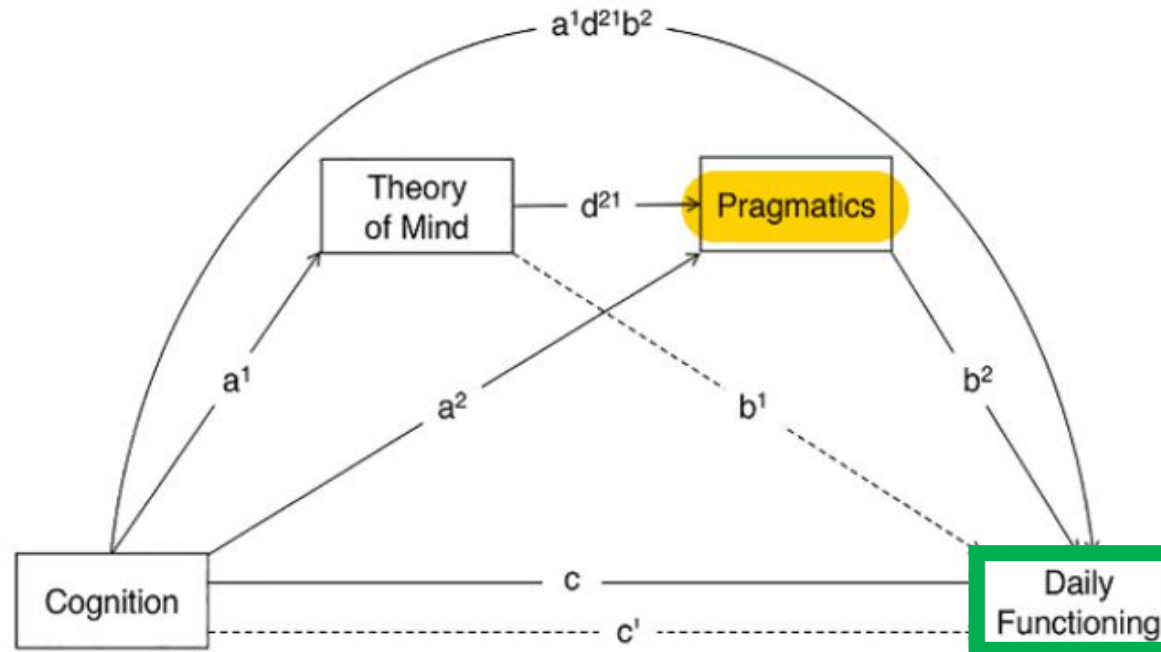
Language Disorders: The Neurolinguistic perspective

- **Pragmatics refers to language use in context.** It involves **verbal, paralinguistic and non verbal** aspects of communication, such as the ability to introduce a topic of conversation, respect turn-taking, detect emotions in someone else voice and adopt appropriate body-posture and facial expression according to the social context. Pragmatic deficits are reflected in **discourse skills and in discourse coherence.**
- Over the last 15 years, the neurolinguistic perspective has systematically described and quantified the **language inconsistencies in SCZ.**
- Pragmatic impairment represents **a core feature of SCZ**, not secondary from other symptoms, **present in all the phases of SCZ (FEP, acute, chronic), and even in UHR subjects**, strongly tied to the disorder's underlying biology.
- Pragmatic difficulties have a profound **impact on global daily life** in SCZ.
- Pragmatic language deficits are **closely related to neurocognition and mentalization**, and have long been considered a subcomponent of the latter. However, the overlap between pragmatic and mentalization deficits is not all-encompassing, and **pragmatic communication deficits presenting themselves among patients with SCZ, even in the absence of other cognitive deficits** (related to mentalization, or executive functions), and **may represent an individual deficient domain.**

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

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% ($p < .05$).

The second mediation model (see Figure 2) yielded a significant effect and explained 31% of variance ($R^2 = .31$, $F(5, 94) = 8.30$, $p < .0001$), confirming the hypothesis that two sequential mediators, ToM and pragmatics respectively, mediate the relationship between cognitive abilities and daily functioning. Table 3 summarizes the estimation of the effects.

As concerns the indirect mediation effects, results showed that the effect of cognitive abilities on daily functioning was mediated by ToM and pragmatics (Indirect effect, Path $a^1d^{21}b^2$). Moreover, the path mediated by pragmatics was statistically significant (Indirect effect, Path a^2b^2), while the path mediated by ToM was not significant (Indirect effect, Path a^1b^1).

Furthermore, with regards to the direct effects, the path showing the effect of cognitive abilities on functioning was significant (Total effect, Path c), but it was no longer significant when the mediators were entered into the model (Direct effect, Path c'). Cognition was a significant predictor of both ToM (Path a^1) and pragmatics (Path a^2). As concerns the direct effects of ToM, the effect on functioning was not significant (Path b^1), while the effect on pragmatics was significant (Path d^{21}). Lastly, with regard to the direct effect of pragmatics, results showed that pragmatic was a significant predictor of daily functioning (Path b^2).

Taken together, these results are consistent with a full mediation effect of cognitive abilities on daily functioning through ToM and pragmatics, since the direct effect of cognition on functioning did not remain significant once the mediators were included in the model.

COGNITIVE FUNCTIONING IN SCZ

COGNITIVE DEFICITS ARE A CORE FEATURE OF SCHIZOPHRENIA

First-degree relatives

Quality of Life

Psychosocial functioning

NEUROCOGNITIVE AND SOCIAL COGNITION DEFICITS

Prodromal phases

Onset

Remission phases

Acute phases

**LANGUAGE DISORDERS IN SCZ:
FOCUS ON COGNITIVE FUNCTIONING**

Neurocognitive and linguistic correlates of positive and negative formal thought disorder: A meta-analysis

Emre Bora ^{a,b,c,*}, Berna Yalincetin ^b, Berna Binnur Akdede ^{a,b}, Köksal Alptekin ^{a,b}

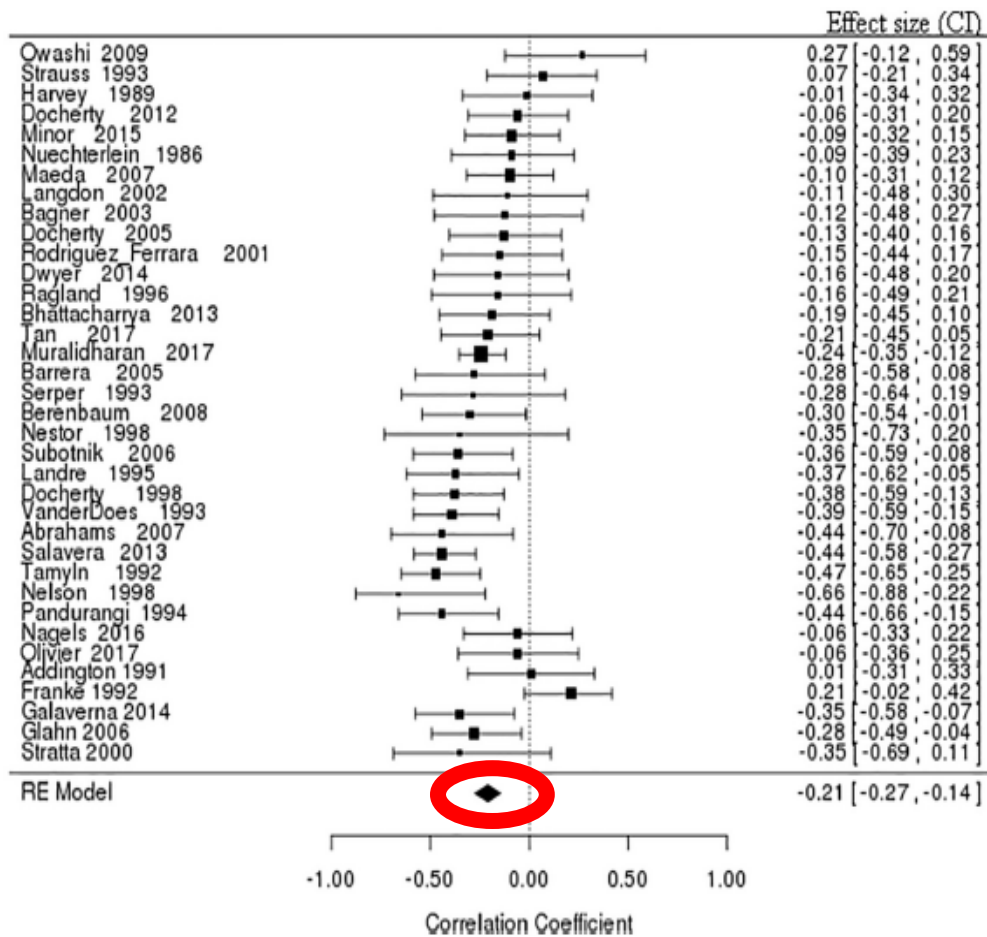


Fig. 1. Forest plot of the meta-analysis of the correlation between PosFTD and global cognition.

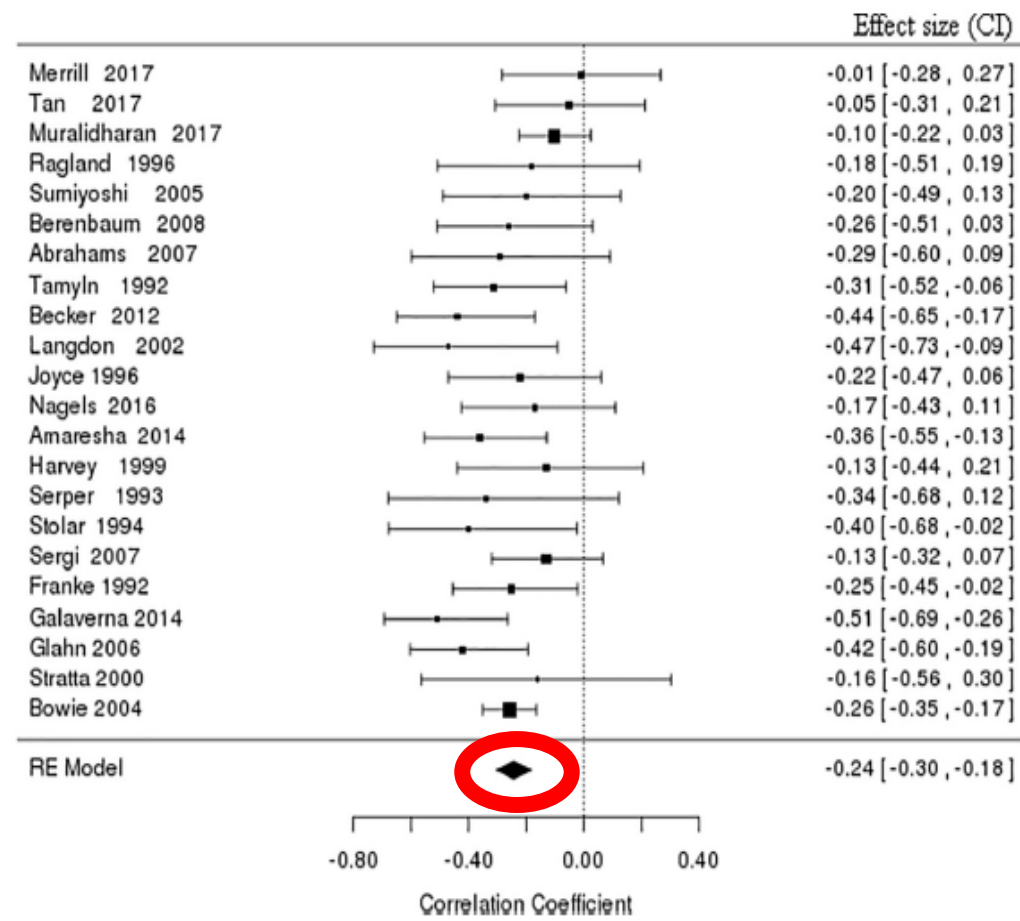


Fig. 2. Forest plot of the meta-analysis of the correlation between NegFTD and global cognition.

Effects of Social Cognitive Impairment on Speech Disorder in Schizophrenia

Nancy M. Docherty*, Amanda McCleery, Marielle Divilbiss, Emily B. Schumann, Aubrey Moe, and Mohammed K. Shakeel

Disordered speech in schizophrenia impairs social functioning because it impedes communication with others. Treatment approaches targeting this symptom have been limited by an incomplete understanding of its causes. This study examined the process underpinnings of speech disorder, assessed in terms of communication failure. Contributions of impairments in 2 social cognitive abilities, emotion perception and theory of mind (ToM), to speech disorder were assessed in 63 patients with schizophrenia or schizoaffective disorder and 21 nonpsychiatric participants, after controlling for the effects of verbal intelligence and impairments in basic language-related neurocognitive abilities.

After removal of the effects of the neurocognitive variables, impairments in emotion perception and ToM each explained additional variance in speech disorder in the patients but not the controls. The neurocognitive and social cognitive variables, taken together, explained 51% of the variance in speech disorder in the patients. Schizophrenic disordered speech may be less a concomitant of “positive” psychotic process than of illness-related limitations in neurocognitive and social cognitive functioning.

On the specificity of figurative language comprehension impairment in schizophrenia and its relation to cognitive skills but not psychopathological symptoms - Study on metaphor, humor and irony

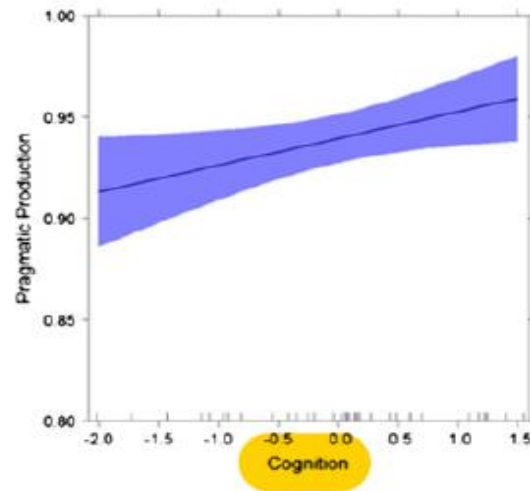
Przemysław Adamczyk^{a,*}, Joanna Biczak^b, Katarzyna Kotlarska^c, Artur Daren^d, Łukasz Cichocki^{b,e}

People with schizophrenia have difficulty understanding figurative expressions, such as metaphors, humor or irony. The present study investigated the specificity of figurative language impairment in schizophrenia and its relation with cognitive and psychotic symptoms. It included 54 schizophrenia and 54 age and sex-matched healthy subjects who performed a cognitive screening (ACE-III) and figurative language comprehension task consisting of 60 short stories with three types of endings: a figurative one and its literal and an absurd (meaningless) counterparts. Each figurative domain – metaphor, humor, irony - was split into two sub-domains, i.e., conventional and novel metaphors, intended-to-be-funny and social-norm-violation jokes, simple irony and critical sarcasm, respectively. The main findings are: i) in schizophrenia, figurative language deficit manifests itself in each domain; ii) the most pronounced subdomain-specific impairment has been found for novel vs conventional metaphors and irony vs sarcasm; iii) altered figurative language comprehension was related to diminished cognitive abilities but not to psychopathology symptoms (PANSS) or other clinical characteristics. This may suggest that figurative language impairment, as a specific part of communication deficit, may be regarded as an essential characteristic of schizophrenia, related to primary cognitive deficits but independent of psychopathology.

ACE-III:

- Attention
- Memory
- Verbal fluency
- Language
- Visual-spatial

Pragmatic Production



Pragmatic Comprehension

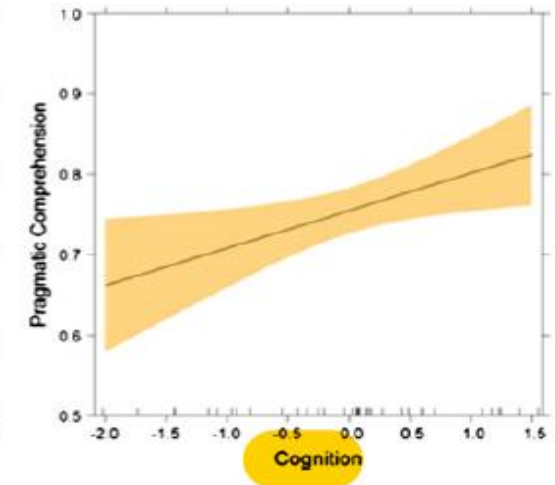
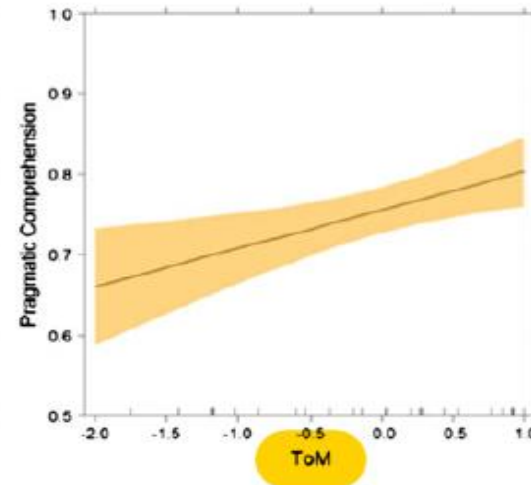
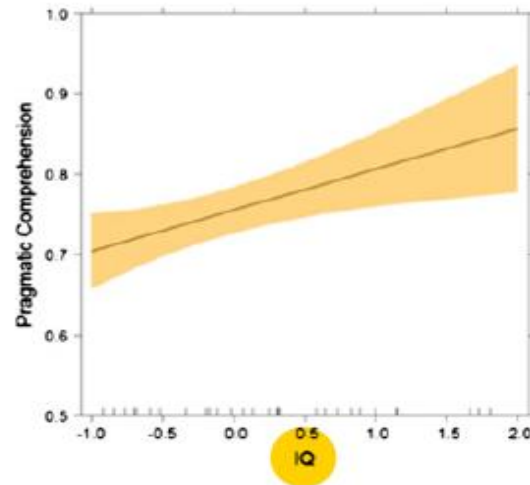


Fig. A.1. Effects of cognitive, socio-cognitive, and intellectual level predictors on APACS composite scores. The figure shows the partial effects of cognitive, socio-cognitive and intellectual level measures on APACS composite scores, as estimated by regression analysis. The figure displays the effects of the predictors that resulted significant in the analysis, namely cognition (as assessed with BACS Total score) for Pragmatic Production and IQ (as assessed with Total IQ), ToM (as assessed with PST Total score), and cognition (as assessed with BACS Total score) for Pragmatic Comprehension. The black line in each plot represents the predicted APACS composite score. The colored band around the line represents point-wise confidence bands around the prediction. Blue is used for Pragmatic Production, orange is used for Pragmatic Comprehension.

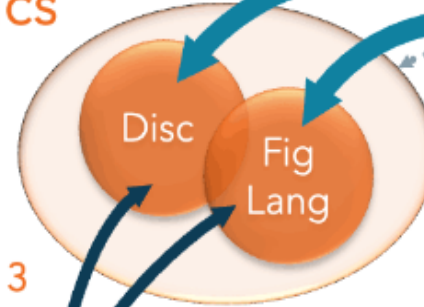


IUSS

Neurolinguistics and
Experimental Pragmatics Lab

Pragmatics

LEVEL 3



LEVEL 2



Social

Executive functions (Level 1) influence pragmatics (Level 3), both in a direct way and in an indirect way, through the mediation of social cognition (Level 2).

From: Frau F., Cerami C., Dodich A., Bosia M., & Bambini V. (2024), *Weighing the role of social cognition and executive functioning in pragmatics in the schizophrenia spectrum: A systematic review and meta-analysis*. *Brain and Language*, 105403. <https://doi.org/10.1016/j.bandl.2024.105403>

Executive
Functions



through social cognition

**LANGUAGE DISORDERS IN SCZ:
FOCUS ON REHABILITATION INTERVENTIONS**

Cognitive Rehabilitation in SCZ

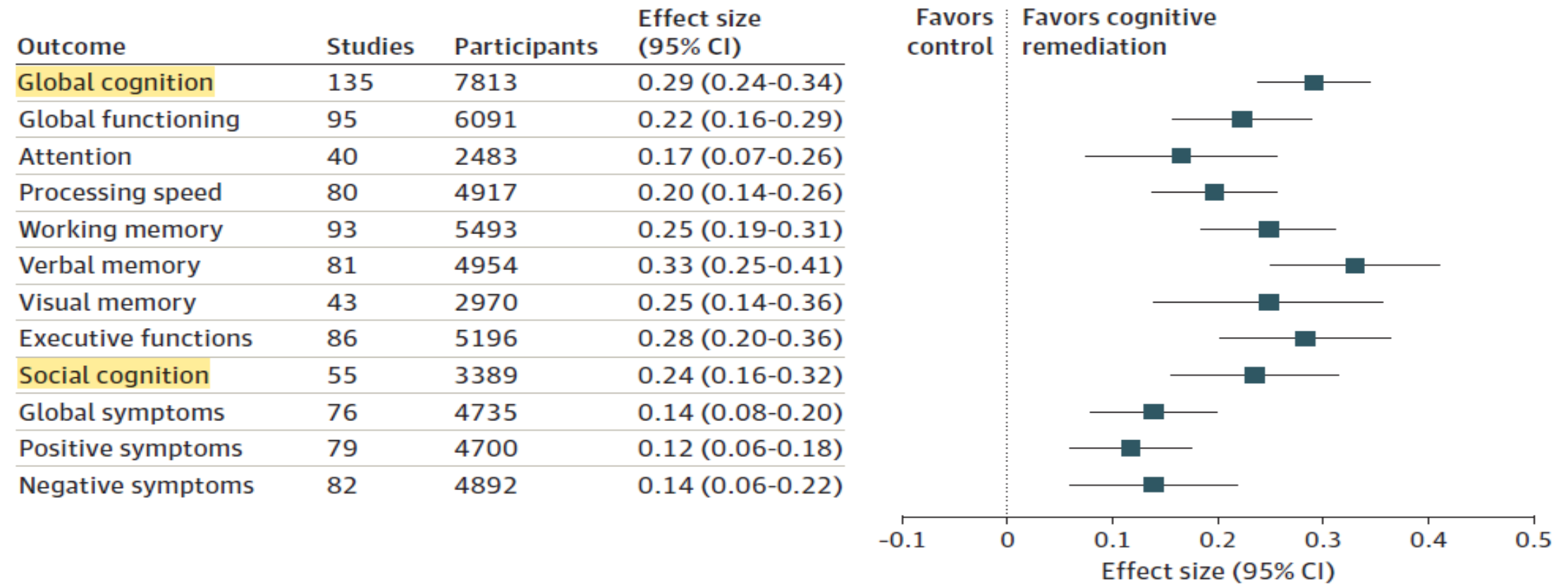
Cognitive remediation for schizophrenia has been recently defined as “a *behavioural training-based intervention that aims to improve cognitive processes (attention, memory, executive function, social cognition or metacognition) with the goal of durability and generalisation*”

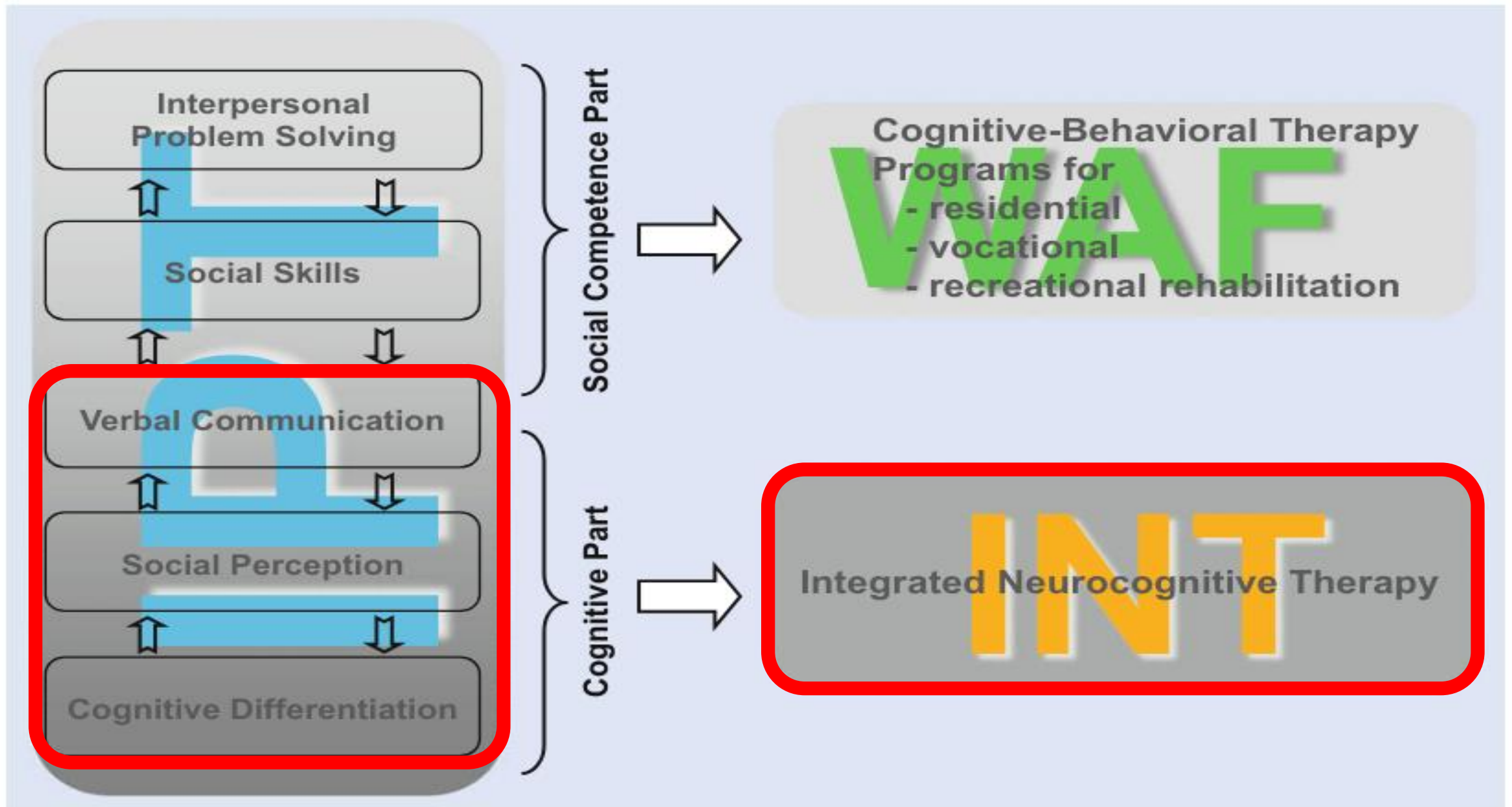
**Cognitive Remediation Experts Workshop
(CREW),
Florence, April 2010**

Effectiveness, Core Elements, and Moderators of Response of Cognitive Remediation for Schizophrenia

A Systematic Review and Meta-analysis of Randomized Clinical Trials

Figure 2. Effects of Cognitive Remediation





■ Fig. 1.3 Further developments of Integrated Psychological Therapy (IPT) (Roder et al. 2008, 2010; with kind permission of Beltz Verlag)

✓ TREATMENTS THAT WORK

Social Cognition and Interaction Training (SCIT)

Group Psychotherapy for Schizophrenia and Other Psychotic Disorders

CLINICIAN GUIDE

DAVID L. ROBERTS
DAVID L. PENN
DENNIS R. COMBS

OXFORD

DAVID L. ROBERTS, DAVID L. PENN, DENNIS R. COMBS

Training per le abilità di interazione e cognizione sociale (SCIT)

Intervento di gruppo per la schizofrenia e altri disturbi psicotici



GIOVANNI FIORITI EDITORE



Effect of cognitive remediation interventions on psychopathological dimensions relates to language and formal thought disorders of schizophrenia

We performed a post-hoc analysis of our own data on the effectiveness of different modalities of CR in SCZ (Vita *et al.* 2011), focusing only on these formal thought disorders or language related psychopathological variables.

Sample = 54 patients with SCZ (mean age = 39 ± 9.9 ; $n = 38$ males), randomly assigned to CR intervention (IPT: $n=26$), or to usual rehabilitative interventions (TAU: $n=28$), in a naturalistic setting of care.

Clinical variables were assessed at baseline (T0) and after 24 weeks (T1) of treatment.

We select the PANSS items that could be related directly to thought and language disorders; i.e. the item “**conceptual disorganization**” from the positive PANSS subscale, and the item “**lack of spontaneity and flow of conversation**” from the negative PANSS subscale.

We then compared the effects of **IPT vs TAU** on these outcome variables.

Analysis of covariance of post-treatment values of these scale scores revealed **significant differences between IPT and TAU groups, in favor of IPT (conceptual disorganization; $P=0.035$; and lack of spontaneity and flow of conversation; $P<0.001$).**

Vita et Al. Unpublished data.

Rehabilitation Interventions for Language Disorders in SCZ

Language and communication rehabilitation in patients with schizophrenia: A narrative review

Natalia Jimeno^{a,b,*}

Language impairments often appear in patients with schizophrenia and are potential targets for rehabilitation. Clinical practice and research should be intimately connected. The aim was to perform a narrative review of the assessment and intervention tools that have been used for the rehabilitation of schizophrenia patients with language and communication impairments. Two types of tools, general and specific, were developed for both purposes. General tools include the Positive and Negative Syndrome Scale for assessment, and the Integrated Psychological Therapy for intervention. The specific tools used to evaluate language and communication impairments include the Scale for the Assessment of Thought, Language and Communication, the Formal Thought Disorder scales (for caregivers and patients), and the Thought and Language Disorder scale. The most recent language-specific intervention tools include the Cognitive Pragmatic Treatment, Conecta-2, Let's talk! Multimodal Speech-Gesture training, Speech Therapy Intervention Group, and PragmaCom. These tools primarily involve psychopathology/psychiatry, psychology, linguistics, speech and language therapy, and nursing. In conclusion, a wide range of assessment and intervention tools are available for the rehabilitation of language and communication impairments associated with schizophrenia. An integrative and interdisciplinary approach should always be considered for rehabilitation of language and communication in patients with schizophrenia throughout their lifetime.

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 ¹, Giulia Agostoni ², Mariachiara Buonocore ³, Elisabetta Tonini ⁴, Margherita Bechi ³, Ilaria Ferri ³, Jacopo Sapienza ⁵, Francesca Martini ³, Federica Cuoco ³, Federica Cocchi ³, Luca Bischetti ⁴, Roberto Cavallaro ⁵, Marta Bosia ⁵

Methods: Inspired by the Gricean account of natural language use, we tailored a novel treatment addressing the pragmatics of communication (PragmaCom) and we tested its efficacy in a sample of individuals with schizophrenia randomized to the experimental group or to an active control group. The primary outcome with respect to the efficacy of the PragmaCom was measured by changes in pragmatic abilities (as evaluated with the global score of the Assessment of Pragmatic Abilities and Cognitive Substrates test) from baseline to 12 weeks and at 3-month follow-up. The secondary outcome was measured by changes in metaphor comprehension, abstract thinking, and global functioning from baseline to 12 weeks and at 3-month follow-up.

Results: Relative to the control group, at post-test the PragmaCom group showed greater and enduring improvement in global pragmatic skills and in metaphor comprehension. At follow-up, these improvements persisted and the PragmaCom exerted beneficial effects also on functioning.

Conclusions: Despite the limited sample size, we believe that these findings offer initial yet encouraging evidence of the possibility to improve pragmatic skills with a theoretically grounded approach and to obtain durable and clinically relevant benefits. We argue that it is time that therapeutic efforts embrace communicative dysfunctions in order to improve illness outcome.

CONCLUSIONS, FUTURE DIRECTIONS, AND RESEARCH PROPOSALS

- Better define LDs profile, pragmatics, and neurocognitive / social cognitive impairment in SCZ, with a particular attention to **their relationships and interconnections**.
- **Assessment** of neurocognitive, social cognitive, and pragmatics deficits (with a better **test harmonization**) in SCZ, both in clinical practice and rehabilitative programs.
- A more structured strategy should be implemented in order to “remediate” **cognitive domains**

PSYCHOSOCIAL REHABILITATION IN SCZ SHOULD NO LONGER IGNORE LANGUAGE AND COMMUNICATION DISORDERS, INCLUDING PRAGMATIC ONES, WHICH HAVE BEEN NEGLECTED FOR TOO LONG.

- An integrative cognitive-linguistic remediation strategy, starting from **cognitive remediation (eg. IPT, or some of its subprograms)**, followed by a **social cognitive training (eg. INT / SCIT, or some of their subprograms)**, and finally by **pragmatics / communication training (eg. PragmaCom)** could carry greater improvements, not only in social- and non-social cognitive functions and pragmatics / communication skills, **but also in psychosocial functioning and quality of life in SCZ patients, with the ultimate goal to achieve recovery.**

THANK YOU FOR YOUR ATTENTION