**Supplemental Materials**

**Appendix A.** Search terms in PubMed

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Diagnosis** | Pick’s disease  frontotemporal dementia  frontotemporal lobar dementia  frontal lobe dementia  dementia of frontal lobe type  frontotemporal lobar degeneration  FTD | | | semantic dementia  semantic variant PPA  progressive nonfluent aphasia  PNFA  primary progressive aphasia  progressive aphasia  logopenic | | |
| **Cognition** | neuropsycholog\*  cognit\*  attention  orientation  processing  speed  sequencing  executive  decision-making  reasoning | WCST  Stroop  Trail Making Test  FAB  Hayling fluency  COWAT  vocabulary  expressive  speech | | | language  naming receptive  comprehension  naming  spelling  verbal  reading  writing  memory | learning  recall  recognition matching  HVLT  visual  visuo\*  percept\*  VOSP  Rey  Benton |
| **Social Cognition** | emot\*  affect  socio\*  social perception  facial  emotion recogni\*  emotion\* processing | | attribution bias  prosody  theory of mind  ToM  TASIT  Faux pas | | | |
| **Olfaction** | olfact\*  smell  chemosens\*  sweet  taste | | gustatory  flavour  odor  odour | | | |
| **Year** | 1980 – present (*search last updated on January 26, 2018*) | | | | | |
| **Human studies?** | Yes | | | | | |
| **Language** | English | | | | | |

**Appendix B.** Reference list of publications included in the current meta-analysis

**Acosta-Cabronero J, Patterson K, Fryer TD, Hodges JR, Pengas G, Williams GB, Nestor PJ** (2011). Atrophy, hypometabolism and white matter abnormalities in semantic dementia tell a coherent story. *Brain* **134**, 2025–2035.

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**Appendix C.**Task domains, subdomains, and example tests assigned in meta-analyses

|  |  |  |
| --- | --- | --- |
| **Cognition** | **Subdomain** | **Example Tests** |
| Global Screening Measures | - | Mini-Mental State Exam (Folstein *et al.* 1975) |
|  |  | Montreal Cognitive Assessment (Osborne *et al.* 2014) |
|  |  | Dementia Rating Scale (Bellak *et al.* 1976) |
|  |  | Addenbroke’s Cognitive Examination (Mathuranath *et al.* 2000) |
|  |  | Cambridge Cognition Examination (Roth *et al.* 1986) |
|  |  | Philadelphia Brief Assessment of Cognition (Libon *et al.* 2011) |
|  |  | Frontal Assessment Battery (Dubois *et al.* 2000) |
|  |  | Rapid Evaluation of Cognitive Function (Gil *et al.* 1986) |
|  |  | INECO Frontal Screening (Torralva *et al.* 2009) |
| Intellectual Functioning | Verbal IQ | WAIS/WASI Verbal IQ Index (Wechsler 1997a) |
|  |  | WAIS/WASI Similarities, Vocabulary subtests (Wechsler 1997a) |
|  |  | WAIS Information subtest (Wechsler 1997a) |
|  | Performance IQ | WAIS/WASI Performance IQ Index (Wechsler 1999) |
|  |  | WAIS/WASI Block Design, Matrix Reasoning subtests (Wechsler 1999) |
|  |  | Raven’s Colored Progressive Matrices (Basso *et al.* 1982) |
| Attention | - | Digit Span Total (Wechsler 1997b) |
|  |  | DRS Attention subtest (Bellak *et al.* 1976) |
|  |  | Kana-Hiroi test (Kaneko 1990) |
|  |  | Elevator Counting with Distraction (Robertson *et al.* 1994) |
|  |  | Map Search (Robertson *et al.* 1994) |
|  |  | Dual Number Cancellation (Robertson *et al.* 1994) |
|  |  | TEA Elevator Counting subtest (Robertson *et al.* 1994) |
|  | Simple Attention | WAIS, WMS or RBANS Digit Span Forward (Wechsler 1997b) |
|  |  | Visuospatial Span Forward (Wechsler 1997b) |
|  |  | Corsi Block-Tapping Task – Forward Span (Corsi 1972) |
|  | Working Memory | Digit Span Backward (Wechsler 1997b) |
|  |  | Visuospatial Span Backward (Wechsler 1997b) |
|  |  | Auditory Consonant Trigram Test (Strauss *et al.* 2007) |
|  |  | Running Span Task (Quinette *et al.* 2003) |
| Processing Speed | - | Stroop Color or Word Reading Trials (Scarpina & Tagini 2017) |
|  |  | Trail Making Test Part A (Reitan 1958) |
|  |  | WAIS-R or WAIS-III Digit Symbol Coding (Wechsler 1997a) |
|  |  | Symbol Digit Modalities Test (Strauss *et al.* 2007) |
|  |  | Crossing-off Test (Botwinick & Storandt 1973) |
| Ideational Fluency | - | ACE Verbal Fluency subtest (Mathuranath *et al.* 2000) |
|  | Letter-Guided Fluency | Controlled Oral Word Association Test (Benton *et al.* 1994) |
|  |  | Letter-Based Word Fluency Test (Mathuranath *et al.* 2000) |
|  | Category-Guided Fluency | Controlled Oral Word Association Test (Benton *et al.* 1994) |
|  |  | Animal Naming (Sager *et al.* 2006) |
|  |  | CSMTB Category Fluency Test (Adlam *et al.* 2010) |
|  |  | Category-Based Word Fluency Test (Sager *et al.* 1992) |
|  |  | Isaacs Set Test (Isaacs & Kennie 1973) |
|  |  | NIH Examiner Category Fluency (Kramer *et al.* 2014) |
|  | Design Generation | Design Fluency Assessment (Delis *et al.* 2001) |
|  |  | DKEFS Nonverbal Fluency (Delis *et al.* 2001) |
|  |  | Shape Fluency (Murtha *et al.* 2002) |
| Language | - | Western Aphasia Battery (WAB) Aphasia Quotient (Kertesz 1982) |
|  |  | ACE Language subtest (Mathuranath *et al.* 2000) |
|  |  | Mississippi Aphasia Screening Test (Nakase-Thompson *et al.* 2005) |
|  |  | Language Aphasia Screening Test (Flamand-Roze *et al.* 2011) |
|  |  | PBAC Language Subscale (Libon *et al.* 2011) |
|  |  | Arizona Phonological Battery subtests (Beeson *et al.* 2010) |
|  |  | Language Composite BNT and VAT |
|  | Speech Output | WAB Spontaneous Speech Fluency subtest (Kertesz 1982) |
|  |  | Speech Rate (words per minute) (Capasso & Miceli 2001) |
|  |  | Picture Description (words per minute) (Goodglass & Kaplan 1983) |
|  |  | Northwestern Anagram Test (Weintraub *et al.* 2009) |
|  |  | NAVS Sentence Production Priming Test (Thompson 2011a) |
|  |  | BDAE Verbal Agility subtests (Goodglass & Kaplan 1983) |
|  |  | Automatic Speech subtests (Kertesz 1982) |
|  | Repetition | WAB Repetition subtest (Kertesz 1982) |
|  |  | PALPA Repetition subtest (Kay *et al.* 1996) |
|  |  | SYDBAT Repetition subtest (Savage *et al.* 2013) |
|  |  | Single-Word Repetition Task (K. Warrington Pat McKenna Lisa Orpw 1998) |
|  |  | Novel Sentence Repetition (McCarthy & Warrington 1984) |
|  |  | Children’s Non-Word Repetition Test (Gathercole *et al.* 1994) |
|  |  | MAE Sentence Repetition (Benton *et al.* 1994) |
|  |  | Repeat & Point Test – Repeat component (Hodges *et al.* 2008) |
|  | Naming | Boston Naming Test (Kaplan *et al.* 1983) |
|  |  | Modified Boston Naming Test (Kaplan *et al.* 1983) |
|  |  | Graded Naming Test (Warrington 1997) |
|  |  | SYDBAT Naming subtest (Savage *et al.* 2013) |
|  |  | CSMTB Picture Naming subtest (Bozeat *et al.* 2000) |
|  |  | Northwestern Naming Battery (Thompson & Weintraub 2014) |
|  |  | CSMTB 64-item Naming Task (Bozeat *et al.* 2000) |
|  |  | BECS GRECO Picture-Naming Task (Merck *et al.* 2011) |
|  |  | VAT Naming (Lindeboom 2002) |
|  |  | Picture naming test (DO 80) (Sajjadi *et al.* 2012) |
|  | Reading | National Adult Reading Test (Nelson 1982) |
|  |  | American National Adult Reading Test (Blair & Spreen 1989) |
|  |  | Schonell Reading Test (Schonell 1900) |
|  |  | Graded Difficulty Nonword Reading Test (Snowling *et al.* 1996) |
|  |  | Irregular word reading (Sajjadi *et al.* 2012) |
|  | Spelling | Graded Spelling Test (Baxter & Warrington 1994) |
|  | Written Expression | BDAE Narrative Writing subtest (Goodglass & Kaplan 1983) |
|  | Comprehension | CSMTB Word-Picture Matching subtest (Bozeat *et al.* 2000) |
|  |  | Test for Reception of Grammar (Bishop 1989) |
|  |  | Peabody Picture Vocabulary Test (Dunn 1965) |
|  |  | British Picture Vocabulary Scale (Dunn 1997) |
|  |  | PALPA Sentence Comprehension, Word-Picture Matching subtests (Kay *et al.* 1996) |
|  |  | AAT Comprehension Subtest (Weniger *et al.* 1981) |
|  |  | MAE Token Test (Benton *et al.* 1994) |
|  |  | NAVS Sentence Comprehension (Thompson 2011b) |
|  |  | BADA Sentence Comprehension Test (Miceli *et al.* 1994) |
|  |  | Auditory and written sentence comprehension (Sajjadi *et al.* 2012) |
|  |  | Story Comprehension (Happé 1994) |
|  |  | Warrington Synonym Test (K. Warrington Pat McKenna Lisa Orpw 1998) |
|  |  | CYCLE Sentence Comprehension (Curtiss & Yamada 1988) |
|  |  | WAB Word Recognition, Sequential Commands subtests (Kertesz 1982) |
|  |  | SYDBAT Word Comprehension Task (Savage *et al.* 2013) |
|  |  | Theory of Mind stories – Comprehension trial (Happé 1994) |
|  | Semantic Knowledge | Pyramids and Palm Trees – Pictures and Words (Howard 1992) |
|  |  | CSMTB Camels and Cactus Test (Bozeat *et al.* 2000) |
|  |  | SYDBAT Semantic Association subtest (Savage *et al.* 2013) |
|  |  | Semantic Associates (Savage *et al.* 2013) |
|  |  | BECS GRECO Verbal Semantic Matching (Merck *et al.* 2011) |
|  |  | Semantic Categorization Test (Grossman *et al.* 1997) |
|  |  | Visual Semantic Association Test (Visch-Brink *et al.* 2005) |
|  |  | Verb Similarity Task (Price & Grossman 2005) |
|  |  | Size/Weight Attribute Test (Warrington & Crutch 2007) |
| Math | - | Graded Difficulty Arithmetic Test (Jackson & Warrington 1986) |
|  |  | Oral and Written Calculation tasks (Halpern *et al.* 2003) |
| Memory | - | ACE-R Memory subtest (Mathuranath *et al.* 2000) |
|  |  | MMSE Recall (Folstein *et al.* 1975) |
|  |  | CAMCOG Memory (Roth *et al.* 1986) |
|  |  | DRS Memory subtest (Bellak *et al.* 1976) |
|  |  | Memory Composites |
|  |  | NAB Memory subtest (R A Stern & T White 2003) |
|  |  | Prospective Memory Test (Livner *et al.* 2009) |
|  | Verbal Learning | Camden Paired Associate Learning (Warrington 1996) |
|  |  | CVLT-II (2000) Learning Trials |
|  |  | RAVLT Learning Trials (Schmidt 1996) |
|  |  | Grober and Buschke learning (Grober & Buschke 1987) |
|  | Immediate Verbal Recall | CVLT-MS 30” Free Recall |
|  |  | WMS-III Logical Memory Immediate Recall (Wechsler 1997b) |
|  |  | RAVLT Immediate Recall (Schmidt 1996) |
|  |  | Free and Cued Selective Reminding Test Immediate Recall (Grober & Buschke 1987) |
|  | Delayed Verbal Recall | CVLT-MS 10’ Free Recall or Retention |
|  |  | WMS-III Logical Memory Delayed Recall or Retention (Wechsler 1997b) |
|  |  | CERAD Delayed Recall or Retention (Morris *et al.* 1993) |
|  |  | HVLT Delayed Recall or Retention (Brandt 1991) |
|  |  | RAVLT 30’ Delayed Recall or Retention (Schmidt 1996) |
|  |  | Free and Cued Selective Reminding Test Immediate Recall (Grober & Buschke 1987) |
|  |  | PVLT Delayed Recall or Retention (Price *et al.* 2009) |
|  | Verbal Recognition Memory | CVLT Recognition Memory |
|  |  | CERAD Word-List Recognition (Morris *et al.* 1993) |
|  |  | WRMT Words subtest (Soukup *et al.* 1999) |
|  |  | Grober and Buschke Recognition (Grober & Buschke 1987) |
|  |  | RAVLT Recognition (Schmidt 1996) |
|  |  | WMS-III Logical Memory Recognition (Wechsler 1997b) |
|  |  | DRM Recognition Discriminability (Roediger & McDermott 1995) |
|  |  | HVLT Recognition Memory (Brandt 1991) |
|  | Immediate Visuospatial Recall | RCFT 3’ Immediate Recall (Meyers 1999) |
|  |  | WMS-III Visual Reproduction, Faces Immediate Recall (Wechsler 1997b) |
|  |  | AMIPB Immediate Figure Recall (Coughlan & Hollows 1985) |
|  | Delayed Visuospatial Recall | RCFT Delayed Recall (Meyers 1999) |
|  |  | Visual Object Memory Recall (Stopford *et al.* 2007) |
|  |  | Benson Figure Recall (Possin *et al.* 2011) |
|  |  | WMS-III Visual Reproduction Delayed Recall (Wechsler 1997b) |
|  |  | AMIPB Delayed Figure Recall (Coughlan & Hollows 1985) |
|  | Visual Recognition Memory | RCFT Recognition Memory (Meyers 1999) |
|  |  | Doors and People Test: Doors subtest (Baddeley *et al.* 1994) |
|  |  | WRMT Faces subtest (Soukup *et al.* 1999) |
|  |  | CANTAB Delayed Matching to Sample Test (J Fray *et al.* 1996) |
|  |  | RVDLT Design Learning Test Recognition (A Rey 1958) |
|  |  | Camden Pictorial Recognition Memory Test (Warrington 1996) |
|  |  | Visual Association Test (Lindeboom 2002) |
|  |  | Four Mountains Test (Bird *et al.* 2010) |
|  |  | Camden Topographical Recognition Memory Test (Warrington 1996) |
|  |  | RVDLT Recognition Memory (A Rey 1958) |
|  |  | WMS-III Faces subtest (Wechsler 1997b) |
|  | Semantic Memory | Dead or Alive Test (Kapur *et al.* 1989) |
|  |  | Famous People Test (Snowden 2004) |
|  |  | NUFFACE Test Recognition (Gefen *et al.* 2013) |
|  |  | UCSF Famous Face Naming (Gorno-Tempini *et al.* 2004) |
| Visuospatial Skills | Motor-free Visuoperceptual | VOSP subtests (Warrington 1991) |
|  |  | Perceptual Assessment Battery (Mendez *et al.* 2002) |
|  |  | Benton Face Recognition Test (Benton 1994) |
|  |  | Benton Judgement of Line Orientation (Benton 1994) |
|  |  | Hooper Visual Organization Test (Hooper 1979) |
|  |  | Birmingham Object Recognition Battery (Riddoch & Humphreys 1993) |
|  |  | Clock Reading tasks (Sunderland *et al.* 1989) |
|  |  | Poppelreuter figures (Golden *et al.* 1982) |
|  |  | FAID Face-Perception and Face-Matching tasks (Miller *et al.* 2012) |
|  |  | Perceptual Control Tasks (Cohen *et al.* 2016) |
|  | Visuoconstruction | RCFT Figure Copy (Meyers 1999) |
|  |  | MMSE Figure Copy (Folstein *et al.* 1975) |
|  |  | ACE Visuoconstruction (Mathuranath *et al.* 2000) |
|  |  | Benson Figure Copy (Possin *et al.* 2011) |
|  |  | Beery Figure Copy (Beery 1982) |
|  |  | Clock Copy (Sunderland *et al.* 1989) |
|  |  | AMIPB Figure Copy (Coughlan & Hollows 1985) |
|  |  | Stick Test (Lezak M 1983) |
| Executive Functioning | - |  |
|  |  | DKEFS Tower Test Total Achievement Score (Delis *et al.* 2001) |
|  |  | Tower of London( Krikorian et al., 1994) |
|  |  | Iowa Gambling Task (Bechara *et al.* 1994) |
|  |  | Wisconsin Card Sorting Test Perseverative Errors (Kongs *et al.* 2000) |
|  |  | BADS subtests (Wilson, B.A. *et al.* 1996) |
|  |  | DKEFS Shifting Trials (Delis *et al.* 2001) |
|  |  | Object and Delayed Alternation (Freedman *et al.* 2013) |
|  |  | SEA Reversal Learning and Extinction Task (Funkiewiez *et al.* 2012) |
|  | Response Inhibition | Stroop Color-Word Inhibition Trial( Scarpina and Tagini, 2017) |
|  |  | Hayling Sentence Completion Test (Burgess & Shallice 1997) |
|  |  | Go-No-Go Tasks (Dubois *et al.* 2000) |
|  |  | NIH Examiner Flanker Task (Kramer *et al.* 2014) |
|  | Visual Set-Shifting | Trail Making Test Part B or B-A difference (Reitan 1958) |
|  |  | D-KEFS Trail Making Test Number–Letter Trial (Delis *et al.* 2001) |
|  | Concept Formation | Wisconsin Card Sorting Test Categories Completed (Kongs *et al.* 2000) |
|  |  | Modified Wisconsin Card Sorting Test Categories Completed (Schretlen D 2010) |
|  |  | Brixton Spatial Anticipation Test (Burgess & Shallice 1997) |
|  |  | Weigl Sorting Test (De Renzi *et al.* 1966) |
|  |  | Visual Verbal Test (Feldman 1959) |
|  |  | D-KEFS Sorting Test (Delis *et al.* 2001) |
|  |  |  |
| **Olfactory** | **Subdomain** | **Example Tests** |
|  | - | University of Pennsylvania Smell Identification Test (Doty *et al.* 1984) |
|  |  | Brief Smell Identification Test (Doty *et al.* 1996) |
|  |  | Motol Hospital Smell Test (H Magerova *et al.* 2008) |
|  |  | Sniffin Sticks’ Odor Identification Test (Hummel *et al.* 1997) |
|  |  | Sniffin Sticks’ Odor Discrimination Test (Hummel *et al.* 1997) |
|  |  | Spontaneous Odor Naming (Greenberg *et al.* 2011) |
|  |  | Odor-Picture Matching (Olofsson *et al.* 2013) |
|  |  | Odor-Word Matching (Olofsson *et al.* 2013) |
|  |  |  |
| **Social Cognition** | **Subdomain** | **Example Tests** |
|  | - | TASIT subtests (McDonald *et al.* 2006) |
|  |  | CATS subtests (Froming, K.B. *et al.* 2001) |
|  |  | Ekman 60 Faces (Ekman & Friesen 1976) |
|  |  | Reading the Minds Eyes Test (Baron-Cohen *et al.* 1997) |
|  |  | SEA Faux Pas and Emotion Recognition subtests (Funkiewiez *et al.* 2012) |
|  |  | Affect and Emotion Matching Tasks (Stone *et al.* 1998) |
|  |  | Theory of Mind Tasks (Winner *et al.* 1998) |
|  |  | Story-Based Empathy Task (Dodich *et al.* 2015) |
|  |  | Intentional Emotional Expression Task (Gola *et al.* 2017) |
|  |  | Facial Emotion Processing Task (Calder 1996) |
|  |  | Faux Pas Recognition Test (Stone *et al.* 1998) |
|  |  | Hotel Task (Manly *et al.* 2002) |
|  |  | Cartoon Prediction Tasks (O’Sullivan *et al.* 1965) |
|  |  | Manchester Faces (Whittaker *et al.* 1994) |
|  |  | Moral/Conventional Distinction Task (Lough *et al.* 2006) |
|  |  | Facial Affect Selection Task (Bowers D *et al.* 1992) |
|  |  | Emotion Selection Task (Miller *et al.* 2012) |
|  |  | Face-Emotion Matching Task (Bowers D *et al.* 1992) |

AAT = Aachen Aphasia Test; ACE = Addenbroke’s Cognitive Examination; AMIPB = Adult Memory and Information Processing Battery; BADA = Batteria per l’Analisi dei Deficit Afasici also called the Battery for the Analysis of the Aphasic Deficit; BADS = Behavioural Assessment of the Dysexecutive Syndrome; BECS GRECO = La batterie d'évaluation des connaissances sémantiques du GRECO also called the GRECO Neuropsychological Semantic Battery(Merck *et al.* 2011); CANTAB = Cambridge Neuropsychological Test Automated Battery, CATS = Comprehensive Affect Testing System; CERAD = Consortium to Establish a Registry for Alzheimer's Disease Neuropsychological Assessment Battery; CSMTB = Cambridge Semantic Memory Test Battery; CYCLE = Curtiss–Yamada Comprehension Language Evaluation; DKEFS = Delis-Kaplan Executive Function System; DRM = Deese-Roediger-McDermott Paradigm; DRS = Dementia Rating Scale; FAI = Facial Affect and Identity Discrimination; MAE = Multilingual Aphasia Examination; NAB = Neuropsychological Assessment Battery; NAVS = Northwestern Assessment of Verbs and Sentences; NUFFACE = Northwestern University Famous Faces; PALPA = Psycholinguistic Assessments of Language Processing in Aphasia; PBAC = Philadelphia Brief Assessment of Cognition; PVLT = Philadelphia Verbal Learning Test; RVDLT = Rey Visual Design Learning Test; SEA = Social Cognition and Emotional Assessment; SYDBAT = Sydney Language Battery; TASIT = The Awareness of Social Inference Test; TEA = Test of Everyday Attention(Robertson *et al.* 1994); TROG = Test for Reception of Grammar(Bishop 1989); VAT = Visual Association Test; WRMT = Warrington Recognition Memory Test(Soukup *et al.* 1999); WAB = Western Aphasia Battery; WASI = Wechsler Abbreviated Scale of Intelligence; WAIS = Wechsler Adult Intelligence Scal

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**Appendix D.** Test categorization for cognitive domains and subdomains

Tests of design fluency and verbal fluency were placed into a separate domain of ideational fluency in lieu of assigning these tasks to the language or executive functioning domains based on prior work (Vannorsdall *et al.* 2012). When multiple scores from the same measure (i.e., from the same set of test stimuli) were reported and were judged to measure the same underlying cognitive construct, a single representative outcome was chosen for the overall task domain and cognitive subdomain. For example, for studies reporting learning, immediate recall, delayed recall and recognition scores from the California Verbal Learning Test, only the delayed recall score was assigned to the cognition domain and memory subdomain. The remaining indices were excluded from analyses involving the cognitive domain and memory subdomain but were assigned to their respective facets within memory and were included only in analyses involving the facets of memory. In instances in which an outcome measure reported multiple scores judged to measure separable cognitive constructs, each score was pooled and assigned to the overall domain and subsequently assigned to its respective subdomain. For example, when assigning the copy, immediate recall, delayed recall and recognition trials of the Rey Complex Figures Test, the copy trial was assigned to the cognitive domain, visuospatial subdomain, and visuoconstruction subcategory. Furthermore, the delayed recall trial was assigned to the cognitive domain, memory subdomain, and delayed visuospatial memory subcategory. All remaining indices were solely assigned to their respective facet within the memory subdomain. The mean outcome was calculated so that each patient group contributed to one effect size per analysis. If separate task data were reported for arbitrary subgroups reported within a study (e.g., with and without autonomic dysfunction), the selected outcomes were pooled together to avoid weighting a single study by the number of outcomes reported.

**Reference for Appendix D**

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**Appendix E.** Heterogeneity Indices (I-squared) for task domains and subdomains in bvFTD, svPPA, and nfvPPA groups

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **bvFTD** |  | **svPPA** |  | **nfvPPA** |  | ***Between Groups*** |
|  | ***I*2 (%)** | ***n*** | ***I*2 (%)** | ***n*** | ***I*2 (%)** | ***n*** | ***I*2 (%)** |
| **Overall** | 82 | 289 | 77 | 199 | 67 | 110 | 79 |
| **Olfaction** | 79 | 4 | 78 | 5 | 0 | 2 | 71 |
| **Social Cognition** | 87 | 52 | 37 | 20 | 0 | 9 | 81 |
| **Cognition** | 82 | 285 | 78 | 199 | 71 | 110 | 79 |
| Global Screening Measures | 86 | 250 | 81 | 153 | 73 | 91 | 83 |
| Intellectual Functioning | 84 | 32 | 88 | 21 | 80 | 13 | 85 |
| Verbal IQ | 85 | 21 | 84 | 13 | 84 | 8 |  |
| Performance IQ | 74 | 29 | 53 | 19 | 43 | 13 |  |
| Attention | 54 | 85 | 15 | 92 | 59 | 50 | 65 |
| Simple Attention | 61 | 48 | 0 | 53 | 71 | 33 |  |
| Working Memory | 57 | 75 | 24 | 80 | 37 | 43 |  |
| Processing Speed | 92 | 48 | 42 | 33 | 85 | 24 | 88 |
| Ideational Fluency | 89 | 102 | 81 | 99 | 77 | 47 | 86 |
| Letter-Guided Fluency | 90 | 90 | 56 | 72 | 74 | 39 |  |
| Category-Guided Fluency | 93 | 64 | 88 | 79 | 82 | 34 |  |
| Design Fluency | 78 | 15 | 80 | 15 | 60 | 6 |  |
| Language | 87 | 110 | 90 | 141 | 76 | 67 | 90 |
| Speech Output | 64 | 9 | 83 | 21 | 86 | 23 |  |
| Repetition | 0 | 5 | 35 | 23 | 57 | 20 |  |
| Naming | 90 | 81 | 92 | 117 | 75 | 53 |  |
| Reading | 85 | 18 | 68 | 18 | 71 | 11 |  |
| Comprehension | 39 | 49 | 83 | 85 | 74 | 43 |  |
| Semantic Knowledge | 51 | 20 | 80 | 60 | 57 | 18 |  |
| Math | 87 | 19 | 68 | 30 | 76 | 18 | 80 |
| Memory | 89 | 107 | 79 | 95 | 67 | 48 | 85 |
| Verbal Learning | 96 | 25 | 82 | 16 | 72 | 11 |  |
| Immediate Verbal Recall | 87 | 33 | 87 | 13 | 75 | 6 |  |
| Delayed Verbal Recall | 93 | 68 | 74 | 30 | 82 | 16 |  |
| Verbal Recognition Memory | 94 | 42 | 88 | 27 | 82 | 12 |  |
| Immediate Visuospatial Recall | 69 | 15 | 64 | 12 | 76 | 4 |  |
| Delayed Visuospatial Recall | 79 | 45 | 35 | 59 | 52 | 24 |  |
| Visual Recognition Memory | 81 | 25 | 84 | 31 | 53 | 16 |  |
| Semantic Memory | 0 | 5 | 91 | 10 | 0 | 1 |  |
| Visuospatial Skills | 75 | 75 | 52 | 94 | 62 | 45 | 70 |
| Visuoperceptual | 87 | 40 | 59 | 55 | 72 | 25 |  |
| Visuoconstruction | 74 | 51 | 51 | 75 | 42 | 31 |  |
| Executive Functioning | 89 | 118 | 64 | 74 | 78 | 44 | 85 |
| Response Inhibition | 83 | 53 | 85 | 22 | 88 | 9 |  |
| Visual Set-Shifting | 92 | 71 | 41 | 59 | 72 | 35 |  |
| Concept Formation | 77 | 33 | 77 | 6 | 70 | 6 |  |
| Executive Errors | 62 | 40 | 69 | 15 | 62 | 8 | 70 |

Note: Behavioral variant frontotemporal dementia (bvFTD), semantic variant primary progressive aphasia (svPPA), and non-fluent variant PPA (nfvPPA)

**Appendix F1.** Cochran’s *Q* statistic of contrasts between cognitive subdomains and domains of olfaction and social cognition within bvFTD

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **GLOB** | **IQ** | **ATT** | **PS** | **FLU** | **LANG** | **MATH** | **MEM** | **VISUO** | **EF** | **OLF** | **SOC** |
|  | *g=*-1.84 | *g=*-1.38 | *g=*-0.96 | *g=*-1.32 | *g=*-1.83 | *g=*-1.28 | *g=*-0.97 | *g=*-1.71 | *g=*-0.84 | *g=*-1.61 | *g=*-1.90 | *g=*-1.76 |
|  | *n* = 250 | *n* = 32 | *n* = 85 | *n =* 48 | *n =* 102 | *n =* 110 | *n =* 19 | *n =* 107 | *n =* 75 | *n* = 118 | *n =* 4 | *n =* 52 |
| **GLOB** | -- | 7.24\*\* | 70.37\*\*\* | 11.80\*\*\* | 0.01 | 27.97\*\*\* | 16.59\*\*\* | 1.44 | 76.89\*\*\* | 4.57\* | 0.02 | 0.25 |
| **IQ** |  | -- | 9.27\*\* | 0.04 | 4.89\* | 0.27 | 2.49 | 2.43 | 11.19\*\*\* | 1.34 | 1.08 | 3.28 |
| **ATT** |  |  | -- | 5.72\* | 45.73\*\*\* | 6.85\*\* | 0.04 | 32.46\*\*\* | 1.59 | 26.97\*\*\* | 8.13\*\* | 37.91\*\*\* |
| **PS** |  |  |  | -- | 7.29\*\* | 0.06 | 1.47 | 3.91\* | 8.08\*\* | 2.42 | 0.81 | 4.13\* |
| **FLU** |  |  |  |  | -- | 15.74\*\*\* | 11.59\*\*\* | 0.74 | 49.27\*\*\* | 2.47 | 0.01 | 0.15 |
| **LANG** |  |  |  |  |  | -- | 1.71 | 9.14\*\* | 10.92\*\*\* | 6.11\* | 1.44 | 8.83\*\* |
| **MATH** |  |  |  |  |  |  | -- | 7.84\*\* | 0.53 | 6.55\*\* | 3.19 | 9.71\*\* |
| **MEM** |  |  |  |  |  |  |  | -- | 36.14\*\*\* | 0.45 | 0.09 | 0.10 |
| **VISUO** |  |  |  |  |  |  |  |  | -- | 31.35\*\*\* | 7.23\*\* | 38.70\*\*\* |
| **EF** |  |  |  |  |  |  |  |  |  | -- | 0.25 | 0.81 |
| **OLF** |  |  |  |  |  |  |  |  |  |  | -- | 0.06 |

bvFTD=behavioral variant frontotemporal dementia; GLOB=Global Screening Measures; IQ=Intellectual Functioning; ATT=Attention; PS=Processing Speed; FLU=Ideational Fluency; LANG=Language; MEM=Memory, VISUO=Visuospatial; EF=Executive Functioning; OLF=Olfaction; SOC=Social Cognition; \**p*≤05, \*\**p*≤0.01, \*\*\**p*≤0.001

**Appendix F2.** Cochran’s *Q* statistic of contrasts between cognitive subdomains and domains of olfaction and social cognition within svPPA

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **GLOB** | **IQ** | **ATT** | **PS** | **FLU** | **LANG** | **MATH** | **MEM** | **VISUO** | **EF** | **OLF** | **SOC** |
|  | *g=*-2.28 | *g=*-1.70 | *g=*-0.55 | *g=*-0.89 | *g=*-2.43 | *g=*-3.05 | *g=*-0.79 | *g=*-1.63 | *g=*-0.29 | *g=*-1.02 | *g=*-2.33 | *g=*-1.53 |
|  | *n =* 153 | *n =* 21 | *n =* 92 | *n =* 33 | *n =* 99 | *n =* 141 | *n =* 30 | *n =* 95 | *n =* 94 | *n =* 74 | *n =* 5 | *n =* 20 |
| **GLOB** | -- | 5.72\* | 276.55\*\*\* | 66.38\*\*\* | 1.42 | 32.86\*\*\* | 65.72\*\*\* | 25.98\*\*\* | 345.02\*\*\* | 105.34\*\*\* | 0.01 | 11.64\*\*\* |
| **IQ** |  | -- | 45.23\*\*\* | 11.15\*\*\* | 7.84\*\* | 16.78\*\*\* | 11.62\*\*\* | 0.09 | 59.70\*\*\* | 10.69\*\*\* | 0.86 | 0.35 |
| **ATT** |  |  | -- | 12.80\*\*\* | 275.41\*\*\* | 296.66\*\*\* | 1.79 | 101.46\*\*\* | 14.73\*\*\* | 28.40\*\*\* | 30.22\*\*\* | 74.28\*\*\* |
| **PS** |  |  |  | -- | 72.37\*\*\* | 78.41\*\*\* | 1.21 | 18.90\*\*\* | 30.29\*\*\* | 0.81 | 15.37\*\*\* | 18.92\*\*\* |
| **FLU** |  |  |  |  | -- | 15.09\*\*\* | 69.98\*\*\* | 31.01\*\*\* | 330.10\*\*\* | 109.74\*\*\* | 0.05 | 15.14\*\*\* |
| **LANG** |  |  |  |  |  | -- | 70.87\*\*\* | 73.47\*\*\* | 348.98\*\*\* | 146.43\*\*\* | 1.43 | 24.33\*\*\* |
| **MATH** |  |  |  |  |  |  | -- | 21.33\*\*\* | 12.49\*\*\* | 3.65 | 14.57\*\*\* | 19.23\*\* |
| **MEM** |  |  |  |  |  |  |  | -- | 144.52\*\*\* | 22.53\*\*\* | 2.18 | 0.19 |
| **VISUO** |  |  |  |  |  |  |  |  | -- | 60.66\*\*\* | 34.00\*\*\* | 81.14\*\*\* |
| **EF** |  |  |  |  |  |  |  |  |  | -- | 11.70\*\*\* | 10.95\*\*\* |
| **OLF** |  |  |  |  |  |  |  |  |  |  | -- | 3.74 |

svPPA= semantic variant primary progressive aphasia; GLOB=Global Screening Measures; IQ=Intellectual Functioning; ATT=Attention; PS=Processing Speed; FLU=Ideational Fluency; LANG=Language; MEM=Memory, VISUO=Visuospatial; EF=Executive Functioning; OLF=Olfaction; SOC=Social Cognition; \**p*≤05, \*\**p*≤0.01, \*\*\**p*≤0.001

**Appendix F3.** Cochran’s *Q* statistic of contrasts between cognitive subdomains and domains of olfaction and social cognition within nfvPPA

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **GLOB** | **IQ** | **ATT** | **PS** | **FLU** | **LANG** | **MATH** | **MEM** | **VISUO** | **EF** | **SOC** |
|  | *g=*-1.88 | *g=*-1.89 | *g=*-1.68 | *g=*-1.92 | *g=*-2.23 | *g=*-1.74 | *g=*-1.29 | *g=*-0.95 | *g=*-0.54 | *g=*-1.76 | *g=*-1.34 |
|  | *n =* 91 | *n =* 13 | *n =* 50 | *n =* 24 | *n =* 47 | *n =* 67 | *n =* 18 | *n =* 48 | *n =* 45 | *n =* 44 | *n =* 9 |
| **GLOB** | -- | 0.006 | 2.05 | 0.07 | 5.37\* | 0.94 | 7.95\*\* | 47.11\*\*\* | 100.56\*\*\* | 0.59 | 3.26 |
| **IQ** |  | -- | 0.71 | 0.02 | 1.22 | 0.29 | 3.39 | 15.09\*\*\* | 34.06\*\*\* | 0.24 | 2.08 |
| **ATT** |  |  | -- | 1.32 | 11.68\*\*\* | 0.13 | 4.13\* | 29.45\*\*\* | 75.22\*\*\* | 0.20 | 1.52 |
| **PS** |  |  |  | -- | 1.25 | 0.66 | 4.56\* | 21.60\*\*\* | 46.79\*\*\* | 0.57 | 2.36 |
| **FLU** |  |  |  |  | -- | 7.92\*\* | 15.31\*\*\* | 63.81\*\*\* | 117.79\*\*\* | 6.16\* | 7.96\*\* |
| **LANG** |  |  |  |  |  | -- | 4.04\* | 27.90\*\*\* | 66.62\*\*\* | 0.002 | 1.55 |
| **MATH** |  |  |  |  |  |  | -- | 2.98 | 15.54 | 3.66 | 0.11 |
| **MEM** |  |  |  |  |  |  |  | -- | 8.72\*\* | 24.37\*\*\* | 3.54 |
| **VISUO** |  |  |  |  |  |  |  |  | -- | 58.66\*\*\* | 14.57\*\*\* |
| **EF** |  |  |  |  |  |  |  |  |  | -- | 1.54 |

nfvPPA=non-fluent variant primary progressive aphasia; GLOB=Global Screening Measures; IQ=Intellectual Functioning; ATT=Attention; PS=Processing Speed; FLU=Ideational Fluency; LANG=Language; MEM=Memory, VISUO=Visuospatial; EF=Executive Functioning; SOC=Social Cognition; \**p*≤05, \*\**p*≤0.01, \*\*\**p*≤0.001

**Appendix G.** Cochran’s *Q* statistic of contrasts between language facets in bvFTD, svPPA, and nfvPPA

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **bvFTD** | | | | | | |
|  | **SPEECH** | **REPETITION** | **NAMING** | **READING** | **COMP** | **SEMK** |
|  | *g=*-1.11 | *g=*-0.52 | *g=*-1.44 | *g=*-1.61 | *g=*-1.06 | *g=*-0.83 |
|  | *n =* 9 | *n =* 5 | *n =* 81 | *n =* 18 | *n =* 49 | *n =* 20 |
| **SPEECH** | -- | 3.09 | 0.73 | 1.71 | 0.03 | 1.02 |
| **REPETITION** |  | -- | 3.43 | 5.75\* | 6.62\*\* | 1.38 |
| **NAMING** |  |  | -- | 0.39 | 4.98\* | 5.63\* |
| **READING** |  |  |  | -- | 5.95\* | 8.18\*\* |
| **COMP** |  |  |  |  | -- | 3.87\* |
| **svPPA** | | | | | | |
|  | **SPEECH** | **REPETITION** | **NAMING** | **READING** | **COMP** | **SEMK** |
|  | *g=*-1.38 | *g=*-0.88 | *g=*-4.57 | *g=*-2.14 | *g=*-2.24 | *g=*-2.23 |
|  | *n =* 21 | *n =* 23 | *n =* 117 | *n =* 18 | *n =* 85 | *n =* 60 |
| **SPEECH** | -- | 3.69 | 53.69\*\*\* | 5.93\* | 9.96\*\* | 9.64\*\* |
| **REPETITION** |  | -- | 99.42\*\*\* | 37.26\*\*\* | 36.29\*\*\* | 38.60\*\*\* |
| **NAMING** |  |  | -- | 34.63\*\*\* | 117.97\*\*\* | 97.08\*\*\* |
| **READING** |  |  |  | -- | 0.20 | 0.11 |
| **COMP** |  |  |  |  | -- | 0.03 |
| **nfvPPA** | | | | | | |
|  | **SPEECH** | **REPETITION** | **NAMING** | **READING** | **COMP** | **SEMK** |
|  | *g=*-2.63 | *g=*-1.53 | *g=*-1.71 | *g=*-2.32 | *g=*-1.28 | *g=*-1.04 |
|  | *n =* 23 | *n =* 20 | *n =* 53 | *n =* 11 | *n =* 43 | *n =* 18 |
| **SPEECH** | -- | 13.87\*\*\* | 15.12\*\*\* | 0.76 | 29.21\*\*\* | 29.26\*\*\* |
| **REPETITION** |  | -- | 0.73 | 7.39\*\* | 1.35 | 5.07\* |
| **NAMING** |  |  | -- | 4.38\* | 6.11\* | 10.00\*\* |
| **READING** |  |  |  | -- | 12.55\*\*\* | 19.91\*\*\* |
| **COMP** |  |  |  |  | -- | 1.29 |

bvFTD=behavioral variant frontotemporal dementia, svPPA=semantic variant primary progressive aphasia, nfvPPA=non-fluent variant PPA; SPEECH=Speech Output; COMP=Comprehension; SEMK=Semantic Knowledge; \**p*≤05, \*\**p*≤0.01, \*\*\**p*≤0.001