A DIALOGUE ON CONCEPTS

Ronaldo Vigo

Characters:
DIONYS LUCIDUS
HERMES SCEPTICUS
FUZIO PROTOTIPICUS
DOGMASUS EXEMPLARIS

FUZIO: Can you tell me, DIONYS, what is 'thinking'?

DIONYS: My dear FUZIO, you ask me a profound and difficult question. Indeed, I am not sure that there can ever be a satisfactory answer to such a grand question, but given that I have never been able to resist a good intellectual challenge, I will try to answer it. But first, let me say that, I do not believe that listing a number of varieties of mental experiences, as is done in a dictionary, defines thinking.

HERMES: How does the dictionary define 'thinking', DIONYS?

DOGMASUS: I happen to have a dictionary with me. To think, according to the *American Heritage Dictionary*, is: '1) to decide by reasoning, reflection, or pondering; 2) to judge or regard; 3) to believe or suppose; 4) to expect or hope; 5) to intend: for example, *They thought they'd take their time.* 6) to call to mind; remember: for example, *I can't think what her name was.* 7) to visualize; imagine: for example, *think what a scene it will be at the reunion'.*

DIONYS: In some sense all these things may be related to thinking. But I *think* (*here I am again, using the concept 'thinking' as I think*) that what we really want to know when we ask such a question is not what the different mental activities related to thinking are but what the essence of thinking is.

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FUZIO: I agree, DIONYS.

DIONYS: So let us examine the various definitions of thinking. Where do all these activities associated with thinking converge? What is it that they all have fundamentally in common?

FUZIO: I would say that all these definitions are 'topicless': that is, they leave out the crucial thing that is the object of thought in general.

DIONYS: Can you clarify what you mean, FUZIO?

FUZIO: For instance, the first definition, *to decide by reasoning, reflection, or pondering*, does not identify what it is that we are deciding about, reflecting about, or pondering about. This is also true for the rest of the definitions.

DIONYS: So what is this crucial thing that is the object of every thought?

HERMES: Concepts! These, I submit, are the atoms of thought!

FUZIO: Excellent, HERMES, excellent!

DIONYS: Suppose, for the sake of argument, that you are right, HERMES, and that concepts are the atoms of thought. Then, the question we should first ask is: how do we acquire concepts? Or perhaps, how are they formed?

HERMES: DIONYS, I think that these are key questions indeed, and that searching for their answers would be very useful in helping us to gain insight into the nature of concepts; however, would you not agree that both of these questions presuppose that we know what a concept is in the first place? Thus, should we not first answer the more fundamental question: What is a concept?

DOGMASUS: This is a very good point you make, HERMES, and the answer is simple. A concept is the mental representation of a category.

DIONYS: But my dear friend DOGMASUS, your answer begs the question.

DOGMASUS: What do you mean, DIONYS?

DIONYS: The problem with your definition is that it sidesteps the question of what a concept is by merely labeling concepts 'mental representations' and by referring to

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categories as if they were crystal clear entities. In other words, to say that a category is represented mentally gives no clue as to what a category or a mental representation is. I would think that the only useful purpose behind this maneuver is to draw a distinction between external entities like tables and mental entities like images of tables. But such a dichotomy is not helpful in answering our question.

Let me explain. One way of characterizing a concept is through a membership rule. Such a rule is based on properties of the entities constituting the set or category that we wish to define. So, for example, the concept *human* is approximately captured by the membership-rule 'x is an element of H if and only if x is a biped and a mammal'. This type of definition, known as an intensional definition, characterizes a set through certain properties of its elements. In contrast, extensional definitions simply list the elements of a set. Unfortunately, there is no perfect correspondence between the intensional and extensional ways of characterizing concepts. That is, no set of properties can ever determine a set of entities uniquely and precisely, while no set of entities can be characterized uniquely and precisely by any set of properties.

For example, suppose that we are shown the following set of objects: a pen, a pencil, a hot dog, and a house, and we are told that they belong to the novel category of blongs. Some observers might think that the rule for determining membership in the category of blongs is the fact that the given objects are longer than they are wide. Others might believe that the rule for this novel category is that all these objects enclose something. For example, a pencil encloses a led, a pen encloses a cartridge, a house encloses furniture, and a hot dog's bun encloses ground meat. What is clear is that the concept associated with this set of 'blong' things is not necessarily the same for each of us.

Matters get far worse if one considers that there are no clear sets that we can think of corresponding to simple, mundane real-world categories such as *fine wine*, or *big*, or even something as seemingly clear as the concept *chair*.

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What exactly comprises the set of chairs corresponding to the concept chair is not clear, and worse, it can never be specified by a rule. Is a futon a chair? Is a stool a chair? Any definition of 'chair' will always leave out some atypical or *exotic* cases and will included items that are not reasonably called 'chairs'. We would therefore constantly have to modify our set of defining properties with each new experience. For this reason, to say that the concept 'chair' is a mental representation of the set of all possible chairs will not do, since we can never know the extension or set corresponding to such a concept. That is, we can never experience the 'set of all chairs' – an idea that actually does not make sense when you think about it.

HERMES: I see your point, DIONYS. I also see another great difficulty with the idea that concepts are mental representations of external sets: namely, what is the mental representation of a set? Or, in other words, using your intensionality-extensionality distinction, what is the mental representation of a rule? Is it a certain arrangement of neurons that encodes our memories of certain entities? Or could it be that an arrangement of neurons could instead encode similarities between the various entities in a set and not so much the entities themselves? Whatever information we may be processing and preserving, the manner by which we encode a set of entities is far from clear.

DIONYS: I agree, HERMES, and I would add that such representations are never a function of simple rules and are never based on simple rules such as the intensional descriptions that I discussed earlier. For example, consider the letter 'B'. There are printed Bs, flipped Bs, cursive Bs, crooked Bs, irregular Bs, and upside-down Bs. Some of these Bs are more *B-like* than other Bs.

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To be 'B' or not to be 'B'

What is the mental representation of this set in terms of a rule? For example, one possible defining rule might be the following: a 'B' is a symbol that is part of the English alphabet and which approximates the shape of a vertical line accompanied to its right by two adjacent half ellipses, one on top of the other, as in the following shape: **B**. Granted, this definition may not capture the essence of 'B-ness', but for the purpose of our discussion it will do.

Is the representation of this rule a cluster of entities, or is it just one new single object that is a condensed encoding of the information content of all the entities in the set, or is it an essence, or a structure. . .? And these are but a few of the possible interpretations! And what about the underlying physical implementations in the brain? Are these physical implementations also not representations?!

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Perhaps there is no summary representation of a concept at all. Perhaps each of our experiences is stored as an individual entity in our brain, and experiences are never combined together into more abstract ideas.

HERMES: I grant you, DIONYS, that there are more questions than answers associated with the view that concepts are mental representations of sets of objects; however, I am not certain that for mathematical concepts, such as that of 'prime number', your objections to the definitional view of concepts are warranted. For this simple kind of highly abstract, artificially defined category, there seems to be no difference in principle between the rule and the set that defines it.

DIONYS: It would seem that way, HERMES. However, how do we know that someone else's conception of a prime number is the same as our own? It may be that whenever I think of the concept *prime*, various instances of prime numbers and associations with the notion come to mind that are unlike those that come to mind for FUZIO. Does this not mean that his conception of primeness and mine might be quite different?

HERMES: Your concepts of primeness may not be exactly the same, but the fact that you both can very effectively communicate ideas about prime numbers and that you both can generate lists of prime numbers for each other without any ambiguity (at least for relatively small primes) makes your concept of primeness, DIONYS, close enough to FUZIO's to call the two identical! In this respect, I hold a pragmatic view.

DOGMASUS: DIONYS and HERMES, as you know, what you are proposing is just what Eleanor Rosch and colleagues proposed in a series of papers in the 1970s. Rosch and her colleagues were not in agreement with the *concepts-as-rules* or *definitional* view of concept acquisition and usage – a view which I feel is necessary for scientific progress.

DIONYS: My dear DOGMASUS, why do you say that the rules view is necessary for scientific progress?

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DOGMASUS: Before I answer your question, DIONYS, I think that we should first define the tenets of the concepts-as-rules view.

FUZIO: Well, as I recall, the crux of the rule-based view of concept formation is that humans form rules, and that these rules represent categories or concepts. Researchers in the 1960s used simple well-defined categories to 'prove' this point.

DOGMASUS: FUZIO, I think that your interpretation of the concepts-as-rules theoretical position is somewhat simple-minded. Although it is true that some researchers held the position that you described, the majority of researchers who might be classified as rule-theorists did not have a philosophical commitment to the definitional view. Their use of simple well-defined categories in their experiments, such as a set of colored geometric shapes, was merely motivated by scientific pragmatism. After all, in science it is often useful to examine highly simplified phenomena under ideal and controlled laboratory conditions. This way, noise from extraneous sources can be kept to a minimum. Indeed, if models do not successfully predict the simplest cases, then what hope is there that behavior corresponding to more complexly structured stimuli can be predicted?

Thus, it is not surprising that even those researchers who have been keenly aware of the difficulties associated with the definitional view engage in research involving definitional concepts as a methodological strategy. This explains why so much research prior to the 1970s had as its focus experimental paradigms involving these well-defined categories featuring clear dimensions such as color, shape, and size, and a small number of distinctive features. Adoption of this pragmatic methodological strategy does not amount to buying into the theory that humans actually represent concepts in their minds or brains with the type of strict definitions described above: the so-called 'classical view' of concept learning.

Although I cannot say what such researchers really believed about the nature of concepts, I think that you

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would agree with me that questions about the nature of concepts are primarily philosophical questions rather than scientific ones. However, it seems to me from what I have heard so far that all three of you would be very sympathetic to the view put forth by Rosch and her colleagues, which sees concepts as prototypes.

DIONYS: My friend DOGMASUS, before I can address your hypothesis regarding our views, please explain to us the prototype view of concepts as proposed by Rosch.

DOGMASUS: Certainly. The question concerns the degree of 'typicality' or 'atypicality' possessed by each of the members (or candidate members) of a category. As you and HERMES so wisely pointed out, under the definitional view, there is no way of expressing that a particular member of a given category is more representative of that category than another. For example, although a hydroplane is technically a boat, most humans would not think of such a boat as a typical example of a boat whereas a rowboat would be. Thus, the typical category members are the ones that – perhaps due to the frequency of our encounters with them in everyday life (or to the fact that they posses certain key diagnostic features to a greater degree than other category members) – constitute a better amalgam, or superposition, or average of many prior instances. This later notion of typicality is essentially what Rosch meant when using the term 'prototype'.

DIONYS: Would it be true that under this view a concept is necessarily a prototype?

DOGMASUS: Why do you ask, DIONYS?

DIONYS: For if it is true, then how is it that we can have concepts comprised of just one single instance or experience? That is, I clearly have concepts consisting of one category member, such as the concept of the only time that I drove by Mt. St. Helens in Washington and saw a massive cloud of smoke in the sky. My feeling at that time was a feeling unlike anything that I have known before or since. Thus, it would seem that the intensity of a single experience or event, regardless of the event's frequency, also plays an important role in concept formation.

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DOGMASUS: DIONYS, perhaps such one-member concepts are really not concepts at all. Or perhaps they are based on a combination of a number of already acquired concepts which in synergy with the novel sensation elicited by a unique event – such as the sudden appearance of massive clouds – leads to the single-member concept of a volcano eruption.

DIONYS: But it is not the volcano eruption that is the concept here! Rather, it was my eerie feeling accompanying the eruption.

DOGMASUS: I stand corrected... the single-member concept of that eruption-related eerie feeling.

HERMES: I am sorry to disagree, but I am inclined to believe that one-member concepts are not concepts at all, but rather, just memories.

DIONYS: Yes, Hermes, but memories are intimately connected to concepts. We are reminded of a former experience, object, or event by certain other things. Indeed, humans are very good at this. If we fall off our bicycle as an adult, we may be reminded of a day when we fell off our bicycle as a child. If we eat a bowl of noodles for the first time, we may be reminded of the first time we saw worms in our parents' garden. If we see an airplane, we may be reminded of a bird we saw the day before. Could it be that concepts are nothing more than triggers for reminding us of things in our memory? This suggestion is consistent with the idea that the cohesiveness or comprehensibility of our world is due to concepts. That is, that our ability to recognize entities in the world and their relationship to other entities is entirely dependent on concepts.

HERMES: The German philosopher Kant would have agreed. In his treatise on human nature, Kant recognizes the importance of the conceptual organization of objects by the human mind when he posits that, without the existence of certain basic concepts or 'categories of the understanding', humans would not be able to make sense of the world they live in. Perhaps concepts are nothing more than devices for organizing our memory: for giving structure to our memory.

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DOGMASUS: This reminds me of another view of the nature of concepts that we have not discussed and that appears to me to be a more tenable one – at least from the point of view of cognitive psychology – than either the prototype or the definitional view of concepts. The exemplar view asserts that memory and similarity play primordial roles in concept formation. Under this view, concepts are simply the activation of individual memories of individual objects (known as exemplars) via a similarity relation. So, for example, a hydroplane is categorized as a boat because it reminds us of similar items (i.e. other boat exemplars) stored in memory such as a row boat, a tow boat, and a sail boat.

DIONYS: I also find this view more appealing, DOGMASUS, but I think that more than a simple similarity relation is at play as a triggering mechanism. I think that a simple notion of similarity alone cannot explain the rich diversity of reminders that are experienced in the course of daily events and in daily communication. Take, for instance, the concept of 'me-too'. This concept conveys a sense of sharing a similar experience to that of a fellow human at some level. The concept, upon analysis, can be very complex, yet we know exactly what we mean when we use it, and we use it immediately, without hesitation. I find it difficult to accept that its usage can be explained strictly in terms of a simple similarity relation on a few well-defined entities.

DOGMASUS: What do you think we mean when we use a 'me-too'?

DIONYS: We mean that we sympathize with or can imagine ourselves in someone else's situation, even though the situation may be quite unlike our own.

FUZIO: So if similarity is not the triggering mechanism for concept retrieval and usage, what do you propose instead, DIONYS?

DIONYS: Analogy, or structural similarity, is the basis of concept formation and evocation. Whenever we trigger a memory, it is done through analogy. That is, analogies are the vehicles, the necessary medium or 'ether', of concept

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formation and expression. Notice how quickly an apt analogy springs to mind whenever we try to communicate concepts. No conscious effort is necessary in order to come up with a good analogy during normal daily discourse. For example, FUZIO related a story to me a week ago. He said that he got up in the morning and tripped over a stool that he had left in front of his bed the day before. After tripping over the stool and twisting his ankle, he found out that his car had a flat. He then drove to work during a massive storm. After relating these ordeals to me, he stated: 'When it rains, it pours!' He did not hesitate for a moment in using this vivid phrase. It came instantly, without any thought or effort.

The concept of a growing series of misfortunes was understood and communicated through with a simple analogy. His response was fluid and seemingly instantaneous. How powerful is this ability in humans! It is what separates us from other animals. Dormant memories were reawakened or triggered by a series of analogies to the unfortunate events; then, each reawakened memory contributed to the emergence of the final analogy 'When it rains, it pours!' For example, FUZIO confessed that the first incident reminded him at the time of (or was like) a previous incident he had experienced when slipping on his porch in a puddle of water. The second incident reminded him at the time of (or was like) a recent loss of a hubcap during a cloudy day. These two analogies triggered specific memories which, combined with the final incident, resulted in the emergence of the final analogy.

I *think* that, for anything that I can *think* of, I *think* about it through analogy. Analogies are so ubiquitous in communicating concepts in an automatic, unpremeditated fashion that it would be hard to disconfirm that thinking is nothing more than the activity of triggering memories through analogies.

DOGMASUS: Amen.

DIONYS: 'Amen' itself is perfect analogy, involving religion a bit but also many situations in which a speaker is

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simply expressing compassion, strong agreement, or respect toward an opinion.

DOGMASUS: No doubt!

FUZIO: I also agree with your claim, DIONYS. And since analogies trigger complex memories and since these memories, in combination or individually, act as concepts, then, an analogy evokes a concept and a concept is built up by a very long series of analogies earlier in life.

DIONYS: Indeed, FUZIO, indeed!

HERMES: DIONYS, your viewpoint is interesting but problematic. It does seem plausible to me that all that I think of may be the result of unconscious analogies. However, given that I cannot falsify this hypothesis, I do not believe that, from the standpoint of rigorous science, it is a well-constructed hypothesis. That is, in principle, I think that there is no empirical test that can be conducted to show that your hypothesis is false. As such, it remains a speculative claim, and most certainly, not a scientific one. And yet, I concede that the very nature of thinking may prevent us from forming hypotheses about thinking that are falsifiable. Thus, I will regard your dublous claim as food for thought for another hearty discussion.

DIONYS: A delicious analogy, HERMES!

All laugh.

I would like to thank Doug Hofstadter for his helpful suggestions regarding this dialogue.

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