

## UNDERSTANDING: THE NURTURE OF NATURE – PART 1

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It is a curious and intriguing feature of Psychology that understanding does not feature as a topic or name a class of events or even signify a concept deserving of explanation in a discipline concerned with mind matters. We don't seem to mind that understanding matters and that in the same way that psychology is a reflexive discipline providing explanations for the minds that must explain mind so too does our understanding turn on itself and beg questioning. The spaces between attention, perception, learning, intelligence, thinking, language, problem solving, and information processing, provide convenient joints for the carving of Cognitive Psychology into manageable pieces and it is in the carving that understanding seems to disappear into these empty spaces. More recently the pieces have been put back together and combined with computer and brain sciences producing a new Cognitive Science for the new millennium. On the flanks of this new hyper-science are linguistics, evolutionary biology/psychology and robotics, and riding along with the crew are the metaphysicians keeping the score, administering Turing tests, demolishing the Theatre that René built (and banishing the phantom within), and devising thought experiments involving brains in vats, bats, and Chinese rooms. This new Cognitive Science seems to stand in an awkward relation to Psychology appropriating its cognitive bits for itself while exposing itself to counter-revolutionary forces that would re-incorporate it within the larger whole that is conveyed by the term *Psychology*. Although it may be convenient and politic within the academy for researchers to hive off and proclaim a new terrain or dominion to attract funds and prestige, the form of the new cognitive science seems to bear a strong resemblance to that of the old psychology inaugurated by the early pioneers such as Helmholtz, Wundt, James, Baldwin, Pavlov, and Ebbinghaus, to mention but a few. At its inception, Psychology consisted of a heady brew fermented out of physiology laboratories and philosophical armchairs. Instead of the boot-up electronic digital machine that underpins our current post-modern computation model of mind, the old Psychology was moulded in the image of a wind-up hydraulic analogue machine. And in much the same way that the founding figures tried to distil consciousness out of their machine (or pump out unconsciousness), so too has consciousness been resurrected as a possible jewel in the reigning crown of Cognitive Science. It is interesting that contemporary consciousness researchers such as Dennett (1993) and Flanagan (1992) refer all the way back to James, and that Luria and Vygotsky's work in the early part of the 20<sup>th</sup> century is cited as providing examples of what today is called distributed cognition (Clark, 1997). Certainly, Piaget's epistemic subject that operates with modular logical (computational)

models seems a possible contender for the as yet unspecified subject of Cognitive Science.

Given that the history of Cognitive Science has still to be contrived, Piaget and Vygotsky seem likely candidates for the role of founding fathers both being relatively uncontaminated by Psychology's dark age of behaviourism that eclipsed the promise of their early contributions to the direction of the burgeoning discipline of Psychology. Referring to the changes that have taken place in the decades following the cognitive revolution, Bruner comments that in retrospect they emerged from "two strikingly divergent conceptions of how the mind works" (1997:1), the computational view and what he calls culturalism. In a broad paradigmatic sense, Piaget and Vygotsky laid the foundations for these conceptions but it is important not to ignore the necessary requirement of a common point of origin or reference for a divergence to occur. Although Piaget's thinking was informed and shaped by evolution in the sense of biological adaptation<sup>1</sup> and Vygotsky's thinking influenced by the historical materialism<sup>2</sup> of Marx, both theories were concerned with development and change and for both, their conceptions of mind were grounded in action. In the case of Piaget the actions of the epistemic subject run from the inside out whereas for Vygotsky the importance of action was its direction from the outside in. But irrespective of the directionality, the actions produced either as a result of our biological form or as a consequence of the form of mediated instruction, are the source and not the product of understanding or what they called "conscious awareness".

All experience consists of happenings, whether of our own making through the actions we perform or through the actions of others or other things. But not every action or happening necessarily constitutes an experience of which we are consciously aware. Two qualities are given in and through experience. First, to experience a happening is to be aware of that happening. This state of awareness is often referred to as consciousness. To regain consciousness after being unconscious is to become aware or to attain a state of awareness. In this sense, conscious is the opposite or complement of unconscious where the presence or absence of awareness determines the state or condition of consciousness. Pinker (1997:134) points out that the word consciousness is ambiguous and (drawing on the work of Jackendoff and Block) distinguishes three meanings; self-knowledge, access to information, and sentience. Of these three meanings, he regards the first, self-knowledge as "an everyday topic in cognitive science" and the second, access to information, as a "mere problem, not a mystery" that will be solved sooner rather than later. This meaning of consciousness is perhaps better reserved for the word awareness and Pinker suggests that information processing in our nervous systems falls into two pools one of which is accessible to awareness and one which is not. The third meaning, sentience, is the stumbling block, the one that strikes us as a miraculous product of evolution where matter finally gets transmogrified into mind. This meaning of consciousness describes a quality of experience in addition to that of awareness. It is what we mean by subjective experience, first-person present tense, or the way it feels or is to be like when we are accessing or have information. The term *qualia* is used to capture this qualitative

<sup>1</sup> Notwithstanding what Plotkin (1997:149) calls his "somewhat unusual biological orientation."

<sup>2</sup> Notwithstanding van der Veer and Valsiner's (1994:3) comment that, "He was both Marxist (...) and non-Marxist (...)."

dimension of sentience or to use Dennett's expression, "the ways things seem to us" (1998:43). Pinker comments that "Sentience and access may be two sides of a single coin" (1997:145) and this suggests that one face would reflect information or an awareness of *things* and the other, *qualia* or *ways of seeming* for which the word consciousness could be reserved.

To be conscious of an experience is to be aware of the "aboutness" of the experience. In other words, consciousness refers to that quality or property that experience has of being about something. Not only are we aware of something but our awareness is an awareness about something. In this sense, consciousness is the intentional object of awareness. Given this distinction, the relation between awareness and consciousness as constituents of experience is analogous to that between the signifier and the signified as the constituents of a sign where the signifier is a kind of vehicle that does not transport itself but carries or holds an aboutness that is not about itself. On hearing a telephone ring, we do not have two experiences; one of a ringing sound and another of an active telephone. Similarly, in the case of familiar word sounds, we seldom ever hear the sound of the word only the aboutness of the sound. In the case of an unfamiliar foreign language, the situation is reversed. We experience sounds that are not about anything. In the same way that reasons, goals, and purposes represent the intentional aspect of actions, and without which actions are reduced to behaviours, consciousness is the intentional aspect of experience without which it reduces to awareness. The aboutness of the happenings we experience constitutes our understanding which concerns the significance of our experiences rather than their transparent contents. Ortega (1957:69-70) distinguishes between things that "are there" and things that "are to us and for us," and comments that the latter consist "in being indications, signals, for our conduct of our life, in informing us that something with certain favourable or adverse qualities that we must take into account is there."<sup>3</sup> This distinction between awareness and consciousness is implicit in the compound term *conscious awareness* that seems to have lost currency but played a crucial theoretical role in Vygotsky's thinking and, in particular, in his account (and critique of Piaget) of the development of scientific concepts (1987:167-241). The aboutness of experience, the taking into account of happenings or the ways of seeming that we experience, is what we mean by understanding in the reflexive sense of knowing that we know.

In the above sense, consciousness does not describe a state of awareness but a condition of understanding. To lack consciousness is to lack understanding. Consciousness, or the aboutness of a happening that we experience, corresponds to the intention, purpose, or goal of an action we perform. The distinction between action and behaviour usually is made in terms of intentionality where the former implies reasons or purpose on the part of the actor and where the latter is detached from the actor's intentional state. Whereas the analysis of behaviour excludes the reasons the actor has for producing actions, the analysis of action includes the reasons or purpose of the action. Two people confronted with the same task (such as children at different ages engaged in a Piagetian conservation task) may respond differently by producing different actions (answers) and providing different reasons for their actions. In this situation, the question arises why different people confronted with the same task have

<sup>3</sup> This idea is often attributed to Heidegger (1962:95-122) in terms of his distinction between "ready-to-hand" and "present at hand".

different reasons for acting as they do. Clearly we need to go behind the reasons and ask what are the conditions that generate the reasons that constitute the intentionality of action? Of course, we may produce reasons for reasons but this set of meta-reasons is soon exhausted. What then stands behind or supports and grounds the intentionality of action? Reasons, purposes, and goals are grounded in understanding where understanding is not the reason or purpose behind or attached to an action but the consequences of actions that happen to us. If my reason for shutting the door is to prevent the warm air from my heater escaping from the room, I must understand that closing the door will help to retain the heat. The same understanding may also provide the ground for not closing the door for the reason that I do not want the room to become too hot. But my understanding of the relation between the state of the door and the heat of the room cannot be based on my reasons for action vis-a-vis the door as these presuppose the understanding upon which they rest. It is as a consequence of the door being opened or closed that my understanding of its relation to the heat in the room is possible, irrespective of the reasons for the door being opened or closed, or whether the actions performed on the door are performed by me or another person or are simply brought about by natural events such as a gust of wind or the tilt of the doorframe. Viewed in this way, intentionality is a kind of understanding in action or a projection of "aboutness" that is mediated by reason or purpose where the latter provides the direction or course of action.

The distinction between awareness and consciousness and the relation between experience and understanding can be illustrated by considering the two extreme ends of the spectrum of human experiences, despair and ecstasy. Both these terms convey a sense of qualitative and profound difference from other kinds of experiences that cluster around their respective poles; sadness and suffering on the one hand, and happiness and pleasure on the other hand. Peculiar to both conditions is that they are happenings that lack any discernible aboutness. It is the absence of aboutness that distinguishes despair from pain or suffering and ecstasy from pleasure or enjoyment. In both cases, it is not merely an absence of aboutness that is critical but the loss of aboutness, consciousness, or understanding that seems to mark or single out these experiences as special. Both are experienced as powerful states of awareness whose intensity seems to derive from an eclipse of the consciousness that usually surrounds or encapsulates our raw awareness. In these heightened states of awareness, consciousness is not an empty gap waiting to be filled but seems to be overwhelmed by happenings that impose themselves and, in the process, displace our consciousness or understanding of what these happenings are about. We are aware, even intensely so, of something happening but the happening is detached from any discernible meaning in that it lacks a dimension of aboutness – an answer to the question why? If this dimension is restored, however painful or pleasurable the understanding may be, then the quality of the experience is transformed; from despair to suffering or sadness; from ecstasy to pleasure or satisfaction.

The paralysis and helplessness induced by despair is eliminated when consciousness is recovered and awareness acquires a dimension of aboutness. Consciousness cannot dispel the misery that a given condition may provoke, but understanding why or believing we understand why we are in some state of misery may leave us feeling sad about our condition but does not induce the desperation that is born of helplessness. One cannot help oneself but only surrender oneself when consciousness is lost to

awareness. In despair we are helpless because a loss of consciousness is a loss of understanding which renders action devoid of intention. Despair is a condition in which awareness is relentlessly open in the sense that no meaningful context, frame of reference, or intentional object can be found for, or attached to, the happening of which we are aware. It is this loss of aboutness that produces the absence of meaning that is the essence of despair. Although the experience of ecstasy is very different to that of despair, both are characterized by the same quality of surrender. Ecstasy is a condition in which awareness is closed on itself, is about itself, in the sense that the meaning of the experience is its awareness. This condition is common to aesthetic experiences. The joy of listening to music is that it is not about anything. In its raw awareness it does not require to be *understood* and attempts at understanding detract from the intensity of the experience. Understanding a work of art, whether a painting or a musical work, in terms of its structure, the life and times of the artist, and so on, may contribute to the pleasure we derive from the work but not to that experience of ecstasy in which the awareness of the work engulfs us and drains our consciousness of what the work is about. In ecstasy we submit to the happening by letting go of consciousness as if to flood our experience with sheer awareness and in so doing driving understanding away. The art of meditation seems to be the ability to achieve a euphoric state of awareness that is non-conscious in the sense of being about nothing. Both despair and ecstasy are experiences characterized by non-conscious, as opposed to unconscious, experiences and both are conditions that could be described in terms of a loss of understanding rather than an absence of understanding.

Equally revealing of the role of awareness and consciousness as constituents of experience is the condition of misunderstanding. Although paradoxical on the surface, misunderstanding is a form of absolute understanding in the sense that as long as it persists, it blocks any transformation to a new or deeper understanding. The paradoxical nature of misunderstanding is that it is experienced as understanding. To misunderstand a situation is to attach an incorrect intention to the awareness of a situation. In this sense, misunderstanding is a condition of misplaced consciousness. Consequently, misunderstanding cannot be experienced as such but only as understanding. It can only be recognized by another person and what the other person recognizes is confusion; a joining together of an awareness and an *aboutness* that do not belong together, at least from the perspective of the other person. Because misunderstanding is experienced as understanding, it presents a barrier to learning. This is because for learning to occur, a process must be set in motion whereby one form of understanding is overcome and transformed, and this requires that the learner must experience a rupture between awareness and aboutness; an un-happening or un-doing of experience. To overcome misunderstanding, a situation must be experienced in a different way and given that the same situation produces the same state of awareness, new understanding can only replace misunderstanding if consciousness is dislodged from the experience of the situation. This process of casting off our consciousness or un-learning is not easily achieved and it may be that it is for this reason that the solutions to problems seem to pop into our heads when our guard is down. This strange phenomenon of understanding resisting our most intense concentration but yielding suddenly and effortlessly when that concentration lapses, may be explained by the very process of attention in which consciousness is intensely and narrowly focussed such that the aboutness of a situation is tightly drawn around and encloses the awareness of the situation. To understand a situation differently is to

experience it differently by raising or shifting our consciousness of what the situation is about. In contrast, misunderstanding is a kind of perseveration of experience in which consciousness and awareness are locked together. Understanding and misunderstanding are both experiences in which awareness and consciousness coincide. But there are situations, in particular learning situations, in which we do not understand what we experience. Two kinds of non- or not-understanding can be distinguished in terms of awareness and consciousness; one in which consciousness strives for awareness; another in which awareness gropes towards and struggles to establish a clear and well defined consciousness. The former we can refer to as non-understanding and the latter as not-understanding.

Non-understanding is a problem of awareness not of consciousness and corresponds with what we usually mean by the term ignorance as distinct from innocence. By the term innocence we mean that a person has no awareness and no consciousness of a situation. To be innocent of something is to have no experience of that thing. In contrast, to be ignorant is to be ignorant of something and not about something. In other words, to be ignorant is not only to lack awareness of something but to know that one lacks this awareness. It is an experience of aboutness without adequate awareness. Visitors to foreign countries may not be aware of the nature of prevailing customs and acceptable forms of behaviour but may be conscious of or know about their existence. They are ignorant of but not about the situation. In principle, non-understanding is not an intractable learning problem. It may of course require strenuous efforts to acquire the necessary awareness, as in the case of ignorance of a foreign language, and a good teacher may be able to render the learning task less arduous. Most of the content of education is directed at transforming non-understanding into understanding (and the same applies to what Kuhn (1962) called normal science). To acquire content in a particular discipline is to broaden one's awareness and much of what is referred to as the learning of skills is concerned with the extent and efficiency of content learning. But a discipline is not merely a body of content or collection of facts. As the term itself suggests, it is a way of dealing with, and relating to, the aboutness of the content of the discipline and the absence of this kind of understanding should be distinguished from the non-understanding characterized by a lack of awareness or content.

Whereas non-understanding is a problem of awareness, not-understanding is a problem of consciousness and occurs frequently in learning situations in which a learner responds by saying, "I do not understand". If the not-understanding can be transformed by the simple expedient of repetition then of course the problem of the initial not-understanding is trivial. However, teachers are most vulnerable when confronted by learners who do not understand and for whom repetition has not been successful. The limitation of repetition in the face of not-understanding is that while it may serve to clarify awareness of a situation or problem, it does not address the aboutness of the situation. A simple example is a set of instructions that are not understood. If each word and sentence is understood on its own but not in their totality then a failure to understand is a failure to comprehend what the instructions are about. Not-understanding is the failure to reconcile the awareness of a situation with what the situation is about - its intentional object. Successful teachers (and learners) when confronted with a problem of not-understanding often use examples and analogies. The power of examples and particularly analogies is that they illustrate what the situation or problem is about and it

is this that can be detached from the awareness or content of the analogy and attached to the awareness of the situation or problem on hand.

Non-understanding and not-understanding are incomplete kinds of understanding but are not symmetrical in the sense that each is a mirror image of the other. Awareness is given by a situation. To be in or to experience a situation is to be aware of something. A lack of or inadequate awareness is corrected by creating appropriate situations. To the extent that awareness presents a problem for a learner, the solution lies in creating the kind of situation or happening that is revealing of the awareness or content that a learner may lack. Experimentation is one way to produce awareness. An experiment is a carefully contrived situation designed to elicit a happening; a method of controlling our experience and regulating our awareness of selected events. Although usually considered to stand in opposition to experimentation, participant observation of the kind traditionally employed by anthropologists is another way to produce awareness. Here the situation itself is not contrived. Rather the investigator contrives to place him/herself into situations that are constituted by the kinds of happenings the investigator wishes to experience. Methodology, or the means of investigation, is essentially a way of manipulating our experience to produce particular kinds of awareness. In this sense, scientific methods do not refer to the nature of the methods used, such as experimentation, but to the deliberate attempt to control and manipulate our awareness in order to render more complete our understanding of a given situation. But neither the intrepid fieldworker intent on participant observation, nor the meticulous experimenter bent on controlling variables, can proceed without a prior consciousness that anticipates the aboutness of the situations that the methods used are designed to capture.

All forms of investigation, or methodology, are expressions of aboutness. Both experimentation and participant observation embody the consciousness of the investigator in the sense that both are predicated on a prior understanding of what the situation they will encounter through their methods is about. Unlike awareness that is given by a situation, consciousness is the means whereby situations are precipitated. The methods we employ to generate data reflect our prior understanding of what the data will be about; what the happenings that constitute a situation will reveal. Method is the externalization or objectification of consciousness and the reason why we cannot deal in neutral facts or theory free data is because to do so is to eliminate consciousness. Prior understandings that are formalized are theories and theories are explicit statements that describe the aboutness of situations. Theories are the language of consciousness, and aboutness finds its most elegant expression in logic and mathematics. But only a small part of consciousness is formalized into explicit theories that find expression in prescriptive methodologies. For the most part, the language of consciousness through which our daily activities are conducted is clumsy, imprecise, and implicit (Geertz, 1993). But whatever its form, consciousness imposes itself as prior or pre-understanding in a kind of transcendental sense in which situations are only possible because they are constituted by a dimension of aboutness.

It is only when the experience of a situation does not conform to the pre-understanding or aboutness that the person brings to bear on a set of happenings that a condition of not-understanding occurs. The difficulty for the learner or teacher is to dislodge the pre-understanding that is fused to the awareness of a situation thereby distorting our experience of the happenings that constitute the situation. What we experience is con-

fusion, a condition of not-understanding. This is not the experience of a void that needs to be filled, or an absence of something that must be replaced by a presence. Not-understanding is a discordant happening or state of disharmony between awareness and consciousness. The tension we experience in not-understanding cannot be resolved by more intense awareness of the situation. On the contrary, the tension increases the more we attempt to impose an inadequate or inappropriate pre-understanding on a situation that requires to be understood in a fundamentally different way. New understanding can only be achieved at the expense of pre-understanding and requires an act of surrender<sup>4</sup> or what Ricoeur (1983:192) calls appropriation: "... a moment of dispossession of the narcissistic ego". In this sense, to surrender is to cease to act and to submit to the actions of the *other*.

The goal of an action is not the action itself but is the happening that is produced by the action. What I do may be experienced by another person as something that happens and, similarly, another person's doings may be experienced as something that happens to me. Consequently, the concept of action as a projection of aboutness or consciousness has more to do with happenings than with doings. But the concept of action conflates doings and happenings in the person of an agent who is both the subject of doings and the object of happenings. Agents do not usually produce reasons for their actions but rather provide explanations for the happenings that are brought about by their actions. (I closed the door because it was noisy. The unspoken and usually taken for granted reason is that the effect/happening of a closed door is to eliminate noise from the outside.) By conflating doing and happening in the discourse of agency (or agent) the essential duality or internal dialectic is lost or obscured in the figure of an autonomous actor who exerts a force or produces an effect. It is interesting that the term *agent* is also used to convey if not the opposite then at least the contrary meaning of an intermediary or mediator. Common to both senses is the idea of an actor with the power to produce effects but in the former case this power is invested in the actor whereas in the latter case the actor or agent acts on behalf of an *other*. In this latter conception, agency is a condition whereby the direction or goal of the action is not determined by the actor who nevertheless brings about the outcome or happening. It is the face of the *other* on whose behalf the agent acts that is obscured in the undifferentiated concept of agency. If the same term is used to refer to the *agent* who performs the action and the *agent* for whom the action is performed then the distinction is not only blurred but it implies that no such distinction is necessary. But ordinary language does distinguish between *I* who does the doing and *me* (or *you*), the recipient for whom the doing is done. The *me* is usually what we mean by the term *self*. If an action is something that not only is done, a doing, but is also something that happens, a happening that is experienced, then doing and happening are related to the grammatical terms *I* and *me* and a psychological conception of agency would entail an analysis and synthesis of what could be called the *ego* and *self* dimensions of agency. Hidden behind and in front of the *ego-agent* is the *self* on whose behalf the *ego* acts and for whom actions are experienced as happenings.

This conception of *self* does not imply an entity but neither is it merely a grammatical fiction as Harré contends or a "site from which a person perceives the world and a place

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<sup>4</sup> Gadamer (1975:299) comments: "Understanding is possible only if one forgets oneself. This is the demand of science".

from which to act" (1998:3). A very different and contrary view of *self* (as distinct from that of *ego*) is captured in what Ortega calls "the most essential difference between man and animal" in a passage that should not be paraphrased.

"But, you will ask, does man perchance not find himself in the same situation as the animal, a prisoner of the world, surrounded by things that terrify him, by things that enchant him, and obliged all his life, inexorably, whether he will or no, to concern himself with them? There is no doubt of it. But with this essential difference - that man can, from time to time, suspend his direct concern with things, detach himself from his surroundings, ignore them, and subjecting his faculty of attention to a radical shift - incomprehensible zoologically - turn, so to speak, his back on the world and take his stand inside himself, attend to his own inwardness or, what is the same thing, concern himself with himself and not with what is other, with things. ... Observe that this marvellous faculty that man possesses of temporarily freeing himself from his slavery to things implies two very different powers: one is his ability to ignore the world for a greater or lesser time without fatal risk; the other is his having somewhere to take his stand, to be, when he has virtually left the world. ... But the world is the whole of exteriority, the absolute without, which can have no other without beyond itself. The only possible without to this without is, precisely, a within, an *intus*, the inwardness of man, his *self*, which is principally made up of ideas" (1957:17-18).

The *self*, then, is the locus or centre of understanding and consciousness is a property of the *self* whose mode of being is understanding. To be aware and conscious of happenings is to understand and understanding is not something we do but something that happens to us. However, all understanding is mediated by action without which there are no happenings. Agency, then, entails a particular condition of internal mediation whereby the actions of the agent are experienced as happenings to the agent. The *self*, on whose behalf the *ego* acts, the understanding that grounds the reasons for action, is the *self* at whom the actions are directed. This circle of understanding, in which existing or pre-understanding is satisfied, preserves the identity of the *self* and can only be disturbed by actions that are not driven by *self*-understanding or conscious awareness, but are regulated from without, either by an alien consciousness, a *self* that is *other*, or by means of biological mechanisms that regulate the course and direction of action in relation to the constraints imposed by the environment.

Biological adaptation is a function of the interaction between biological mechanisms and environmental constraints in the process of which actions are regulated or adjusted to meet the needs of the organism which culminate in survival. Writing within the context of evolutionary epistemology (although unhappy with the term), Plotkin (1994:116) makes the bold statement that "Adaptations are knowledge." Within this explanatory framework, there is no need to posit or accommodate the concepts of understanding or consciousness, or to differentiate between *ego* and *self*. Birds do not need reasons for flying or fish for swimming. Flying and swimming are what they do; their way of being. Piaget's claim that "Intelligence is a particular instance of biological adaptation" (1952:3-4) can be understood in the same way. But we must take seriously his concept of the "epistemic subject" that is central to his theories of genetic epistemology. The epistemic subject is an abstraction, a one-sided or partial representation, of a larger reality that is constituted by life-size people. That the subject or agent of intelligence is a theoretical

construct does not detract from the theory any more than the concept of genotype detracts from biological theories for which it is a convenient device. But the consequence of this abstraction is that the conception of intelligence that is tied to the epistemic subject is likewise partial in its one-sidedness. For Piaget, intelligence refers to the organization or structure of action and its development entails the re-structuring or transformation of action structures constituted by sets of co-ordinated operations.

The actions or cognitive operations (or computations) that constitute this intelligence are what we mean by the term *Reason*, not in the *why* sense of intentional or purposive reasons we provide for our actions, but in the *how* sense of the operational structures that generate our knowledge of the world. The important point is that not only are consciousness and understanding unnecessary concepts for Piagetian theory, they are deliberately excluded in the abstraction from person to epistemic subject. It is precisely because children at different stages of cognitive development understand aspects of the world differently, that understanding is eliminated as an explanation for the regulation of the epistemic subject. To do otherwise would be to fall into the trap of the learning paradox in which new learning becomes a prerequisite for its own achievement. (In order to achieve conservation, children must already understand conservation principles.) Clearly, the actions that produce new understanding, such as conservation, cannot be derived from a prior understanding characterized by non-conservation any more than a paradigm shift can be explained by the previous paradigm against which the shift occurs.

Piaget refers to the process by which cognitive structures are progressively modified or transformed as equilibration. Although the term *self-regulation* is used to refer to the regulation of actions that must occur if and when new structures or organizations of mental actions take place, the word *self* is misleading. Piagetian theory does not posit any explicit concept of *self* and the concept of *self* or auto-regulation is used to exclude the possibility of *other*-regulation (e.g. teaching, instruction, or more generally mediation) as an explanatory concept. But by explicitly excluding other-regulation as an explanation for the development of intelligence or *Reason*, the theory must provide an alternative explanation or generative mechanism in terms of which actions are regulated or structures transformed by an agency other than the structures themselves. Piaget's answer (like those of other structuralists such as Chomsky and Levi-Strauss) is that the organization or regulating principle of action, the means by which action is structured, ultimately lies in the biology of the species as do the computational modules of the new cognitive scientists.

The epistemic or computational subject does not need reasons for *Reasoning* (or computing) any more than birds need reasons for flying. *Reasoning* is what people do as part of their nature. It is a way of being. To ask why concrete operational children reverse mental operations is like asking why birds fly. We can ask how flying is possible and we can ask how knowing is possible and, in both cases, it is not necessary that birds or people understand (are aware or conscious of) how their actions are regulated. It is also not necessary, in terms of a theory of action, that an epistemic subject or "aviatic" subject understand the happening that a particular structure of operations produces. On the contrary, it is understanding that is the undoing of the epistemic subject whose very creation (abstraction on the part of the theorist) entails the elimination of understanding. If a particular operational structure produces a

conservation response, the happening that the actions produce, as distinct from the actions themselves, is conservation. In this sense, conservation is a happening, something we experience as understanding. But the power and limitation of biological adaptation as an explanatory framework is that it does not rely on understanding or require the concept of an *understanding subject*. The reverse, however, is not true.

If understanding is mediated by action, then theories of understanding must, at some point, have recourse to theories of action whose ultimate explanation lies in the biological mechanisms that regulate action. The distinction between the *ego* and the *self* is that between the epistemic subject as the locus of action and the understanding subject as the locus of experience, between doing and happening. The dimension that is missing in the Piagetian conception of intelligence is understanding. The fact that Piaget's conception of intelligence cannot account for individual differences is not in itself as significant as the fact that it eliminates that very aspect of the intellect that accounts for creativity in every facet of life. Ingenuity, inspiration, and genius, clearly require something other than the formal operations that reduce all adults to the same common denominator. As a psychological theory of intelligence, Piaget's theory would fail the first test of any psychological theory; that it should explain the theorist in the same way that the theorist explains other people. What distinguishes Piaget's own intelligence (the genius that created his theory) from that of others is a particular distinctive way of understanding the world and the same is true of all the great creative thinkers who stand apart from their peers by virtue of an uncanny ability to use the same intellectual equipment or forms of *Reasoning* to produce new and different kinds of understanding. But this is not the only or even the most significant test that theories of this kind fail. A theory of intelligence, of the intellect or of mind, must explain why understanding does not always occur – must provide an explanation of how it is possible to answer to the question behind the statement, "I don't understand."<sup>5</sup>

The question of how understanding is possible receives only a partial answer from Piagetian theory. Cognitive operations are a necessary condition for understanding but do not constitute understanding. It is only by acting on things that we can explain them. But what we explain are our actions; what we do rather than what is done to us. In this sense, explanation is a description or account of actions whose goal is a happening that requires to be understood. The actions that constitute explanation are what we call *Reason*. Reasoning is something we do, not something we experience as done to us. In directing others to act as I do, I explain my-self by revealing my understanding. But the form of explanation, the means and medium through which I reveal my understanding or express my consciousness, is action. Understood in this way, mediation in the sense of instruction or teaching is a form of explanation rather than a communion of understanding. Consciousness or understanding cannot be communicated directly as an experience but can be explained by directing or regulating the actions of an-other. Conversely, in order to learn from others, to be instructed by someone other than my-self, to understand what others understand, to transform my pre-understandings, I must surrender my *self*, suspend my pre-understanding and submit my actions or *Reason* to the will of the *self* in whose consciousness I wish to participate. To submit to the *other* is

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<sup>5</sup> In the context of academic development and under-preparedness, there is a crucial difference between not understanding and not knowing; a difference that should underpin the design of foundation as distinct from bridging courses/programmes.

to surrender the *self* and this entails the suspension of agency. Conversely, to become an agent or to recover agency is to close the circle of understanding that is ruptured by not-understanding. Actions that are *other*-regulated are realized as happenings that are experienced by the *self* but do not originate in the consciousness that constitutes the pre-understandings of the *self*.

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