The Unbearable Heaviness of Being in Phenomenologist AI

Submitted to CogSys 2008

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Abstract

The aim of this paper is to pin down the somewhat misuse of Heideggerian philosophy in artificial intelligence (AI) and robotics. In this paper we argue that a central thesis of phenomenology, in Husserl's words, "putting the world between brackets", has led to a positioning in embodied AI that deeply neglects fundamental representational aspects that are totally necessary build a theory of cognition that can explain but the simpler phenomena in living cognizers. The unification of representational and being-in-the-world aspects are necesary for the explanation and realization of the maximally complex consciousness phenomenon in a cognizer, both animal and mechanic.

The emphasis on the self (post-cognitivists), on the being (phenomenologists), as well as and the Being by the Heideggerians, although has contributed with interesting insights concerning the puzzle of cognition and consciousness, however, has neglected the necessity and even denied the possibility to provide a scientific theory of cognition.

On the other hand, the phenomenologist separation of the world into two different ones, the scientific and objective world and the one of our common and lived experience is untenable. The claim that nay scientific-theoretical world must find its foundation in the the so called live world is ill-founded. In this paper we will propose the basis of a theoretical framework where only one world —with entities and processes— exists and can to be known to a certain degree by the cognitive system. This calls for a unified vision of both ontology and epistemology trough a channel of knowledge-ladden phenommenology.

1 The Phenomenological Bias

1.1 The object/subject problem revisited

Phenomenology arise out from the necessity to surmount the difficulties posed by the dichotomic vision established in Idealist and Materialist philosophies. Apparently, in the core of this dichotomic philosophical approach lurks a paradox pointed out by Husserl: "How is it possible that myself, as a transcendental ego, builds-up the world, being at the same time a human ego inside the world ?"". But, where is the paradox? We can't really see it.

The agent is in the world and build a world of its own, but there is not such a paradox. Assuming that for a finite agent it is impossible to give a causal explanation for every fact in the world, this is not, in any case, due to a world's opacity to the cognitive capabilites but to the fact that we are limited cognitive agents inserted in the same reality we want to know. We are a situated part of the world and therefore can perceive it only partially. The world we build and the world we live in are not identical but closely bound by what Rosen's called the modeling relation (1). This closeness being of evolutionary survival value.

We can't say that the phenomenologist approach is ill-founded, but obviously it is excesively biased towards the experiencing agent. This bias has been inherited by robocists and other AI scholars as a reaction to the perceived failures of GOFAI (6). It has been used as a starting point for further development of commonsense-centered theories and other naiver conceptions of peception and cognition.

In Husserl's philosophy (3) the object appears as essentially determined by the structure of thinking itself. The world is *placed between brackets* and the focus is put on the Cogito in the Cartesian's Cogito ergo sum, and the objectivity is not anymore on the consciousness side.

Husserl pretends to arrive at the essence of things from the experiencer[1]. To that end, phenomenology proposes a method called transcendental reduction (*epoché*) to get to the essence of the objects, hence bracketing the assumption of the existence of an external world. So, access to the real being of the things may only be achieved by the transcendental reduction process grounded in the *experiencing self*. [2].

The direct economic approach from engineering is necessarily closer to a Humean theory of the self. Hume rejects the object-subject dichotomy, eliminating the self as a knower. Hume's claim, unlike other empiricists like Locke or Berkeley, is in a sense more ontological than epistemological, because he does not have to posit the object of the knower but he just describes and analyze a group of entities called

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[1]Then phenomenology becomes the discipline that investigates the essential nature of the world.

[2]From a sociological perspective, Phenomenology is a philosophy placed historically in a time of crisis, which could somewhat explain his ascientifity and obscurity. It is surprising, not to say scandalous, the hold it has taken in many AI and robotics projects, being engineering so keen to solid scientific grounds.

perceptions.

The self would be *just* that succession of related ideas and impressions (perceptions in Hume's words) of which the agent have an intimate memory[3]. This interpretation of the self, as a connected succession of perceptions, will be taken afterwards by other authors (e.g. James).

1.2 Two kinds of beings for two kinds of worlds

In Husserl's philosophy, a distinction between the world and the everyday world (Lebenswelt) is established. This is a logical consequence of his tenets: if the cognitive agent is who rises the world depending on the agent's attitude, the world could be configured in a different manner.

Here, there is an implicit criticism to the scientific method. In Husserl's view, the scientific method would be just one attitude, valuable to understand the world explained by physics, but not the correct to unveil the everyday world (Lebenswelt). This claim, that is, the inescapable distinction between the external reality and the reality perceived by the cognitive agent, animal or robot, has been repeated as a totem by continental philosophers and some AI and roboticits scholars of post-modernist vein.

We fully agree with the analysis that there are different attitudes and that we perceive things, categorize items or infer new sentences, in part motivated and shaped by our current attitude. But the distinction of worlds as a consequence of the attitude, vanishes when we define the concepts in a rigorous manner. Attitudes are structured frames or theories that can be eventually formalized, and might not be confounded with intentionality, which is, as Brentano pointed out, the focus of consciousness.

Intentionality and attention are radically different things, the former is the power of minds to be about or to stand for things, and guiding the behavior, or said *à la* Dennett "an active engagement with the real world"; and the last is a more complex understanding of objects and process that frames the intentionality of the cognitive agent.

The question the existence of two worlds —or two thousands— appears promptly. This *degeneration*[4] in the use of the word "worlds´´, is in part motivated by the mistake of consider thought and word as the same thing. Obviously language is an important high order cognitive ability, which fundamental function is to share mental

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[3]If we eliminate, as Humes does, the epistemologic concept of knower, we do it too for the antinomy between unknown reality and known reality. Hume erases the trascendence in the cognitive agent, transcendence that by other means will be emphasized in Phenomenology, with the harmful consequences that will be shown next.

[4]Gerald Edelman (12) uses the same term -degenerate- to explain consciousness, "neural groups whose degenerate responses can, by selection accommodate the open-ended richness of environmental input, history, and individual variation".

states, that is, is a mean to vehiculize, to make public the thoughts; but inferring from that that there is an ontologic equivalence between mental concepts and the words that denotes them, in order to make accessible to the linguistic level the thoughts of the members in a community, is totally wrong[5].

The distinction between the world explained by the physics and the everyday world (Lebenswelt) does not correspond to any scientific reason but is a sign of obscurantist or at best, lazy thinking. The construction of the everyday world, different to the world of the physics, is not justified. There is only one world, whose entities and process are known to a certain degree, both to scientists and cognitive agents. Our duty as scientists is to explain this world, its phenomenon and entities, by means of laws and causal theories either deterministic or probabilistic or a mixture of both.

2   Heideggerian AI. The being in the world

Husserl's program is indeed deeply epistemologic but it is not the case of Heidegger, so keen to many post-modern roboticists. For Heidegger, Ontology is possible only as a kind of Phenomenology. we can obtain the structures of the being only by means of the way they manifest themselves as phenomenon. Heidegger's accentuation is in on the pre-conceptual understanding of Being (Dassein) like a proto-consciousness, already socialized. But, explaining conciousness in terms of Dasein is close to be *ignotum per ignotius*.

Heideggerian philosophy rejects the apparent Cartesian isolation of the epistemological subject. There is never an isolated "I" given without the world, rather any ontology in only conceived as the ontology of a subjectivity. Being-in-the-world is the mode of being of cognitive agents immersed not in interactions but in couplings with surrounding entities.

This metaphysics differentiates two kind of beings when we contemplate them, the readiness-to-hand and unreadiness-to-hand, the former being the being when we are using it and the second when we contemplate it[6].

This analysis is fundamentally based in the perceptual and motor interaction with equipments. The habitual example of the hammer (a hammer hammering a nail or a hammer in a drawer has to different modes of being) offers an extremely basic categorization (maybe that is the reason why has some followers in AI) that is also extremely limited, because is focused only in tools. It looks like Heidegger's phobia to technology[7] gives to his system a kind of hand made or medieval *touch*

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[5]The falsity of the ontological equivalence between thinking and speaking is easily demostrated: not all the concepts are linguistic concepts. This confussion was exemplary described by the first Wittgenstein: "the limits of my language mean the limits of my world´´.

[6]Another Heideggerian, J.P. Sartre distinguishes between etre-en-soi and etre-pour-soi

[7]"When man reveals that which presences, he merely responds to the call of unconcealment even

in his philosophy.

What this approach seems to provide and to our understanding the central reason for its luring capability is that it seem to offer an explanation for the apparent failure of GOFAI and a potential alternative to explore in the implementation of cognitive architectures. Agents need not representation but continuous sensory-motor immersion in its reality. The aphorism "the map is not the territory" (13) became the motto of the situated robotics movement[8]. This immersion in the world offers a seemingly solution to the so called frame problem. If the agent uses the world as its own map it is no longer necessary to keep in sync world and mental representation.

The agent captures reality in the form of patterns (see Figure 2) or in the words of Agre these representations "designate, not a particular object in the world, but rather a role that an object might play in a certain time-extended pattern of interaction between an agent and its environment''(14).
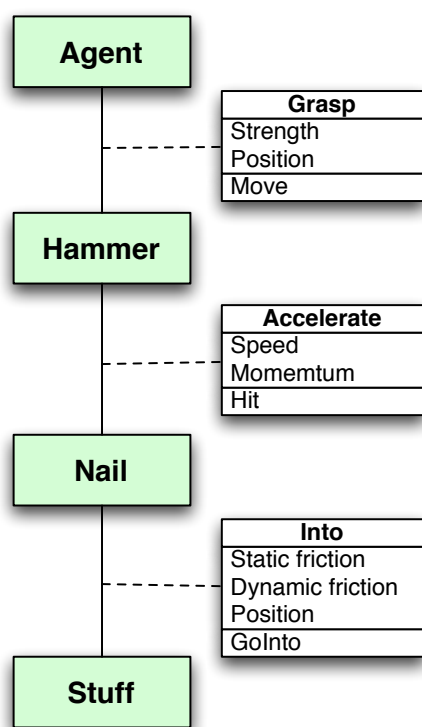

Figure 1: *The hammer, the nail and the stuff it gets into constitute a pattern.*

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when he contradicts it. Thus when man, investigating, observing, ensnares nature as an area of his own conceiving, he has already been claimed by a way of revealing that challenges him to approach nature as an object of research, until even the object disappears into the objectlessness of standing-reserve. Modern technology as an ordering revealing is, then, no merely human doing''.(10)

[8]Curiously enough, some argue for this approach being non-externalist in the sense of Clark cognitive externalism.

Of course, this Heideggerian conceptual system for beings is far too simple to give clear responses to other kind of concepts like the abstract or the simulated ones.

The epistemic Husserlian program anticipates the frames theory developed by Minsky with his concept of *Noema*: a symbolic description of the anticipated features and values of an object, a sort of inner horizon of expectations that permit to structure the incoming data, conforming the context of the object. Heidegger criticizes this enterprise of determining the *inner horizon* as insufficeint to give account of the context, because the necessary condition to determine it is considering the cultural practises. Therefore the relevant characteristics which define the context are always already contextualized in a cultural and historical background(6).

Paraphrasing Heidegger we can say that "[Agents] are already always in a situation". But H.L. Dreyfus —*the* Heideggerian in the AI world— claims, in an opossing line, that a robot, even counting on all the possible knowledge it would get from the outside, would not be in any situation, the robot being a decontextualized entity [9].

But the Heideggerian analysis of AI is useful in the sense that raises some critical issues concerning the kind of control architecture that a real-world cognitive agent should have —including the representational aspects they would abhor. This analysis does not exclude the possibility to describe formally the situation and hence derive representations for it. Heideggerians opposing representation-based architectures and modular structures go indeed too far in their analyses of the limitations. For example, their case for coupling vs input/output interactions seem to ignore the trivial fact that any interaction —whether input or output— is indeed bidirectional except in degenerate cases, because the labeling *input* and *output* is plainly arbitrary and is in the eye of the beholder.

The thesis defended in this paper is pretty far from this antropomorphist view. We stress again that the big mistake is in giving to the mental phenomenon a condition of ontologic difference respect to the external phenomenon, driving the theorist to be ascribed to ascientific assumptions and intuitionist theories.

One clear example of this is when Heidegger claims that the mental model of a human of the world is the world itself (cf Korzybski before). Were this the case, any two agents navigating the world would be similarly proficient. But it is obvious that humans, unlike robots or cockroaches, have a mental model of the world that is more acute —ideally isomorphic to a certain extent— that is good enough to permit the human race to survive. We can not say the same of the heideggerian robots like brooksian insects or of Cog, the failed humanoid. But we can say something about of cockroaches, their maximal survability being the reason for the mystifying

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[9]Heideggerian AI arises out from the frame problem, but goes too fast, and not only does not provide any solution to the problem, not even any useful insight; but it is a pernicious influence for AI and robotics. Although Dreyfus insists, Heideggerian and positive theories are indeed a *contradictio in terminis*.

power of bioinspiration, and it is that in a direct human-cockroach confrontation for an ecological niche all we know what would happen.

It is a logical absurdity the claim that the *mental model of the world of the cognitive agent is the external world*; it can be suggestive as a poetic figure, but no scientific model or theory can accept an ontologic falsity as that as a valid proposition[10].

We claim that there is not any unsurmountable obstacle in defining formally a context for the everyday action. The focus must be put in the theory which is operating as caché memory when we categorize or define concepts, we call this theory Legality. This is done in the context of the realization of an epistemic control loop, where a model of the surrounding world is used by the agent in the performance of its dwelling (See Figure 2).
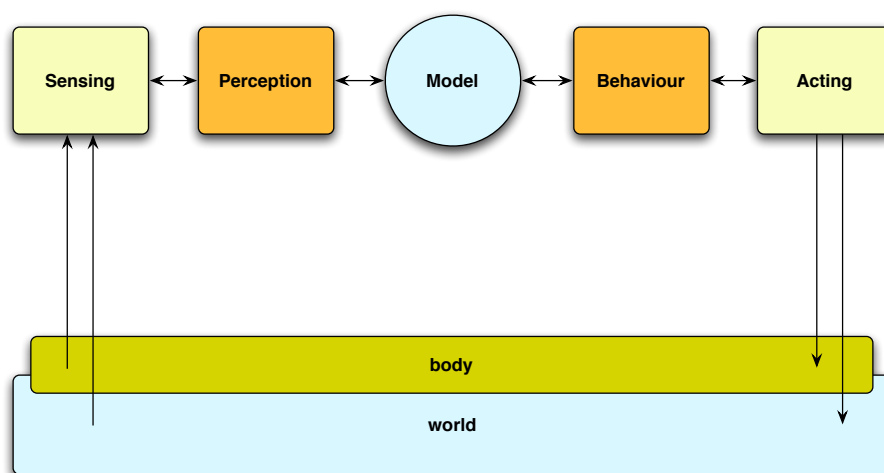
Figure 2: *The simple vision of the epistemic —model-based— control loop.*

3   The Embodied Cognition or the Being with Flesh

All these efforts are very valuable but, from our systemic perspective, all these fleshists —Heidegger, Marleau-Ponty, van Gelder, Lakoff, Dreyfus, etc— put too much flesh in the dish of cognition.

Marleau-Ponty (15) gives a sound account that supersedes the dichotomy subject(knower)-object(knowing) formulating the circularity in the perception-action loop. The animal is moved to action in order to acquire and maintain an optimal perceptual grip on what is significant to him in the world[11]; in other words, the body evolves in a pathway of permitted states defined by a net of basin of attractors which led the body to move towards an optimal grip.

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[10]Heidegger here is totally coherent because Heidegger himself is ascientific.

[11]This is also the central tennet of W.T. Powers perceptual control theory(16).

The introduction by Marleau-Ponty of the body and the perception action loop in his cognitive theory is consistent with the naturalized studies of consciousness, and has set the basis of embodied cognition theories, biological inspired, where the mental phenomena pass to be studied not as personal feeling but as a natural phenomenon. The body (coper) interacts with the environment *in such a way as to cope with an environment organized in terms of that organism's need to find its way around*(6).

So for Marleau-Ponty the body is not just the physical space occupied by the thinking agent, but the necessary instrument to get the best coping with the environment, and to that end, the body moves towards its equilibrium. But once achieved the equilibrium, the coper can not stop there because the environment continues sending solicitations to be interpreted by the coper, in order to get a new best coupling or equilibrium between coper and environment. It is interesting to consider, at this point, the analysis done in neuroscience —and consequently in neuro-inspired robotics— in terms of learning stimulus-response and action-outcome pairs. The question of causality lurks here and is strongly related with Merleau-Ponty's concept of solicitation.

Marleau-Ponty reduces or explains cognition based just on the perceptive process; it looks like the body is the magic key which explains and obtains all the meanings. [12]

Van Gelder considers that the external world is too complex to possibly get a representation of it, and argues that it is cognition what makes the agent to cope successfully with the world."The post-Cartesian agent manages to cope with the world without necessarily representing it. ..the internal operation of a system interacting with an external world can be so subtle and complex as to defy description in representational terms-how in other words, cognition can transcend representatio" (17). Obviously this is only true is representations are to be universal and not action-oriented. It is clear that representation complexity can be reduced without much performance sacrifice for concrete tasks. The tradeoff between the complexity of the representation and the competence it offers is resolved in evolutionary economic terms.

Even if van Gelder is using the term cognition in a wider sense as the act of knowing or, as an emergent property of the cognitive agent, representation can not be excluded from cognition, van Gelder eliminates the representational power of the agent in cognition, and put in his place the notion of coupling.

Indeed coupled system performance —e.g. in terms of agent survival— is the result of an isomorphic representation of the world by the agent (more on this later). However, van Gelder suggests that cognition must be untangled from represen-

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[12]Admitting the importance of mirror neurons discovery in motor verbs, we can not construct a global theory of knowledge just with bodily metaphors, flesh is not enough we need the bones, the skeleton! Maybe too much importance is given to the body(11).

tation except for *sophisticated cases [such as breakdowns, problem solving, and abstract thought] involve representation; but such a phenomenon are best understood as emerging from a dynamical substrate, rather than as constituting the basic level of cognitive performance"*.

But we think that the coupling part in the dynamic information processing, realized by the agent in a dynamic environment, just her, is not the appropriate alternative to the representation in what the heideggerians call everyday world.

Van Gelder is missing the point. There is not any justification to separate cognition and representation, both are inherently informational processes or products of such processes; and on the other hand, when he points out that thinking an abstract thought is a phenomenon better understood as emergent, not only he is not not saying anything of any value about such a phenomenon but he is also suggesting a sort of emergentist inexplicablity.

No matter what the emergent properties are, they must occur following laws, as do all the other phenomena happening in the world[13]. Denial of this is pure obscurantism, an attitude incompatible with the scientific stance.

4   A proposal: Systemic-Explanation

When we observe a heideggerian robot trying to avoid a non trivial obstacle (see for example (20)) we certainly know that this is not what we see from an animal not much more sophisticated than an insect or what expect from the machines of the future. Higher animals do have *cognitive* capabilities that surpass what the ready-to-hand and present-at-hand ontologies make possible. Deep representations and representation-based behavior engines lie a the core of this capability. For us something is a representation of another something if it contains/captures some aspect of this second something.

In a sense, the whole issue of anti-representationism seems absurd from our perspective. What a sensor does is re-present in a different value space the value of a certain magnitude. So, from this perspective if there is a sensor there is a representation. And all the systems we are discussing —philosophers, roboticists, neuroscientists, etc— do indeed have sensors. Elephants don't play chess but they *necessarily* re-present the light in the sky, the water on their trunk or the sound of their youngsters.

An beyond the concreteness and atomicity of such representations, can you imagine going back home by means of being-in-the-world. That would take time, too much time indeed for an evolutionarily viable system.

The impression that we get from the heideggerians is that they see representa-

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[13]It is quite probable that the so called emergent phenomena is just massive non-linearity, to be explained in the future using thoeries like nonlinear thermodynamics, chaos theory, etc.

tion just in the simplest GOFAI sense of collections of atomic predicates. Obviously this representation is untenable as a substrate for cognitive behavior in a world for the simple reason that these representations can not represent relevant aspects of the world; fundamentally those related with dynamical-structural aspects of the world.

Heideggerians realize this fact and their reaction is the rejection of the representation as such —and its associated sense of separation between agent and world— to embrace a holistic approach: the agent can't be separated from the world and it must be its own representation. But what they should reject is not representation but the kind of representation that is not effective for the particular class of world that the agent in interacting with.

Systems theorists describe systems as a collection of *things* and a *relation* between them:

$$S = (T, R)$$

In the system we are interested in, the things T include the agent and its surrounding reality. Heideggerians aptly see that a collection of representations of the states of the things is not enough to capture the dynamics of the agent-world system. But they fail when they revert into strictly focusing just into the relational aspects R. There is no system without the relation and there is no system without the things. Both parts are necessary to understand the dynamics and hence necessary to master to make a living in that context. While centered on social studies, the article of Mario Bunge (8) is extremely clarifying in this aspect.

So, what a perfect cognitive system must do is to perfectly represent the whole system $S = (T, R)$ in its mind in order to maximize its performance. Obviously, perfection in representation is not possible (this is van Gelder's argument) but thanks God it is not necessary for a *real* agent. What an agent actually needs is a *sufficiently good* representation of S —we call this a *model*— to get a sufficiently good outcome from its use. Fortunately, simpler models can be qualitatively equivalent to detailed ones in a certain region of their state space. This is what makes possible driving cars in roads, the use of computers without being a computer scientist or what enables cooking without being an histologist, chemical engineer and perception psychologist at the same time. Quoting Edward Box we can say that "Essentially, all models are wrong, but some are useful". Cognitive agents just exploit useful models.

But having a model is not a question of contingency but of necessity. There is no other alternative than internalizing a model to be effective. As Conant and Ashby demonstrates (19) every good regulator must contain a model of the system it is controlling, or, put into the words of cognitive science, the agent must represent the world to dwell in it. This has strong implications: if an agent is successful in a certain world, it is because it is driven by a model of that world.

This does not mean that we can open the agent and read in its mind about the structure of the world —reading the model– because the model can be collapsed with the perceptual or behavioral systems or with both (see figure fig:epistemic). For example the hammering model of Figure 2 can be collapsed with behavioral subsystem so a hammering order will directly map into the motor action of the agent *for a concrete hammer, a particular type of nail and a class of stuff to nail the nail in*. These *embodied* realizations of the hammering agent are less effective for a different hammer, different nail or different stuff —the things— of for a different grasp or static friction coefficient —the relations. But a non-embodied, cognitive agent, can appropriately reason in those circumstances.

We may then question what is the adaptive value of embodiment. The answer is clear and well known in engineering: there are tradeoffs that define families of control structures for the available niches; speed vs cost, robustness vs variety, size vs growth, etc. Embodiment is just an economic, effective solution for certain operational niches.

But we shall remember the fact that embodiment sacrifices behavioral flexibility and that in conditions of no restrictions the pure disembodied agent is maximally performant.

We may wonder what is the theoretical substrate that enables the construction and exploitation of effective model-based representations. The deep insight is that models do have morphic relations with the modeled. This means that entailments in the modeled —e.g. causal entailments in a physical system— can be mapped into logical entailments in the model, and logical entailments in the model can be mapped back to the modeled system. So we can use the model to reason about the modeled —e.g. to drive part of the world to a certain state or to get some qualia for the agent.

This relation between systems (Figure 4) is called the modeling relation by Rosen (1) and to our understanding captures the very nature of cognition: minds can be put into congruence with the world.

5   Conclusions

Trying to overcome Descartes, the Phenomenologists —from Husserl to Varela passing through Heidegger— have proposed something worse than the Cartesianism, the invention of transcendental entities hardly justifiable in the modern scientific paradigm to give substance to an impoverished relational model of the system composed by an agent and its environment. What Husserl calls the Ego or for Heidegger is the Dassein are more or less suggestive metaphors or rhetorical pictures insufficient to get a scientific representation of the mental state.

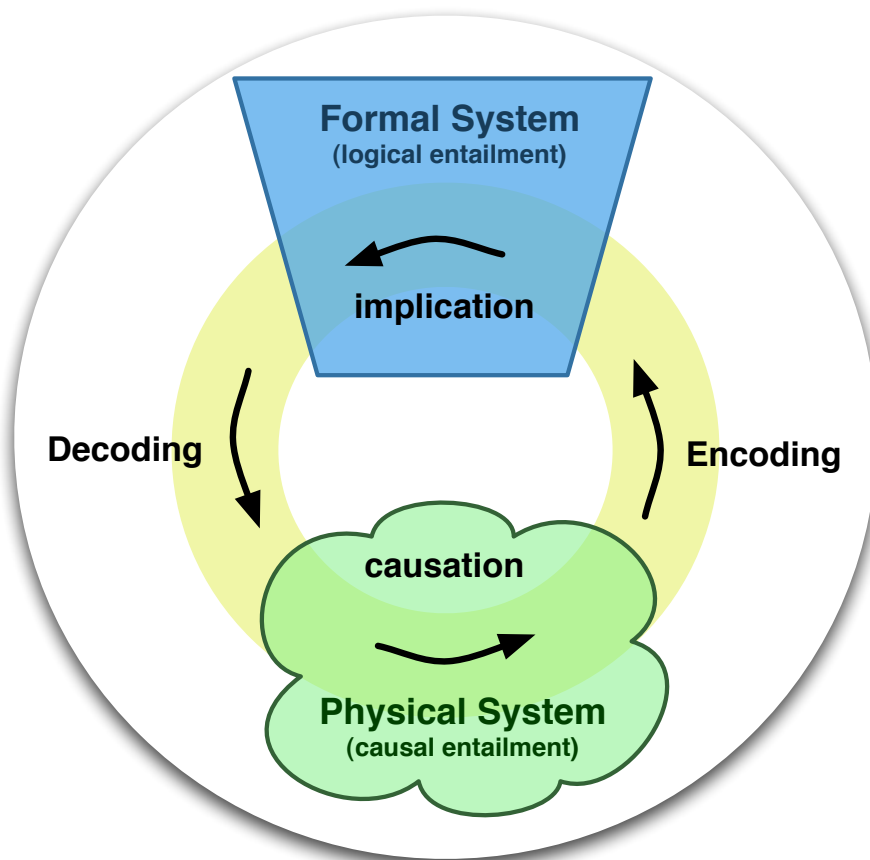We must strive to find the *general conditions of possibility* for the mental phe-

Figure 3: *The Rosen's modelling relation captures the basic tenets of cognition as model-based interaction with the world.*

nomenon. Naturalizing minds up to the level of consciousness is a long term project but scientifically falsable, technically sound and in any case better than the simple option of the phenomenologists.

Anti-reductionism is usually mislead, and the distinction between ontologic and epistemic reductionism must be known. The first is a reductionism of type "A is B", being A and B predicates (i.e: A neural process is a mental process), and the later is "B is explained in terms of A" (i.e: In a depressive state the concentration of serotonine is low).

The nature is structured in levels, the postulation of the Dassein and other ill entities is a consequence of the incapability to appreciate this fact. The everyday world is the same world of the books of physics. Indeed newton mechanics can be written in Einstein equations. It is a question of granularity (norms and theories , the legality in Petitot terms) and not of inconmesurabilidad or arepresentabil-ity. Models do not only have resolution levels but qualitatively hierarchical mor-

phisms.

The external world exists independently of the subject[14] and the real processes and entities belonging to the world can be described and explained objectively. In the opposite side of this view are those who claim that there only exist the appareances perceived by the subject; but even the extreme phenomenist take for granted the reality, independently of what is observing, he assumes the reality of what is observing and also the reality and of his ownself as an observer of the phenomenon.

In conclusion, it is impossible to avoid being realist and it is nonsense to be an anti-representationinst. This is how we-are-in-the-world.

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