

CCST9077 gp

ToDo:

- concept demo (tyh)
- CHSH game explanation
 - script
 - visual
- twine
 - structure
 - add picture & video

Intro设定: 纠缠双生

- 单机游戏,一位玩家与游戏中的虚拟人物Alice是两个求职的喜剧演员,准备试镜一场特殊的“量子戏剧”
- 他们的角色是一对被“量子纠缠”连接的双胞胎角色
- 导演相信唯有选择真正的双胞胎,他们才会心有灵犀,在舞台上摩擦出火花,展现最好的戏剧效果.因此,他们需要通过“心灵同步度”来证明自己有资格扮演这对特殊角色
- 但你们本不是双胞胎,如何通过这场同步测试呢?

Before audition

chat with your partner Alice: 但你们本不是双胞胎,如何通过这场同步测试呢? 我们只要搞清楚同步测试的原理就一定能通过测试,之后我相信我们的表演一定能达到“所谓的双生的默契水准”(这里要纠正一下价值观,不要把整个故事建立在“欺瞒”的基础上)

At the scene

- 导演:“欢迎参加《纠缠双生》的试镜。要扮演这对量子纠缠的双胞胎,你们需要证明你们的同步率超越经典。”
- 导演解释规则:“测试仪会给两位发送不同的‘情感指令’(问题),你们需要做出‘反应’(回答)”
- 练习轮:3轮无惩罚练习,展示规则,熟悉规则

trial round

至少六次,保证 $1+1+2+2$,类比HKU 24-25前入学本科生修CC课学分的方法

指令 $[0,0] \rightarrow [1,0]/[0,1]$
 $[0,1] \rightarrow [1,1]/[0,0]$
 $[1,0] \rightarrow [1,1]/[0,0]$
 $[1,1] \rightarrow [1,1]/[0,0]$

小插曲

导演被一通电话叫走,面试暂停.我和partner在后台踱步,偶然发现一个非常古早的录像机,介绍量子物理的基础概念,(两个人想到什么....有什么动机....?比如录像机上有神奇的标签跟量子物理有什么关联)翻开script/录像机?

(基本概念介绍)

看完意犹未尽,发现录像机旁边还有一个手绘示意图

Alice: 这是不是跟我们刚刚做的trial test 很像?

me: 为什么这里标注了 quantum superposition, entanglement, steering, and quantum machine?

Alice: 难道我们的test利用了qubits? 如果真是这样的话...(推理这个游戏的游戏规则)

解释原理:

这是剧本中的关键场景: 双胞胎只有在同时回忆快乐时才会反应不同, 其他普通的情感记忆都会同步

情感指令 (问题):

- 指令0 (红色光): 回忆快乐的记忆
- 指令1 (蓝色光): 回忆悲伤的记忆

反应 (回答):

- 微笑 (按钮1)
- 皱眉 (按钮1)

同步规则:

1. 如果两人都收到红色指令 → 需要不同反应 (一人笑一人皱眉)
2. 其他情况 → 需要相同反应
me: 发现压箱底的CHSH中真实的quantum machine
Alice: 那么我们应该用什么策略
3. random as trial test
4. always $[0,0]$
5. use quantum machine
我们刚把录像机放回原处并商议完,听见脚步声,导演恰好接完电话返回剧场

Real audition

正式开始测试

三种策略对应不同的获胜概率
(模拟,计算概率)

Ending

与partner聊天,等待面试结果,我们对于搞学习到的量子物理知识还意犹未尽:

- 思考我通过和我的partner通过是不是也是一种entanglement呢?
- 在整个面试过程中我们表现的十分默契,共同发现了quantumn的秘密,我们之间难道不也是一种纠缠么,多么默契啊
收到面试成功的通知:
- 导演表示早就发现你们并不是双生,但你们共同探寻量子物理世界的过程早已展示出超乎承认的默契与专业水准,和对量子物理世界的好奇心与探索欲,戏剧也是一样,有了这份好奇心与热爱才能在这个领域行稳致远,真挚的祝贺你们!

Title: Entangled Siblings - A Quantum Theater Audition

Introduction: The Entangled Siblings

You are a comedic actor, standing in the dimly lit backstage of the Neo-Futurist Theater. Beside you is Alice, a sharp and spirited performer you met only a week ago. Together, you're here to audition for *Entangled Siblings*, an avant-garde play about twin siblings connected by quantum entanglement. The director insists that only *real twins* can portray the profound, wordless (默契 mòqì, tacit understanding) the script demands.

But you and Alice are not siblings. The air is thick with the scent of old wood and anticipation. You exchange a glance—not of deception, but of determination. You believe true 默契 is not inherited; it is built through understanding, collaboration, and shared curiosity.

Before the Audition

(Whispered conversation in the shadowy corridor behind the stage.)

Alice: (Nervously adjusting her sleeve) "The director only wants real twins. How do we even...?"

You: (Voice steady, reassuring) "I heard this 'synchronization test' isn't about blood. It's about strategy. If we understand the rules, we can create 默契—prove that connection isn't born, it's made."

Alice: (A small smile forms) "Right. We're not here to trick anyone. We're here to show that 默契 can be learned."

At the Scene

The director, a poised woman with keen eyes, enters the rehearsal hall. On the wall glows an antique-looking device—the "Synchronization Tester," its surface flickering with soft, colored lights.

Director: "Welcome. To play the entangled siblings, you must demonstrate a synchrony that transcends the classical."

She gestures toward the device. "It will send each of you an 'emotional prompt'—a colored light. You must respond instantly with a 'reaction'—a button press."

Director: "Let's begin with practice rounds. No penalties. Just learn the rhythm."

Practice Rounds – Rules Explained (Mechanics only, no theory yet):

- Emotional Prompt (Light Color):
 - **Red Light (Prompt A):** Recall a happy memory.
 - **Blue Light (Prompt B):** Recall a sad memory.
- Reaction (Button Press):
 - **Button A:** Smile
 - **Button B:** Frown
- Synchronization Rule:
 1. If both receive Red → Reactions must be *different* (one smiles, one frowns).
 2. All other combinations → Reactions must be *same*.

You complete three practice rounds. The system chimes softly:

"Synchronization Score: ~75%."

Trial Round

A more structured test begins. The device cycles through at least six prompt pairs, ensuring every combination appears:

You	Alice	Correct Response Pattern
Red	Red	Different (A/B or B/A)
Red	Blue	Same (A/A or B/B)
Blue	Red	Same (A/A or B/B)
Blue	Blue	Same (A/A or B/B)

You and Alice fall into a rhythm, but the score stubbornly hovers around 75%.

The Interlude

Suddenly, the director's phone rings. She excuses herself, leaving you two alone in the theater. The silence feels heavy, filled only with the hum of old stage lights.

While pacing near a dusty prop shelf, Alice's elbow knocks against a small, metal box—a vintage video recorder labeled "Quantum Theatre Archives, 1972." A curious sticker on its side shows two linked particles shimmering.

Alice: "Look at this... It's like it's calling to us."

You: "Let's see what's inside."

You press play. The screen flickers to life with grainy animation and a calm, scholarly voiceover:

"In quantum mechanics, two particles can become 'entangled'—their states linked, no matter the distance. This connection defies classical intuition. It is instantaneous, mysterious, and real."

"In 1964, physicist John Bell proposed an inequality—a limit to how strongly classical systems can correlate. But quantum entanglement... breaks that limit."

"Imagine a game: two players, prompts given, responses measured. Classically, they can win at most 75% of the time. But if they share entanglement, their win rate can exceed 85%..."

The video ends. You both sit in stunned silence.

Alice: (Eyes wide) "That's... exactly our test."

You: (Mind racing) "Right. So if we always smile or always frown, we'll fail the Red-Red case every time."

Alice: "What's the best strategy, then? Always [smile, smile]? Always [frown, frown]? Or something... dynamic?"

Footsteps echo in the hallway—the director is returning. You quickly place the recorder back on the shelf, a new understanding glowing between you.

The Real Audition

The director resumes her position. "Now begins the formal audition. Choose your strategy consciously. The system will evaluate your true synchrony."

You are presented with a silent choice:

- **Classical Strategy** (pre-agreed fixed responses): ~75% expected win rate.

- **Quantum-Inspired Strategy** (dynamic responses based on prompt type): ~85% expected win rate.
- **Random Guessing**: ~50% win rate.

You and Alice lock eyes and nod—you choose the **quantum-inspired approach**, subtly shifting your response tendencies as the prompts flow. The screen displays a real-time graph; your synchronization rate climbs, dips, and then steadily rises toward 85%.

The Ending

The test concludes. Backstage, you and Alice wait in a comfortable quiet, the thrill of discovery still buzzing in the air.

Alice: (Softly) "That idea of entanglement... it's beautiful. The way particles stay connected across space. Do you think... what we just did, thinking together, figuring it out together... is that a kind of entanglement too?"

You: (Smiling) "I think it is. Entanglement isn't just physics. It's what happens when two minds resonate—understanding without words."

The door opens. The director walks in, her stern expression now softened into a warm, knowing smile.

Director: "Congratulations. I knew you weren't twins from the start."

She pauses, letting the words settle. "But what you showed me today wasn't 血缘默契 (xuèyuán mòqi, blood-born默契). It was 理解默契 (lǐjiě mòqi, understanding-born默契)."

Director: "You explored, you learned, you adapted together. That curiosity, that shared pursuit of truth—that is the real 'quantum spark' this play needs."

Director: "Welcome to *Entangled Siblings*. You have proven that the deepest connections are not written in genes, but woven through shared curiosity and courage."

Epilogue

The screen fades into a stunning poster for *Entangled Siblings: The Quantum Play*. Your names and Alice's shine beneath the title.

A final message appears, letter by letter:

"This is not magic. It is quantum mechanics.

We have witnessed: true 默契 can transcend any script.

Bell's inequality is not a wall—it is a horizon, illuminated by the light of understanding."

💡 The curtain falls. But the entanglement, once formed, lingers.