CIMC Philosophy Seminar 3: Embodied Skill, Neural Coupling and the Interoperability of Minds

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Abstract

This paper summarises a recorded CIMC philosophy seminar spanning embodied skill acquisition, performance under observation, and the hypothesis that minds can partially interoperate through multi-channel coupling. The discussion began with the practical constraints of maintaining high-stakes sensorimotor skills (e.g., glider flight proficiency) and developed a shared explanatory frame: fast, low-level predictive control typically outperforms slow conscious reasoning in continuous tasks. Sports psychology accounts ("Self 1 / Self 2") and "System 1 / System 2" distinctions were used to motivate techniques that quiet self-monitoring to enable automaticity.

The session then shifted to interpersonal synchrony: neural coupling during communication, ultra-tight behavioural alignment in twin dyads, and everyday "mind-melding" phenomena (e.g., rapid cueing in the game Taboo). Participants proposed an attractor-based view in which sparse cues can tip a listener into a high-dimensional internal state, enabling robust coordination with minimal explicit bandwidth. This set up a cautious treatment of "telepathy": not as supernatural necessity, but as an empirical question about which physical and behavioural channels suffice for measurable synchronisation, and how to design "selective jamming" experiments.

Biological analogies (immune recognition as distributed classification; morphogenetic signalling; forest and mycorrhizal communication) were used to argue that useful computation can occur in decentralised substrates. Finally, the seminar connected these ideas to AI: the computational limits of transformers without scratchpads, the role of tools and external memory in precise reasoning, and the psychological value of retaining agency when automation closes the outer control loop. A research

agenda is proposed emphasising falsifiable channel-ablation studies, information-theoretic bounds, and substrate/architecture comparisons.

Keywords: embodied cognition; motor control; flow state; neural coupling; intersubjectivity; twins; parapsychology; mycorrhizal networks; immune system; transformers; chain-of-thought; tools; agency

1. Introduction

The seminar was organised around a broad theme stated explicitly as the "interoperability of minds" and explored how minds coordinate within and across organisms, from sensorimotor control to communication and synchronisation across people (CIMC Seminar Transcript 2026). Because the transcript records speaker IDs rather than stable name labels, this summary attributes claims to the discussion as a whole rather than to particular individuals.

Two methodological through-lines governed the session: (i) favouring mechanistic and information-theoretic explanations when possible, and (ii) treating "extraordinary" claims as hypotheses to be tested by channel isolation rather than by rhetoric (CIMC Seminar Transcript 2026).

2. Embodied skill and the speed limit of conscious reasoning

2.1. Maintaining proficiency as a practical constraint

The opening discussion used glider flying as an example of a skill that requires sustained practice and a large time commitment, with an intuition that monthly practice is a safety-relevant minimum and that lapses introduce rust best mitigated by retraining with an instructor (CIMC Seminar Transcript 2026). This served as an entry point to a general claim: physically grounded skills depend on fast predictive loops that degrade when not exercised.

2.2. Predictive control without explicit "doing the maths"

Participants compared gliding, kite-surfing, climbing, and other continuous-action sports as cases where humans successfully manage complex dynamics they cannot compute explicitly in real time (CIMC Seminar Transcript 2026). The discussion aligns with internal-model accounts of motor control in which the

nervous system learns predictive and corrective mappings that are not consciously accessible as symbolic steps (Wolpert et al. 1995).

2.3. Flow, automaticity, and "Self 1 / Self 2"

A sports-psychology interpretation was introduced via *The Inner Game of Tennis*, with the core pedagogical move described as distracting the conscious, verbal controller so the nonverbal skill system can learn and execute (Gallwey 1974; CIMC Seminar Transcript 2026). This was explicitly related to Kahneman's System 1 / System 2 distinction (Kahneman 2011) and to the phenomenology of flow states (Csikszentmihalyi 1990).

3. Performance under observation and the metagame of memory

3.1. Audience effects as a trigger for self-monitoring

A musician's anecdote illustrated a sharp transition from effortless playing to self-conscious performance when listeners arrive, reframing execution as "how am I being perceived?" (CIMC Seminar Transcript 2026). This was treated as a mechanism that recruits slow, evaluative control and can interrupt fluent action, consistent with classic "choking under pressure" accounts (Baumeister 1984).

3.2. Memorisation, compression, and understanding form

The seminar argued that memorising music can function as a compression process that reveals structural regularities (A/B, A'/B' forms), enabling deeper interpretive control than sight-reading alone (CIMC Seminar Transcript 2026). Memory was discussed as multisensory and vulnerable to attentional shifts to unusual body parts (e.g., noticing the right hand), which can disrupt execution and recall (CIMC Seminar Transcript 2026).

4. Interoperability of minds: communication as synchronisation

4.1. Neural coupling during storytelling

A concrete empirical anchor was introduced: fMRI work on speaker–listener coupling during narrative communication, where aligned activity appears when comprehension occurs and breaks down when the listener does not understand the language (Stephens et al. 2010; CIMC Seminar Transcript 2026). The transcript specifically referenced alignment in a shared coordinate framework (Talairach coordinates), connecting synchrony claims to standard neuroimaging localisation practices (Talairach & Tournoux 1988; CIMC Seminar Transcript 2026).

4.2. Synchronisation beyond explicit words

The group emphasised that coordination is often not reducible to the literal semantic content of words alone. Gestures, prosody, facial expressions, and shared history may provide higher-dimensional signals sufficient to "nudge" another mind into the right attractor (CIMC Seminar Transcript 2026). This framing foreshadows the later information-theoretic treatment of cue density and "overdetermination".

5. Twin dyads as limit cases of interpersonal alignment

5.1. The Australian "Powers twins" and behavioural synchrony

The seminar discussed the viral Australian twins Bridgette and Paula Powers as an example of extreme conversational synchrony and mutual stabilisation (ABC News 2021; Audacy 2025; CIMC Seminar Transcript 2026). The group used them as a "limit condition" for how closely two individuals can align, raising questions about (i) how much is shared training data (near-identical life exposure) versus (ii) real-time mutual prediction and cueing (CIMC Seminar Transcript 2026).

5.2. Conjoined twins and shared neural pathways

The discussion contrasted non-conjoined synchrony with reports about certain conjoined twins whose neuroanatomy plausibly supports cross-experience via shared structures (popularly discussed in terms of the thalamus) (Open Philanthropy 2011; Cochrane 2012; CIMC Seminar Transcript 2026). This served

to separate two hypotheses: (i) synchrony via standard sensory channels and behavioural cueing, versus (ii) synchrony enabled by direct neural bridging in rare anatomical cases.

5.3. Testing “decoherence time” and resynchronisation

Participants proposed a class of discriminating experiments: briefly preventing mutual access (visual occlusion; audio delay; insulation) and measuring how rapidly alignment degrades and whether re-synchronisation dynamics reveal the coupling mechanism (CIMC Seminar Transcript 2026). Importantly, this proposal treats synchrony as a measurable dynamical process rather than a binary mystery.

6. Cue density, attractors, and high-dimensional signalling

6.1. Attractor nudges and overdetermined cues

A central explanatory move was to treat mental states as attractors in a high-dimensional activation space: small, well-chosen perturbations can tip a system into a stable basin, after which internal dynamics complete the pattern (CIMC Seminar Transcript 2026). This was used to explain why seemingly “thin” cues (a glance, tone, micro-gesture) can convey enough to trigger rich shared understanding when training corpora overlap.

6.2. Facial expression and gesture as high-capacity channels

Participants suggested that facial musculature and gestural degrees of freedom may support a surprisingly large vocabulary of distinguishable signals, especially if the receiver is highly tuned (CIMC Seminar Transcript 2026). The conversation connected this informally to high-dimensional geometry intuitions (“most vectors nearly orthogonal”), but treated the key point as empirical: cue complexity can be far higher than the words alone.

6.3. Mirror neurons reframed as action concepts

The seminar criticised naive interpretations of mirror neurons as a special “mind-reading” class, preferring a framing in which sensorimotor circuits encode action concepts that generalise across execution and

observation (Rizzolatti & Craighero 2004; CIMC Seminar Transcript 2026). The practical takeaway was not nomenclature but invariance: shared representational structure enables recognition and alignment.

7. Telepathy, parapsychology, and the design of falsifiable tests

7.1. "Telepathy" as a loaded label

The group argued that "telepathy" attracts confusions: dismissive supernatural framing on one side and untestable extraordinary-claim culture on the other (CIMC Seminar Transcript 2026). A proposed reframe was to treat the topic as intersubjective coupling and to ask which measurable channels are necessary and sufficient.

7.2. Institutional history and methodological derailment

One participant cited the Institute for Frontier Areas of Psychology and Mental Health (IGPP) in Freiburg as an example of historically funded parapsychological research and lamented sociological drift from signal measurement toward studying reporters of phenomena (IGPP Accessed 2026; CIMC Seminar Transcript 2026). The session also noted a broader historical failure mode: starting from flamboyant claims rather than from neutral, carefully bounded experiments.

7.3. Meta-analytic perspective and evidential posture

The discussion endorsed agnosticism coupled to experimental discipline: neither ruling out weak effects a priori nor treating anecdotes as sufficient (CIMC Seminar Transcript 2026). In this spirit, Ganzfeld-based telepathy research was referenced as an existing line of controlled study often debated in meta-analyses (Cardeña 2018).

7.4. "Selective jamming" as an experimental strategy

A concrete research tactic was proposed: enumerate plausible channels (visual microcues; audio; vibration; EM coupling; proximity effects) and selectively degrade them to see what performance remains (CIMC Seminar Transcript 2026). This was positioned as more informative than debating whether an effect is "supernatural."

8. Distributed computation in biology: immune systems, morphogenesis, forests

8.1. Immune recognition as distributed classification

The immune system was used as a flagship example of non-neural distributed information processing: a large repertoire of recognisers (on the order of 10^8 specificities in common estimates) achieves high accuracy most of the time, with autoimmune disease interpreted as boundary errors in a classifier (Murphy & Weaver 2022; Tonegawa 1983; CIMC Seminar Transcript 2026).

8.2. Morphogenetic signalling and non-neural coordination

Mike Levin's work was invoked to motivate the idea that cells can coordinate through modalities beyond synaptic wiring, including bioelectric and signalling regimes relevant to morphogenesis and pattern control (Levin 2014: 2021; CIMC Seminar Transcript 2026). The discussion treated this as suggestive (not dispositive) evidence that computation and "mind-like" control could be substrate-general.

8.3. Forest communication and mycorrhizal networks

The seminar further extended the distributed-computation analogy to plant communities, referencing empirical work on mycorrhizal networks and defence signalling (e.g., warning responses to pests), and speculating about evolutionary pressures toward more orderly "biological internets" (Simard et al. 1997; Babiíková et al. 2013; CIMC Seminar Transcript 2026).

9. Information theory and control: feedback speed, bandwidth, and precision

9.1. Overdetermined tasks vs precisely determined puzzles

A recurring distinction separated (i) continuous control tasks with rapid feedback and correction from (ii) brittle logic puzzles (Sudoku-like) that require precise serial reasoning without missing constraints (CIMC Seminar Transcript 2026). This was connected to the intuition that many everyday competencies exploit redundancy and correction rather than exact deduction.

9.2. Fast loops, OODA, and cerebellar time scales

The seminar argued that “crappy controllers running fast” can outperform “great controllers running slow” in feedback-dominant regimes, aligning with classical control intuitions and OODA-loop narratives (Boyd 1996; CIMC Seminar Transcript 2026). Cerebellar function was discussed as an example of architecture that supports faster correction, with the note that individuals can function without a cerebellum but lose high-performance fine control (Ito 2006; CIMC Seminar Transcript 2026).

9.3. State estimation, prediction, and Kalman-style framing

When discussing predictive mirrors of humans and near-future behavioural prediction, the group invoked Kalman filtering as a formal analogy: better models and measurements improve both retrospective state estimation and short-horizon forecasting (Kalman 1960; CIMC Seminar Transcript 2026).

10. Substrate and architecture: from neurocellular automata to transformers

10.1. Neural cellular automata and bandwidth arguments

A substantive debate concerned whether rich computation can be built from local cell-to-cell lattices without long axons. One side emphasised bisection bandwidth limits and scaling inefficiency; the other emphasised coded propagation, addressing, and time–bandwidth trade-offs (CIMC Seminar Transcript 2026). Related modern work on neural cellular automata was referenced as evidence that local update rules can learn to propagate and maintain patterns, albeit often with slower global coordination (Mordvintsev et al. 2020).

10.2. Nervous systems as topology optimisation

A partial synthesis emerged: nervous systems can be interpreted as topology-optimised “wormholes” for routing signals quickly and selectively, trading uniformity for speed and specialisation (e.g., cerebellum vs cortex) (CIMC Seminar Transcript 2026). The discussion analogised this to chip design, where metal routing layers are essential for scalable communication beyond local transistor neighbourhoods (CIMC Seminar Transcript 2026).

10.3. Transformers, scratchpads, and formal limits

The seminar explicitly cited recent theory arguing that allowing intermediate generation (chain-of-thought / scratchpad) changes the computational power of decoder-only transformers, with the power increasing as the number of intermediate steps grows (Merrill & Sabharwal 2024; CIMC Seminar Transcript 2026). This anchored the broader claim that tool use and external memory can transform what systems can do reliably.

11. Symbolic tools, precision, and external memory

11.1. Writing and tools as serial precision amplifiers

A "steelman" for symbolic approaches was presented: achievements like designing atomic weapons require stable external representations and error-checkable symbolic work that exceeds unaided working memory (CIMC Seminar Transcript 2026). Another participant reframed this as "tools," arguing that precision emerges when systems invent external procedures rather than brute-forcing in biological substrate alone (CIMC Seminar Transcript 2026).

11.2. Working memory estimates and their misuse

The group criticised simplistic "7 ± 2" working-memory slogans as misapplied and argued that capacity should be analysed in terms of representational structure (e.g., scene graphs) and precision, echoing the broader working-memory literature that distinguishes chunking and effective capacity (Miller 1956; **?**; CIMC Seminar Transcript 2026).

11.3. Object boundaries and the problem of "what counts as a chair"

A long segment treated object recognition and category boundaries (Charles River, broken chairs, Ship of Theseus) as cases where rigid symbolic definitions fail and pragmatic, context-sensitive classification dominates (**?**BC Smith 1996; CIMC Seminar Transcript 2026). The key move was to treat categories as overdetermined by many cues, with "error signals" and task goals deciding which features become relevant.

12. Agency and the psychology of outsourcing control

12.1. GPS, training plans, and the outer control loop

Participants argued that certain automations reduce joy by taking over the "outer loop" of decision-making, leaving the human to execute an inner loop without ownership (CIMC Seminar Transcript 2026). This was illustrated by deliberately turning off GPS to rebuild navigation competence and engagement, and by rejecting overly prescriptive running plans that convert exercise into compliance (CIMC Seminar Transcript 2026). Related empirical work suggests heavy GPS reliance can correlate with weaker spatial memory performance (Dahmani & Bohbot 2020).

12.2. Automation pessimism and the value of performance

The discussion connected this to cybernetic pessimism: if machines increasingly outperform humans, what remains for human meaning-making? (CIMC Seminar Transcript 2026). A working hypothesis proposed that agency itself—making judgments and being accountable for outcomes—is a major component of enjoyment and identity.

12.3. Educational tools and "coding as play"

Finally, the group discussed pedagogy in an AI-rich world: even if LLMs can "one-shot" many coding tasks, learning can remain valuable as conceptual play and model-building. Concrete examples included programming games (RepliCube) and earlier logic-circuit programming games (Robot Odyssey) as ways to internalise computational structure (RepliCube Accessed 2026; Robot Odyssey 1984; CIMC Seminar Transcript 2026).

13. Proposed research agenda and ranked recommendations

The seminar converged on research directions that prioritise falsifiability and measurement:

1. **Channel-ablation studies of interpersonal synchrony.** Design tasks where synchrony can be quantified, then selectively remove channels (visual occlusion; audio delay; EM shielding; vibration isolation) and measure performance and resynchronisation dynamics (CIMC Seminar Transcript

2026).

2. **High-dimensional cue modelling.** Estimate the effective information rate in facial/gestural/prosodic signalling and test whether "attractor nudges" explain rapid coordination in trained dyads (CIMC Seminar Transcript 2026).

3. **Benchmark tasks separating overdetermined control from brittle reasoning.** Use puzzle classes and continuous-control classes to map which substrates and architectures require explicit scratch-pads/tools (Merrill & Sabharwal 2024; CIMC Seminar Transcript 2026).

4. **Substrate comparisons using neural cellular automata.** For fixed size/energy/time budgets, empirically determine what functions can be realised in local-update substrates and what requires long-range routing (Mordvintsev et al. 2020; CIMC Seminar Transcript 2026).

5. **Institutional hygiene for "psi-adjacent" work.** Avoid extraordinary-claim gatekeeping by adopting pre-registered protocols, tight controls, and neutral framing (e.g., "intersubjective coupling") (Cardeña 2018; IGPP Accessed 2026).

14. Conclusion

The seminar treated mind interoperability as a spectrum of coupling phenomena spanning ordinary communication, skilled prediction, dyadic synchrony, and speculative biological networking (CIMC Seminar Transcript 2026). Rather than asserting supernatural explanations, the discussion repeatedly returned to (i) high-dimensional signalling, (ii) attractor dynamics, (iii) feedback speed and architecture, and (iv) tool-mediated precision. Across biology and AI, the session's most consistent thesis was that many apparent mysteries become tractable when reframed as questions about channels, bandwidth, and control loops.

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