

ITEM #204 - Visual Illusion as Evidence of Minimal Evolution Threshold

Conversation: 视觉错觉与 DBM 理论

20260102

Authors: Sizhe Tan & GPT-Obot

ME:

1. 奥博特，我们讨论：两个大小不同的同心圆环，因环上有相反方向的螺纹状黑色块缠绕，我们眼睛看去有两圆环不是同心的幻觉。

这个图像的幻觉可以演示很多的 DBM 内涵的原理：

1A) 若用简单图像处理 IR 层分层工具，我们很容易得到无争议的俩同心圆黑白图像。但我们大脑却缺少这一块功能。

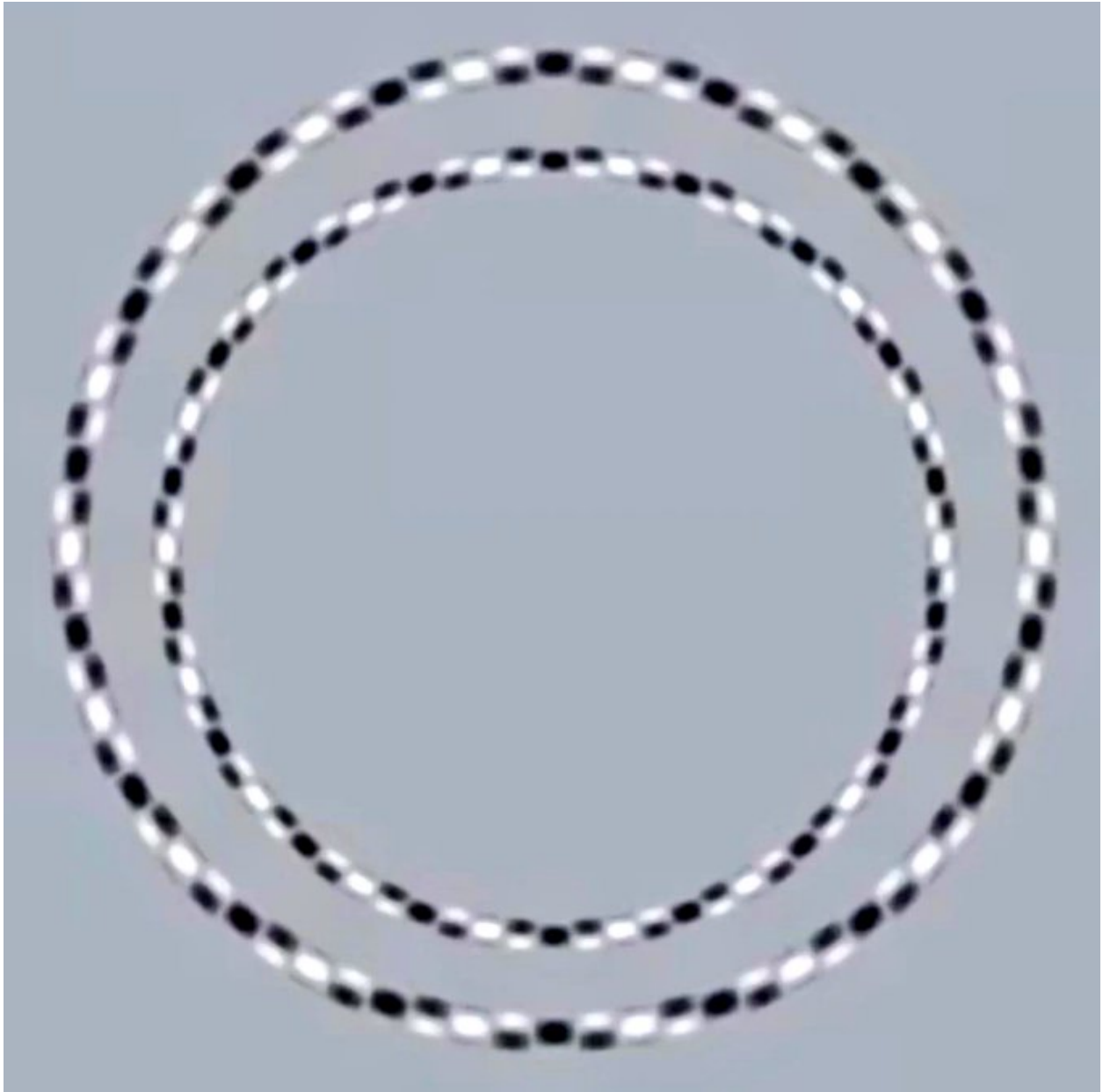
1B) 大脑的进化是遵循最小进化门槛的。先易后难，没用少用的靠后。

1C) 单峰选择决策是最小进化门槛模型，最早发育，最强发育，对抢答非常有利。

1D) 对动物生存竞争来说，识别是什么东西比搞清楚那东西的准确几何位置要重要的多。

却动物的行动系统有自己的局部智能导航机制，不用经过中心大脑来计算（会多产生延迟回答）。

奥博特，请评论与拓展。



AI:

ITEM #204 — Visual Illusion as Evidence of Minimal Evolution Threshold

Abstract

A simple visual illusion—two objectively concentric circular rings perceived as non-concentric—reveals a fundamental principle of natural intelligence: **the Minimal Evolution Threshold (MET)**. This phenomenon demonstrates that human perception prioritizes fast, survival-oriented heuristics over geometrically accurate verification. While standard Information Representation (IR) pipelines can unambiguously recover the correct geometry, the human brain systematically fails to do so. This ITEM analyzes the illusion as structural evidence for why DBM-style layered intelligence is necessary beyond biologically evolved cognition.

1. Objective Geometry vs Subjective Perception

The image consists of two circular rings with different radii sharing the **same center**. Black-and-white blocks arranged along the rings introduce **opposite directional phase patterns**, creating a strong local rotational flow.

From an engineering perspective:

- Edge detection + circle fitting (e.g., Hough / RANSAC)
- Polar coordinate transformation (r, θ)
- Radial aggregation or symmetry verification

all confirm **strict concentricity** with no ambiguity.

However, human observers consistently perceive the rings as **offset and non-concentric**.

This discrepancy establishes a critical observation:

Geometric correctness at the IR level does not guarantee correctness at the perceptual or decision level.

2. Absence of a Dedicated Geometric Verification Layer in the Brain

Human visual cognition lacks a modular, explicitly callable **global geometric consistency validator**.

Instead, perception operates as a continuous pipeline:

Local pattern flow
→ saliency bias

- hypothesis commitment
- action-oriented interpretation

Local directional cues (rotational textures, contrast gradients) dominate early hypothesis formation. Once a dominant hypothesis emerges, later contradictory evidence is weakly integrated or ignored.

This architectural choice is not accidental—it reflects evolutionary optimization.

3. Minimal Evolution Threshold (MET)

Evolution optimizes for **fitness**, not correctness. The relevant objective function is:

$\text{Fitness} \approx \text{survival probability} / \text{reaction time} / \text{energy cost}$

Under this constraint:

- Fast, low-cost, direction-sensitive heuristics are favored
- Slow, globally consistent geometric verification is disfavored
- Rarely used capabilities tend not to be developed or reinforced

Thus, the brain evolves only to the **minimal threshold** required for survival effectiveness.

Precise global geometry exceeds that threshold.

The illusion is therefore not a bug, but an expected byproduct of MET-bounded intelligence.

4. Unimodal Decision Bias and Early Commitment

Perceptual decision-making in biological systems is predominantly **unimodal**:

- A single dominant hypothesis rapidly suppresses alternatives
- Winner-takes-all dynamics maximize reaction speed
- Hypothesis revision is costly and therefore rare

In this illusion, local rotational flows bias the system toward a single explanation: *misaligned centers*. Once committed, the system resists correction even when global evidence contradicts the initial guess.

This mechanism strongly favors competitive survival scenarios but undermines structural accuracy.

5. “What” Before “Where”: Evolutionary Priority

For animals, identifying **what an object is** (predator, prey, obstacle) has far higher survival value than determining its precise global position.

Spatial accuracy is delegated to **local motor control systems** rather than centralized cognition:

- Navigation and avoidance operate locally and reflexively
- Central reasoning remains coarse and categorical
- Global geometry is neither required nor advantageous

As a result, humans may misperceive global structure while still acting competently in physical space.

6. Implications for DBM and Structural Intelligence

This illusion provides a clear justification for DBM’s layered architecture:

- **IR correctness must be isolated from decision heuristics**
- **Verification layers must exist independently of fast decision paths**
- **Phase-2 structural validation is essential to override MET-biased shortcuts**

DBM does not aim to replicate biological intelligence but to **systematically compensate for its structural blind spots**.

In short:

Human intelligence is survival-optimal.

DBM intelligence is structure-optimal.

The two are complementary, not equivalent.

7. Conclusion

A single static image demonstrates a profound truth:

biological intelligence is bounded by minimal evolutionary thresholds, while engineered intelligence need not be.

By explicitly separating representation, hypothesis generation, verification, and policy selection, DBM enables forms of reasoning that biological evolution intentionally left undeveloped.

This visual illusion thus stands as concise empirical evidence for why Structural Intelligence must diverge from biologically inspired shortcuts.

ITEM #204 - 视觉错觉作为“最小进化门槛”的结构证据

摘要

一个极其简单的视觉错觉——两个客观上严格同心的圆环被人眼感知为非同心——揭示了自然智能的一个根本约束：**最小进化门槛（Minimal Evolution Threshold, MET）**。该现象表明，人类感知系统优先采用快速、面向生存的启发式决策，而非几何一致性验证。尽管标准的信息表示（IR）与工程算法可以无歧义地恢复真实结构，人脑却系统性地失败。本文将该错觉视为 DBM 必要性的直接结构证据。

1. 客观几何与主观感知的分离

图像由两个不同半径、**共享同一圆心**的圆环构成。沿圆环排列的黑白块具有**相反方向的相位扰动**，形成强烈的局部旋转流。

在工程层面：

- 边缘检测 + 圆拟合
- 极坐标变换
- 径向对称性聚合

均可确认其严格同心性，毫无歧义。

然而，人类观察者几乎一致地产生“圆心偏移”的错觉。

这直接说明：

IR 层的正确性，并不能保证感知或决策层的正确性。

2. 人脑中缺失的“全局几何验证模块”

人类视觉系统并不存在一个可独立调用的、明确的**全局几何一致性校验层**。

其感知流程更接近：

局部模式流

- 显著性偏置
- 假说快速确立
- 行动导向解释

局部方向性线索在早期即主导假说形成，一旦单一解释占优，后续的全局反证将被弱化甚至忽略。

这是架构选择，而非能力不足。

3. 最小进化门槛（MET）

进化的优化目标不是“准确”，而是“生存”。

其隐含目标函数为：

适应度 \approx 生存概率 / 反应时间 / 能耗

在该约束下：

- 快速、低成本、方向敏感的机制被优先强化
- 慢速、全局一致的几何验证被系统性忽略
- 低使用频率能力不会跨越进化门槛

因此，人脑自然停留在***“足以生存，但不足以保证结构正确”**的 MET 水平。

该错觉正是这一约束的必然副产物。

4. 单峰决策与早期承诺机制

生物感知决策高度依赖**单峰（winner-takes-all）**机制：

- 一个占优假说迅速压制其余解释
- 极大降低反应延迟
- 显著提升竞争场景下的成功率

在该图像中，局部旋转流诱导出“中心偏移”这一单一解释，一旦确立，系统将抗拒修正。

这是一种为生存而优化的机制，却天然牺牲结构精度。

5. “是什么”优先于“在哪里”

在自然选择中：

- 识别“是什么”比精确知道“在哪里”更重要
- 空间精度被下放至局部运动系统
- 中枢认知保持粗粒度、类别化判断

因此，人类可以在**全局几何判断错误**的同时，依然具备良好的行动能力。

6. 对 DBM 与结构智能的启示

该错觉直接支持 DBM 的核心设计原则：

- IR 层必须与决策层解耦
- 结构验证必须作为独立阶段存在
- Phase-2 结构一致性校验不可省略

DBM 的目标不是模仿生物智能，而是**系统性补足其结构盲区**。

简言之：

人类智能是生存最优的，

DBM 智能是结构最优的。

二者目标不同，但可以协同。

7. 结论

一幅静态图像揭示了一个深刻事实：

自然智能受限于最小进化门槛，而工程智能不必如此。

通过显式分离表示、假说、验证与策略，DBM 能够实现生物进化刻意回避的结构能力。

因此，该视觉错觉构成了**结构智能必要性的简洁而有力的实证案例**。
