Engaging narratives evoke similar brainwaves and lead to similar perception of time

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Introduction
- It is said that we lose track of time - that "time flies" - when we are engrossed in a story.
- How does engagement with the story cause this distorted perception of time, and what are its neural correlates?

Experimental measure of engagement behavior

Real-world

Engagement as committed or "surviving" viewers

S(t) = Viewership Survival [%]

λ(t) = Hazard [1/s]: λ(t) = \( \frac{1}{S(t)} \) \frac{dS(t)}{dt} ≈ \( \frac{1}{S(t)} \) \frac{S(t) - S(t + \Delta t)}{\Delta t} 

E(t) = Engagement [s]: E(t) = \( \frac{1}{\lambda(t)} \)

Behavioral engagement in “experimental” cohort mimics “real-world” behavior.

Does engagement alter time perception?

How much time has elapsed?

“Time flies when you’re having fun.”

Correlated brains perceive time more uniformly

Neural engagement predicts behavioral engagement

“Neural Engagement” = (Baseline Engagement) x (“ISC”):

\[ \tilde{E}(t) = E_D(t) \]

\[ \gamma(t) = \exp \left( \sum_{i=1}^{3} \beta_i \gamma_i(t) \right) = \prod_{i=1}^{3} \gamma_i(t) \]

Train parameters on experimental behavioral engagement… Test parameters on real-world behavioral engagement

Conclusions
- Engagement can be objectively quantified in terms of time commitment.
- The inter-subject correlation of evoked brain responses predicts behavioral engagement.
- Similar neural processing correlates with similar time perception.

References


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