

Born to be Wild:

Faust, Pinocchio and the Marlboro Man meet the Embodied Other

J. Scott Jordan ^{1,2}

Department of Psychology¹

Illinois State University

Center for Interdisciplinary Research²

University of Bielefeld

Please send correspondence to J. Scott Jordan, Department of Psychology, Campus Box 4620,
Illinois State University, Normal, IL 61790-4620 e-mail: jsjorda@ilstu.edu

Scott Jordan studied cognitive psychology and the neurophysiological basis of perception at Northern Illinois University in Dekalb, Illinois. He received his PhD in psychology in 1991. His research focus is directed toward volition and its relationship to consciousness. His dissertation addressed the relationship between voluntary eye-movements and spatial perception. In 1992 he was awarded an Alexander von Humboldt Post-doctoral Fellowship and spent a year in Prof. Dr. Hans Kornhuber's neurophysiology lab at the University of Ulm studying the relationship between event-related brain potentials and memory and attention. In 1998 – 1999 he spent a year at the Max Planck Institute for Psychological Research studying the relationship between action planning and spatial perception. He is currently a professor in the Department of Psychology at Illinois State University in Normal, Illinois. Given his interest, he also publishes philosophical papers aimed at generating a framework that naturalizes volition and consciousness. At the core of the framework is the notion of self-sustaining systems. He is currently working at the ZiF as a resident fellow, and is investigating the applicability of the notion of self-sustaining systems to the theme of embodied communication.

Ein Text über verkörperte Kommunikation muss nicht trocken sein: Im ersten Teil diskutieren Faust, Pinocchio und der Marlboro Mann über Geist, Natur, das Selbst und die anderen – natürlich vor dem Hintergrund ihrer jeweiligen Geschichte. Im Laufe der Debatte lernen alle Beteiligten zwei Dinge: 1. Der Geist ist Teil der Natur und 2. das Selbst ist ein Vordergrund, der vor dem Hintergrund der anderen entsteht. Diese beiden Gedanken werden im zweiten Teil formal entwickelt. Ich argumentiere, dass der Geist (einschließlich seiner phänomenalen Qualitäten) in Systemen entstand, die in der Lage waren sich selbst zu erhalten (wie etwa lebende Systeme), weil ihre inneren Zustände natürlicher- und notwendigerweise die Gegebenheiten der Umwelt internalisierten, mit der sie sich arrangieren mussten. „Geist“ entsteht, wenn diese Gegebenheiten es erforderlich machen, virtuelle Inhalte (etwa Annahmen über die Zukunft) zu verkörpern und für einige Zeit aufrecht zu erhalten. Dies ist etwa der Fall, wenn ein Raubtier seiner Beute nicht einfach hinterherläuft, sondern ihr den Weg abzuschneiden versucht, also vorwegnimmt, wo sie im nächsten Moment sein wird. Ein solcher sich selbst erhaltender virtueller Gehalt ist notwendigerweise in die Natur eingebettet, notwendigerweise bedeutungsvoll und handelt notwendigerweise von der Beziehung zwischen dem Selbst und anderen. So gesehen, erscheint verkörperte Kommunikation als ein sich selbst erhaltendes Resonanz-Phänomen.

Abstract

This paper presents a theory of embodied communication and it does so in a unique way. Part 1 entails a short story in which three icons (Faust, Pinocchio and the Marlboro Man) give voice to the different assumptions they make about *mind* and *nature*, and *self* and *other*, and they do so within the folk-psychological framework of their own unique story. The conversation leads to each character understanding the following: (1) the mind is an aspect of nature, and (2) the self emerges as a foreground amidst a background of others. Part 2 develops these ideas in a formal way by arguing that mind (including its phenomenal properties) emerged in systems whose work was able to sustain itself (i.e., living systems) because the internal states of such systems were naturally and necessarily 'about' the external constraints they had to embody (i.e., internalize) in order to sustain themselves. 'Mind' emerges when external constraints require the embodiment and sustainment of *virtual* content (i.e., anticipation), as is the case when a predator propels itself toward *future* prey locations. Such self-sustaining virtual content is necessarily embedded in nature, necessarily meaningful, and necessarily 'about' the self-other relation. Seen in this light, embodied communication is modelled as a form of self-sustaining resonance.

Part 1

*Get your motor runnin'
Head out on the highway
Lookin' for adventure
And whatever comes our way*

STEPPENWOLF 1968

It's karaoke night at the TOM club. Faust, Pinocchio and the Marlboro Man sit together near the stage. Faust's arms flail through the air as he works to convince the other two of the futility of true knowledge. Pinocchio is somewhat bored. Having recently become human, he is savouring his first taste of beer while secretly delighting at the ease with which he can provide Faust an ensemble of false displays (i.e., head nods, moments of eye-contact, etc.) without having to worry about his nose involuntarily revealing his true boredom. He smiles to himself, closes his eyes, and takes another sip of beer. Faust does not seem close to being finished, so Pinocchio diverts his attention to the young man on stage who is trying to sing along with the BLACK EYED PEAS song, *Let's get it Started*. Despite the intensity of Faust's gestures and his persistent nonverbal requests for feedback, Pinocchio is still able to understand the singer's words:

*In this context, there's no disrespect, so, when I bust my rhyme,
you break your necks.
We got five minutes for us to disconnect, from all intellect
collect the rhythm effect.
Obstacles are inefficient, follow your intuition, free your inner soul
and break away from tradition.*

Faust detects Pinocchio's lack of interest. Dejected, he prepares for an internal dialogue. Suddenly however, the singer's words make their way into his thoughts. As he absorbs them, he realizes he has heard this idea before. As a matter of fact, the idea was his. It is one of the many he spoke aloud to himself in the isolation of his study on that dark dreary night, oh so long ago. With much difficulty, he waits for the singer to finish. Then, after the small spattering of applause has ended, he springs to the stage, grabs the microphone, and

raps the following stanzas with as much funk as an 18th century German intellectual can muster.

*Und fragst du noch, warum dein Herz
Sich bang in deinem Busen klemmt?
Warum ein unerklärter Schmerz
Dir alle Lebensregung hemmt?*

And do you still ask yourself
Why your heart quivers in your chest?
Why an undefinable pain
Steals all of your life strength?

*Statt der lebendigen Natur,
Da Gott die Menschen schuf hinein,
Umgibt in Rauch und Moder nur
Dich Tiergeripp und Totenbein.*

Instead of living nature,
where God placed humankind
you are surrounded in smoke and mold,
by decay and stagnation.

Faust finishes the piece with his body hunched over, staring at the floor, hugging himself. He holds the posture, waiting for it to have its intended dramatic effect. The audience is not sure what to do. Snoop Dog, he is not. Someone produces a few isolated claps in the hope of getting him off stage. A few others join in. Faust releases the tension in his body and walks off stage, again somewhat dejected by the public's apparent inability to grasp his point. By the time he is back in his seat, the room is filled with the sound of many small, yet lively conversations.

“All right, Man!” says Pinocchio supportively as Faust takes his seat. “A little heavy on the melodrama, but still, all right!”

Faust pretends to ignore him as he takes his seat.

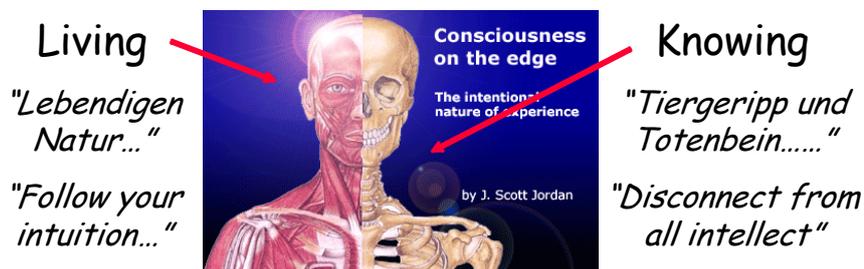
“But do you really believe all that stuff about knowledge and the vitality of life being two different things?”

Faust gives him a slightly blank stare, as if he is surprised Pinocchio actually listened to what he was saying, let alone understood it.

“I mean,” continues Pinocchio. “Don’t you think that thoughts and ideas are also alive...you know...kind of wild...just like living things?”

Das Problem?

We believe that *knowledge* and *organisms* are two different things. And we don't know how to put them back together.



Jordan, J.S. (2003b). Consciousness on the edge: The intentional nature of experience. *Science and Consciousness Review* (December, No.1). Online serial, URL: <http://www.scicon.org/news/articles/20040101.html>

Of course, Faust had always been a rationalist, but as such he had always found himself somewhat annoyed by the touchy-feely ‘everything is part of everything’ thinking that pan-psyched rationalists like SPINOZA tried to get away with. Rationalism and logic were God’s gift to humankind as a means of accessing the Creator’s divine wisdom. That wisdom was a means of getting above nature. It was not a part of nature itself. Years ago, his certainty of this division and the limits it implicitly placed on human knowledge had come close to driving him mad, and had spawned a series of horrible dreams in which he made a pact with the devil as a means of overcoming the gap. Now, this little man sitting in front of him, who had just recently become human, was challenging him on the one point in his thinking that had always seemed most true. Faust wasn’t sure what to do. Having come from this recently animated puppet, the words had an effect they perhaps would not have, had they come from someone else.

Faust throws a glance in the direction of the Marlboro Man. The Marlboro Man meets his gaze for a second, but both retreat from the exchange so quickly neither has time to simulate the other, let alone provide the sort of confirming body movements indicative of a desire to sustain a joint simulation.

Having successfully avoided the exchange with Faust, yet pleased in the knowledge that Faust knows this, the Marlboro Man turns his body askew just enough so that any passerby would never suspect he is actually sitting with the other two. “Why am I sitting with these guys?” he asks himself. Unable to generate an answer, yet unwilling to externalize the thought and risk an answer, he keeps his gaze aloft, basking in the strength of his rugged individuality.

Suddenly, a cell-phone rings. The three look back and forth between each others’ eyes and bodies, trying to figure out whose phone it is.

“Not mine,” says Pinocchio.

“Mine neither,” grunts the Marlboro Man.

“I don’t own one,” moans Faust.

“Whyeeeeeee?” burps Pinocchio. “Man,” he thinks to himself. “This inhibition stuff takes getting used to.”

“I loathe the idea of people bothering me,” he answers.

Pinocchio laughs. Faust’s contemptuous glare stops him in mid-giggle. Pinocchio hiccups as his new-found neurocircuitry struggles to generate a facial configuration that will remove the glare from Faust’s face. Faust registers the penitence in Pinocchio’s demeanour and demonstrates this knowledge by scowling as he looks away.

“Jerk!” thinks Pinocchio as he turns to the Marlboro Man for moral support. The Marlboro Man keeps his body askew and does not return Pinocchio’s inviting gaze.

“Double Jerk!” thinks Pinocchio as he lets his attention be drawn by the still-ringing cell phone. It belongs to the bartender.

“Theory of Mind club,” says the bartender as he answers the phone. After a brief pause he says, “No, things are rather slow tonight, dear”.

“Tell Sally I said hello John,” says Pinocchio with a smile.

“Pinocchio says hello, dear,” John says to the phone.

Pinocchio smiles at John, waiting to hear what Sally has to say.

“Sally says hello, Pinocchio.”

Pinocchio smiles and waves “cheers” to Sally, via John. John waves “cheers” in return, while looking back and forth between Pinocchio and the phone. Pinocchio nods a “thank you” and returns his gaze to a point in space located somewhere between the two jerks. As he sits there simulating the futility of generating any sort of real conversation with either one, he becomes a bit miffed. Having had enough, he stands up and walks to the stage. He speaks with the DJ. The DJ flips through his CDs, finds the one he is looking for, loads it and presses the START button. Shortly thereafter, the music to *Rockin in the Free World* rains down upon on the audience. Pinocchio walks to the microphone and sings his own lyrics:

*I've got no strings / To hold me down / To make me fret, or make me frown /
I had strings / But now I'm free / There are no strings on me*

*Hi-ho the me-ri-o / That's the only way to go / I want the world to know /
Nothing ever worries me*

As he blares on about his lack of strings, he gestures to Faust and the Marlboro Man, hoping they understand that he really does not need them. Both occasionally meet his gaze. For now that he is on public display, there is no risk of their gesture being experienced as personal.

The song ends. Pinocchio puts the microphone back in its stand and walks off stage, pretending not to need applause. He smiles as he hears a small bit of clapping. He takes his seat and assumes a posture that indicates he is waiting for feedback.

“So,” says Faust as he rests his forearms on the table, creating a stage for the discussion that will follow. “You believe freedom involves a lack of constraint?”

“Sure,” says Pinocchio. “Free to do as I please, you know, I got no strings to hold me down”.

“But yet you want the world to know about your lack of constraint,” Faust responds slightly, as if he feels he has out-thought Pinocchio. He continues. “And you do not experience this desire for others to model your mind, as a constraint on your own?”

“What?” says Pinocchio as if the number of recursions required to answer Faust’s question is currently beyond him.

“Never mind,” says Faust as he lifts his forearms off of the table and crosses them across his body. He looks off to the side.

Pinocchio looks over at the Marlboro Man. He continues to stare into apparent nothingness. New to this inhibition thing, a question jumps from his lips.

“Hey M & M.”

“What?” returns the Marlboro Man gruffly while turning his body slightly toward Pinocchio. Implicitly he knows such minute demonstrations of reciprocity only enhance his image of independence. That is, as long as they are made in response to another’s question.

“How do you know you are so independent?” asks Pinocchio.

M & M laughs sarcastically while looking at no one.

“What,” he says to Pinocchio with contempt. “Were you born yesterday?”

“Well,” begins Pinocchio, having taken the question seriously. “It was actually the day before yesterday.”

Faust’s body language reveals his rising interest in the conversation. For reasons he cannot explain, he finds himself drawn to the conflict between Pinocchio’s seemingly naïve liveliness and M & M’s rather obvious attempts at appearing aloof. He sees aspects of himself in M & M, much in the way a parent sees aspects of him or herself in a child. The sentiment is

new to Faust. He finds himself hoping M & M will fare well in the exchange. Oddly, his hope is accompanied by a slight twinge of remorse; as if he feels responsible for M & M, and is concerned he may not have prepared his child well enough.

M & M is obviously confused, but can't quite form the confusion into a question. Instead, he turns his body completely toward Pinocchio, stares him in the eyes for a bit and then says,

“I know I'm independent little man”....

Faust stares on, crossing his fingers and hoping for redemption.

Pinocchio is looking over the top of his beer glass into M & M's eyes.

Certain of their commitment, M & M continues.

“I know I am independent, because everyone acknowledges that I am!”

M & M looks triumphant.

Pinocchio looks dumbfounded.

Faust looks terrified.

Pinocchio waits to see if M & M was joking or not. After some time, he realizes he was serious. Pinocchio works hard to inhibit laughter. It doesn't work. As he laughs, he hears John laughing in the background.

“Is Sally laughing also?” asks Pinocchio.

John nods his head up and down as he continues to laugh.

“What's so funny?” asks M & M, obviously a bit pissed.

“Oh nothing,” states Pinocchio between laughs. “Don't you just hate it when people act like you're not even there?” he says sarcastically.

“Sure do,” scoffs M & M as he turns away and gets back to the busy work of not being there.

Pinocchio turns to Faust and is surprised to see him staring at M & M as if he is about to walk to him and give him a hug. Pinocchio looks back at M & M who continues to stare

into nothingness. After a moment, Pinocchio is surprised to find that he feels M & M's pain. A moment later he experiences the role he played in producing that pain. A moment later he feels guilty.

“Man,” he says to himself, surprised at the swiftness with which his mind generated increasingly sophisticated representations of the situation, as well as how effectively the process transformed his anger toward M & M into anger toward himself. “So this is what it’s like to be truly human.” The insight swirls in his mind for some time and forces him to remember his recent struggle to become human. At first he had thought it was about himself and his free will—about his ability to be independent and do whatever he wanted, no strings attached. But now, having experienced how much his sense of himself was tied up in his representations of other people, he realizes it wasn’t about him per se, at all. He had expressed his free will both when entering the land of the jackass, as well when entering the ocean to save his father. The latter expression of free will had made him human because it was not about him, but rather someone else. To be human is to be about others. He lets the insight move through him for a moment. Calm and clear in the emotional cascades of his new-found mind, he throws a smile at Faust as he slaps the table.

“Hey M & M!” he says cheerfully.

“What,” responds M & M gruffly.

“How about I buy you a beer!”

“No!” he responds as he begins turning his body ever so slightly toward Pinocchio.

“Ah, come on,” says Pinocchio, gesturing John to bring another beer.

“Well,” begins M & M.

“All right then!” cheers Pinocchio as John hands M & M a beer.

“And how about my weary-looking friend over there?” he says to Faust with a childish grin on his face.

“What?” enquires Faust softly, Pinocchio’s words pulling him out of his own mind a bit.

“A beer my friend,” says Pinocchio kindly as John hands Faust a beer.

“Thanks,” says Faust weakly. He raises his glass slightly to Pinocchio then takes a long pull. His head tilted back, he uses the posture to hide the shock that had climbed into his mind. “All those nights,” he thinks to himself. “Locked up in my study, book after book, searching for truth, condemning the human condition for its inability to grasp true knowledge, never understanding...” He finds it hard to continue, the truth of his new insight forcing him through emotional states he previously thought unworthy of a rational man. He looks over the top of his glass at Pinocchio, who is looking at M & M. He then looks at M & M, and in that moment realizes his deal was not meant to be made with the devil, but with the wild world of which he was a part. He now understands that M & M is Mephistopheles’ greatest triumph. A man born of the belief he must measure himself in terms of his independence is doomed to miss the fact his independence is little more than the collage of differences he has gleaned from his persistent interactions with others. The Other was forever there, hiding in the shadows, providing a background against which a sense of self could emerge as foreground. The thought soothed him and made him realize that even alone amidst his books, he was only truly alone if he modelled himself as such.

“Thanks Pinocchio,” he says while toasting his wildly insightful newly-found friend.

“Thank you,” reciprocates Pinocchio, gladly submitting himself to the virtual strings of social constraint.

“How about a duet?” asks Faust.

“Cool,” responds Pinocchio with delight.

The two run onto the stage and assail the DJ with requests. The DJ waives his hands in the air and directs the two to the microphone. He then searches through his collection for a particular CD. He finds it, loads it, and presses the START button. MICHAEL JACKSON’s *We*

are the World fills the room. A nostalgic “Ahhhhh” rises from the audience. Arm in arm, Faust and Pinocchio begin to sing. Then, just before they reach the chorus, they gesture to M & M to join them on stage. He resists. The bifurcated world-view he has internalized like a religion will take years to let go. But then, like FRANKENSTEIN hearing the voice of a potential friend, a slight smile spreads across his face, and slowly but surely he begins to tap his fingers on the table in time with the music.

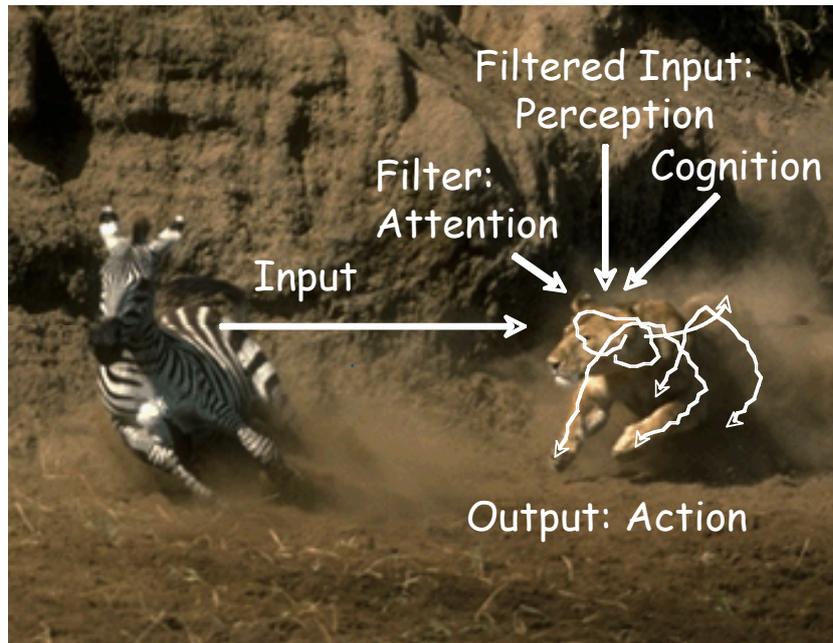
*Like a true nature's child
We were born, born to be wild
We can climb so high
I never wanna die
STEPPENWOLF 1968*

Part 2

The point of the above story was to exemplify two ideas that I believe are important to the field of *embodied communication*. These ideas have to do with the relationship between *mind* and *nature*, and *self* and *other*. Often in the embodied communication camp, communication is treated as the passing of information from one self to the other, and *embodiment* refers to the role the body plays in constraining and sustaining such exchanges of information. In my work on embodiment, I attempt to develop the following points: (1) a body *is* meaning and, ultimately is *mind*, and (2) a *self* emerges as a foreground amidst a background of internalized (embodied) others. Combined, these ideas render embodied communication more an act of *sustained resonance*, than an act of information exchange. While at first glance, the notion of *sustained resonance* may seem to have more to do with sounding hip than actually explaining anything, I hope to show that it might provide the field of embodied communication specifically, and cognitive science in general, a means of overcoming certain conceptual traps that both have been led to via the notion of independent cognizers and information exchange.

The first step in developing the current thesis is to examine how mind was cast out of nature in the first place. My argument on this issue is given voice via the character of Faust. I chose him because he represents a way of thinking about mind and nature that I believe permeates Western culture to this day. Specifically, Faust seems to be lamenting the fact that while God originally placed humankind in the vital world of living nature, Faust himself, in his quest for true knowledge, has wound up in a world of dead and sterile books, and he sees no way of getting from one to the other. The irony of Faust is his lack of understanding that he, himself, is the source of his own despair. For by conceptualizing his rationalism as a means of getting *above* and *beyond* nature, as opposed to being a part of it, he has made it conceptually impossible for one to get him back into the other. This way of conceptualizing mind can be traced back at least as far back as DESCARTES who, in his attempt to bring his belief in GOD in line with his belief in the power of Naturalism, conceptualized rationalism as a gift from GOD that could be used to ultimately understand the universe GOD had created. Conceptualizing rationalism in this fashion lead to the invention of individualistic models of mind (TSENG, 2003), in which minds were, and still are, modeled as lone cognizers whose rational powers represent the epitome of mind and what it means to be human.

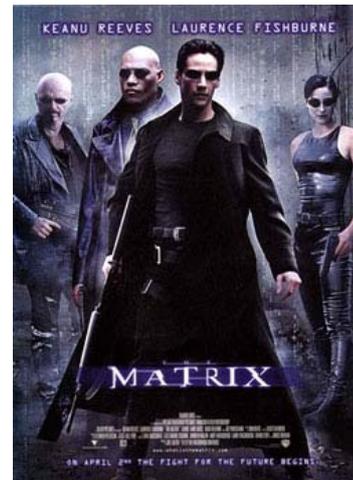
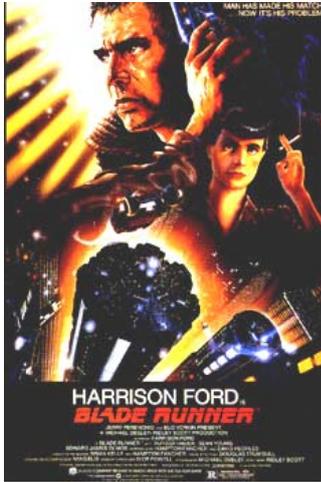
The Mechanistic Mind



Modeling ourselves as lone cognizers has had consequences in both the academic and social worlds. In the former, it has made it difficult to naturalize the mind. For in modern scientific parlance, the lone cognizing mind tends to be modeled servo-mechanistically: *perception* is an input function, *cognition* a computational function, and *behavior*, an output function (JORDAN, 2003a,b). Such modeling has made it difficult to naturalize mind because it often leaves open the logical possibility that our phenomenal experience of having a mind might actually be epiphenomenal. That is, since all statements about the causal relations that constitute a servo-mind can be stated without making reference to phenomenal experience, there seems to be little, if any, causal work remaining for phenomenal experience to do (CHALMERS, 1996). Unable to fit phenomenal experience back into DESCARTES' disassembled machine, it falls through the cracks and we are asked to entertain the notion that our feeling of being mindful plays little if any role in determining what we do (WEGNER, 2002).

Socially, the myth of the lone cognizer puts some people ill-at-ease. (At this point, please run a simulation in which I am standing on a soapbox in the middle of a public square, wagging my finger in the air at innocent passers-by.) In the Black-eyed Peas song mentioned above, there is an obvious desire to move away from the world of intellect and toward the world of intuition (i.e., nature). In movies such as *The Terminator*, emotionally-void machines work with relentless precision as they attempt to exterminate the human race. In *The Matrix*, a super-computer forces humans to live virtual lives so that it can sustain itself on the power emitted from their hallucinating brains. What these images seem to be tapping into is our Faustian discontent with our bifurcated world-view. We are not happy with the idea that the lone, rational cognizer constitutes the best model of what we are. And unlike the 17th century, we in the 21st century tend not to model the lone cognizer and his rationalism as having anything to do with GOD. Thus, while the rationalism of the lone cognizer is still modelled as constituting the epitome of human mentality, and is still conceptualized as a means of getting above and beyond nature, the fact that it exists is seen as being due to the random chance of evolution, not the divine motives of a benevolent GOD. For certain members of the academic community, this account suffices (CHURCHLAND, 1995, DAWKINS, 1989; DENNETT, 1996). But for many, the notion of a universe of blind chance does little to help them feel embedded in a universe of meaning and, I would argue, leads them to develop and internalize a world-view that emphasises and esteems the oxymoronic notion of the

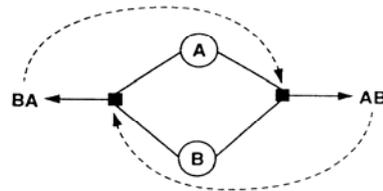
independent, *non-embedded*, lone cognizer—a world-view I expressed in Part 1 via the Marlboro Man.



So, how do we overcome the problems we have created for ourselves with our Marlboro Man model of mind? Evidence as to what we think might serve as a better model can be found in movies such as *Bicentennial Man*, *AI*, and *Short Circuit*, in which we empathize with the protagonist artificial mind. We do so because the AI is attempting to *internalize* its world, including the world of humans. This is why Pinocchio is mentioned in Part 1. It is when he internalizes the desires of others that he becomes truly human. It is this notion of internalization—what I want to refer to as *embodiment*—that lies at the heart of getting mind meaningfully (i.e., with all its phenomenal properties) back into nature. My central thesis (what I call *Wild Systems Theory*) is that organisms (i.e., bodies) *are* meaning (and ultimately mind), precisely because they constitute embodiments of the external constraints (i.e., contexts) they have had to internalize phylogenetically as well as ontogenetically in order to sustain themselves (Jordan, 1998). Within this framework, e.g., fins constitute an embodiment of the hydrodynamic properties of water, bones, an embodiment of the constraints that need to be overcome in order to propel a body through a

gravity field, and teeth, an embodiment of the make-up of plants and what it takes to release the chemical energy they contain. In every case, these embodiments are *naturally* and *necessarily* “about” the environmental constraints they evolved to address. It is this necessary “aboutness” that I want to define as meaning and, ultimately *mind*.

But does this notion of internalized constraints really naturalize meaning and, ultimately mind? One could argue that the body of a submarine, the body of a car and the body of certain farm tools also constitute embodiments of water, gravity and plants, respectively. Do they really constitute *meaning*? Of course, I have to say yes, but I would also add that this is not the type of meaning that ultimately evolved into mind. To be sure, the designers of submarines, cars and farm tools constructed such bodies so that their internal structure reflected the external constraints within which they have to function. Pinocchio’s body was also constructed in this fashion. The difference between these bodies however, and biological bodies is the means by which they sustain themselves. Biological bodies do so by continuously taking in, transforming, and dissipating energy. Non-biological bodies do not. It is my position that it is this wild, interactive-internalization of local context (i.e., energy transformation) that afforded, and continues to afford biological systems the means by which their embodied meaning was and is capable of evolving into mind. This is because the work (i.e., energy transformation) that constitutes biological bodies is *self-sustaining*. That is, it produces products that feed back into and sustain the work. KAUFFMAN (1995) recognized this principle at the chemical level and referred to it as *autocatalysis*. Specifically, an autocatalytic (i.e., self-sustaining) chemical system is one in which the work (energy transformations) taking place among molecules, produces its own catalyst. By producing its own catalyst, the work sustains itself, as well as the system as a whole. KAUFFMAN conceptualizes such work as a self-sustaining metabolism and argues that the emergence of such systems constituted the emergence of living systems.



From Kauffman, 1995

According to Wild Systems Theory (WST), such self-sustaining “work” constituted a type of meaning—what JORDAN and GHIN (2006a) refer to as *content*—that proved capable of evolving into mind. It constituted *meaning* because the work, as well as the global whole it sustained, was naturally and necessarily “about” the external constraints the system had to embody in order to sustain itself. It constituted *content* because it gave rise to (i.e., was *for*) the global whole (i.e., the body) it sustained, while the body (i.e., the sustained global whole) synergistically provided a sustained context in which the internal work could be *for* something (cf. BICKHARD, 2001; JORDAN & GHIN, 2006b). And it proved capable of affording the evolution of mind because it constituted a potential fuel source (i.e. encapsulated energy). That is, the energy entailed in such a system could be captured by another system. But to be capable of doing so, the latter had to internalize (i.e., embody) all the constraints that needed to be addressed in order to capture the energy encapsulated in the former. Said another way, once plant energy was widely available, it provided a context in which a system could emerge that sustained itself on plant energy. From this perspective, herbivores can be seen as embodiments of the constraints that need to be internalized in order for a system to sustain itself on the energy encapsulated in plants, and carnivores, the constraints to be addressed to sustain a system on the energy encapsulated in herbivores. What we have here then, is a continuing recursion on a simple theme; specifically, *the fuel source dictates the consumer*. From this perspective, the world of nature is conceptualized as a self-organizing energy transformation hierarchy (ODUM, 1988; VANDERVERT, 1995) in which any newly emerging

systems constitute embodiments of the constraints they have to address to sustain themselves within this transformation hierarchy.

According to WST, within the context of such a self-sustaining hierarchy, *mind* emerges when systems emerge that are capable of embodying (i.e., internalizing) *virtual* content. By virtual, I simply mean content that is “about” events that are non-existent in the present context. Take, for example, a lion chasing a gazelle. LOTKA (1945) recognized that in order to capture the energy entailed in the gazelle, the lion must propel itself as a whole on an *anticipatory* pursuit curve. What makes the pursuit curve anticipatory is the fact the lion runs toward a location the gazelle does not yet occupy. In short, it propels itself toward the gazelle’s *future*. The reason it can do so is because it has embodied (i.e., internalized) the constraint of having to capture a moving energy source. Specifically, certain structures in the lion’s cerebellum have access to both the movement commands leaving motor cortex, and the immediate sensory consequences of the resultant movements. These cerebellar structures project back up to motor cortex and influence its activity. This is important, for it affords the lion the ability to embody (i.e., internalize), in the weights of its cerebral-cerebellar circuitry, patterns between motor commands and their resultant sensory effects. Thus, as the lion garners experience controlling its body in relation to moving prey, successful command-feedback patterns become embodied in the cerebral-cerebellar circuits. And given these cerebral-cerebellar loops influence motor cortex and function at a time scale of 10-20 milliseconds, versus the 120 millisecond time-scale between motor commands and sensory feedback, the system can basically control its propulsion on *virtual* feedback (CLARK, 1997; GRUSH, 2004) and, as a result, propel itself toward internalized (i.e., embodied) *virtual* prey locations (i.e., where the prey will be in the next 200 or so milliseconds).

There are five important points to be made about such *virtual* content. First, it is not virtual in the sense it does not exist. To the contrary, it does exist. It is virtual in the sense it is about *future* body-prey states. Second, it is possible for the lion to embed (i.e., embody) such

content within its brain because neural networks function according to the principle of self-sustaining work. HEBB (1949) recognized this aspect of neural work and referred to it as the cell-assembly, the notion that neurons sustain themselves by becoming part of a neural network. EDELMAN (1989) also noted this principle in the developing brain, and referred to it as *Neuronal Darwinism*. In short, the work of being a neuron (i.e., producing action potentials and forming synapses with other neurons) sustains the neuron. Thus, patterns of neural activity sustain themselves, and factors that cause neural patterns to repeat (i.e., command-feedback patterns in cerebral-cerebellar loops and their relationship to prey patterns) become embedded (i.e., embodied) within these self-sustaining neural patterns.

Third, all of this embodied work is naturally and necessarily about the external (as well as internal) contexts (patterns) that have to be addressed in order for the work to sustain itself; from the single neuron, to the neural circuit, to the neuro-muscular system, to the organism as a whole. Thus, there is no epistemic divide between internal and external states (including virtual states)—organisms are reciprocally nested eco-systems of self-sustaining work. They are a representation, at every level, of the phylogenetic, as well as ontogenetic constraints their species has had to overcome in order to sustain itself.

This leads to the fourth point. Virtual content emerged in self-sustaining systems precisely because of their need to capture energy that was on the move. The virtual content therefore, is necessarily about the *other*. That is, it is not just about the command-feedback patterns in the lion's brain, but rather, the relationship between command-feedback patterns and their relationship to prey patterns. The point I'm after here is that the virtual content is inherently *other-relative*. If we assume that the ability to chase gazelles phylogenetically emerged prior to the ability to have self-consciousness about chasing gazelles, it seems to be the case that *others* were in the brain before the *self* was. In short, the brain has never been alone. This claim is supported by the discovery of areas in the brain (i.e., mirror neurons) that are active both when one plans a goal related action, as well as when one observes another

execute such an action (RIZZOLATTI, FADIGA, FOGASSI & GALLESE, 2002). This means that as others produce goal-directed actions, they simultaneously put my brain in a planning state for the same goal-related action. The discovery of such mechanisms indicates that resonance (i.e., doing what others are doing) constitutes the default value in human interaction. KINSBOURNE (2002) agrees with this position and argues that infant imitation is actually uninhibited perception “on the fly”. Only as the cortex develops inhibitory circuits, he argues, are we able to “not” resonate to the actions of others. He cites echopraxia as further evidence of this claim. RIZZOLATTI et al. agree with this notion of resonance, and distinguish between low- and high-level resonance. While the former refers to the ability of an organism’s body movements to entrain similar movements in conspecifics (e.g., a school of fish moving together, or a flock of birds flying together), the latter refers to resonance at the level of goal-related actions (e.g., a chimp watching another eat a peanut, or a person watching another dance). Collectively, these findings indicate that the *other* was embodied in the structure of the brain very early on, and has been there ever since.

And finally, the fifth point about virtual content is that it sets the stage for the emergence of phenomenal self-experience (GHIN, 2005; METZINGER, 2003). For since neural networks emerge and function according to the principle of self-sustaining work, the virtual content embedded in a brain is always available for “capture” by newly-emerging neural networks (GRUSH, 2004). The content of these new circuits will necessarily constitute an abstraction from the content embedded and sustained in the network it is tapping into.

As systems emerged that were capable of externalizing and sharing virtual content (i.e., communicate), the ability to “capture” such content required the system to be able to distinguish its own, internally-generated virtual content from that entering the system from the outside. These are the constraints that I believe forced the emergence of “self” and “other” (JORDAN, 2003C; JORDAN & KNOBLICH, 2003; KNOBLICH & JORDAN, 2003). In short, the self emerges as foreground amidst a background of virtual others, and it does so in order to sustain

itself with those others in virtual contexts (i.e., within a world of ideas). The phenomenal self then garners its content (i.e., phenomenal properties) as do all self-sustaining systems; from the fact it is naturally and necessarily “about” the context (i.e., the externalized virtual content of others) it must embody in order to sustain itself.

The idea that the other has always been there, embodied within us, seems to render communication more an act of self-sustaining resonance among embodied others than an act of information exchange between lone cognizers. It does so because self-sustaining systems do not need to “perceive” their environment in order to be “about” it. Rather, they are naturally and necessarily about the contexts they have embodied, including the context of others. Environments therefore, including the world of others, modulate (versus ‘cause’) what self-sustaining systems are “about”. Communication therefore, at least among self-sustaining embodiments, is an act of reciprocal modulation (i.e., resonance). And in order for such resonance to sustain itself, participants must generate work (e.g., eye-contact, gestures and head nods) to sustain the joint modulation. In short, communication itself is a self-sustaining process. Instead of constituting work among chemical systems embedded in a pre-biotic soup however, it constitutes work among embodied others embedded in a sea of virtual meaning.

In closing, Wild Systems Theory indicates that both Faust and Pinocchio should feel at home in the universe, despite our commitment to the Marlboro Man. Faust, because self-sustaining mind is and always has been, necessarily *in, of and about* the wild, self-organizing energy-transformation hierarchy from which it emerged and in which it continues to sustain itself. And Pinocchio, because despite all his attempts at establishing his personhood through the exercise of free will, the only reason he ever did so was to be accepted by others as human. As for the Marlboro Man? Well, only time will tell. It’s tough being alone in a world in which everyone knows they are not. Perhaps a few more karaoke nights at the TOM club will do the trick.

Acknowledgments

This manuscript was written with support from the ZiF: Center for Interdisciplinary Research at the University of Bielefeld. Thanks to IPKE WACHSMUTH, GÜNTHER KNOBLICH, MANUELA LENZEN and MARCELLO GHIN for comments on an earlier version, and AMKE DE BOES for help with the translation of *Faust*. The passage quoted from *Faust* is, of course, open to many interpretations, and I take full responsibility for any deviations from what some may believe to be the text's true meaning.

References

- BICKHARD, M. H. (2001): The emergence of contentful experience. In: T. KITAMURA (Ed.): *What should be computed to understand and model brain function?* (217-237). Singapore: World Scientific.
- CHALMERS, D. J. (1996): *The conscious mind: In search of a fundamental theory*. New York: Oxford University Press.
- CHURCHLAND, P. (1995): *The engine of reason, the seat of the soul: A philosophical journey into the brain*. MIT Press.
- CLARK, A. (1997): *Being there: Putting brain, body, and world together again*. London: MIT Press.
- DAWKINS, R. (1989): *The selfish gene: Second edition*. Oxford: Oxford University Press.
- DENNETT, D. C. (1996): *Darwin's dangerous idea. Evolution and the meaning of life*. New York: Simon & Schuster.
- EDELMAN, G. M. (1989): *Neural Darwinism: The theory of group neuronal selection*. Oxford: Oxford University Press.
- GHIN, M. (2005, June): What a self could be. *Psyche*, 11(5). Online: <http://psyche.cs.monash.edu.au/symposia/metzinger/Marcello.pdf>
- GRUSH, R. (2004): The emulation theory of representation: motor control, imagery, and perception. *Behavioral and Brain Sciences*, 27, 377 – 442.
- HEBB, D. O. (1949): *The organization of behavior: A neuropsychological theory*. New York: Wiley.
- JORDAN, J. S. (1998): Recasting Dewey's critique of the reflex-arc concept via a theory of anticipatory consciousness: Implications for theories of perception. *New Ideas in Psychology*, 16(3), 165 – 187.
- JORDAN, J. S. (2003a): The embodiment of intentionality. In W. TSCHACHER & J. DAUWALDER (Eds.): *Dynamical systems approaches to embodied cognition* (pp. 201 – 228). Berlin: Springer Verlag.
- JORDAN, J. S. (2003b): Consciousness on the edge: The intentional nature of experience. *Science and Consciousness Review* (December, No.1). Online serial, URL: <http://www.sci-con.org/news/articles/20040101.html>
- JORDAN, J. S. (2003c): Emergence of self and other in perception and action. *Consciousness and Cognition*, 12, 633 – 646.
- JORDAN, J. S. & GHIN, M. (2006a): Born to be wild: Grounding embodiment and content in self-sustaining systems. *Manuscript submitted for publication*.
- JORDAN, J. S. & GHIN, M. (2006b): (Proto-) consciousness as a contextually emergent property of self-sustaining systems. *Mind & Matter*, 4(1), 45 – 68.
- JORDAN, J. S. & KNOBLICH, G. (2004): Spatial perception and control. *Psychonomic Bulletin and Review*, 11(1), 54 – 59.
- KAUFFMAN, S. (1995): *At home in the universe*. New York: Oxford University Press.
- KINSBOURNE, M. (2002): The role of imitation in body ownership and mental growth. In: A. MELTZOFF & W. PRINZ (Eds.): *The imitative mind* (pp. 311 – 330). New York, Oxford: Oxford University Press.
- KNOBLICH, G. & JORDAN, J. S. (2003): Action coordination in groups and individuals: Learning anticipatory control. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 29(5), 1006 – 1016.
- LOTKA, A. J. (1945). The law of evolution as a maximal principle. *Human Biology*, 17, 167 – 194.
- METZINGER, T. (2003): *Being no one. The self-model theory of subjectivity*. The MIT Press.
- ODUM, H. T. (1988): Self-organization, transformity, and information. *Science*, 242, 132 – 1139.

- RIZZOLATTI G., FADIGA L., FOGASSI L. & GALLESE V. (2002): From mirror neurons to imitation: facts and speculations. In: A. M: *The Imitative Mind Development, Evolution and Brain Bases*. Eds. MELTZOFF A. N., PRINZ W. (Cambridge: CUP (Cambridge studies in cognitive perceptual development), 2002.
- TSENG, R. (2003): *The skeptical idealist*. Charlottesville, VA: Imprint Academic.
- VANDERVERT, L. (1995): Chaos theory and the evolution of consciousness and mind: A thermodynamic-holographic resolution to the mind-body problem. *New Ideas in Psychology*, 13(2), 107 – 127.
- WEGNER, D. (2002): *The illusion of conscious will*. The MIT Press.