VII

PERSONAL KNOWLEDGE AND SCIENTIFIC MEANING

We can conceive of things existing independently of our existence. We saw in Chapter Four that this was also one meaning of the objectivity of theories for Polanyi. They can exhibit an independence of our "internal" and "external" experience. We also saw that we can affirm the existence of entities which we do not directly experience, because we can understand them. In fact, beings are more real for us as understood than as merely experienced. Everything said in the previous chapter can be considered as applying to beings existing independently of our existence. Before the rise of man they certainly existed independently of us. It may be tempting to conclude, then, that since they exist independently of us, we should detach ourselves from our personal concerns in our effort to know them. There is a fallacy here. Though knowledge can be of what exists independently of us, knowledge does not exhibit the same independence. We have seen that knowing 1s a human achievement. Though knowledge forms an ontological level of its own, materially instantiated in books, artifacts and nervous systems, it does not exist independently of any knower whatsoever. Similarly, human knowledge does not exist independently of all humans. This is why someone must carry on a tradition or else it dies out.

Throughout this work we have been developing Polanyi's view that scientific knowing is personal and that the knowledge which results from it is intimately tied to its human origins. In this chapter I will develop that argument further showing how the more impersonal knowledge of beings which are not human has personal roots and by extending the model of personal know ledge to the human sciences. This will permit us

to understand the unity of the sciences; a unity which also respects their autonomy.

1) PERSONAL FACTS

Polanyi directly challenges objectivism with his notion of personal facts. This idea will permit us to unify the points previously made. He states:

> To the extent to which our personal participation in knowing a fact contributes to making it what it is, we may call it a personal fact.

Correspondingly, facts can be more or less personal depending on our degree of participation. Likewise, one will consider facts as more or less personal depending on the degree to which he considers himself to participate in knowing them. Thus, insofar as the objectivist thinks that he does not participate in knowing certain facts, the facts will appear impersonal to him. Conversely, the more personal a fact, the more personal one must be to know it. Knowing, then, becomes a challenge to our personal existence. In knowing we modify ourselves in the process and the modification can mean a. transformation of the basic ideals by which we live, a deepening of our sensitivity, a basic reorientation of our feelings. There is also a correspondence between the greatness of a person and the greatness of his knowledge.

Before we go further into Polanyi's notion of personal facts, we should consider an important philosophical problem raised by Polanyi's characterization of them. As noted, Polanyi states that “our personal participation in knowing a fact contributes to making it what it is….” This statement has strong idealistic overtones. If knowing is a creation of the object for him, then Polanyi is an idealist. However, there is ample evidence that Polanyi does not consider himself an idealist. Entities have meaning in themselves which we do not create, but discover. Also, we judge with universal intent. This does not mean that our results are stated in universal terms, but that we judge

according to standards which we believe reasonable people to have. Thus, others, too, should come to the same conclusions we do. I have also used such terms as the "intentional integrating of the object", which is the mental integration of what is in fact integrated in nature. If we turn again to phenomenological terminology we can eliminate the idealist over tones of the above statement.

Our personal participation in knowing a fact is the constitution of the fact. Constitution is not the creation of a fact, but the coming to be of the fact for us as it is in itself. It is the mental integrating of the object, which is a creative act, guided by our intending of the object as it really is. This integrating is our personal participation in knowing the object. That participation is our indwelling of a set of subsidiaries which have a bearing on the focal whole we are intending. It is also our integration of the subsidiaries into a coherent, meaningful entity and the process of responsible judgment by which we posit the entity as existing. The higher the degree of indwelling, the more we personally participate in constituting the fact.

However, there are a set of facts which we do not merely constitute, but also have a hand in "creating". I am not referring here to human arte facts, but to sensibly experienced objects as sensibly experienced, and the realm of specifically human meanings. We bodily participate in the creation of the object as sensibly present. The fact, then, is not merely the object, but the object as experienced. This is a level of reality which only emerged with the emergence of sensitive beings. In grasping human meanings a different situation obtains. We can be the creator of the meaning, or we can understand what has been created. As understanding what has been created, laws or rules of a game, for example, we merely constitute the meaning.

2) PERSONAL FACTS, DESCRIPTIVE SCIENCE AND REDUCTIONISM

Polanyi thinks that the activity of personal knowledge is best illustrated in the descriptive sciences. Perhaps this is the case because the object as described is crea.ted in some sense by our senses in the constitution of it. We indwell sensible clues in an effort to identify significant shapes and wholes. The identification of species in taxonomy by looking at them requires a connoisseurship acquired by long practice. It is the development of a capacity we share with other animals, to recognize individuals of a particular kind. We also use personal knowing to recognize shapes in morphology. The recognition of individuals is also done perceptually.

It is generally thought that zoology and botany did not become sciences until they transcended their descriptive phase and became systematic and explanatory. The transcendence of the descriptive phase is associated with a devaluation of descriptive knowledge and the kind of personal knowing used in recognizing significant shapes and individuals. However, this kind of knowing is essential to these sciences, and any attempt to eliminate it pre supposes it. For example, Polanyi notes that a species is generally defined as "a world population of an organism where there is … a potentiality for an exchange of chromosomal material throughout the entire population." He goes on to say that "the genetic investigation of a population presupposes its morphological distinctness." Thus, the recognition of a species presupposes descriptive knowledge of it,

An example more to the point is offered by phenetic taxonomy. Its practitioners propose to make taxonomy an objective science by classifying species in terms of certain key features (unit characters). There is no need to go into the subt1ties of their analysis here. As Po1anyl concludes, the approach also relies on personal knowledge for

the identification of the unit' characters.

> …reference to them represents once more a claim to the identification of a typical shape in its variable instances,

In addition, morphology relies on judgments that the development of an organism 15 normal if the succession of shapes it assumes is "true to type", or normal.

Because science is empirical, and because we are embodied knowers, we must begin with descriptive knowledge in any science. Though we may go be yond this in our theories, the theories can only be scientific if they ex plain our experience. For this reason alone no science can be purely objective. However, there is a more important principle immanent in the above examples, and it is best illustrated if we turn to the recognition of individuals.

If we could not recognize a cat we could certainly not understand it, Analogously, we understand biological systems by attending to their comprehensive performance. Both individuals and systems can be analyzed into their parts only if we first recognize them as wholes. Concerning embryology, Polanyi has stated:

> The analysis of the process by which living beings are formed corresponds to the logic of achievement, as illustrated by the manner in which we find out how a machine works. We must start from some anterior knowledge of the system's total performance and take the system apart with a view to discovering how each part functions in conjunction with the other parts. The frame work of any such analysis is logically fixed by the problem which evoked it. Its content may be extended indefinitely and it may penetrate thereby ever further into the physical and chemical mechanism of morphogenesis; but its meaning will always lie in its bearing on living structures that are true to type, emerging from a mosaic of morphogenetic fields.

The same holds for the understanding of the developed organism upon which embryology relies. Anatomy specifies the parts of the animal, physiology specifies the function of the parts, and biochemistry specifies some of the operational principles of

the parts. All depend on recognition of the animal as an individual and an appreciation of its total performance. Consider, for example, the understanding of the brain. It is proving as difficult to "map" the brain as it is to map the earth. The dissection of its grossest structures by Klinger is considered a great achievement. The physiology of the brain is even more difficult, since its understanding re lies on an understanding of its anatomy, human behavior, and very complex organismic processes. There have been great scientific achievements in the biochemical understanding of the transmission of nerve impulses, but these will not be fully understood until they are integrated into an understanding of the anatomy and physio1ogy of the brain. Neither will the combination of these sciences yield a complete understanding of the brain until its bearing on human behavior is understood. Psychology enters the picture, and it becomes still more complex.

These considerations have important consequences for the problem of reductionism. If hierarchical organization is conceived imaginatively, reductionists want to understand organisms from below upwards; explaining each higher level in terms of the lower level preceding it. However, the actual course of understanding is from above downwards. We start with some notion of an individual's comprehensive functioning and then try to analyze it into its parts, understanding those parts in terms of their bearing on the complete function, and the function in terms of the complete individual. Though the individual is not always at the focus of our attention, it is our primary concern. Reductionists, however, engage in a destructive analysis that leads to the disintegration of the individual and its overall functioning for our intelligence. This is because the meaning of each lower level as part of a multileveled process is found in the higher level. The meaning of the higher level is not found in the lower level.

Reductionism is plausible only because of an epistemological error. One must advert focally to chemicals to understand parts of biological processes, for example. However, that understanding must then be used subsidiarily to understand the process as a whole. Similarly, that understanding may have to become a subsidiary element in a higher understanding of the life cycle of the organism. The reductionist generalizes the focal understanding of chemistry in understanding organisms and overlooks its subsidiary role. However, chemistry is significant here, is biochemistry, only because it is a study of the objects known in anatomy and physiology. If we started with biochemistry we would have no organisms to study, for, viewed focally, biochemistry is simply chemistry which "studies carbon compounds and a few others~ Reductionists think they can reduce biology to chemistry and physics because they have surreptitiously imported the "higher" sciences into their heuristic conception of organisms.

However, as we ascend the levels of existence, the understood entity not only becomes more complex, but more personal. Individuality becomes more pronounced and we are forced to rely increasingly on the same kind of understanding which we have of ourselves to understand the entity. This is evident if we switch our examples from physiological functioning and animal development to animal psychology.

We were introduced to the evaluative categories which come into play in understanding the higher achievements of animals. We understand their drives and efforts as analogous in some cases to ours. We understand them as making efforts to reach goals where these efforts display various degrees of intelligence. In the case of the most intelligent animals we can set them problems which we ourselves may have. As we ascend the levels of biotic achievements in the various species of animals we come

closer to the kinds of activities distinctive of humans, and we increasingly understand those activities in the same terms that we understand our own empathetic understanding emerges. Though this may be overly valued on the part of some pet owners, it is necessary in some degree to understand animals. Consider, for example, giving an animal a problem in learning experiments and evaluating the degree of intelligence an animal has by the degree of difficulty of the problems he can solve. We participate through indwelling in his perplexity (if he is a more highly developed animal), and in his solving of the problem we determine what a problem is for him in terms of what a problem is in general, and we get the notion of what a problem is in general by reflecting on what a problem is for us. In all of this we assume that he has powers to recognize and solve problems just as we do, though they may be of different degrees of difficulty. We c~ also recognize emotions in animals, especially mammals. We can recognize anger, fear, hunger and joy with little difficulty. The animal psychologist, then, develops the capacity we all have to understand animals.

Empathetic understanding is the understanding of others in a manner similar to the way we understand ourselves. It is most obvious in understanding other people, especially those we consider sane. In that case we conclude that there are certain basic commitments which we have in common with the sane person. If we consider him insane, then the same theoretical context we use in making that conclusion is also used to conclude that we, in contrast, are sane. Our involvement in knowing other people is greater than in knowing animals, and the increase in involvement is an increased enrichment of ourselves through our indwelling of the object of our interest. This capacity is evident in the imitative behavior of children. Though they cannot see themselves acting, they can duplicate the actions of someone else who they do see.

Similarly, there is a range of intersubjective experiences in which the other is spontaneously present to me in manners similar to the way he is present to himself.

Of course, empathetic understanding can be wrong since it too is an achievement. For example, the psychologist must "become" the patient he is analyzing. If he has a neurosis similar to the patient's, then he may not be able to distinguish between himself and the patient. As Carl Rogers once did, he may have to break off the analysis if he is not able to distinguish between himself proper and the assimilation of the object in indwelling.

Empathetic understanding is also convivial. We establish an increasingly convivial relation with the objects of our interest as we ascend the levels of being. "Pure conviviality … (is)… the cultivation of good fellowship." It includes the "sharing of experience (and) a participation in joint activities." More specifically, in learning from a master there is the sharing which is the imitation of him, the indwelling of his art as he practices it. Likewise, the assimilating of the object in knowing can be the forming of a link between one individual and another, even if that link is on the side of the knower alone. In scientific studies of animal behavior and in the human sciences there should be some convivial relation between the scientist and his subject.

Within Polanyi's theory the reason for this is easily grasped. We have found that intellectual passions are also related to the degree of meaning discovered. ~~us, even though one may be totally absorbed in the study of the atom, the beauty of the intelligibility of a human being is much greater than that of the atom. The love for beings, which is the emotional underpinning of knowing, becomes increasingly personal and, hence, convivial as we ascend the ontological scale. In being with other people, which is necessary for knowing them, we can be involved to our utmost. Analogously,

Konrad Lorentz lived with the animals he studied, even becoming the "mother" of a brood of ducklings.

Naturally, non-empathetic, non-convivial understanding of animal and human behavior is also possible. For example, animal behavior can be understood in terms of instinct, and, indeed, much animal behavior is instinctual. However, as one ascends the level of animal achievements, less and less of it is. Even though animals' interest may be fixed within a set of drives, the means of satisfying those drives become more innovative, and must be understood organismically. However, this is a problem to be resolved by animal psychologists.

If the understanding of animals must be empathetic and convivial, then that understanding is more of a personal challenge than understanding lower levels of existence. The scientist himself must be more personal. It may be that certain psychological types are more suited for particular scientific fields. If one has little empathy for other people, for example, it is more probable that he will have little empathy for animals. If this is the case, then it is possible that he will overlook a whole field of intelligibility in animal behavior. Likewise, if one is detached from his feelings in +he sense that he has an impoverished emotional life, then he is less likely to be empathetic, and the same reasoning holds. Thus, to be a good animal psychologist may mean to become more complete as a human being so that one can indwell more clues for understanding the object of his interest.

In conclusion to this section and in support of these final reflections, I will provide quotations from two leading ethnologists of our day. The first are from Tinbergen's Herring Gull's World as quoted by Grene in The Knower and the Known. Tinbergen is an avowed objectivist, but he too, at least indirectly, admits that he has a

convivial, empathetic understanding of the animals he studies.

> It is quite a thrill to discover that the birds you are studying are not simply specimens of the species Larus argentatus but that they are personal acquaintances …. Somehow you feel, you are at home, you are taking part in their lives and their adventures become part of your life. It is difficult to explain this more fully but I think everybody who has studied animal communities will understand how we felt.

Grene goes on to point out that though "the interpretation of gull behavior in terms of human subjectivity is rejected, the interpretation of human behavior in terms of gull behavior is not." She again cites Tinbergen.

> Much of what little understanding I have of human nature has been derived not only from man-watching, but from bird-watching and fish-watching as well. It is as if the animals are continuously holding a mirror in front of the observer, and it must be said that the reflection, if properly understood, is often rather embarrassing.

The possibility of understanding human behavior in terms of animal behavior is one of the motivations for Jeffrey Grey's study of fear and stress in rats. It is odd that neither he nor Tinbergen acknowledge the possibility of understanding animal behavior in terms of human behavior since, insofar as we can understand human behavior in terms of animal behavior, we can understand animal behavior in terms of human behavior. Why they put the emphasis on the reductive analysis is not puzzling if we realize that they accept objectivistic epistemological ideals.

However, one person who admits that he understands animals convivially and empathetically is Konrad Lorentz. He notes that

> …laughter, like greeting, tends to create a bond. From self observation I can safely assert that shared laughter not only directs aggression but also produces a feeling of social unity…. Something very similar may happen in the greeting ceremonies of many animals: dogs and geese, and probably other animals, break into intensive greeting when an unpleasantly tense conflict situation 1s suddenly relieved. (My emphasis)

3) PERSONAL FACTS AND UNSPECIFIABILITY

Polanyi claims that as we encounter beings of higher degrees of complexity the "logical gap between our comprehension and the specification of our comprehension goes on deepening," Polanyi makes the statement in the context of his discussion of personal facts. His contention is that the more personal our knowledge, the more we know without being able to say what we know. His examples of personal knowledge of this kind which follow that discussion are those of descriptive knowledge discussed above. Now there is a correlation between more complex beings and more detailed experiences. To grasp the actions of the beings on the basis of our experience of them we have to indwell the particulars we experience focusing on the coherence we seek. The more complex the being, the more complex the indwelling needed to understand it. However, now we come to a problem concerning unspecifiability which we met in Chapter Two. Knowledge of a coherence, such as a proper shape, will not be specifiable in terms of its particulars, but it will be specifiable in terms of itself. That is, it can be specified as a proper or normal shape. We may not be able to specify the subsidiaries of our comprehension, but we can specify the comprehension itself, though in descriptive knowing the specification will not match the richness of the object as experienced. Again, we may not be able to specify the ground of our knowledge, or how we know, but we may be able to specify what we know. However, as Polanyi notes, descriptive knowledge becomes more skillful as we ascend the levels of complexity. The logical gap in descriptive knowing is akin to that which exists between a skillful performance and the specification of how we do it. One may be able to recognize a normal shape, but will not be able to specify how he did it or all the clues he relied upon for realizing that it is normal.

The nature of the logical gap changes, however, if we turn from descriptive

knowledge to knowledge of correlations such as those manifest in machine-like and organismic processes. Polanyi fails to acknowledge this. This stems from an inadequate appreciation of explanation and jeopardizes the scientific character of explanatory thought.

Marjorie Grene, in her personal reminiscences of Polanyi notes that he admitted never being particularly interested in explanation. However, there is an implicit interest in explanatory knowledge in his theory of hierarchies and in his understanding of evolution. Different structures can be specified by relating their components to one another in an act of insight, Likewise, higher organizations of structures can also be specified. However, to paraphrase Polanyi, "the logical gap between the higher organization and the specification of its components goes on deepening." The levels become increasingly logically unspecifiable in terms of their subsidiaries. The most striking general case is an organismic process with a high degree of equipotentiality for achieving a particular end. The components can be organized in a number of ways to achieve that end, and a specification of the components would not yield a sufficient understanding of the manners of achieving the end.

Another way of looking at this same relation is to consider the increasing individuality of organisms as they become more complex. The degree of individuality is related to the degree, to which they are independent of lower level processes in their action and to the range of action they have. A greater degree of individuality is related to a greater degree of autonomy which in turn corresponds to more of a logical gap between the highest and lower levels.

Now, it seems that all of this is in principle specifiable. The only thing which may seem inexplicable is the emergence of higher orders. But that too can be

understood. though of course not in terms of the lower levels alone, if we acknowledge that we live in a universe which has a potential for higher orders. Of course, I am not claiming that everything can be explained scientifically. If that was the case, accidents would not be possible.

My point is that if we concentrate on an explanatory understanding of order, then, as we ascend the ontological levels we cannot claim that there is in principle an increasing logical gap between our comprehension and the specification of it. Though it is much more difficult to understand a per son than it is to understand a plant, and though that understanding of the person may rely on much ineffable knowledge of a descriptive nature, once we grasp order in the behavior of the person we can usually specify it. In accord with the logic of achievement it has to be understood on its own level and not on a lower one. But to claim that insights such as this become increasingly unspecifiable 1n the sense of being inarticulable pre vents psychology from becoming a science which can understand a person non reductively and still match the achievement of coherence of the natural sciences. In fact, to reject that claim, is to conceive psychology and the other human sciences as much greater achievements, for they presuppose the results of the natural sciences and integrate them in their bearing on the personal level, as well as understanding that level in its own right.

The problem is compounded because the higher level sciences have not reached the same relative degree of coherence as the lower level sciences. Descriptive knowledge is mixed and sometimes confused with explanatory knowledge. I think that Polanyi does the same thing. It is a grave weakness in his account that he does not stress explanatory knowledge as much as he does descriptive knowledge. Explanatory knowledge is a higher achievement of coherence; it is what is most attractive to

objectivist theorists; but it too has a basis in personal knowing. Turning once again to psychology, we must indwell the other person to gain the basis for grasping the coherence of his personal activity. To be concrete, explanation in psycho logy has to be personal. This issue demands much more attention than I have given it here. However, I think that I have made it sufficiently clear that there are two opposed tendencies in Polanyi concerning the specifiability in language of knowledge of higher level entities. It is a problem which needs to be resolved if we are to retain the scientific character of psychology and the other human sciences without making them too abstract, natural scientific or reductionistic.

4) UNDERSTANDING THE MIND

It will help to clarify the above problem and to illustrate once more the points made earlier in this chapter if we consider Polanyi's understanding of the human mind. The functioning of the mind includes the integration of bodily processes in their bearing on coherent realities and values. This is most evident in the development and practice of skills, but it occurs in all cases where sensitive processes are used for intelligent purposes and when we strive to perceive coherently. In these cases the integration of the body is in terms of realities in the world, be they human actions, which are themselves meaningful in terms of their worldly context, or other coherent realities. This is another way of noting that bodily activities as subsidiaries of tacit integrations are integrated through the intentionality of the person. We saw that the relation between the subsidiaries of an integration and the focal object are subject to the logic of tacit integration. Viewed ontologically, however, we can see that they are also subject to the logic of achievement and, in their inception, to the logic of' emergence. In fact, as the reader probably suspects already, it is the same logic in all three instances. With the

logic of emergence we are dealing with innovations, in the widest sense of the term. The logic of' achievement concerns the operation of normatively appraised operational principles. The logic of tacit integration is the logic of achievement applied to conscious processes. In the person who has an original insight the three logics become one. However, the notion that physiological processes are subsidiaries in intentional acts suggests that there are two ontological levels operative in the mind, both of which are present to the subject, but usually in different ways. The physiological processes are present subsidiariliy in their bearing on the focal objects. They are our means of indwelling the object. Though we are aware of the object through them, we are not focally aware of them, but only subsidiarily aware. They contribute, for example, to the constitution of our phenomenal field of experience, but our awareness of them is not always as items within that field, but as the field itself. This appearance of them is the phenomenal aspect of tacit integration. It is possible, because indwelling is both assimilative and projective. Thus, it is generally when our body is functioning improperly that we are focally aware of it, Also, if the body is altered through drugs or disease drastic alterations in the perceptual field may result. As Polanyi notes:

> … we observe external objects by being subsidiarily aware of the impact they make on our body and of the responses our body makes to them. All our conscious transactions with the world involve our subsidiary use of our body. And our body is the only aggregate of things of which we are aware almost exclusively in such a subsidiary manner.

Besides the phenomenal aspect of tacit integrations, the relation of mind and body also displays the functional aspect. The instrumental aspect of the body is perhaps it's most obvious, being, literally, that with which we work. Again, the body plays a subsidiary role as an instrument, for our attention is focused on work in the broader sense, the task at hand. Physiological processes in imagining, feeling, speaking and so on also have a

functional aspect. Examples could be multiplied endlessly.

A third aspect, and the most significant for our present purposes, is the semantical. Polanyi states that the mind is the meaning of the body. What this means is that the human mind is the highest integration of human activity, If biotic achievements and the mental integration of them are conceived as a series of cycles within cycles within cycles …, until we reach the life cycle of the organism which is a cyclic organization of the subsidiary cycles, then the life cycle of human beings is within the realm of the intention of coherent reality and values. It is the repetition and origination of meaningful acts which constitute our lives in the highest sense, and it is this integrative behavior which is the result of harmonious physical and psychical functioning, with the mind conditioned by and providing the boundary conditions for physiological processes. Understanding a brain cell, then, which is integrated within conscious functioning, requires understanding it physically, chemically, as resulting from and embodying a set of biotic achievements, and as part of the nervous system providing the potentiality for higher level functioning. In turn, one must understand that functioning to understand the cell in action just as one must understand human physical activity and human emotions to understand the full range of activity of the circulatory system. Understanding the higher level functioning involves understanding the full range of human activity, from private psychic experiences to social relations and from recreation to serious intellectual endeavors. What I have been developing here in an extremely brief fashion is the notion introduced at the beginning of the previous chapter that the possibility of integration of a lower level process is the possibility of greater meaning for that process, understood in its bearing on the higher integration. When we find that the function of the process is to be integrated in a higher level of achievement,

then the meaning of that process is found in the higher level achievement. Thus, Polanyi can claim that the meaning of the body is the mind.

The mind encompasses two ontological levels for Polanyi.

> I am speaking here of active consciousness, which excludes incoherent dreams or pathological bursts of temper. Active consciousness achieves coherence by integrating clues to the things on which they bear or integrating parts to the wholes they form. This brings forth the two levels of awareness; the lower one for the clues, the parts or other subsidiary elements and the higher one for the focally apprehended comprehensive entity to which these elements point. A deliberate act of consciousness has therefore not only an identifiable object as its focal point but also a set of subsidiary roots which function as clues to its object or as parts of it. This is the point at which our body is related to our mind.

Active consciousness comprises the set of tacit integrations which are epistemological and ethical commitments. Active consciousness sets its own standards for itself and regulates itself in the attempt to meet those standards. But we rely on the body. As in any dual-level relation the higher sets boundary conditions for the lower and is in turn limited by the potentialities of the lower for higher integration. Thus, images emerge which are helpful in solving a problem. In some manner the drive to understand provokes the emergence of images which have a bearing on the solution to the problem, but we do not have complete control over which images will emerge. Similarly, we can understand how to perform some skill, but our body may not respond as we want it to. Likewise, the neurotic can repress his feelings, but that repression is never complete. We rely on, but do not dominate, the body. That understanding relies on neural processes is not difficult to understand or to establish. Consider solving a word jumble, UERBUA for example. There are at least two strategies which can be followed, The first is to mentally try various permutations. This relies on our ability to mentally juxtapose images. As research into the brain has shown, this relies on the proper

functioning of neural pathways, since lesions in the brain can cause people to confuse right and left for example. We can actively engage in the permutation. However, if one pays close attention, we can sometimes catch ourselves spontaneously permutating without any intervention of active consciousness. Active consciousness may have recognized and set the problem to itself, but there are periods where the imagination works on the problem while we are actively concerned with something else. This happens to such an extent that one acquires a disciplined mind with great difficulty. Those adept at meditation, for example, have to go through a prolonged period of practice in concentration before they acquire the habit of contemplation, which, in Polanyi's terms, would be the ability to fully indwell an object (in the broadest sense of that term) without having extraneous concerns interfering and without actively excluding those concerns. Another strategy which can be pursued is associating words with one another which use some of the letters used in the jumble. This strategy can rely on either visual or auditory clues. Again, the association of similar experiences and objects with one another can occur spontaneously without the intervention of intelligence. Experiments with epileptic patients have shown that this power too relies on physiological processes. In fact, in the evolution of intelligence we can conceive that the evolution of the capacity of association was the perfect prelude to the emergence of an intelligence which can grasp universals. In the above example, however, association is in the service of grasping the integration, which is "Bureau". Now, I have only pointed to two physiologically based functions on which the solving of this problem relied. There are many more. For example, checking that the example which emerges in the imagination is a word and is the correct word relies on memory. The specification of these and other processes will be necessary for a complete understanding of the brain.

How is the power of active consciousness to exert what control it has over lower level processes to be conceived? Polanyi provides a clue towards the end of Personal Knowledge.

> It may be important to distinguish here between action and decision. The action of mechanical forces transforms potential into kinetic energy, and the action of biotic fields may be regarded as analogous to this. But mechanical effects can be produced without force, merely by selection, as in the case of a Maxwellian demon which can compress; a gas indefinitely by effortlessly moving to and fro a frictionless, perfectly balanced shutter. This offers a possibility for conceiving the action of the mind on the body as exercising no force and transferring no energy of its own. Indeed, since it is the peculiar function of the mind to exercise discrimination, it may not even appear too far-fetched that the mind should exercise power over the body merely by sorting out the random impulses of the ambient thermal agitation. We may bear this possibility in mind whenever referring to autonomous centres of decision.

There is a great need for more work in this area.

Polanyi's position is both dualistic and interactionistic. It is dualistic for there are two ontological levels functioning in the mind. However, it is not the dualism of Descartes where there is a strict separation of mind and body. Rather the mind is the integration of the body._ The person is the unity of mind and body where the unity is understood hierarchically. The integration of physiological processes by the mind and the conditioning of the acts of active consciousness by the potentialities of the nervous system are examples of the interaction of mind and body. Polanyi attributes Descartes dualism to viewing both the mind and the body focally, instead of recognizing the subsidiary function of the body in the action of the mind. Epiphenomenalism and psycho-physical parallelism are both ruled out by Polanyi because active consciousness is an integration of the lower manifold. Lower level processes do not account for active consciousness, nor are they isomorphic to it.

The mind-brain identity thesis is one of the most popular positions today and

refutation of it on Polanyi's grounds will help us understand his position more fully. Mind-brain identity theorists such as Smart and Feigl concentrate on understanding the content of sensing and the imagination as physiological processes. They see no contradiction in describing these in both physiological and psychical terms, where the physiological account explains the psychic phenomena, or the propensity to use psychic rather than physiological language to describe these experiences. In physics we encounter similar situations. The phenomenological theory of gases, established on the basis of experiential qualities of gases, can be explained in terms of the kinetic theory of gases which postulates unobservable entities. Likewise, they think that the phenomenological characteristics of the mind can be explained in terms of processes not experienced by the mind in its operations.

This stand gains part of its force from the restriction of attention to sensing and imagining processes which have a physiological basis. However, they have functions as conscious which can only be understood in terms of conscious acts. As Polanyi notes, we use two different kinds of language to describe physiological and conscious processes because we understand two different kinds of processes. For example, most people would accept prima facie the validity of experience in its own right, though the role it plays within the cognitional process may be disputed. The man of common sense, at least implicitly, and the empiricist philosopher, explicitly, accept it as having some definitive, incontrovertible role in judgments of fact.

Experience is not indubitable. There are perceptual illusions such as the straight stick which appears bent when it is half in and half out of the water and the twinkling of stars which in fact do not twinkle. There can also be errors on the side of the person such as hallucinations. However, this merely shows that experience in itself 1s not

sufficient for us to know what reality is, not that experience cannot be validly appealed to in judgments of fact. The claims that someone is suffering a hallucination and that someone is not, both rest on appeals to the experience those people have of themselves and the experience we have of them.

Unless we are merely passive spectators with mechanistic minds, we cannot use our experiences as evidence for claiming that experience is mere¥ the activity of a set of brain processes. Because we must have some experience of the sets of neurons to verify that our experiencing is in fact the activity of neurons, we presuppose the validity of our experiencing in itself in order to claim that experiencing is merely a set of brain processes. Though much experience, such as sensing, is certainly a set of biological functions, at least in part, as giving us some access to the sensory world it serves an epistemological function. If we claim that that epistemological function is actually performed in some other "realm" besides consciousness, then we cannot be empirical and appeal to our experience as evidence for that claim without begging the question. Thus, physiological processes have a function in making contents available for consciousness~ but as available for consciousness they assume comprehensive qualities not explicable in terms of physiological processes alone because they have a conscious function. If we turn to active consciousness the situation is clearer, for it is a contradiction to consider active consciousness as unconscious.

The understanding of consciousness provides us with a different situation than the understanding of non-conscious processes, such as the theory of gases. If we consider processes which are intrinsically conscious, then the processes as experienced and consciousness as present to itself have to be taken into account as experienced. In understanding the kinetic theory of gases we begin by trying to understand what we

experience, not experience and the conscious operations by which we understand that experience. Though our data in physics is in some sense experiential and though we verify our hypotheses in experience, in understanding gases, for example, we quickly transcend our experience. We try to understand gases as they are even if we are not around, not merely as they appear to us. But if we try to understand our conscious operations, and an intrinsic characteristic is that they do appear to us, then they must be understood as appearing to us. If this understanding is of an integrated set of acts, which are integrated in their bearing on an integrated object, and which are self-regulatory, then we have grounds for assuming that they constitute an ontological level of their own.

This brings us to another point. The mind-brain identity thesis is invoked as a more economical account of the mind, accounting for the mind in terms of one, rather than two, sciences. But if the mind is a dynamic integrating which can itself be understood as an integration by grasping the structure immanent in our experience of it, that is, without recourse to an understanding of physiological processes as focal objects in its operation, then it is more parsimonious to accept that understanding as an understanding of a distinct ontological level, than to postulate the existence of correlative physiological operations for which there is as yet no firm evidence.

We find the same general structure in the mind that we found at all levels of existence beyond that of physics and chemistry. However, in the case of the mind the logic of achievement is identical with tacit logic. This presents some problems for the scientific study of the mind,

The basic one is that the neurologist must understand the mind as experienced to understand the mind physiologically. Otherwise, he does not know what the

physiological processes' functions are. The best he could do is to tell us how they work without being able to tell us what they do, for they are integrated in their bearing on higher achievements. Thus, we find a similar situation in understanding the mind that we had in understanding the body, If we wish to reduce understanding to neurophysiological processes, we must first determine what it is we wish to reduce. If it is understanding as we grasp it in tacit integration, then to reduce it to neurophysiology is to characterize it in terms of subsidiaries which are meaningless as "understanding" unless they are integrated in their bearing on understanding as experienced. But if they are integrated in their bearing on understanding as experienced, then it is clear that the meaning of understanding is not found in neurophysiology. Rather the meaning of physiology concerning the question is found in an understanding of understanding as experienced.

The above is an argument for Polanyi's view of the logical impossibility of objectivising the mind. Polanyi notes that "Mind is not the aggregate of its focally known manifestations, but is that on which we focus our attention while being subsidiarily aware of its manifestations." He makes this point in the context of a discussion concerning the possibility of understanding another person's mind. To objectivize the mind in that case is to fail to acknowledge the personal dimension. Oddly enough, it is only by acknowledging the personal dimension that we can objectivize the mind, and this is the primary argument for the autonomy of consciousness. The reductionist presupposes the personal dimension just as the reductionist empiricist has to presuppose the autonomy of consciousness to conclude that it is reducible to neurophysiology. While my earlier argument rested on the fact that we at least implicitly accord validity to our experience, Polanyi's rests on the fact that

we must have a comprehensive understanding of the mind before we can reduce it. Since reduction tries to eliminate the possibility of such an understanding (or tries to account for it on grounds other than itself), it undermines its own effort. Polanyi would have us conclude that "To objectivize the parts of conscious behavior must make us lose sight of the mind and dissolve the very image of a coherent behavior."

So far I have been concerned with our understanding of the mind insofar as it is specifiable. In this case the mind is considered as an integration in its own right where what the integration is can at least in principle be specified. Indeed, if physiology is to have a bearing on understanding the mind, this organization must be specifiable. On the other hand we are faced with Polanyi's claim that as we ascend the ontological hierarchy the gap between our understanding and the specification of it keeps broadening. Viewed explanatorily, the logical gap between the mind and the body is the greatest, for conscious processes are radically different from non-conscious ones. However, turning to the understanding of others in everyday life, from which the psychologists specialized understanding develops and on which it constantly relies, we find that we do know much more about others than we can tell. That knowledge is unspecifiable in terms of the subsidiaries by which we grasp it. For example, in discussing behaviorism Polanyi notes that they mistake the subsidiary role which the awareness of others' actions plays in understanding what others mean with the focal awareness of that meaning. In other words, we understand other minds by attending to their bodily expression and speech, but as noted above, those expressions are not the others' minds.

Much communication is non-verbal. Expression can be incredibly nuanced. Consider the range of facial expressions, for example. Knowledge of other minds is knowledge of what is for us intangible mediated by our experience of the tangible, or

sensible. We can learn things about others by attending to what they do not attend to themselves. Once we know a person well, or even if the person is from our own culture, we may need to pick up only one or two key clues to grasp their meaning, mood, or intention. However, we may not be able to specify what those clues are. Here again we find an incipient distinction between descriptive knowledge and systematic knowledge. As in the discussion of unspecifiability in Chapter Two, I think the tension between the two can be resolved if we acknowledge that the knowledge is in fact tacit, that we do know more than we can tell, but that in principle it need not be tacit. It can be specified, but that specification would not change the tacit character of the knowledge and the knowing in action. At best it would provide maxims for the practice of an art.

5)UNDERSTANDING SOCIAL RELATIONS

6)

In the discussion of the structure of the scientific community we saw how common commitments made by free individuals can unite them in pursuit of a common goal. The unity of the scientific community depends also on the mutual respect scientists accord one another and the conviviality of the group. The product of the group commitment is a body of superior know ledge which is both a cultural achievement and guide. We saw that much of it is assimilated tacitly within the relationship of master and pupil. We can expand that analysis by introducing the notion of a person's calling.

Using the analogy of morphogenetic fields, Polanyi considers science developing by pursuing a gradient in a heuristic field. There is a field because there is a body of knowledge to be achieved which, for its achievement, depends on a certain development of the ~~owing being. The field is heuristic because the knowledge is not yet achieved but is anticipated in the same way we recognize problems. Gradients in the field are those areas the pursuit of which would be the most fruitful. Following other strategies of

research would result in dead-ends. Results would be less and less valuable.

A person entering the scientific tradition is endowed with a range of natural talent and a set of interests. He must appraise the subject matter of science as much as possible, determining in conjunction with his teachers the areas of investigation for which he is best suited. The combination of interests, talents and possibilities for research constitute the novice's calling. He finds himself attracted to a particular field, or fields, and works in them in accord with his ability. In turn, his creativity may serve as the catalyst for resolving certain problems within the field leading to the development of science. Other intellectual disciplines may be understood in the same fashion. There are also analogies which can be drawn with the transmission of artistic, practical and political knowledge. The key to understanding the social transmission of knowledge is an understanding of commitment and the manner in which it binds or divides groups.

Instead of pursuing that line of inquiry, I would like to return to Polanyi's hierarchy theory and show how we can conceive of social relations and the society they constitute as personal and as having comprehensive features (i.e., the acceptance by the scientific community of a theory) without understanding the group as a mere aggregate of individuals at the one extreme nor as having a group mind whim exists over and above the existence of individual people at the other extreme.

Brodbeck defines a group property as follows:

> When the property is attributed to a group collectively, so that the group itself is logically the subject of the proposition, rather than distributively, in which case "each and every" member of the group could logically be the subject of the proposition, then we have a group property.

For example, if we consider a baseball team, we would claim that the team won or lost, not that each individual won or lost. However, in boxing we could claim that the

individual lost or won. If we pursue the team analogy, I think we can arrive at a middle position. A baseball team is composed of individuals, each of whom has a set of functions which are in turn related to certain situations which arise on the playing field. Though this analysis could get extremely complex, all I want to conclude at the present time is that a team is at least a two-leveled organization. The individuals are akin to parts with certain functions, and when they are interrelated in certain ways, certain consequences have a greater probability of following. Their functions are defined by the rules of the game and the strategy of the manager. Their functions are also conditioned by their abilities, but I will leave this out of consideration. Two major differences between a baseball team and an organism are that the baseball team is a product of human intelligence and that the parts of the team become parts through their own commitment of themselves. However, while a baseball team cannot be completely explained without reference to its origin in intelligence nor without reference to the individuals that compose it and their commitments, it also cannot be completely explained in terms of such references. One must have recourse to an account of the rules of the game and its strategy. These are human creations which transcend commitment. What needs explaining is the organization of the team, and the organization of the team presupposes the commitments and discoveries of the members, just as the organization of living beings presupposes physical-chemical laws. Thus, it is not completely explained in terms of its origin nor in terms of its parts, for neither of these can specify what the organization is. This can only be specified in terms of the organization itself. When life emerges from inorganic matter, there is also the emergence of a new thing. However, we need not consider a baseball team to be a thing. Thus, the emergence of a social group, such as a team, need net be considered to be the emergence of a "group

mind". Instead, we have a set of minds, each with different functions in the context of the group, organized in terms of a common purpose. However, the group also cannot be explained in terms of an aggregate of individuals. One must explain the group in terms of the individuals as organized, not merely in terms of properties which each and every member of the group possesses in common. This is because they give rise to group properties (i.e., victory) by functioning in different ways.

7)THE UNITY OF THE SCIENCES

8)

In discussing Polanyi's ontology we have been developing an extremely complex view of the object of knowledge. It is in Polanyi's metaphysical view and its central notion of a multi-leveled thing that we find the central terms and relations which will allow us to account for the autonomy and the unity of the sciences. The primary reason for considering the sciences to be autonomous has already been pointed out. They study different ontological levels of being. Hence, they cannot be translated into one another. However, it is much more difficult to conceive their unity. Again we may turn to the object for our primary clues. The levels are unified in the object. To understand man we have to take into account at least physics, chemistry, biology, psychology and the full range of the human sciences. How are they unified? The unity of the sciences is grasped through a series of tacit integrations of the particular integrations manifest in the object and in another series of tacit integrations which discerns the general structure of the integrations in the object. This second series yields a hierarchy theory. Finally, there is a series of tacit integrations of the acts of tacit integrating which comprise science which discerns the common bearing of the acts on the multi-leveled object. It is in this series of integrations that the unity of the sciences is seen to depend on a unitary intending of the meaning of the object, but an intending which manifests itself in diverse methods

appropriate to understanding different aspects of the object, In its own recognition of itself, the intending must make leaps akin to those of evolution in which a set of subsidiary operations and views are integrated boldly into a new heuristic conception of the object not specifiable in terms of prior knowledge. The unity of the sciences, then, has its ontological basis in the unified object, but is to be discovered in the self-objectification of the scientific process, for it is the subject of that self-objectification, the person, which is the basis of the multiple, but common orientations of the human intellect and human decisions in science.

However, one may still wonder how this unity is to be conceived. Robert McRae in The Problem of the Unity of the Sciences notes that

> As an initial and minimum description of the unity of science, it may seem safe to say that there must be two elements present. In the first place it might be said that a science is one in virtue of possessing one subject-matter which is peculiarly its own, so that there is some knowledge which can be said to belong within that science, and other knowledge which is excluded … Secondly, it might be said that the variety of knowledge contained in the science will be unified in a certain logical structure.

It should be clear that the unity of the sciences is not that of a single science, for Polanyi. Even if two sciences regard the same object, still they are concerned with different aspects of the object. Likewise, the connection between disparate sciences is not strictly logical. It is logical in the sense of tacit logic, which corresponds to the logics of emergence and achievement. However, this logic is not one of deducing conclusions from premises. It is, rather, the grasping of the "implications" of subsidiary elements in their bearing on a focal whole in tacit integration. Similarly, the sciences are not united because there is one method common to all of them. However, each of the methods is a specialization of human knowing. Though they are not identical, there are common key elements The most general are observation, understanding and responsible

judgment.

Each method is trying to discover some aspect of the reality of the object. There is, then, a unitary intending in science which is manifest in different ways. As mentioned above, the diverse results of the various sciences can be related to one another in the same general manner in which they were discovered, through tacit integration. This corresponds to the relationships of the different levels of being in the object in emergence and achievement. This is a broader instance of the isomorphism between knowing and being.

The unity of the sciences on the side of the object can be discerned through science alone; that is, in doing science the unity of the sciences will be actualized. However, the unity can only be conceived on the side of the person through an epistemological analysis. Likewise, the integration of the two notions, as well as the affirmation in the face of reductionists' arguments that this hierarchical scheme is true, can only be achieved philosophically. At this point we have the conception of a metaphysics which includes the results of science in the context of a higher-level theory of subjectivity--a theory of personal commitment in science.

This conception allows for the autonomy of the sciences and for the integration of the natural sciences with the human sciences, philosophy and religion. What the integration is in fact would require a set of books. Also, I believe it is, for the most part, yet to be discovered. However, it is possible to indicate in the most general terms the possibility of such an integration. The natural sciences are related to the human sciences, and the human sciences to philosophy, and philosophy to theology as a set of particulars is related to their higher integration. For man this means that he may discover a higher meaning and purpose in political philosophy, the intersubjective

group, the state, metaphysics or religion, for example, beyond the meaning attributed by him to himself in the natural sciences alone. As noted above, this schema provides for the autonomy of the lower level, while unifying it with the higher in accord with tacit logic.

7) A MEANINGFUL UNIVERSE

The foregoing is extremely schematic, but it can be broadened on the side of the subject and the object by discussing the increase in intrinsic interest and meaning as one ascends the levels. As knowers we are interested in meaning. The more meaning there is, the more we are interested. For Polanyi, meaning is intrinsic to beings. Thus, we can conclude that being has an intrinsic interest for us. Analogously, each level of being has an intrinsic interest. However, since each higher level presupposes and adds to the meaning of the lower, it follows that a higher level of being has a greater intrinsic interest than a lower one. It also follows that there is more being on the higher level than on the lower. Now, if one takes only a superficial overview of human knowledge it is obvious that man has had the greatest interest for himself among the natural objects of the universe. Natural science comprises only a part of knowledge, and even here much of the research is done in terms of its bearing on man. Within Polanyi's schema this is not difficult to understand, for man, being the highest natural level of biological and personal achievement that we know, has the highest" degree of intrinsic interest. Coupled with this interest in knowledge for its own sake is the need for man to live his life intelligently and responsibly. Thus, the position we in fact accord man in practice is both philosophically intelligible and justifiable.

This also means that as we ascend the levels of being in knowing them, we become more involved in our subject matter. In support of this is the simple and

relatively uninteresting correlation that the more there is to know, the more we can be involved in knowing it. Analogously, one may become more involved in arithmetic simply by doing more problems. However, the quality of the involvement also changes. As we ascend the levels our involvement becomes more personal. "(O)ur subject matter will tend to 1n elude more and more of the very faculties on which we rely for understanding it." In short, the subject matter becomes more and more like us, so that in appraising it we are increasingly appraising ourselves also. Eventually, we are led to appraising our acts of appraisal.

The appraisal of life in terms of success and failure introduces a normative element into the knowledge of living things. The analysis of animal sentience, perception, intelligence and knowledge involves us in normative appraisals which will rest in part on our views of human knowledge, as sentience, perception and intelligence. This dependence increases as we study animals with greater intelligence. In human psychology an identity is established. We become involved through indwelling, and the increase in involvement is an enrichment of the person by indwelling the object of his interest.

Finally, within this context the Laplacian vision displays its meaningless. The logics of emergence and achievement are powerful arguments against the possibility of predicting the course of the universe from the positions of physical-chemical entities and the laws governing them. Moreover, Polanyi notes:

> My main criticism of the kind of universal knowledge defined by Laplace is that it would tell us absolutely nothing that we are interested in.

This statement is a bit too strong. If we are interested in physics it will tell us something of interest. However, the point is that, given the implausibility of reduction, Laplace's

knowledge relative to the other levels of being has little intrinsic interest. This is basically because these levels, being autonomous, cannot be defined in terms of this knowledge. It was the possibility of so defining them which gave Laplace's metaphysical view its great intrinsic interest. However, once a hierarchical conception is affirmed his universe becomes relatively uninteresting and meaningless, and his theory is seen to derive its power for fascinating us from a pseudo-substitution of physical science for metaphysics. In contrast, Polanyi's view, of which I have indicated merely the outlines, is compatible with, and discloses the possibility of, fulfilling the passionate, intelligent and responsible metaphysical needs of men and women.