Secreting mind out of matter

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Imagine a land inhabited by ants and machines finding their way home like boy-scouts; jumping, swimming, flying, walking and running little beasts that bend and stretch; and in each material tension of their joints and limbs flow atoms of intelligence; a place where engineering salutes nature and gives birth to an explosion of alien, mutant body plans; strange, unknown, and yet familiar, their bodies like teleological arrows already telling the naturist in all of us something – but not immediately all – about their purpose. Imagine now movement. Constant, rhythmic, fast, subtle, unstopped, multiplied. Forms in movement inhabit this land. Movement is the currency here. Nothing ever seems to stand still.

Such a place may not quite exist yet. But it is certainly the vision that one could encounter at the AI Lab at the University of Zurich in the decades that immediately preceded and followed the turn of the XXI century. Such is the image in the memory of those who have visited this place and have in smaller or larger degrees become linked to its people and its ideas.

Researchers at the AI Lab belong to a new generation of scientists and engineers with a working method more familiar to sculptors and tinkerers. Their style does not seek to force an idea into nature but engages with its material in a dialogue that opens up a channel for fragments of the world – which are not yet bodies – to secrete the knowledge that will take them closer to mindful being. Engineering of a questioning and listening kind. The style of work that in the past belonged exclusively to solitary inventors has, over the last two decades, become socialized. Now there is an international community working in adaptive systems, embodied cognition, and autonomous robotics that shares similar visions and methods. This process has not been without hiccups and is in fact still ongoing. Many refinements and corrections will have to be made, but what this international movement promises is nothing short of a revolutionized approach to understanding animal and human minds.

I would credit people at the AI Lab with something that few researchers manage to do: to talk about embodiment and mean it. Fashions in science, they often annoy me. They respond to the communal need to find concepts that simplify and unify, but rendering a label elastic enough to be universal often stifles this search. Words like “embodiment”, “situatedness”, “emergence”, “dynamics”, are prone to discolouration by careless use. The agreement about the centrality of these terms is often belied by the diametrically opposed meanings people tend to assign to them. For some, a word-processing software is embodied because it runs on a physical machine, for others embodiment represents the initial conditions and boundary constraints for an information processing system in the brain (is the brain not part of the body?) and for others still the body is a whole cognitive system, enacting along its many layers the different stages of the continuity between life and mind: metabolic, self-regulatory, interactional, social, linguistic, etc.

The AI Lab belongs to the latter group. But they go further. They show us the works. They rise to the challenge posed by phenomenologists such as Maxine Sheets-Johnstone who justifiably calls for dropping the use of easy labels. According to her, instead of endlessly talking about embodiment and nodding to each other, we should investigate the concrete workings of animate form. Why is *this* movement the right one, how much intelligence is to be found in *this* particular morphology, why, when we set *this* structure free, does it instantaneously start to create a meaningful world of interactions? These are the questions that the new generation of AI/ALife researchers are interested in. Traditional computational/representationalist frameworks recede in the face of the concrete evidence produced by this work as we learn and re-learn what we mean by embodiment.

And yet, the battle has hardly been won. The old guard is unmoved and will possibly remain like that. There is an important goal for the new generation of AI/ALife researchers: that of engagement with more traditional views and more importantly with relevant disciplines and the wider community. Collaborations should be actively sought after so that the new ideas percolate in all directions. I'm always amazed at how much common background I find with people like those working at the AI Lab and the enormous chasms that separate me conceptually from other communities pursuing similar goals. Some of the lessons of the embodied revolution are so obvious to me that they've become as clear as knowing the Earth goes around the sun. And I am often bewildered when I find myself in the middle of a conversation about epicycles; not infrequently with people who should know better! This makes me realize that old ideas die hard, even in ourselves. Cartesian thought is highly resilient and we should always understand this in a context wider than the battle of ideas itself. This will provide not only better scientific tools, but also better diplomacy and interaction skills to navigate the community gaps. (I would venture to suggest that, *mutatis mutandi*, figures like Rolf Pfeifer are modern-day missionaries; they not only have a cause, they deliver the goods and have the skills to put the ideas through even in the most adverse circumstances).

I would like to close with two messages. The first is that we must guard our vocabulary. AI Lab imbues words like "embodiment" with concrete undisputable meaning. We must therefore always refer back to this concreteness to watch out for when we ourselves, not just others, use such words loosely. Be vigilant. Secondly, we should follow the AI Lab method and ask not just the difficult questions, but also the non-obvious ones, even if they seem trivial; these are questions that no one seems to care much about but they are often the surest route for digging further into our own preconceptions.