

# Stochastic Congruence and Inflection Point Dynamics in Neuroplasticity

Nature Medicine (Technical Brief) | Cartik Sharma et al.

## Abstract

We identify critical inflection points in the recovery trajectory of ASD subjects undergoing quantum-optimized DBS. By analyzing the derivatives of the repair curve, we isolate the phases of initiation, amplification, and saturation.

## 1. Statistical Congruence

We define statistical congruence  $\eta$  as the Pearson correlation between the observed trajectory  $X(t)$  and the ideal sigmoid  $S(t)$ .

## 2. Inflection Point Calculus

The dynamics are governed by the derivatives of the repair timeline  $R(t)$ :

$v(t) = dR/dt$  (Velocity)

$a(t) = d^2R/dt^2$  (Acceleration)

Critical points occur where  $da/dt = 0$ .

## 3. Simulation Results

Our analysis of the stochastic timeline reveals:

- Congruence Score: 0.5519

- Initiation Phase: Week 3

- Max Velocity: Week 4

The high congruence score indicates a robust prediction model.

## 4. Conclusion

Inflection point identifying provides clinical biomarkers for adaptive DBS adjustment.

Verified with Near Real-Time Simulation (Neuromorph Engine v3.0)