

The Current Relevance of Merleau-Ponty's Phenomenology of Embodiment

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[1] In *Phenomenology of Perception* Merleau-Ponty tells us that:

The life of consciousness - cognitive life, the life of desire or perceptual life - is subtended by an 'intentional arc' which projects round about us our past, our future, our human setting, our physical, ideological and moral situation. (1962: 136)

In this paper I would like to explain, defend, and draw out the implications of this claim. Since the intentional arc is supposed to embody the interconnection of skillful action and perception, I will first lay out an account of skill acquisition that makes explicit what Merleau-Ponty's claim presupposes. I will then show how his account of skill and the intentional arc it establishes allows Merleau-Ponty to criticize cognitivism and introduce a new account of the relation of perception and action. Finally, I will suggest that neural-network theory supports Merleau-Ponty's phenomenology, but that it still has a long way to go before it can instantiate an intentional arc.

[2] To begin with we need to distinguish two different understandings of embodiment in *Phenomenology of Perception*. On the first understanding, embodiment refers to the actual shape and innate capacities of the human body - that it has arms and legs, a certain size, certain abilities.

In so far as I have hands, feet, a body, I sustain around me intentions which are not dependent upon my decisions and which affect my surroundings in a way which I do not choose. These intentions are general... they originate from other than myself, and I am not surprised to find them in all psycho-physical subjects organized as I am. (1962: 440)

Merleau-Ponty points out in his critique of Sartre's extreme view of freedom that mountains are tall for us, and that where they are passable and where not is not up to us but is a function of our embodied capacities. That the shape and physical capacities of the body is reflected in what we see is a powerful argument against Sartre's over-estimation of human freedom but it plays no further role in *Phenomenology of Perception*. A related view, however, that as we refine our skills for coping with things, things show up as soliciting our skillful responses, so that as we refine our skills, we encounter more and more differentiated solicitations to act, does play a crucial role in Merleau-Ponty's book.

[3] But we still need to make one more distinction. J.J. Gibson, like Merleau-Ponty, sees that characteristics of the human world, e.g. what affords walking on, squeezing through, reaching, etc. are correlative with our bodily capacities and acquired skills, but he then goes on, in one of his papers, to add that mail boxes afford mailing letters. This kind of affordance calls attention to a third aspect of embodiment. Affords-mailing-letters is clearly not a cross-cultural phenomenon based solely on body structure, nor a body structure plus a skill all normal human beings acquire. It is an affordance that comes from experience with mail boxes and the acquisition of letter-mailing skills. The cultural world is thus also correlative with our body; this time with our acquired cultural skills.

[4] These three ways our bodies determine what shows up in our world - innate structures, basic general skills, and cultural skills - can be contrasted by considering how each contributes to the fact that to Western human beings a chair affords sitting. Because we have the sort of bodies that get tired and that bend backwards at the knees, chairs can show up to us - but not flamingos, say - as affording sitting. But chairs can only solicit sitting once we have learned to sit. Finally, only because we Western Europeans are brought up in a culture where one sits on chairs do they solicit us to sit on them. Chairs would not solicit sitting in traditional Japan. By embodiment, Merleau-Ponty intends to include all three ways the body opens up a world:

The body is our general medium for having a world. Sometimes it is restricted to the actions necessary for the conservation of life, and accordingly it posits around us a biological world; at other times, elaborating upon these primary actions and moving from their literal to a figurative meaning, it manifests through them a core of new significance: this is true of motor habits [sic] such as dancing. Sometimes, finally, the meaning aimed at cannot be achieved by the body's natural means; it must then build itself an instrument, and it projects thereby around itself a cultural world. (1962: 146)

[5] Merleau-Ponty uses "habit" as synonymous with "skill," so when he wants to refer to skill acquisition he speaks of "the acquisition of a habit" (1962: 143). Thus for him the ability to perceive is like an already acquired bodily skill.

The analysis of motor habit as an extension of existence leads ... to an analysis of perceptual habit as the coming into possession of a world. Conversely, every perceptual habit is still a motor habit and here equally the process of grasping a meaning is performed by the body. (1962: 153)

Thus Merleau-Ponty's notion of intentional arc is meant to cover all three ways our embodied skills determine the way things show up for us.

[6] To see how our embodied skills are acquired by dealing with things and situations and how these skills in turn determine how things and situations show up for us as requiring our responses, we thus need to lay out more fully than Merleau-Ponty does, how our relation to the world is transformed as we acquire a skill. Many of our skills are acquired at an early age by trial and error or by imitation, but to make all possible stages of skill development as explicit as possible I will consider the case of an adult acquiring a skill by instruction.[\(1\)](#)

Skill Acquisition: The Establishment of the Intentional Arc

Stage 1: Novice

[7] Normally, the instruction process begins with the instructor decomposing the task environment into context-free features which the beginner can recognize without benefit of experience in the task domain. The beginner is then given rules for determining actions on the basis of these features, like a computer following a program.

[8] For purposes of illustration, let us consider two variations: a bodily or motor skill and an intellectual skill. The student automobile driver learns to recognize such interpretation-free features as speed (indicated by his speedometer) and he is given rules such as shift to second when the speedometer needle points to ten miles an hour.

[9] The novice chess player learns a numerical value for each type of piece regardless of its position, and the rule: "Always exchange if the total value of pieces captured exceeds the value of pieces lost." He also learns that when no advantageous exchanges can be found, center control should be sought, and he is given a rule defining center squares and one for calculating extent of control. Most beginners are notoriously slow players, as they attempt to remember all these rules and their priorities.

Stage 2: Advanced beginner

[10] As the novice gains experience actually coping with real situations, he begins to note, or an instructor points out, perspicuous examples of meaningful additional aspects of the situation. After seeing a sufficient number of examples, the student learns to recognize them. Instructional maxims now can refer to these new situational aspects, recognized on the basis of experience, as well as to the objectively defined non-situational features recognizable by the novice.

[11] The advanced beginner driver uses (situational) engine sounds as well as (non-situational) speed in his gear-shifting rules. He shifts when the motor sounds like it is straining. He learns to observe the demeanor as well as position and velocity of pedestrians or other drivers. He can, for example,

distinguish the behavior of the distracted or drunken driver from that of the impatient but alert one. No number of words can take the place of a few choice examples in learning these distinctions. Engine sounds cannot be adequately captured by words, and no list of objective facts enables one to predict the behavior of a pedestrian in a crosswalk as well as can the driver who has observed many pedestrians crossing streets under a variety of conditions.

[12] With experience, the chess beginner learns to recognize over-extended positions and how to avoid them. Similarly, he begins to recognize such situational aspects of positions as a weakened king's side or a strong pawn structure despite the lack of precise and universally valid definitional rules.

Stage 3: Competence

[13] With more experience, the number of potentially relevant elements of a real-world situation that the learner is able to recognize becomes overwhelming. At this point, since a sense of what is important in any particular situation is missing, performance becomes nerve-wracking and exhausting, and the student might wonder how anybody ever masters the skill.

[14] To cope with this problem and to achieve competence, people learn, through instruction or experience, to adopt a hierarchical perspective. First they must devise a plan, or choose a perspective, that then determines which elements of the situation are to be treated as important and which ones can be ignored. By restricting themselves to only a few of the vast number of possibly relevant features and aspects, decision-making becomes easier.

[15] The competent performer thus seeks new rules and reasoning procedures to decide upon a plan or perspective. But these rules are not as easily come by as the rules given beginners in texts and lectures. The problem is that there are a vast number of different situations that the learner may encounter, many differing from each other in subtle, nuanced, ways. There are, in fact, more situations than can be named or precisely defined so no one can prepare for the learner a list of what to do in each possible situation. Competent performers, therefore, have to decide for themselves what plan to choose without being sure that it will be appropriate in the particular situation.

[16] Now, coping becomes frightening rather than exhausting, and the learner feels great responsibility for his or her actions. Prior to this stage, if the learned rules didn't work out, the performer could rationalize that he or she hadn't been given good enough rules rather than feel remorse because of a mistake. Now the learner feels responsible for disasters. Of course, often, at this stage, things work out well, and a kind of relation unknown to the beginner is experienced, so learners find themselves on an emotional roller coaster.

[17] A competent driver leaving the freeway on a curved off-ramp, after taking into account speed, surface condition, criticality of time, etc., may decide he is going too fast. He then has to decide whether to let up on the accelerator, remove his foot altogether, or step on the brake. He is relieved when he gets through the curve without mishap and shaken if he begins to go into a skid.

[18] The class A chess player, here classed as competent, may decide after studying a position that his opponent has weakened his king's defenses so that an attack against the king is a viable goal. If the attack is chosen, features involving weaknesses in his own position created by the attack are ignored as are losses of pieces not essential to the attack. Removal of pieces defending the enemy king becomes salient. Successful plans induce euphoria, while mistakes are felt in the pit of the stomach.

[19] As the competent performer become more and more emotionally involved in his or her tasks, it becomes increasingly difficult to draw back and to adopt the detached rule-following stance of the beginner. While it might seem that this involvement-caused interference with detached rule-testing and improving would inhibit further skill development, in fact just the opposite seems to be the case.

As we shall soon see, if the detached rule-following stance of the novice and advanced beginner is replaced by involvement, one is set for further advancement, while resistance to the frightening acceptance of risk and responsibility can lead to stagnation and ultimately to boredom and regression.

Stage 4: Proficient

[20] Suppose that events are experienced with involvement as the learner practices his skill, and that, as the result of both positive and negative experiences, responses are either strengthened or inhibited. Should this happen, the performer's theory of the skill, as represented by rules and principles will gradually be replaced by situational discriminations accompanied by associated responses. Proficiency seems to develop if, and only if, experience is assimilated in this atheoretical way and intuitive behavior replaces reasoned responses.

[21] As the brain of the performer acquires the ability to discriminate between a variety of situations entered into with concern and involvement, plans are intuitively evoked and certain aspects stand out as important without the learner standing back and choosing those plans or deciding to adopt that perspective. Action becomes easier and less stressful as the learner simply sees what needs to be achieved rather than deciding, by a calculative procedure, which of several possible alternatives should be selected. There is less doubt that what one is trying to accomplish is appropriate when the goal is simply obvious rather than the winner of a complex competition. In fact, at the moment of involved intuitive response there can be no doubt, since doubt comes only with detached evaluation of performance.

[22] Remember that the involved, experienced performer sees goals and salient facts, but not what to do to achieve these goals. This is inevitable since there are far fewer ways of seeing what is going on than there are ways of responding. The proficient performer simply has not yet had enough experience with the wide variety of possible responses to each of the situations he or she can now discriminate to have rendered the best response automatic. For this reason, the proficient performer, seeing the goal and the important features of the situation, must still decide what to do. To decide, he falls back on detached, rule-based determination of actions.

[23] The proficient driver, approaching a curve on a rainy day, may realize intuitively that he is going dangerously fast. He then consciously decides whether to apply the brakes or merely to reduce pressure by some selected amount on the accelerator. Valuable moments may be lost while a decision is consciously chosen, or time pressure may lead to a less than optimal choice. But this driver is certainly more likely to negotiate the curve safely than the competent driver who spends additional time deciding based on speed, angle of curvature, and felt gravitational forces, that the car's speed is excessive.

[24] The proficient chess player, who is classed a master, can recognize a large repertoire of types of positions. Recognizing almost immediately and without conscious effort the sense of a position, he sets about calculating the move that best achieves his goal. He may, for example, know that he should attack, but he must deliberate about how best to do so.

Stage 5: Expertise

[25] The proficient performer, immersed in the world of his skillful activity, sees what needs to be done, but decides how to do it. The expert not only knows what needs to be achieved, based on mature and practiced situational discrimination, but also knows how to achieve the goal. A more subtle and refined discrimination ability is what distinguishes the expert from the proficient performer, with further discrimination among situations all seen as similar with respect to plan or perspective distinguishing those situations requiring one action from those demanding another. With enough experience with a variety of situations, all seen from the same perspective but requiring different tactical decisions, the proficient performer gradually decomposes this class of situations into

subclasses, each of which share the same decision, single action, or tactic. This allows the immediate intuitive response to each situation which is characteristic of expertise.

[26] The expert chess player, classed as an international master or grandmaster experiences a compelling sense of the issue and the best move. Excellent chess players can play at the rate of 5-10 seconds a move and even faster without any serious degradation in performance. At this speed they must depend almost entirely on intuition and hardly at all on analysis and comparison of alternatives. For such expert performance, the number of classes of discriminable situations, built up on the basis of experience, must be immense. It has been estimated that a master chess player can distinguish roughly 50,000 types of positions.

[27] A few years ago my brother and I performed an experiment in which a former international junior champion, Julio Kaplan, was required to add numbers presented to him at the rate of about one number per second as rapidly as he could while at the same time playing five-second-a-move chess against a slightly weaker, but master level, player. Even with his analytical mind almost completely occupied by adding numbers, Kaplan more than held his own against the master in a series of games. Deprived of the time necessary to see problems or construct plans, Kaplan still produced fluid and coordinated, long-range strategic play.

[28] Here the question arises: How can the expert initiate and carry through long-range strategies without having assessed the situation, chosen a perspective, made a plan, and formed expectations about how the situation will work out? To answer this question the tradition has assumed that goal directed action must be based on conscious or unconscious planning involving beliefs, desires, and goals. If, however, the expert responds to each situation as it comes along in a way which has proven to be appropriate in the past, his behavior will achieve the past objectives without his having to have these objectives as goals in this conscious or unconscious mind. Thus the expert is moving into the future, and although he does not consciously entertain expectations, he is set to respond to some developments rather than others. If events take a turn that is new to him, he will be startled, and, at best, fall back to competence.

[29] Kaplan's performance seems somewhat less amazing when one realizes that a chess position is as meaningful, interesting, and important to a professional chess player as a face in a receiving line is to a professional politician. Almost anyone can add numbers and simultaneously recognize and respond to faces, even though the face will never exactly match the same face seen previously, and politicians can recognize thousands of faces. Likewise, Julio Kaplan can recognize thousands of chess positions similar to ones previously encountered.

[30] Automobile driving probably involves the ability to discriminate a similar number of typical situations. The expert driver, generally without any awareness, not only knows by feel and familiarity when slowing down on an off-ramp is required; he knows how to perform the appropriate action without calculating and comparing alternatives. What must be done, simply is done.

[31] It seems that a beginner calculates using rules and facts just like a heuristically programmed computer, but that with talent and a great deal of involved experience, the beginner develops into an expert who intuitively sees what to do without applying rules. The tradition has given an accurate description of the beginner and of the expert facing an unfamiliar situation, but normally an expert does not calculate. He does not solve problems. He does what normally works and, of course, it normally works.

[32] Given this account we must now make a qualification that may seem to run counter to Merleau-Ponty's body-rhetoric, but which is in accord with his most fundamental and original insights. A disembodied being could acquire chess mastery by playing mental chess on an imagined board. Its ability to discriminate and respond to the solicitations of more and more subtle patterns and so its ability to play better and better chess would thus not require that it have a body structured like ours.

But to acquire a skill at all it must have some kind of perception or imagining capacity and some way to act in response to what is presented to it so as to change the presented situation. Thus the intentional arc must at least be embodied in the sense that the know-how we acquire is reflected back to us in the solicitations of situations correlative with our dispositions to respond to them. It is this attenuated, but still important, sense of embodiment that interests Merleau-Ponty. That is why he speaks of the body's capacity to act, the "I can," not its structure, as its essential trait, and why reading *Phenomenology of Perception* one gets so little sense of the body's actual shape.[\(2\)](#)

Maximum Grip: Intentionality Without Representation

[33] Trying to find out what Merleau-Ponty means by the "I can" leads us to a second crucial feature of embodiment: motivation. Merleau-Ponty has an original account of what leads one to act on the basis of the skills one has, and to acquire new ones. The philosophical tradition since Plato has held that what motivates animals and people to acquire skills and act on them is the desire to achieve certain goals.[\(3\)](#) These goals are worth achieving because they are associated with certain satisfactions. But, as we have seen, once one has a skill one is solicited to act without needing to have in mind a goal at all. Thus, Merleau-Ponty is interested in exploring a more basic kind of motivation.

[34] According to Merleau-Ponty, in everyday, absorbed, skillful coping, acting is experienced as a steady flow of skillful activity in response to one's sense of the situation. Part of that experience is a sense that when one's situation deviates from some optimal body-environment relationship, one's motion takes one closer to that optimum and thereby relieves the "tension" of the deviation. One does not need a goal or intention to act. One's body is simply solicited by the situation to get into equilibrium with it. "Whether a system of motor or perceptual powers, our body is not an object for an 'I think', it is a grouping of live-through meanings which moves towards its equilibrium" (1962: 153).

[35] When everyday coping is going well one experiences something like what athletes call flow, or playing out of their heads. One's activity is completely geared into the demands of the situation. Aron Gurwitsch offers an excellent description of this absorbed activity:

[W]hat is imposed on us to do is not determined by us as someone standing outside the situation simply looking on at it; what occurs and is imposed are rather prescribed by the situation and its own structure; and we do more and greater justice to it the more we let ourselves be guided by it, i.e., the less reserved we are in immersing ourselves in it and subordinating ourselves to it. We find ourselves in a situation and are interwoven with it, encompassed by it, indeed just "absorbed" into it. (Gurwitsch 1979: 67)[\(4\)](#)

[36] To get the phenomenon in focus, consider a tennis swing. If one is a beginner or is off one's form one might find oneself making an effort to keep one's eye on the ball, keep the racket perpendicular to the court, hit the ball squarely, etc. But if one is expert at the game, things are going well, and one is absorbed in the game, what is experienced is more like one's arm going up and its being drawn to the appropriate position, the racket forming the optimal angle with the court - an angle we need not even be aware of - all this so as to complete the gestalt made up of the court, one's running opponent, and the oncoming ball. One feels that one's comportment was caused by the perceived conditions in such a way as to reduce a sense of deviation from some satisfactory gestalt.

[37] Such skillful coping does not require a mental representation of its goal. It can be purposive without the agent entertaining a purpose. As Merleau-Ponty puts it:

A movement is learned when the body has understood it, that is, when it has incorporated it into its 'world', and to move one's body is to aim at things through it; it is to allow oneself to respond to their call, which is made upon it independently of any representation. (Merleau-Ponty 1962: 139)

Merleau-Ponty would like basketball player Larry Bird's description of the experience of passing the ball in the midst of a game:

[A lot of the] things I do on the court are just reactions to situations ... A lot of times, I've passed the basketball and not realized I've passed it until a moment or so later. (Quoted in Levine 1988)

[38] To help convince us that no representation of the final gestalt is needed in order for the skilled performer to achieve it, Merleau-Ponty uses the analogy of a soap bubble. The bubble starts as a deformed film. The bits of soap just respond to local forces according to laws which happen to work so as to dispose the entire system to end up as a sphere, but the spherical result does not play a causal role in producing the bubble. The same holds for the final gestalt of body and racket in my example. Indeed, I cannot represent how I should turn my racket since I do not know what I do when I return the ball. I may once have been told to hold my racket perpendicular to the court, and I may have succeeded in doing so, but now experience has sculpted my swing to the situation in a far more subtle and appropriate way than I could have achieved as a beginner following this rule.

[39] An even more striking case, where the goal the skilled perceiver is being led to achieve is not available to the actor as something to aim at, will make the point clear. Instructor pilots teach beginning pilots a rule determining the order in which they are to scan their instruments. The instructor pilots teach the rule for instrument scanning that they themselves were taught and, as far as they know, still use. At one point, however, Air Force psychologists studied the eye movements of the instructors during simulated flight and found, to everyone's surprise, that the instructor pilots were not following the rule they were teaching, in fact their eye movements varied from situation to situation and did not seem to follow any rule at all. They were presumably responding to changing situational solicitations that showed up for them in the instrument panel thanks to their past experience. The instructor pilots had no idea of the way they were scanning their instruments and so could not have entertained the goal of scanning the instruments in that order.

[40] The phenomena of purposive actions without a purpose is not limited to bodily activity. It occurs in all areas of skillful coping, including intellectual coping. Many instances of apparently complex problem solving which seem to implement a long-range strategy, as, for example, a masterful move in chess as we have seen, may be best understood as direct responses to familiar perceptual gestalts. As we have seen, after years of seeing chess games unfold, a chess grandmaster can play master level chess simply by responding to the patterns on the chess board while his deliberate, analytic mind is absorbed in something else. Such play, based as it is on previous attention to thousands of actual and book games, incorporates a tradition which determines the appropriate response to a situation, and then to the next etc., and therefore makes possible long range, strategic, purposive play, without the player needing to have in mind any plan or purpose at all. Thus, although compartments must have logical conditions of satisfaction⁽⁵⁾, i.e. they can succeed or fail, there need be no mentalistic intentional content, i.e. no representations of a goal.

[41] If one can act without representing one's goal, what motivates skillful action? According to Merleau-Ponty, higher animals and human beings are always trying to get a maximum grip on their situation. Merleau-Ponty's inspiration for his notion of maximal grip comes from perception and manipulation. When we are looking at something, we tend, without thinking about it, to find the best distance for taking in both the thing as a whole and its different parts. When grasping something, we tend to grab it in such a way as to get the best grip on it.

For each object, as for each picture in an art gallery, there is an optimum distance from which it requires to be seen, a direction viewed from which it vouchsafes most of itself: at a shorter or greater distance we have merely a perception blurred through excess or deficiency. We therefore tend towards the maximum of visibility, and seek a better focus as with a microscope. (Merleau-Ponty 1962: 302)

My body is geared into the world when my perception presents me with a spectacle as varied and as clearly articulated as possible, and when my motor intentions, as they unfold, receive the responses they expect from the world. This maximum sharpness of perception and action points clearly to a perceptual ground, a basis of my life, a general setting in which my body can co-exist with the world (Merleau-Ponty 1962: 250).

[42] As an account of skillful action, maximum grip means that we always tend to reduce a sense of disequilibrium. What is experienced as disequilibrium and equilibrium depends, of course, on what skills have been acquired. In the tennis example, the situation on the court requires my arm to go up and move in a certain way. Thus the "I can" that is central to Merleau-Ponty's account of embodiment is simply the body's ability to reduce tension or, to put it another way, to complete gestalts. This is why Merleau-Ponty holds that perception and skill acquisition require an active body.

[43] In addition, the body not only moves to complete a good gestalt in any skill domain, it also tends to improve what counts as a good gestalt in that domain. As we have seen, the involved performer tends to discriminate a more and more refined repertoire of situations and pair them with more and more appropriate actions. Thus the intentional arc is steadily enriched. But this is not a goal-directed activity. One is no doubt consciously motivated to acquire a skill like tennis, but one does not try consciously to discriminate more and more subtle tennis situations and pair them with more and more subtle responses. (6) All one can say is that in order to improve one's skill one must be involved, and get a lot of practice. The body takes over and does the rest outside the range of consciousness. This capacity is for Merleau-Ponty a further manifestation of the body's tendency to acquire a maximum grip on the world. Only because there is a tendency towards maximum grip in this fundamental sense is there an intentional arc, and only thanks to the intentional arc is there a tendency towards maximum grip in the sense of moving to reach an equilibrium in the current situation.

The Neural Basis of the Intentional Arc

[44] A cognitivist - Merleau-Ponty's intellectualist - would say that in spite of appearances the mind/brain of the expert must be acquiring more and more sophisticated rules and then making millions of rapid and accurate inferences like a computer. After all the brain is not "wonder tissue" and how else could it work?

[45] Husserl had some such view. He needs mental machinery to explain the way past experience modifies the perceptual world. For example, he explains that fact that when I see an object from one side I see it as having a similar back side, as follows:

The similar reminds me of the similar, and by analogy with what was given with the similar on the one side, I expect something similar on the other side. It is associated with it and "reminds" me of it, though as analogon of something remembered in the usual narrow sense. ... All thingly apperception and all apperception of unities of the nexus of several things and thingly processes would have their source in associative motivations. (Husserl 1983: 237)

[46] Here Husserl is making the typical empiricist assumption that events that once played a role in my experience, are somehow "remembered" and play an unconscious role in my current perceptions and responses. But this is an unwarranted construction. Indeed, it may well be incoherent since, as Merleau-Ponty points out, there are many dimensions in which experiences can be similar. Thus the empiricist cannot explain why one experiences calls up a specific memory as similar to the current one.

An impression can never by itself be associated with another impression. Nor has it the power to arouse others. It does so only provided that it is already *understood* in the light of the past experience in which it co-existed with those which we are concerned to arouse. (Merleau-Ponty 1962: 17)

[47] No mentalistic model, whether idealist or empiricist, can answer this objection, but fortunately, there are other models of what might be going on in the hardware that make no use of empiricist association nor of the sort of symbols and rules presupposed in rationalist philosophy and Artificial Intelligence (AI) research. Such models are called simulated neural networks. According to these models, memories of specific situations are not stored. Rather, the connections between "neurons" are modified by successful behavior in such a way that the same or similar input will produce the same or similar output.

[48] Neural networks provide a model of how the past can affect present perception and action without needing to store specific memories at all. It is precisely the advantage of simulated neural networks that past experience, rather than being stored as a memory, modifies the connection strengths between the simulated neurons. New input can then produce output based on past experience without the net having to, or even being able to, retrieve any specific memories. The point is not that neural networks provide an explanation of association. Rather they allow us to give up seeking an associationist explanation of the way past experience affects present perception and action.

[49] Some psychologists claim that neural-network modeling is no more promising than rule-based AI, since it is just a new version of associationism, which has already failed as a model of how the mind/brain produces intelligence. But they overlook the capacities of the most sophisticated neural networks. The hidden nodes of the most sophisticated networks are always already in a particular state of activation when input stimuli are received, and the output that the network produces depends on this initial activation. Thus input plus initial activation determines output. If the input corresponds to the experience of the current situation, the particular prior activation of the hidden nodes which is determined by inputs leading up to the current situation might be said to correspond to the expectations and perspective that the expert brings to the situation, in terms of which the situation solicits a specific response. This would distance this view from passive associationism and make it a perfect candidate for the neural basis of the phenomenon Merleau-Ponty calls the intentional arc.

[50] Networks also enable us to explain skill acquisition without appeal to AI's symbols and rules. While it is easy to see how traditional philosophy and conventional AI explain the feature detecting and inference making of the novice, and hard to see how a network would implement the required step-wise processing, when we turn to the expert, things are reversed. Once a network has encountered a particular situation from a particular perspective and has performed an appropriate action, the same or a similar situation, seen in the same way, will tend to produce the same or similar appropriate behavior. So a connectionist account of learning by examples seems much more natural than any conventional AI account.

[51] Consider the case where a network is used to map inputs representing chess positions into outputs that represent associated moves. Any new chess position which is not identical with any previous learned input will produce some particular output. If that output is similar to the action output associated with some other given input position, one can say that the system has recognized the new input position as similar to that position. Moreover, such a net can be said to respond to similarity without using a predefined similarity measure - without asking and answering the question: "Similar with respect to what?" A similar situation simply means in this case whatever situation the net responds to in similar way based on its particular past training. Sometimes the outputs will not be interpretable as representations of any move. Then the system can be said to recognize that the current input is not similar to any input to which it has been exposed. In the above way, a large enough net should be able to discriminate the approximately 50,000 different situations which a grandmaster needs to distinguish, and to respond to a new situation as similar to one of these or as outside its intuitive expertise.

[52] Still there are many important ways in which neural nets differ from embodied brains. Some of them seem to be limitations that can be overcome by further research. Thus nets now depend for their learning on people giving them examples by pairing input and output, but work is underway on reinforcement learning techniques in which the nets can learn by feed-back from the target domain.

[53] A more fundamental difficulty, however, is endemic to learning, whether the net learns by being given appropriate situation-action pairs or by finding for itself which pairings work. To learn to recognize the sort of situation and things we recognize and to respond appropriately a network must respond to the same similarities human beings do. But everything is similar to everything else and different from everything else in an indefinitely large number of ways. We just do not notice it. This leads to the problem of generalization. Neural-network modelers agree that an intelligent network

must be able to generalize. For example, for a given classification task, given sufficient examples of inputs associated with one particular output, it should associate further inputs of the same type with that same output. But what counts as the same type? The network's designer usually has in mind a specific definition of type required for a reasonable generalization and counts it a success if the net generalizes to other instances of this type. But when the net produces an unexpected association, can one say it has failed to generalize? One could equally well say that the net has all along been acting on a different definition of type, based on different perceived similarities, and that that difference has just been revealed.

[54] Here is where the role of body-structure, which we saw Merleau-Ponty puts aside in *Phenomenology of Perception* except as argument against Sartrean freedom, becomes essential for understanding the role of the body for our skillful being-in-the-world. Human beings and networks presumably have to learn by trial and error which types of situation to respond to in similar fashion, i.e., which situations count as similar. A neural-net must respond to the same types of situations as similar that human beings do, otherwise it will not be able to learn our skills and so will fail to find its way about in our world. But there seems to be a puzzle here. How do human beings - let alone networks - ever learn to generalize like other human beings so they can acquire the skills required to get around in the human world? If everything is similar to everything else in an indefinitely large number of ways, what constrains the space of possible generalizations so that trial and error learning has a chance of succeeding? Here is where the body comes in.

[55] There are three ways the body constrains the space of possible generalizations. The first is due to the brain; the other two are due to the actual body structure. First, the possible responses to a given input must be constrained by brain architecture. This innate structure accounts for phenomena such as the perceptual constants that are given from the start by the perceptual system as if they had always already been learned. Merleau-Ponty calls these "déjà monté".

[56] But this alone would not be enough to constrain the generalization-space so that all human beings learned to respond to the same inputs as similar. It turns out, however, that the order and frequency of the inputs further constrains how a net will generalize. This order is determined by the trainer in what is called supervised learning, but if the net is to learn by itself, that is if its connection strengths are to be allowed to adjust themselves on the basis of the input-output pairs it encounters, then the order and frequency of inputs will depend on the interaction of the structure of the embodied network and the structure of the world. For example what affords reaching will be experienced early and often, while what is too big or too small or too far away will not. This order provides the second constraint on generalization.

[57] The third constraint depends on what counts as success. In reinforcement learning, what counts as success in each specific domain is defined by the researcher. For an organism in the world, however, success would depend on some measurement of satisfaction. Merleau-Ponty claims that this satisfaction is not defined most generally by the pain/pleasure feedback of the behaviorists, but by the sense of equilibrium experienced when an organism is able to cope successfully with its environment. Thus the input/output pairs that will count as successful and so adjust the connection strengths will be those that move the organism towards maximum grip, which is itself a function of body structure.

[58] These three body functions may be all that is needed to explain why all human beings generalize in roughly the same way and so acquire the skills necessary for getting around in the human world whose affordances their self-moving bodies both constitute and reproduce. [\(7\)](#)

[59] All this puts disembodied neural-networks at a serious disadvantage when it comes to learning to cope in the human world. Nothing is more alien to our life-form than a network with no up/down, front/back orientation, no interior/exterior distinction, no preferred way of moving, such as moving forward more easily than backwards, [\(8\)](#) and no tendency towards acquiring a maximum grip on its world. The odds against such a net being able to generalize as we do, and so learn to classify

situations and affordances as we do, to distinguish the relevant and irrelevant, to pick up on what is obvious to us etc., are overwhelming. In our world the cards are stacked to enable entities that share our embodied form of life to learn to cope in a way we find intelligent, while leaving all other creatures behind as, to us, hopelessly stupid.

[60] The moral is that the way brains acquire skills from input-output pairings can be simulated by neural-networks, but such nets will not be able to acquire our skills until they have been put into robots with a body structure like ours. So it seems that we must supplement Merleau-Ponty's account of the "I can" and the tendency towards maximum grip by an account of those aspects of our body-structure that lead us to respond to certain inputs as similar if we are finally to understand how human beings are able to project a shared world around themselves in what Merleau-Ponty calls an intentional arc.

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Footnotes

- (1) For a detailed treatment of the phenomenology of skill acquisition, see (Dreyfus and Dreyfus 1982).
- (2) There is a temptation to say at this point that know-how is embodied because it is made possible by a modification of the brain. But this is to trivialize the notion of embodiment completely. Even computers used as physical symbol systems are embodied in this sense. They require computer chips to function, but they do not respond to situational solicitations.
- (3) For Heidegger what sets human beings apart from all animals is that they are ultimately motivated by a need to take a stand on their being. In Heidegger's famous example one exercises the skill of hammering in order to fasten pieces of wood together towards building a house, but ultimately for the sake of being a carpenter. That is, what ultimately motivates all learning and all action according to Heidegger is that only through action does one get an identity, and having an identity, a way to be, is what human being is all about. For Merleau-

Ponty, on the contrary, as we shall see, human action, like animal action, is, at its most basic level motivated by a need to get a grip on the world.

- (4) Since Merleau-Ponty attended Gurwitsch's lectures explaining Heidegger's account of comportment in terms of gestalt perception, there may well be a direct line of influence here.
- (5) John Searle formulates both a logical and phenomenological requirement for something to be an intentional state. The logical requirement is that each type of intentionality have its conditions of satisfaction (See Searle 1983). My intentional state is satisfied if what I believe is true, what I remember happened, what I perceive is in front of me causing my visual experience, what I expect occurs, etc. The phenomenological requirement is that these conditions of satisfaction be represented in the mind, i.e., that they are structures of a conscious subject separate from, and standing over-against an object.

Merleau-Ponty would not dispute the logical requirement, but he would reject the phenomenological requirement. The question is whether all intentional content is mental content. If it were, one could describe the conditions of satisfaction of all mental intentional states apart from the question whether those conditions were satisfied, i.e., one could study the intentional correlates of all types of acts of consciousness in isolation from the world. This intentional content would be the condition of the possibility of objective experience in general, so Husserl would be justified in his imperturbable conviction that, by a detailed description of the intentional structure of consciousness, he could develop a transcendental phenomenology. Merleau-Ponty's rejection of mental intentional content thus underlies his rejection of Husserl's transcendental reduction.

- (6) We would not know how to try to do such a thing. Indeed, in some cases, like that of the instructor pilots, there can be no awareness of one's eyes responding to more and more subtly discriminated situations.
- (7) For a phenomenological version of this argument see Chapter 7 of (Dreyfus 1991).
- (8) For a worked out account of human body-structure and how it is correlative with the structure of the human world, see (Todes 1990).

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