**Supplementary material**

**Table S1.** Results of fixed effects of the linear mixed models (LMMs) for recovery of clinical orientation in the domains in person, place and time. Values represent means with 95% upper and lower confidence intervals. Postictal medication (i.e., midazolam), electrode placement and sex were binarized (with value 1 = use of postictal medication, 1 = bi(fronto)temporal stimulation, and 1 = male, respectively).

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Intercept** | **Tmax** | $$a$$ | $$τ$$ | **Electrical charge** | **Seizure duration** | **Postictal medication** | **Electrode placement** | **ECT-session** | **Sex** | **Age** |
| **ROT in person** | 24.2 [20.2, 28.3]\*\*\* | 1.5 [0.4, 2.6]\*\* | -1.2 [-2.3, -0.1]\* | 0.7 [-0.1, 1.5] | -0.3 [-1.7, 1.1] | 2.5 [1.5, 3.5]\*\*\* | 4.4 [1.3, 7.4]\*\* | 1.3 [-2.3, 4.9] | 0.1 [-0.1, 0.3]\* | -2.9 [-7.1, 1.3] | -0.3 [-2.2, 1.7] |
| **ROT in place** | 25.1 [18.9, 31.4]\*\*\* | 3.3 [1.3, 5.4]\*\* | -1.2 [-3.0, 0.5] | -0.7 [-2.0, 0.6] | 2.6 [0.5, 4.8]\* | 3.1 [1.5, 4.8]\*\*\* | 8.3 [3.5, 13.2]\*\*\* | 5.2 [-0.4, 10.8] | -0.1 [-0.4, 0.3] | 1.9 [-4.0, 7.9] | 0.2 [-2.5, 2.9] |
| **ROT in time** | 31.2 [25.2, 37.2]\*\*\* | 2.9 [0.9, 4.9]\*\* | -2.8 [-4.8,-0.8]\*\* | -0.3 [-1.8, 1.2] | 0.5 [-1.9, 3.0] | 3.3 [1.6, 5.1]\*\*\* | 5.6 [0.4, 10.7]\* | 2.5 [-3.1, 8.2] | -0.2 [-0.6, 0.3] | 3.5 [-2.5, 9.4] | 4.0 [1.3, 6.7]\*\* |

ROT = reorientation time; Tmax = timepoint in the postictal electroencephalogram where recovery is maximized; $a$ = the extent of recovery ($Δ$ADR [alpha/delta ratio]); $τ$ = time constant; ECT = electroconvulsive therapy; \*p < .05; \*\*p < .01; \*\*\*p < .001

**Model design and performances**

*Model design.* A linear mixed model (LMM) to predict time to reorientation for each domain (i.e., person, place and time, in minutes) with fixed effects Tmax, $a$, $τ$, electrical charge of the ECT-stimulus (in millicoulombs), seizure duration (in seconds), postictal medication (1 = use of postictal medication), electrode placement (1 = bi[fronto]temporal stimulation) and number of ECT-session, sex (1 = male) and age (in years) was fitted. Tmax and subject were included as random effects. The formula was: ‘ROT ~ Tmax + $a$ + $τ$ + electrical charge + seizure duration + postictal medication + electrode placement + number of ECT-session + sex + age + (1 + Tmax | subject)’.

*Model performance.* For time to reorientation in person, the model’s total explanatory power (i.e., conditional R2) was 0.72 and the part related to the fixed effects (i.e., marginal R2) alone was 0.35. For time to reorientation in place and time, conditional R2 was 0.75 and 0.55, and marginal R2 was 0.31 and 0.29, respectively.

**Table S2.** Results of fixed effects of the linear mixed models (LMMs) for recovery of clinical orientation in the domains in person, place and time without midazolam. Values represent means with 95% upper and lower confidence intervals. Electrode placement and sex were binarized (with value 1 = bi(fronto)temporal stimulation and 1 = male, respectively).

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Intercept** | **Tmax** | $$a$$ | $$τ$$ | **Electrical charge** | **Seizure duration** | **Electrode placement** | **ECT-session** | **Sex** | **Age** |
| **ROT in person** | 26.9 [21.4, 30.6]\*\*\* | 1.4 [0.3, 2.5]\* | -1.2 [-2.5, 0.1] | 0.4 [-0.5, 1.4] | 03 [-1.3, 1.9] | 3.1 [1.8, 4.4]\*\*\* | -1.6 [-5.6, 2.4] | 0.1 [-0.2, 0.4] | -4.0 [-8.6, 0.6] | -0.2 [-2.3, 1.9] |
| **ROT in place** | 26.6 [19.2, 34.0]\*\*\* | 4.3 [1.5, 7.0]\*\* | -0.5 [-2.7, 1.7] | -0.8 [-2.5, 1.0] | 2.8 [0.3, 5.4]\* | 3.8 [1.4, 6.3]\*\* | 3.9 [-2.7, 10.5] | -0.2 [-0.7, 0.4] | 1.2 [-5.6, 7.9] | 0.3 [-2.9, 3.4] |
| **ROT in time** | 32.4 [24.5, 40.3]\*\*\* | 2.2 [-0.2, 4.6] | -2.9 [-5.6, -0.2]\* | -0.8 [-2.9, 1.4] | 2.3 [-1.0, 5.5] | 4.6 [2.0, 7.1]\*\*\* | 3.3 [-3.6, 10.2] | -0.5 [-1.2, 0.1] | 2.8 [-4.6, 10.2] | 3.4 [0.0, 6.8]\* |

ROT = reorientation time; Tmax = timepoint in the postictal electroencephalogram where recovery is maximized; $a$ = the extent of recovery ($Δ$ADR [alpha/delta ratio]); $τ$ = time constant; ECT = electroconvulsive therapy; \*p < .05; \*\*p < .01; \*\*\*p < .001

*Model design.* Similar to Table S1 but without midazolam as fixed effect.

*Model performance.* For time to reorientation in person, the model’s total explanatory power (i.e., conditional R2) was 0.71 and the part related to the fixed effects (i.e., marginal R2) alone was 0.30. For time to reorientation in place and time, conditional R2 was 0.72 and 0.49, and marginal R2 was 0.21 and 0.25, respectively.

**Table S3.** Results of fixed effects of the linear mixed models (LMMs) for postictal EEG restoration parameters Tmax, $a$ and $τ$. Values represent means with 95% upper and lower confidence intervals. Postictal medication (i.e., midazolam), electrode placement and sex were binarized (with value 1 = use of postictal medication, 1 = bi(fronto)temporal stimulation, and 1 = male, respectively).

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Intercept** | **Electrical charge** | **Seizure duration** | **Postictal medication** | **Electrode placement** | **ECT-session** | **Sex** | **Age** |
| **Tmax** | 26.8 [23.4, 30.3]\*\*\* | 1.0 [-0.5, 2.4] | 3.9 [2.4, 5.4]\*\*\* | 5.5 [2.6, 8.4]\*\*\* | -1.5 [-4.7, 1.8] | 0.3 [0.0, 0.6]\* | 0.4 [-2.9, 3.7] | -0.6 [-2.1, 0.9] |
| $$a$$ | 0.60 [0.47, 0.73]\*\*\* | -0.07 [-0.11, -0.02]\*\* | -0.04 [-0.07, -0.01]\* | -0.04 [-0.14, 0.06] | -0.15 [-0.27, -0.03]\* | -0.02 [-0.02, -0.01]\*\*\* | -0.07 [-0.22, 0.08] | 0.06 [-0.01, 0.12] |
| $$τ$$ | 6.4 [5.1, 7.8]\*\*\* | -0.3 [-0.9, 0.3] | 0.1 [-0.3, 0.3] | -0.5 [-1.7, 0.7] | -0.5 [-1.8, 0.8] | 0.2 [0.0, 0.3]\* | -1.0 [-2.3, 0.4] | -0.2 [-0.8, 0.4] |

Tmax = timepoint in the postictal electroencephalogram where recovery is maximized; $a$ = the extent of recovery ($Δ$ADR [alpha/delta ratio]); $τ$ = time constant; ECT = electroconvulsive therapy; \*p < .05; \*\*p < .01; \*\*\*p < .001

Seizure duration ( = 3.90, 95% CI [2.4, 5.4], *p* < .001) and number of the ECT-session ( = 0.29, 95% CI [0.0, 0.6], *p* = .036) were positively related with Tmax. Administration of midazolam was positively associated with Tmax ( = 5.5, 95% CI [2.6, 8.4], *p* < .001). Electrical charge of the ECT-stimulus ( = -0.07, 95% CI [-0.11, -0.02], *p* = .004) and seizure duration ( = -0.04, 95% CI [-0.07, -0.01], *p* = .020) were negatively related to $a$. BL electrode placement ( = -0.15, 95% CI [-0.27, -0.03], *p* = .013) and ECT-session number ( = -0.02, 95% CI [-0.02, -0.01], *p* < .001) were negatively associated with $a$. ECT-session number was positively associated with $τ$ ( = 0.2, 95% CI [0.0, 0.3], *p* = .015). Results of fixed effects and model performances are shown in Supplementary Table S3.

**Model design and performances**

*Model design.* A linear mixed model (LMM) to predict postictal EEG features Tmax, $a$, $τ$ (one for each) with fixed effects electrical charge of the ECT-stimulus (in millicoulombs), seizure duration (in seconds), postictal medication (1 = use of postictal medication), electrode placement (1 = bi[fronto]temporal stimulation) and number of ECT-session, sex (1 = male) and age (in years) was fitted. Seizure duration and subject were included as random effects. The formula was: ‘Tmax/$a$/$τ$ ~ electrical charge + seizure duration + postictal medication + electrode placement + number of ECT-session + sex + age + (1 + seizure duration| subject)’.

*Model performance.* For Tmax, the model’s total explanatory power (i.e., conditional R2) was 0.52 and the part related to the fixed effects (i.e., marginal R2) alone was 0.33. For $a$ and $τ$, conditional R2 was 0.65 and 0.18, and marginal R2 was 0.18 and 0.04, respectively.