EPISODE 2

# FROM EXPERIENCE TO KNOWLEDGE

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## 1 Evolution of Individual and Collective Knowledge

The concept of cognitive levels in the design and implementation of curricula in Bloom's Taxonomy can be applied to many levels of education including:

~ Higher education covering the range of Bachelor's, Master's and PhD.
~ Degree programs, in mathematics, physics, psychology, philosophy, engineering, medicine, law, and so on; and
~ Individual courses in the degree programs, such as Introduction to Philosophy, Classical Mechanics, Introduction to Gender Studies, and so on.

In this article, we outline a different way of conceptualising levels of knowledge, in terms of the epistemology of Academic Cognition, beginning with experience and ending in knowledge.

The idea that knowledge is ultimately grounded in experience allows us a lens through which we can explore three aspects of the evolution of knowledge:

Evolution of knowledge in living systems: unicellular organisms, plants, and animals, including humans.

Evolution of knowledge in growth from a human zygote to a foetus and subsequently an adult human being.

Evolution of collective knowledge in the human species, from the early days of humanity to the modern times, and from the pre-academic to the academic systems of knowledge.

Once we grasp the idea that knowledge results from experience, we can apply this to both pre-academic and academic systems of knowledge.

## 2 Experiential Knowledge

Let us begin with a thought experiment. Imagine a pregnant mother shipwrecked on a deserted island with no other humans around. Despite her ill-fated circumstances, she survives, and gives birth to a baby, only to die shortly after delivering the child. Miraculously, the baby survives and grows up alone on the island without another single living person and reaches adulthood.

The situation described above is a *counterfactual* thought experiment: we all know that a baby left alone on a deserted island would die very soon. This type of thought experiment functions as an entry point and an aid in our exploration of the concept of experiential knowledge, as distinct from imbibed or imparted knowledge.

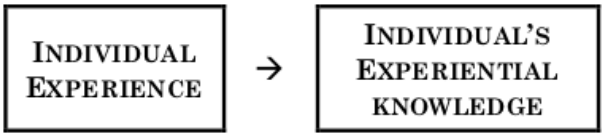
M G Subramanian has pointed out in his comments on an earlier draft:

> "the word experience incorporates the subjective 'events' and 'processes' that A may experience and B has no access to, and thus has no good basis for agreeing or disagreeing."

We agree. Our point is, the concept of experience — whether verbalised or pre-linguistic, whether conscious or unconscious, whether involving neurons or not — is relevant for the knowing/cognition that all life forms exhibit. Bacteria do not agree or disagree with one another, but they make inferences from what we call experience.

Being alone, the child does not have the opportunity to learn a human ***language*** (such as English, Malayalam, Russian, Japanese, and Yoruba); that would require exposure to fellow human beings who speak that language. However, knowing a language is not necessary for her to experience the world around her, as she obtains knowledge needed for survival, of the flora, and fauna, and other aspects of her environment, through experience, and not through human communication. We may call this the ***experiential knowledge*** of the individual.

A.




How is experiential knowledge relevant to the design and implementation of curricula for Higher Education? To answer that question, we need to place human cognition against the backdrop of non-human cognition. All life forms from unicellular organisms to plants and animals, including newborn babies, have experience, resulting in 'knowledge' triggered by their experiences. Humans, however, have an additional level of knowledge that comes from our ability to verbalize in a community.

By 'experiential knowledge,' we do not mean the specific experiences that philosophers call ***qualia***, such as "the taste of the pineapple cake I had on my birthday," but the ***memory*** resulting from the generalisations from a multitude of experiences. When a newborn babe sees the face of her mother one morning, and a few seconds later, sees that face from a different angle in a different set of light conditions, each *quale* (singular of *qualia*) is distinct from the other. What is recorded in the child's permanent memory, however, is what is common to all the qualia. This calls for the more complex mental functions of ***abstracting*** and ***generalising***.

At this point, we need to ask an important question: Does pre-linguistic experiential knowledge, common to all forms of life, have the need for ***concepts***? If we subscribe to the view that there exist such things as pre-linguistic concepts that bacteria and plants have, then, yes, experiential knowledge is built on concepts not necessarily expressed in words and phrases of a human language. But if we use the word 'concept' in such a way that bacteria, plants, and non-human animals do not have concepts, then experiential knowledge does not involve concepts.

If we assume that all life forms have knowledge grounded in their experiences, and that there are patterns of experiences stored in their memory, then we can accept that all life forms are capable of at least rudimentary forms of inferencing based on those patterns.

As far as we know, non-human life forms do not have some of the cognitive resources that human knowledge systems have, namely, language, language-based reasoning, formal reasoning based on algebraic symbols, and ways of making numerical calculations using mathematics. However, this distinction about humans does not in any way negate what we have in common with other forms of life: the ability to have experiences.

## 3 Verbalised Knowledge of Human Communities

Let us change the scenario of our first thought experiment. This time there are several pregnant mothers shipwrecked on the deserted island which again is devoid of other humans. Incredibly they all survive, and each of them gives birth to a baby, though as with the solitary mother, they die while giving birth. By some amazing fate, the babies all survive.

By the time the children are about three years old, they develop a rudimentary system of communication with one another, whether or signed, and by the time they are ten, they become fluent users of that system.

This language is used by each member of their community on the island to relate experiences to one another resulting in shared knowledge.


Now, readers might question the credibility of the thought experiment. Does the first generation of adults who in their development had no interaction with older adults develop a human language? Research suggests that they may develop varieties of systems of communication, spoken or signed, with a rudimentary vocabulary and structure. Research in linguistics suggests that the transition from such rudimentary varieties to fully developed systems happens only in the second generation or perhaps over successive generations.

The linguists' doubts about how the existence of pre-linguistic experiential knowledge influences the development of verbalised knowledge of a community is something that can certainly be explored through thought experiments. (The authors of this article are themselves linguists, and we are using the term *verbalised* to include spoken, signed, diagrammatic, and algebraic languages.)

Retuning to our central premise, we must note that not all distinct experiences can be verbalised in terms of distinct words, phrases, or sentences of a language. Consider the experiences verbalised by the English words *pain* and *ache*. We express the undesirable sensation resulting from a

pinprick or a wound on the finger as *pain*, but the undesirable sensation in the body resulting from a fever as *ache*. These are words in ordinary discourse. If we were asked for distinct words to express distinct kinds of pain (e.g., pain resulting from a knife wound vs. pain resulting from stubbing one's toe against a door), we would use words to verbalise the distinct causes of pain rather than the differences in the sensation of pain.

Similar examples include differences in the visual experience of the face of the same person under different conditions of light (e.g., a face as seen under the slanting sunlight at sunset, vs. at noon, under a candlelight vs. light from different kinds of electric bulbs). These are examples of experiences that are *ineffable*, i.e., experiences that cannot be verbalised using the vocabulary of the languages with which we are familiar.

Specialised education, with the technical vocabulary of academic knowledge, equips us with ways of talking about some of the ineffable experiences we encounter. Medical sciences, for instance, distinguish between *acute* pain and *chronic* pain. They also make distinctions between *neuropathic pain, nociceptive pain,* and *nociplastic pain,* but these are words that express the causes of pain, not the experiences themselves.

As we move from the experiential knowledge of an individual to the collective knowledge of a community through verbalisation in a shared language, the challenge of ineffability demands that we leave out significant terrains of human experience.

We may note in passing that in the terminology of phenomenological research, what we have called 'experience' is called 'lived experience'. It refers to the first-hand direct experiences that serve as the grounds for the knowledge of an individual or a community. Given that only living organisms have experiences, the addition of the word 'lived' in 'lived experience' is redundant and confusing.

To make it complicated, it could be the case that 'lived experience' contrasts with 'imagined experience'. For example, a woman who has had the experience of pregnancy and delivery, has 'lived' the experience; it is not something that was imagined. Contrast this with women (as well as men) who have never conceived but have imagined experience, not lived experience.

We are not sure that this is the distinction made in the published literature. Even if it is, the term 'lived experience' refers to the experience specific to a given individual, which others have no access to, and cannot be the basis of collective knowledge building in research.

## 4 Knowledge Transmission across Time and Space

To return to our scenario of the offspring of pregnant mothers shipwrecked on a deserted island, let us imagine that the adult offspring mate and reproduce. The next generation acquires knowledge not only from their own experiences, but also from the verbalised experiential knowledge — ***testimonies*** — of their parents. Imagine a father telling his daughter, "A wild dog bit me when I was five years old." The father is reporting what he experienced, but for the

daughter, it is a testimony; she may not have had the experience herself, nor have heard of such an experience from someone else.

Over successive generations, the islanders invent the technology of travel by boat. Suppose they travel to the nearby deserted islands and populate them as well, and also invent a system of ***writing*** to communicate with the other members of the community. Now, they acquire knowledge not only from their peers and parents, but also from those across time and space. This makes it possible to have knowledge from those who lived hundreds of years ago, in places that one has not been to:


The inhabitants of the islands in our thought experiments call themselves *dharatas*. In their language, the word *stastra* refers to *beliefs transmitted through writing*, as distinct from beliefs transmitted through speech; in other words, it is documented knowledge put down in writing.

We will use the term ***testimonial knowledge*** to refer to knowledge resulting from verbal testimonies (spoken or written) rather than direct experience.

Before proceeding to the next section, we would like to quote from feedback on an earlier draft from John Goldsmith, also a linguist:

> "I continue to be unhappy with your 18th century anthropological fantasy. It is so tuned to our particular historical patrimony! How do you know how knowledge will be passed down? Will people have names? How many generations does a society need to exist until the notion of a proper name arises? I have no idea, and I can't imagine that anyone can know that. And of course, "when I was five years old" is not a concept that will arise in a culture in less than quite a few generations of scientific development (year?! five!?)"

John Goldsmith is also sceptical about the way we present the idea of the emergence of writing.

> "This is something that happened a very small number of times in human history -- hardly something that you can just suggest off-handedly is going to happen. In fact, though people tell us writing was independently invented in about five places, there is a coincidence assumed in that statement that makes me suspicious: that is that it all happened at around the same time. Humans have been around, we know now, 200,000 years -- we used to think 75,000, but we've discovered homo sapiens now going back 200K years -- and it is only after 195,000 years that writing sprang up? Something doesn't make sense in that statement, and I'm not sure what it is, but it does suggest that you shouldn't say "they also invent a system of writing" as if that did not require tremendous cultural development of a sort that we have not yet identified."

With gratitude to John, we leave these objections for the readers to ruminate on. It is important for them to critically evaluate what we say.

## 5 The Rise of Rational Knowledge

Verbalisation through language allows members of the *dharata* community to use ***reasoning*** to go beyond experiential knowledge. Let us imagine that Padu sees Vika and Tron standing side by side, and based on his visual experience, concludes that Vika is taller than Tron. The next day, he sees Tron and Somi standing side by side and concludes that Tron is taller than Somi. Because of these experiences, Padu ***infers*** that Vika is taller than Somi, even though he has never seen them standing side by side.

What this scenario describes is the process of *making inferences* from what is experienced. This capacity is not unique to the human species: it is shared by all living creatures ranging across unicellular organisms, plants, and animals. [We recommend that readers who are curious about this do an Internet search on bacterial cognition and plant cognition.]

There is, however, something that humans alone are capable of, namely, making inferences from propositions expressed in a natural language. Imagine that Padu tells his daughter Patia that Vika is taller than Tron, and that Tron is taller than Somi. Based on the propositions expressed by these sentences, Patia infers that Vika is taller than Somi, even though she has never seen Vika, Tron, or Somi:

| | |
|---|---|
| Premise 1: | Vika is taller than Tron. |
| Premise 2: | Tron is taller than Somi. |
| Conclusion: | Therefore, Vika is taller than Somi. |

We use the term ***reasoning*** to refer to making inferences from propositions expressed by sentences, to distinguish it from making inferences from experience.

And we will use the term ***rational knowledge*** to refer to knowledge arrived at through reasoning, whether expressed through speech or through writing. We believe that this is the distinction that Jane Goodall makes when talking about the *intelligence* of all creatures, and the potential for the *intellect* that distinguishes humans from non-humans.

## 6 Towards a Definition of Academic Knowledge

Our first article in this series, "Knowledge and Knowledge Systems," (in the July 2025 issue) ended with a note on the need for both general and specialised understanding of the different systems of academic knowledge on the part of "all stakeholders of Higher Education, whether to acquire or to transmit academic knowledge."

The term 'academic' in 'academic knowledge' has multiple meanings for different individuals who identify themselves as 'academics'. So, it is important that we define this concept, or at least clarify what we mean.

We might think of defining academic knowledge as what is accepted as knowledge by the members of the communities of academics, or what is taught as knowledge in educational institutions. But these are problematic moves, for reasons we will not go into here. We propose to take a different path.

We have already signalled that for a system of knowledge to be considered academic; it must qualify as ***rational knowledge***. We now propose another attribute: for a system of knowledge to be considered academic, it must also be ***analytic***.

What is ***analytic knowledge***? To answer that question, we must unpack the concept of *analytic*, by asking another question: what is ***analysis***?

One way to answer that question is to say:

> *Analysis is the process of identifying what the whole is composed of, that is, the parts of a whole.*

This is the meaning implicit in expressions like conceptual analysis, political analysis, historical analysis, and so on. If we accept this idea, then we can conceptualise analytical knowledge as that which is committed to the analysis of the concepts and propositions expressed by the words, phrases and sentences a language,

We may now say that analytic knowledge is a system of knowledge committed to the analysis of the concepts and propositions of that knowledge. For a system of knowledge to qualify as ***academic knowledge***, it must be the *rational analytic knowledge of the community*.

Let us add other conditions:

Academic knowledge must be a body of knowledge that is:

~ constructed and evaluated by a community of lifelong learners who have dedicated their lives to the pursuit of knowledge.

~ transmitted in the written form (i.e., it must be a *saastra*), whether also in the spoken form.

It must have

~ a sense of the ***uncertainty and fallibility*** of human knowledge,
including all forms of knowledge such as mathematics, the physical-biological-human sciences and the humanities, engineering, medicine, and so on.

~ the demand for the ***rational justification*** of knowledge claims, to be accepted as knowledge, in accordance with the norms of rationality;

~ ***doubting and questioning*** knowledge claims, both one's own and other people's; and

~ continual ***debating and self-correction***.

It is not necessary that all readers accept our characterisation of academic knowledge. All that we can say is that when we, the authors of this article, use the term 'academic knowledge,' the above characterisation is what we mean.

## 7 The Role of Reasoning in Academic Knowledge

Central to that characterisation of academic knowledge is ***reasoning***. As pointed out in our article in the previous issue, reasoning can be viewed as the process of deriving one set of propositions called ***conclusions*** from another set of propositions called ***premises***.

**D.** PREMISES ⇨ REASONING ⇨ CONCLUSIONS

As stated above, reasoning, which connects experience and knowledge, lies at the core of systems of academic knowledge. To understand the nature of reasoning in each domain or discipline, as well as the unity and diversity of reasoning across knowledge systems, it would be useful to begin by distinguishing between two kinds of premise-conclusion pairings:

- ~ Reasoning from empirical (observational) premises to observational generalisations, interpretations, and theories.
- ~ Reasoning from theories to their logical consequences (predictions/theorems).

A theory is composed of a set of postulates. A postulate is what we assume as a concept or a proposition of a theory. It is not something that we observe or experience. When we say that whenever we eat beyond a limit, there is discomfort in the stomach, we are noticing a correlation between our actions and our experience and stating a generalisation we have arrived at on that basis. When we connect a sedentary lifestyle and obesity, we are stating a generalisation based on observation. But when we say that overeating causes discomfort in the stomach and a sedentary lifestyle causes obesity, we are ***postulating a cause***: we can neither experience nor observe causality.

A theory, as mentioned above, is a configuration of postulates. In mathematical theories, we postulate definitions and axioms; and in scientific theories, we postulate definitions and theoretical laws/principles and constraints.

Reasoning from postulates is characteristic of the derivation of conclusions in mathematical, scientific, and philosophical theories, while reasoning from experiences (what we observe/data) is characteristic of observational inquiry in science, which includes experimental inquiry.

Let us take an example to illustrate these two modes of reasoning. Suppose someone is telling you about a family that you do not know — Raphael, his biological mother, and his older sister. She tells you that Rafael's mother was born a year after Rafael was born. You are likely to say, "What? That is impossible! What you are saying is preposterous."

If we were to ask on what basis you judge that statement to be false, even though you know nothing about the people the statement refers to, you might say that it does not matter who they are, or when or where they lived. It applies to everyone; the situation is impossible. For any person, it cannot be true that their biological mother was born after they were born.

Now suppose we asked you to prove that statement. How would you do it?

You have two options. One is to adopt the mode that is characteristic of scientific inquiry. In this mode, you might take a large random sample of mother-son pairs. In that sample, there is not a single pair in which the mother was born after the son was born. You can now generalise from the sample, using what is called ***inductive reasoning***, and ***conclude***:

> For any Y in the human population,
> it cannot be true that Y's biological mother was born after Y was born.

That would count as a scientific proof.

If you adopt the mode of mathematical inquiry, your reasoning would be different. Instead of gathering data, you would:

> define the concept of mother, and
> set up an axiom on the process of being born.

and using that definition and the axiom as your premises, you would conclude, using ***deductive reasoning***, that:

> For any Y in the human population,
> it cannot be true that Y's biological mother was born after Y was born.

You might say:

> **To prove**: For any Y in the human population, it cannot be true that Y's biological mother was born after Y was born.

And follow it up with:

> Mother (DEF): X is Y's biological mother if and only if X gave birth to Y.
> **Axiom**: For X to give birth to Y, X must be born before Y.
> **Proof**: From the axiom and the definition, it follows that for any X and Y in the human population, if X is the mother of Y, it must be the case that X was born before Y.
> Therefore, it cannot be true that X was born after Y. (QED)

[QED is a short form for the Latin phrase *quod erat demonstrandum,* 'that which has to be proved/demonstrated.']

This is just an outline, and needs to be supplemented with definitions of the concepts denoted by the expressions *be born* as well as what is meant by *before* and *after*. What we have outlined is a ***proof*** within the mathematical ***mode of inquiry***, even though its ***subject matter*** — mothers, offspring, age, birth, etc. — does not come under the body of knowledge called mathematics.

Interestingly, even though we judged as false the proposition that Rafael's biological mother *was born* a year after he was born, we do not have the same judgement on the proposition that Rafael's biological mother *died* a year after he died. On what basis do we judge the first proposition to be false, but not the second one? What is the difference between them? Try to prove or refute the second proposition using axiomatic reasoning, and you will see why.

[We must point out that before the 19th century, axioms were said to be self-evidently true; they were viewed as propositions that were true without the requirement of proof. For reasons that we will not go into, that idea was rejected in the 19th century, and was replaced by the concept of axioms as

assumptions that served as starting points for proofs, without the requirement that they be true.]

As another practice activity to gain an experiential understanding of reasoning from axioms and definitions, try to refute (disprove) the proposition that Seema and Helen are both Rafael's biological mothers.

## 8 Cognition and Reasoning by Machines

A note is in order here on decisions on the roles of existing versions of Artificial Intelligence using Large Language Models (LLMs), and their relevance to the design of curricula for higher education. LLMs make inferences based on the frequency, distribution, and cooccurrence of words, phrases, and sentences, without an understanding of the concepts and propositions that they express. Also, unlike unicellular organisms, plants, and animals that make inferences from experience, LLMs are implemented in lifeless machines.

These machines have visual experience (from built-in cameras), and auditory experience (from built-in microphones) but they do not have other modalities of sensory experience: tactile experience of the skin, kinesthetic experience of muscles and skeletal joints, gustatory experience of taste, and olefactory experience of smell. Nor do they have the experiences of pain, pleasure, sadness, joy, anger, hatred, compassion, and a myriad of other experiences that are crucial for human cognition. Hence, such machines may be capable of cognition and even consciousness, but not human cognition and human consciousness. Machine intelligence does not yet qualify as Artificial Intelligence of the kind that the founders of Artificial Intelligence, Alan Turing (1912-1954) and John McCarthy (1957-2011), set out to establish.

The input to the mechanical operations that allow LLMs to make inferences are the words, phrases, and sentences without meaning. They cannot reason unless reasoning is converted to the mechanical operations of formal systems of logic. Their usefulness lies in gathering and collating (NOT integrating) the information available on the Internet, and not for the functions of imagination, insight, intuition, reasoning, and clarity.

In the domain of verbalised information, they do the equivalent of what pocket calculators do in the domain of quantified information. Without a clear understanding of what AI can do and cannot do in qualitative and quantitative information, pushing AI into schools and colleges can be detrimental to learning, and disastrous for human development.

## 9 Summary

This article began with the concepts of experience, experiential knowledge, and verbalised experience. While all life forms from bacteria and plants to animals (including humans) have biological systems that generate experiential knowledge, it is only humans who are capable of verbalising their experience in terms of the words, phrases, and sentences of a human language.

Verbalisation of experience, combined with the invention of writing, allows humans to document knowledge in the written form. The knowledge of a given knower can then be transmitted across time and space, and a school student in Kerala can learn from a writer in ancient Greece. The emergence of what are called *saastras* — ancient knowledge documented in the written form — combined with the emergence of rational knowledge and analytical knowledge, are important steps in the formation of what we now recognise as the system of academic knowledge.

Central to the system of academic knowledge is the ingredient of reasoning — making inferences from premise propositions expressed as sentences in a human language. The second step in the evolution of academic knowledge is the emergence of the system of rational knowledge, based on the acceptance of the logical consequences of what we have already accepted, and the rejection of logical contradictions in a body of knowledge.

In addition to the above, some other strands of the rational temper include:

1) an awareness of the uncertainty and fallibility of human knowledge;
2) the need to doubt and question what is asserted, and what is implicitly or explicitly assumed;
3) the openness to correct what we believe to be true, when confronted with sufficient reasons;
4) the requirement of rational justification to defend our knowledge claims.

To illustrate the role of reasoning in (4) above, we presented in section 6 a detailed case study of two modes of reasoning, one from postulates to their logical consequences, and the other from experience to knowledge. During that pursuit, we saw how the clarification of concepts through the process of defining is an important ingredient of the system of academic knowledge.

We leave it to the stakeholders of higher education — students, faculty members, faculty trainers, parents of students, education administrators, and the generally educated — to use what they have gained from this article in their own continued learning. And if you are a faculty member or a faculty trainer, to use it to help others to learn. Ideally, learning forms the basis for action, each action brings us deeper learning, and every part of this process brings collective growth.

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