

# NON-HUMAN KNOWLEDGE ACCORDING TO MICHAEL POLANYI<sup>1</sup>



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**Keywords:** Michael Polanyi, Harald Grimen, Harry Collins, John McDowell, tacit knowledge, explicit knowledge, personhood, animal knowledge

## ABSTRACT

*Three recent interpreters of tacit knowledge, Harald Grimen, Harry Collins, and John McDowell, either deny it is appropriate to attribute knowledge of any sort to animals or ignore the relevance of the tacit knowledge of animals to human knowledge. In this article, we seek to show that in Michael Polanyi's understanding, tacit knowledge in animals underlies and supports human explicit knowledge. For Polanyi, tacit knowledge arises in increasingly complex forms in evolutionary history, and explicit knowledge emerges from it. Both forms of knowledge are personal achievements that can be true or false; animal behavior is not simply deterministic. Polanyi's view on non-human tacit knowledge thus explains features of human knowledge that those denying or ignoring non-human knowledge leave unexplained.*

## Introduction

There are today references to tacit knowledge in management science, knowledge engineering, and theoretical biology, among other disciplines. Yet, there are many competing views about the nature, scope and limits of tacit knowledge. In this article we examine whether animals have tacit knowledge as defined by Michael Polanyi, and if so, what the significance of this is. We attempt to show that a consistent concept of tacit knowledge should include animals. Moreover, we show, by reconstructing Polanyi's position as closely as possible, that he indeed acknowledged animals as knowers and

that this has significant implications for human knowledge. Our main findings are the following:

1. In Polanyi's view all living beings, including humans, possess tacit knowledge. The tacit knowledge of highly developed species is more sophisticated than that of simpler organisms, but it is of the same nature in all cases.
2. Polanyi emphasizes the continuity and gradual degrees of development in the evolution of tacit knowledge. He makes no distinction between humans and animals in this respect. He even goes into details about the mental representation of tacit knowledge in higher animals.
3. Polanyi attributes the superior cognitive capabilities of humans to explicit knowledge, which is nevertheless based on tacit knowledge that is common in all animals.
4. Like all knowledge, tacit knowledge can include mental representation, which is discussed briefly by Polanyi in the case of higher animals with nervous systems.
5. Tacit knowledge, like all knowledge, can be true or false in Polanyi's theory of truth. This is possible because he understands truth not to be a property of explicit propositions only, but he relates it to the adequacy of contact with reality. Thus, animal knowledge can be true or false, even though they cannot express it as propositions or in any other linguistic form.

These findings refute the view that having explicit knowledge is necessary in order to have tacit knowledge, a view that is argued by some (see the next section). Moreover, it follows that any theory of truth consistent with tacit knowledge cannot be dependent on the use of language. Nevertheless, this does not mean that the two are independent, for we affirm the view that explicit knowledge is impossible without tacit knowledge. Although we agree with Polanyi that all living beings, including plants, possess tacit knowledge in some form, for the sake of simplicity, we will concentrate on animals as Polanyi himself usually does.

### **Accounts of Tacit Knowledge and Their Consequences for Animal Knowledge**

Many epistemologies conflict with tacit knowledge because they are based on explicit language. The idea of animal knowledge contradicts these frameworks, such as the Cartesian worldview or formalist, proposition-based theories about knowledge, because animals have no explicit language. Therefore, to focus our work, we only contrast our findings with some recent views that allow a place for both tacit and explicit knowledge.

Grimen has four interpretations of tacit knowledge. While these interpretations do not even mention animals (nor does the whole work discussed here), assuming only humans to be knowers, we attempt to analyze whether Grimen's thought could be compatible with animal tacit knowledge.

Grimen's first interpretation is that tacit knowledge arises from conscious under-articulation, meaning that people decide to say less than they know. His examples are marriage and political relationships in which it is ill-advised to articulate everything that is known to the parties involved. This philosophically uninteresting interpretation of tacit knowledge ignores the possibility of animal knowledge since it relies on the ability of using language and it is strongly connected with human cultural life (4).

The second interpretation of tacit knowledge might be called the Gestalt thesis. In this interpretation, a performance of some activity falls apart when the actor tries to articulate the background the activity relies upon during the performance (5). This is not to say that background details cannot be articulated later or by someone else during the process. This interpretation does not claim that there are fundamentally inarticulate kinds of knowledge. At first sight, this concept is also incompatible with animal tacit knowledge because it draws upon explicit articulation, something that is not done by animals. However, the main concern of this Gestalt interpretation of tacit knowledge is not articulation but focal and subsidiary awareness. That is, the comprehensive performance falls apart when the actor tries to make focal some of its subsidiary elements. Animals thus might be said to have a form of this knowledge in the following sense.

If I know how to ride a bicycle or how to swim, this does not mean that I can tell how I manage to keep my balance on a bicycle or keep afloat when I go swimming. I may not have the slightest idea of how I do this or even an entirely wrong or grossly imperfect idea of it, and yet go on cycling or swimming merrily. Nor can it be said that I know how to bicycle or swim and yet do not know how to coordinate the complex pattern of muscular acts by which I do my cycling or swimming. I both know how to carry out these performances as a whole and also know how to carry out the elementary acts which constitute them, even though I cannot tell what these acts are. This is due to the fact that I am only subsidiarily aware of [how I do] these things, and our subsidiary awareness of a thing is not sufficient to make it identifiable (*KB*, 141-142). So, if animals swim in the same way as we humans do, we end up with a concept that might be compatible with animal knowledge.

The third interpretation, "epistemic regionalism," is that any given elements of our knowledge can be verbally explicated, but not all of our knowledge can be explicated simultaneously as there is simply no perspective from which we could do that (6). This interpretation clearly involves verbal explication and assumes the knower to be human, therefore as stated is incompatible with animal knowledge.

The fourth thesis—what Grimen calls the strong thesis—says that certain types of knowledge are inarticulable as they cannot be grasped by descriptions or verbal statements. While Grimen believes Polanyi himself would not support such a strong interpretation (Grimen sees the Gestalt thesis as the most Polanyian) we believe that this view is the closest among the four to Polanyi’s concept of tacit knowledge. More exactly, this is the point of saying we know more than we can tell, and the focal-subsidary dichotomy of tacit actions, as well as the reason of epistemic regionalism, are the consequences of the fact that certain types of knowledge are necessarily inarticulable. Also, this interpretation of tacit knowledge is entirely compatible with animal knowledge, as it does not define the tacit by drawing upon verbal expression, which is what Collins does in *Tacit and Explicit Knowledge*.

It can be seen that some of Grimen’s interpretations of the tacit dimensions are compatible with animal knowledge, but that in not exploring this relationship. Grimen’s understanding of the evolutionary sources of the tacit are undeveloped.

### *Harry Collins on Tacit and Explicit Knowledge*<sup>3</sup>

In *Tacit and Explicit Knowledge* (hereafter *TEK*), Collins misinterprets what Polanyi means in *Tacit Dimension* and characterizes tacit knowledge as knowledge that *cannot* be made explicit (4). He classifies the kinds of tacit knowledge by the kinds of reasons that inhibit their explication. In order to clarify the notion of “tacit knowledge,” he first focuses on the question of what explicit knowledge means, as well as the kind of actions that are candidates for explication. His reasoning involves a reduction of most actions to so-called “string transformations”—a reductionist approach in which every physical entity in the world, or “string,” is causally related to other strings and is thus a candidate for explicit explanation.

Collins clearly denies that animals possess tacit knowledge. He proposes two different kinds of arguments to support this claim. The core of one of his arguments is that the idea of tacit knowledge only makes sense as something not explicable, i.e., it cannot be made explicit. Furthermore, one cannot be said to have tacit knowledge unless one can have explicit knowledge: “Nevertheless, as argued in the introduction, the idea of tacit knowledge only makes sense when it is in tension with explicit knowledge, and since cats and dogs and sieves and trees cannot be said to ‘know’ any explicit knowledge, they shouldn’t be said to know any tacit knowledge either” (78).

The other reason for his opinion on animals is his view on knowledge in general, in which the focus is on social capabilities and skills that are ultimately based on language. He claims that being a part of a collective requires many social skills (e.g. driving in traffic, using language) that are just not exhibited by animals in general, not counting some exceptions. He calls his position “Social Cartesianism”—it means that humans are different from anything else because of their skills with regard to collectives.

Social Cartesianism claims that humans and animals are radically different. What it does not claim, unlike Cartesian Cartesianism, is that the boundary between humans and animals is sharply marked. There may be some animals, perhaps chimpanzees, perhaps cetaceans, perhaps birds, that share some human abilities in small ways. But this is not the issue. The issue is the marked difference in abilities between a species that possesses fully developed languages and cultures and one that does not (125).

Skills like swimming or cycling represent a kind of knowledge that can ultimately be explicated or even replicated by machines, and therefore—in Collins’ framework—they cannot be tacit knowledge. Collins recognizes and discusses the fact that animals cannot express this kind of causal string transformation knowledge themselves—in his interpretation only humans might make that explicit by studying animals. In his view this inability cannot be a warrant to call those skills tacit knowledge. For Collins, according to his Social Cartesianism, animals are not knowers and they do not possess any kind of knowledge, and humans are not merely animals; they are radically different.<sup>4</sup> Tacit knowledge only arises in human social culture because it is based on the flightiness of linguistic application, which cannot be predicted by a string transformation.

*John McDowell on Mind and World*<sup>5</sup>

If we, contrary to Collins, see human knowing as an ability that is more continuous with the skills of animals, then the question concerning the relationship between the knowledge of humans and animals necessarily arises. What do we share in common; what is special in man; and how does human knowledge emerge? In *Mind and World*, McDowell explores these questions, but he does so without an explicit differentiation between explicit and tacit knowledge.

McDowell’s original goal is to determine the special relationship between mind and world. It is evident for him that the “realm of natural law” and the “logical space of reasons” are two different things. Therefore, if we regard man as part of nature and we do not want to lose meaning and the space of reason, then “we have to expand nature beyond what is countenanced in naturalism of the realm of law” (109). In this expanded naturalism man reaches the “second nature” of the space of reasons by his explicit conceptual powers. “Human beings acquire a second nature in part by being initiated into conceptual capacities, whose interrelations belong in the logical space of reasons” (109).

About animal capabilities, he states that “an animal endowed with reason would be metaphysically split, with disastrous consequences for our reflection about empirical thinking and action” (108). For him, animals—unlike humans—are entirely part

of first nature, of the realm of natural law, and this leads to a deep abyss between the knowledge of animals and humans and thus between the worlds of animals and humans, even though both are biological living beings.

According to McDowell, for animals nature is only “environment” because “the objective world is present only to a self-conscious subject” and animals “without conceptual capacities lack self-consciousness and...experience of objective reality” (114). Therefore “the animal’s behaviour at a given moment is an immediate outcome of biological forces. A mere animal does not weigh reasons and decide what to do” (115). But because man has freedom by conceptual powers and can decide what to think and do, his life is “no longer determined by immediate biological forces” (115). The question is how we are similar to and yet different from animals in order to be the kind of animal that can have knowledge.

McDowell is clear: “we share perception with mere animals” (114) because we are also living beings of (first) nature. McDowell denies that animals are subjects, therefore the reason that they experience only the “environment” is not that they have a specific subjective point of view. According to him, if animals had subjectivity and thus explicit conceptual powers, then the objective world would be open for them. It follows for him that, “for a perceiver with capacities of spontaneity, the environment is more than a succession of problems and opportunities; it is the bit of objective reality that is within her perceptual and practical reach” (116). So, man, contrary to animals, has subjectivity and a special point of view of his environment and therefore a capability to reach a “bit of objective reality.” The question is how the environment becomes an objective world for man if he has the same perceptual abilities as mere animals. McDowell attempts to show how the subjective point of view with conceptual cognitive capacities can bring this about.

Animals, of course, do not understand the succession of problems and opportunities of their environment as problems and opportunities because they have no subjectivity and self-consciousness. Therefore, they handle these problems without understanding them as problems and opportunities. According to McDowell, only the human observer understands these processes and situations as problems and opportunities by his explicit conceptual powers (116). Like Collins, McDowell sees no cognition in the causal/behavioral responses of animals, and thus no knowledge.

McDowell asserts that “no animal’s perceptual machinery (not even ours) possesses the spontaneity of understanding” (121). He also asserts that human “infants are mere animals...and nothing occult happens to a human being in ordinary upbringing” (123). But he says *nothing* about how man emerges from the first nature of the realm of law into the second nature of the logical space of reason. We only see here a deep abyss as was the case with Collins’ Social Cartesianism. Of course, McDowell denies

Cartesianism and calls man's logical space of reason a kind of nature but nevertheless the gap between the knowledge of animals and man is just as wide.

McDowell's starting point is interesting: "An experiencing and acting subject is a living thing, with active and passive bodily powers that are genuinely her own; she is herself embodied" (111). Polanyi could say that. But as we have seen, for McDowell there is a deep abyss between animal and human understandings. Second nature and subjectivity in human experience are important parts of McDowell's account, but their origins are not profoundly accounted for, meaning that there are some explanatory gaps in his philosophy. These gaps could be mended by following Polanyi and seeing that tacit knowledge develops in animals and in humans as part of the natural world. Both rely upon tacit knowledge even as language helps generate distinctively human types of knowledge. This position of gradually emerging human knowledge is fundamentally different from the positions of Collins and McDowell, but is compatible with Grimen's strong interpretation of tacit knowledge.

### Animal Knowledge According to Polanyi

In *Personal Knowledge*, Polanyi draws a clear, continuous path from the simplest forms of life like amoebas to the more advanced forms ending with humans. For him every living being is a knower and has a kind of personhood, which is a precondition for humans having personal (tacit and explicit) knowledge. After the first virus-like speck of living matter,

The next stage on the way towards **personhood** was reached by the protozoa. The appearance of a nucleus within a bed of protoplasm indicates an increased complexity of internal organization, underlying an external behaviour of immensely augmented self-control... A floating amoeba emits exploratory pseudopodia in all directions... All these manoeuvres are coordinated: the amoeba hunts for food. Thus it grows fatter until it reaches the size at which its **personal life** ends by fission. A further great step was achieved by the aggregation of protozoan-like creatures to multicellular organisms. This enabled animals to evolve a more complex physiology based on sexual reproduction, a manner of propagation which greatly strengthened their **personhood** (*PK*, 387).<sup>6</sup>

Let us remember that the title of this book is *Personal Knowledge*. Polanyi seems to make an effort at many locations in the text to make it clear that he means to use the term "person" very broadly, including even the simplest life forms in it. Therefore, while an animal may not be self-aware, the animal is not just a mechanical machine of the "first nature" à la McDowell, but a person involved in heuristic efforts. A dog's

frustration at being unable to distinguish what signals indicated more food “shows the depth to which the animal’s person is involved even in such an elementary heuristic effort” (*PK*, 367).

This universal concept of personhood that is performing heuristic efforts to solve problems deeply resembles the notion of universal biological adaptivity, mentioned much earlier in the book: “[A]ll life is endowed with originality and originality of a higher order is but a magnified form of a universal biological adaptivity” (*PK*, 124). Universal biological adaptivity seems to indicate that animals have a degree of personhood. So, for Polanyi, earlier stages of “subjectivity” and “knowledge” set the stage for our own.

In the second part of *Personal Knowledge* Polanyi explicitly explains that the organisms that bear an “active-perceptive” level of physiology also have motives and knowledge. This distinguishes higher animals from the protozoa.

I have dealt before with the molar features that characterize the vegetative level; let me now sum up the new features that are added to these on the active-perceptive level. **They are *sentience of motive and knowledge***; an effort to *do right* and *know truly*; a belief that there exists an *independent reality* which makes these endeavours meaningful, and a sense for the consequent *hazards* (*PK*, 363).

As we can see from the quotation above, this knowledge is a belief that aims at the true—that is, it’s connected to the independent reality. As a reminder, in many philosophical discussions, especially in analytic philosophy, beliefs are represented as propositions. The question of truth becomes the question of the connection of these propositions with reality (external or otherwise). Animals cannot form propositions. In an analytical framework animals cannot have true or false knowledge. In this paper we follow Polanyi and argue that beliefs are not necessarily propositions that can be represented explicitly and that beliefs are not held only by humans. As we will see later, Polanyi’s understanding of mental representation supports this view of beliefs.

We can see that Polanyi speaks of animals as persons, possessing consciousness, feelings, personality, originality, sentience, beliefs and knowledge.

Knowledge (as distinct from a single experience) is transmitted on a primordial level from one generation of animals to the next by an imitative process which students of animal behaviour call *mimesis*...A true transmission of knowledge stemming from conviviality takes place **when an animal shares in the intelligent effort which another animal is making in its presence** (*PK*, 206).

Also, the universality of knowledge is emphasized again at the end of the book.



*[K]nowing belongs to the class of achievements that are comprised by all forms of living*, simply because every manifestation of life is a technical achievement, and is therefore—like the practice of technology—an applied knowledge of nature (*PK*, 403-404).

Polanyi speaks about animal knowledge explicitly in many passages. Every manifestation of life is “an applied knowledge of nature” since every life form has to know the difference between what is nourishing and what is dangerous; it is a question of life and death, the working of biological adaptivity. Polanyi seems to make no general distinction between the way animals and humans know.

If animals have knowledge, then the questions are what *kind* of knowledge they possess, how it is different, and what the connection is between animal and human knowledge. First of all, Polanyi states that tacit knowledge is more fundamental than explicit knowledge. “While tacit knowledge can be possessed by itself, explicit knowledge must rely on being tacitly understood and applied. Hence all knowledge is either tacit or rooted in tacit knowledge. A wholly explicit knowledge is unthinkable” (*KB*, 144). There are two possibilities regarding knowing: tacit knowledge by itself or tacit knowledge supporting explicit knowledge. A wholly explicit knowledge, that is, explicit knowledge by itself, is “unthinkable.”

The knowledge of animals is tacit only. Tacit knowledge can be possessed by itself. The simple reason that animal knowledge has to be wholly tacit is that animals cannot articulate and form explicit sentences. They did not reach the second major stage of evolutionary emergence as man did, that is, the cultural stage relying on language use that comes after the biological one (*PK*, 388-389).

The following paragraphs are very helpful in explaining how animal knowledge arises and its relation to human knowledge. Polanyi distinguished three forms of animal learning which, although inarticulate, allow for planning and choice: *trick*, *sign* and *latent* learning. Latent learning is significant, because it shows that animals have memories of experience that they can reorganize and prepare for future use. However, this reorganization is much more efficient in humans, thanks to the usage of explicit language. Therefore, human knowledge is a special, advanced form of animal knowledge that goes beyond it (as Collins and McDowell note) in being conceptual and communal:

We have seen that in the process of latent learning, described as Type C, animals reorganize their memories of experience **mentally**. It appears now that the intellectual superiority of man is due predominantly to an extension of this power by the **representation** of experience in terms of manageable **symbols** which he can reorganize, either formally or mentally, for the purpose of yielding new

information. This enormously increased power of reinterpretation is of course ultimately based on that relatively slight superiority of the tacit powers which constitute our gift of speech (*PK*, 82).

Also,

The tracing of personal knowledge on these lines, through all spoken utterances and further back to the active principles of animal life, has shown that **the tacit intellectual powers which we share with animals** and infants suffice to account in a first approximation for the immense expansion in the scope of human knowledge opened up by the acquisition of speech. This approximation has, at any rate, the advantage of representing separately those aspects of articulate thought which require no striking expansion of tacit powers beyond those common to animals. But there are other constituents of thought, and of science itself, which are guided by tacit powers far surpassing the range of animal intelligence (*PK*, 132-133).

“[A]ll knowledge is either tacit or rooted in tacit knowledge,” that is, although man reached the second major stage of evolutionary emergence and can articulate and form explicit sentences that can reorganize his memories of experience by explicit symbols, his knowledge is not wholly explicit but is based on his tacit knowledge, “on that relatively slight superiority of the tacit powers which constitute our gift of speech.”

Man and animals have common tacit powers, but there are differences, too. These “relatively slight” tacit differences unfold and evolve into intellectual tools, concepts, logic, systems of thinking, etc., that can create a huge gap between the initially very similar animal and human knowledge. Moreover, humans do not rely on this kind of explicit reorganization only. They continue to exercise non-symbolic reorganization just as animals do; this is what the well-known examples of bicycle riding and swimming make clear. Collins and McDowell witness the gap, but miss the underlying continuity that Grimen points out in his third and fourth levels of interpretation.<sup>7</sup> Grimen, like Polanyi, understands that some things tacit can be made explicit and some cannot.

So, the reason why our knowledge is not perfectly explicit and thus objective and absolute, etc., can be found in the structure of tacit knowing and our animal evolutionary roots that anchor our intellectual powers in nature. While emphasizing the universality of personhood and knowledge in life, Polanyi is also asserting that the human is a special animal—special because of the magnificent explicit intellectual powers that are nevertheless based in tacit foundations we share with animals. Therefore, if we reject the tacit knowledge of animals, as we have seen several authors do, we are disregarding our animal evolutionary roots, that is, the basis of our own tacit

knowledge, which is the cornerstone of the Polanyian theory of personal knowledge. Recognizing this basis and continuity is the reason that Part IV of *Personal Knowledge* which explains evolutionary emergence, has key importance in Polanyi's thinking.

We must face the fact that life has actually arisen from inanimate matter, and that human beings...have evolved from tiny creatures resembling the parental zygote in which each of us had his individual origin. I shall meet this situation by re-establishing within the logic of achievement, the conception of emergence first postulated by Lloyd Morgan and Samuel Alexander (*PK*, 382).

### Truth in Animal Knowledge

We have seen above that according to Polanyi animals can have non-propositional but true knowledge. In order to understand what this means we need to focus on Polanyi's theory of truth. At the core of this theory is knowledge's tendency to prove significant by contacting reality in spite of reality's unpredictability: "The implications of new knowledge can never be known at its birth. For it speaks of something real, and to attribute reality to something is to express the belief that its presence will yet show up in an indefinite number of unpredictable ways" (*PK*, 311).

In Polanyi's view, there is no absolute, perfectly explicit knowledge by which we can acquire a final, definitive understanding of reality. Actually, such definite knowledge, if it is considered fixed and unchangeable would not be so useful in the long run. That is because in Polanyi's view both reality and our knowledge of it continue to change in unpredictable ways, as we have seen in the case of the progressively intensifying personhood in Polanyi's account of life and its evolutionary development. From time to time an animal has to adapt to a harshly changing environment. Thus "truth lies in the achievement of a contact with reality—a contact destined to reveal itself further by an indefinite range of yet unforeseen consequences" (*PK*, 147).

So, although truth is a correspondence, it is not a definite, unchanging and perfectly explicit—that is, objective—correspondence with the real but a personal one based on our tacit powers. It is important to see that the process of claiming what is true is not equivalent to stating an exact proposition about an object of reality. Rather, its basis is the logic of achievement, which can function tacitly and without explicit concepts, that is, true knowledge is an achievement of a living being's heuristic action to adapt, to stay alive, to be successful. By true knowledge a living being can create a contact with reality for its benefit. A fish has true knowledge when it can successfully differentiate between a prey and bait. In life, knowledge about reality can mean life or death. The process of gaining true knowledge is the foundation of successful evolutionary emergence of a lineage.

We may say that the animal has seen a problem, if its perplexity lasts for some time and it is clearly trying to find a solution to the situation which puzzles it. In doing so, the animal is searching for a hidden aspect of the situation, the existence of which it surmises, and for the finding or achieving of which the manifest features of the situation serve it as tentative clues or instruments. **To see a problem is a definite addition to knowledge**, as much as it is to see a tree, or to see a mathematical proof—or a joke. **It is a surmise which can be true or false**, depending on whether the hidden possibilities of which it assumes the existence do actually exist or not. To recognize a problem which can be solved and is worth solving is in fact a discovery in its own right (*PK*, 120).

We have seen in the previous section that non-human animals have only tacit knowledge. This means that in their case they have no explicit sentences that they can critically reflect upon to see if their thought corresponds to reality. Even many higher animals have “only” tacit intellectual powers by which they can reorganize their experiences for future use. So, in their case we must speak of tacit mental and physical skills by which they categorize and understand nature and reality and by which they act. A cat, for example, can recognize a dog or a frog and acts according to opportunities or dangers offered by this specific recognition. The tacit intellectual knowledge of animals can be acquired or genetically encoded. (The latter comment does not imply genetic determinism. That is, during its ontogenesis, the animal has to make heuristic efforts to develop its genetic heritage into real skills.) This corresponds to the process of Darwinian natural selection.

According to Polanyi’s theory of tacit knowledge, an explicit sentence or a word in itself has no meaning. “[O]nly a speaker or listener can mean something *by* a word, and a word *in itself* can mean nothing” (*PK*, 252). A meaning is the achievement of a tacit act by which we assert something according to our tacit beliefs and commitments. “An articulate assertion is composed of two parts: a sentence conveying the content of what is asserted and a tacit act by which this sentence is asserted” (*PK*, 254).

In Polanyi’s view the source of meaning and of a belief in a truth is that tacit foundation of our knowledge which we have in common with animals. It is true that in contrast to animals man can articulate explicit sentences, but even in the case of humans the true meaning of a belief relies on a tacit act. Animals cannot make articulate claims, but as we can see, they have dispositional states and commitments towards reality that enable them to solve a problem, to differentiate between a prey and a bait, etc. (e.g. *PK*, 120 or 364-365). Therefore, if Polanyi’s theory of tacit knowledge is true and as general as he claims it to be, animals also have meaningful and true commitments and knowledge concerning reality as approached by their species.

## Conclusion: Human Knowledge as Based on Animal Knowledge

In conclusion, we must ask a fundamental question: If Polanyi's writing convincingly makes it very clear that animals have tacit knowledge, why do so many still doubt this fact?

To understand this situation better, let us consider Polanyi's example of the neurologist (1968, 39).<sup>8</sup> The neurologist is able to examine the brain of another person while that person is, for example, watching a cat. The scientist is able to make focal the subject's internal brain processes and he can make explicit assertions of them. Of course the subject herself cannot do this; focally he is not aware of his brain processes. But the fact remains that to see a cat differs sharply from the knowledge of the mechanism of seeing a cat.

Therefore, the subject and the neurologist have quite different knowledge. The subject has tacit knowledge according to his own beliefs and commitments by which he can recognize or see the cat. The brain processes are the tacit material *conditions* for this knowledge. The neurologist has explicit knowledge of the subject's brain processes which he understands on the grounds of his own scientific beliefs and commitments. The subject probably has little idea what the neurologist knows and understands.

In other words, no matter how fully the neurologist explicates the subject's brain mechanisms, the knowledge he gathers is *not the same* as the subject's own knowledge. The subject has her own *existential* knowledge by which she acts, and the neurologist has *denotative* knowledge of the brain processes of the subject. As a consequence, the scientist *cannot* use the subject's knowledge as his own. The deep meaning of this example is more evident if we consider the case of swimming, riding a bicycle or playing a piano. The neurologist might be able to give an exhaustive explicit description of how the subject rides the bicycle or plays the piano in terms of brain and body mechanisms, but of course having only this knowledge does not enable him to ride or play at all.

An animal has tacit knowledge, for example, it can distinguish food that is nutritious from food that is toxic (or dangerous). This means, according to Polanyi's theory of tacit and personal knowledge, that it acts by its own natural commitments concerning reality. Let us assume that this skill of the animal is genetically encoded and assume that a geneticist can identify the exact gene sequences which are responsible for the possession of this skill. Stating that we thus revealed the animal's knowledge is misleading, because we forgot about the animal's real tacit skill. The animal's real tacit knowledge by which it acts and the geneticist's perfect explicit knowledge of the gene sequences are not the same at all. Similarly, the subject's real tacit knowledge concerning the cat and the neurologist's knowledge of brain processes are not the same. We cannot recognize an animal's real tacit knowledge by the explicit analysis of the material parts, but only by our tacit knowledge of the whole. Our scientific methods and belief in the possibility of perfectly explicit knowledge, however, tempt us to forget about

comprehensive tacit skills, and we concentrate only on such explicitly describable parts as brain processes and genes.

Actually, we have seen this, when McDowell tries to understand the problem-solving of animals. He concludes that only the human observer understands the different environmental situations of the animal as problems and opportunities by his explicit conceptual powers. The animal knows nothing; its behavior is just the mechanical consequence of “the realm of law” (116). In contrast to this, consider Polanyi’s following words.

Our understanding of the hungry animal choosing its food, or of an animal on the alert listening, watching and reacting to what it notices, is an act of personal knowing similar in its structure to the **animal’s own personal act** which our knowing of it appraises. And accordingly, our knowledge of the active-perceptive animal would dissolve altogether if we replaced it by our focal knowledge of its several manifestations. Only by being aware of these particulars subsidiarily, in relation to a focal awareness of the animal as an individual, can we know what the animal is doing and knowing. Besides, when the subsidiary particulars of a comprehensive entity are as highly complex and variable as in these cases, attempts to specify them can do no more than highlight some features, the meaning of which will continue to depend on an unspecifiable background that we only know within our understanding of the entity in question. In other words, the meaning of an animal’s actions can be understood only by *reading* the particulars of its actions (or by reading its mind in terms of these actions) and not by observing the actions themselves as we may observe inanimate processes (*PK*, 364).

The higher a piece of knowledge is in the hierarchy of evolutionary emergence, the more personal it is. However, science education forces us to ignore our tacit and personal knowledge and commitments in an effort to be more objective, more exact. It points out causal relations in “first nature” as if they were sufficient for explicit knowledge. It implies that the “true” scientific knowledge is the most explicit knowledge of the parts, for instance, the explicit knowledge of gene sequences. This leads to questioning the existential knowledge of animals and its continuity with our own tacit and explicit knowledge. Polanyi explains how this distorted approach also fails to recognize the emergence of all sorts of beings with real and active centers:

One might expect to find this grandiose achievement celebrated wherever biology—the science of animals and plants—is taught and cherished. But no; classical taxonomy has almost ceased to count as a

science. The explanation seems to lie in a change in the valuation of knowledge. It is due to a steadily mounting distaste for certain forms of knowing and being; a growing reluctance to credit ourselves with the capacity for personal knowing, and a corresponding unwillingness to recognize the reality of the unspecifiable entities established by such knowing (*PK*, 350).

If we do not recognize human tacit knowledge and its important role in science, we will question the knowledge of animals too. And by doing this, we create an evolutionary gap—an unexplained leap between animals and humans. In Polanyi's philosophy, a universal theory of tacit and personal knowledge for all animals is indispensable. Humans arise through evolutionary emergence. Our personal viewpoint is necessarily anchored in our body. Our knowledge, even long after the emergence of our explicit intellectual powers, necessarily lies on tacit foundations. That is, because human knowledge is rooted in tacit skills, certain types of knowledge need not be articulated in language to be true.

Finally, consider this quotation and here we believe that we have to understand Polanyi literally and not just metaphorically or as a matter of mere projection:

Our existing knowledge of physics and chemistry can certainly not suffice to account for our experience of active, resourceful **living beings**, for **their activities are often accompanied by conscious efforts and feelings** of which our physics and chemistry know nothing (*PK*, 336).

## ENDNOTES

<sup>1</sup>The authors would like to thank Phil Mullins, Walter Gulick, and an anonymous reviewer for their profoundly helpful comments on the draft of this article.

<sup>2</sup>All citations to Grimen (2004) are given in the body of the paper. The paper was originally written in Norwegian, but later translated to English by Bjoern Wikner, improved by Judith Lasen and finally approved by Harald Grimen. The paper was cited by Yu Zhenhua (2004). We are grateful to him for providing this paper and can send the paper on request.

<sup>3</sup>All citations to Collins (2010) are given in the body of the paper.

<sup>4</sup>More analysis of Collins' Social Cartesianism can be found in Heder (2012).

<sup>5</sup>All citations to McDowell (2000) are given in the body of the paper.

<sup>6</sup>Bold lettering indicates emphasis not found in the original.

<sup>7</sup>For the range of missed options by Collins see Lowney (2011-12).

<sup>8</sup>We provide a critique of this interpretation of the neurosurgeon thought experiment in Héder and Paksi (2012).

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