Appendix S1: Information about neuropsychological indices and clinical variables

— Clinical variables

Demographics
AGE: Age of patient (in years)
EDU: Educational level (in years)
GEN: Gender (Male/Female)
HDS: Handedness (Edinburgh laterality index)
HDS_b: Handedness (Left/Right)

Epilepsy related information
HEM: Hemispheric lateralization of the temporal lobe epilepsy (L = Left; R = right)
ASO: Age of seizures onset (in years)
AHS: Hippocampal asymmetry (absolute volume difference)
DUR: Duration of the epilepsy (in years)
DUR_b: Duration ≤ 15years (1); > 15years (2)
HS_b: Hippocampal sclerosis (yes/no)
FRQ: Frequency of seizures (by months)
AED: Antiepileptic drugs (daily taken)
SEV: Severity of the epilepsy (composite score deriving from DUR, FRQ and AED)
SEV_b: Severity composite score ≤ 6 (1); > 6 (2)

Psycho-emotional variables
BDI: Beck Depression Inventory (Beck & Steer, 1984)
STA: State-Trait Anxiety Inventory (STAI State: Spielberger, 1983)
STB: State-Trait Anxiety Inventory (STAI Trait: Spielberger, 1983)
THY: Thymic state composite score derived from BDI and STA)
THY_b: Thymic composite score ≤ -1 SD

Surgery information
AGE: Age at time of neurosurgery (in years)
DIST: distance of the post-op workup from the date of surgery (in years)
ENG: Engel score at two years post-surgery (Engel, 1993, 2013)
ENG_b: Engel score = 1 (1 = ENG+); Engel score = 2, 3 or 4 (2 = ENG-)
NAM: Naming DO80 at two years post-surgery (Metz-Lutz et al., 1991)
NAM_b: NAM Reliable Change Index > -1.28 SD (1 = NAM +); NAM RCI ≤ -1.28 SD (2 = NAM-)

— All neuropsychological indices (NPE)

Verbal reasoning (V_IQ)
VCI: Verbal Comprehension Index (Wechsler, 2011)
VOC: Vocabulary (Wechsler, 2011)
INF: Information (Wechsler, 2011)
SIM: Similarities (Wechsler, 2011)

Verbal memory (V_Mem)
AMI: Auditory Memory Index (Wechsler, 2012)

LM1: Logical Memory 1 (Wechsler, 2012)
LM2: Logica lMemory 2 (Wechsler, 2012)
PA1: Paired Associates 1 (Wechsler, 2012)
PA2: Paired Associates 2 (Wechsler, 2012)
DS1: Digit Span 1 (Wechsler, 2011)

Verbal executive functioning (V_Exe)
PFL: Phonological Fluency (Godefroy & GREFEX, 2008)
SFL: Semantic Fluency (Godefroy & GREFEX, 2008)
STR: Stroop Test (Godefroy & GREFEX, 2008)
DS2: Digit Span 2 (Wechsler, 2011)

Verbal semantics (V_Sem)
NAM: Naming DO80 (Metz-Lutz et al., 1991)
NOC: Naming of Complex Objects (Merck et al., 2011)
NFA: Face Naming (Merck et al., 2011)
TOK: Token Test (De Renzi & Vignolo, 1962)
CHC: Chapman Cook (Chapman & Cook, 1923)

Visuo-spatial reasoning (VS_IQ)
PRI: Perceptual Reasoning Index (Wechsler, 2011)
PUZ: Puzzle (Wechsler, 2011)
CUB: Cubes (Wechsler, 2011)
MAT: Matrices (Wechsler, 2011)

Visuo-spatial memory (VS_Mem)
VMI: Visual Memory Index (Wechsler, 2012)
VR1: Visual Reproduction 1 (Wechsler, 2012)
VR2: Visual Reproduction 2 (Wechsler, 2012)
DE1: Design 1 (Wechsler, 2012)
DE2: Design 2 (Wechsler, 2012)

Visuo-spatial executive functioning (VS_Exe)
TMT: Trail Making Test (Godefroy & GREFEX, 2008)
PSI: Processing Speed Index (Wechsler, 2011)
WCS: Wisconsin Card Sorting Test (Godefroy & GREFEX, 2008)

Visuo-spatial and semantics (VS_Sem)
IFA: Identification of Faces (Merck et al., 2011)

Note. The standardization of the scores obtained by patients (z scores) was carried out by the neuropsychologist with respects to the French norms, provided in respective manuals. The tests in red are the main indicators selected to perform the machine learning analyses that require restricting the number of variables used for classification (see main text, Section 3.1.1.). These specific indicators were chosen because (i) they are derived from standard and widely used tests in the NPE of epilepsy patients and (ii) given their sensitivity in temporal epilepsy in particular (Roger et al., 2020). A more detailed description of these indicators is provided in the following section.

— **Main neuropsychological indicators**

The Wechsler Memory Scale (WMS IV; Wechsler, 2012) allows computing several index scores such as:
(i) an **Auditory Memory Index** (**AMI**): this index includes the subtests "*logical memory*" and "*verbal paired associates*"; assess the ability to listen and repeat oral information immediately and after a delay of 20 to 30 minutes;
(ii) a **Visual Memory Index** (**VMI**); this index includes the subtests "*designs*" and "*visual reproduction*" and measure the ability to remember visual details and spatial location.

The Wechsler Adult Intelligence Scale (WAIS IV; Wechsler, 2011) allows to calculate several index scores such as:
(i) a **Verbal Comprehension Index** (**VCI**) measuring verbal reasoning abilities, abstraction of concept, general knowledge. This index comprises several subtests including: "*similarities*", "*vocabulary*" and "*information*" tests;
(ii) a **Perceptual Reasoning Index** (**PRI**) evaluating nonverbal reasoning abilities, mental rotation. This index includes "*block design*", "*matrix reasoning*" and "*visual puzzles*". For a more detailed and exhaustive description of all of the indexes and subtests see Wechsler, 2011, 2012).

The **DO80 Naming** task (**NAM**) is the French equivalent of the Boston Naming Task (BNT: Kaplan et al., 1983) consisting of correctly naming 80 draws visually presented. The test was designed to assess naming ability and is used to evaluate certain forms of aphasia and the "tip-of-the-tongue" phenomenon (Deloche & Hannequin, 1997).

The **Semantic Fluency** task (**SFL**) consists in giving as many words as possible belonging to a particular semantic "class", during 2 minutes (e.g. animals; Godefroy & GREFEX, 2008). The **Phonological Fluency** task (**PFL**) consists in giving as many words as possible starting with a particular letter during 2 minutes (e.g. words beginning with the letter P; Godefroy & GREFEX, 2008). These fluency tests assess executive functioning and in particular the functions of mental flexibility and lexical research.

The **Trail Making Test B-A** (**TMT**) aims to alternately connecting as fast as possible a series of numbers and letters randomly presented in the space (Godefroy & GREFEX, 2008). The test is thought to evaluate the flexibility and processing speed capacities.

The **Stroop** "interference" test (**STR**) consists to name the ink color of written names of colors. In this task, the ink color can be congruent, i.e. it actually corresponds to the name written (name /red/ written in red ink) or incongruent (name /red/ written in blue ink). To succeed in the task, the subject must therefore say "red" in the first case and "blue" in the second one. Overall, the test measures the ability to inhibit cognitive interference (Stroop, 1935).

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