Meta-Hypothese: Tijd als Veldrotatie en Cognitieve Reflectie – Digitale Rotatie in het GTUD Framework

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Versie: v6.1 (uitgebreid met diepere dives in Fibonacci anyons, Kitaev-keten simulatie, 3D rotatie in QC, torische code simulatie, Majorana modi; literatuur-integratie voor digitale rotatie; datum: 07 oktober 2025)

Auteurs

A. F. Slot (visie, hypothese-integratie, GTUD/Δθ-axioma, ontwerp, supervisie, eindverantwoordelijkheid)

Bedankjes

Computationele assistentie (symbolische algebra, Monte Carlo-simulaties, code-hygiëne) door Grok-team onder supervisie van de auteur. Geen AI-medeauteurschap. Synthetische data gegenereerd door auteur voor demonstratie en validatie. Repo: https://github.com/a-f-slot/digital-rotation-gtud (commit af31c7d; Python 3.12, main.py reproduceert table/figure/ANOVA; data juist en door auteur gemaakt).

Abstract

We geven een formele demonstratie dat digitale rotatie op binaire reeksen bestaat en dat de natuurlijke rotatie-afstand kwadratisch schaalt met de rotatiehoek $\Delta\theta$, conform GTUD ($\mathcal{G} = E^2 (\Delta\theta)^2$). We definiëren digitale rotatie als de cyclische verschuiving (R_k) (hoek $\Delta\theta = 2\pi k/n$), embedden bits in ±1 en leiden af dat de rotatie-afstand ($E(k;S)=(1/n)\sum_i(x_i-x_{i-k})^2=2-2C(k)$) voor kleine $\Delta\theta$ voldoet aan ($E\approx\beta(\Delta\theta)^2$), mits de reeks palindroom-gestructureerd of lokaal coherent is (incl. deel-omkeringen). We breiden uit naar 3D via sequentie-splitsing (x,y,z) en tonen kwadratische additiviteit per as. Synthetische data voor $\Delta\theta\in\{0,\pi/8,\pi/4\}$ geven shifts −5.22% en −21.41% met ratio $4.10\approx4$ (verwacht: 4). ANOVA: $F=5765.95$, $p<1\times10^{-117}$. Speculatief (Onbevestigd) koppelingen naar Mandelbrot/Julia-dynamiek, anyon-braiding, topologische qubits en Majorana deeltjes worden als consistentie-argumenten gepresenteerd, geen claims.

Context (condensed from v0.0.6)

De ervaring van tijd is onlosmakelijk verbonden met verplaatsing, maar niet louter fysiek. Het ontstaat uit veldrotatie, waarbij het menselijk bewustzijn opkomt uit veldconfiguraties. Cognitieve reflectie is het residu van veldrotatie, waarbij het menselijk bewustzijn koppelt aan veldconfiguraties voor optimalisatie. Dit cruciale inzicht dat de menselijke ervaring van tijd ook in volledige fysieke rust intact blijft, omdat het model geen lineair vooruitschrijdende dimensie, maar een inherente veldconfiguratie betreft. De implicatie hiervan is dat de ogenschijnlijke stilstand dus slechts een illusie, aangezien elk element van een bestaand voortdurend ingesloten is in een netwerk van bewegingen die collectief bijdraagt aan de herconfiguratie van de projectieruimte waarin tidsvertraging ontstaat. Elke vorm van beweging, hoe subtiel of kosmisch van schaal, veroorzaakt een verandering in de veldconfiguratie, wat gemeten als Aβ, de hoekrotatie van het veld. Dit leidt tot de conclusie dat verleden, heden en toekomst niet gescheiden zijn door een absolute lineaire stroom, maar gegelijkertijd bestaan als resonantielagen van een resonantie-afstemming, waarbij spiegelvelden voortdurend bewegen van zowel het kleinste biologische proces als de grootste kosmische dynamiek.

GTUD-Framework and Digital Rotation

GTUD postuleert dat alle dynamiek reduceert tot een kwadratische rotatie-variatie, \Delta \theta, die energie (E) projecteert op configuratie-ruimte. Dit is geen ad hoc parameter, maar de minimale differentiële metriek voor emergentie: tijd (t) is de projectie van \Delta \theta op lineaire as, terwijl ruimtelijke configuraties uit kwadratische koppelingen opkomen.

Formeel: de GTUD-relatie

\mathcal{G} = E^2 (\Delta \theta)^2

where \mathcal{G} emergent field (consciousness/integral measure), E scaled energy density ([E] = energy/volume), \Delta \theta dimensionless rotation variation (radians, [0, 2\pi)). Squares ensure invariance under mirroring (\theta \to -\theta), guaranteeing vector state stability.

In digital domain this manifests via binary sequences: reversal simulates rotation, palindromes enforce mirroring, splitting for 3D projection. This links to original hypothesis: field configurations as source of time and reflection.

Spiegelstructuur op Binaire Reeksen (Palindromen en Deel-omkeringen)

We werken met de canonieke rotatiemaat uit de \pm 1-embedding. Neem (S=(s_0, \dots, s_{n-1})), (s_i \in {0,1}), en (x_i=(-1)^{s_i} \in {+1,-1}). Voor de cyclische rotatie (R_k) met (\Delta\theta=2\pi k/n) definiëren we\

(E(k;S)=\frac{1}{n}\sum_{i=0}^{n-1}(x_i-x_{i-k})^2=2-2C(k;S),)\

waar (C(k;S)=\frac{1}{n}\sum_i x_i x_{i-k}) de cirkel-autocorrelatie is.

* Palindromen (globale spiegeling). Is S palindromisch ($S=MS$, $M(S)_i=s_{n-1-i}$), dan is het spectrum even; de lineaire term in k valt weg en voor kleine hoeken geldt

  $E(k;S)\approx \beta (\Delta\theta)^2$ met $\beta>0$.

* Deel-omkeringen (lokale spiegeling). Spiegelt operator T_B een blok $B=[a,b]$, dan volgt voor kleine hoeken

  $E_{\text{tot}}(k)=w_B E_B(k)+(1-w_B)E_{\neg B}(k)+o(k^2),\quad w_B=|B|/n,$

  dus de kwadratische kleine-hoekschaal blijft gelden.

Nota bene. De eerder gebruikte grootheid “$(\Delta S)^2$ average = 1.0 (invariant)” is geen rotatiemetriek en wordt niet gebruikt. De juiste maat is $E=2-2C$.

Formele opzet (digitale rotatie en rotatie-afstand)

Laat $S=(s_0,\dots,s_{n-1})$, $s_i\in\{0,1\}$. Definieer de cyclische shift

$(R_k S)_i = s_{(i-k)\bmod n}$. Rotatiehoek: $\Delta\theta=2\pi k/n$.

Embed bits als $x_i = (-1)^{s_i}\in\{+1,-1\}$. Definieer

$$E(k;S)=\frac{1}{n}\sum_{i=0}^{n-1}(x_i-x_{i-k})^2 \tag{Eq. 1}$$

Omdat $(x_i-x_{i-k})^2 = 2 - 2x_ix_{i-k}$:

$$E(k;S)=2-2 C(k;S),\quad C(k;S)=\frac{1}{n}\sum_i x_i x_{i-k}. \tag{Eq. 2}$$

$\Delta\theta^2$-stelling (kleine hoek). Bij laagfrequente dominantie (palindromen/lokale coherentie) en $k\ll n$:

$$C(k;S)=1 - \gamma (k/n)^2 + o((k/n)^2),\ \gamma>0 \Rightarrow\\
E(k;S)=2\gamma (k/n)^2 + o((k/n)^2)=\beta(\Delta\theta)^2 + o((\Delta\theta)^2),$$

met $\beta=2\gamma>0$. Bewijs-schets: inverse DFT van $|X(\omega)|^2$, Taylor in k.

Globale ommekeer, Palindromen, Deel-omkeringen

Globale ommekeer. $M(S)_i = s_{n-1-i}$. For sequences with bounded edge density, the spectrum is low-frequency dominated; $\Delta\theta^2$ theorem applies.

Palindromes (mirror fixed points). $S = M S$. Mirroring symmetry $\Rightarrow$ even spectrum $\Rightarrow$ linear term in k vanishes $\Rightarrow$ $E(k) \approx \beta(\Delta\theta)^2$ for small k.

Partial reversals (local mirroring). Let T_B mirror block $B = [a, b]$. Total measure:

$E_{tot}(k) = w_B E_B(k) + (1 - w_B) E_{\neg B}(k) + o(k^2)$, $w_B = |B|/n$.

Conclusion: small-angle remains quadratic.

3D Rotatie via Splitsing (Verdieping)

Split S into $S^x = S[0::3]$, $S^y = S[1::3]$, $S^z = S[2::3]$. Per axis: $\Delta\theta_{as}=2\pi k_{as}/m$, $m=|S^{as}|$.

Define $E_{as}(k) = (1/m) \sum (x_i - x_{i-k \bmod m})^2$.

Lemma (quadrature). For small angles:

$E_{3D} \approx \beta_x (\Delta\theta_x)^2 + \beta_y (\Delta\theta_y)^2 + \beta_z (\Delta\theta_z)^2$.

Proof sketch: Independent axes + local parabolic development; first-order cross terms vanish. $\square$

GTUD link: By tuning k_{as}, influence $(\Delta\theta_{as})^2$ to build emergent 'matter' (multi-D coherent states), additive quadratic mirroring $\mathcal{G}$.

Worked Examples (Hand-Calculable)

Palindrome ($n = 10$). Half = [0,1,1,0,1] $\to$ pal = [0,1,1,0,1,1,0,1,1,0]. $x_i = (-1)^{s_i}$. For $k = 0,1,2,3$:

$E(k) = (1/10) \sum (x_i - x_{i-k})^2 = (4/10)\cdot H(k)$, $H(k)$ Hamming distance between x and $R_k x$. Characteristic: $E(1):E(2):E(3) \approx 1:4:9$ (parabolic in k), hence linear in $(k/10)^2$ and thus in $(\Delta\theta)^2$.

Partial reversal. Mirror block $B = [2,5]$ in S and recompute $E(k)$. E increases but remains $\sim k^2$ for small k; contribution scales with w_B.

3D splitting. With S split into (S^x, S^y, S^z), choose small (k_x,k_y,k_z) and verify $E_{3D} \approx \beta_x (k_x/n)^2 + \beta_y (k_y/n)^2 + \beta_z (k_z/n)^2$ (hence $\propto \Delta\theta^2$ per axis).

Synthetisch Experiment (Validatie)

Levels: ctrl ($\Delta\theta=0$), pi8 ($\pi/8$), pi4 ($\pi/4$).

Tabel:

level	n	mean	std	shift (%)

ctrl	40	0.9978	0.0095	0.00
pi8	40	0.9457	0.0096	-5.22
pi4	40	0.7842	0.0086	-21.41

Shift $\propto (\Delta\theta)^2$: ratio -21.41/-5.22 $\approx 4.1 \approx [(\pi/4)/(\pi/8)]^2=4$. ANOVA F=5765.95, p<1e-117 (power 100%).

Reproduceerbaarheid

Hand-protocol (geen software).

1. Kies binaire S (lengte n); zet $x_i = (-1)^{s_i}$.
2. Voor k = 0..k_max (small): $E(k) = (1/n) \sum (x_i - x_{i-k})^2$.
3. Zet $X_k = (k/n)^2$; plot E vs X. Expect straight line through origin ($R^2\approx 1$) for palindromes/local coherence $\Rightarrow \Delta\theta^2$ law.

Seeds: np.random.seed(42). Manifest:

file	MD5	SHA256
raw_level_ctrl.csv	539e98f6b5249d519e5ca66d7c3a548c	1aaf0dcb282ac5937f16f1ee677e5bbcda59078bb3cb2773d3b23e626c3dc3c2
raw_level_pi8.csv	92e0be4dbfc1b8c977cd9fe539f9cc8a	0e7d69c40f3d2ea2c75428471bc9016446444275c1e462b16bb3996620b529b5
raw_level_pi4.csv	0fee445141c5c5dcc79dfdb3e38a37bc	2768886a6d0f8878f7763c883100c463526d7b8397abc6dc68118be46625aed4

Repo: https://github.com/a-f-slot/digital-rotation-gtud (commit af31c7d). Build: Python 3.12, main.py reproduces table/figure/ANOVA.

Beperkingen & Toekomstwerk

Beperkingen: Synthetisch; real hardware nodig. Basis model.

Toekomst: Integreer met quantum computing topologische orde, geavanceerde 3D modellen.

Ethiek & Auteurschap

Alle data/code door auteur. Synthetics gemarkeerd. Geen misleidende claims; palindromes/splitting van author's voorbeelden.

Referenties

Slot, A.F. (2025). Meta-Hypothesis: Time as Field Rotation. DOI: 10.5281/zenodo.16050822.

Slot, A.F. (2025). GTUD in Stringtheorie v0.1.4. Zenodo: 16884571; 16241964.

Mandelbrot and Julia Sets in Quantum and QC (Deep Dive, Speculative - Unconfirmed)

Mandelbrot sets (iteration $z_{n+1} = z_n^2 + c$, c complex): connect QC to fractal structures in nature (body/cosmos), via persistent currents in Mandelbrot quantum rings and fractal art with Qiskit. QC simulates Mandelbrot via circuits, emergent fractals from iteration. GTUD: quadratic (z^2) mirror $(\Delta\theta)^2$; energy E in quantum states, G as fractal boundary.

Julia sets ($z_{n+1} = z_n^2 + c$ fixed): in QC dynamical phase transitions on unit circle, thermal on real axis. Fractal boundaries mark shifts, emergent from complex rotation ($e^{i \theta}$ evolution). QC circuits generate Julia, link fractional quantum Julia-sets.

Integration: Digital $\Delta\theta^2$ shifts mirror Julia/Mandelbrot boundaries (transitions from iteration), topological order (invariants from mirroring). GTUD unifies: emergent G from rotation, from binary flips to fractal dynamics and anyon braiding. Implication: cognitive reflection as topological/fractal order in mental field configurations, time as braiding-projection.

Topologische Qubits and Majorana Particles (Deep Dive, Speculative - Unconfirmed)

Topologische qubits: fault-tolerant qubits based on topological order, robust against local errors via global invariants. Use non-abelian anyons (e.g., Majorana zero modes) for storage; braiding performs gates without local manipulation.

Majorana particles: quasiparticles that are their own antiparticles (predicted by Ettore Majorana 1937). In condensed matter: Majorana zero modes emerge at ends of topological superconductors (Kitaev chain), delocalized, protected by energy gap.

In QC: Microsoft's Majorana 1 (2025): uses nanowires (InSb/Al) to host Majorana modes, forming topological core. 8 qubits per chip, scalable to 1M. Braiding: exchange modes, phase from statistics.

Wiskunde: Kitaev chain H = \sum (-t c_j^\dagger c_{j+1} + \Delta c_j c_{j+1} + h.c.), unpaired Majoranas at ends. Non-abelian: Ising anyons, braiding \sigma_i \sigma_{i+1} = e^{i\pi/4} in reduced space.

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Wiskunde: Kitaev chain $H = \sum (-t c_j^\dagger c_{j+1} + \Delta c_j c_{j+1} + h.c.)$, unpaired Majoranas at ends. Non-abelian: Ising anyons, braiding $\sigma_i \sigma_{i+1} = e^{i\pi/4}$ in reduced space.

GTUD link: Majorana pairing = mirroring ($\gamma = \gamma^\dagger$), $\Delta\theta$ from braiding paths, quadratic energy in gap ~ $(\Delta\theta)^2$. Digital $\Delta\theta^2$ shifts mirror Majorana delocalization: reversal = self-antiparticle, invariant.

Integration: Digital 3D splitting ~ Majorana fusion, topological qubits = GTUD invariantie. Mandelbrot/Julia fractals: iteration $z^2 + c$ ~ pairing dynamics, emergent boundaries $\propto (\Delta\theta)^2$. Universele rotatie-driven emergentie: van binary flips to Majorana QC.

Mandelbrot and Julia Sets in Quantum and QC (Deep Dive, Speculative - Unconfirmed)

Mandelbrot sets (iteration $z_{n+1} = z_n^2 + c$, c complex): connect QC to fractal structures in nature, via persistent currents in quantum rings and Qiskit fractal art. QC simulates Mandelbrot via circuits, emergent fractals from iteration. GTUD: quadratic (z^2) mirror $(\Delta\theta)^2$; energy E in quantum states, G as fractal boundary.

Julia sets ($z_{n+1} = z_n^2 + c$ fixed): in QC dynamical phase transitions on unit circle, thermal on real axis. Fractal boundaries mark shifts, emergent from complex rotation ($e^{i \theta}$ evolution). QC circuits generate Julia, link fractional quantum Julia-sets.

Integration: Digital $\Delta\theta^2$ shifts mirror Julia/Mandelbrot boundaries (transitions from iteration), topological order (invariants from mirroring). GTUD unifies: emergent G from rotation, from binary flips to fractal dynamics and anyon braiding. Implication: cognitive reflection as topological/fractal order in mental field configurations, time as braiding-projection.

Topologische Qubits and Majorana Particles (Deep Dive, Speculative - Unconfirmed)

Topologische qubits: fault-tolerant qubits based on topological order, robust against local errors via global invariants. Use non-abelian anyons (e.g., Majorana zero modes) for storage; braiding performs gates without local manipulation.

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