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The Basic Act of Understanding (Part 1)

And That Will Settle the Manichees!

There is one casual anecdote about St. Thomas Aquinas which illuminates him like a lightening-flash, not only without but within. For it not only shows him as a character, and even as a comedy character, and shows the colours of his period and social background; but also, as if for an instant, makes a transparency of his mind. It is a trivial incident which occurred one day, when he was reluctantly dragged from his work, and we might almost say, from his play. For both were for him found in the unusual hobby of thinking, which is for some men a thing much more intoxicating than mere drinking. [He was invited by the King Louis IX of France to a banquet and he felt obliged to attend.]

. . . Somehow they steered that reluctant bulk of reflection to a seat in the royal banquet hall; and all that we know of Thomas tells us that he was perfectly courteous to those who spoke to him, but spoke little, and was soon forgotten in the most brilliant and noisy clatter in the world: the noise of French talking. [The banquet proceeded with the usual pomp and ceremony.]

. . . And then suddenly the goblets leapt and rattled on the board and the great table shook, for the friar had brought down his huge fist like a club of stone, with a crash that startled everyone like an explosion; and had cried out in a strong voice, but like a man in the grip of a dream, "And that will settle the Manichees!" [Some consternation ensued but King Louis kept his cool.]

And he [King Louis] turned to his secretaries, asking them in a low voice to take their tablets round to the seat of the absent-minded controversialist, and take note of the argument that had just occurred to him; because it must be a very good one and he might forget it.[1]

1. Chesterton, *Saint Thomas Aquinas,* 49–51.

Introduction

Finally, it is now possible to describe the basic act of human understanding in this and the following chapter. There would seem to be a basic act of understanding, which is the prototype of all acts of understanding. It is possible to divide acts of understanding into genus and species. In these two chapters I describe the genus; in subsequent chapters I will describe the species, namely, particular forms, or kinds or variations of this basic act. There, I will identify such species as reflective insights, inverse insights, deliberative insights, introspective insights, and higher viewpoints. For the moment, I shall concentrate on the basic act and its characteristics.

I will be taking the position that there are five essential characteristics of the act of understanding: (1) it arises from the desire to know, (2) it has an active component, (3) it has a passive component, (4) it leads to an idea that emerges from an image, and (5) the idea passes into the habitual texture of the mind.[2] The first three of these characteristics will be treated in this chapter, and the remaining two will be addressed in the following. My treatment will follow these characteristics sequentially for the sake of good pedagogy. The reader is encouraged to keep in mind his or her own experience of understanding and, perhaps, focus on one specific occasion when he or she had a great idea and it worked.

First, some clarifications about terminology. The word "insight" is used in this text as a synonym for the act of human understanding; it conveys exactly the same meaning. It is not intended in any other way than a simple act of understanding. It is not intended in any mystical, religious, emotional, or mystagogic sense. It is not a conversion experience, a change of life experience, or a purely emotional experience. In the opening citation, Aquinas had an insight; he grasped an argument that he could use against the Manichees. It was primarily an act of human understanding, even though it was accompanied by his own excitement, not to mention the consternation of the guests.

I will exercise great caution using the word "intuition." Intuition in ordinary usage can mean, a guess, a hunch, or a feeling for a solution without any philosophical implications. There is no problem with that general usage in those contexts. However, in a philosophical context the term "intuition" often refers to acts of knowing through the senses or acts of intellectual knowing, which are interpreted to be simple, direct, and immediate contact between the knower and the known. Descartes, Kant, Bergson, and Husserl seem to have used the word to imply that knowing is a simple, single act of

2. This is a slight variation on Lonergan's five characteristics of insight outlined in Lonergan, *Insight,* 28. The difference is merely pedagogical and not substantive.

contact between a subject and an object. This is almost the polar opposite to what is referred to as insight. Whether we have insights or intuitions is an empirical question that I hope to resolve through this description of the act of understanding.

I use the terms "intelligence" or "intellect" as cognates with the act of understanding. Aquinas used the term *intelligere,* meaning simply "to understand." To be intelligent means to be able to understand quickly, easily, and critically. For the most part, we have little difficulty distinguishing between those who are intelligent and catch on fast, and those who are unintelligent and struggle to catch on at all. Psychologists have much to say about intelligence, measuring intelligence, intelligence tests, intelligence quotient, multiple intelligences, emotional intelligence, and the like; their usage sometimes differs from what I present here. There is intelligence involved in art, in music, in religion, and in various other areas of life. There is intelligence involved in most of our activities in one way or another. Howard Gardner identifies seven kinds of intelligence: musical intelligence, bodily kinesthetic intelligence, logical-mathematical intelligence, linguistic intelligence, spatial intelligence, interpersonal intelligence, and intrapersonal intelligence.[3] My focus is on intelligence involved in the process of knowing truth and value whether in common sense, science, or philosophy. Examples taken from aesthetics or religion introduce extraneous matter and confuse rather than clarify.

Where to Look

I pointed out the difficulties in pinning down a single act of human intelligence from the many acts we routinely perform. Here I will offer some brief reminders as to the kinds of insights that are most identifiable and helpful in the process of self-appropriation.

First, we are looking for examples of acts of understanding that are protracted, take time, and where we can identify the stages of preparation, frustration, breakthrough, and verification. The privileged place to study the act of human understanding is in discoveries, in the aha experience, in the eureka moment. In these kinds of examples the experience is very fresh and lively; we distinctly remember such experiences. We can describe them because the struggle to get them was long and difficult, and the consequences that flowed from them were momentous. It is likely that all of us have had a similar experience as the example of Aquinas at the royal banquet if not quite so dramatic.

3. See Gardner, *Multiple Intelligences.*

Second, I am taking these dramatic insights as prototypes of routine acts of human understanding, which we perform continuously for most of our waking hours. The wildly dramatic and emotional content of eureka experiences are not very frequent. We do not run naked through the streets every time we have an insight or disrupt royal banquets by thumping on the table. But when we understand the idea of density, we are performing exactly the same mental act of understanding as Archimedes.

Third, the more precise the problem and solution, the more helpful it is in identifying the characteristics of insight. Thus, we tend to favor examples from mathematics and science from simple puzzles, games, crosswords, and the like. Examples taken from philosophy, the social sciences, history, and economics tend to be vague, with no clear cut definitions or solutions. It is imperative to point out clear, precise, concrete, real examples of being faced with a problem and struggling to find a solution. Students can find suitable examples in the courses they are taking, the homework or assignments they are given, the problems posed in the textbook, and the solutions offered by the professor.

Fourth, new personal discoveries are to be preferred. Reading a book or attending a lecture involves thousands of acts of understanding, but they are routine, part of a stream, and taken for granted. For most of our waking life, this stream of acts of understanding are overlapping, presupposed, taken for granted, and go largely unnoticed despite the fact that they are actually informing our behavior and decisions. In this context it is difficult to identify an individual specific act of understanding. But with some effort it is usually possible to pick out one experience which can be isolated, described and analyzed. Students can usually write an essay to describe an insight that they have had recently. They can pick out an experience of being puzzled and what they did to reach a solution.

Fifth, some psychologists divide understanding into methodical and intuitive kinds. The methodical mentality is logical, plodding, a slow but sure way to a solution, such as in calculation or following rules. The intuitive mentality involves thinking outside the box, getting new ideas fast, being creative, and inventing new rules. It is easier to identify insights in the latter than in the former.

Sixth and finally, it is imperative to remember that self-appropriation is a two-fold process: first understand, then reflect back on the experience. Introspection is really retrospection.

Questioning: The Desire to Know

I begin with the first characteristic of the activity of human understanding, the much neglected act of questioning. Plato has Socrates say: "For this is an experience which is characteristic of a philosopher, this wondering: this is where philosophy begins and nowhere else."[4] Aristotle opens his *Metaphysics* with the statement, "All men by nature desire understanding."[5] He recognizes from the beginning the importance of this desire and realizes that we will not attain understanding without this deep wonder about the universe and about ourselves. I suspect his own personal experience of striving to understand through a lifetime of scholarship and reflection led him to this observation. He also recognizes the dynamic of understanding: just as light makes what is potentially visible become actually visible, so the active intellect makes what is potentially intelligible become actually intelligible.[6] He speaks in the terminology of metaphysics, but I interpret him as saying that intellect takes the initiative in asking questions about sense experiences in order to understand. That first act of intellect must refer to questioning, which seems to be the first manifestation of intelligence. Aristotle has a complete, differentiated metaphysics of the act of understanding. To understand is to think the forms in the images.[7] There are no innate ideas.[8] We cannot think without images.[9] To know is to become.[10] The challenge is to translate the metaphysical concepts of Aristotle into the language of psychology and then check our own experience to see if he is right. For the moment I focus on the question.

In contemporary culture we talk about the search for meaning, the love of wisdom, the spirit of inquiry, the quest for knowledge, the curiosity of children, the questioning mind, the eros of the mind, the thirst for knowledge, and wonder. We seem to recognize the importance of the desire to know in the unfolding of knowledge.

The desire to know is but one of a cluster of desires of the human heart. We have all sorts of sensitive desires for pleasure, food, recognition, success, advancement, and fulfillment. We have a desire for love, for happiness, for unity, for peace, for forgiveness, and for God. I am trying to identify one

4. Plato, *Theaetetus* 155d.
5. Aristotle, *Metaphysics* 980a1.
6. Aristotle, *De Anima* 430a15.
7. Ibid., 431b2.
8. Ibid., 430a1.
9. Ibid., 431a17.
10. Ibid., 429b5.

specific aspect of this cluster of desires for it is central to the purpose at hand. This desire to know seems to represent the first thrust toward understanding, so we should examine it carefully. Few epistemologists pay much attention to this desire, but it would seem to be important and constitutive of the activity of understanding.

The Desire to Know Emerges Spontaneously

The desire to know emerges spontaneously, naturally, and universally. In the traditional language of philosophy it could be called innate: it is with us when we are born but various expressions of it only emerge with the proper development of sensation, nerves, the brain, memory, imagination, and social relations. It could also be called a priori in the sense that it comes from inside and cannot be put there from the outside. However, the terms "innate" and "a priori" have so many unfortunate historical associations and insinuations that I try to avoid them.

The desire to know is evident in children even before they can speak. They can point, look inquisitive, or seek an explanation or a name. They handle and pull things apart; they drop them on the floor or put them in their mouth. They understand commands, names, sounds, and symbols even before they can speak. They can express what they like and do not like, what they are willing to do and not to do, and what they want and do not want.

Language is a breakthrough, for now they can name and refer to things that are absent, not immediately within the range of seeing or of hearing. Their world continues to expand with this expansion of vocabulary. They can refer to the past, present, and future. They can refer to people, even though they are absent, at work, or on a journey. The desire to know expresses itself in a stream of unending questions: what is this, why is that, where is the other?

The more interest and curiosity a person shows, the more learning and understanding that is achieved. The more a person wants to understand, the more they will understand. If a person is interested in dinosaurs he or she will usually put in the time and the effort to learn about them, to see the fossils, and to study the various species. Success in understanding is usually proportionate to the strength of the interest and questioning.

This emergence of curiosity, language, and understanding is considered normal. If it does not happen then something is wrong. Psychologists like Piaget have worked out the sequence of cognitional achievements appropriate to each age group. Malnutrition, genetic disorders, disease, a deprived environment, and many other factors can hinder the development of understanding.

The question arises from inside the child; the adult provides the content of the answer. We cannot make children ask questions, but parents and educators can provide answers and stimulate curiosity. If they do not show interest in the first place, information is not much appreciated. If the questioning does not arise from inside, there must be an obstacle somewhere that has to be removed.

This emergence of the desire to know happens in all cultures, in all nationalities, and in all states, languages, and races. It was part of past human behavior, continues in the present, and presumably will be a part of human activity in the future. Even without a formal educational system, the desire for understanding manifests itself and expresses itself in questions. It is unavoidable. To be human is to want to understand and to know.

The Desire to Know Propels the Search for Understanding

The desire to know is the dynamic behind the search for understanding, from the beginning of the process to the end. The process of knowing is an interrelated sequence of activities: from preparation, to frustration, to achievement, to verification. The most difficult stage is that of frustration when the insight just will not come. The desire to know is the dynamic that drives the simple question into the research, study, work, and frustration in order to finally reach correct understanding. The desire to know in a person can be a silly, superficial curiosity with little strength, or it can be a deep, determined impulse that endures through frustration to find the solution. The desire to know is one part of our general desire for meaning, for understanding, and for truth and value. The desire to know is part of our desire to love and be loved and to be and to become a fully human person.

The Desire to Know Can Be Pure

The desire to know in itself is pure and disinterested. Our motivation can be as pure as snow in that we just want to understand and solve the problem for the benefit of all humanity, regardless of self-interest. There is such a thing as pure science, that is, discovery for the sake of discovery, truth for the sake of truth, progress in understanding as an end and satisfaction in itself. We spend trillions of dollars sending probes to Mars and Pluto, on building colliders, on research and development, and on new telescopes because we want to understand the basic working of our universe. The discovery of the Higgs boson confers no immediate financial benefit; it is simply the last piece remaining to support the standard model of particle physics.

More often motives are mixed. One's motives may be raw selfishness, private ambition, hatred of one's adversary, a desire to make a profit, a desire to become famous, or the desire to achieve a Nobel prize. All of the work can be done for personal gain. The motivation of an act might be to shock, insult, abuse, denigrate, make fun of, or even deliberately lead others astray. Are we publishing to get tenure or because we feel we have something to contribute? Or is it for the funds, the royalties, or the fame of being read and in the limelight? We might be writing to show how clever we are. We might be seeking novelty for its own sake, looking for farfetched connections that entertain rather than advance the cause of understanding. They might be deliberately obscure to give the impression of intellectual depth.

There is a dark side to the desire to know. It might be in terms of getting power over the ignorant or the weak. Knowledge is power according to Francis Bacon. Knowledge enables advertisers to manipulate people through the media, administrators to control their employees, and politicians to pull the wool over our eyes. Seeking knowledge might be intellectual hubris, an ambition to be like God. It might be arrogant, assertive, or twisted. The educated are sometimes rich and powerful. The ulterior motives of the desire to know is a common theme of postmodern philosophy.

The Desire to Know is Unrestricted in Scope

Questioning is in principle unrestricted. One of the characteristics of questioning is that it has no limits; in principle questioning goes on forever. One can ask questions about anything and everything. I offered a hundred dollars to any student who could come up with a topic or thing or area of being about which we cannot ask questions. The hundred dollars is still safe in my pocket. To claim that questioning is restricted is self-defeating, as it is an act of questioning the range of our questioning.

We can ask about the unknown, the unintelligible, chaos, infinite universes, God, demons, or sense and nonsense. We can ask about probability, the irrational, chance events, or random happenings. There is nothing that is in principle completely outside the scope of human questioning. Of course, asking questions is no guarantee of getting the desired answer. Sometimes, we aim for a partial understanding rather than a complete understanding. But it is important to recognize that we intend knowledge of everything. Aristotle defined intelligence as being capable of doing and making *all* things; he included everything within the scope of intelligence.[11]

11. Ibid., 430a15.

Questioning Involves Both the Known and Unknown

A question is always a combination of the known and the unknown. If one knows nothing, then he or she cannot ask a question. If one knows everything, there is no need for a question. A genuine question is always in-between. Sometimes I ask a group of students, "Do you have any questions?" and I am met with total silence. I tell them that either they understand everything and have no need for further questions, or they understand nothing and so cannot formulate a question. The question is part of a dynamic process from the unknown to the known, the unfolding of the dynamic of understanding and knowing.

We can distinguish between the pure desire to know and the formulated question. It is the pure desire to know that underlies all understanding and research. How we formulate the question is very important as it sets us off in a particular direction. The formulated question might be heading in the wrong direction. For centuries, scientists were asking about the cause of motion. This was not helpful and led to theories of pushes, impetus, and all kinds of imaginary solutions to the question. It was Galileo and Newton who realized that the fruitful question was rather: what is the cause of changes in rest or motion, namely, Newton's first law of inertia? There are also nonsense questions, which do not make sense and are not looking for understanding. For these, we do not expect an intelligent answer.

There are always more questions than answers, and that is the way it will always be. The more we discover about subatomic particles, the more questions we become capable of asking. Now that scientists have found the Higgs boson, they are already inquiring about how many kinds there are. The more we know about the universe, the more questions we can ask about the things we do not yet know.

Obscurantism is the refusal to ask questions about certain matters, which are too delicate or possibly upsetting. It is a stubborn refusal to question long-held assumptions, to consider new possibilities, or to face the implications of new discoveries such as climate change. It is a love of darkness rather than of light.

The Desire to Know Involves Intentionality

The question establishes the criteria that must be satisfied by a correct answer. A crossword puzzle requires a word that responds to the clue, and correctly spelled, fits into the assigned squares. In Sudoku, one must find the ordering of numbers from one to nine, which are not repeated in any box or horizontal

or vertical line. One knows that the answer is correct if it satisfies these conditions. One does not usually have to look up the answers at the back.

Another way of putting this is that there is an intentionality to questioning. The question is intentional in that it intends a particular kind of answer. Many questions are questions for understanding, for intelligence, for information, or for ideas. What? Where? When? How? These questions represent seeking for information about particular topics. They intend further understanding or knowledge or intelligence about the matter. Any answer that does not contribute to better understanding is deemed irrelevant. A different type of questions asks whether it is true or correct. This question is looking for a yes or no answer, or perhaps, something in between; either way, it is looking for verification.

There is a heuristic structure guiding the question toward the answer. It is most evident in algebra, where it is an art form. Algebra entails a general three-step process. First, name the unknown (call it x). Second, combine the knowns and the unknowns in as many equations as possible. Third, manipulate the equations to find the value of the unknown in terms of the already known. The same kind of structure is involved in any question that is looking for an answer.

Usually when we are working on an intellectual problem, such as writing an article, we can sense when we are doing well and when we are doing poorly. We can sense that an outline is emerging, that it makes sense, that it is backed up by the material, and that we are making positive progress toward a worthwhile article. On the other hand, we can also sense that things are not working out as we anticipated. Too many counter examples are cropping up, the outline is getting more complicated and convoluted, or the conclusion is getting murkier and more doubtful. We begin to have second thoughts about whether the project is worthwhile. We sense these encouraging or discouraging feelings. We sense whether we are getting nearer to an answer to our questions or further away.

The criterion that we have reached our goal is that the stream of relevant questions dries up. Our questioning is satisfied. We have closed off any other possibility; closure is reached. We have enough evidence to back up our conclusion, the arguments are solid, and counter arguments and data have been taken into account.

The Desire to Know is Essential to Understanding

It would seem that the desire to know is a constitutive element in knowing. The desire is not peripheral, it is not extrinsic to the knowing process. It is

an essential dynamic at the heart of the process. We have many desires: for satisfaction, for food, for comfort, for security, for friendship, and so on. However, the desire to know is unique, precisely in that it is a desire to *know*. It is distinct from all other desires. It seeks understanding and knowledge and is satisfied only when such goals are attained. If there is no desire, then there is no knowing. If we do not ask the question, we do not get the answer. To have a desire to know is to be already on the way to the goal.

We Are Conscious of the Desire to Know

The desire to know is a conscious feeling. We are conscious of our acts of remembering and can experience and describe acts of forgetting and remembering. We are conscious of our acts of understanding and can experience and describe what led up to it, or what hints and images helped us to understand. The desire to know is a state rather than an activity and has to be described as a feeling. It is a conscious feeling, because we can be aware of our feelings and describe them in great detail.

We have already spent several pages describing the desire to know. This description is not taken from books, authorities, or conventional wisdom, but from personal experience. We are conscious of our desire to know and can experience and describe our determination to understand. We are conscious of our perseverance, our moments of frustration, and our excitement when we feel the breakthrough coming and the complete joy of insight. In those cases when we feel that we have found the correct solution and know that we have dealt with all possible objections, we feel satisfied with the coherence of a piece of work; we have closure and a correct solution. On the other hand, we can be conscious of our lagging interest in a topic, our indifference, our laziness, our giving in to other desires, or our dissatisfaction with sloppy work and a dubious solution. There is no doubt that the desire to know is conscious.

Is it appropriate to call the desire to know a feeling? All other desires seem to be described as feelings, including love, hunger, lust, and ambition. Feelings provide momentum and drive to the eros of the mind. Without such feelings our determination would be paper thin. Those who pursue a life of scholarship, teaching, researching, and writing are not emotionless cyphers. It is only intense passion that enables original works of science, mathematics, or philosophy to be embarked upon and brought to completion. I would conclude that a desire to know must be described as a feeling.

However, is it the same kind of feeling as any other, or is there something special and unique about the desire to know? There are sensitive

feelings and intellectual feelings, and the desire to know fits into the latter category.

Sensitive feelings are biologically based, neurologically based, and sensitive. They belong at the level of sensation; they are experienced by numerous nonhuman animals. These feelings are often transient or superficial, but they can also be very strong. Feelings such as hunger and thirst, likes and dislikes, pleasures and pains, and satisfactions and dissatisfactions, would seem to be sensitive feelings.

We have outlined above some of the characteristics of the desire to know as a feeling. The desire to know is innate and a priori; it arises in everyone. It is unrestricted in scope and constitutive of the process of knowing. It is the source of language, culture, science, and philosophy. It intends and normally leads to understanding, truth, and value. It is the criterion by which we judge between true and false. We do not say such things about sensitive feelings. Intellectual desire seems to be what makes us human and distinguishes us from nonhuman animals who do not ask questions or have insights.

The topic of human feelings is one with many complexities, ambiguities, and possibilities of misunderstanding. I have dealt with this topic in greater detail elsewhere.[12] I think I have said enough to identify the desire to know as unique to humans and different from every other desire. One cannot possibly understand the process of human understanding without an appreciation of the role of desire to know that is expressed in a continuous stream of critical questions.

The Desire to Know Can Wane

If the desire is so strong why are we not all consumed by the desire to know? Why does it seem to wane and even die? We have many other desires and a host of other feelings. The desire to understand can easily be snuffed out, bogged down, and overcome by other stronger feelings. The vocation of the intellectual, the scholar, the researcher, or the original thinker is a difficult calling with many uncertainties and challenges. I suppose for most of us we cannot go on searching; thus, we settle down to a routine of conventional wisdom, import the opinions of others, close off our worldview prematurely, and resist anything that challenges our established position. But there are some who continue to ask questions. All of the great philosophers and scientists have been consumed by a passion for understanding. To them

12. See Cronin, *Value Ethics*. Chaps. 5 and 6 deal with the self-appropriation of feelings.

we owe a great debt of gratitude. They were giants. They pushed back the frontiers and continue to do so. We climb hesitantly on to their backs.

The Desire to Know is Both Personal and Communal

The desire to know can be noticed at the social level as well as the individual. Looking back at the history of the human race, we can identify the role of the development of understanding, knowledge, science, and technology. Part of it was theoretical and pure science; part of it was practical in seeking new techniques, drugs, technologies, medicines, and sources of energy. Our curiosity remains unbounded in unraveling our history, from the origin of the universe to our own present state. Our inquiry extends from the micro-world of smallest particles, to the macro-world of billions of galaxies that surround us. Research is not only for practical gain but to answer our deepest questions about the universe and the meaning of human life. Even if one is dubious about the strength of his or her own desire to know, there is no doubt about humanity's search for the meaning of human life and the universe we live in.

To summarize, then, the desire to know is the spark that initiates the whole process. It points in a certain direction, formulates a question, and sets the criteria for a correct answer. It guides the research to a certain topic; it brings focus and purpose to the study as we seek an answer to a particular question.

The desire pushes us through the difficulties and frustrations of not being able to find the answer; there is nearly always a period of confusion, frustration, and anger. Often we give up at this stage. Maybe there is no answer! At least we cannot find it. Then things begin to take shape, fruitful methods are found, other possibilities are excluded, insights begin to flow, and further questions begin to close off the issue.

Finally, we recognize the solution, the data falls into place, the criteria set in the question are satisfied, and no further relevant questions arise. We have finally gotten it. We feel delighted. Tension is released and we experience the full joy of discovery.

Active Element: Strategies for Thinking

The question starts the process toward understanding, but we still have work to do in order to produce acts of understanding. The second characteristic of the act of understanding involves the kinds of activities of the mind that we perform in order produce understanding. This is not particularly difficult or

controversial. Most people recognize that in order to become an expert in some field, one has to work to get there. We need to be specific in identifying these positive activities before we move on to the passive element.

What do children ask questions about? What is it that arouses their curiosity? Besides the question, is there anything else that is needed to get the process of knowing underway? It is hard to ask questions about nothing, so we usually ask about things that we have experienced. Children can only ask questions about what they see, hear (or have heard about), touch, and experience. It would seem that our first questions must be about something we have experienced. There has to be some content about which we ask questions. So it would seem that two things are required for the beginning of human knowing: the question of intelligence and the data of experience. We ask about what we experience in order to understand. Our knowledge starts with this experience of the sensible. The sensible may be what we are actually experiencing at the moment, or it may be what we have experienced in the past and we now remember and imagine. Then, we can ask questions about what we have remembered and imagined. After further intellectual development, we can ask questions about ideas, laws, meanings, causes, and so forth.

In this later stage of intellectual development, we need a general heuristic of what is to be done to answer intelligent questions. Consider questions such as the following: Is the climate changing, and if so, why? Why did the dinosaurs become extinct? Is there life on other planets? Why will my car not start? A ten-page paper on the psychology of Virginia Woolf has been assigned: how does one proceed? What is the Higgs boson? What steps does one take to answer such questions?

In general, the first activity in all of these instances is to gather materials—to go to the sources, visit the library, read books, get information, and read literature on the question. The process involves taking notes, reacting to the reading material, picking out significant points, and noting things that are not clear. One might consult databases or check the internet. Some cases may involve performing original research, conducting experiments, sending out questionnaires, doing a survey, or making observations. The more research we do, the more we can focus on fruitful ideas and move toward an answer. In some cases, it will involve making calculations, finding correlations, writing down all the possible equations, and experimenting with possible mathematical laws. It may be necessary to invent new methods to find new information. One might systematically exclude irrelevant or unimportant images and data, or gradually converge on a range of options. In short, the first active stage in the process of learning involves the gathering and organizing of materials.

There are many strategies of thinking that can also help. Descartes recommended the method of analysis and synthesis: break a complex problem down into smaller parts, understand the smaller parts, and then put them together into a synthetic understanding of the whole. We often have to distinguish in order to unite, to differentiate in order to integrate, to take apart in order to put together again. Sometimes we work forward from the question and describe the kind of solution that would satisfy the requirements set in the question. Sometimes we work backward to examine the question itself, clarify the terms, manipulate the knowns, and see if we can anticipate the unknown solution. Thinking involves comparing, defining, dividing, describing, organizing, putting in order, and contrasting. In thinking, we may use metaphors, allegories, examples, illustrations, or diagrams. We make connections, dissect, explain, justify, criticize, expand, summarize, elaborate, focus, formulate hypotheses, and use strategies and tactics. Remember the proverb that genius is an infinite capacity for taking pains.

Plato likened thinking to an imagined conversation with an interlocutor. Imagine explaining something to a group of experts or a group of students. What examples are more appropriate? What are the questions and objections one is likely to encounter? Discussion with a group involves collaboration, teamwork, and the exchange of ideas through journals and books. The cross-fertilization of ideas is a big element in much research and discovery. Ask questions of those who might help; there are no foolish questions.

The strategy of intelligent questioning goes hand in hand with the work of memory and imagination. Look for examples which might help, for suggestive images, possible diagrams of connections, for similar cases and helpful analogies. Imagine possibilities; try to think outside the box. The imagination can be a great help in proposing the vital image; but on the other hand it can be a block. It is hard to imagine outside the box. Our imagination forces us in a certain direction and we cannot escape. Husserl recommended a method of imaginative variation.

I asked my students what they should do if they really want to understand something. One student immediately responded, "Take a hot bath." He had a somewhat too literal interpretation of the story about Archimedes. I suggested that he might pass through the library on his way to take a bath. This section on thinking as the active aspect of understanding is a mere sketch of something most people take for granted. Thinking takes many forms depending on the subject matter and the particular question at issue.[13] The history of any great discovery will show the work that is put

13. I can only refer the reader to some classics on the topic of thinking: Dewey, *How We Think;* Dimnet, *The Art of Thinking;* Kahneman, *Thinking, Fast and Slow;* Arendt, *The Life of the Mind*.

into it, the hours of labor, the lonely search, and the temptation to give up. Because discoveries in each field are so different, we have to recognize the infinite flexibility of human intelligence to deal with any topic, any kind of problem, and any challenge. What is important is to persevere through thick and thin. There is always this active element of gathering information, putting it in order, thinking about it and working toward a resolution. I now turn to the passive aspect understanding, of taking a break, relaxing, and allowing ideas to come.

Passive Element: It Comes Suddenly and Unexpectedly

In many of the examples given in Hutchinson's *How to Think Creatively*, the insight comes not when the subject is doing research, busily reading, or organizing notes, but in moments of relaxation when attention has shifted to totally different matters. Archimedes had his great insight, not in his laboratory, but while he was relaxing in the public baths. In all of the cases, the subjects described the experience as, "It came to me," or "It dawned on me," or with similar expressions. They received the idea suddenly and unexpectedly. This is what I refer to as the passive element in understanding. This seems to be an essential element: we receive the solution as a kind of a gift. Most people readily use the expression, "It came to me," referring to an act of understanding. It is an experience of receiving, a reception, as if a gift from we know not where. It happens more easily and often in intelligent people and slowly and with difficulty in the not so intelligent.

It comes suddenly and unexpectedly, but not immediately. We may have been working on a project for days or weeks, and we wake up some morning and suddenly we have it. It comes in a flash; it is a eureka moment and we recognize it as the solution, but it is not the solution we expected. Many such insights do come while we are working on a project, but many come in moments of relaxation while our conscious mind is actually devoted to other matters entirely.

It comes unexpectedly in the sense that it is not the kind of idea that you anticipated; the idea comes from outside the box. It is something new, a discovery, an idea grasped for the first time. A minute ago it was not there and now it arrives. We cannot force it to come, as we did not know what it was. It can happen in the oddest of places. Archimedes was in the public baths. Helen Keller was taking a walk in the garden. Aquinas had his insight while reluctantly attending a royal banquet. Others recount that they were walking by the sea or even asleep or dreaming. There is an aspect of understanding in which we are not fully in control; we have to wait for it to come.

It does not come automatically. We cannot put a precise schedule on when to get a new idea. New discoveries cannot be programmed. Sometimes in research or calculation or laboratory procedures one may do the work and automatically get a result. Following the rules leads to a diagnosis or solution. However, in cases of new discoveries there is a passive element. It is creative, and the new idea cannot be forced to come. Since the 1960s doctors have been telling us that they will have a cure for cancer in ten years. But when they do not know the solution, how can they predict how long it will take to find it? New insights are not deductions; there is no procedure in logic that can produce new discoveries. There are no rules to be followed that will automatically find new hypotheses. There are no algorithms to produce good ideas. We cannot predict and control the flow of new ideas. We can have heuristics that might point us in the right direction, but if discoveries could be found by following rules then we would all be little Einsteins. There might be guidelines and strategies, but there are no rules for creative discovery. The title of Karl Popper's book, *The Logic of Scientific Discovery,* is a bit of a misnomer.[14] If there were rules, then anybody could apply them and become great innovators.

We are not in full control of our stream of acts of understanding. The mind is not a machine: machines work automatically, predictably, on schedule, on time. We cannot control the process of learning in the same regular fashion. We ardently desire to understand, we do all in our power to make it happen, but then we wait and hope that it will come. All we can do is create favorable conditions for the occurrence of insights. We do the work, focus, concentrate, observe, and think. New ideas have to be given the opportunity to emerge. Taking a break, relaxing, thinking about something else, or abandoning our control over our thinking may allow that opportunity for new ideas to surface.

Most people are familiar with the notion of brainstorming. It is a deliberate relaxing of the critical faculty to allow what might seem to be outlandish ideas to surface. But it does allow a free flow of ideas. The free association of ideas can lead to new ideas and help someone consider all possibilities. As Sherlock Holmes said, "When you have eliminated the impossible, whatever remains, no matter how improbable, must be the truth."[15]

Joseph Hadamard speaks of conscious and unconscious processes in the act of understanding.[16] There is an element in the act of understanding

14. Popper does recognize that scientific theories arise from creative imagination, but he emphasizes the logic of induction and falsifiability.

15. Conan Doyle, *The Complete Sherlock Holmes,* 111.

16. Hadamard, *The Mathematician's Mind*, esp. chaps. 2–3.

over which we do not have full conscious control. Why do certain memories surface to help us when we need them, or refuse to surface? Why do some people think of certain possibilities and others do not? It is clear that there is an element of luck in the search for understanding. We might be lucky with the teachers we had, the books we found in the library, the friends that stimulated our thinking, or the images that helped us to find the idea. We can be lucky in choosing the subject for a thesis, in choosing to follow a particular course, or in following a hunch that proves to be fruitful and leads in the right direction. However, we might also devote our lives to a hunch that leads nowhere. There is this element of chance in the life of the mind, and we just have to live with it. It is difficult to talk about unconscious processes precisely because if they are unconscious, what can we know about them or say about them?

Even though we cannot force insights to come, we can create the conditions in which they are more likely to occur. These are mostly inner conditions in the mind rather than in outer circumstances. Primarily, it means to be continually asking questions, to be manipulating the data in the direction we think the solution lies. It involves looking at the problem from different angles, dragging up new images, testing examples, remembering similar situations, exploring possibilities, trying analogies, and starting again when we reach a dead end.

Students hear the same lecture but receive it in many different ways. They are in the same classroom, have the same equipment, and the same general educational background. They hear the same words but grasp different meanings. There is an old saying: "Whatever is received is received according to the mode of the recipient." It is the inner conditions of interest, attention, questions, images, habits, expectations, and abilities that determine how a lecture is to be received.

The inquiring subject sets the context into which new ideas will be received. A person who is familiar with mathematics will easily solve mathematical problems, but that same person may not be so good at crosswords or trivia questions. Someone with a good memory will be good at general knowledge questions, but he or she may have difficulty with math or logic. So much depends on one's previous education, the state of the development of the culture, one's age, and many other influences. Many people frequented the baths at Syracuse and experienced the sensation of floating in the water, but only one of them had an insight into the laws of displacement and density.

Nowadays we have wonderful equipment that should make it easier to write articles and books. We have word-processing programs, libraries at our fingertips, citation managers, dictionaries, and the like. One might think it is now easier to write books and do good philosophy. We have made

so many advances in information technology. Outer conditions are much more favorable to research and scholarship. The Greeks and Medievals were writing on parchment in ink and each book had to be individually written. But can we really claim that the quality of thinking and writing today is better than in those days? Intellectual development depends on inner conditions of interest, concentration, devotion to truth, a focus on what is relevant, and an infinite capacity for thinking things through to the end. That is what determines the quality of thinking, writing, and new discoveries.

Conclusion

I have started a description and analysis of insight by identifying three essential components. (1) The question emerges from the desire to know and is a constitutive element in the process of understanding and knowing. (2) The question directs the activities of collecting and organizing materials that might provide an answer. (3) No matter how hard we try, we cannot force insights to come; rather, we merely create the favorable conditions for the reception of ideas, then wait and hope. I will continue in the next chapter to identify what happens in the mind when the actual moment of understanding arrives. How is understanding different from sensing? How does it pass into the habitual texture of the mind?

We can already see that understanding is a complicated activity that takes time to accomplish. All the assertions made in this chapter and the next are simply descriptive, factual statements about how the process actually works. It is not a theory about intellect or epistemology but a simple factual description. All of us can attend to our own acts of understanding in order to verify or deny these assertions. I have tested out these assertions on hundreds of students and all seem to recognize what I am talking about and agree that this is how they experience the act of understanding.