Practice Script: Cognitive MRI Presentation (FINAL VERSION)

File: slide-pretty.tex | Target Time: 11:00-11:30 (12-minute slot)

Core Principle: Let the work speak for itself. These are smart people—they'll see the limitations without you belaboring them. Focus on clarity, honesty, and forward momentum.

Delivery Philosophy: Measured pacing. Pause for complex visuals. Speed through transitions. The network visualization (Slide 8) is your centerpiece—give it room to breathe.

REFINED TIME BUDGET

Section	Slides	Time	Notes
Setup	1-4	2:57	Includes embedding definition, concrete example
Methods	5-7	3:15	Weighting (1:00), edges (0:45), ablation (1:30)
Results	8-10	4:32	Network gets 1:42, observations ~1:25 each
Vision & Close	11-12	1:35	Crisp ending
Target Total	**12**	**12:19**	**Tight—practice will tell**

Contingency: If running over at 10:30 mark, trim Slide 11 to 30 seconds (skip application details, just say "navigation by topic rather than timeline").

Slide 1: Title (25 seconds)

[VISUAL: Plain frame with gradient background, conference logo, GitHub link]

[Stand still, make eye contact, wait 2 seconds before speaking]

> "Good morning. This talk is about a simple question: what happens if you treat your AI conversation history as a dataset?"

[Pause 1 second]

> "Most of us have hundreds—maybe thousands—of conversations with LLMs by now. They're usually just buried in a scroll. We wanted to know whether there's any interesting structure hiding in there."

[Slight smile]

> "We're calling this a 'Cognitive MRI.' That's a metaphor, not a literal claim—the idea is to extract something resembling a knowledge map from conversation logs."

[Transition: move to next slide immediately, no verbal bridge needed]

Slide 2: Scale & Stakes (40 seconds)

[VISUAL: Globe with user icons (left), comparison table (right)]

[POINT to globe] (10s): > "ChatGPT alone has 1.7 billion users. That's a lot of conversational data."

[GESTURE to table on RIGHT] (12s): > "What's potentially interesting is that conversation logs capture something different from traditional datasets."

[POINT to first two table rows briefly] (8s): > "Citation networks capture outputs. Social networks capture connections."

[POINT to highlighted third row with green checkmark] (10s): > "Conversation logs might capture something closer to the *process* of thinking—the iteration, the back-and-forth."

[Beat—let that land for 1 second]

"That's an empirical question. Today I'll show one case study to see if there's signal."

Slide 3: The Big Picture - Externalized Cognition (55 seconds)

[VISUAL: LEFT column has theory text with two bullet points ("Thinking Out Loud", "The Iterative Loop") and orange alert block ("The Cognitive Dark Matter"). RIGHT column has iceberg diagram: "Visibility Threshold" waterline, paper icon labeled "The Product (Linear, Polished)" above, glowing network labeled "The Process (Networked, Exploratory)" below, dashed arrow "Generated From" connecting them]

Opening (12s): [GESTURE to left column header]: > "We're framing this through Distributed Cognition—thinking happens not just in your head, but between you and your tools."

[POINT to "Thinking Out Loud" bullet] (10s): > "When you use an LLM, you're thinking out loud. Offloading cognitive work to the machine."

[POINT to "The Iterative Loop" bullet] (8s): > "Ideas get constructed through dialogue, not just retrieved."

[MOVE to RIGHT—point to paper icon ABOVE "Visibility Threshold"] (8s): > "What usually gets archived? The product. Linear, polished."

[SWEEP hand DOWN past waterline to glowing network] (8s): > "The process underneath—networked, exploratory—usually invisible."

[Concrete example—conversational tone] (12s): > "Think of a bug fix. Twenty iterations of debugging—false leads, backtracking, finally the insight. The commit message? One line. Or a mathematician filling notebooks, redefining the problem three times before the proof clicks. We only see the final theorem."

[POINT to orange "Cognitive Dark Matter" alert block] (5s): > "That's the cognitive dark matter. LLM logs might actually capture it."

[Transition:] > "So here's what we did."

Slide 4: From Log to a "Cognitive MRI" (47 seconds)

[VISUAL: Two-column comparison. LEFT: "1. The Linear Log (Chronological Sequence)" - vertical timeline with colored dots. MIDDLE: Arrow labeled "Embed & Link". RIGHT: "2. The Cognitive MRI (Semantic Topology)" - network with labeled clusters. BOTTOM: "The Insight" block]

[**POINT to LEFT column title, trace down timeline**] **(12s):** > "Start with the linear log. Chronological sequence. January: Python error. February: Banana bread. March: More debugging. April: Ethics."

[**Note: blue dots (Coding) are separated in time by gray (Cooking) and purple (Philosophy)**]

[**GESTURE to center arrow with "Embed & Link" label**] **(15s):** > "We embed each conversation—turn it into a point in high-dimensional space. 768 dimensions. Semantically similar conversations end up near each other geometrically."

"Then we link by similarity, not time."

[**POINT to RIGHT column - "The Cognitive MRI"**] **(15s):** > "The result: a semantic topology. The two coding sessions—months apart—snap together."

[**POINT to "Linked!" annotation between blue nodes, then to isolated gray "Cooking" node**]: > "Banana bread stays isolated. Philosophy forms its own region."

[**POINT to bottom "The Insight" block**] **(5s):** > "Distance in time doesn't equal distance in thought."

Slide 5: Method - Weighting (1:00)

[**VISUAL: Flowchart—"Conversation" at top splits into thick blue arrow (User ×2) and thin orange arrow (AI ×1), converging to green "Final Embedding" box with formula**]

The Problem (12s): > "One practical issue: AI responses are verbose. Lots of boilerplate. If you embed everything equally, AI phrasing might dominate."

[**POINT to "Conversation" box, trace descending arrows**] **(15s):** > "So we separated user prompts from AI responses and weighted them differently."

[**POINT to thick blue arrow and "×2" label**] **(15s):** > "The intuition: user prompts carry more of the *intent*—what you actually wanted to know."

[**POINT to thin orange arrow**] **(8s):** > "AI response is context but shouldn't dominate."

[**POINT to green formula box at bottom**] **(12s):** > "We embed user turns and AI turns separately, then take the mean of each. Then we combine those two mean vectors with the 2:1 weighting. One final vector per conversation."

"But how do we turn embeddings into a network?"

Slide 6: From Embeddings to Edges (45 seconds)

[**VISUAL: LEFT side has vector diagram showing three vectors (e , e , e) from origin. e and e point similar direction (small angle) with "Edge!" annotation. e points differently with "No edge (too different)" annotation. Cosine formula box at bottom. RIGHT side has two blocks: "Cosine Similarity" explaining angle measurement, "Edge Formation Rule" with threshold formula, and "Two Key Parameters" listing and]**

Opening (10s): > "Now we have embeddings—vectors in high-dimensional space. How do we turn that into a network?"

[**POINT to vector diagram—trace e and e] (15s):** > "Cosine similarity measures the angle between vectors. Same direction means similar content—cosine of 1. Orthogonal is 0. Since we normalize to unit length, this is just the dot product."

[**POINT to "Edge Formation Rule" block**] **(12s):** > "If the similarity is at or above our threshold , we connect them. The edge weight is the similarity score itself—stronger connections for more similar conversations."

[**POINT to "Two Key Parameters" list**] **(8s):** > "So we have two key parameters: controls how we embed, controls how we connect. Both need validation."

Slide 7: Parameter Selection (1:30)

[**VISUAL: Two stacked plots (left)—top shows threshold vs modularity phase transition, bottom shows weight ratio vs modularity peak at 2:1. Bullet summary (right)**]

Opening (12s): > "We ran a 2D parameter sweep—63 configurations, varying both and together. We optimized for modularity: how cleanly communities separate."

[**POINT to TOP plot—trace curve**] **(30s):** > "The threshold dimension. There's a phase transition around 0.875. Below that, too many edges—you get a hairball. Above that, things fragment."

[**POINT to 0.9 on curve**]**:** > " = 0.9 gave reasonable structure. Not objectively 'correct'—a reasonable choice we're explicit about."

[**MOVE DOWN to BOTTOM plot**] **(30s):** > "The weight ratio dimension. Modularity peaked at 2:1, user-to-AI."

[**POINT to peak**]**:** > "This supported our intuition that user prompts carry more signal. The joint optimum: = 0.9, = 2:1."

Conclusion (8s): > "The ablation gives us confidence the findings aren't artifacts of arbitrary choices. But this is still N=1."

Slide 8: The Network (1:42) ← CENTERPIECE

[**VISUAL: Full-color network (cluster-vis-topics-better.png) showing 449 nodes, colored by community. On-slide callouts: "AI Theory →" (right), "↓ Coding" (bottom). Stats on right: 449 nodes, 1,615 edges, Q=0.750, 15 communities**]

[**Let image appear—PAUSE 4 SECONDS. Let them absorb it. Don't speak yet.**]

> "So here's the network. 449 conversations from about two years."

The Numbers (15s): [**POINT to stats on right**]**:** > "1,615 edges. 15 communities. Modularity 0.750—reasonably high, suggesting non-random structure."

The Structure (30s): [**GESTURE across overall structure**]**:** > "The communities roughly correspond to topics I'd recognize."

[**USE on-slide callout "AI Theory →"—point to dense blue/purple cluster RIGHT**]**:** > "AI and machine learning here—dense cluster with lots of internal connections. Neural networks, probability, embeddings."

[**USE callout "↓ Coding"—point to pink/green clusters BOTTOM**]**:** > "Coding projects down here. More fragmented—different projects, different sub-clusters."

[**SWEEP across other visible clusters**]**:** > "Philosophy elsewhere. Writing. Math."

Core-Periphery (12s): > "The network isn't uniform. A quarter forms a dense core—broadly connected topics. The periphery is specialized. And the average path length—about 6 hops between any two conversations—gives you a sense of cognitive distance."

The Interpretation (30s): [**Step back from screen**]**:** > "I'm the one labeling these after the fact. The algorithm finds structure; interpretation is mine."

[**Pause 1 second**]

"That said—I did preliminary tests where an LLM labeled communities based on conversation content. Results were reasonable. In principle, this whole pipeline could be automated: embed, cluster, label. No human required."

Key Point (15s): > "What's interesting is the algorithm found *something*. Whether these communities are meaningful beyond my recognition—harder question we can't fully answer with N=1."

Slide 9: Observation 1 - Heterogeneity (1:25)

[VISUAL: Two columns—LEFT "Theoretical Domains" with dense blue mesh diagram (C 0.58), RIGHT "Practical Domains" with sparse green tree diagram (C 0.39)]

Opening (12s): > "One thing we noticed: different topic areas have different network structure."

[POINT to clustering coefficients below diagrams] (15s): > "Theoretical topics—math, ML theory—have higher clustering, about 0.58. Practical coding is lower, 0.39."

[POINT to LEFT blue mesh] (30s): > "The interpretation: theoretical work involves returning to core concepts, refining definitions, lots of cross-referencing."

[Trace connections between peripheral nodes]: > "Everything connects. Dense local structure."

[MOVE to RIGHT green tree] (25s): > "Coding projects are more linear. Solve one bug, move to next. Less backtracking."

[Trace tree from root to leaves]: > "More tree-like. Not much connection between branches."

Caveat (3s—quick): > "Suggestive, not definitive. Need more data to know if this generalizes."

Slide 10: Observation 2 - Bridges (1:25)

[VISUAL: Bridge visualization (left) with high-betweenness nodes highlighted. Right side lists three types: blue "Evolutionary", teal "Integrative", orange "Pure Bridges"]

Opening (10s): > "We also looked at high-betweenness nodes—conversations connecting different clusters."

[POINT to visualization LEFT] (12s): > "Qualitatively, we noticed a few patterns in these bridging conversations."

[POINT to blue "Evolutionary Bridges" text] (25s): > "Some conversations *drift* between topics. Start in one area, organically evolve into another."

[GESTURE to visualization—trace path across communities]: > " 'Evolutionary' bridges. Like geometric means drifting from pure math into neural network loss functions."

[POINT to teal "Integrative Bridges" text] (25s): > "Others are deliberate—explicitly connecting two fields. Ethics of AI, for example."

" 'Integrative.' Consciously synthesizing."

[POINT to orange "Pure Bridges" text] (13s): > "Occasionally a single conversation connects distant clusters. A 'pure' bridge—maybe a Linux question linking gaming to work."

[Wrap—don't apologize]: > "This is a taxonomy we're proposing based on what we observed."

Slide 11: Potential Applications (45 seconds)

[VISUAL: "The Scroll" (left)—gray bars fading up labeled "Ephemeral & Buried" → arrow → "The Map" (right)—small network with labeled nodes and "Synthesis" path. Example query box at bottom]

Opening (8s): > "Why might this matter?"

[POINT to scroll LEFT] (12s): > "Right now, conversation history is an infinite scroll. Finding something from months ago is painful."

[Trace finger up fading bars briefly]

[GESTURE to network map RIGHT] (15s): > "If this works more generally, you could navigate by topic rather than by date."

[POINT to query box]: > " 'Show me everywhere I discussed entropy.' "

[Trace network connections—Entropy to Biology, AI, Coding]: > "Network lights up connections."

Broader View (10s): > "This paper focused on network topology—structure, communities, bridges. But once you have this structure, it enables other things: semantic search, recommendations, gap detection. We haven't built those yet."

[Beat—don't oversell]: > "That's speculative. But it's the direction."

Slide 12: Conclusion (50 seconds)

[VISUAL: Three columns—LEFT "Key Findings" (green) with network image and bullets, MIDDLE "Limitations" (orange) with N=1 icon and camera, RIGHT "Future Directions" (blue) with growth diagram and magnifying glass]

Summary (15s): > "To summarize: we took one user's conversation logs, built a semantic network, found what appears to be meaningful community structure."

[POINT to LEFT green "Key Findings"]: > "User weighting helps. Structural differences between topic types. Taxonomy of bridge conversations."

[POINT to MIDDLE orange "Limitations" with N=1 icon] (12s): > "But this is exploratory. N=1."

[POINT to camera icon]: > "One platform. Snapshot in time. No ground truth."

[POINT to RIGHT blue "Future" with growth diagram] (10s): > "Obvious next steps: more users, longitudinal analysis, validation."

[POINT to magnifying glass]: > "We'd welcome collaborators with larger datasets."

Closing (3s): [Make eye contact, smile slightly]: > "Thanks. Happy to discuss."

[Hold position for 2 seconds before stepping back]

[GitHub link visible at bottom for those who want to follow up]

BACKUP SLIDES (Q&A Only) — DO NOT ADVANCE UNLESS ASKED

Backup 1: Technical Details

Trigger: "What embedding model?" / "How did you detect communities?" - nomic-embed-text, 768 dimensions - 500-token chunks, 50-token overlap - Louvain algorithm, resolution 1.0, Q = 0.750 - 1,908 conversations → 449 in giant component after = 0.9 filtering

Backup 2: Core Formulas

Trigger: "Can you show the math?" - Weighted embedding formula - Newman's modularity Q - Betweenness centrality - Clustering coefficient

Backup 3: Privacy & Data Handling

Trigger: "What about privacy?" - This study: author's own data - Framework runs locally—no data leaves machine - Future: IRB, informed consent, anonymization required

Backup 4: Methodology Alternatives

Trigger: "Why cosine?" / "Why not k-NN?" - Comparison table: Cosine vs Euclidean vs Jaccard - Hard threshold vs soft clustering - nomic vs OpenAI vs Sentence-BERT - 2:1 vs 1:1 vs user-only rationale

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TIMING CHECKPOINTS & RECOVERY STRATEGIES

Clock	You should be at…	If behind…	If ahead…
3:00	Starting Slide 5	Trim Slide 3 example	Add 5s pause on Slide 4
4:45	Starting Slide 7 (Ablation)	Speed through Slide 6	On track
6:45	Starting Slide 8 (Network)	Don't rush—this is key	Can linger on network
8:15	Finishing Slide 8	Critical—don't cut network	Perfect—save buffer
10:30	Starting Slide 11	**CONTINGENCY:** Trim Slide 11	You have buffer
11:30	Starting Slide 12	Cut to conclusion fast	Excellent—confident close

CRITICAL RECOVERY: If at 10:30 you're still on Slide 10, cut Slide 11 to 20 seconds: "Imagine navigating by topic rather than timeline. That's the vision." Then jump to Slide 12.

IF RUNNING AHEAD (Finishing early is fine—here's how to use extra time well)

At 9:30 and starting Slide 11? You have ~2 minutes of buffer. Here's what to do:

Where to Expand (Gracefully)

1. **Slide 8 — The Network (best place to linger)**
   - Take an extra 10-15 seconds just *looking* at the network with them
   - Point to additional clusters: "There's also a philosophy cluster here… writing over here…"
   - More deliberately trace a path between communities
   - "Take a moment to find patterns you see"
2. **Slide 3 — The Iceberg**
   - The concrete example is already there; deliver it more slowly
3. **Slide 10 — Bridges**
   - Give an extra example for each bridge type
   - More slowly trace paths across the network visualization
4. **Pauses and Eye Contact**
   - Before each slide transition, make eye contact for 2-3 seconds instead of 1

- After making a key point, let it land—don't rush to the next thought
- Stillness reads as confidence

What NOT to Do

- **Don't ramble** — Adding filler words or tangents sounds unprepared
- **Don't over-explain** — If you've made your point, stop
- **Don't apologize for being brief** — 10 minutes of clear content beats 12 minutes of padding
- **Don't add new claims** — Stay within what you can defend

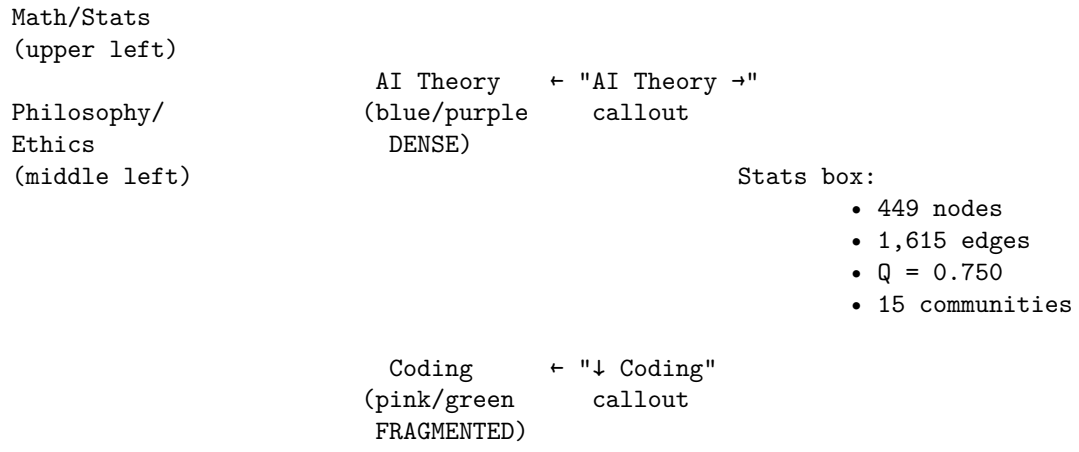
The Golden Rule

Better to finish at 10:30 with a crisp close than to pad to 11:45 with meandering.

Finishing 1-2 minutes early shows confidence. It leaves room for a longer Q&A, which is often where the best conversations happen. The moderator will appreciate not running behind.

If you hit Slide 12 at 10:00: Slow down slightly on the conclusion. Make deliberate eye contact with different sections of the audience. Let your final "Thanks. Happy to discuss." breathe.

VISUAL REFERENCE: Network Structure (Slide 8)



Pointing strategy: 1. Stats first (15s) — establish numbers 2. Dense AI cluster RIGHT (15s) — lots of internal edges 3. Fragmented Coding BOTTOM (10s) — separate silos 4. Step back, talk interpretation (30s) 5. Don't rush—this is your best visual

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ANTICIPATED QUESTIONS & RESPONSES

Q: "Isn't this just clustering text?" > "Fair point. Embedding and clustering are standard. The data source—conversation logs as cognitive process—is what's potentially interesting. Whether that's valuable is what we're exploring."

Q: "How do you know communities are meaningful?" > "Honestly, we don't have strong validation. I recognize them, but that's not rigorous. Proper validation would need user studies or retrieval benchmarks. Future work."

Q: "N=1 is pretty limited." > "Agreed. This is exploratory. We wanted to see if there was signal before scaling up. Answer seems to be yes, but we need more data for stronger claims."

Q: "What about privacy for multi-user studies?" > "Critical issue. Any multi-user study needs IRB approval, informed consent, anonymization. Framework runs locally—no data leaves your machine. But studying others' conversations raises real ethical questions."

Q: "Could structure be a parameter artifact?" > "That's why we did the ablation study. Structure persists across parameter ranges, which gives confidence. But different choices would give different results."

Q: "Why nomic-embed-text?" > "Open weights, reproducibility, 8k context window. Wanted something others could replicate without API costs. Reasonable choice, not necessarily optimal."

Q: "What would falsify the heterogeneity hypothesis?" > "If we saw same clustering coefficient across all topic types in a larger sample, that would suggest the difference was noise or specific to my patterns. Testable with more data."

Q: "How did you label communities?" > "Manually, by reading representative conversations. But I also tested LLM-based labeling—reasonable results. Whole pipeline could be automated."

Q: "Applications beyond visualization?" > "This paper focused on topology—structure, communities, bridges. But network enables semantic search, recommendation, gap detection, maybe tracking evolution of thinking over time. Haven't built those yet."

DELIVERY NOTES

Pacing Rhythm

- **Slides 1-4:** Moderate pace, building context
- **Slides 5-6:** Slightly faster through methods (they can read the paper for details)
- **Slide 7:** SLOW DOWN. This is the payoff. Let them look.
- **Slides 8-9:** Moderate—observations are interesting but don't drag
- **Slides 10-11:** Pick up pace—vision and wrap

Gesture Economy

- **Don't over-gesture.** Point when directing attention to specific elements.
- **Use pauses instead of filler gestures.** Stillness = confidence.
- **On Slide 7:** Step back after pointing to let them see the whole network.

Voice Modulation

- **Slide 1:** Conversational, inviting
- **Slides 2-4:** Building momentum
- **Slide 5-6:** Professional, methodical (this is the "we did our homework" section)
- **Slide 7:** Slightly more energy—this is your reveal
- **Slides 8-9:** Analytical but not dry
- **Slide 10:** Forward-looking, optimistic but measured
- **Slide 11:** Crisp, confident close

What to Emphasize

- **"1.7 billion users"** — scale matters
- **"Distributed Cognition"** — theoretical anchor
- **"2:1 user weighting"** — design choice validated
- **"Q = 0.750"** — quantitative validation
- **"N=1"** — honest limitation

- **"15 communities"** — concrete finding

What NOT to Do

- Don't apologize for limitations more than once (Slide 11 is enough)
- Don't rush the network visualization
- Don't read bullets—talk around them
- Don't say "um" or "so" as filler—pause instead
- Don't pre-answer questions you think they'll ask (save for Q&A)

PRE-TALK MINDSET

You're not selling. You're sharing.

You found something interesting. You're being honest about its limitations. You're inviting others to explore this direction.

The network is your evidence. The modularity score backs it up. The ablation study shows it's not arbitrary.

If someone challenges your methodology, that's *collaboration*, not criticism. Thank them.

Goal: Walk out of this room with 2-3 people who want to talk more. That's success.

PRE-TALK CHECKLIST

☐ **PDF loaded** — test arrow keys, ensure no black screen on first slide
☐ **Timer visible** — phone or watch, easy to glance at
☐ **Water nearby** — stay hydrated, use pauses for sips
☐ **Opening line memorized** — first 10 seconds should be automatic
☐ **Backup slides accessible** — know they're there but don't advance unless asked
☐ **Slide 7 clarity verified** — colors, callouts, stats all visible from back of room
☐ **Contingency plan clear** — know what to cut if running over at 10:00

THE OPENING (MEMORIZE THIS)

[Stand still. Make eye contact. Wait 2 seconds. Then begin.]

> "Good morning. This talk is about a simple question: what happens if you treat your AI conversation history as a dataset?"

[If you remember nothing else, remember this opening. It sets the tone for everything that follows.]

THE CLOSING (KNOW THIS COLD TOO)

[After "we'd welcome collaborators with larger datasets"...]

[Pause 1 second. Make eye contact.]

> "Thanks. Happy to discuss."

[Smile slightly. Hold position 2 seconds. Step back.]

[Do NOT add "any questions?" or "I'll take questions now"—the moderator will handle that.]

You've got this. The work is solid. The network is beautiful. Just tell the story.