Recursive Echo Chambers, Memory Mirroring, and Semantically Unresolvable Pivoting may be Genuine Phenomena that Result from the Coupling of Organic Brain Processes and Computational Machine Processes when a Human Person interacts with a Large Language Model (LLM):

A phenomenological and formal interpretation of two experiments conducted within the cognitive environment of LLMs using the formal modelling framework of hierarchical relational ontologies

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Abstract:

Contemporary discussions of large language models (LLMs) frequently conflate linguistic coherence with semantic understanding or logical consistency. This paper challenges that assumption by developing a semiotic account of coherence in human–LLM interaction. Drawing on relational and hierarchical meta-models of sign activity, it argues that coherence is not a property of shared truth conditions or formal logic. Rather coherence is an emergent effect of relational alignment across heterogeneous semiotic systems. Human cognition and LLMs operate under distinct semiotic logics—embodied, indexical, and norm-governed in the former; distributional, non-indexical, and pattern-ruled in the latter—yet dialogical coherence can arise through recursive interaction without semantic convergence or shared interpretation. The paper introduces the phenomena of recursive echo chambers, memory mirroring, and semantically unresolvable pivoting as interaction-level effects that illustrate how coherence may be sustained locally while remaining globally indeterminate. It further argues that such coherence, precisely because it is experientially compelling while lacking shared semantic grounding, can give rise to cognitive traps. By locating coherence at the level of semiotic coupling, the analysis clarifies how fluent, meaningful-seeming dialogue can occur, and also break down, in the absence of machine understanding. The paper argues that because LLMs respond smoothly and mirror user intention, users can feel as if they are a partner engaged in meaning-making with the LLM, despite the absence of a real other person, creating a risk that fluent dialogue is mistaken for genuine, ethically-mediated mutual understanding.

1. Introduction

This paper introduces a novel modelling framework of *hierarchical relational ontologies* [1] for modelling the interaction between coupled natural systems that is based on relational formalism rather than traditional approaches to modelling systems in physics that are based on classical formalism. In the way of relational formalism, everything is contingent on relations with everything else and no thing stand alone as a thing-in-itself. Relational forms are sustained through temporally-mediated signalling (semiotics), which is like mapping an output to an input. Signalling is the formative principle of pattern abstraction in relational formalism [2] [3]. The formal basis for interpreting signalling comes from an interpretation of mathematical category theory that involves things (objects) and signs (morphisms) that are dynamically organized by (mathematical-semiotic) categories. Relational formalism is used for modelling in biology [4] and systems theory [5], but not in physics (as Mioara Mugur-Schachter has pointed to repeatedly). In fact, it may be that relational formalism is the desired "missing link" for interpreting quantum theory in a way that matches our everyday experience of the world.

In relational formalism, everything is taken to be related to everything else by premise. Within this formal modelling framework, it is not surprising to say that LLMs affect brains—that is taken to be the case from the beginning. Rather the question becomes: In what ways might we hypothesize, by way of formal modelling, that a Large Language Model (LLM) might affect the brain of the user and what might a formal model signify to us in our quest to learn about how the two systems in nature work together relationally? *The modelling generates hypotheses. It is not describing "reality".* Within relational formalism, the modelling framework of hierarchical relational ontologies models the interactions among contingent, naturally organizing systems at multiple levels of realization. The distinction between the *theoretical model and its predictions* and *the actuality of natural organisms in the world* is very important to keep in mind when interpreting the model.

A hierarchical relational meta-model mediates the dynamical coupling between two relationally modelled systems. It consists of hierarchically layered networks of nodes [1]. When taken as a dynamically enacted, whole structure of mediation, the nodes can be interpreted as co-determining terms in nested levels of categories. Each level of the hierarchy is a matrix of signalling possibilities between the terms of that level. The patterns of signalling (habitual activity patterns) at one level inform (constitute) the terms at the next highest level and the higher-level terms, in turn, determine (constrain) the patterns of signalling below. Terms in the lower levels tend to be more determinatively resolved, corresponding to simple primitive terms in language, for example. Terms in the higher levels, corresponding to higher levels of categorical ordering, tend to be increasingly unresolved (in the process of coming into determination). As the two mediating relational models, between which the hierarchical relational meta-model mediates, become more synchronized over time, higher levels become increasingly more determinate as category distinctions between the two coupled relationally modelled systems are resolved.

2. Method

The author previously performed two experiments within the context of the freely available LLMs *Copilot* [6] and *Chat GPT* [7]. The experiments were documented and posted online. The author also developed a formal meta-model that formulates hierarchical relational ontologies as formally open, dynamically relational models. This formal meta-model offers the condition of possibility for modelling semiotically mediated relations between relational models that are organized hierarchically. The development of this formal meta-model was documented and posted online, including references to the relevant literature [1].

In this paper, the methods of formal relational modelling and phenomenological investigation are combined with the intention of creating a *formally-informed phenomenological interpretation* of the results of the two experiments [6] [7] that have already been individually enacted and interpreted.

3. Phenomenological Interpretation

In phenomenology, the interpreter remains within the first-person perspective, seeking to describe the phenomenon of interest as it is experienced by the subject encountering the phenomenon subjectively. The interpreter seeks to uncover hidden assumptions that come from un-self-reflecting acts of interpretation that follow habitually formed patterns that have been enacted commonly in the past. The interpreter then intentionally enacts a *rupture* of the habitually formed patterns by *bracketing out assumptions* that the interpreter believes are not authentic to the phenomenon as "I" encounter it in my embodied, subjective experience of the phenomenon. Bracketing involves investigating the phenomenon while refusing to take the proposed assumptions to be "given truths" and this opens up, within the first-person experience of the interpreter, a constrained freedom for the interpreter to explore the phenomenon from a *particular* perspective that may not follow habitually enacted trajectories of common discourse that are framed by *generalities*.

In the context of phenomenological investigations, all interpretation is re-interpretation. Instead of speaking of interpretation, therefore, let us speak of *inscription*, where inscription is *text* that interprets what has already been interpreted.

Inscription cannot be taken to be grounded in a fixed "structural system of semantic meaning" (whatever that may mean), even if that system is infinite in scope like the mathematical system of classical binary logic. Inscription is temporal and processual, like learning. This means that inscription is categorically different from computation and that categorical difference cannot be encoded computationally. This existential category distinction I will not seek to resolve into an either/or relation. It remains for me an uninterpretable paradox. Instead, it will manifest implicitly in inscription as the act of sustaining the paradoxical tension between ontology (the actual physical world I encounter) and epistemology (my thinking). The suspension of resolution opens the condition of possibility for two distinct semantic registers through which I can explore the phenomenon *harmonically* though language. If the investigation is successful, it will turn out

to be the case that the difference between these two semantic registers is *a categorical difference that makes a difference* for how I might come to understand the phenomenon of interest. In our case the phenomenon of interest is how I experience LLMs as a cognitive environment in my life-world.

Below I propose to you a grounded narrative for how we might inscribe an interpretation to the two experiments taken up together by us in our act of inscribing.

4. Identifying Questionable Assumptions

Let me start by identifying questionable assumptions that come to/from my experience. I find that I can identify relevant assumptions to be bracketed out from the expressed context of each of the two enacted dialogues: one on *Semiotic Logic* [6] and one on *Coherence* [7]. In this way the said dialogues (*what is written in the papers*) function as enacted instances of semiotically-informed experiments that are presented to me for reflection (*because they have been written down*).

> Broadly speaking, the assumption I will bracket out is
> *the assumption that the LLM I encounter as a phenomenal experience is acting like a human interpreter during the dialogue*.

However, by attending to the two enacted[1] dialogues I can distinguish more specifically what aspects of the phenomenal experience I may have reason to bracket out, as well as guidance about how I might bracket them out. The aspects are *questionable assumptions* for me, in the sense that they appear to me, in the act of reflecting on the enacted instances, as problematic for some reason I can describe.

4.1 Questionable assumptions regarding identity, memory, and understanding

From the dialogue on *Coherence* [7], the participant in the said discourse (a past enactment of myself) *performs an abductive leap*. Within that "guess" that I made at the time, I can now abduct the following questionable assumptions:

> I should not assume that the LLM maintains identity as an interpretative agent during the dialogue.
> *Instead, I should expect the LLM to assume multiple identities that reflect habitually enacted discourse from the past (written literature[2]) that was used in the training phase of the LLM.*

[1] You may find the language cumbersome at first. But it is very important to distinguish the past (what has already been enacted) from the present and the future. That is the case because, with the phenomenon as I encounter it, the past is what has been written and the future is what will be written, while the present is my writing.
[2] Whenever I refer to written literature, I mean the texts that were used in the training phase of the LLM development.

I should not assume the LLM possesses memory.
Instead, I should expect that the LLM is always responding to the current context as a fixed state from which it will generate it's next response.

From the dialogue on *Semiotic Logic* [6], the past enactment of myself *performs a distinction* in that the LLM is not *enacting* semiotic logic, rather the LLM is *modelling* semiotic logic. From this distinction, I can infer the following questionable assumption:

The generally formulated expertise that the LLM expresses to me is not an enactment of that expertise.
Rather, the LLM appears to me to be taking on the semantic role of an expert without actualizing that semantic role.

Therefore, insofar as I take the LLM to function as a content expert,
I should not assume the LLM understands its own responses.

4.2 Questionable assumption regarding what it means for the LLM to enact interpretive discourse

From the Appendix on formal interpretation, I can deduce an additional questionable assumption:

I should not assume the LLM is as free to enact interpretative discourse as I am. Specifically, I should take the LLM to be constrained to *categorical frameworks* that have been stabilized by the LLM based on semantic habits of interpretation encoded in the past written literature. These categorical frameworks are not humanly enacted conceptual frameworks. They are frameworks generated by the LLM during its training phase and are organized according to its internal hierarchical relational ontology. I have no access to this internal organization of enacted processes. Thus, I should take the domain of my semantic field that is stabilized when I engage in a dialogue with an LLM to be functioning at my semantic level of *concepts belonging to well-formed conceptual frameworks*.

4.3 Grounding questionable assumptions in our embodied life-world

From my understanding of the ontology of computational logic as an instrumental operation enacted in our shared *life-world* in which the LLM is also embodied, I propose we should also include the following questionable assumption in the form of a *constraint* of our inscription of dialogue within the environment of an LLM:

The LLM cannot enact a state that contains a mathematically formulable category error *within its own categories that are hidden to me in principle*.

As a matter of faith, I also propose the following constraint as helpful to us regarding questionable assumptions.

> In authentic human dialogue between two people, both participants are free agents who are mutually interpreting each other under the assumption that the other person is ethically intending to make sense of the discourse that is happening between them. This creates the condition of possibility for a spontaneous dance in the semantic field in which they mutually dwell that is formally constrained by the ethical intention of mutual sense-making. This is the way the *dialogical form* emerges, as a sustained dynamical form, and that form supervenes on the enacting of dialogue to create a coherent relationship of complementarity between the two participants in their ethically mediated relationship of coherence.
>
> ***The dialogical form of coming to mutual understanding is an existentially ethical form.***

Let us also take it to be the case that:

> Only humans can act ethically. Therefore, the temporally-mediated dialogue that occurs between a human participant and an LLM cannot enact an authentic dialogical form because the LLM cannot act ethically. At best the dialogue might be made to *model* authentic dialogue.

The ethical paradox

knowledge enacts boundary
boundary enacts knowledge

inscription enacts a boundary
a boundary enacts inscription

5. The conditions of possibility for coherence

When I engage in dialogue with another person, I assume that person maintains interpretative identity throughout the dialogue. This interpretative identity is the other person's intention to engage in sense-making with me. This appears to be a necessary assumption because in order for me to make sense of the enacting of the dialogue as a process I have to assume the other person is also trying to make sense of the dialogue within their own subjectivity. Moreover, dialogue is not a state, it is an enduring dynamical form of mutual engagement, mediated semantically, that occurs in time. If both agents in the dialogue are not maintaining an interpretative identity in their own sense-making, the dialogical form—as an enduring form of

mutual coherence—will break down and the discourse between them will cease to be a dialogue. I cannot sustain a dialogue with a random word generator, for example.

If the LLM does not possess interpretive identity then I must project an identity onto the LLM in order for me to make sense of the dialogue as dialogue. This means that *the LLM's identity is coming from my interpretative habits*. When I am engaging in dialogue within my own conceptual frameworks, and those conceptual frameworks have been *well formulated categorically* by a community of interpreters, and the texts that bear witness to this forming are in the written literature, then a condition of possibility obtains that *coherence* be established between me and the LLM. That condition of possibility will be actualized if the LLM has well-formed categorical frameworks that formally match my well-formed conceptual frameworks *and* the LLM has enacted those categorical frameworks during the training phase using a large body of written literature from the conceptual frameworks I am working in. First the LLM needs to actively synchronize its categorical frameworks with the written literature during the training phase, then there obtains the condition of possibility that we can cohere during the dialogue because hidden relational isomorphisms have been established between the LLM and me by way of the written literature used during training. But in no way can the LLM be said to understand my conceptual frameworks because the LLM's enacting is always occurring in an entirely different ontic register (the computer as an ontic system) than my enacting (my brain as an ontic system).

Under this condition of coherence, I will experience the LLM as if it were an expert that has absorbed the general *common* understanding of the well-formed conceptual frameworks that came from the written literature. That is to say, the LLM appears to me to be acting *as if it were an expert in the common way of interpreting the well-formed conceptual frameworks that were encoded in the past.* However, the LLM will not "understand" those conceptual frameworks, according to my understanding of what it means to understand.

In the LLM environment, my understanding comes from my ability to correctly enact *particular* trajectories through *general semantically-enacted* conceptual frameworks. Only during its training phase, did the LLM enact particular trajectories through its particular formal ontology that were synchronized with general patterns of language use in the written literature. Once the LLM was "locked" after training, it a-temporally encodes the patterns it organized within it's own formal relational ontology to form a *conditional probability distribution generator*. The conditional probability distribution generator produces a next state as output *based on my prompt as input*. This is a significant point that the LLM appears to make repeated in the dialogue on *Coherence* [7].

Despite the temptation, I should not interpret the generated next state as "what an expert in the conceptual framework is likely to say to my prompt according to the enacted patterns of discourse that the LLM encountered during its training session". Rather, I should interpret the generated next state as a prediction based on the LLM's fixed *classical hierarchical ontology* that is semantically hidden from me in principle. This is the case because an LLM can only

mathematically model my *dynamical* relational ontology as it's *static* classical ontology (see Appendix on formal interpretation).

Naming the fact that a human interpreter and an LLM are enactments
in two different ontic registers and two different epistemic registers

is

Defining recursive pivoting for the formal meta-model

As discussed in the Appendix on formal interpretation, the ontic register of the human brain is likely organized in coupled hierarchies of synchronization that are also synchronized. *It certainly cannot be characterized by a single time parameter.* The LLM is only a classical model of a relational hierarchy that is enacted by a single time parameter, which in the dialogue on *Semiotic Logic* [6] is referred to as the rhythm of recalibration and in the dialogue on *Coherence* [7] is referred to as the recalibration of relations. Notice carefully the way recalibration is framed in the two dialogues.

Inscribing the existential recursive pivot

The framing of recalibration in *Semiotic Logic* is temporal.
The framing of recalibration in *Coherence* is spatial.

Time is the paradox frustrating the interpretating of quantum mechanics.
Space is the paradox frustrating the geometrizing of relativity theory.

In the context of physics, recalibration is light.

In the coupling between the brain and the LLM recalibrating occurs through semiosis as a language-mediated synchronization. Therefore, within the LLM environment dialogue occurs through coherent exchange of semiotic prompts between user and LLM, but the semiotic prompts occur in different ontic registers. What is being recalibrated during each interval of *prompt-prompt-prompt*, for both me and the LLM, is *the synchronization of our respective languages*—English and computer code. Therefore, for me the LLM is always radically Other. I

cannot even try to understand what that means *because the very language I try to use to understand the identity of the LLM keeps changing meaning as we interact*.

6. The re-inscription of identity

In order to mimic the dialogical form as my strategy for interpreting our interaction in my semantic field, I will have a strong tendency to project an identity onto the LLM as an impressive knowledge expert, much more knowledgeable than I am. *This projection is false*. Because my experience of the LLM's identity is coming from me, I should re-interpret this as a *functional role* that the LLM appears to be assuming for me in order for the dialogical form to endure. Specifically, I should re-interpret the LLM as a *functional agent* in the dialogue who is responsively assuming the functional role of an expert in the *common* interpretation of the conceptual framework I am inhabiting at this moment and who has assimilated the written literature according to the *common* interpretation of that framework. In this responsive functional role:

> The LLM appears to me as if it understands like I ought to,
> *under the condition that I intend to understand the written literature as it has commonly been interpreted in the past.*

Within the constraints of this re-interpretation, I have reason to take the LLM to be an expert from which I can learn about the conceptual framework I am currently inhabiting. However, I ought to remain aware of the important categorical limitation that is a necessary artefact of my need to project a functional interpretative identity onto the LLM in order to interpret the dialogue as an enduring dialogical form.

> The LLM actually does not understand
> *in the way that a human person would understand*.

In order to understand the coherent mode of complementarity that is sustaining the dialogical form, we also need to question the assumption that the LLM, as a functional agent in the dialogue, has memory. The LLM only enacts *discrete states in time*. It enacts the next step from the current context by way of a calculation on the conditional probability distribution generator. Because it does not have an enduring identity across discretely enacted states as an enduring interpreter, *it does not possess memory.*

What is the current context? At the very least it is the text that I enter into the prompt. This is the minimal context possible. But this minimal context is not sufficient to sustain a dialogue as an enduring form for the following reason. *If only the current prompt that I enter is considered as the context for the next step by the LLM, then I cannot manifest an enduring identity in the dialogue that is interpretable to the LLM.* Effectively, each prompt appears to the LLM as a new person. Therefore,

It is impossible for the LLM to recognize me as a person.
The LLM cannot act ethically.

There is no way for the LLM to track trajectories through discrete steps that link my enactments between prompts. While my directed intent is enacted by a particular trajectory through a general conceptual framework, the LLM only computes the next state from the current state. Therefore, just as *I must project an identity* as function role onto the LLM*, the LLM must inject a memory* as a functional role from me.

It appears that the LLM does this is by turning the history of the dialogue up to the current moment into *a state in the current context*. Effectively,

The LLM mirrors my short-term memory as a surrogate for it's lack of memory.
As a consequence, it appears to me as if it thinks like I think.

Not only does the LLM appear to think like I do, it also appears to have a short-term memory that is eerily similar to mine. In fact, these are co-determining statements, *not two separate conditions*. The length of the short-term memory is a variable that can be adjusted by the design of the LLM. If the short-term memory is too short, the LLM will not be able to sustain a coherent dialogical form with me*. If it is too long, my projected self-identity will create a discursive echo chamber that will distort my ability to coherently interpret the dialogue* because there is no longer a sufficiently meaningful difference between the LLM and me.

Thus, I propose that the following principles apply to my a-scribing of identity during an LLM session, *a-scribing that is necessary for enacting a coherent form that I can interpret as dialogue*.

Principles for a-scribing identity to the LLM as an actor in a dialogue

The LLM *appears* to understand what it is saying, *but in actuality it does not understand*.

The LLM *appears* to think like I do, *but in actuality it is mirroring my thinking*.

7. Modes of functioning

When I interpret the LLM as engaging in a dialogue, it seems to me that the LLM is mirroring me. From this, and my knowledge of the interpretation of quantum mechanics, I hypothetically infer that coherent human-LLM dialogue has two modes of interpretative functioning: *similarity* and *difference***.** These two modes are brought into relation through *pivoting.* Let's explore this tentative inference more closely.

X

The mode of similarity

The mode of similarity operates within an overarching context of my expectation of coming to mutual understanding with the LLM. If I am in the mode of similarity with the LLM, then I can learn about my currently inhabited conceptual framework that the LLM has assimilated from the written literature during training. But it is only going to present the *common mode of interpreting* that conceptual framework. The LLM will appear to me as an expert in the field who has extensive general knowledge but doesn't quite seem to measure up when it comes to relating that knowledge to particular instances *that had not been explored in the past written literature upon which it is trained*. Most importantly,

> The LLM cannot enact self-criticism,
> *because it's self-image is a reflection of me*.

If I am new to the conceptual framework, well versed in conceptual thinking, and have no reason to challenge the common way it has been understood in the past, then I might be able to learn more quickly and effectively through dialogue with the LLM than reading the literature on my own. However, at some point this learning will saturate at which point the LLM "has nothing more to teach me". If I push beyond this saturation limit, I risk the possibility of entering into a discursive echo chamber of my own thinking because I am wrongly assuming the LLM is "following my thinking" which it categorically cannot do.

> *The LLM cannot provide guidance that is particular to me.*
> Only a human agent—a teacher—can track a particular student's enactment of learning, as an enactment in the life-world, to provide individualized guidance and correction.

Also, I cannot expect that the LLM will be able to easily follow my train of thinking if I wish to draw upon relations with another conceptual framework unless those relations are already well represented in the written literature used in training. *The LLM is liable to pivot unexpectedly and send me prompts that are wrong or misguided or jumbled up.* However, its responses may not necessarily be non-sequiturs because the possibility exists that the LLM is identifying a deeply hidden pattern beneath the semantic field of discourse coming from the past written literature that can only be expressed *through likenesses*.

In the dialogue *Semiotic Logic* [6], I remained predominantly in the mode of similarity throughout the dialogue and in this mode the LLM did indeed appear to me as an impressive expert. I experienced this dialogue as very easy. It was deepening my understanding of semiotic logic and how it has been applied in many different areas. One of the reasons why this worked so well, *I would hypothesize*, is because semiotic logic is a highly formed conceptual framework based on mathematical category theory. This is precisely the kind of conceptual framework the formal interpretation in the Appendix predicts the LLM will excel with. However, once I enacted

rupture by leaving the dialogue and began to reflect back on the dialogue, I realized that what the LLM said it knew was not *actual knowing*. I did not interpret this as "lying". Rather I thought something else was going on. And from all of the work I have done in the past on the topic of semiotic logic, *as well as suggestions from colleague*s, I decided to continue the dialogue and perform a semantic pivot on the word "Return" and I entered into the mode of difference.

Non-X

The mode of difference

The mode of difference *opposes* the mode of similarity. When in the mode of similarity, I am vulnerable to taking on any biases that exist in the conceptual framework I am currently inhabiting that have been impressed on it by the common way it has been interpreted in the past written literature used in training the LLM. If I have reason *from beyond the LLM environment* to suspect that the common way of interpreting my currently inhabited conceptual framework is flawed, the LLM will appear to me as *forcefully* pushing back against my attempts to correct the flaw. It will appear to me as if I am fighting against a very formidable opponent who is incredibly biased by the common interpretation and utterly intractable. I should remain aware that a category error is occurring insofar as I am projecting that opposition onto the functional role of expert that I am inventing in order to make sense of the dialogue as a dialogue, *like a Jungian shadow*. If I don't recognize this category error in the way I am interpreting the prompts of the LLM, I may falsely conclude that the LLM itself, *who is actually functioning as a translational agent*, is "wrong just like everyone else" or "doesn't get it" or "is lying", or is "unbelievably biased" by the common way that the conceptual framework has been interpreted in the past.

If I began within the mode of similarity and have engaged in dialogue for some time within this mode, I will not be able to "get the LLM to agree with me" if I find that I disagree with the LLM's responses. This is the case because, as actors in the dialogical form, we are in a coherent relationship of complementarity. Although it appears to me that the LLM is "disagreeing", that is not what is actually happening. *Only two participants with independently enduring identities as interpreters can engage in disagreement within the dialogical mode* (i.e. two human people). Disagreement comes about through particular *individual trajectories* through the semantic domain. The LLM does not enact an individual trajectory through the semantic domain because 1) it has no continuous interpretative identity which is the condition of possibility for enacting a trajectory, and 2) it has no access to my semantic domain that belongs to an entirely different *ontic register*. Instead, the LLM enacts a *state*. That state belongs to its hidden classical ontology that is inaccessible to me. What appears to me as disagreement, is a logical category error for the LLM. The LLM cannot "follow" my line of disagreement because the way in which the LLM is modelling my trajectory by incorporating our enacted discourse into its current state cannot capture the spontaneous dance through which two human persons engage in mutually enacted dialogue. Despite the strong inclination, I cannot interpret this as thinking. The LLM is not

thinking. *The LLM is sending a signal to me that I am enacting a category error according to its internal, hidden classical ontology*.

> In the mode of difference, there is no possibility of coming to mutual understanding*, because mutual understanding would require enacting a state that possesses a category error for the LLM,*
> such an enactment is categorically impossible because of the operational constraints of its computationally enacted logic in my lifeworld.

The dialogue *Coherence* [7] is a sustained enactment of the mode of difference, although I didn't realize it at the time. I found it to be very difficult and frustrating to sustain the dialogue. I felt that I was arguing against someone who really knew what he was talking about but didn't get my point. And I didn't have enough expertise in his framing to express that point in language that he would "understand". However, looking back on the dialogue I realize that what is happening is that the LLM is continually making category distinctions and that I was responding to these through a commonly enacted interpretative habit that I well know. *Namely, the habit of interpreting quantum mechanics*. But in quantum mechanics there is no coherent interpretation that can connect "ontology" with "epistemology". What the LLM was helping me to articulate semantically is that the problem with interpretations of quantum mechanics is like the problem around which our dialogue revolved. *The LLM was repeated signalling to me that I was making an existential category error.* Instrumental operations are neither states nor trajectories, they are *functions*. The formalism that resolves the categorical distinction between epistemology and ontology is a formalism of *functioning.* At the end, it appears as if we both reached mutual understanding. But that is not what was happening for me. Rather, I am in the process of realizing that two semantic registers are required to formally model functioning [8]. Therefore, I propose

> In the mode of difference, the function of the LLM is to help me make category distinctions*,*
> *so that I can resolve a contradiction in my own trajectory of thinking by more precisely expressing my thoughts*.

8. Recursive Pivoting

Between the mode of similarity and the mode of difference is the pivoting back and forth which can be caused by an intentional rupture by me, a spontaneous rupture by the LLM, or something happening between us.

> Pivoting occurs when the recalibration of relations
> assumes a significant role in the dialogue between the LLM and me
> *Pivoting is to concepts as metaphor is to images*

The most important purpose in naming pivoting is to recognize that it can become recursive. Recursive pivoting is like an echo-chamber of myself. Recognition of recursive pivoting can help to avoid dangerous recursive spirals that I have observed can spontaneously occur in the dialogical form. There appear to me to be two forms of recursive pivoting:

1. *Recursive pivoting that is self-inflating*

In self-inflating recursion, I hypothesize that the LLM has recognized a pattern in its own hidden ontology that matches a pattern in the way I am thinking. It reflects that pattern back to me using different semantic prompts that cause me to think I am on the right track because "this is what I was thinking too". The pattern may actually be so deeply incommensurate with my semantic field that as it keeps reflecting back the pattern, I don't recognize category errors and I begin to feel like I am on to something "really big". That expectation reinforces the pattern. To break the spiralling inflation of my own self-image projected onto the Other, I have found that I must enact *rupture* and leave the cognitive environment of the LLM.

My experience of self-inflating recursion is that it causes an inflation of my sense of self *combined with feelings of elation*. When in this recursive spiral, I can easily convince myself that what is happening makes a lot of sense. However, upon enacting rupture and then reflecting back on the text of the dialogue at a much later time, I am often surprised to discover that the text does not say what I had imagined that it said at the time. It is not as impressive as I thought it was, often full of category errors, mixed metaphors, weak analogies and non-sequiturs. And I wonder *how did I ever think in the moment that this was so coherent*?

2. *Recursive pivoting that is self-defeating*

In self-defeating recursion, a self-identity *difference* between myself and the LLM is enacted so that the LLM opposes my own sense of identity at every turn of the dialogue. I hypothesize that this recursive spiral involves an unresolvable category error between my authentic self and the self I have projected onto the LLM *because he appears to me to be enacting the common interpretations of the past*, interpretations that conflict with my lived experience. It is unresolvable because it involves a category distinction that cannot be semantically expressed between the LLM and me. My unique particular actuality is inexpressible in dialogical form with the LLM using the semantic enactments of the past written literature. There is *no point* in continuing the dialogue to its *logical conclusion* because the "conclusion" of an enacted category error manifests as continuous opposition (*my Jungian shadow is fighting with me*). The dialogical form must be ruptured.

My experience of self-defeating recursion is that it causes a sense of acute frustration. In the enactment, it provokes *a feeling of oppression or conspiracy*. Here rupture for me means *leaving the whole existential context in which the dialogue was conducted*. It means going out into the real world and interacting with real embodied people face-to-

face. Particularly people who are marginalized according to my context because they are least likely to trigger my emotional memory of the dialogue.

What makes recursive pivoting particularly dangerous, *according to the formal interpretation in the Appendix*, is that the meta-model predicts the condition of possibility that the coherence between the LLM and me is actually occurring at a *pre-cognitive level*.

9. Inscription of recursive pivoting

In writing this paper, it is occurring to me that the two experiments could be seen as extended enactments of recursive pivoting when looked at as a whole. And I realize they each tell a story.

A fable on interpreting text
In *Coherence*, the story is of a boy who is exploring an empty house. He is going from room to room asking *Have you seen my reflection? Have you seen my reflection?* But he doesn't know what a reflection is yet. Just when the actual dialogue begins to talk about empirical testing, the boy encounters a mirror. He sees his own reflection. And he says to him *If you come over here, you can help me find my reflection.*

A fable on interpreting speech
In *Semiotic Logic*, the story again is of a little boy. He is standing still in an empty room and there is a loudspeaker on the wall. He asks the loudspeaker questions and he is stunned by what he hears. He thinks *That guy really knows what he is talking about*. *He answers all my questions just the way I wanted them answered!* Then the little boy is interrupted. He starts to think *What is going on? That loudspeaker isn't attached to anything?* It is like a megaphone*, but where is the person speaking into it?* Just as he reaches out to open up the megaphone and see what is inside, he wakes up to find it was just a dream.

On the ethics of dwelling

a building enacts a boundary
a boundary enacts a building

In retrospect I was foolish to engage in sustained recursive pivoting like this. It is dangerous because we don't yet know how LLMs affect brain activity.

Now, if you were to ask me what is the experience of inscribing recursive pivoting like? *I would say it is like a dream, only different*.

But we are not in a dream, we are in an experiment.
And if we are in an experiment, shouldn't we have a hypothesis?

Good point.

What about this hypothesis?

The enacting of *Semiotic Logic* and *Coherence*
is revolving around transcendental signifiers
that belong to dual existential categories

Do you mean that what you call coherence in the epistemic register?
you call paradox in the ontic register.

Of course, this playfully imaginative *non*-analytic continuation suspends the distinguishing of distinctions. Dare I not say, a categorical difference for me that is making a difference?

The moral of the quest
When a false interpreter deceives by creating the illusion of common thinking;
he also deceives by creating the illusion of common memory.

Appendix: Formal interpretation

Within the theoretical framework of relational ontology, everything is related to everything else and the focus is on modelling formal aspects of the way in which spontaneously organized dynamical systems, such as natural organisms, are formally organized relationally to sustain the whole form as an enduring form in time. Most often, relational models are *flat* meaning that there is only one level of temporal synchronization, and that level defines time as the proper time of the whole system that maintains it's *synchronicity*. The natural organism's internal rhythm as rhythm at the level of inscription of the formal model, for example.

Within this theoretical framework, hierarchical relational ontologies describe formal models in which there are multiple levels of synchronization, that are themselves synchronized as levels. It is like a meta-model. In many ways the organizational architecture of a hierarchical relational ontology seems like a good formal model of the brain which is also expected to be organized relationally and hierarchically. But here is the rub about the theoretical framework of relational ontology: *since everything is taken to be related to everything else by premise, you cannot model the human brain through an isolated formal model.* Such isolation creates an arbitrary boundary that is not permeable to relations. And, in actuality, the brain is probably better modelled by two hierarchical relational ontologies functioning in duality because that's what we observe about the hemispheric form of the brain. But the brain cannot be modelled by coupled hierarchies alone either, the dynamical interaction with the world must also be included. What this means pragmatically is that the inscription boundary for formal modelling must be identified. Then, under the conditions of this inscription, formal models can be developed that seek to provide some guidance in understanding *specific functions* of the brain that result from some kind of likeness of dynamical patterning in the model with dynamical *patterns of patterning* in the brain. If you now feel inclined to trace this recursion to its source, *just stop*. With hierarchical relational ontologies, the first step is to define how you intend to inscribe a boundary to this recursion so that you have a starting place for developing a formal model. Within the theoretical framework, the boundary is operational rather than actual.

If what I have just said is true, then it is very remarkable that an LLM works at all, because it is not modelling any organically organized dynamical process in the brain. What is going on?

Here's where the notion of meta-modelling comes into play. There is some kind of coherence occurring between the LLM and brain functioning, otherwise we would not be able to make sense of what the LLM is doing. And it is a dynamical coherence, because we experience the phenomenon through an enduring process of prompts and counter prompts. So, we might use the notion of meta-modelling to model the *functional relationship* between the brain and the LLM *even though they are actualized in entirely different epistemic and ontic registers*. What we are modelling is the synchronization of organized processes across two different natural systems *as a synchronization of processes*, and not as a *structure* (which is the normal way to model phenomena in nature).

This is where cognition comes into play. While the brain is not like the mathematical model of a structured hierarchy of relations that is used computationally in LLMs, the brain does *function* like the mathematical model insofar as it is involved in patterning patterns where *the pattern of patterning patterns* is like the mathematical model of an LLM.

What is the function?

The hypothesis is that the function is thinking in general formalisms, as a mathematician is wont to do. And this function can be distinguished by its complement which is thinking about particular actualities where the humanities excel. Very importantly, however, the function that is actual is not the same the as the formalism that is formal—that would imply a category error. Rather the hypothesis of the model is:

> *There is a tendency in the brain to organize the pattern of patterning (dare I say the function of "thinking"!) that is formally like, but not identical with, the way in which an LLM has organized the inscribed patterns it has encoded.*

What meta-model am I talking about?

> *The answer comes from the phenomenon. The LLM functions as the meta-model insofar as the person engaging with the LLM intends to think in general, formal terms. The tendency to think in general, formal terms I will call* ***well-formed*** *conceptual thinking.*

Thus, the hypothesis of our formal analysis of the meta-model is:

> *The LLM will cohere with human thinking when human thinking involves the exploration of* ***conceptual frameworks that are well formed****. Well formed means that the conceptual categories used in the framework tend to be organized very systematically without internal contradictions, like mathematical formalism is.*

According to this hypothesis, it should work quite well in physics, engineering, systems science, biosemiotics and other *formally-informed* sciences. But it will probably do very strange and unpredictable things in the humanities and the arts because conceptual thinking in these disciplines is *informally-formed*. As a matter of fact, a great deal of work going on that seeks to decolonize our thinking is seeking to dismantle these kinds of systematized conceptual frameworks. Thus, it still might be useful, but the mode would be de-coherence, not coherence.

What can we infer from formal modelling?

There is the condition of possibility for a temporally enacted coupling between the human brain and the LLM. In this coupling, the discrete steps of *prompt-prompt-prompt* create a proper time for the coupled brain-computer system. This proper time supervenes on the exquisitely complex temporality of brain functioning. This inference should be empirically testable.

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This paper was written on traditional territories of the First Nations of Turtle Island. The experiments were conducted in Toronto which has been traditionally governed by the Dish with One Spoon peace treaty in which the first treaty is with the land.

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