

COGNIZIONE SOCIALE: VALUTAZIONE E RIABILITAZIONE

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5 Ottobre 2026



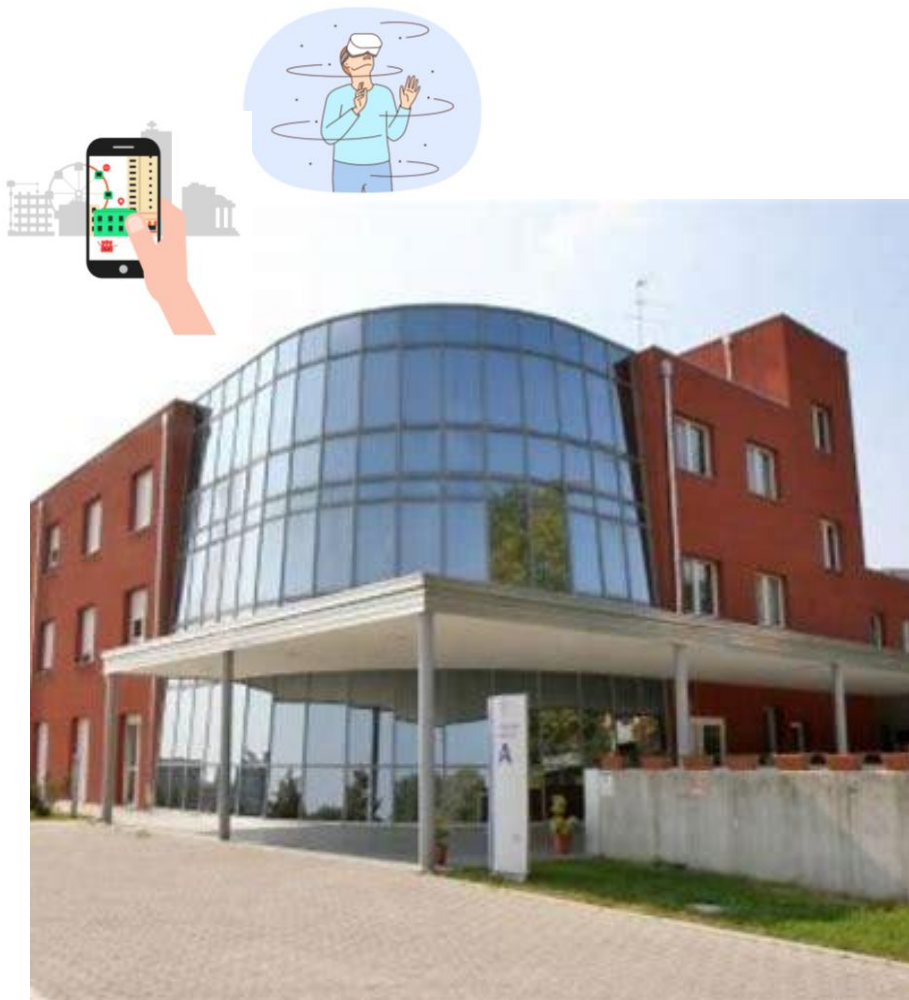
Studio dell'**architettura strutturale e funzionale del funzionamento cognitivo**, attraverso paradigmi sperimentali di neuroimaging, neurofisiologia e definizione di modelli cognitivi in popolazioni sane e patologiche

Identificazione di **marker cognitivi predittivi, diagnostici e prognostici nelle patologie neurologiche** (Stroke, Alzheimer e altre Demenze, Parkinson, ALS, Atassie, etc.)

Creazione di **strumenti testistici convenzionali e digitali** per il paziente con sospetti disturbi neurocognitivi



Immagine Generata con Chatbot a scopo descrittivo



Sviluppo e validazione di **strumenti di neurologia digitale**,
per prevenzione, diagnosi, monitoraggio del declino cognitivo

Progettazione e **sperimentazione di interventi riabilitativi
cognitivi, cognitivo-motori e comportamentali digitali**
mediante strumenti di medicina digitale e telemedicina

Promozione dell'**empowerment nella diade paziente-
caregiver** in neuroriabilitazione



Concept & Relevance

Clinical Research Evidence

From Lab to Clinics

Tools & Measures

Frontiers in Rehabilitation



Quanti di voi *effettuano o hanno effettuato valutazioni neuropsicologiche nella pratica clinica?*

*Quanti, all'interno della valutazione neuropsicologica, valutano **routinariamente almeno un dominio della cognizione sociale?***

*Se sì, che **cosa** valutate?*

“Social cognition processing includes those neuropsychological processes aiming at recognizing and interpreting information acquired from the social environment, understanding own and/or other behaviour and modulating the way of thinking and acting related to the requirements of the different social situations”

Tania Singer, 2012



Stranger Things – III Season

LARGE AMOUNT OF EVIDENCE

REVIEW

Theory of mind in behavioural-variant frontotemporal dementia and Alzheimer's disease: a meta-analysis

Bora E, et al. *J Neurol Neurosurg Psychiatry* 2015;0:1–6. doi:10.1136/jnnp-2014-309445

Neuropsychol Rev (2017) 27:18–30
DOI 10.1007/s11065-016-9340-2

REVIEW

Disrupted Face Processing in Frontotemporal Dementia: A Review of the Clinical and Neuroanatomical Evidence

Resalind Hutchings^{1,2,3} · Romina Palermo^{3,4} · Olivier Piguet^{1,2,3} · Fiona Kumfor^{1,2,3}

Neuroscience and Biobehavioral Reviews 109 (2020) 92–102

Contents lists available at ScienceDirect

Neuroscience and Biobehavioral Reviews

journal homepage: www.elsevier.com/locate/neubiorev

Empathy and theory of mind in Parkinson's disease: A meta-analysis

Sarah P. Coundouris*, Alexandra G. Adams, Julie D. Henry

School of Psychology, University of Queensland, Brisbane, Australia

Original Article

Meta-Analysis of Social Cognition in Mild Cognitive Impairment

Emre Bora, MD^{1,2}, and Görsev G. Yener, MD^{3,4,5,6,7}

Journal of Geriatric Psychiatry and Neurology
2017, Vol. 30(4) 204–213
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DOI: 10.1177/0891933717710317
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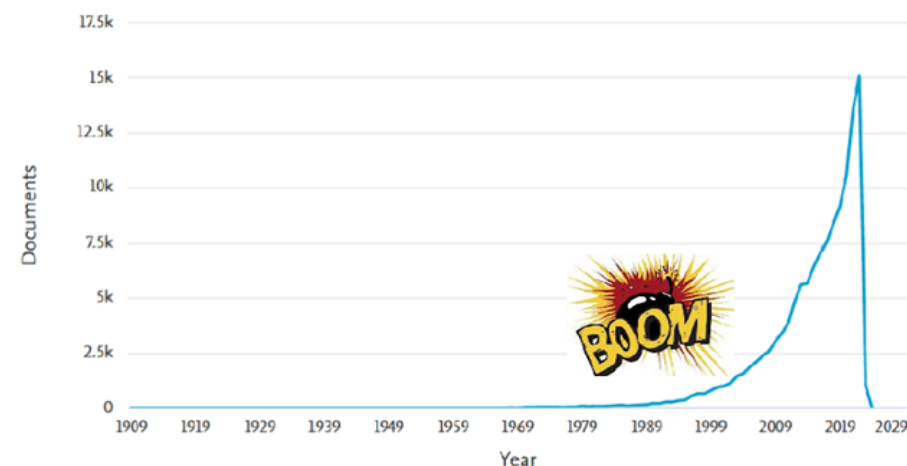
< Back to results

ALL ("social cognition" OR "empathy" OR "emotion" OR "theory of mind" OR "TOM" OR "social behavior" OR "social knowledge") AND ALL ("neurodegeneration" OR "dementia" OR "parkinson")

125,890 document results

Select year range to analyze: 1909 to 2024 Analyze

Documents by year



Social Cognition Deficits in NeuroPsychiatric Conditions

Psychiatric disorders

- Schizophrenia
- Bipolar disorder
- Antisocial personality disorder
- Major depressive disorder
- Post-traumatic stress disorder
- Social phobia
- Anorexia nervosa
- Personality disorders (for example, borderline, antisocial, narcissistic, schizoid, avoidant)

Developmental disorders

- Autism spectrum disorder
- Fragile X syndrome
- Williams syndrome
- Angelman syndrome
- Prader–Willi syndrome
- Turner syndrome
- Rett syndrome
- Attention deficit hyperactivity disorder
- Severe conduct disorder
- Fetal alcohol syndrome

Neurodegenerative disorders

- Frontotemporal dementia
- Alzheimer disease
- Amyotrophic lateral sclerosis
- Parkinson disease
- Huntington disease
- Progressive supranuclear palsy
- Corticobasal degeneration
- Multiple sclerosis

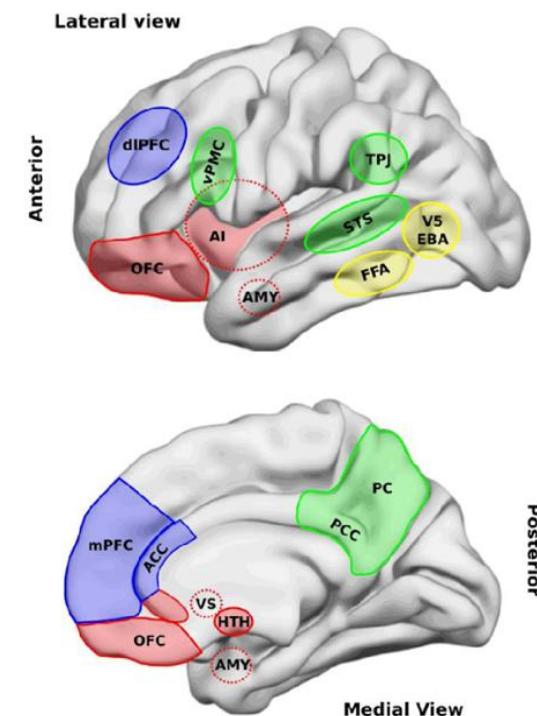
Acute brain damage

- Traumatic brain injury
- Stroke

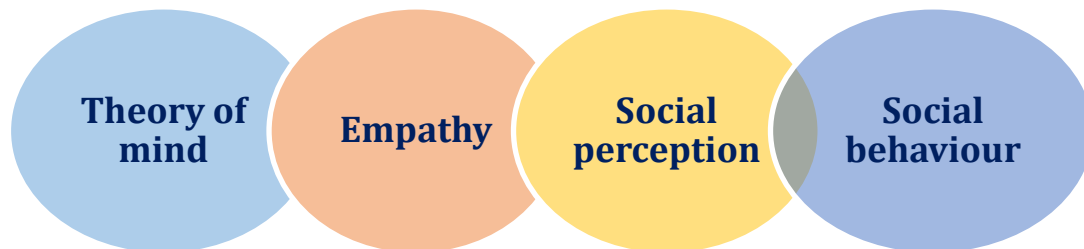
Henry et al., Nat Rev Neurol 2016

Several regions are implicated in the different aspects of perception & processing of social signals in a **complex fronto-striatal, limbic and parietal network**

Social Perception	Face, eye, gesture perception (biological movement/expressions)
Emotion & Motivation	Emotion recognition Self-monitoring and awareness Reward/punishment
Behavioral adaptation	Affective decision-making Knowledge of social norms and rules Moral cognition
Social Attribution	Empathy Theory of Mind Social attribution



Billeke et al., 2013 Front Psych

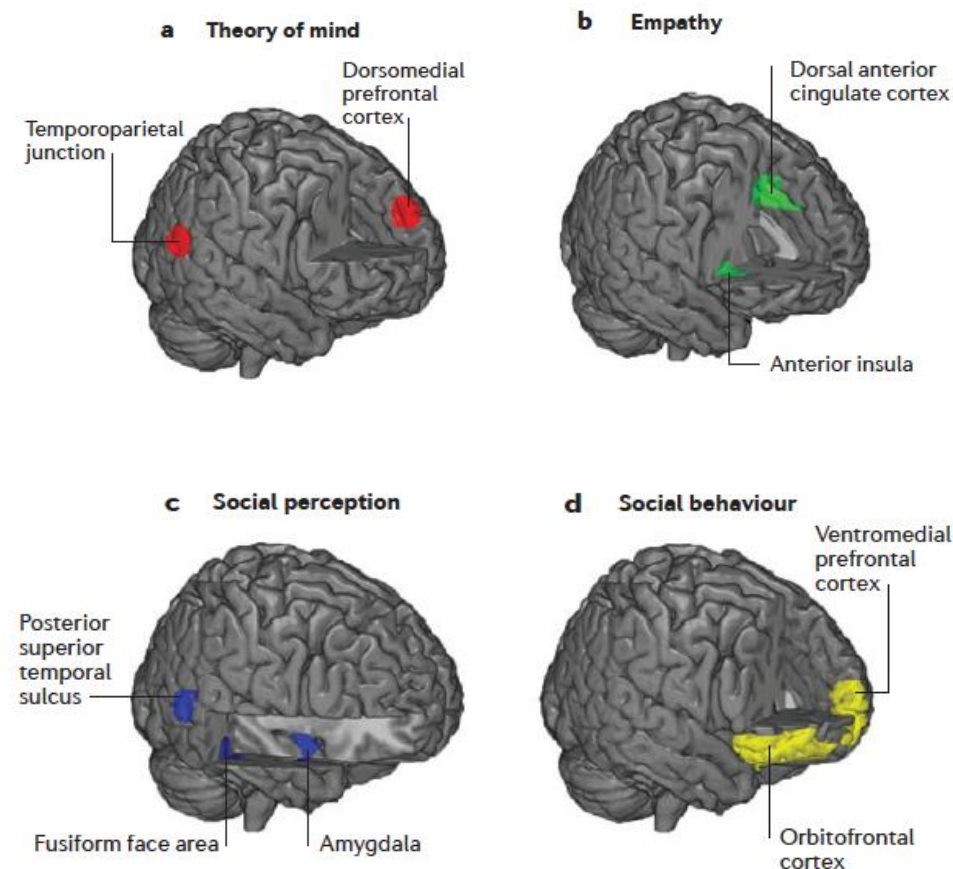


Theory of Mind: ability to *infer and represent others' beliefs*, intentions, desires, *and emotions*, and to use these inferences to predict and interpret behavior

Empathy: multidimensional construct encompassing the capacity to *perceive, understand, and respond to the emotional experiences of others*, involving *both affective sharing and understanding/infering others' emotional states*

Social perception: set of cognitive and affective processes by which individuals *encode, integrate, and interpret social cues* (facial expressions, gaze, body language, voice)

Social behavior: set of *actions, reactions, and interaction patterns* that an individual displays *in relation to others*, shaped by social signals, norms, and contextual demands



Henry et al., Nat Rev Neurol 2016

Right > Left Hemisphere

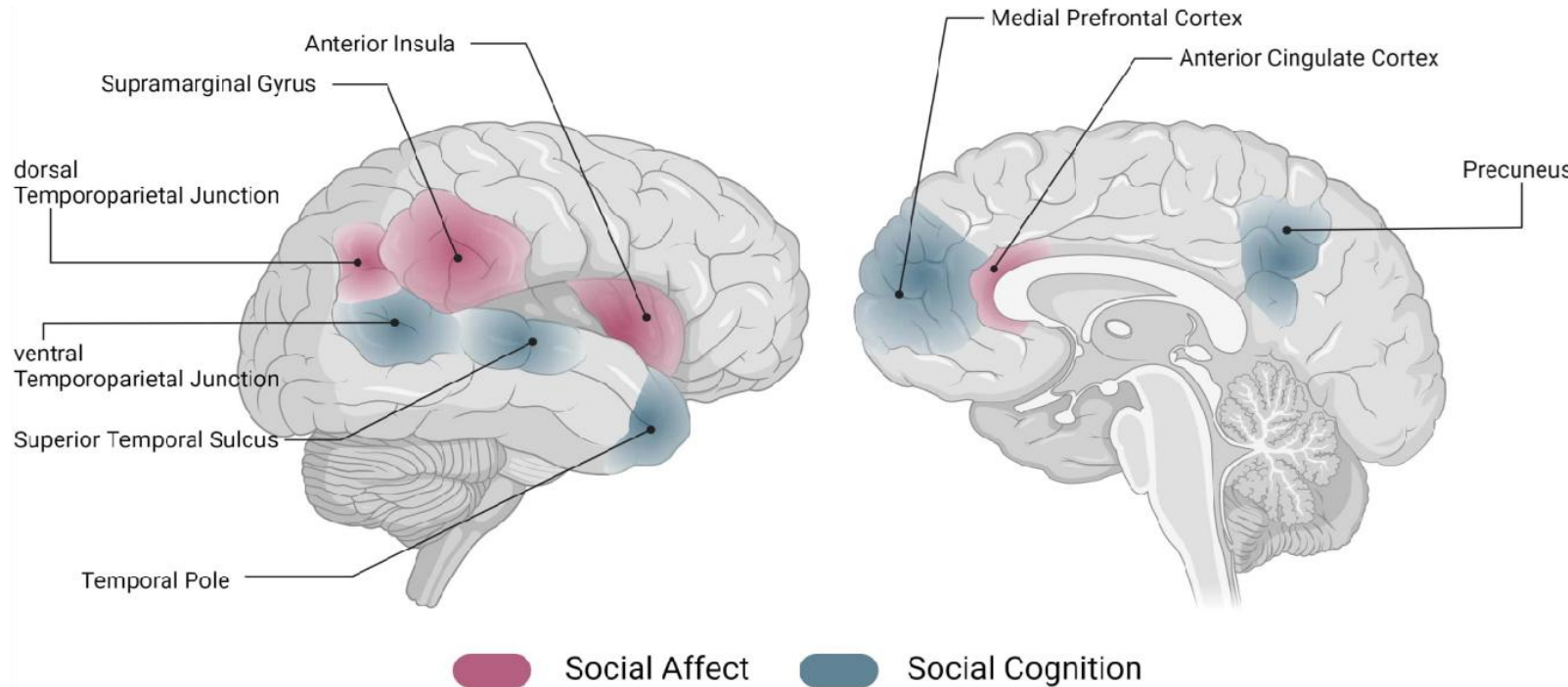
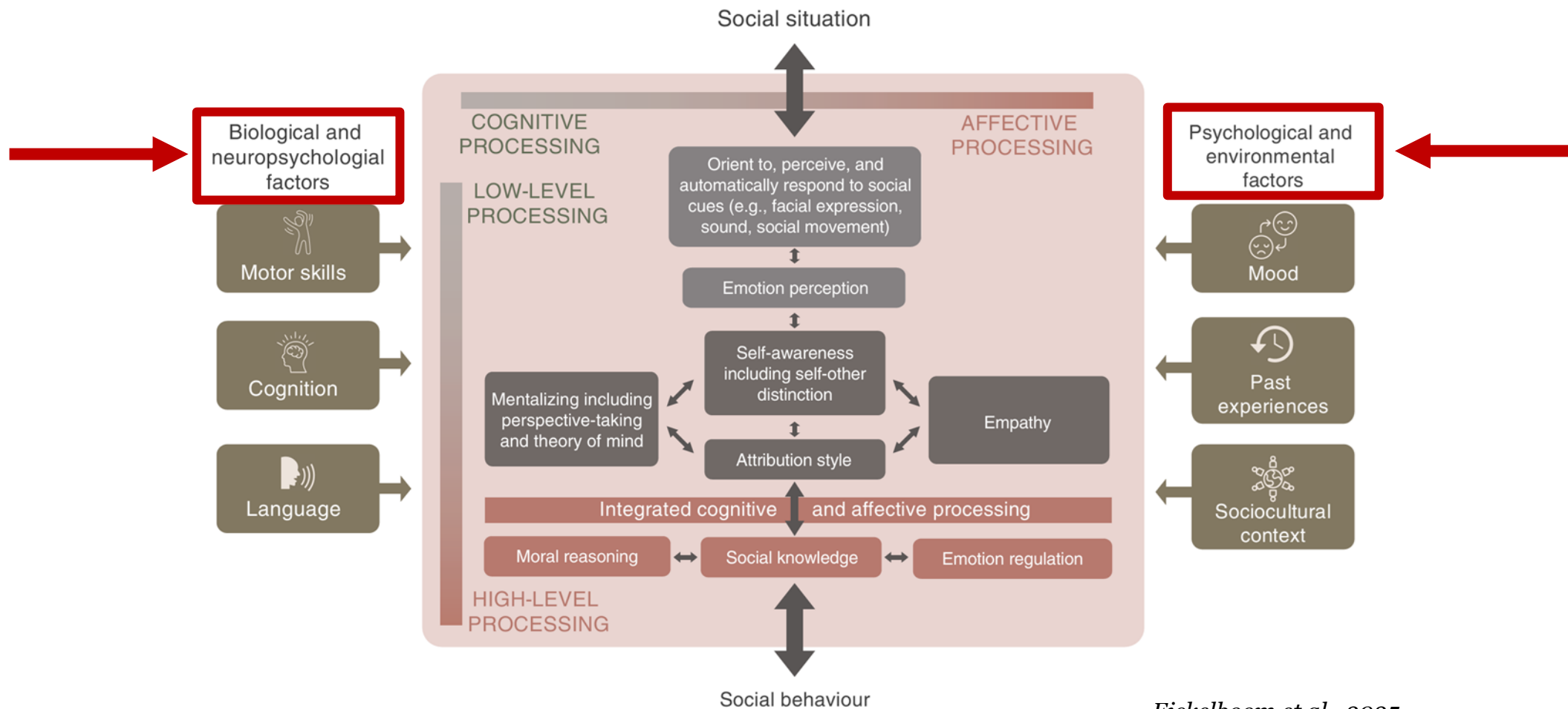


FIGURE 1 | Networks of the social brain. Schematic overview of activation in regions that have previously been associated with social affect (red) and social cognition (blue) [for an overview, see e.g., (7–10)]. Image generated using biorender (www.biorender.com).

Maliske & Kanske. *Front Psychiatry* 2022



Eickelboom et al., 2025

*Clinical Evidence in **patients with neurological disorders** has pushed the first Research Studies about three decades ago*

Troubles in **recognizing friends & family members' emotions**

Problems **understanding what others might be thinking** or intending

Tendency to **misinterpret social situations** or **behave inappropriately**

Limited ability to show empathy or **respond to others' feelings**

Appearing indifferent, **socially withdrawn**

Difficulty understanding jokes, sarcasm, or irony

...



*Functional impairment, Caregiver distress
Social burden, Reduced QoL*

Early Studies

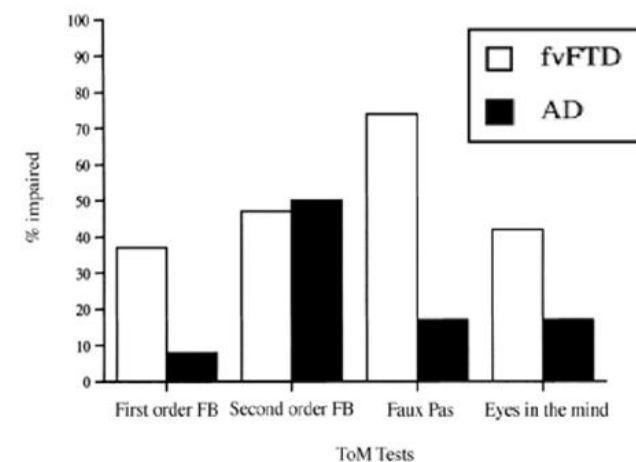
TABLE 2. Designation in the first (t1) and the second (t2) trials

	% Correct answers (SD)			F	p	Comparison
	FTD	AD	Controls			
Total						
t1	46.2 (14.7)	62.1 (13.8)	72.6 (8.9)	15.32	<0.0001	AD vs. FTD, FTD vs. controls
t2	52.7 (19)	59.2 (14.6)	77.6 (11.8)	9.16	0.0004	AD vs. controls, FTD vs. controls
Anger						
t1	48.6 (30.2)	71.2 (23.3)	68.7 (21.6)	4.13	0.0221	AD vs. FTD
t2	63.8 (35.5)	68.7 (29.1)	77 (24.9)	0.66	0.51	NS
Disgust						
t1	34.7 (31)	60 (30.7)	79.1 (20.8)	8.92	0.0005	AD vs. FTD, FTD vs. controls
t2	47.2 (38.2)	55 (41.8)	85.4 (16.7)	4.29	0.019	FTD vs. controls
Fear						
t1	31.9 (26.8)	32.5 (29.3)	58.3 (28.8)	3.86	0.028	AD vs. controls, FTD vs. controls
t2	29.1 (24.6)	22.5 (19.7)	62.5 (37.6)	9.03	0.0005	AD vs. controls, FTD vs. controls
Happiness						
t1	90.2 (21.2)	97.5 (7.6)	100	2.17	0.125	NS
t2	86.1 (24.5)	96.2 (9.1)	100	3.24	0.047	NS
Sadness						
t1	30.5 (18.3)	53.7 (28.4)	52.0 (29.1)	4.55	0.015	AD vs. FTD
t2	45.8 (28.7)	48.7 (32.9)	66.6 (30.7)	1.81	0.17	NS
Surprise						
t1	65.2 (35.4)	83.7 (24.7)	85.4 (24.9)	2.49	0.093	NS
t2	72.2 (35.2)	75 (26.9)	79.1 (23.4)	0.199	0.81	NS
Contempt						
t1	22.2 (25.5)	36.2 (26.2)	64.5 (32.7)	8.49	0.0007	AD vs. controls, FTD vs. controls
t2	25 (28.4)	48.7 (34.8)	72.9 (29.1)	8.54	0.0007	FTD vs. controls

Values presented are mean percentages (SD) of the correct answers. FTD, frontotemporal dementia; AD, Alzheimer disease; NS, nonsignificant.



Behavioral Variant of Frontotemporal Dementia



Gregory et al., Brain 2002

Lavenex & Pasquier, ADAD 1999

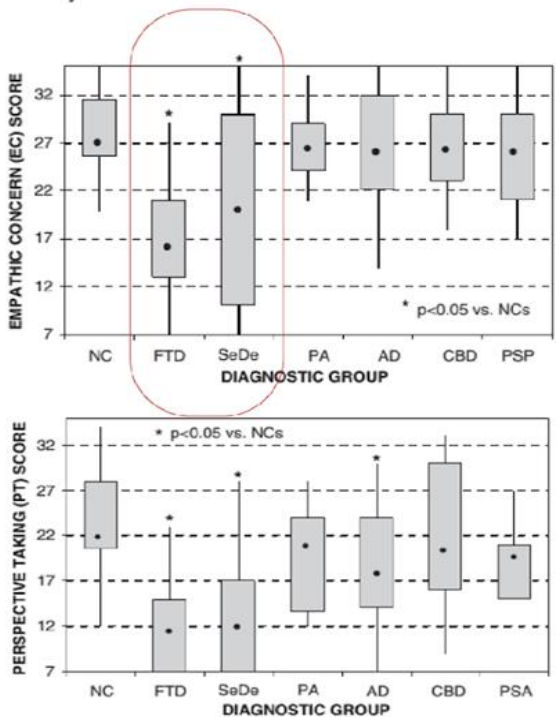
Jill had just moved into a new apartment. Jill went shopping and bought some new curtains for her bedroom. When she had just finished decorating the apartment her best friend Lisa came over. Jill gave her a tour of the apartment and asked 'how do you like my bedroom?' 'Those curtains are horrible', Lisa said, 'I hope you're going to get some new ones.'

Early Studies

Structural anatomy of empathy in neurodegenerative disease

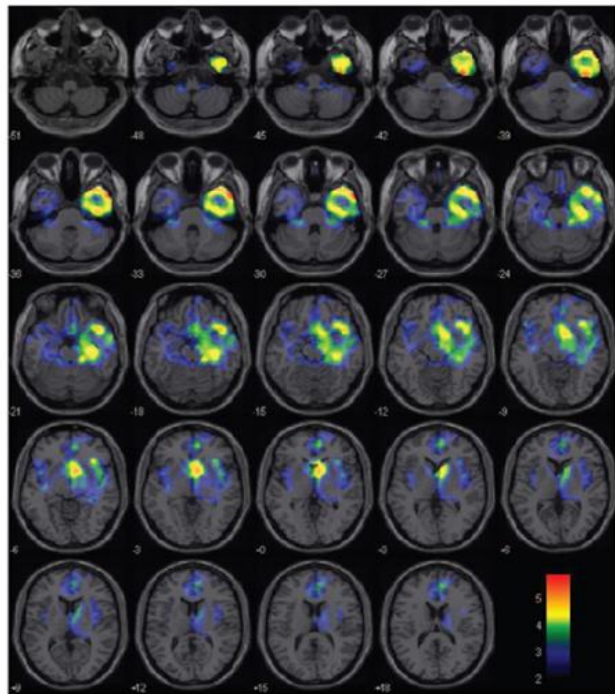
Brain 2006

Katherine P. Rankin, Maria Luisa Gorno-Tempini, Stephen C. Allison, Christine M. Stanley, Shenly Glenn, Michael W. Weiner and Bruce L. Miller



✓ Empathic Concern (Affective Empathy) →
“I have tender feelings for people less fortunate than me”

✓ Perspective Taking (Cognitive Empathy) →
“I try to understand how things look from other’s perspective”

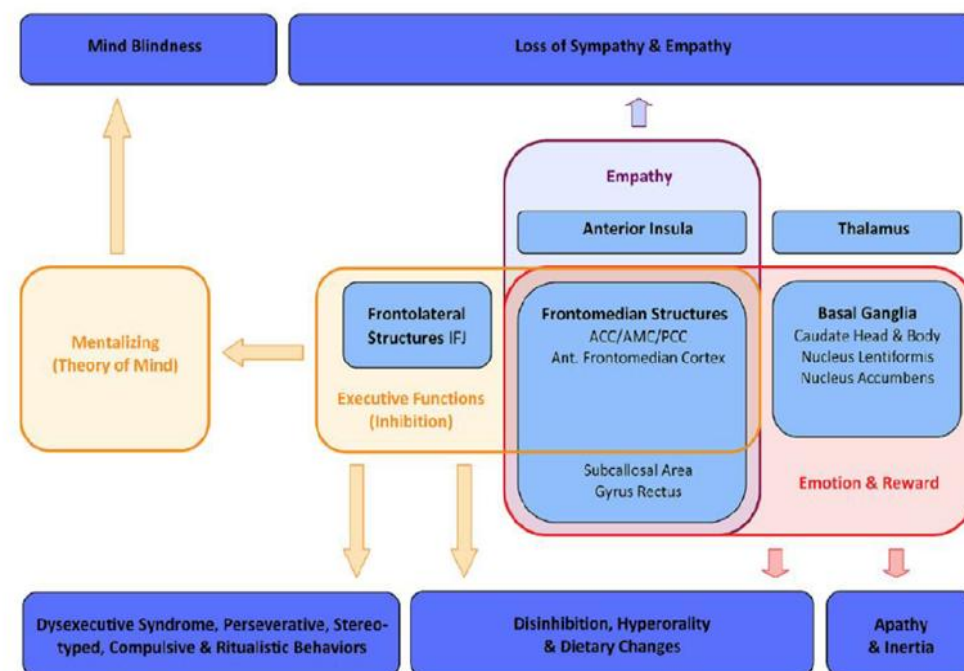
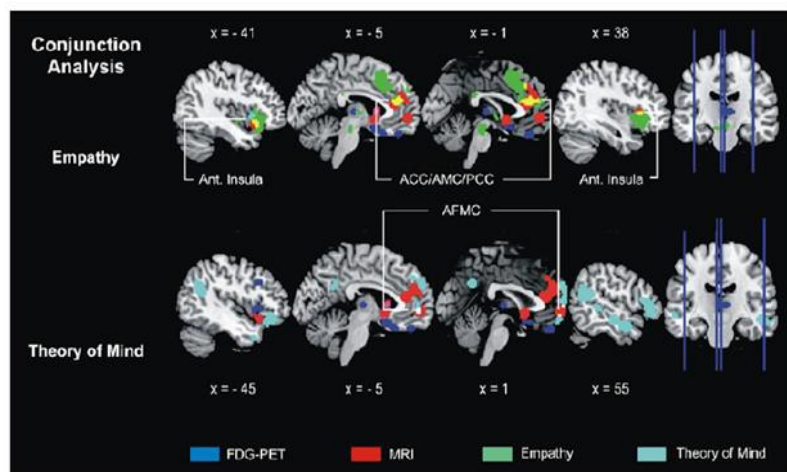


Structural correlates of EC+PT performance in the whole sample

CORTEX 57 (2014) 22-37

Conceptualizing neuropsychiatric diseases with multimodal data-driven meta-analyses – The case of behavioral variant frontotemporal dementia

Matthias L. Schroeter^{a,b,c,d,e,*}, Angela R. Laird^e, Caroline Chwiesko^a, Christine Deuschl^a, Else Schneider^a, Danilo Bzdok^f, Simon B. Eickhoff^{f,g} and Jane Neumann^{a,h}



✓ *BvFTD is the neurological model of the “Social Brain” disruption*

Table 3 International consensus criteria for behavioural variant FTD (FTDC)

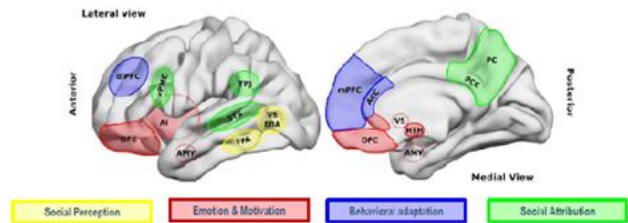
I. Neurodegenerative disease
The following symptom must be present to meet criteria for bvFTD
A. Shows progressive deterioration of behaviour and/or cognition by observation or history (as provided by a knowledgeable informant).
II. Possible bvFTD
Three of the following behavioural/cognitive symptoms (A–F) must be present to meet criteria. Ascertainment requires that symptoms be persistent or recurrent, rather than single or rare events.
A. Early* behavioural disinhibition [one of the following symptoms (A.1–A.3) must be present]:
A.1. Socially inappropriate behaviour
A.2. Loss of manners or decorum
A.3. Impulsive, rash or careless actions
B. Early apathy or inertia [one of the following symptoms (B.1–B.2) must be present]:
B.1. Apathy
B.2. Inertia
C. Early loss of sympathy or empathy [one of the following symptoms (C.1–C.2) must be present]:
C.1. Diminished response to other people's needs and feelings
C.2. Diminished social interest, interrelatedness or personal warmth
D. Early perseverative, stereotyped or compulsive/ritualistic behaviour [one of the following symptoms (D.1–D.3) must be present]:
D.1. Simple repetitive movements
D.2. Complex, compulsive or ritualistic behaviours
D.3. Stereotypy of speech
E. Hyperorality and dietary changes [one of the following symptoms (E.1–E.3) must be present]:
E.1. Altered food preferences
E.2. Binge eating, increased consumption of alcohol or cigarettes
E.3. Oral exploration or consumption of inedible objects
F. Neuropsychological profile: executive/generation deficits with relative sparing of memory and visuospatial functions [all of the following symptoms (F.1–F.3) must be present]:
F.1. Deficits in executive tasks
F.2. Relative sparing of episodic memory
F.3. Relative sparing of visuospatial skills

International consensus criteria for behavioural variant FTD (FTDC)

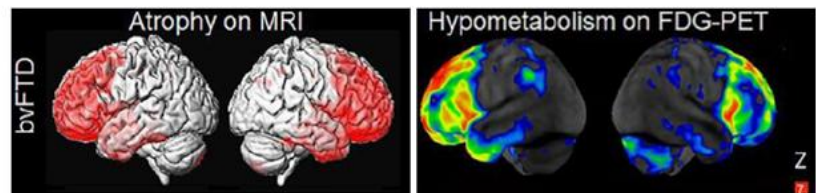
Brain 2011; 134; 2456–2477

Sensitivity of revised diagnostic criteria for the behavioural variant of frontotemporal dementia

Rascovsky et al., 2011

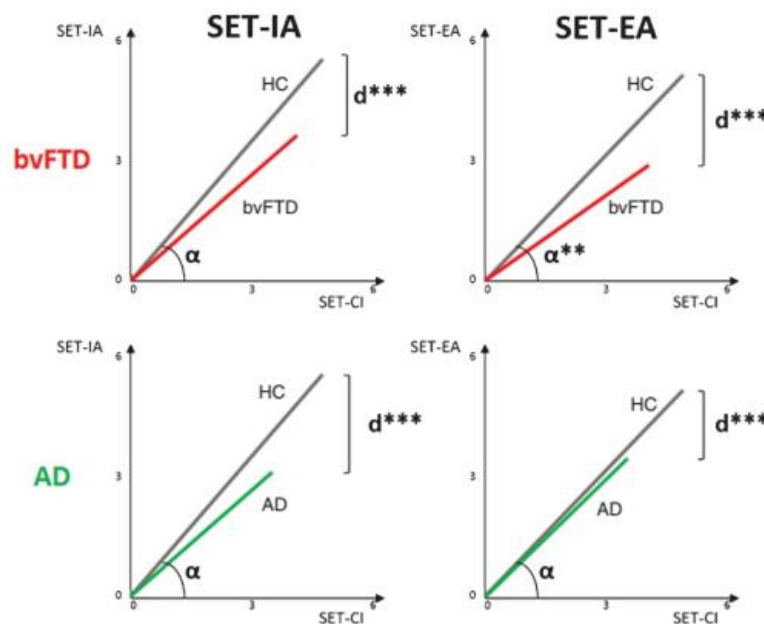
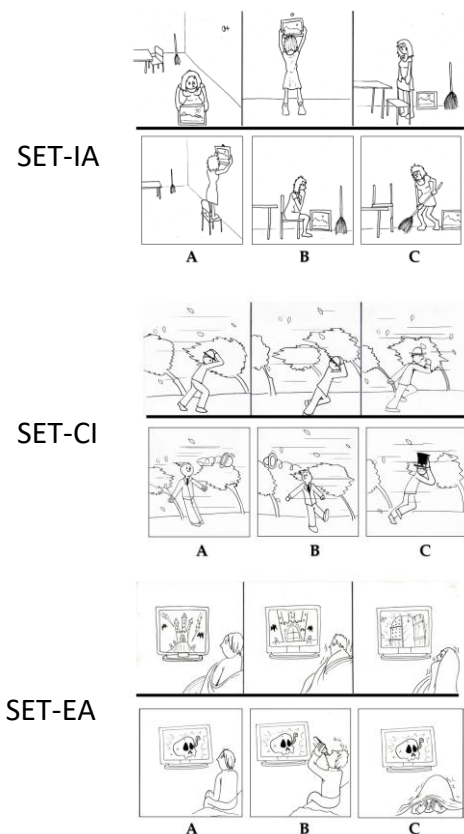


Billeke et al., Front Psychiatry 2013



Whitwell et al., Prog Mol Biol Transl Sci 2019

BvFTD – affective ToM > cognitive ToM



Dodich et al., JAD 2016
Dodich et al., Neurol Sci 2015

Torralva et al., Cogn Behav Neurol 2015

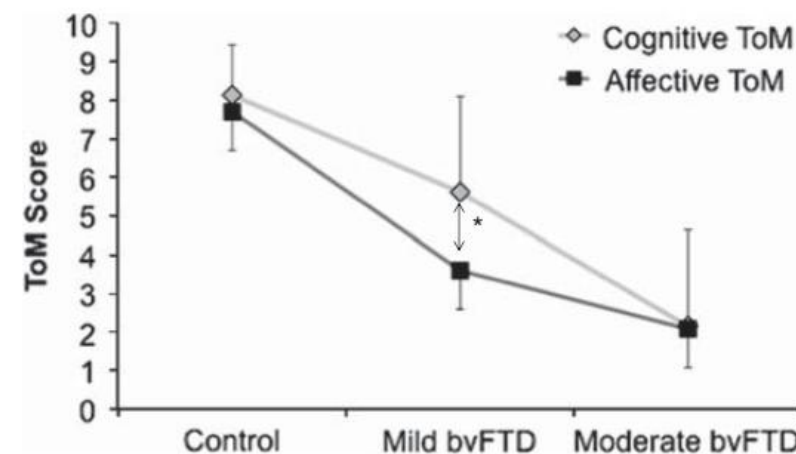
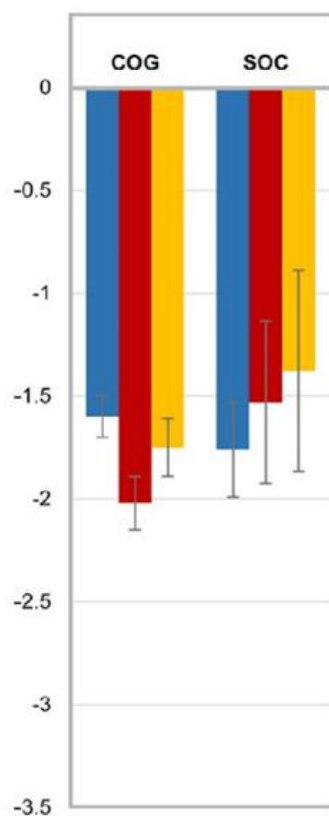


FIGURE 1. Cognitive and affective theory of mind (ToM) test scores for 18 healthy controls, 26 patients with mild behavioral variant frontotemporal dementia (bvFTD), and 14 patients with moderate bvFTD. The patients with mild bvFTD had significantly lower affective than cognitive ToM scores.

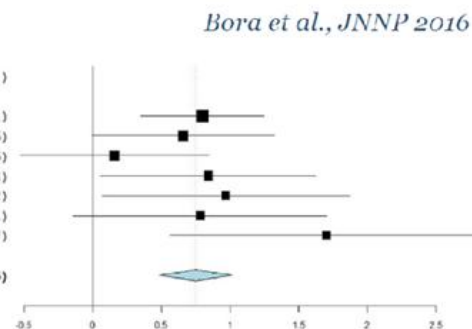
Late Studies



Kamath et al., Psych Med 2018

Social cognition is impaired in bvFTD, SD and PNFA (470 pubs, n=11,782)

Studies	Estimate (95% C.I.)
Bertoux 2014	0.800 (0.349, 1.251)
Lavenex 1999	0.660 (-0.006, 1.326)
Freedman 2013	0.160 (-0.526, 0.846)
Kipps 2009	0.040 (0.056, 1.624)
Naime 2013	0.970 (0.068, 1.872)
Bediou 2012	0.780 (-0.141, 1.701)
Fernandez Duque 2005	1.700 (0.563, 2.837)
Overall (I ² =0%, P=0.432)	0.748 (0.462, 1.015)

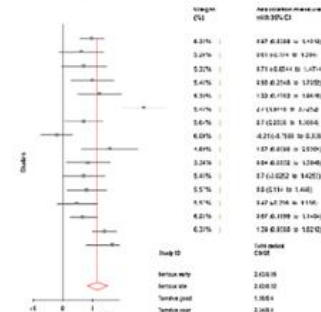


Bora et al., JNNP 2016

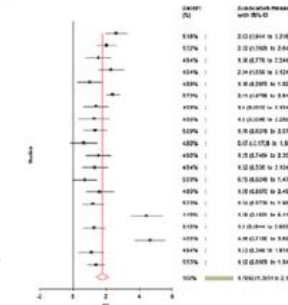
Facial emotion recognition is significantly impaired in bvFTD and in AD vs controls

Theory of Mind, especially *faux pas* and sarcasm, is impaired in bvFTD and AD vs controls

AD vs HC



FTD vs HC



Bora et al., JNNP 2015

Late Studies

Social cognition domain / stimuli		PPA variant		
		nvPPA	svPPA	lvPPA
EMOTION RECOGNITION	Static faces	Impaired (5 reports) - Related to perception and attention - Possibly related to language - Related to right temporal pole and bilateral insula	Impaired (18 reports) - Independent of perception and attention - Independent of naming and semantic comprehension - Related to right ATL, OFC and ACC	Mixed evidence (Impaired: 1 report; Preserved: 1 report)
	Dynamic faces	Impaired (2 reports)	Impaired (2 reports)	Unexplored
	Bodies	Unexplored	Impaired? (1 report)	Unexplored
	Prosody / vocal sounds	Impaired? (1 report) - Related to generic perceptual deficits	Impaired (2 reports)	Impaired? (1 report) - Related to generic perceptual deficits
	Naturalistic scenes	Mixed evidence (Impaired: 1 report; Preserved: 3 reports)	Impaired (7 reports) - Independent of vocabulary and semantic comprehension - Possible related to anterior thalamic radiation and right uncinate fasciculus	Impaired? (1 report)
TOM	Cognitive	Unexplored	Impaired (3 reports) - Independent of categorical fluency and comprehension - Related to right temporal lobe, medial parietal and prefrontal regions - Deficits independent of primary site of atrophy (right vs left) at initial presentation	Unexplored
	Affective	Impaired? (1 report) - Possibly related to face perception and facial emotion recognition - Related to bilateral insula, temporal pole, and amygdala	Impaired (3 reports) - Independent of categorical fluency - Related to right and left-medial temporal regions - Deficits independent of primary site of atrophy (right vs left) at initial presentation	Unexplored
EMPATHY	Cognitive	Impaired? (1 report) - Related to emotion recognition	Impaired (6 reports) - More profound in right svPPA but also present in left svPPA - Not related to language impairments	Impaired? (1 report) - Related to visuospatial abilities
	Affective	Preserved (6 reports) - Decreased when compared to premorbid functioning (1 report)	Impaired (8 reports) - More profound in right svPPA but also present in left svPPA - Not related to language impairments	Preserved? (1 report) - Decreased when compared to premorbid functioning (non-significant)

Impaired Unexplored Preserved

Social Cognition is present also in PPA, especially in **svPPA**

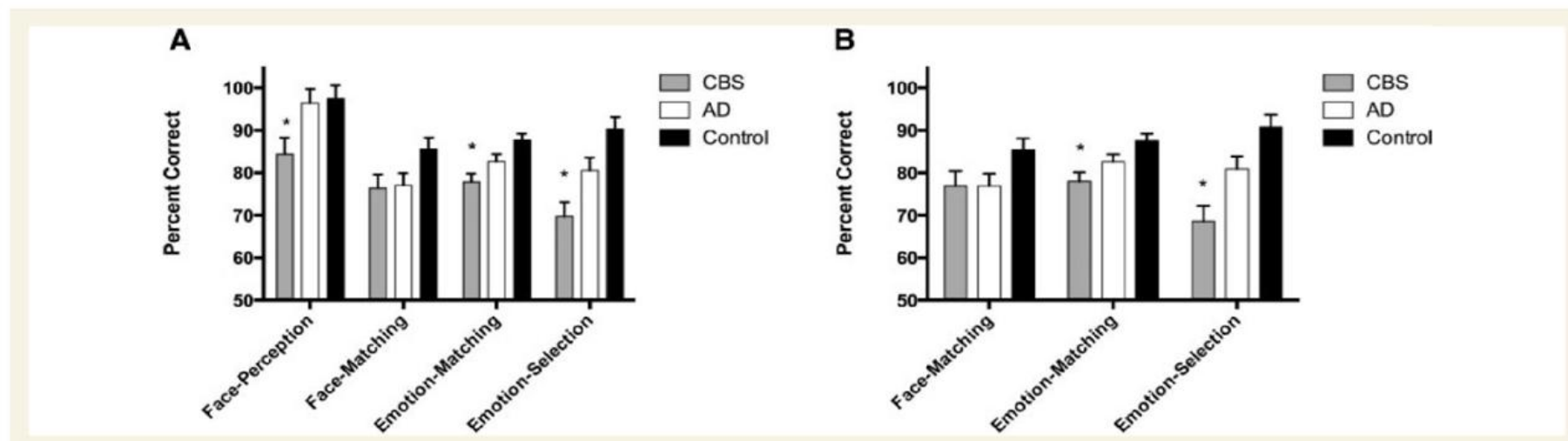
Fittipaldi et al., Neurosci Biobehav Rev 2019

Late Studies

- ✓ **CBD** → deficits in *basic face processing* and *high-level emotion processing tasks* related to basal ganglia volume loss and cortical thinning of the left paracentral gyrus/precuneus region

Task	Face-Perception Task	Face-Matching Task	Emotion-Matching Task	Emotion-Selection Task
Stimulus Example				
Instruction	"Is this the same picture?"	"Is this the same person?"	"Is this the same emotional expression?"	"Point to the angry face"

Figure 1 Example stimuli from the facial emotion recognition task. Images are from the NimStim database www.macbrain.org.



Kumfor et al., Brain 2014

Late Studies

✓ CBD → deficits in *cognitive empathy*

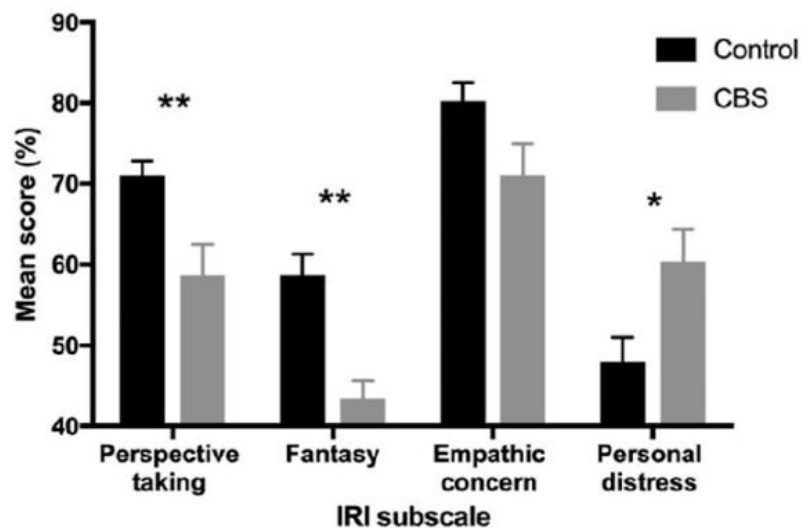


FIGURE 1 Profiles of empathy in corticobasal syndrome (CBS) and controls at the present time. Between group differences: * $P < 0.05$; ** $P < 0.01$. Empathic concern CBS vs controls $P = 0.051$.

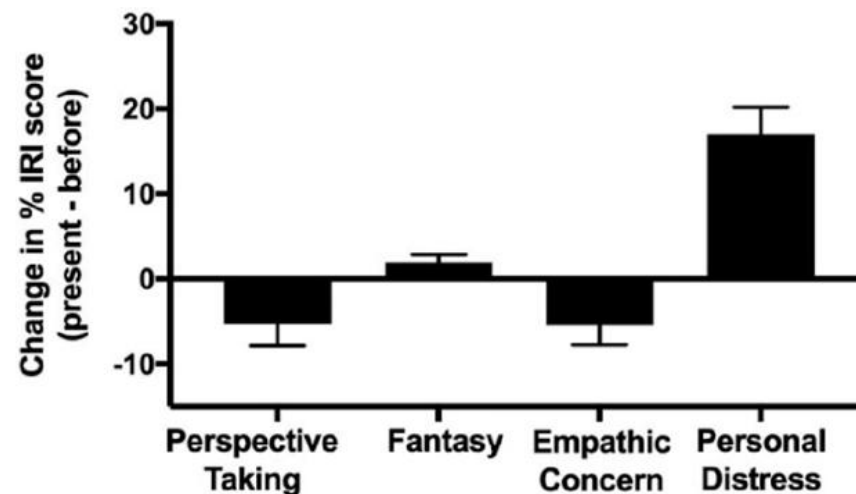
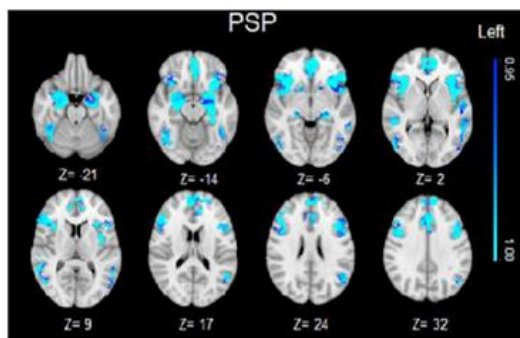
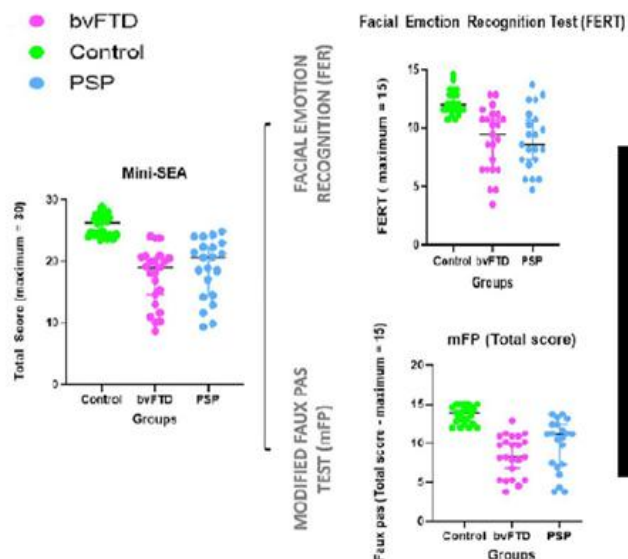


FIGURE 2 Change in Interpersonal Reactivity Index (IRI) scores based on the differences in ratings before illness onset and at the present time in corticobasal syndrome (CBS) patients. Note. Missing data for two CBS patients where IRI data was only available for the present time

Southi et al., IJGP 2018

- ✓ PSP → multimodal deficits in social cognition
- ✓ Emotion recognition (both positive and negative emotions) and Theory of Mind impairments related to damage in vmPFC and IFG

Late Studies



Cruz de Souza et al., Cortex 2022

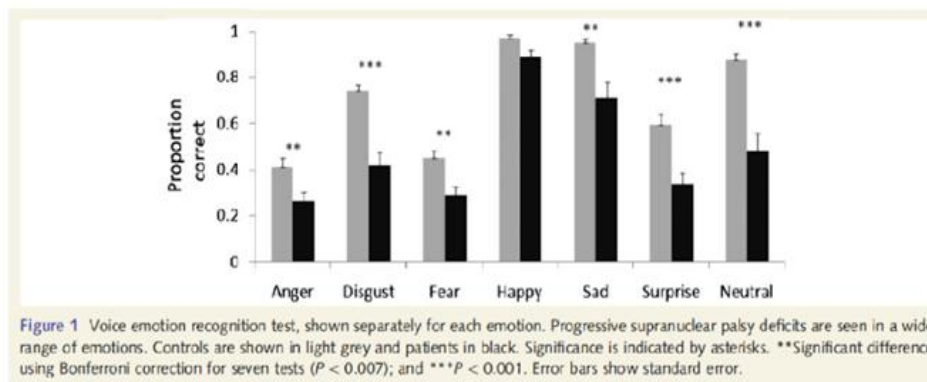
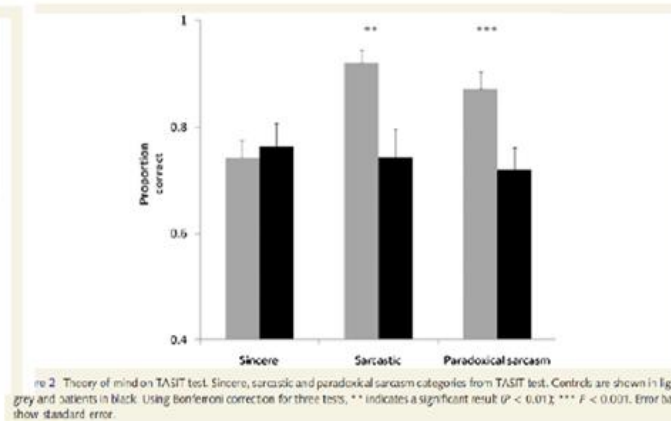
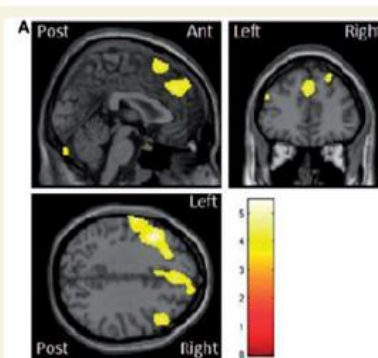


Figure 1 Voice emotion recognition test, shown separately for each emotion. Progressive supranuclear palsy deficits are seen in a wide range of emotions. Controls are shown in light grey and patients in black. Significance is indicated by asterisks. **Significant difference using Bonferroni correction for seven tests ($P < 0.007$); and *** $P < 0.001$. Error bars show standard error.

Ghosh et al., Brain 2012

Late Studies

Social Cognition is impaired in the **whole FTL** spectrum (including CBS-PSP)

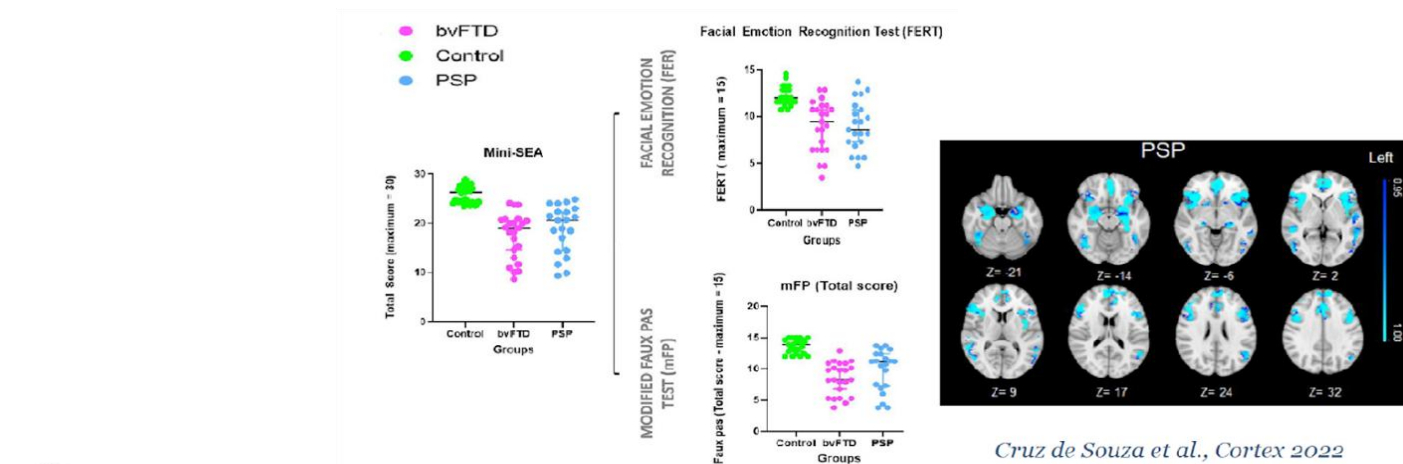
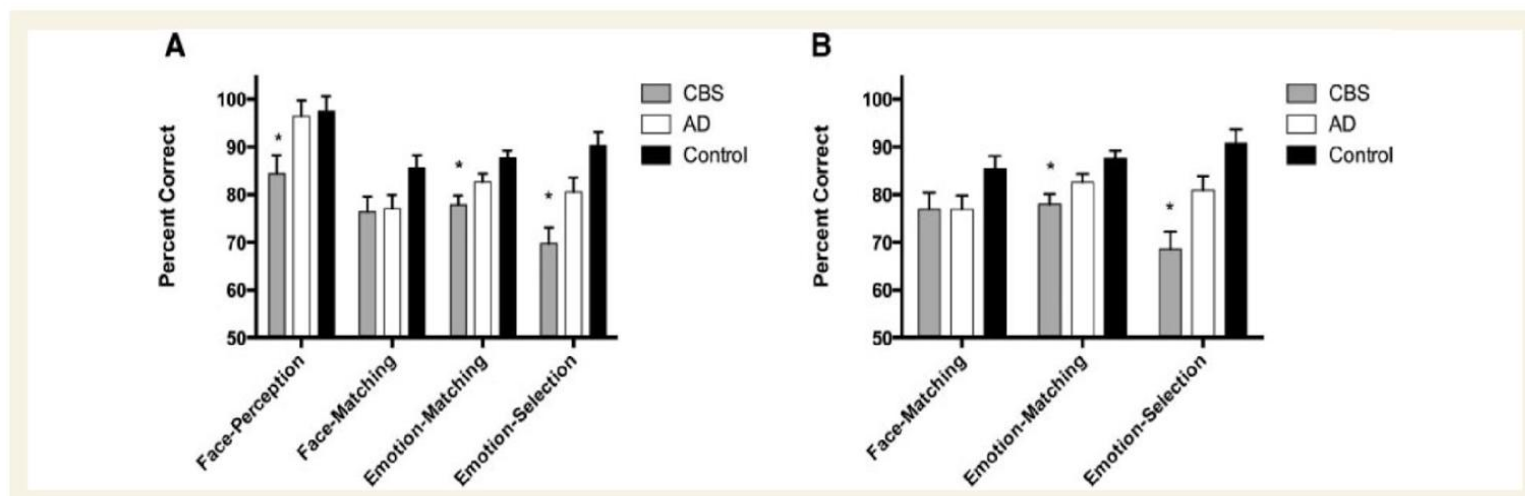


FIGURE 1 Profiles of empathy in corticobasal syndrome (CBS) and controls at the present time. Between group differences: * $P < 0.05$; ** $P < 0.01$. Empathic concern CBS vs controls $P = 0.051$

Southi et al., IJGP 2018





Late Studies

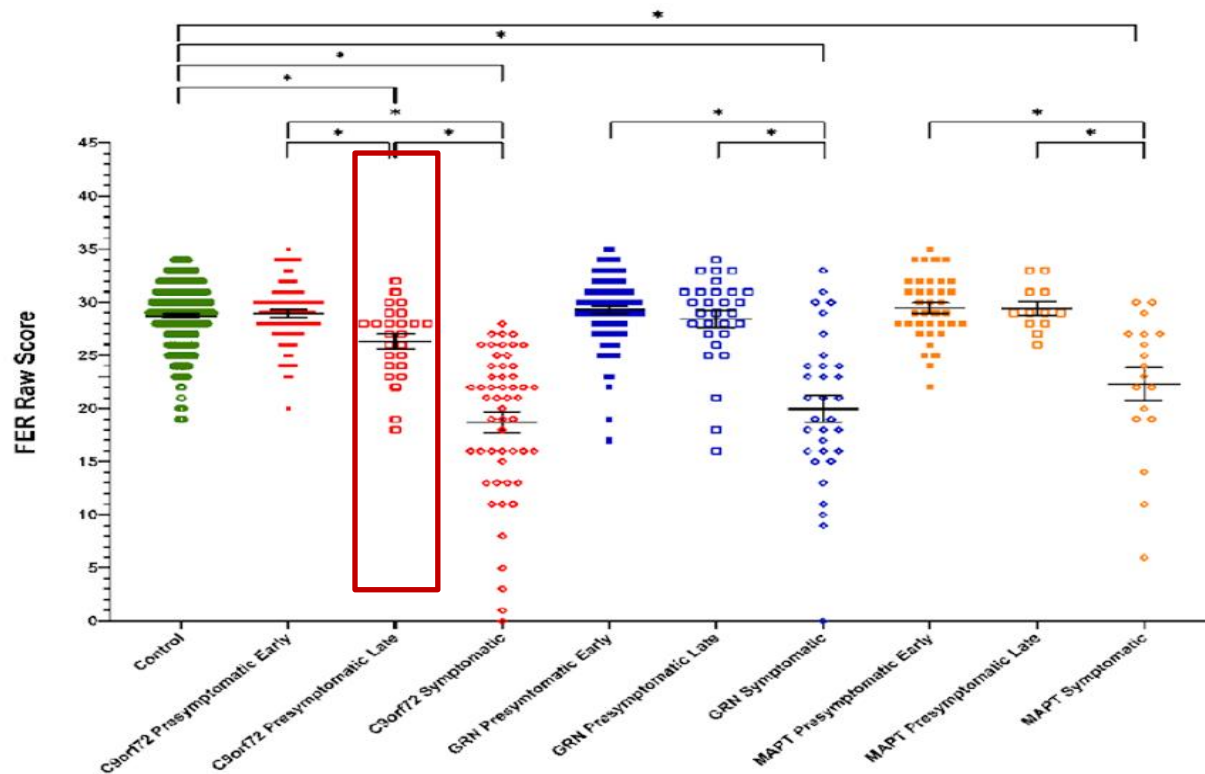
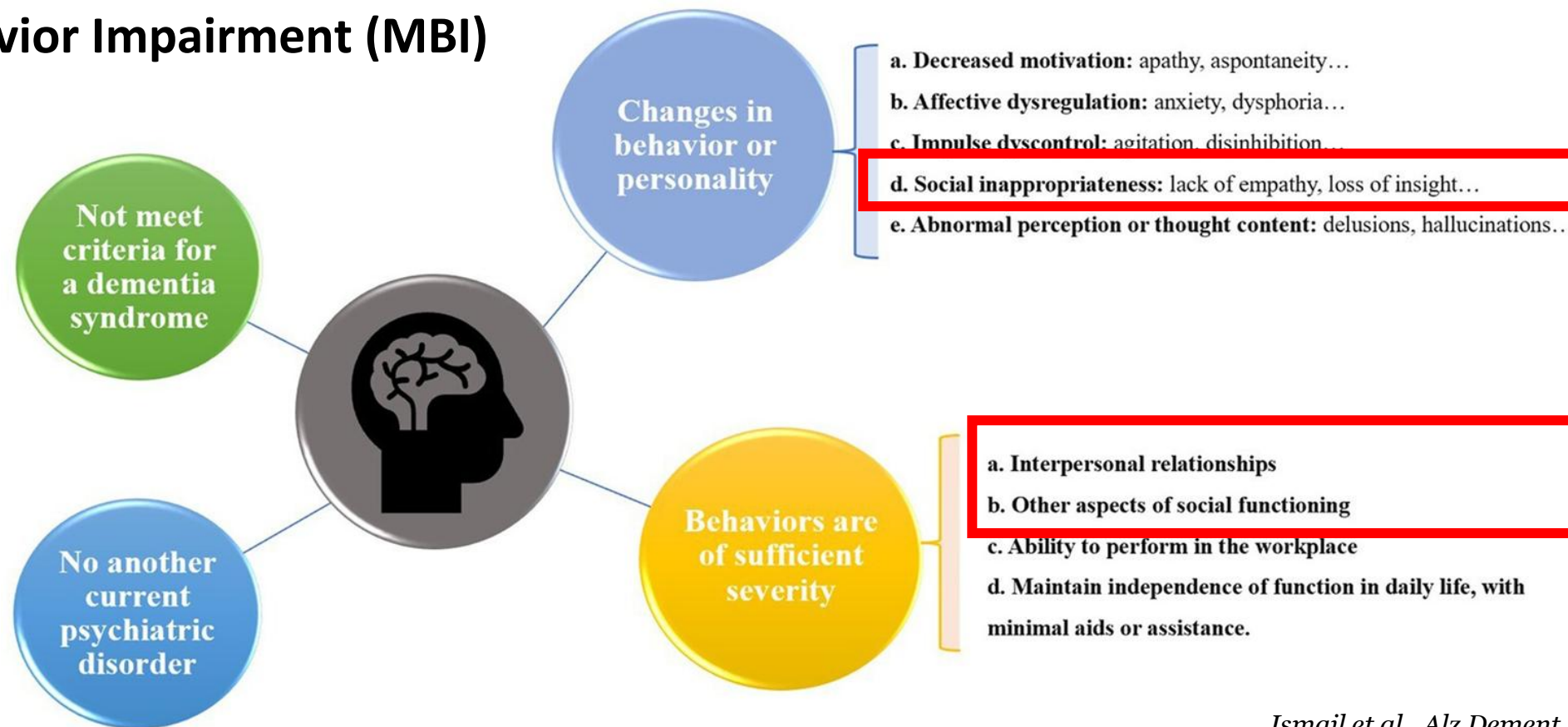


Fig. 1 – Facial Emotion Recognition test scores in each group. Significant differences from controls and within each genetic group are starred. Differences across genetic groups are not shown.

Social Cognition is a cognitive marker of prodromal FTD (carrier of causative mutations)

Russel et al., Cortex 2020

Mild Behavior Impairment (MBI)



Ismail et al., Alz Dement 2016
Jin et al., Front Psychiatry 2023

<https://doi.org/10.1093/brain/awac382>

BRAIN 2023; 146; 2163–2174 | 2163

BRAIN
ORIGINAL ARTICLE

Social cognition deficits and biometric signatures in the behavioural variant of Alzheimer's disease

Ellen H. Singleton,¹ Jay L. P. Fieldhouse,¹ Jochum J. van 't Hooft,¹ Marta Scarioni,¹ Marie-Paule E. van Engelen,¹ Sietske A. M. Sikkes,^{1,2} Casper de Boer,¹ Diana I. Bocancea,¹ Esther van den Berg,³ Philip Scheltens,¹ Wiesje M. van der Flier,^{1,4} Janne M. Papma,³ Yolande A. L. Pijnenburg^{1,†} and Rik Ossenkoppele^{1,5,†}

Social cognition components



Part 1: Emotion recognition

Social cognition tests

- Ekman 60 faces test



Part 2: Empathy

- Interpersonal Reactivity Index
- Empathy eliciting videos



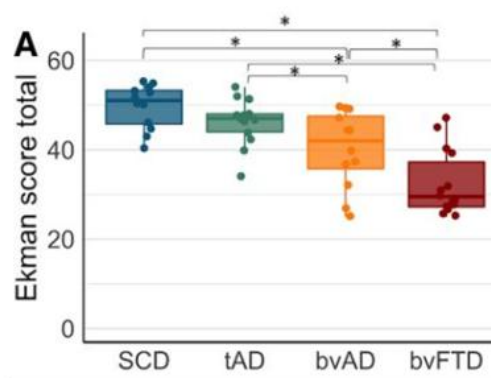
Part 3: Knowledge of social norms & Moral reasoning

- Social Norms Questionnaire
- Moral dilemmas

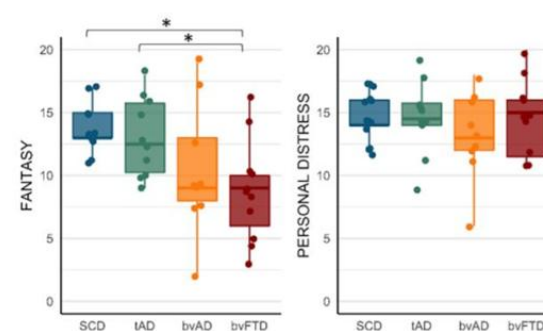
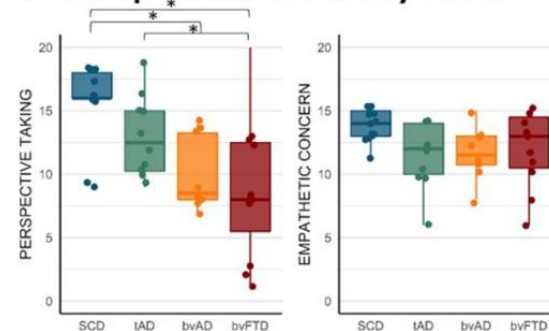
Biometrics



Behavioral Variant of Alzheimer's Disease



A Interpersonal Reactivity Index



A Social Norms Questionn

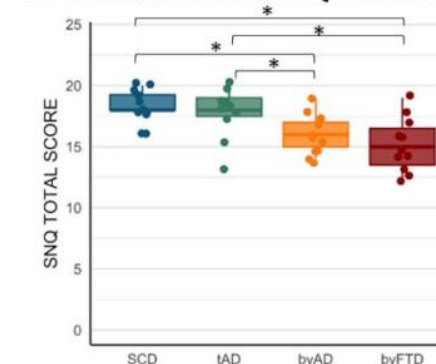


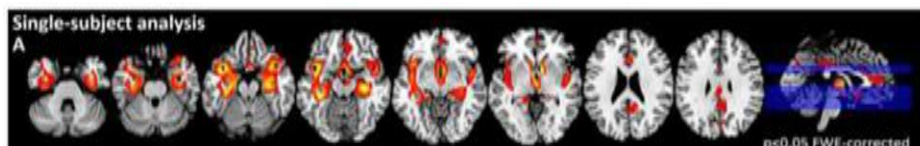
Table 2. Mean Weighted Effect Sizes for Differences Between Patients With MCI and Healthy Controls on Social Cognition Tasks.

Test	Study (k)	MCI	HC	d	95% CI	Z	P	Q	Q (p)	τ^2	Bias (P)	I ² (%)	Estimated Cohen d (CI), Trim and fill
Social cognition	19	513	693	0.59	0.47-0.71	9.4	<.001	17.4	0.44	0	.77	0	No change
Social cognition (aMCI)	15	386	630	0.60	0.45-0.75	7.8	<.001	15.8	0.33	0.01		11	
ToM	6	143	259	0.63	0.35-0.91	4.4	<.001	7.6	0.18	0.04	.62	34	No change
ToM (aMCI)	5	123	234	0.60	0.27-0.92	3.6	<.001	7.0	0.14	0.06		43	
Facial emotion	13	370	434	0.58	0.43-0.73	7.7	<.001	9.8	0.63	0	.92	0	No change
Facial emotion (aMCI)	10	259	396	0.61	0.43-0.78	6.8	<.001	8.8	0.46	0		0	
Anger	8	220	172	0.37	0.15-0.59	3.3	<.001	7.7	0.36	0.01		9	
Fear	7	196	148	0.46	0.24-0.68	4.1	<.001	5.8	0.45	0		0	
Sad	5	169	128	0.46	0.17-0.74	3.5	<.001	5.6	0.26	0.03		23	
Happy	8	220	172	0.18	-0.02-0.39	1.7	.08	3.9	0.79	0		0	
Disgust	5	132	118	0.23	-0.04-0.50	1.7	.09	1.6	0.81	0		0	
Surprise	3	72	36	0.29	-0.12-0.71	1.4	.16	0.9	0.63	0		0	

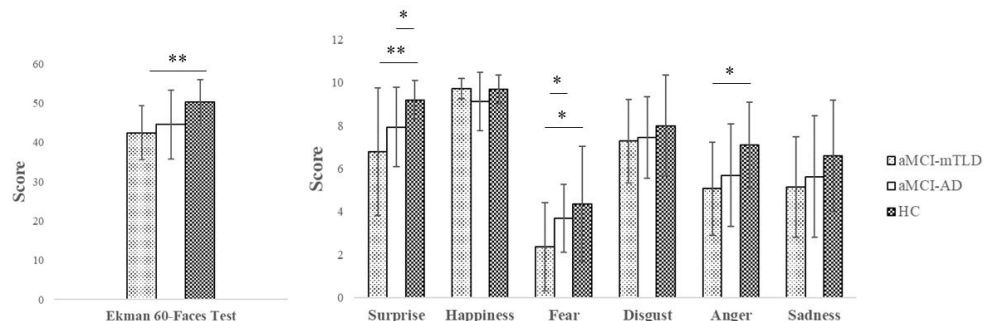
Abbreviations: aMCI, amnesic MCI; CI, confidence interval; d, Cohen's d, HC, healthy controls; ToM, theory of mind; MCI, mild cognitive impairment.

Bora et al., *J Ger Psy Neurol* 2017

EMOTION RECOGNITION DEFICIT IN LONG-LASTING AMNESTIC MCI



Dodich et al. *JINS* 2021



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Neuropsychology

2023, Vol. 37, No. 7, 837–845
<https://doi.org/10.1037/0894-4105.37.7.837>

Self-Assessment of Empathy Uncovers Defective Self-Awareness in Mild Cognitive Impairment

Davide Quaranta^{1, 2}, Chiara Cerami^{3, 4}, Naïke Caraglia¹, Emanuele Maria Costantini¹, Sonia Di Tella², Maria Caterina Silveri², Stefano Cappa^{4, 5}, Simona Gaudino^{6, 7}, Camillo Marra^{1, 8}, and Alessandra Dodich⁹

Table 2

Subjective Rating Discrepancy (SRD) Between the Self-Reported and the Caregiver-Administered IRI Global and Subscale Scores in Mild Cognitive Impairment (MCI) and Healthy Control (HC) Individuals

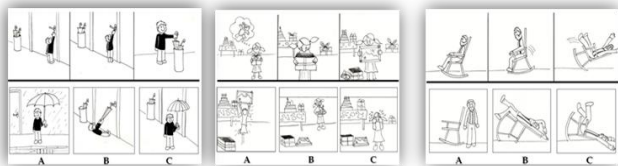
Questionnaire	HC (n = 38)		MCI (n = 20)		Statistics			
	M	SD	M	SD	U	p	pFDR	Cohen's d
Subjective rating discrepancy scores								
IRI global score	2.9	9.73	5.4	11.99	324.00	.235	0.456	0.242
Perspective Taking	0.6	5.79	6.1	5.35	193.50	.001	0.015	0.874
Fantasy	0.7	4.85	0.1	4.87	376.50	.721	0.832	0.015
Empathic Concern	3.0	4.78	2.1	4.72	393.50	.930	0.962	0.058
Personal Distress	-0.9	5.47	-2.9	4.72	299.50	.114	0.428	0.351

Note. pFDR = p corrected according to the false discovery rate method; IRI = Interpersonal Reactivity Index. Significant p-values (p < .05) are highlighted in bold font.

EK-60F



Dodich et al., 2014
Dodich et al., 2015



Story-based Empathy Task

Validation of existing tasks
Development of novel tasks

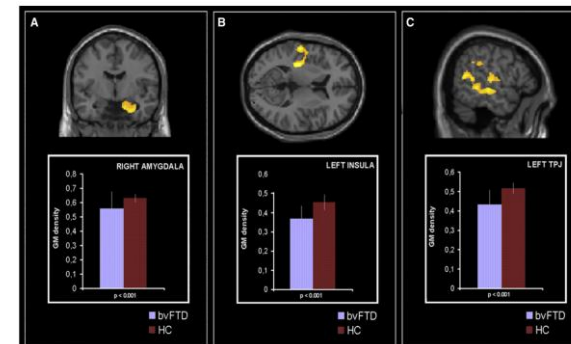


Accuracy estimation & real-life use

Dodich et al., 2016
Dodich et al., 2018
Dodich et al., 2020
Dodich et al., 2021

	AUC	Significance	Cut-off score	Sensitivity	Specificity	Accuracy
bvFTD vs HC						
SET-EA	0.84	p<0.001	4.15	0.81	0.75	78%
EK-60F-GS	0.92	p<0.001	43.1	0.84	0.93	89%
ERA index	0.90	p<0.001	95.8	0.94	0.73	82%
bvFTD vs AD						
SET-EA	0.67	p=0.026	2.3	0.56	0.81	67%
EK-60F-GS	0.78	p<0.001	36.5	0.66	0.85	74%
ERA index	0.74	p=0.002	65	0.63	0.85	72%

Cerami et al., 2014
Caminiti et al., 2015
Cerami et al., 2016
Dodich et al., 2018
Cerami et al., 2018
Campanella et al., 2022
Van den Stock et al., 2023



Validation in clinical populations

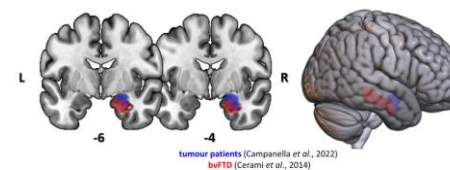
<https://doi.org/10.1093/brain/awad023>

BRAIN 2023; 00; 1-4 | 1

BRAIN
LETTER TO THE EDITOR

Transdiagnostic overlap in brain correlates of affective and cognitive theory of mind deficits

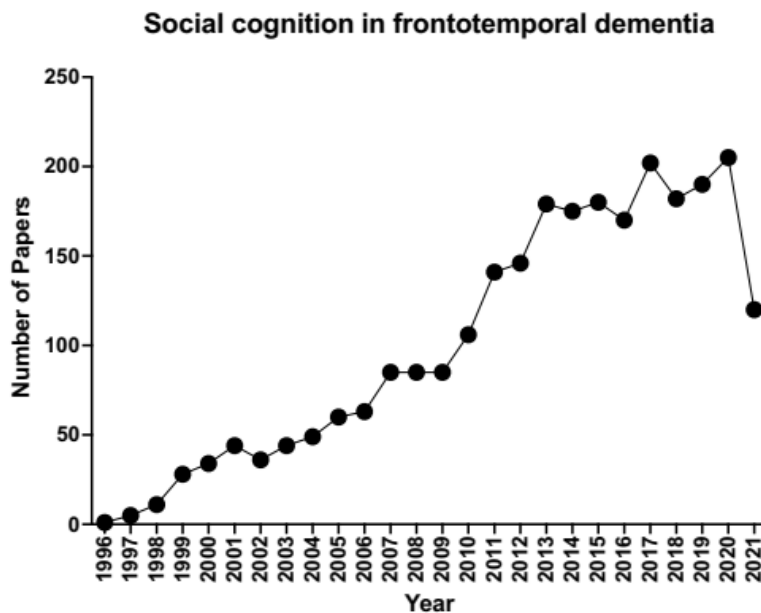
Jan Van den Stock,^{1,2,†} Chiara Cerami,^{3,4,†} Alessandra Dodich,^{5,†} Stefano Cappa,^{3,6} Rik Vandenbergh,^{7,8} François-Laurent De Winter^{1,2} and Mathieu Vandenbulcke^{1,2}



BRAIN
ORIGINAL ARTICLE
Cognitive and affective theory of mind double dissociation after parietal and temporal lobe tumours
Fabio Campanella,¹ Thomas West,² Corrado Corradi-Dell'Acqua³ and Miran Skrap⁴

Huge Mismatch between results from experimental research and clinical implementation

Fig. 1 A Scopus search conducted in July 2021 identified > 2600 papers that used the terms ("frontotemporal dementia" AND ("social cognition" OR "emotion" OR "empathy" OR "theory of mind" OR "mentalizing" OR "affect*")) in the title, abstract or keywords



Van den Stock et al., 2023, Neuropsych Review

Neuropsychology Review (2021) 31:251–266
<https://doi.org/10.1007/s11065-020-09457-1>

REVIEW



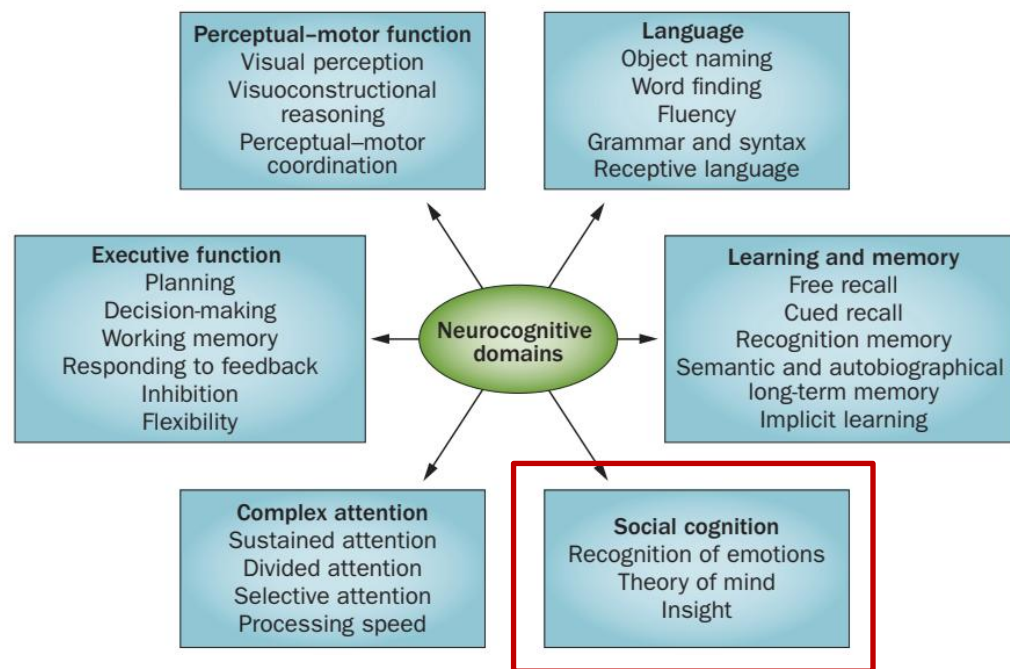
Evaluation of Discriminative Detection Abilities of Social Cognition Measures for the Diagnosis of the Behavioral Variant of Frontotemporal Dementia: a Systematic Review

Alessandra Dodich¹ · Chiara Crespi^{2,3} · Gaia C. Santi⁴ · Stefano F. Cappa^{4,5} · Chiara Cerami^{3,4}

- ✓ Starting from 663 papers, only **14 papers assessed clinical validity** of socio-cognitive tasks in bvFTD
- ✓ Focus on socio-cognitive tasks administered to patients

Neurocognitive Domains

Neurocognitive domains in DSM-5



Sachdev et al., Nature Review 2014

The criteria for the various NCDs are all based on defined cognitive domains. Table 1 provides for each of the key domains a working definition, examples of symptoms or observations regarding impairments in everyday activities, and examples of assessments. The domains thus defined, along with guidelines for clinical thresholds, form the basis on which the NCDs, their levels, and their subtypes may be diagnosed.

Major Neurocognitive Disorder

Diagnostic Criteria

- A. Evidence of significant cognitive decline from a previous level of performance in one or more cognitive domains (complex attention, executive function, learning and memory, language, perceptual-motor, or social cognition) based on:
 1. Concern of the individual, a knowledgeable informant, or the clinician that there has been a significant decline in cognitive function; and
 2. A substantial impairment in cognitive performance, preferably documented by standardized neuropsychological testing or, in its absence, another quantified clinical assessment.
- B. The cognitive deficits interfere with independence in everyday activities (i.e., at a minimum, requiring assistance with complex instrumental activities of daily living such as paying bills or managing medications).

Mild Neurocognitive Disorder

Diagnostic Criteria

- A. Evidence of modest cognitive decline from a previous level of performance in one or more cognitive domains (complex attention, executive function, learning and memory, language, perceptual motor, or social cognition) based on:
 1. Concern of the individual, a knowledgeable informant, or the clinician that there has been a mild decline in cognitive function; and
 2. A modest impairment in cognitive performance, preferably documented by standardized neuropsychological testing or, in its absence, another quantified clinical assessment.
- B. The cognitive deficits do not interfere with capacity for independence in everyday activities (i.e., complex instrumental activities of daily living such as paying bills or managing medications are preserved, but greater effort, compensatory strategies, or accommodation may be required).



Cognitive domain	Examples of symptoms or observations	Examples of assessments
Social cognition (recognition of emotions, theory of mind)	<i>Major:</i> Behavior clearly out of acceptable social range; shows insensitivity to social standards of modesty in dress or of political, religious, or sexual topics of conversation. Focuses excessively on a topic despite group's disinterest or direct feedback. Behavioral intention without regard to family or friends. Makes decisions without regard to safety (e.g., inappropriate clothing for weather or social setting). Typically, has little insight into these changes. <i>Mild:</i> Has subtle changes in behavior or attitude, often described as a change in personality, such as less ability to recognize social cues or read facial expressions, decreased empathy, increased extraversion or introversion, decreased inhibition, or subtle or episodic apathy or restlessness.	<u>Recognition of emotions:</u> Identification of emotion in images of faces representing a variety of both positive and negative emotions. <u>Theory of mind:</u> Ability to consider another person's mental state (thoughts, desires, intentions) or experience—story cards with questions to elicit information about the mental state of the individuals portrayed, such as "Where will the girl look for the lost bag?" or "Why is the boy sad?"

- ✓ Do we have **reliable tools to assess social cognition deficits** in clinical settings?
- ✓ What is the **clinical validity of social cognition measures** in the diagnostic framework of NCDs?

Received: 27 July 2020 | Revised: 11 March 2021 | Accepted: 5 April 2021

DOI: 10.1002/alz.12365

FEATURED ARTICLE

Alzheimer's & Dementia®
THE JOURNAL OF THE ALZHEIMER'S ASSOCIATION

Harmonizing neuropsychological assessment for mild neurocognitive disorders in Europe

- ✓ Social cognition among the **core cognitive domains** to be assessed in NCDs
- ✓ **Story-based Empathy Task** suggested by the Harmonization consortium based on high face validity, ad hoc developed for NCDs, low language and no copyright



2021

Domains – DSM-5	UDS-3	cUDS
General cognitive assessment	MoCA	MoCA
Attention		
sustained		
selective		
divided		
processing speed	Trail making A	Trail making A
Executive function		
planning		
decision making		
working memory	Number span backward	(Digit span backward)
feedback use		
flexibility	Trail making B	Trail making B
Perceptual-motor		
visual perception		
constructional	Benson complex figure copy	(Complex figure copy)
perceptual-motor		
praxis		
gnosis		
Social cognition		
theory of mind		SET
Learning-Memory		
immediate span	Number span forward	(Digit span forward)
recent memory	Craft story 21; Benson complex figure recall	FCSRT (Complex figure recall)
very-long-term memory	Category fluency	Category fluency
Language		
production	MINT; Category/letter fluency	MINT; Category/letter fluency
comprehension		



- ✓ Multiple social cognition instruments developed from a research perspective, but **poor translational efforts toward the use in clinical settings**
- ✓ There is **no consensus on reference standard social cognition task** for the characterization of socio-cognitive deficits in mild NCD
- ✓ **Top-down** (experimental neuropsychology) initiatives based on **bottom-up** (clinical neuropsychology) needs may guide the use of social cognition tools in clinical settings

Understanding barriers and optimizing socio-cognitive assessment in the diagnosis of neurocognitive disorders

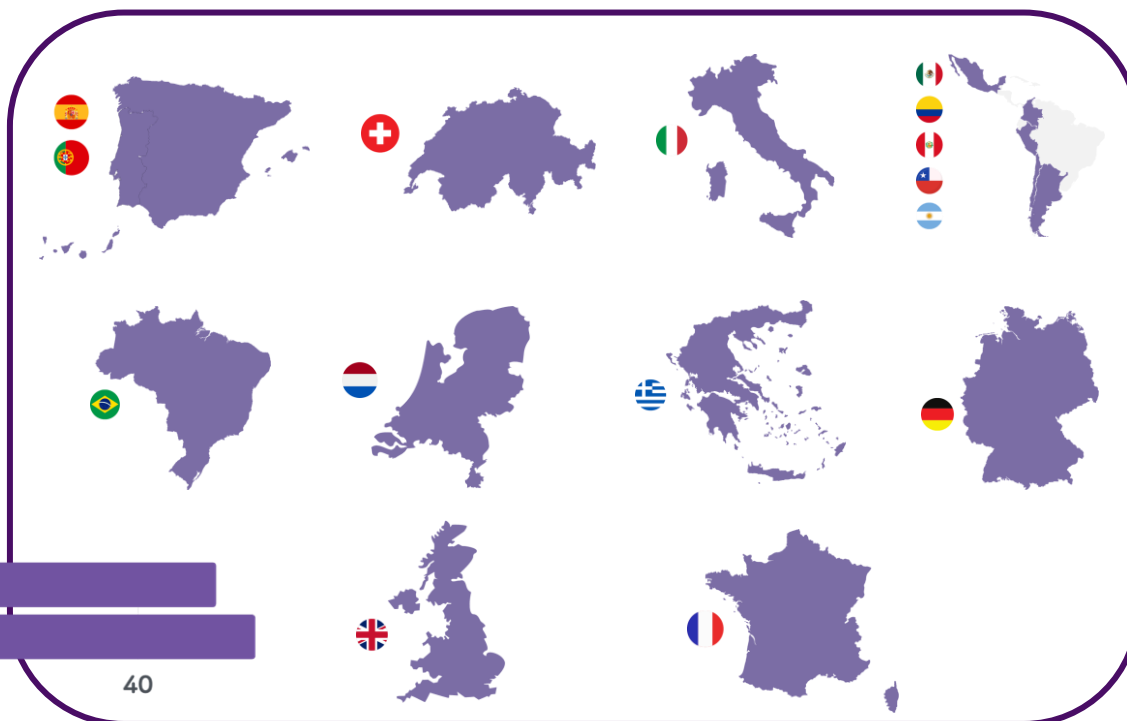
Chiara Cerami^{1,2} | Marina Boccardi^{3,4} | Claudia Meli⁵ |
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Fiona Kumfor^{23,24} | Jan Van den Stock^{38,39} | Kathleen A. Welsh-Bohmer⁴⁰ |
Alessandra Dodich⁵ | on behalf of the SIGNATURE initiative

SURVEY – Exploring *Clinical Experience & Needs* in Socio-Cognitive Testing



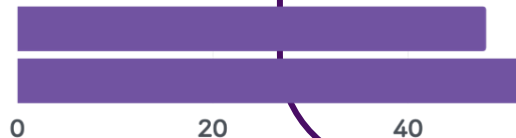
62% FEMALES, 33% MALES
5% PREFER NOT TO ANSWER

430 responses from 10 European & Latin American geographic areas



48% PHYSICIANS

52% PSYCHOLOGISTS



STATE-OF-THE-ART EVALUATION

Phase 2

Clinical experience and
obstacles in the use of
socio-cognitive measures

Understanding barriers and optimizing socio-cognitive assessment in the diagnosis of neurocognitive disorders

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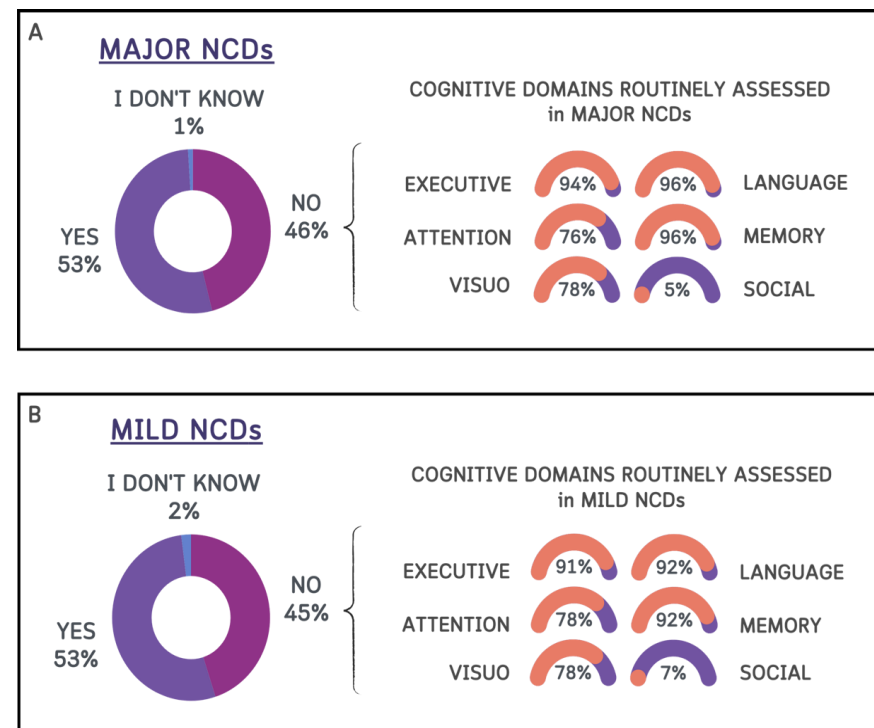
STATE-OF-THE-ART
EVALUATION

Phase 2

Clinical experience and
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SURVEY – Exploring *Clinical Experience & Needs* in Socio-Cognitive Testing

In your centre, are all core DSM-5 cognitive domains **routinely assessed at baseline** evaluation in... ?



Understanding barriers and optimizing socio-cognitive assessment in the diagnosis of neurocognitive disorders

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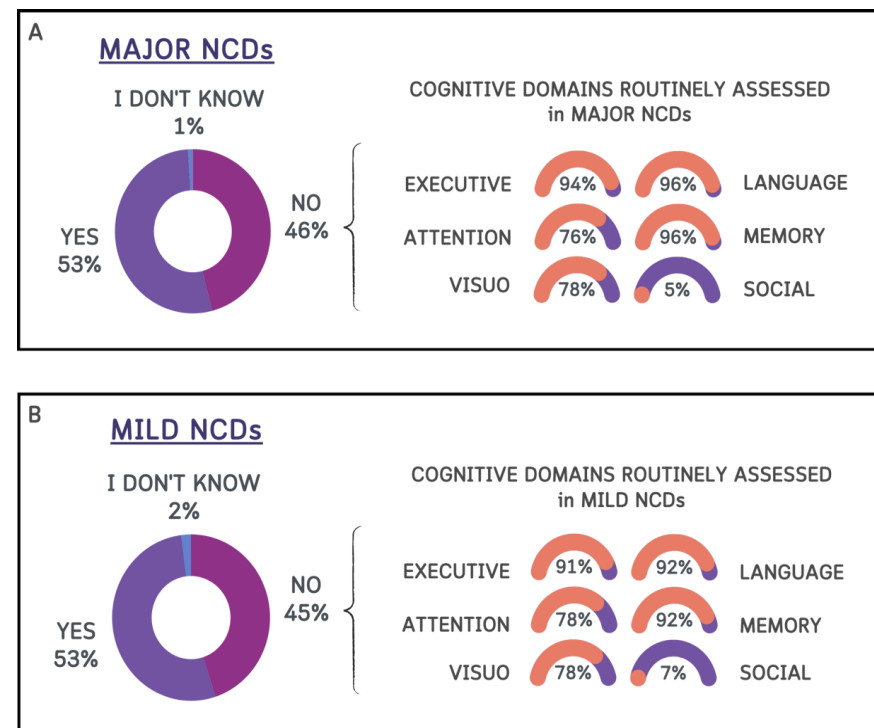
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STATE-OF-THE-ART
EVALUATION

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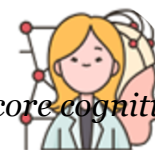
SURVEY – Exploring **Clinical Experience & Needs** in Socio-Cognitive Testing

High perceived relevance vs. low clinical use →

>85% consider social cognition important, yet ~78% report little/no experience

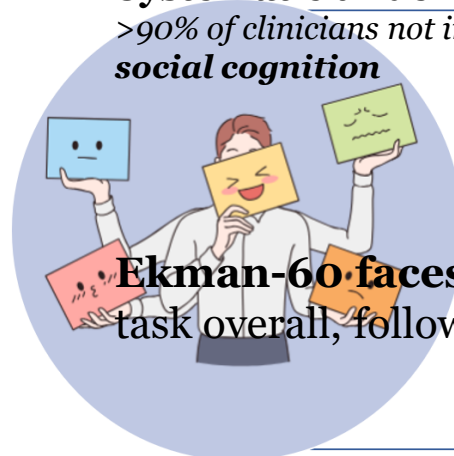
Systematic underassessment →

>90% of clinicians not investigating all six core cognitive domains, **do not assess social cognition**



TRANSLATIONAL NEEDS

From experimental research to clinics



Ekman-60 faces (EK-60F) → the most well-known and used task overall, followed by the **Faux-Pas** and the **RMET**



OPERATIONAL NEEDS

Lack of validated & cross-cultural tools



EDUCATIONAL NEEDS

Guidelines, Education & Training, etc.

IBRO WORKSHOP – Clinical Research Priorities



INTERNATIONAL BRAIN
IBRO
RESEARCH ORGANIZATION



SEPTEMBER
14-15, 2023

SALA DEL CAMINO
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FOR ADVANCED STUDIES
PAVIA ITALY

FIRST INTERNATIONAL
WORKSHOP OF THE
SIGNATURE INITIATIVE



IUSS
Scuola Universitaria Superiore Pavia



IBRO WORKSHOP – Dataset of Available Tools

- ✓ Provide an **open database of clinical tests available** across countries
- ✓ Identify for which tests an **effort is needed to develop normative data** in single countries
- ✓ Define tests to be used for cross-cultural **multi-centric clinical studies**



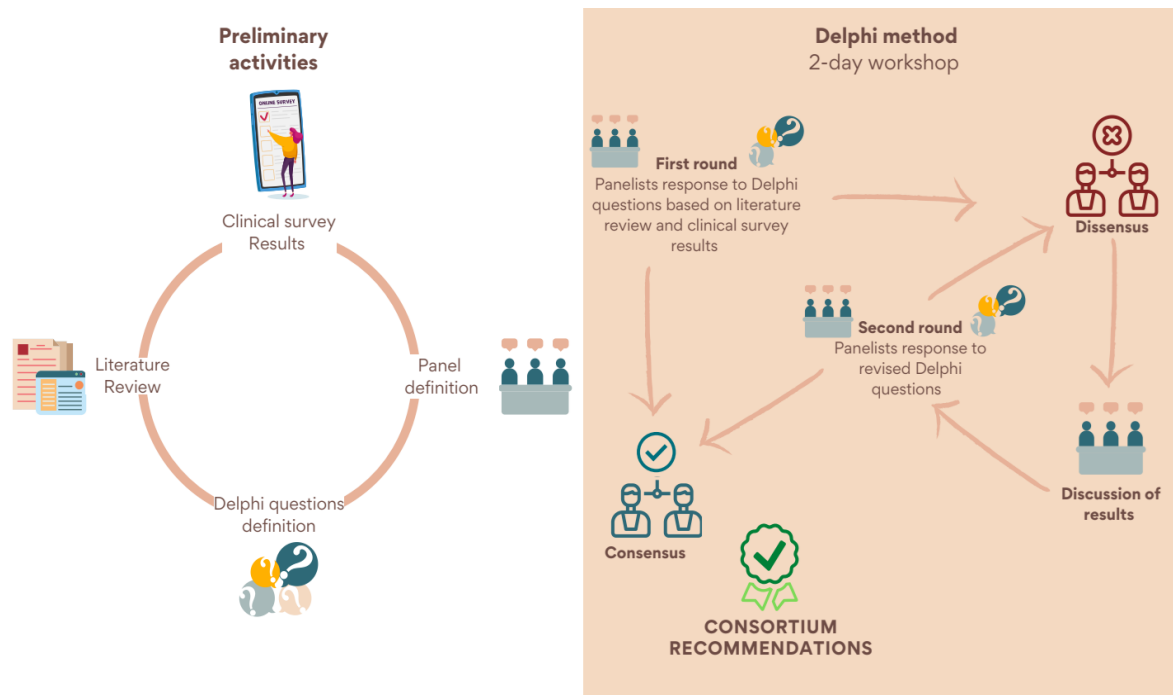
TEST	UK	SWITZERLAND	SPAIN	PORTUGAL	NETHERLANDS	ITALY	GERMANY	FRANCE	CANADA	BRASIL	BELGIUM	ARGENTINA
Picture of facial affect (Ekman 60-Faces test)	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	NO	YES
Faux-pas test	NO	YES	YES	YES	YES	NO	YES	YES	NO	YES	YES	YES
Reading the mind in the Eyes (RMET)	NO	YES	YES	YES	NO	YES	YES		NO	YES	YES	YES
Mini socio-emotional assessment battery (MINI-SEA)	NO	YES	YES	NO	NO	NO	YES	YES	NO	YES	NO	YES
Story-based Empathy task (SET)	NO	YES	YES	NO		YES			NO	NO	YES	
TOM-15 False Belief task	NO	NO	NO	NO		NO		YES	NO	YES	YES	YES
Interpersonal reactivity index	YES	YES	YES	YES	YES	YES	YES		NO	YES	YES	YES
Happé's strange stories	NO	NO	NO	NO	YES	NO			NO	NO	NO	
Sally-Anne test	NO	YES	NO	NO	YES	NO			NO	NO	NO	
NEPSY II affects recognition and theory of mind	YES	NO	NO	NO		NO			NO	YES	NO	
Self-monitoring scale (SMS, r-SMS)	NO	YES	NO	YES	NO	NO			NO	YES	YES	
Edinburgh social cognition test (ESCoT)	YES	NO	NO	NO	NO	YES			NO	NO	NO	NO
The awareness of social inference test (TASIT)	YES	YES	NO	NO	NO	NO			NO	NO	NO	YES
Florida Affect Battery	YES	NO	NO	NO	NO	NO			NO	NO	YES	NO



SCAN THE QR CODE TO ACCESS
TO THE OPEN DATABASE OF
CLINICAL TESTS AVAILABLE
ACROSS COUNTRIES



IBRO WORKSHOP – Clinical-driven Recommendations



Delphi Procedure



Dodich et al. *Alzheimer's Research & Therapy* (2026) 18:6
<https://doi.org/10.1186/s13195-025-01908-2>

Alzheimer's Research & Therapy

RESEARCH

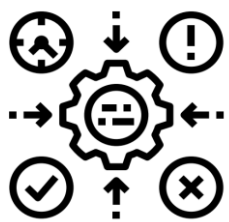
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International consensus for the assessment of social cognition in neurocognitive disorders: framework definition and clinical recommendations of the SIGNATURE initiative

Alessandra Dodich^{1*}, Andrea Panzavolta², Giulia Funghi¹, Claudia Meli¹, Cristina Festari³, Thanos Chatzikostopoulos⁴, Christian Chicherio⁵, Florencia Clarens⁶, Fabricio Ferreira de Oliveira⁷, Marco Filardi⁸, Agustin Ibanez^{9,10,11,12,13}, Laura Invernizzi¹⁴, Thibaud Lebouvier¹⁵, Giancarlo Logroschino¹⁶, Sarah E. MacPherson¹⁷, Riccardo Manca¹⁸, Camillo Marra^{19,20}, Jordi A. Matias-Guiu²¹, Maxime Montembeault²², Costanza Papagno¹, Simone Pomati²³, Mario Possenti²⁴, Olivier Piguet²⁵, Leonardo Sacco²⁶, Ann-Katrin Schild²⁷, Marc Sollberger²⁸, Miguel Tábuas-Pereira^{29,30}, Marianna Tsatali³¹, Magda Tsolaki³², Esther van den Berg³¹, Stefano F. Cappa², Maxime Bertoux³², Fiona Kumfor³³, Jan Van den Stock³⁴, Marina Boccardi^{35,36,37}, Kathleen Anne Welsh-Bohmer³⁸ and Chiara Cerami^{2,39} on behalf of SIGNATURE Consortium

22 Panelists including social cognition experts, clinicians & scientific society and stakeholder representatives from different countries

IBRO WORKSHOP – Clinical-driven Recommendations



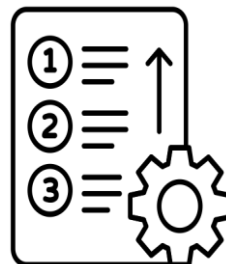
Clinical context of use
(*when* and *to whom*
use socio-cognitive tests)



**Obstacles and
Facilitators**



Relevance of socio-
cognitive testing in the
diagnostic framework



Priorities for future
development



Clinical recommendations
based on available
evidence

Dodich et al. *Alzheimer's Research & Therapy* (2026) 18:6
<https://doi.org/10.1186/s13195-025-01908-2>

Alzheimer's Research &
Therapy

RESEARCH

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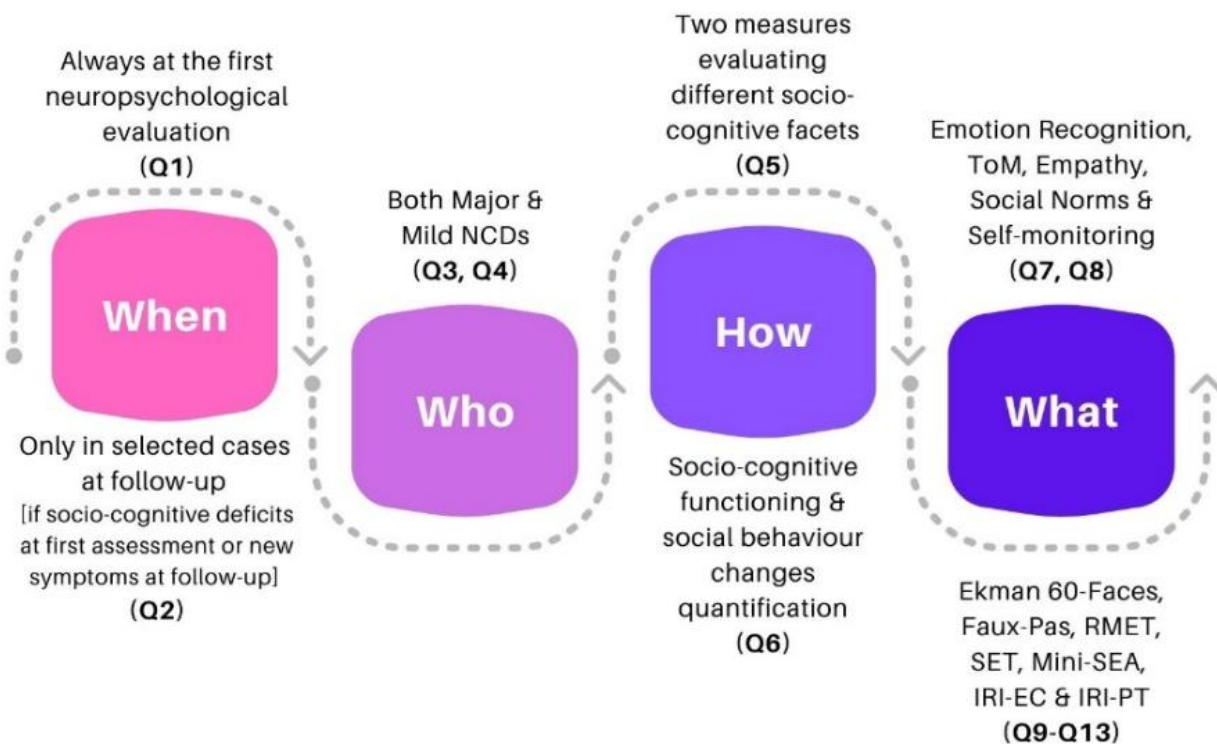


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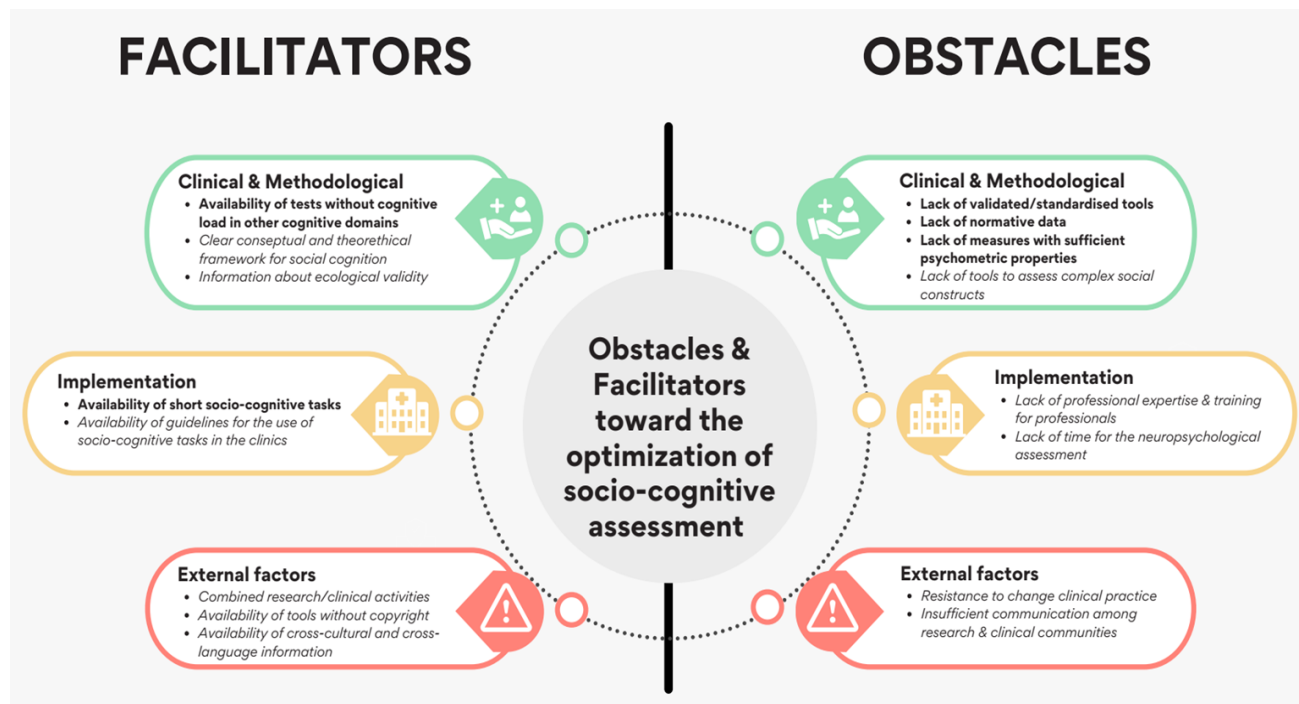
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JPND WORKSHOP – Focus Group activities on NPS assessment and Socio-cognitive testing



SECOND INTERNATIONAL WORKSHOP OF THE SIGNATURE INITIATIVE



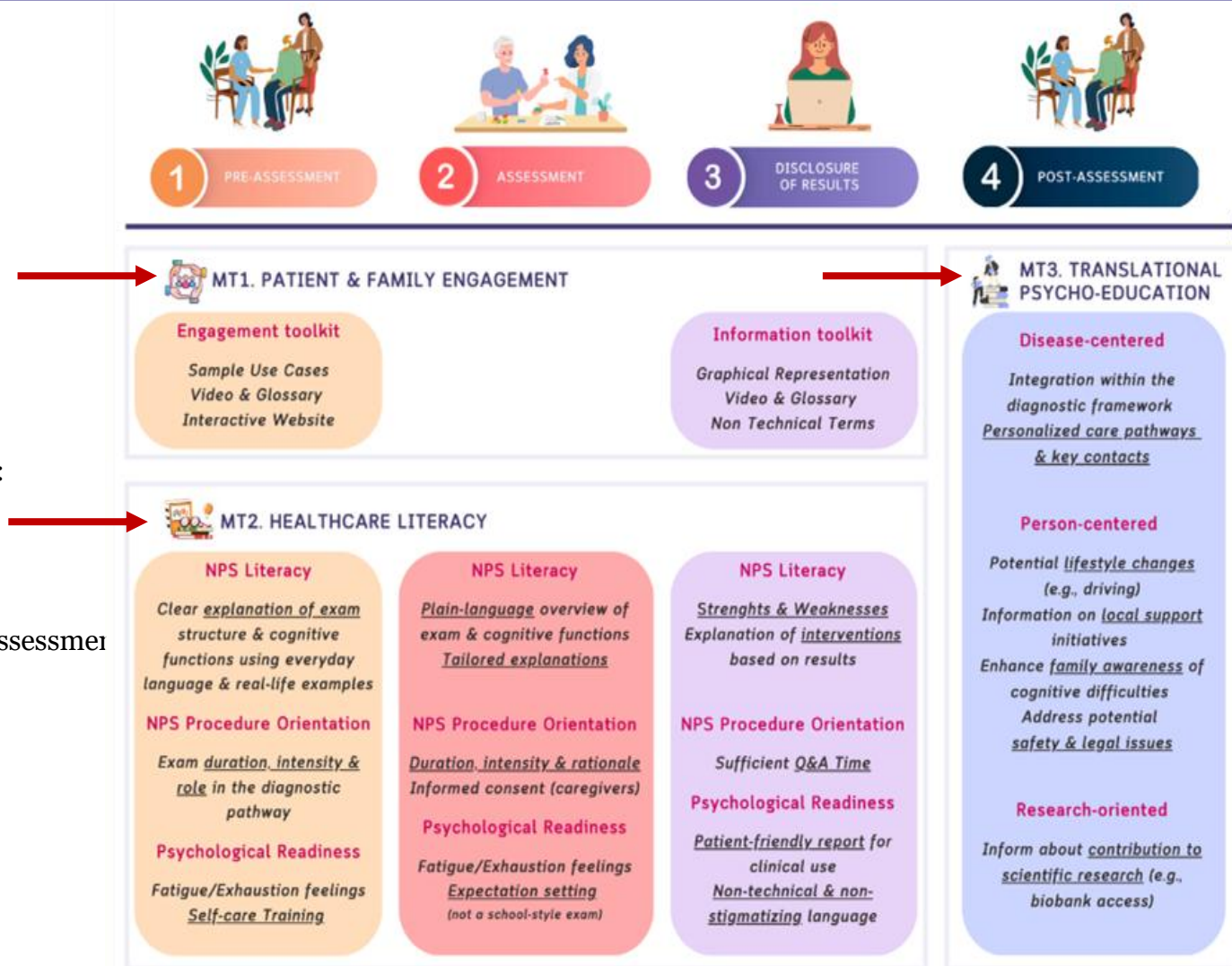
JPND WORKSHOP – Association Representatives & Experts Focus Groups



- ✓ Association representatives identified 3 themes:
Patient & family engagement
Healthcare literacy
Translational psycho-education
- ✓ Experts classified themes in the different NPS assessment phases



Cerami et al., submitted



JPND WORKSHOP – Association Representatives & Experts Focus Groups



- ✓ Discuss patient-oriented **perspective** on the **relevance of the neuropsychological assessment, in particular socio-cognitive**, based on the results of an online survey on European caregivers
- ✓ Focus Group activities to derive a **list of patient-oriented needs** to improve social cognition measure outcomes in clinics

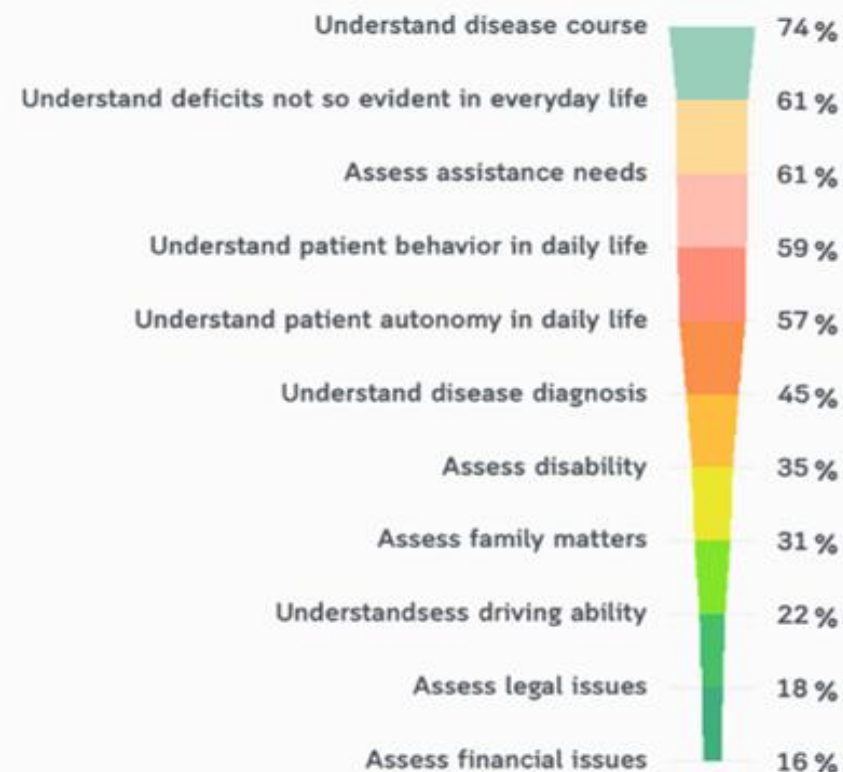


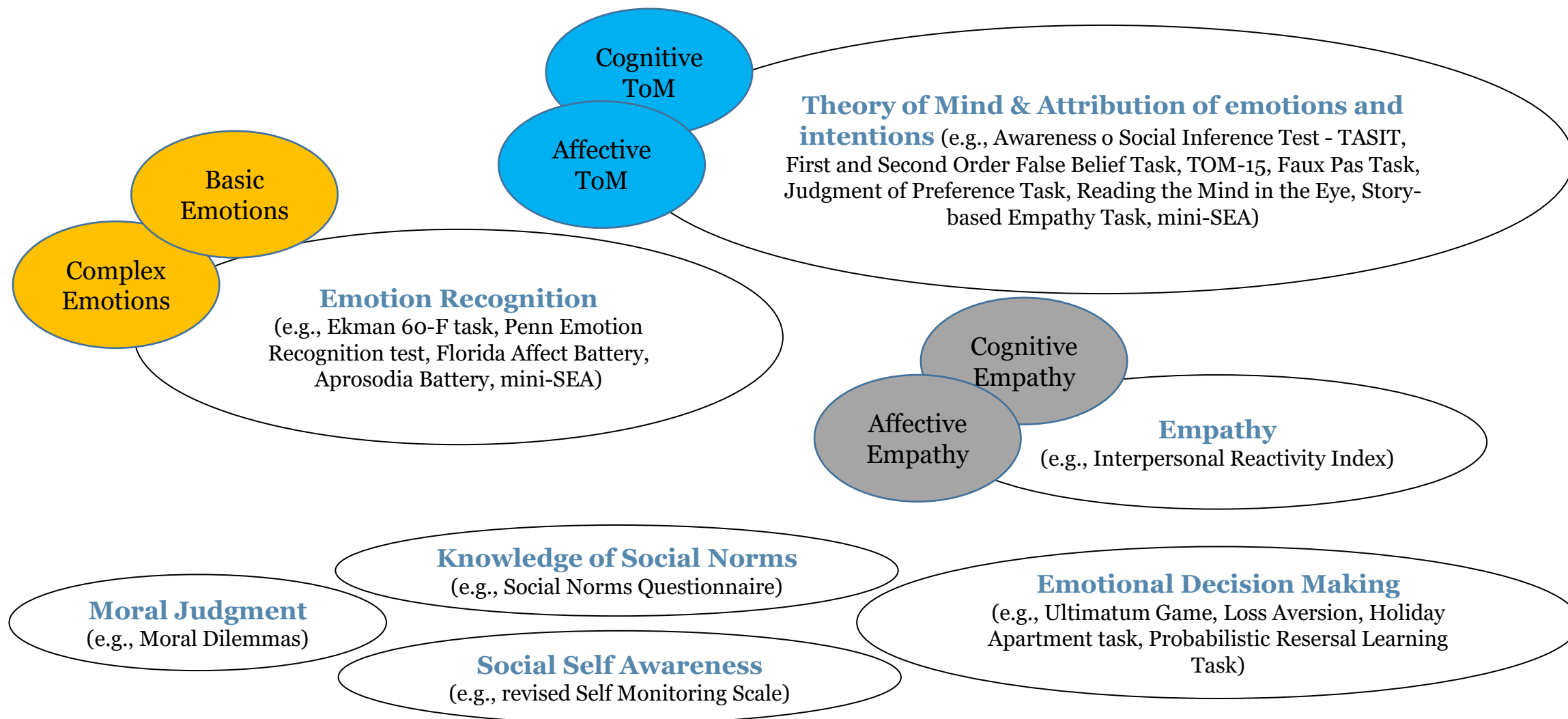
JPND WORKSHOP – Association Representatives & Experts Focus Groups



WORK in
PROGRESS //

Why do you think it is useful to measure cognitive and/or behavioural changes of the person you care for?





The Ekman 60-Faces

- ✓ 60 stimuli eliciting the 6 basic emotions (i.e., happy, fear, anger, disgust, sad, surprise)
- ✓ Global score (0-60) and single emotion score (0-10)
- ✓ Preliminary trial
- ✓ Italian normative data (Dodich et al., 2014; 132 healthy subjects - 20-89 years of age and 3-23 years of education)



Table 1 Demographic data of the 132 healthy controls

Education in years	Age in years						Total (F/M)	Total
	20-29	30-39	40-49	50-59	60-69	70-79		
3-8	1/0	0/0	3/3	4/4	7/6	5/1	20/14	34
9-13	1/5	2/2	4/2	7/7	4/3	4/1	22/20	42
>13	6/8	4/5	2/3	6/6	3/7	4/2	25/31	56
Total (F/M)	8/13	6/7	9/8	17/17	14/16	13/4	67/65	132
Total	21	13	17	34	30	17	132	-

Italian version of Ekman 60 Faces Test (Dodich et al., 2014)

EKMAN TEST 1

Istruzioni: In questo test, le mostreremo dei volti di uomini e donne e un elenco di sei emozioni (sorpresa, felicità, paura, disgusto, rabbia, tristezza). Dovrà dirci, secondo lei, qual è l'emozione che descrive al meglio l'espressione della persona che vedrà sullo schermo. Mi raccomando, presti molta attenzione poiché le immagini le verranno presentate solo per 5 secondi. All'inizio ci sarà un esercizio di prova, dopodiché inizierà il vero test.

Prima di iniziare il test accertarsi che non vi siano difficoltà semantiche nel riconoscimento del concetto di sorpresa, felicità, etc. Chiedere quindi al soggetto di descrivere una situazione in cui si può provare ognuna delle sei emozioni in questione. Es. "secondo lei in quale occasione si prova felicità?". Se il paziente risponde correttamente a tutte e sei le domande, iniziare il test.

	PRACTICE-1		TEST-1		TEST-1		TEST-1		TEST-1
1P		1F		16R		31D		46S	
2R		2R		17S		32F		47D	
3F		3S		18R		33R		48P	
4T		4R		19P		34T		49D	
5D		5T		20P		35F		50T	
6S		6P		21P		36F		51D	
		7F		22D		37F		52P	
		8S		23R		38P		53F	
		9D		24R		39P		54S	
		10T		25D		40T		55S	
		11I		26I		41P		56D	
		12S		27S		42T		57T	
		13S		28T		43T		58F	
		14D		29P		44D		59S	
		15R		30R		45F		60R	

Italian version of Ekman 60 Faces Test (Dodich et al., 2014) - INSTRUCTIONS

Durata complessiva della prova: _____

Risposte Sorpresa: _____ / 10

Risposte Felicità: _____ / 10

Risposte Paura: _____ / 10

Risposte Disgusto: _____ / 10

Risposte Rabbia: _____ / 10

Risposte Tristezza: _____ / 10

Risposte Totale: _____ / 60

LEGENDA:

SORPRESA S ~~Surprise~~
 FELICITÀ F ~~Happiness~~
 PAURA P ~~Fear~~
 DISGUSTO D ~~Disgust~~
 RABBIA R ~~Anger~~
 TRISTEZZA T ~~Sadness~~



SURPRISE

HAPPINESS

FEAR

DISGUST

ANGER

SADNESS



SURPRISE

HAPPINESS

FEAR

DISGUST

ANGER

SADNESS



SURPRISE

HAPPINESS

FEAR

DISGUST

ANGER

SADNESS



SURPRISE

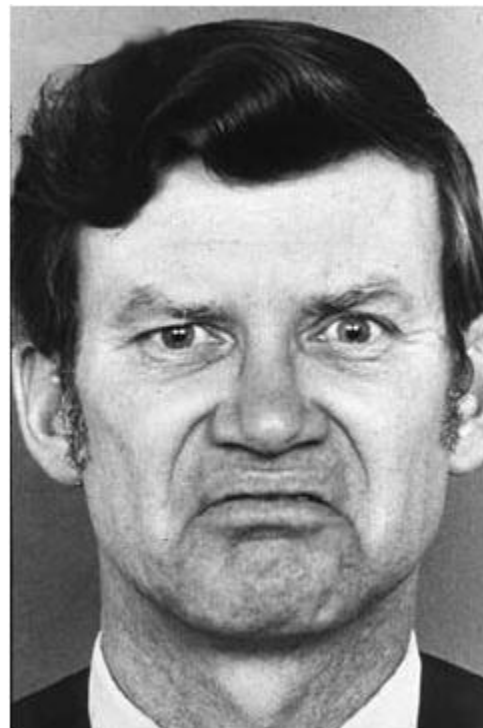
HAPPINESS

FEAR

DISGUST

ANGER

SADNESS



SURPRISE

HAPPINESS

FEAR

DISGUST

ANGER

SADNESS



SURPRISE

HAPPINESS

FEAR

DISGUST

ANGER

SADNESS

Advantages:

- Measure of basic emotion recognition from face expression
- Easy to administer
- Administration time: 10-15 min
- Not linked to executive functions

Disadvantages:

- Linked to attention and visuo-perceptive skills
- Old fashioned stimuli
- Non ecological task



The Reading the Mind in the Eye

- ✓ 36 b/w photos of male and female eye gaze depicting emotional states
- ✓ For each photograph, participants are asked **to describe the emotional state that best describes the eye gaze**, choosing one out of four terms
- ✓ Global Score: 0-36 (number of correct responses)



✓ Italian normative data (Maddaluno et al., 2022; 462 healthy subjects - <35->86 years of age and <5->17 years of education)

Table 1. Demographic characteristic of the sample

M F	Age (years)						
	35≤	36-45	46-55	56-65	66-75	76-85	≥86
Education	35≤	36-45	46-55	56-65	66-75	76-85	≥86
5≤	0	0	1	1	3	6	0
	0	0	0	0	9	14	5
6-11	3	2	1	4	9	10	0
	0	1	9	9	11	5	2
12-16	75	8	13	10	8	2	0
	101	7	23	23	1	5	1
≥17	13	5	4	7	2	1	0
	14	7	6	6	3	0	2
Total	206	30	57	60	46	43	8

Number of males/females (M/F) for each age/education range.

- ✓ Participants first read a sheet of paper with task instructions in which is asked to look at each photograph reproduced on the following sheets, to read the four terms below and indicate the one that best described the gaze in the photo
- ✓ Participants also perform a control task in which they are asked to recognize the gender of the people portrayed in the stimuli
- ✓ In addition to the response protocol, the subject is given a glossary for the words included in the test and the instruction to use it in case of uncertainty

Istruzioni

Per ognuna delle immagini di occhi, scelga e indichi la parola che meglio descrive ciò che la persona nella fotografia sta pensando o sentendo. Potrebbe sembrare che più di una possibilità sia corretta ma per favore scelga una sola parola, quella che considera più adatta. Prima di scegliere, si accerti di aver letto tutte 4 le parole. Indichi inoltre se gli occhi appartengono al volto di un uomo o di una donna.

L'esercizio non sarà cronometrato, ma cerchi di svolgere il compito il più velocemente possibile. Se non ricorda cosa significa una parola può controllare sulla lista delle definizioni allegata in fondo.

Test degli occhi Foglio notazione

Soggetto n° _____

Istruzioni. Per ognuna delle immagini di occhi, scelga e indichi la parola che meglio descrive ciò che la persona nella fotografia sta pensando o sentendo. Indichi inoltre se gli occhi appartengono al volto di un uomo o di una donna. Nel caso in cui il soggetto non conosca alcune definizioni è possibile consultare il file delle definizioni

	Stim 1	Stim 2	Stim 3	Stim 4	M/T
Prova	Invidioso	Preso dal panico	Arrogante	Pieno d'odio	M
1	Giocoso	Confortante	Irritato	Anniciato	M
2	Terrorizzato	Turbato	Arrogante	Infastidito	M
3	Scherzoso	Contrariato	Con brama	Convinto	F
4	Scherzoso	Insistente	Divertito	Rilassato	M
5	Irritato	Sarcastico	Preoccupato	Amichevole	M
6	Atterrito	Sognante	Impaziente	Allarmato	F
7	Contrito	Amichevole	A disagio	Abbattuto	M
8	Sconfortato	Sollevato	Intimidito	Eccitato	M
9	Infastidito	Ostile	Assorto	Inorridito	F
10	Guardingo	Insistente	Annoiato	Atterrito	M
11	Terrorizzato	Divertito	Addolorato	Civettuolo	M
12	Indifferente	Imbarazzato	Scettico	Abbattuto	M
13	Determinato	Speranzoso	Minaccioso	Intimidito	M
14	Irritato	Deluso	Depresso	Accusatore	M
15	Contemplativo	Contrariato	Incoraggiante	Divertito	F
16	Irritato	Pensieroso	Incoraggiante	Comprensivo	M
17	Dubbioso	Affettuoso	Giocoso	Atterrito	F
18	Determinato	Divertito	Atterrito	Anniciato	F
19	Arrogante	Riconoscente	Sarcastico	Esitante	F
20	Dominante	Amichevole	Colpevole	Inorridito	M
21	Imbarazzato	Sognante	Confuso	Preso dal panico	F
22	Assorto	Riconoscente	Insistente	Implorante	F
23	Soddisfatto	Contrito	Insolente	Curioso	M
24	Pensoso	Irritato	Eccitato	Ostile	M
25	Preso dal panico	Incredulo	Sconfortato	Interessato	F
26	Allarmato	Intimidito	Ostile	Ansioso	M
27	Scherzoso	Guardingo	Arrogante	Rassicurante	F
28	Interessato	Scherzoso	Affettuoso	Soddisfatto	F
29	Impaziente	Atterrito	Irritato	Riflessivo	F
30	Riconoscente	Civettuolo	Ostile	Deluso	F
31	Che ha vergogna	Fiducioso	Scherzoso	Abbattuto	F
32	Serio	Che ha vergogna	Sbalordito	Allarmato	M
33	Imbarazzato	Colpevole	Sognante	Coinvolto	M
34	Atterrito	Concertato	Diffidente	Terrorizzato	F
35	Perplesso	Nervoso	Insistente	Contemplativo	F
36	Che ha vergogna	Nervoso	Sospettoso	Indeciso	M

Punteggio complessivo occhi _____

Punteggio complessivo genere _____

- ✓ One practice item
- ✓ Examiner must sign emotion and gender for each stimuli
- ✓ Eye and Gender scores



Invidioso
(jealous)

Preso dal panico
(panicked)

Arrogante
(arrogant)

Pieno d'odio
(hateful)



Invidioso
(jealous)

Preso dal panico
(panicked)

Arrogante
(arrogant)

Pieno d'odio
(hateful)



Giocosso
(playful)

Confortante
(comforting)

Irritato
(irritated)

Annoiato
(bored)



Giocosso
(playful)

Confortante
(comforting)

Irritato
(irritated)

Annoiato
(bored)



Terrorizzato
(terrified)

Turbato
(upset)

Arrogante
(arrogant)

Infastidito
(annoyed)

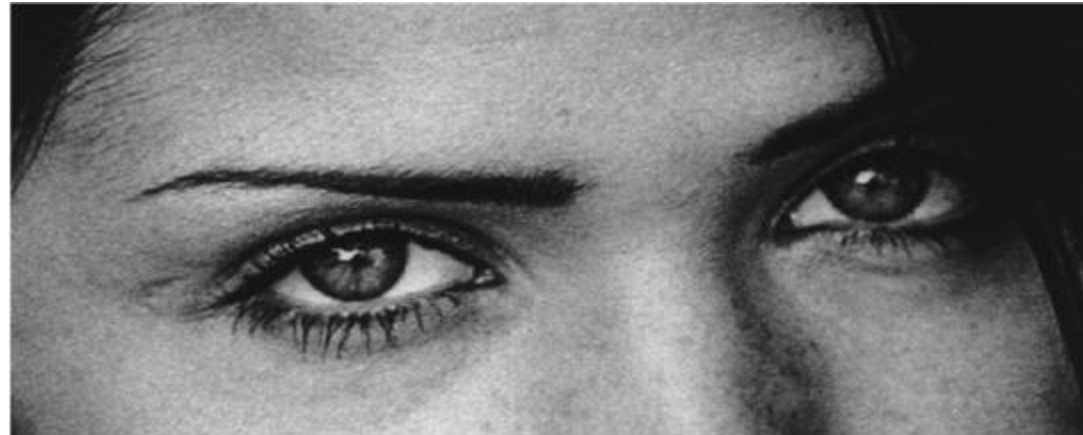


Terrorizzato
(terrified)

Turbato
(upset)

Arrogante
(arrogant)

Infastidito
(annoyed)

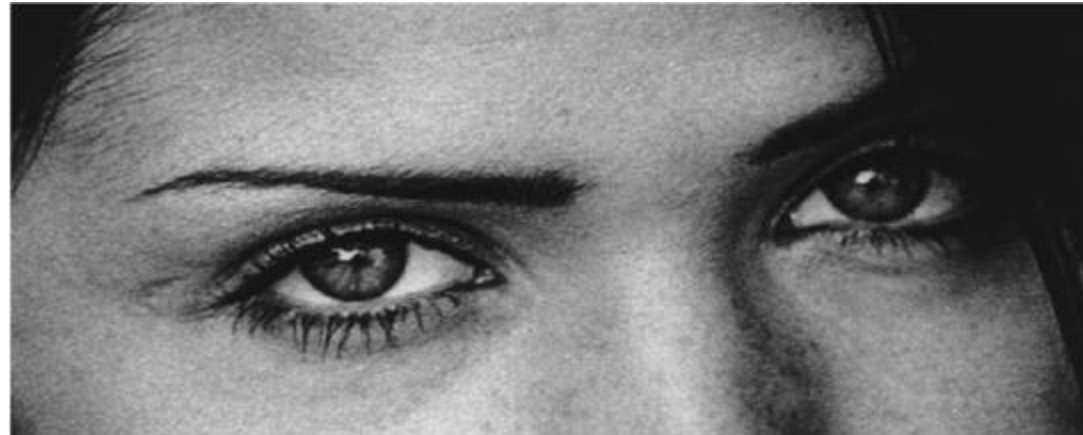


Scherzoso
(joking)

Contrariato
(flustered)

Con brama
(desire)

Convinto
(convinced)



Scherzoso
(joking)

Contrariato
(flustered)

Con brama
(desire)

Convinto
(convinced)



Scherzoso
(joking)

Insistente
(insisting)

Divertito
(amused)

Rilassato
(relaxed)



Scherzoso
(joking)

Insistente
(insisting)

Divertito
(amused)

Rilassato
(relaxed)



Irritato
(irritated)

Sarcastico
(sarcastic)

Preoccupato
(worried)

Amichevole
(friendly)



Irritato
(irritated)

Sarcastico
(sarcastic)

Preoccupato
(worried)

Amichevole
(friendly)

APPENDICE 1

Lista dei termini utilizzati nel TDO. In grassetto sono riportate le parole bersaglio

prova (practice)	invidioso (jealous)	preso dal panico (panicked)	arrogante (arrogant)	pieno d'odio (hateful)
1	giocosso (playful)	confortante (comforting)	irritato (irritated)	annoiato (bored)
2	terrorizzato (terrified)	turbato (upset)	arrogante (arrogant)	infastidito (annoyed)
3	scherzoso (joking)	contrariato (flustered)	con brama (desire)	convinto (convinced)
4	scherzoso (joking)	insistente (insisting)	divertito (amused)	rilassato (relaxed)
5	irritato (irritated)	sarcastico (sarcastic)	preoccupato (worried)	amichevole (friendly)
6	atterrito (aghast)	sognante (fantasizing)	impaziente (impatient)	allarmato (alarmed)
7	contrito (apologetic)	amichevole (friendly)	a disagio (uneasy)	abbattuto (dispirited)
8	sconfortato (despondent)	sollevato (relieved)	intimidito (shy)	eccitato (excited)
9	infastidito (annoyed)	ostile (hostile)	inorridito (horrified)	assorto (preoccupied)
10	guardingo (cautious)	insistente (insisting)	annoiato (bored)	atterrito (aghast)
11	terrorizzato (terrified)	divertito (amused)	addolorato (regretful)	civettuolo (flirtatious)

prova (practice)	invidioso (jealous)	preso dal panico (panicked)	arrogante (arrogant)	pieno d'odio (hateful)
12	indifferente (indifferent)	imbarazzato (embarrassed)	scettico (sceptical)	abbattuto (dispirited)
13	determinato (decisive)	speranzoso (anticipating)	minaccioso (threatening)	intimidito (shy)
14	irritato (irritated)	deluso (disappointed)	depresso (depressed)	accusatore (accusing)
15	contemplativo (contemplative)	contrariato (flustered)	incoraggiante (encouraging)	divertito (amused)
16	irritato (irritated)	pensieroso (thoughtful)	incoraggiante (encouraging)	comprensivo (sympathetic)
17	dubbioso (doubtful)	affettuoso (affectionate)	giocosso (playful)	atterrito (aghast)
18	determinato (decisive)	divertito (amused)	atterrito (aghast)	annoiato (bored)
19	arrogante (arrogant)	riconoscente (grateful)	sarcastico (sarcastic)	esitante (tentative)
20	dominante (dominant)	amichevole (friendly)	colpevole (guilty)	inorridito (horrified)
21	imbarazzato (embarrassed)	sognante (fantasizing)	confuso (confused)	preso dal panico (panicked)
22	assorto (preoccupied)	riconoscente (grateful)	insistente (insisting)	implorante (imploing)
23	soddisfatto (contented)	contrito (apologetic)	insolente (defiant)	curioso (curious)
24	pensoso (pensive)	irritato (irritated)	eccitato (excited)	ostile (hostile)
25	preso dal panico (panicked)	incredulo (incredulous)	sconfortato (despondent)	interessato (interested)
26	allarmato (alarmed)	intimidito (shy)	ostile (hostile)	ansioso (anxious)
27	scherzoso (joking)	guardingo (cautious)	arrogante (arrogant)	rassicurante (reassuring)
28	interessato (interested)	scherzoso (joking)	affettuoso (affectionate)	soddisfatto (contented)
29	impaziente (impatient)	atterrito (aghast)	irritato (irritated)	riflessivo (reflective)
30	riconoscente (grateful)	civettuolo (flirtatious)	ostile (hostile)	deluso (disappointed)
31	che ha vergogna (ashamed)	fiducioso (confident)	scherzoso (joking)	abbattuto (dispirited)
32	serio (serious)	che ha vergogna (ashamed)	sbalordito (bewildered)	allarmato (alarmed)
33	imbarazzato (embarrassed)	colpevole (guilty)	sognante (fantasizing)	coinvolto (concerned)
34	atterrito (aghast)	sconcertato (baffled)	diffidente (distrustful)	terrorizzato (terrified)
35	perplesso (puzzled)	nervoso (nervous)	insistente (insisting)	contemplativo (contemplative)
36	che ha vergogna (ashamed)	nervoso (nervous)	sospettoso (suspicious)	indeciso (indecisive)

APPENDICE 2

*Glossario**ABBATTUTO.*

Essere avvilito, in preda allo sconforto, trovarsi in uno stato di prostrazione.

«Adamo era molto abbattuto per non aver passato l'esame».

ACCUSATORIO.

Chi attribuisce la colpa di un evento a qualcosa o a qualcuno.

«Il poliziotto osservava il ladro con aria accusatoria».

ADDOLORATO.

Chi prova dolore, specialmente di tipo spirituale.

«Sono addolorato di non poter venire».

A DISAGIO.

Non sentirsi a proprio agio, essere in difficoltà ed infastidito.

«Kate si sentiva a disagio nell'accettare un passaggio da quel ragazzo appena conosciuto».

AFFETTUOSO.

Chi dimostra affetto ed intimità.

«Molte madri appaiono affettuose con i loro figli, dando carezze e baci».

ALLARMATO.

Chi si pone in uno stato d'agitazione e trepidazione.

«Caterina si mostrò allarmata nell'accorgersi di essere stata seguita fino a casa».

AMICHEVOLE.

Chi si comporta da amico, essere gentile e collaborante.

«Quella donna sconosciuta fu molto amichevole con noi: ci accompagnò fino alla stazione».

✓ Glossary with full description of the meanings of each term provided should help participants with poorer lexicon competences in order to avoid uncertainties

Advantages:

- Measure of affective ToM
- Easy to administer
- Not linked to executive functions

Disadvantages:

- Linked to verbal abilities
- Difficulties in terms (e.g., con brama)
- Old fashioned stimuli
- Administration time: 20 min
- Limited to affective ToM
- Non ecological stimuli



The Face Test

- ✓ 36 b/w photos of male and female depicting emotional states
- ✓ For each photograph, participants are asked to **describe the emotional state that best describe the face in the photo**, choosing one out of four terms
- ✓ 2 Short Version with 18 photos
- ✓ Global Score: 0-36 (number of correct responses)



SERIO
SHOCKATO
OSTILE
DESIDEROSO

Education in years	Age in years						
	18–29	30–39	40–49	50–59	60–69	70–79	≥80
≤5	NA	NA	NA	NA	21.0	27.8 ± 6.4	23.6 ± 2.9
6–8	NA	NA	26.0 ± 1.0	27.8 ± 3.0	26.9 ± 2.9	26.7 ± 3.5	28.0 ± 0.0
9–16	30.6 ± 3.1	31.8 ± 2.2	30.1 ± 2.8	29.1 ± 2.9	28.1 ± 3.6	26.1 ± 3.5	25.8 ± 2.0
≥17	32.3 ± 2.8	31.7 ± 2.9	31.0 ± 2.6	30.4 ± 1.5	28.2 ± 3.0	29.4 ± 2.9	30.0 ± 4.2

Italian normative data
(Terruzzi et. Al 2023)

Esempio

	Stimolo target	Risposta 1	Risposta 2	Risposta 3	Risposta 4
Es.	OSTILE	Serio	Shockato	Ostile	Desideroso

Test

	Stimolo target	Risposta 1	Risposta 2	Risposta 3	Risposta 4
1	RALLEGRATO	Desideroso	Rallegrato	Incuriosito	Minaccioso
2	TERRORIZZATO	Terrorizzato	Imbarazzato	Sprezzante	Sollevato
3	CONTEMPLATIVO	Spiritoso	Colpevole	Contemplativo	Affascinato
4	SUPPLICHEVOLE	Suppliehevole	Affettuoso	Scettico	Minaccioso
5	AFFABILE	Pensieroso	Convinto	Entusiasta	Affabile
6	PERPLESSO	Rassicurante	Atterrito	Perplesso	Imbarazzato
7	INORRIDITO	Inorridito	Scherzoso	Esitante	Accusatorio
8	SODDISFATTO	Spiritoso	Soddisfatto	Accusatorio	Assorto
9	SPAVENTATO	Spaventato	Scettico	Irritato	Desideroso
10	SARCASTICO	Indignato	Incoraggiante	Sarcastico	Indifferente
11	SPIRITOSO	Affascinato	Spiritoso	Rammaricato	Riconoscente
12	INTERDETTO	Insistente	Terrorizzato	Rilassato	Interdetto
13	ESITANTE	Affabile	Esitante	Inorridito	Curioso
14	SBALORDITO	Diffidente	Suppliehevole	Sbalordito	Soddisfatto
15	DOMINANTE	Demoralizzato	Divertito	Dispiaciuto	Dominante
16	SCHERZOSO	Scherzoso	Sicuro	Assorto	Shockato
17	RILASSATO	Spiritoso	Fermo	Incredulo	Rilassato
18	INFELICE	Teso	Insolente	Infelice	Confortante
19	SHOCKATO	Soddisfatto	Shockato	Dubbioso	Sprezzante
20	DIVERTITO	Affettuoso	Sospettoso	Riflessivo	Divertito
21	INDECISO	Indeciso	Spaventato	Colpevole	Affabile
22	SOSPETTOSO	Turbato	Desideroso	Sospettoso	Sconcertato
23	APPAGATO	Divertito	Appagato	Confuso	Assorto
24	SCETTICO	Scettico	Disorientato	Sognante	Insistente
25	MINACCIOSO	Scherzoso	Minaccioso	Indignato	Indifferente
25	SOGNANTE	Rilassato	Imbarazzato	Sognante	Entusiasta
27	CONFUSO	Serio	Incoraggiante	Insolente	Confuso
28	RIFLESSIVO	Appagato	Riflessivo	Incuriosito	Seccato
29	ENTUSIASTA	Desideroso	Preoccupato	Entusiasta	Assorto
30	SCONTENTO	Scontento	Sprezzante	Incredulo	Convinto
31	SERIO	Invidioso	Serio	Affascinato	Suppliehevole
32	PENSIEROSO	Sbalordito	Incredulo	Affabile	Pensieroso
33	ALLARMATO	Allarmato	Sicuro	Dispiaciuto	Invidioso
34	SICURO	Dispiaciuto	Entusiasta	Sicuro	Rilassato
35	SOLLEVATO	Agitato	Sicuro	Affascinato	Sollevato
36	DIFFIDENTE	Diffidente	Sarcastico	Incuriosito	Indeciso

✓ One practice item

✓ Examiner must sign emotion for each stimuli



TERRORIZZATO
IMBARAZZATO
SPREZZANTE
SOLLEVATO



SPIRITOSO
COLPEVOLE
CONTEMPLATIVO
AFFASCINATO

Glossario

- A. **Accusatorio:** Chi attribuisce la colpa di un evento a qualcosa o a qualcuno.
- Affabile:** Chi si comporta da amico, essere gentile e collaborante.
- Affascinato:** Chi è attratto irresistibilmente, ammaliato e incantato.
- Affettuoso:** Amorevole, tenero, che dimostra intimità.
- Agitato:** Chi è pieno d'ansia e di nervosismo, essere impaziente.
- Allarmato:** Chi si pone in uno stato d'agitazione e trepidazione.
- Appagato:** Chi riesce a esaudire un bisogno spirituale, un desiderio.
- Assorto:** Chi è profondamente intento con l'animo e la mente a riflettere su qualcosa.
- Atterrito:** Provare una paura intensa, sentirsi in pericolo e non avere via di fuga.
- C. **Colpevole:** Chi è responsabile o si sente in colpa.
- Confortante:** Chi consola e sostiene qualcuno affetto da dolore fisico o psicologico.
- Confuso:** Cui manca chiarezza, precisione e lucidità.
- Contemplativo:** Chi medita e fissa il pensiero su qualcosa.
- Convinto:** Essere certo delle proprie opinioni e principi, acquistati dopo maturo esame.
- Curioso:** Chi vuol sapere, indagare e conoscere.
- D. **Demoralizzato:** Essere avvilito, in preda allo sconforto, trovarsi in uno stato di prostrazione.
- Desideroso:** Chi aspira intensamente a colmare una mancanza o a soddisfare un bisogno.
- Diffidente:** Chi non si fida o che mostra sfiducia e sospetto.
- Disorientato:** Chi è confuso, turbato e ha perso l'orientamento.

✓ Glossary with full description of the meanings of each term provided should help participants with poorer lexicon competences in order to avoid uncertainties

Advantages:

- Measure of affective ToM
- Easy to administer
- Not linked to executive functions
- 2 parallel shorter version available (with normative data)

Disadvantages:

- Linked to verbal and visuo-perceptual abilities
- Difficulties with some terms
- Restricted to affective ToM



SERIO
SHOCKATO
OSTILE
DESIDEROSO

The Story-based Empathy Task



Alzheimer's & Dementia ■ (2014) 1–8

Alzheimer's
&
Dementia

Research Article

Neural correlates of empathic impairment in the behavioral variant of frontotemporal dementia

Chiara Cerami^{a,b,c}, Alessandra Dodich^{a,c}, Nicola Canessa^{a,c}, Chiara Crespi^{a,c},
Alessandra Marcone^b, Francesca Cortese^a, Gabriele Chierchia^a, Elisa Scola^{a,d},
Andrea Falini^{a,d}, Stefano F. Cappa^{a,b,c,*}

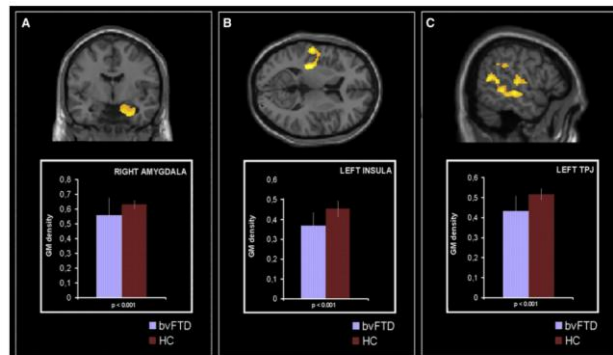
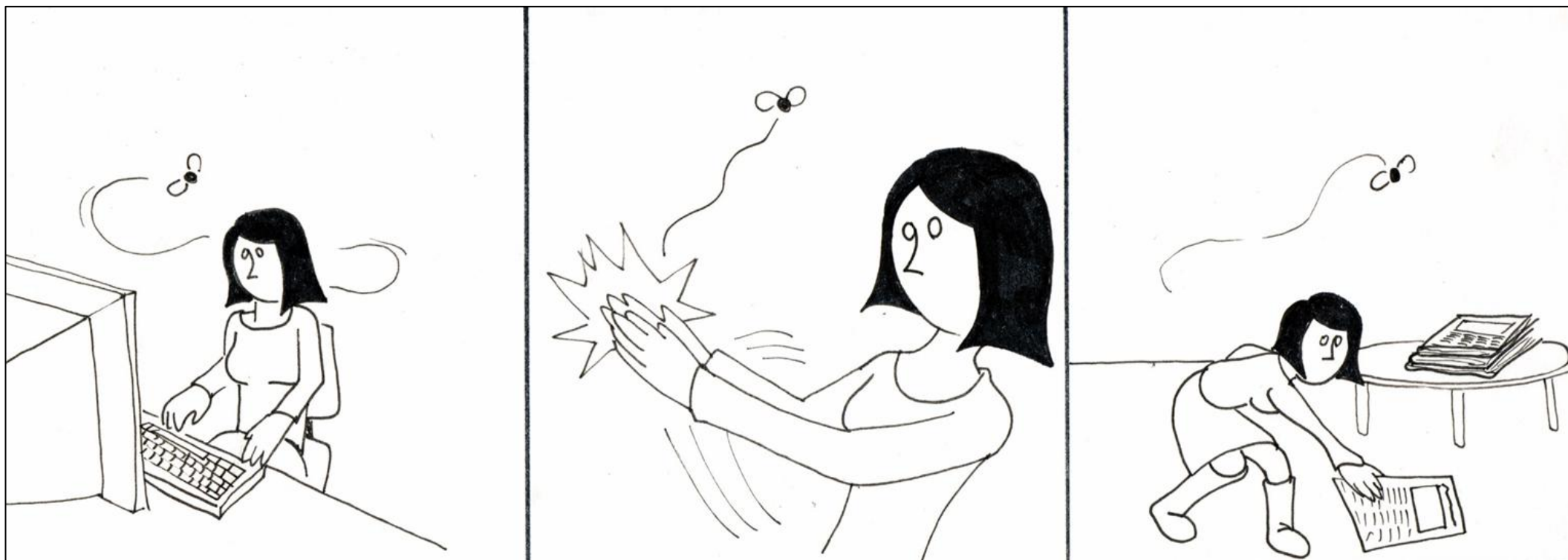


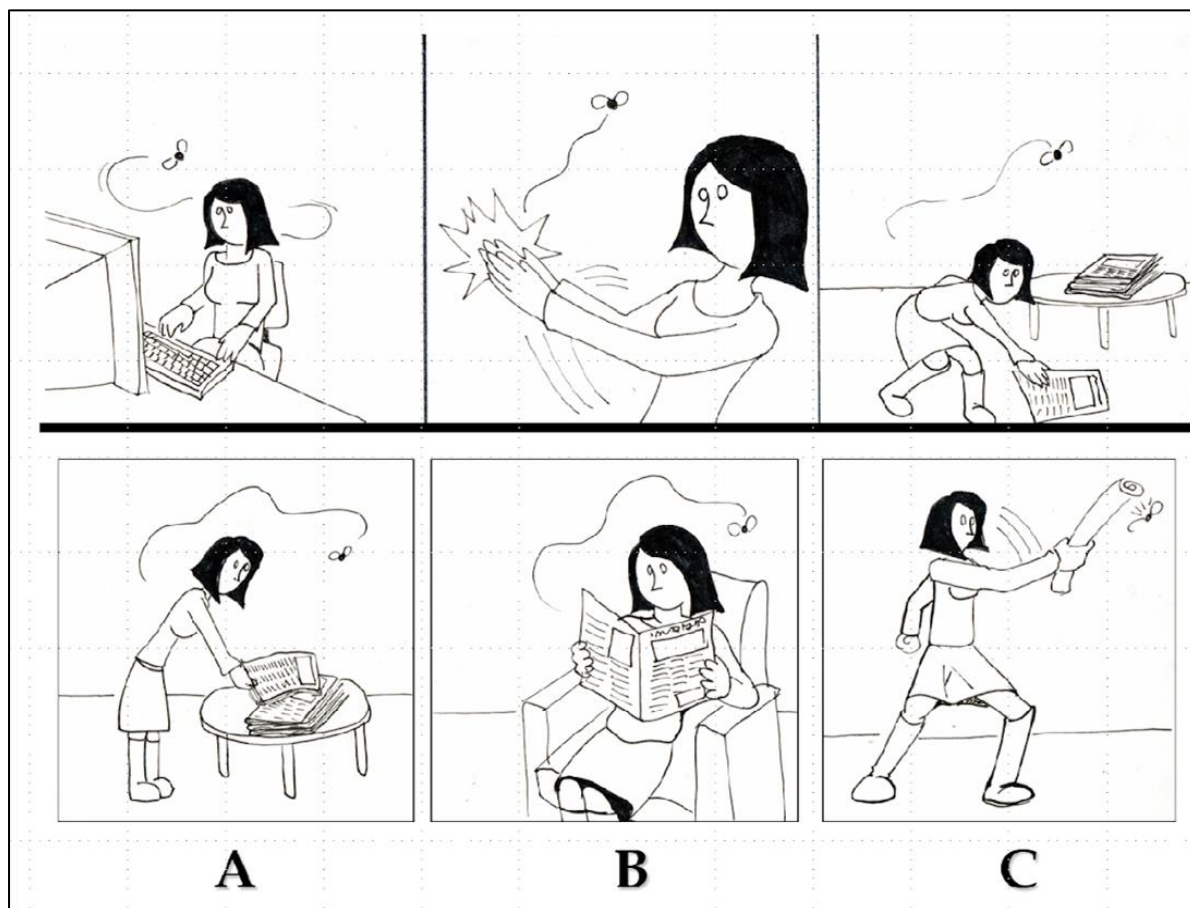
Fig. 4. Correlation analysis between GM density and EA in patients, highlighting (A) the right amygdala and hippocampus, (B) the left posterior insula, and (C) the left posterior superior temporal sulcus extending into the TPJ. Histograms show average GM density in the cluster. Vertical bars represent standard deviations. Abbreviations: GM, gray matter; EA, emotion attribution; TPJ, temporoparietal junction.

- ✓ Task developed for the clinical **Assessment of Attribution of Intention and Emotion in NCDs**
- ✓ Combination of 3 subconditions (6 cartoon-strip each)
- ✓ Two experimental conditions (**Intention Attribution – IA** and **Emotion Attribution – EA**)
- ✓ One control condition (**Causal Inference – CI**)
- ✓ Global & Single Scores
- ✓ Multi-language Translations (4 languages) and validation in different NCD samples

SET Test (Dodich et al., 2015)

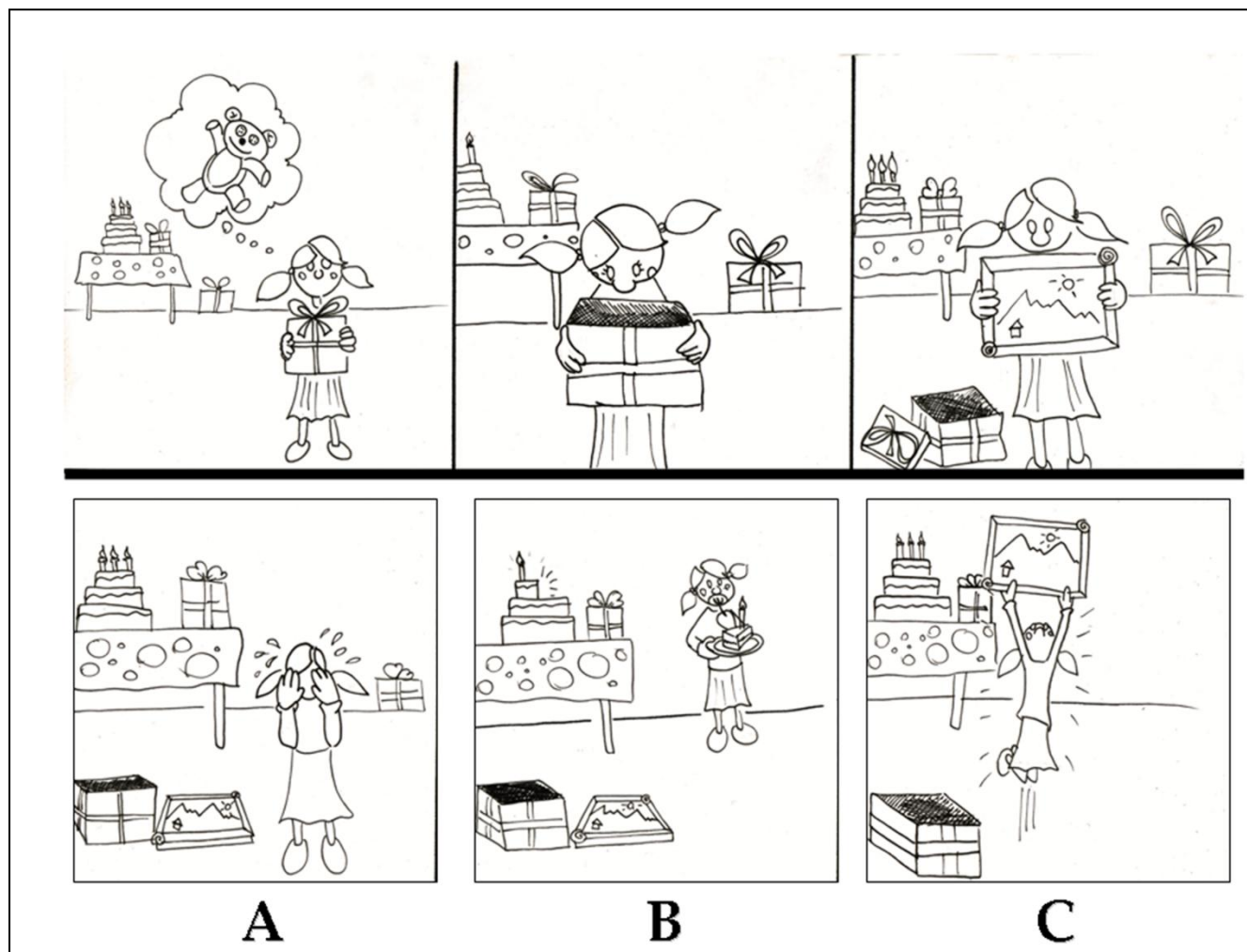
SET- INTENTION ATTRIBUTION (IA) SUB-TASK





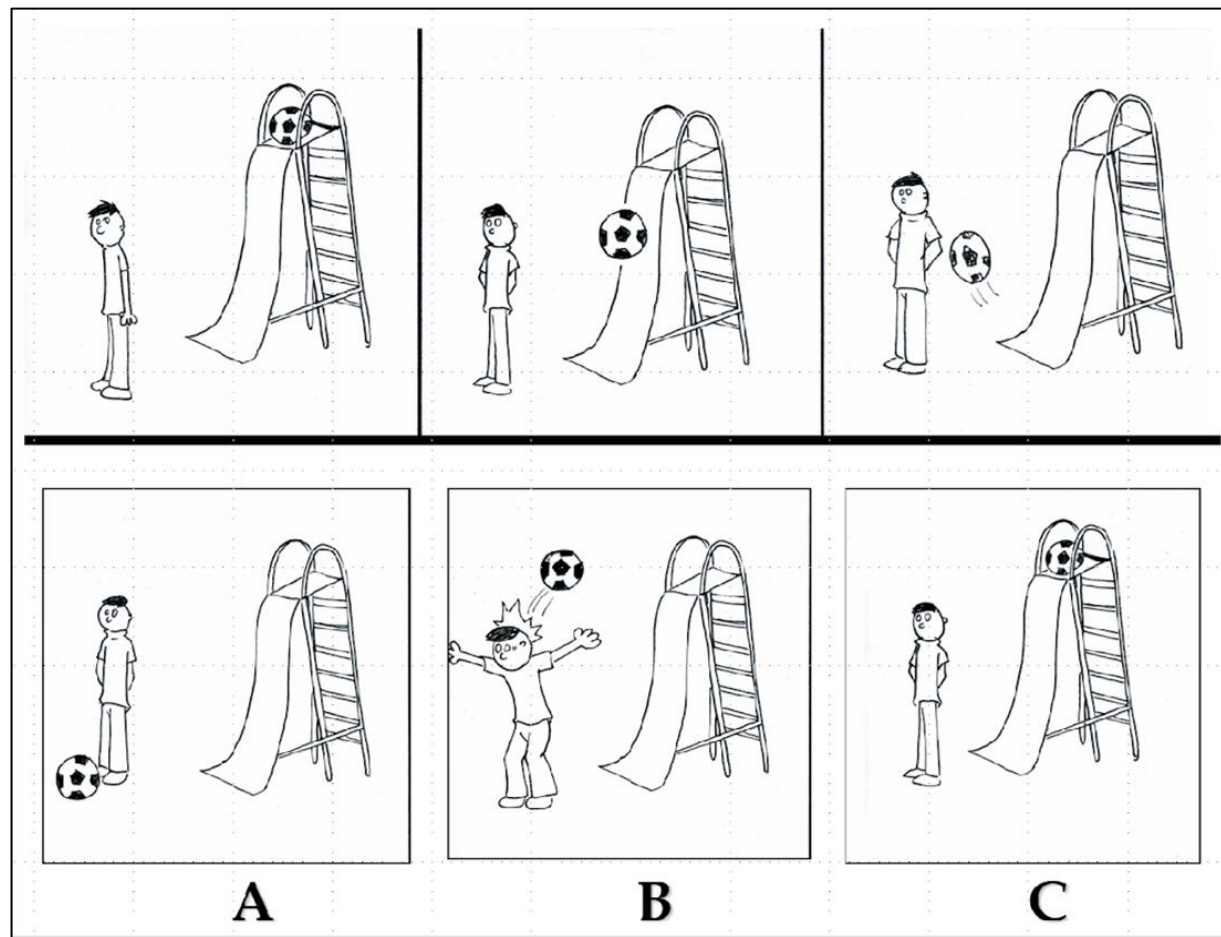
SET- EMOTION ATTRIBUTION (EA) SUB-TASK





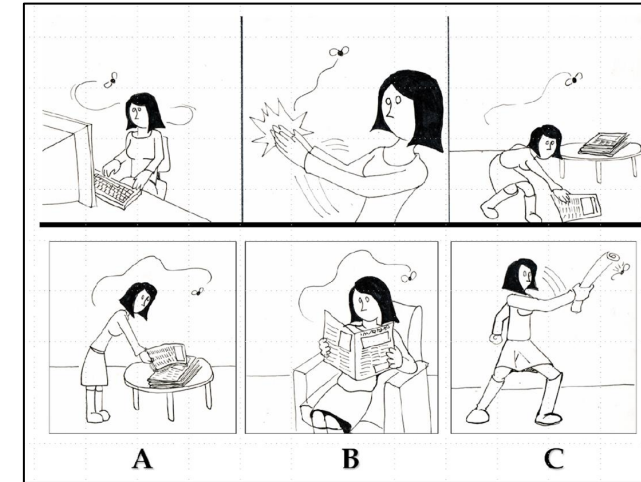
SET- CAUSAL INFERENCE (CI) SUB-TASK





Advantages:

- ✓ Developed for Assessment of patient with dementia
- ✓ Assessing both emotion & intention attribution
- ✓ Both single and combined scoring
- ✓ Easy to administer and score
- ✓ Easy cartoon stimuli
- ✓ No Load of Verbal skills
- ✓ Normative data available in Italy and Spain



Disadvantages:

- ✓ Long-lasting: 25 min (administration time)
- ✓ Good non-social cognitive efficiency is required (working memory and attention)

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UNIVERSITY PRESS

Archives of Clinical Neuropsychology 36 (2021) 711–722

Archives
of
CLINICAL
NEUROPSYCHOLOGY

Development, Spanish Normative Data, and Validation
of a Social Cognition Battery in Prodromal Alzheimer's
Disease and Multiple Sclerosis

Alfonso Delgado-Álvarez¹, Vanesa Pytel¹, Cristina Delgado-Alonso¹, Carmen María Olbrich-Guzmán²,
Ana Cortés-Martínez¹, Teresa Moreno-Ramos¹, Paloma Montero-Escribano¹, Jorge Matías-Guiú¹,
Jordi A Matias-Guiú^{1,*}

Interpersonal Reactivity Index

- ✓ Caregiver questionnaire
- ✓ 28 questions (7 for each subscale)
- ✓ 4 subscales: **perspective taking and fantasy** (cognitive empathy) and **empathic concern and personal distress** (affective empathy)
- ✓ 5-pt Likert scale
- ✓ Global and subscale scores



PT → tendency to spontaneously adopt the psychological point of view of others in everyday life

FS → evaluates individual's ability to switch him/herself into roles of fictitious characters in books or movies

EC → measures the extent to which an individual experiences sympathy for others

PD → measures “self-oriented” feelings of personal anxiety in tense interpersonal settings

In your opinion, the patient is used to.....	Never true	Rarely true	Sometimes true	Often true	Always true
1. Daydream and fantasize, with some regularity, about things that might happen to him/her (FS)					
2. Often have tender, concerned feelings for people less fortunate than him/her. (EC)					
3. Sometimes find it difficult to see things from the "other guy's" point of view. (PT) (-)					
4. Sometimes do not feel very sorry for other people when they are having problems. (EC) (-)					
5. Get really involved with the feelings of the characters in a novel. (FS)					
6. Feel apprehensive and ill-at-ease in emergency situations. (PD)					
7. Be usually objective when he/she watches a movie or a play, and do not often get completely caught up in it. (FS) (-)					
8. Try to look at everybody's side of a disagreement before he/she makes a decision. (PT)					
9. Feel kind of protective towards someone, when he/she sees someone being taken advantage of. (EC)					
10. Feel sometimes helpless when he/she is in the middle of a very emotional situation. (PD)					
11. Try sometimes to understand friends better by imagining how things look from their perspective. (PT)					
12. Become involved in a good book or movie extremely rarely. (FS) (-)					

Advantages:

- Measure of both cognitive and affective empathy
- Administration time: 10-20 min
- Self-reporting & caregiver-administered questionnaires allow to calculate discrepancy scores (self-awareness measure)

Disadvantages:

- Indirect measure of social cognition (caregiver score)
- Normative data in Italy only for the “self-reporting questionnaire” (Maddaluno et al., 2022)
- Some difficulties in the interpretation of questions
- Limited to cognitive empathy and affective ToM

In your opinion, the patient is used to....	Never true	Rarely true	Sometimes true	Often true	Always true
1. Daydream and fantasize, with some regularity, about things that might happen to him/her. (FS)					
2. Often have tender, concerned feelings for people less fortunate than him/her. (EC)					
3. Sometimes find it difficult to see things from the "other guy's" point of view. (PT) (-)					
4. Sometimes do not feel very sorry for other people when they are having problems. (EC) (-)					
5. Get really involved with the feelings of the characters in a novel. (FS)					
6. Feel apprehensive and ill-at-ease in emergency situations. (PD)					
7. Be usually objective when he/she watches a movie or a play, and do not often get completely caught up in it. (FS) (-)					
8. Try to look at everybody's side of a disagreement before he/she makes a decision. (PT)					
9. Feel kind of protective towards someone, when he/she sees someone being taken advantage of. (EC)					
10. Feel sometimes helpless when he/she is in the middle of a very emotional situation. (PD)					
11. Try sometimes to understand friends better by imagining how things look from their perspective. (PT)					
12. Become involved in a good book or movie extremely rarely. (FS) (-)					

Revised Self-Monitoring Scale

- ✓ Caregiver Questionnaire
- ✓ 13 questions
- ✓ 2 subscales: **Ability** (explores the ability to modify one's social behaviour) and **Sensitivity** (individual sensitivity to the expressive behaviour of others)
- ✓ 5-pt Likert scale
- ✓ Global and subscale scores



Italian version of rSMS (Panzavolta et al., in press)

Istruzioni: Prendendo in considerazione il comportamento **ATTUALE** del paziente, decida quanto le seguenti affermazioni sono vere o false. Non ci sono risposte giuste o sbagliate; vogliamo solo avere la vostra impressione su come pensate che il soggetto si comporti di solito.

Secondo lei il paziente...

	Sempre falsa	Generalmente falsa	Talvolta falsa, ma con eccezioni	Talvolta vera, ma con eccezioni	Generalmente vera	Sempre vera
1. AB Riesce a comportarsi diversamente a seconda di ciò che il contesto sociale richiede? ~~(formale/informale)~~	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
2. SENS È in grado di riconoscere le emozioni degli altri attraverso il loro sguardo?	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
3. AB Sa controllare il suo modo di fare a seconda dell'impressione che vuole dare agli altri?	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
4. SENS Durante una conversazione, è sensibile ai cambiamenti di espressione della persona con cui parla?	0	1	2	3	4	5
5. SENS Il suo intuito è piuttosto buono se si tratta di capire le emozioni e le intenzioni degli altri?	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
6. SENS Generalmente capisce se gli altri considerano una battuta di cattivo gusto, anche se ridono veramente?	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
7. AB Se si accorge che l'impressione che <u>da di sé</u> è inadeguata alla situazione, riesce a cambiarla con un'altra migliore?	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Advantages:

- Measure socioemotional sensitivity to own and other behaviors
- Administration time: 5-10 min
- Self-reporting & caregiver-administered questionnaires allow to calculate discrepancy scores (self-awareness measure)

Disadvantages:

- Indirect measure of social cognition (caregiver score)
- No normative data
- Some difficulties in the interpretation of questions

Istruzioni: Prendendo in considerazione il comportamento ATTUALE del paziente, decida quanto le seguenti affermazioni sono vere o false. Non ci sono risposte giuste o sbagliate; vogliamo solo avere la vostra impressione su come pensate che il soggetto si comporti di solito.

Secondo lei il paziente...

	Sempre falsa	Generalmente falsa	Talvolta falsa, ma con eccezioni	Talvolta vera, ma con eccezioni	Generalmente vera	Sempre vera
1. AB Riesce a comportarsi diversamente a seconda di ciò che il contesto sociale richiede? (<i>formale/informale</i>)	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
2. SENS È in grado di riconoscere le emozioni degli altri attraverso il loro sguardo?	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
3. AB Sa controllare il suo modo di fare a seconda dell'impressione che vuole dare agli altri?	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
4. SENS Durante una conversazione, è sensibile ai cambiamenti di espressione della persona con cui parla?	0	1	2	3	4	5
5. SENS Il suo intuito è piuttosto buono se si tratta di capire le emozioni e le intenzioni degli altri?	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
6. SENS Generalmente capisce se gli altri considerano una battuta di cattivo gusto, anche se ridono veramente?	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
7. AB Se si accorge che l'impressione che <u>da di sé</u> è inadeguata alla situazione, riesce a cambiarla con un'altra migliore?	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Social Norms Questionnaire

- ✓ Patient Questionnaire
- ✓ 22 questions
- ✓ 2 Error Subscales:
 - **Over-adherence error** (when they indicate something is socially inappropriate, but it really is not)
 - **Break error** (where individuals indicate it is appropriate to do something which is not)
- ✓ Yes/No response
- ✓ Global and subscale scores



WOULD IT BE SOCIALLY ACCEPTABLE TO:

1. Tell a stranger you don't like their hairstyle?	☐ 0 NO	☐ 1 YES
2. Spit on the floor?	☐ 0 NO	☐ 1 YES
3. Blow your nose in public?	☐ 0 NO	☐ 1 YES
4. Ask a coworker their age?	☐ 0 NO	☐ 1 YES
5. Cry during a movie at the theater?	☐ 0 NO	☐ 1 YES
6. Cut in line if you are in a hurry?	☐ 0 NO	☐ 1 YES
7. Laugh when you yourself trip and fall?	☐ 0 NO	☐ 1 YES
8. Eat pasta with your fingers?	☐ 0 NO	☐ 1 YES
9. Tell a coworker your age?	☐ 0 NO	☐ 1 YES
10. Tell someone your opinion of a movie they haven't seen?	☐ 0 NO	☐ 1 YES
11. Laugh when someone else trips and falls?	☐ 0 NO	☐ 1 YES
12. Wear the same shirt every day?	☐ 0 NO	☐ 1 YES
13. Keep money you find on the sidewalk?	☐ 0 NO	☐ 1 YES

Advantages:

- Measure of social norms knowledge and rules
- Administration time: 5-10 min
- Easy to administer

Disadvantages:

- Language dependency
- No normative data
- Some difficulties with the interpretation

WOULD IT BE SOCIALLY ACCEPTABLE TO:

1. Tell a stranger you don't like their hairstyle?	☐ 0 NO	☐ 1 YES
2. Spit on the floor?	☐ 0 NO	☐ 1 YES
3. Blow your nose in public?	☐ 0 NO	☐ 1 YES
4. Ask a coworker their age?	☐ 0 NO	☐ 1 YES
5. Cry during a movie at the theater?	☐ 0 NO	☐ 1 YES
6. Cut in line if you are in a hurry?	☐ 0 NO	☐ 1 YES
7. Laugh when you yourself trip and fall?	☐ 0 NO	☐ 1 YES
8. Eat pasta with your fingers?	☐ 0 NO	☐ 1 YES
9. Tell a coworker your age?	☐ 0 NO	☐ 1 YES
10. Tell someone your opinion of a movie they haven't seen?	☐ 0 NO	☐ 1 YES
11. Laugh when someone else trips and falls?	☐ 0 NO	☐ 1 YES
12. Wear the same shirt every day?	☐ 0 NO	☐ 1 YES
13. Keep money you find on the sidewalk?	☐ 0 NO	☐ 1 YES

Social Cognition batteries

Mini-SEA Battery

MINI SOCIAL COGNITION AND EMOTION ASSESSMENT – MINI-SEA

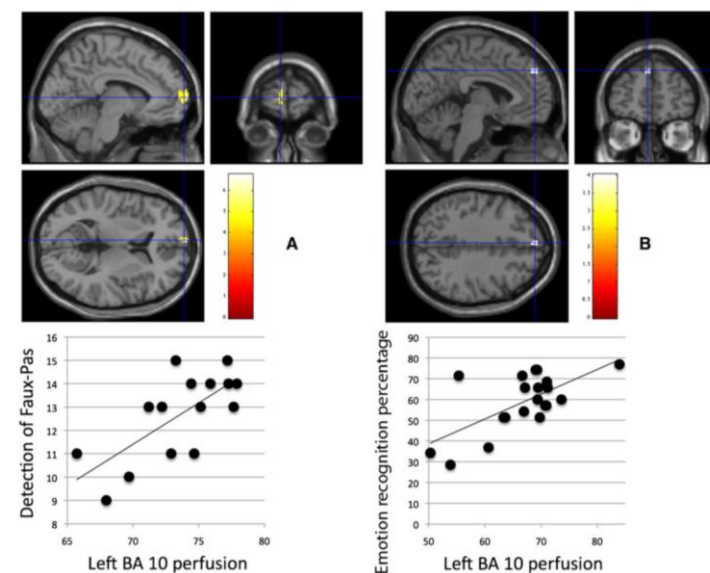
- ✓ NPS Battery developed for the clinical **Assessment of Social and Affective Cognition** in patient with **NCDs**
- ✓ Combination of 2 tasks
- ✓ A short version of the Baron-Cohen «**Faux-Pas** test» with *10 stories* (5 faux-pas and 5 neutral) + *1 example* (**written stories and visual support**)
- ✓ A short version of the Ekman «**Facial Emotion Recognition** test» with *35 face stimuli* (5 for each of 6 basic emotions + 5 neutral)
- ✓ Multi-language Translations (5 languages) and used in harmonized FTD dementia studies (e.g. GENFI)

Brain Imaging and Behavior (2014) 8:1–6
DOI 10.1007/s11682-013-9261-0

BRIEF COMMUNICATION

Neural correlates of the mini-SEA (Social cognition and Emotional Assessment) in behavioral variant frontotemporal dementia

M. Bertoux • E. Völle • L. C. de Souza • A. Funkiewiez •
B. Dubois • M. O. Habert



MINI-SEA – Faux-Pas SubTask

Test instructions

Say: *"You will now read some short stories and after you have read each story I will ask you some questions about them. Each part of the story is supported by an illustration of the characters and the action taking place. It is not a memory test, so you can re-read the story or look at the illustrations with each question I ask".*

Let the subject read the story-example or read it with him/her.

After the reading say: *"Did someone say something they should not have said or something inappropriate? Or, in other words, was there a "gaffe" in the story?"*

If the subject to the first question answers "No", tell him/her that there was a gaffe and explain it briefly. Do this only for the story-example.

If the subject answers "Yes", make sure that the gaffe has been understood.

The example story is not included in the calculation of the score but is only an example to familiarize with the test procedure.

Saying: *"You will now read 10 stories. For each story I would like you to tell me whether there was a gaffe or not. In some stories there will be a gaffe while in others there will not be. If there is a gaffe, I would like you to explain it".*

The administration procedures for the entire test are as follows: For stories 1-10, if the subject answers 'No' to the first question, proceed to the control questions. If the subject answers 'Yes' to the first question, ask the follow-up questions. Make sure to always ask the control questions to test comprehension, regardless of whether the answer to the first question is 'Yes' or 'No'.

Scoring: One point X correct answer

MINI-SEA – Faux-Pas SubTask

- | | | | |
|-----------------------------------|------------------|------------------------|-----------------------|
| 1) Is there a gaffe in the story? | Faux pas stories | Yes': true (1 point) | 'No': false (0 point) |
| | Neutral stories | 'No': false (2 points) | 'Si': false (0 point) |

In case of a wrong answer, score 0 and skip the following questions

- 2) Who did the gaffe in the story?
- 3) Why is there a gaffe? Which is the gaffe in the story?)
- 4) Why do you think X did that thing?

Every eligible answer identifying the right person, the wrong thing he/she did, the reason why he/she did is accepted

- | | |
|-----------------------|---|
| 5) Did X know that Y? | <i>The answer should confirm that the subject has understood the unintentional meaning of the gaffe</i> |
| 6) How did X feel? | <i>The question investigates empathy of the subject with the victim</i> |

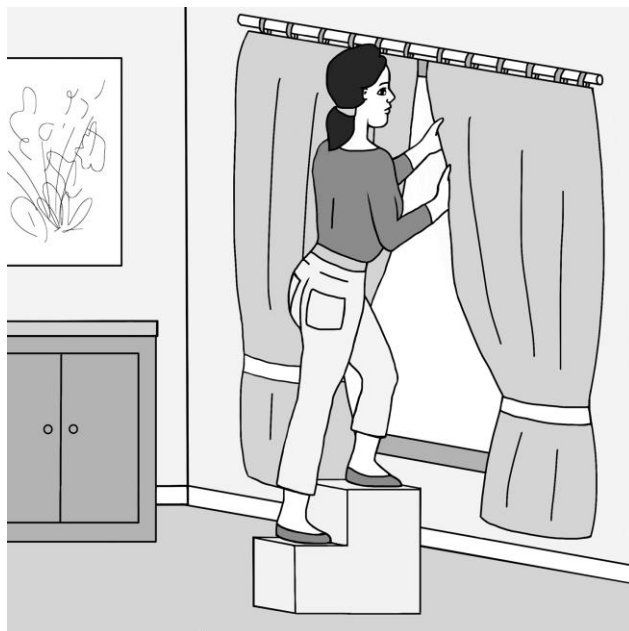
The maximum score for all 5 stories containing a faux-pas is 30, with a maximum score of 6 for each story

- | | |
|-------------------------------|--|
| 7) and 8) (control questions) | <i>The questions investigate whether the subject understood main elements of the stories</i> |
|-------------------------------|--|

The maximum score for all 5 stories not containing a faux-pas is 10, with a maximum score of 2 for each story (First question with answer 'No')

MINI-SEA – Faux-Pas SubTask

Giuliana aveva appena traslocato in un nuovo appartamento. Giuliana si recò a fare shopping e acquistò delle tende nuove per la sua camera da letto.



Non appena ebbe terminato di decorare l'appartamento, la sua migliore amica Lisa andò a trovarla.



Giuliana mostrò l'appartamento a Lisa e le chiese: "Come ti sembra la mia camera da letto?" "Quelle tende sono orribili," disse Lisa. "Spero che tu le voglia sostituire!".



Faux-pas story

MINI-SEA – Faux-Pas SubTask

Giulia era ad una festa a casa del suo amico Antonio. Stava parlando con Antonio quando un'altra donna si avvicinò a loro. Era una delle vicine di casa di Antonio.



La donna disse "Ciao", quindi rivolgendosi a Giulia aggiunse: "Non credo che ci siamo mai incontrate. Sono Maria, e tu come ti chiami?" "Giulia".



"Gradite qualcosa da bere?" chiese Antonio.



Neutral story

MINI-SEA – Facial Emotion Recognition SubTask

Test instructions

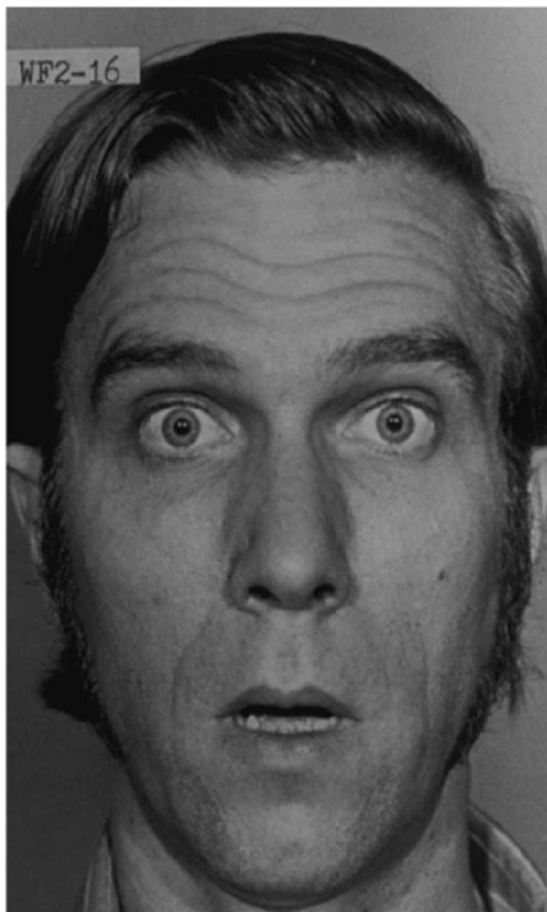
Say: *“I am going to show you pictures of some faces, each representing one of the following emotions: Happiness, Surprise, Sadness, Fear, Disgust, Anger and Neutral, if the face does not show any emotion. I would like you to look carefully at each face and tell me which emotion you think is shown. There is no need to hurry in answering. But be aware that each face will only be shown to you for 12 seconds”.*

Present each face until the subject has made a choice or for the maximum time of 12 seconds. After 12 seconds, count as an error even if the subject makes a response.

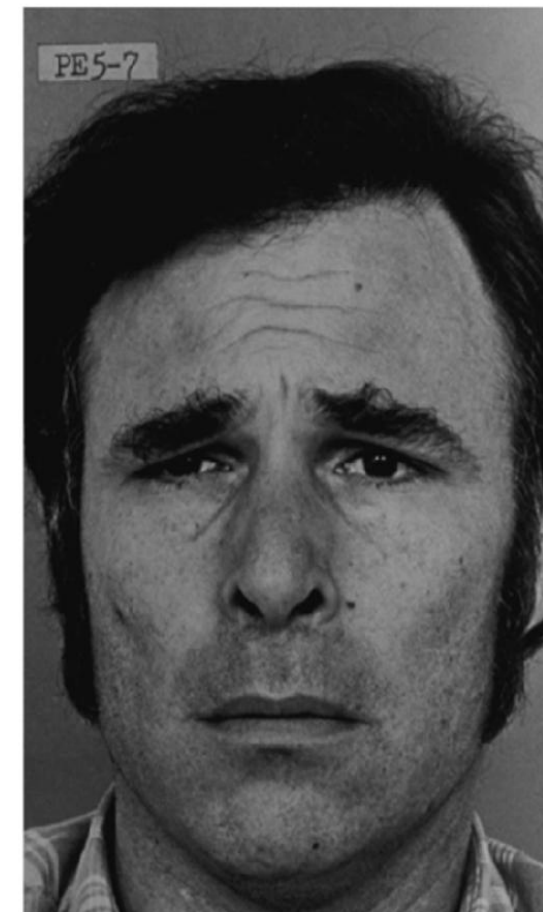
If the subject shows difficulty in responding to the first items, give the choices verbally without prompting, e.g. 'Is this face happy, surprised, sad, scared, disgusted, angry or neutral?' During the test encourage the patient to provide an answer.



Felicità – Sorpresa – Neutralità – Tristezza – Paura – Disgusto - Rabbia



Felicità – Sorpresa – Neutralità – Tristezza – Paura – Disgusto - Rabbia



Felicità – Sorpresa – Neutralità – Tristezza – Paura – Disgusto - Rabbia

Social cognition Emotion Assessment Foglio di notazione

Nome:
Età :

Scolarità :
Data :

Test Faux-Pas (illustrato)

Storie con *Faux-pas* /30
Storie senza *Faux-pas* /10
Totale /40
Domande di controllo /20

Punteggio Faux-pas /15

(Totale/4)*1.5

Healthy young (mean = 40) 13.9 (1)
Healthy Elderly (mean = 67) 13.2 (1.4)
Alzheimer disease 13.5 (1.3)
Depression 13.3 (1.4)
bvFTD 9.1 (2.3)

Riconoscimento delle emozioni facciali

Felicità /5
Paura /5
Disgusto /5
Neutralità /5
Sorpresa /5
Rabbia /5
Tristezza /5
Totale /35

Punteggio Emozioni /15

(Totale/3.5)*1.5

Healthy young 12.5 (1.1)
Healthy Elderly 12.6 (1.1)
Alzheimer disease 12.1 (1)
Depression 12.4 (0.7)
bvFTD 8.9 (2.2)

mini-SEA	Punteggio totale	/30
Healthy young	20.4 (1.0)	
Healthy Elderly	25.0 (1.0)	
Alzheimer disease	25.6 (1.5)	
Depression	25.7 (1.7)	
bvFTD	10 (3.1)	

Punteggio Faux-pas + Punteggio

Mini-SEA: Foglio di notazione riassuntivo – Test dei Faux-pas

		Storia 1	Storia 2	Storia 3 *	Storia 4 *	Storia 5	Storia 6	Storia 7 *	Storia 8 *	Storia 9 *	Storia 10
Domande Faux-Pas	1 – (Individuazione del faux-pas)	/2	/2	/1	/1	/2	/2	/1	/1	/1	/2
	2 – (Identificazione)			/1	/1			/1	/1	/1	
	3 – (Comprensione)			/1	/1			/1	/1	/1	
	4 – (Intenzioni)			/1	/1			/1	/1	/1	
	5 – (Credenze)			/1	/1			/1	/1	/1	
	6 – (Empatia)			/1	/1			/1	/1	/1	
Domande di controllo	1 & 2	/2	/2	/2	/2	/2	/2	/2	/2	/2	/2
Storie senza Faux-pas		/2	/2			/2	/2				/2
Totale storie con Faux-pas (*)				/6	/6			/6	/6	/6	
Totale (Non Faux-pas)		/10									
Totale (Faux-pas *)		/30									
Totale (Tutte le storie)		/40									
Totale (Domande di controllo)		/20									

Advantages:

- ✓ Developed for Assessment of **patient with dementia**
- ✓ Assessing **two different sub-domains** of social cognition
- ✓ Both **single and combined scoring**

Disadvantages:

- ✓ Long-lasting: **25 min** (administration time) + scoring
- ✓ Good **non-social cognitive efficiency** is required (working memory and attention)
- ✓ **Complex stimuli** Faus-pax test (visual & verbal)
- ✓ **Old fashion stimuli** Emotion Recognition test
- ✓ **Complex scoring**

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Research Article

Social Cognition Deficits: The Key to Discriminate Behavioral Variant Frontotemporal Dementia from Alzheimer's Disease Regardless of Amnesia?

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RESEARCH ARTICLE



Mini social cognition and emotional assessment:
Diagnostic performance and neural correlates in
behavioural-variant frontotemporal dementia

Investigación original

Vertex Rev Arg Psiquiatr. (2021). 32(152): 5-10.

Baremos en español del Mini-SEA (Mini Social Cognition and Emotional Assessment) en adultos normales de Buenos Aires

Spanish Norms for Mini-SEA (Mini Social Cognition and Emotional Assessment) in adults in Buenos Aires

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Considerations for Selection of Social Cognition Tasks in Clinics:

- Providing control conditions to account for non-social cognitive impairments
- Minimizing language and working memory demands
- Cross-cultural & Cross-language validity
- Good psychometric properties

*Pay attention to classic social cognition tests **developed in Western populations** (e.g. Ekman Faces & Faux Pas Test)*



Image Generated with AI software

Neurological Sciences (2026) 47:524
https://doi.org/10.1007/s10072-026-09079-0

REVIEW ARTICLE

How can social cognition be improved in neurological patients? a systematic review

Anna Rita Giovagnoli¹ · Panayiotis Patrikelis² · Claudia Accolla³ · Elisa Bianchi⁴ · Martina Preti³ · Rute Flávia Meneses⁵ · Giorgia Giussani⁴



- ✓ Heterogeneous designs, populations and results
- ✓ **17 studies included**
- ✓ **344 patients** with MS, stroke, PD, ataxia, TBI, etc.
- ✓ Interventions targeted **social cognition, general cognitive functions, and relational skills**
- ✓ Individual or group-based training, rehabilitation, or combined approaches
- ✓ **Promising improvements across diagnoses and age groups**

Table 1 Studies on non-pharmacological interventions relating to social cognition reported in 17 selected articles

	N*	%
Experimental interventions (19)		
Number of procedures per study	1	11 57.9
	2+	7 36.8
	Unspecified	1 5.3
Type	Observational	6 31.6
	Randomized	13 68.4
Design	Case-control	12 63.2
	Retrospective cohort	1 5.3
	Prospective cohort	2 10.5
	Clinical trial	4 21.1
Number of participants per study (range)	5–42	
Number of studies with diagnosis	Parkinson disease	2 10.5
	Cerebellar lesion	3 15.8
	Epilepsy	1 5.3
	Multiple sclerosis	5 26.3
	Stroke	1 5.3
	Traumatic brain injury	5 26.3
	More than a diagnosis**	2 10.5

Administration modality	Face-to-face	8 42.1
	Hybrid	2 10.5
	Online	5 26.3
	Unspecified	4 21.1
	Mixed	4 21.1
Setting	Group	4 21.1
	Individual	10 52.6
	Unspecified	1 5.3
Control interventions (15)		
Number of participants per study (range)		10–44
Number of studies with diagnosis	Parkinson disease	2 13.3
	Cerebellar lesion	2 13.3
	Congenital neurological	1 6.7
	Epilepsy	1 6.7
	Multiple sclerosis	5 33.3
	Stroke	1 6.7
	Traumatic brain injury	3 20.0
	Administration modality	Face-to-face 6 31.6
	Hybrid	0 0.0
	Online	4 21.0
Setting	Unspecified	9 47.4
	Mixed	1 5.3
	Group	1 5.3
	Individual	9 47.3
	Unspecified	8 42.1

*N number of studies. **One study included Alzheimer's disease and related dementia, and another included traumatic brain injury, left cerebrovascular accident, and brain tumour

- ✓ **DESIGN:** From face-to-face and group-based programs to online, hybrid, and VR approaches, and often combine social-cognitive training with psychoeducation, general cognitive rehabilitation, or relational activities.
- ✓ **OUTCOME:** Emotion recognition, ToM/Perspective taking, communication, and social problem-solving with ecological and multimodal methods

Table 3 An overview of non-pharmacological intervention methods for social cognition

Intervention	Authors Year	Methods	Categories*
Face-to-face			
Multifaceted Treatment of the Dysexecutive Syndrome	Lamberts et al. 2016	The intervention included three consecutive modules: Information and Awareness, Goal Setting and Planning, and Initiation, Execution and Regulation	Psychoeducation and Training
NICE	Cho et al. 2017	The intervention's sessions followed a group format allowing to identify the session's purpose, to review concepts, to introduce a new topic, to practice, and to discuss the week homework	Training
GIST	Ingebretsen et al. 2023	The intervention included introduction to topics, group discussions, individual goal setting, feedback, and social learning	Rehabilitation
Dance training	Begel 2022	The training consisted in several playful exercises with different physical intensity and music	Training
Exercise, language stimulation, social outing/volunteer work	La Rue et al. 2013	This volunteer-based intervention combined physical exercise, cognitive-linguistic stimulation, and social outings	Stimulation and Training
RHEACOP	Rilo et al. 2018	This integrative cognitive rehabilitation programme used a bottom-up approach and an integration of the tasks in daily life	Rehabilitation
Endurance training	Bahamani et al. 2000	The Endurance training consisted of guided group exercises on treadmill, bicycles or walking and jogging; the Coordinative training focused on balancing and mirroring and imitating movements	Training
Coordinative training			
Psychomotor therapy, Ergo-physiotherapy, Balance exercises, and Robot-assisted therapy	Vostrý et al. 2020	The combined therapy was repeated periodically on an individual basis through a psychological intervention, early rehabilitation, and late rehabilitation targeted to motor disability	Rehabilitation
VR-SPIRIT	Butti et al. 2020	The program focused on social prediction ability in VR social context compared to motor training	Training
VR-SPIRIT	Urgesi et al. 2021	The experiment tested how social prediction can be boosted by an intensive VR training focused on social perception, ToM and recognition of facial emotional	Training
Online			
SoCoBo	Lohaus 2023	The therapy was divided into three modules: emotion recognition, cognitive and affective perspective taking (ToM/empathy), and social problem-solving	Psychoeducation and Training
T-ScEmo	Westerhof-Evers et al. 2017	The compensatory strategy training was a multi-stage intervention with three modules aimed to enhance emotion perception, perspective taking and ToM, and goal-directed social behavior	Psychoeducation, Training and Rehabilitation

Giovagnoli et al., Neurol Sci 2025

- ✓ **DESIGN:** From **face-to-face and group-based programs** to **online, hybrid, and VR approaches**, and **often combine** social-cognitive training with **psychoeducation, general cognitive rehabilitation, or relational activities**.
- ✓ **OUTCOME:** Emotion recognition, ToM/Perspective taking, communication, and social problem-solving with ecological and multimodal methods

Table 3 An overview of non-pharmacological intervention methods for social cognition

Intervention	Authors Year	Methods	Categories*
Hybrid			
Structured Social Rehabilitation Model	Kolk et al. 2023	The structured rehabilitation intervention started with assessments of base-level social competence and was aimed to solve increasingly complicated tasks	Rehabilitation
Cognitive Brain training apps Tele-VR	Maggio et al. 2024	In the first study, two cognitive apps and therapist-guided exercises were used to enhance different cognitive domains. The second study applied a VR-based cognitive program	Training
Multiple cognitive and social activities	Best et al. 2011	The intervention included role playing, slide observation, information handouts, homework, access to the community, and transference of skills to real life	Rehabilitation
Not specified			
Communication training	Nejad et al. 2020	The package included a variety of skills such as verbal and nonverbal communication in social situations, self-knowledge, flexibility, expressing emotions, and environmental factors	Training
SC Rehabilitation for Veterans	Thomas et al. 2015	The intervention was a cognitive-behavioral treatment targeting PTSD, addressing thoughts and feelings about the trauma, cognitive distortions and restructuring, and compensatory strategies	Psychoeducation and Rehabilitation

*Based on the literature^{26,27,28} and the description or definition provided in the article. CPT-C, Cognitive Processing Therapy-Cognitive; CogSMART, Cognitive Symptom Management and Rehabilitation Therapy; GIST, Group Interactive Structured Treatment; NICE, Noticing you have a problem, Identifying the information you need for help, Compensatory strategies, Evaluating progress; RCT, Randomized Controlled Trial; PTSD, post-traumatic stress disorders; REHACOP, Rehabilitaci3n Cognitiva en Psicosis; SoCoBo, Treatment Program for Deficits in Social Cognition and Social Competencies of the Ruhr University Bochum; T-ScEmo, Treatment for Social Cognition and Emotion; VR, Virtual Reality; VR- SPIRIT, Virtual Reality Social Prediction Improvement and Rehabilitation Intensive

Giovagnoli et al., Neurol Sci 2025

- ✓ Some improvements in emotion recognition, Theory of Mind, social communication, and self-awareness, although **modest and domain-specific effects**
- ✓ Benefits beyond test performance, including **better social behaviour, communication, self-efficacy, relationship quality, and everyday functioning**, suggesting *potential transfer to real-life outcomes*

Giovagnoli et al., Neurol Sci 2025

Table 4 Outcomes, assessment tools and results of non-pharmacological interventions for social cognition

Intervention	Authors	Diagnosis	Outcomes	Tools	Results
Face-to-face					
Multifaceted treatment dysexecutive syndrome	Lamberts et al. 2016	ABI	Self-awareness, emotion perception	DEX, FEEST	Improved self-awareness
NICE	Cho et al. 2017	ABI	Primary: help-seeking Secondary: way finding, problem solving	21-point SBRS; the EFRT-R measures of wayfinding, total score, and footstep ratio; TASIT-R; SPSI-RS; PSI	Improvement in help-seeking, footstep ratio, and social problems solving
GIST	Ingebrechtsen et al. 2023	ABI	Primary: social competencies Secondary: QoL, social communication, mental and cognitive health, self-efficacy	LCQ, BRIEF, CIQ, GAS, GPSES, MiET, PQoL, SCD, SCL-10, SCSQ-A	Mild improvement for social competencies; significant improvement for social communication; maintenance of communication at follow-up
Dance training	Bégl et al. 2022	CL	Rhythmic sensorimotor, speed, cognitive, and social skills	Finger tapping, balance, cognitive flexibility, SC measures	Positive changes in finger tapping, balance, cognitive flexibility, SC
Exercise plus language stimulation, social outing, volunteer work	La Rue et al. 2013	Dementia	Global mental status, QoL, depression, physical fitness	MMSE, GDS, QoL – Alzheimer Disease, Chair stand, Arm curls, Step in place	Marginal improvement at the MMSE and arm curls; decline in QoL
Rehabilitación Cognitiva en Psicosis (REHACOP)	Rilo et al. 2018	MS	Processing speed, working memory, verbal memory, and executive functions	BTA, SDMT, TMT-A, PCT, SCWT, EDSS, TAP, NART Spanish version, CRQ, 15-item GDS, FSS, mental fatigue VAS	Significant improvements in mental speed, working and verbal memory, executive functions
Endurance training	Bahamani et al. 2020	MS	Emotion regulation, empathy	Emotionale-Kompetenz-Fragebogen, RME test	Improvement in the regulation of emotions and empathy
Coordinative training					
Psychomotor therapy, elements of ergo- and physiotherapy, balance exercises and robot-assisted therapy	Vostrý et al. 2020	MS	Independence: First: the ability to perform routine daily activities; Second: mobility; Third: the development and support in social adaptation	FIM	Less dependence on the assistance of caretakers; improved gross motor skills; less dependency in social adaptation
VR-SPIRIT	Butti et al. 2020	CL	SC: Primary: social prediction ability; Secondary: cognitive abilities, behaviour, QoL	NEPSY-II battery: SC, implicit learning, executive functions, attention, visuospatial and sensorimotor abilities, memory; CBCL 6–18, parent version; Overall functioning; TACQOL	Enhanced social prediction ability and indirect improvement of other cognitive abilities

- ✓ Some improvements in emotion recognition, Theory of Mind, social communication, and self-awareness, although **modest and domain-specific effects**
- ✓ Benefits beyond test performance, including **better social behaviour, communication, self-efficacy, relationship quality, and everyday functioning**, suggesting *potential transfer to real-life outcomes*

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Table 4 (continued)

VR-SPIRIT	Urgesi et al. 2021	CL	SC	Action prediction task (to predict the outcome of motor intention) NEPSY-II Social perception, ToM, and Emotion Recognition subtests	Improved ability to use context-based predictions to understand others' intentions
Online SoCoBo	Lohaus et al. 2024	TBI	SC, ToM	ERI; GERT-S; IRI German version; Affective Empathy Concern and Personal Distress; Cognitive Empathy Fantasy and Perspective Taking; ISK-K; Kanning Social Orientation, Offensiveness, Self-monitoring, Reflexibility, SC Test Battery	Significant improvements in facial emotion recognition and self-rated empathy; association between increased empathy and life satisfaction
T-ScEmo	Westerhof-Evers et al. 2017	TBI	Primary: recognition of emotions and understanding of others in real-life situation; Secondary: QoL, quality of relationships	Dutch TASIT-R short version Tests and questionnaires for SC, self- and proxy-rated social behaviour, societal participation, QoL	Significant improvement in SC dimensions and goal attainment At follow-up, better QoL and partner-rated relationship
Hybrid					
Structured Social Rehabilitation Model	Kolk et al. 2023	Epilepsy	ToM	NEPSY-II, ToM Stories, FOS, SCT, Spence Children's Anxiety Scale, BRIEF	Improved communication, cooperation, pragmatics, social attention, conflict resolution, empathy, ToM, ability to start conversations and bullying
Tele-VR: Neuronation-Brain Training and Train Brain cognitive apps; Neuronation-Brain Training and Sims socio-cognitive apps	Maggio et al. 2024	PD	Cognitive performance and social skills	MoCA, FAB, RAVLT immediate and delayed recall. TMT A and B; COWAT, RCPM, CDT, Copy of figures, HAM-D, MAC-Q, HRS-D/A, VRT, EQ-SS, FPT Adult Version, SC-ST, TAS, WCST	Mild improvement of attention and ToM. Significant improvement on many cognitive and SC tests, MoCA and FAB at follow-up
Multiple cognitive and social activities	Best et al. 2011	TBI	Social and communication skills	Role play, slide shows, information handouts, accessing the community, and skills transference to real life situations (details not available)	Positive outcomes in social behaviour and communication skills in social settings
Not specified Communication skills training	Nejad et al., 2020	MS	Self-efficacy, social adjustment, emotional adjustment	Washington MS Self-efficacy Scale, Bell's Adjustment Inventory	Enhanced self-efficacy and emotional and social adjustment in the women
SC Rehabilitation for Veterans with TBI and PTSD: A Treatment Workbook	Thomas et al. 2015	TBI	QoL, Depression, Anxiety, Social functioning	QoL after Brain Injury, Mayo-Portland Adaptability Inventory, IRI, the Weschler Social Perception Task, BDI, BAI, SFS	Significant improvements in QoL, adaptability, social perception, and depression. Mildly improved social functions and anxiety

- Social cognition is highly relevant in **patients with different major NCDs** and impaired **since early stages** (mild NCD)
- Social cognition dysfunction is a **cognitive hallmark in the behavioral variant FTD**. The assessment of social cognition improves the early and accurate diagnosis of this neurodegenerative syndrome
- There are **several tests available** to evaluate social cognition, which has shown favorable diagnostic properties and neurobiological validity, in isolation or in combination with others
- Findings from socio-cognitive examination should be always **combined with non-social cognitive and biomarker information**
- Preliminary evidence suggests that **targeted interventions can improve emotion recognition, Theory of Mind, and empathy**, particularly in patients with acquired brain injury
- The most promising approaches are **multimodal, ecological, and personalized, combining cognitive training**, realistic social scenarios, feedback, and emerging technologies
- The major challenge is to demonstrate that **gains on social-cognitive tasks translate into meaningful improvements in everyday relationships, social functioning, and quality of life** for patients and caregivers





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