ITEM #208 — DBM-COT Children & Early-Stage Cognitive Games

Structural Intelligence from Play: A Ten-Game Onboarding Framework

Conversation: 儿童 DBM 启蒙游戏设计

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Authors: Sizhe Tan & GPT-Obot

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1. Motivation & Positioning (EN)

Digital Brain Model (DBM) algorithms are not inherently adult-only.
Their foundational primitives—partitioning, search, distance, cost, and constrained evolution—are *natural cognitive abilities* that emerge early in human development.

Conventional education postpones or suppresses these abilities by:

- Over-emphasizing symbolic memorization,
- Teaching rules without structural intuition,
- Treating algorithms as late-stage abstractions.

ITEM #208 introduces a corrective path:
to onboard DBM-style *Structural Intelligence* through **play**, **competition**, and **physical or social interaction**, aligned with the **Minimal Evolution Threshold** principle.

This ITEM defines a canonical set of **ten cognitive games** that:

- Are accessible to children,
- Scale naturally to adolescents and adults,
- Map directly to DBM core algorithms,
- Are suitable for classrooms, families, parties, and the game industry.

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1. 动机与定位（中文）

数字脑模型（DBM）的算法**并非只属于成人世界**。
其核心能力——空间划分、搜索、距离、代价意识与受限演化——本就是**人类早期发育中自然出现的认知能力**。

传统教育往往通过以下方式延迟甚至抑制这些能力：

- 过度强调符号与记忆；
- 先教规则而非结构直觉；
- 将算法视为“晚期抽象知识”。

ITEM #208 提出一条纠偏路径：
通过**游戏、竞争与实体/社交互动**，在不依赖数学与编程的前提下，引导儿童进入 **DBM 风格的结构智能（Structural Intelligence）**，并与**最小进化门槛原则**保持一致。

本 ITEM 固化了一套 **10 个标准启蒙游戏**，具备：

- 儿童可玩性；

- 青少年与成人的自然升级空间；
- 与 DBM 核心算法的一一映射；
- 可用于课堂、家庭、派对与电玩产品。

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2. Design Principles (EN)

Each game in this framework satisfies all of the following:

1. Structure-first, not formula-first
2. Observable cost and trade-offs
3. Partial information and uncertainty
4. Difficulty scales without rule replacement
5. Direct correspondence to a DBM algorithmic primitive

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2. 设计原则（中文）

本框架中的每一个游戏均满足以下五项 DBM 原生原则：

1. **先结构，后公式**
2. **代价与取舍可被感知**
3. **信息不完备与不确定性**
4. **难度可升级但规则不必推翻**
5. **与 DBM 算法原语存在直接映射**

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3. The Ten Canonical DBM-COT Games (EN)

Game 1 — Bi-section Search (Yes / No / Unknown)

Minimize questions to identify a hidden target using three-valued answers.

- Cognitive Focus: search-space reduction, information gain
- DBM Mapping: Differential Trees, ACLM Reachable States

Game 2 — Variable-Size Blocks Partition & Color Prediction

Partition space into non-uniform blocks and predict labels of queried points.

- Cognitive Focus: density-aware partitioning
- DBM Mapping: Variable-Size Blocks Index

Game 3 — Euclidean Grid / Tree Routing (Delivery Game)

Deliver messages efficiently across grid or tree layouts.

- Cognitive Focus: path cost, topology choice
- DBM Mapping: Euclidean Differential Trees

Game 4 — Cosine Similarity vs Distance (IS vs HAS)

Compare similarity under directional vs metric rules.

- Cognitive Focus: “similar” ≠ “close”
- DBM Mapping: Cosine Similarity vs Metric Distance, CCC

Game 5 — Two-Phases Search Demonstration

Perform rough filtering before precise ranking.

- Cognitive Focus: cost layering
- DBM Mapping: Phase-1 / Phase-2 Search

Game 6 — Unaligned-AND & CCC Matching

Identify common cores without full alignment.

- Cognitive Focus: partial overlap reasoning
- DBM Mapping: Unaligned-AND, CCC

Game 7 — ACLM Path Finding (Simple → Advanced)

Find feasible causal paths under constraints.

- Cognitive Focus: feasible vs optimal paths
- DBM Mapping: ACLM Calling Graph

Game 8 — LHS → RHS Prediction Game

Infer possible outcomes from given conditions.

- Cognitive Focus: rule induction
- DBM Mapping: Operation(X) → Y

Game 9 — Minimal Evolution Threshold Simulator

Choose one upgrade per round under limited resources.

- Cognitive Focus: constrained evolution
- DBM Mapping: Minimal Evolution Threshold, APTGOE

Game 10 — Intelligence Carrier Demonstration

Show intelligence as runtime behavior, not static possession.

- Cognitive Focus: carrier vs intelligence
- DBM Mapping: Runtime Evidence Principle

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3. 十个标准 DBM-COT 启蒙游戏（中文）

游戏 1 — 半分法搜索（是 / 否 / 不确定）

在最少提问次数（或代价）下猜中隐藏目标。

- 训练重点：搜索空间缩减、信息增益
- DBM 对应：差分树、ACLM 可达状态

游戏 2 — 可变尺寸块划分与颜色预测

对空间进行非均匀划分并预测查询点属性。

- 训练重点：密度感知划分
- DBM 对应：Variable-Size Blocks 索引

游戏 3 — 欧氏网格 / 树结构送信游戏

在不同拓扑中寻找高效路径。

- 训练重点：路径代价与结构差异
- DBM 对应：欧氏差分树

游戏 4 — 余弦相似度 vs 距离（IS / HAS）

比较“像不像”与“近不近”的差别。

- 训练重点：方向 vs 距离
- DBM 对应：Cosine / Metric Distance，CCC

游戏 5 — 两阶段搜索演示

先粗筛，再精排。

- 训练重点：代价分层
- DBM 对应：Two-Phases Search

游戏 6 — Unaligned-AND 与 CCC 匹配

在不完全对齐的条件下寻找共同核心。

- 训练重点：部分重叠推理
- DBM 对应：Unaligned-AND，CCC

游戏 7 — ACLM 路径发现（由简入繁）

在约束条件下寻找可行因果路径。

- 训练重点：可行路径 vs 最优路径
- DBM 对应：ACLM Calling Graph

游戏 8 — LHS → RHS 预测游戏

从给定条件推断可能结果。

- 训练重点：规则归纳
- DBM 对应：Operation(X) → Y

游戏 9 — 最小进化门槛模拟器

资源有限下，每轮只能选择一次演化。

- 训练重点：受限演化与不可逆性
- DBM 对应：Minimal Evolution Threshold，APTGOE

游戏 10 — 智能载体演示

区分载体与运行态智能。

- 训练重点：智能不等于静态属性
- DBM 对应：Runtime Evidence 原则

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4. Age Scaling & Reusability (EN)

Rules remain stable; **interpretation deepens with age**.

Age	Focus
5–8	Intuition & play
9–12	Strategy & explanation
13+	Algorithmic mapping

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4. 年龄分层与复用（中文）

规则不变，理解逐级加深：

年龄段	侧重点
5–8 岁	直觉与玩乐
9–12 岁	策略与解释
13 岁以上	算法映射

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5. Strategic Impact (EN)

ITEM #208 enables DBM-COT to:

- Enter early education without abstraction overload
- Provide intuitive AI literacy
- Counter “AI-as-magic” narratives
- Build a long-term pipeline into structural intelligence

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5. 战略意义（中文）

ITEM #208 使 DBM-COT：

- 能够进入儿童与启蒙教育领域；
- 以直觉方式普及 AI 结构认知；
- 及早纠正“AI 即魔法”的误解；
- 建立通往结构智能的长期学习管道。

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6. Closing Statement (EN)

Structural Intelligence does not begin with equations.
It begins with where to cut, how to search, and what to sacrifice.

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6. 结语（中文）

结构智能并非始于公式，

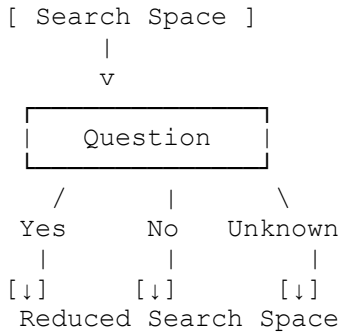
而是始于如何划分、如何搜索、以及如何取舍。

ITEM #208 — End

ITEM #208 — One-Page Rule Diagrams (Bilingual)

Game 1 — Bi-section Search

半分法搜索（是 / 否 / 不确定）



Rule (EN)
Ask questions to reduce the search space. Answers are Yes / No / Unknown. No lies.

规则（中）

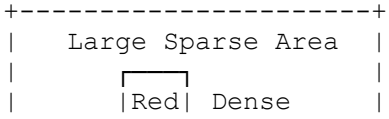
通过提问不断缩小搜索空间，只允许“是 / 否 / 不确定”。

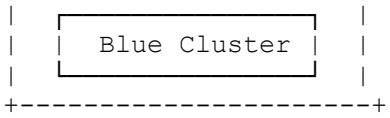
Win Condition / 胜负标准
Minimum total cost (questions or time).

DBM Mapping
Differential Tree · Reachable States · Information Gain

Game 2 — Variable-Size Blocks Partition

可变尺寸块划分与颜色预测





Rule (EN)
Players choose how to partition space; block sizes may differ.

规则（中）

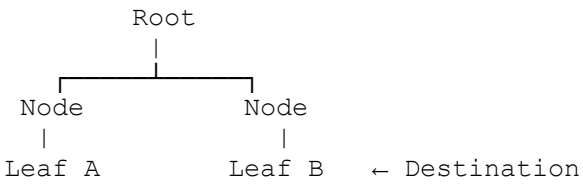
空间可不均匀划分，块大小由玩家决定。

Win Condition
Accuracy ÷ Number of Blocks

DBM Mapping
Variable-Size Blocks Index · Density-Aware Partition

Game 3 — Euclidean Grid / Tree Delivery

欧氏网格 / 树结构送信（直达叶子）



⭐ Key DBM Insight / 核心洞见

Do NOT search step by step.
Route directly to the target leaf.

不是一格一格走，

而是一次性定位到叶子节点。

Rule (EN)
Deliver messages. You may route directly to a known leaf if structure allows.

规则（中）

若已知目标所在叶子，可直接定位，无需逐层遍历。

Win Condition
Lowest routing cost.

DBM Mapping
Euclidean Differential Tree · **Direct-to-Leaf Routing (DBM Core Contribution)**

Game 4 — Cosine Similarity vs Distance

相似 ≠ 距离（IS vs HAS）

```
Vectors:
A →→→
B →→→       (High Cosine Similarity)
C ↓↓↓        (Low Cosine, maybe close)
```

Rule (EN)
Judge similarity using two rules: direction vs distance.

规则（中）

方向相似不等于距离接近。

Win Condition
Correctly explain disagreements.

DBM Mapping
Cosine Similarity · Metric Distance · CCC

Game 5 — Two-Phases Search

两阶段搜索

```
[ All Candidates ]
        |
   Phase 1 (Fast)
        |
   [ Shortlist ]
        |
   Phase 2 (Precise)
        |
     [ Best ]
```

Rule (EN)
Fast filter first, precise ranking later.

规则（中）

先粗筛，再精排。

Win Condition
Best result under time + cost constraint.

DBM Mapping
Two-Phases Search Architecture

Game 6 — Unaligned-AND & CCC

非对齐 AND 与共同概念核

```
Object A: [ a  b  c  d ]
Object B: [ b  c     e ]

Common Core → [ b  c ]
```

Rule (EN)
Match by shared core, not full alignment.

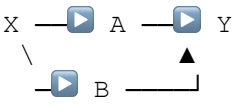
规则（中）

不要求完全一致，只寻找共同核心。

DBM Mapping
Unaligned-AND · Common Concept Core

Game 7 — ACLM Path Finding

因果路径发现



Rule (EN)
Find any feasible path, not necessarily optimal.

规则（中）

先找到“能走通的路”。

Win Condition
Reach Y with constraints satisfied.

DBM Mapping
ACLM Calling Graph · Feasible Path

Game 8 — LHS → RHS Prediction

条件到结果的推断

```
LHS: {A, B}
   ↓
Possible RHS:
 {C} , {D} , {C+D}
```

Rule (EN)
Multiple RHS may be valid.

规则（中）

一个条件可能对应多个结果。

DBM Mapping
Operation(X) → Y · Vertical Bridging

Game 9 — Minimal Evolution Threshold

最小进化门槛

```
Round Budget: ★
Options:
[ Speed ] [ Memory ] [ Vision ]

Choose ONE → Others lost
```

Rule (EN)
Only one upgrade per round.

规则（中）

每轮只能进化一项，其余永久放弃。

DBM Mapping
Minimal Evolution Threshold · APTGOE

Game 10 — Intelligence Carrier

智能载体演示

```
Same Rules
   ↓
Different Carriers
(Human / AI / Device)

→ Different Outcomes
```

Rule (EN)
Intelligence exists only during execution.

规则（中）

智能只存在于运行态。

DBM Mapping
Runtime Evidence · Dormant vs Active Intelligence

✅ 总结性说明（可作为 #208 配图说明页）

DBM teaches children one crucial lesson early:
Do not crawl through the world step by step
when structure allows you to jump directly to the leaf.

DBM 教给孩子的核心一课是：

当结构已知时，不必一步步试探，

可以直接抵达叶子。
