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On Kripke's puzzle about time and thought

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Kripke [Kp] formulates the following puzzle.

At any moment of time, Kripke might be thinking of a certain set of times.

For example, the set of all times when TV was unknown. Or the set of all times when interplanetary travel will be commonplace and the like.

Kripke proceeds.

However, there is a problem: suppose I think at a certain time t_0 of the set S_0 where S_0 contains all times t at which I'm thinking of a given set S_t of times, and S_t does not include t itself. In conventional notation:

$$S_0 = \{t \mid S_t \text{ exists \& } t \notin S_t\}$$

Now, I am thinking of S_0 at a certain time t_0 . Is t_0 a member of S_0 or not? The reader can fill in the resulting paradox for herself.

One question which might be raised here is **What does thinking of something amount to?** It is not clear to me what Kripke's notion of 'thinking of something' is. I have used an approach where syntax is an intermediary to semantics which is then used to think of things.

Thus I shall take the point of view that thinking of some X is mentally repeating some words intended to denote X . If there is such an X , and is denoted by the expression one has mentally repeated then in normal circumstances one has succeeded in thinking of X .

However, surely that is not the only way. Perhaps one thinks of someone by having a picture of him in one's mind. So I might think of Quine, not by saying the word to myself but remembering him. But remembering how? In his office? Giving a lecture at CUNY? If I remember him giving a lecture and someone else remembers him walking through Harvard yard, then are we thinking of different persons? If I read Borges' [The Aleph](#) in English and Adriana reads it in Spanish then when we think about [The Aleph](#) are we thinking of the same book?

I shall avoid such questions by simply assuming that thinking of Quine amounts to saying the word to oneself provided one satisfies the required conditions viz: one has met Quine or read one of his papers or met someone who knew Quine, or whatever. A second reason for going the linguistic route is that while at least a weak case can be made that one can think of Quine by having a mental image of him, it seems implausible that one can think of S_0 without going the linguistic route. [Sm] discusses some of these questions though in a different context.

Before addressing Kripke's problem, let us turn to another Harvard philosopher, namely Hilary Putnam who is famous for not being able to distinguish a beech from an elm. Suppose that Putnam is looking at a tree in a friend's backyard and says, "I think that tree might be a beech."

The friend responds, "Do you mean to say that my tree is a member of the set of all beech trees?", and Putnam responds, "Yes, just that. I think your tree is a member of the set of beech trees."

Now Putnam does not know whether the tree in question is a beech or not. May we nonetheless say that Putnam is thinking of the set B of beech trees and wondering if the tree in question belongs to B?

Surely yes. Putnam does not need to be able to tell a beech tree by sight in order to think of the set B, just as we can think of Aristotle without having the ability to recognize him by sight.

Here is the quote from Putnam: Suppose you are like me and cannot tell an elm from a beech tree. We still say that the extension of 'elm' in my idiolect is the same as the extension of 'elm' in anyone else's, viz., the set of all elm trees, and that the set of all beech trees is the extension of 'beech' in both of our idiolects. Thus 'elm' in my idiolect has a different extension from 'beech' in your idiolect (as it should). Is it really credible that this difference in extension is brought about by some difference in our concepts? My concept of an elm tree is exactly the same as my concept of a beech tree (I blush to confess).

And again, The last two examples depend upon a fact about language that seems, surprisingly, never to have been pointed out: that there is division of linguistic labor. We could hardly use such words as 'elm and 'aluminum' if no one possessed a way of recognizing elm trees and aluminum metal; but not everyone to whom the distinction is important has to be able to make the distinction.

Let us shift the example; consider gold. Gold is important for many reasons: it is a precious metal; it is a monetary metal; it has symbolic value (it is important to most people that the "gold" wedding ring they wear really consist of gold and not just look gold); etc. Consider our community as a "factory": in this "factory" some people have the "job" of wearing gold wedding rings; other people have the "job" of selling gold wedding rings; still other people have the job of telling whether or not something is really gold.

It is not at all necessary or efficient that every one who wears a gold ring (or a gold cufflink, etc.), or discusses the "gold standard," etc., engage in buying and selling gold. Nor is it necessary or efficient that every one who buys and sells gold be able to tell whether or not something is really gold in a society where this form of dishonesty is uncommon (selling fake gold) and in which one can easily consult an expert in case of doubt. And it is certainly not necessary or efficient that every one who has occasion to buy or wear gold be able to tell with any reliability whether or not something is really gold.

The foregoing facts are just examples of mundane division of labor (in a wide sense). But they engender a division of linguistic labor: every one to whom gold is important for any reason has to acquire the word 'gold'; but he does not have to acquire the method of recognizing whether something is or is not gold. Thus a chain extending from us to Aristotle enables us to think of him, (see [Kn]), and the community of horticulturists enables Putnam to think of the set B. He can just say the word "beech" or think it, and he thinks of B.

The work of deciding on the denotation of the word “beech” is done by society and it is society which helps Putnam “think of” the set of beech trees by just using the word “beech”. There is a linguistic division of labor. Putnam thinks the word “beech” and the community sees to it that he is thinking of the set of beeches.

For another example, I can speak about (and think of) the set of physicists currently at CERN without knowing whether my friend Pran Nath is currently at CERN or not. If he is, then he is a member of the set I am thinking about and if not then not. I **do not need a mental image** of all the physicists lined up in a row, nor do I need to know whether Pran is at Cern. The community does part of the work for me by deciding who is to be counted as a physicist and Pran does part of the work by being at CERN or by not being at CERN. All I need is the phrase “the set of physicists currently at CERN.”

In Putnam's case, Putnam does not play any role in deciding what a beech tree is and in my case I do not play a role in deciding what the word "physicist" means or who is at CERN. And it is Putnam's non-interference with the meaning of "beech" and my [non-interference](#) (as we shall see) with physicisthood that enables us to use the word or the phrase to think of something.

Before returning to Kripke's puzzle, let us consider another, practical problem. Mr. Smith wants to listen to a lecture by Kripke, but it turns out that the room in which Kripke is speaking is full. However, CUNY has considerably provided rooms A and B in which a video transmission of the lecture can be heard. Smith goes into room A and starts listening when he suddenly realizes that there a problem. It is Thursday evening, and Smith belongs to a religion which allows him to listen to a lecture on a Thursday only if the room in which he is doing the listening has an odd number of people in it (including Smith himself). Unfortunately (and Smith counts) there are 20 people in room A including Smith. Clearly Smith cannot stay in room A.

But then he looks across the hall and sees that room B only has 11 people in it. 'Aha!' says Smith and proceeds to room B. He sits down and starts to listen. But after a minute or two his conscience starts to trouble him and he counts the number of people in room B. The number, alas, is 12. Clearly Smith cannot stay in B and proceeds back to A which, he can now see, only has 19 people. We need not trouble ourselves more with Smith's quandary. Perhaps he just goes home. Or perhaps he pays someone in A to move to room B.

Smith's problem is a convoluted version of a simpler problem. Can I enter an empty elevator? Yes, if all I ask is that the elevator be empty prior to my entering it. But if I demand that the elevator be empty **after** I have entered it, then I am going to be frustrated.

For an even more alarming example, if a man cannot marry a married woman, and he cannot marry an unmarried woman, then marriage would come to an end. It is clever of mankind to decide that “an unmarried woman” means a woman who is unmarried before she says “I do” .

We do have occasion to worry that we are not able to enter a full elevator, especially if we are late for class. But not many of us worry about not being able to enter an empty elevator. “Empty elevator”, in common usage means an elevator which is empty when seen from outside.

As for Smith, it is quite likely that had Russell written to Frege about Smith, Frege might not have been particularly concerned. He might just have advised Smith to convert to a more practical religion.

Let us now return to Kripke's problem. Let us assume that at each moment of time, Kripke is mentally uttering a word or phrase to himself. Perhaps the phrase is, "the set of all times when TV was unknown." Let p be the phrase and TVU be that set. The meaning $M(p)$ of p is TVU and by thinking p , Kripke can think of TVU . Very possibly Kripke does not know exactly when TV became known (known to how many?) but (as I have argued) he can think of the set TVU just by mentally uttering the phrase p .

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But now what happens if Kripke utters " S_0 " to himself at time t_0 ? What set is he thinking of? The answer to that is presumably, $M(S_0)$. We have the expression " S_0 " and all we need now is the function M . We can then look to see if $t_0 \in M(S_0)$.

The trouble is that if at time t_0 Kripke had not thought " S_0 " but thought p instead, then t_0 would have been in the value $M(S_0)$. For $M(p)$ as a [set of times](#) would have been empty. But Kripke unwisely did not think p . Instead, he thought " S_0 " and by thinking " S_0 " he put t_0 out of $M(S_0)$. But no, by putting t_0 out, he put it back in, etc. etc.

The trouble is that if at time t_0 Kripke had not thought " S_0 " but thought p instead, then t_0 would have been in the value $M(S_0)$. For $M(p)$ as a **set of times** would have been empty. But Kripke unwisely did not think p . Instead, he thought " S_0 " and by thinking " S_0 " he put t_0 out of $M(S_0)$. But no, by putting t_0 out, he put it back in, etc. etc.

The fact that Kripke is thinking " S_0 " is not the problem. The problem lies in the fact that Kripke is **interfering** with the meaning function M by thinking " S_0 ".

In particular, if Kripke is uttering " S_0 " to himself at time t_0 , does $M(S_0)$ have the property of containing t_0 ? Clearly the rest of us cannot help Kripke here. He will have to make up his own mind about M , just as Mr. Smith had to make up his mind whether to go home or pay someone to move from room A to room B, or perhaps convert to some other religion. Or he could go to a room with an even number of people in it, knowing that the number would be odd when he went in.

In sum, are Kripke's troubles any worse than Smith's? I am not convinced that they are. Let me now present a baby result which generalizes Kripke's examples of TV and interplanetary travel. In both cases, Kripke was able to make use of society's denotation of certain phrases by leaving the meaning function alone.

Let M be a function which takes a moment t of time and a phrase p to produce a set. M may not depend on t at all. For example $M(p,t)$ where p is “the set of all times when TV was unknown” does not depend on t at all – it is not indexical.

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But we will allow indexicality. Thus if Humpty Dumpty says, “from now on ‘horse’ means a cow” and we allow him this indulgence, then after Humpty Dumpty’s remark, we can think of the set of cows just by using the word “horse”. So we allow M to depend on certain data, like Humpty Dumpty’s remark about the word “horse”. If Kripke uses the function M to think of some set, he can use his own behavior **prior** to the moment of his use of some phrase p .

So let M be such a meaning function $M(p,t,d)$ where p is a noun phrase, t is a time, and d are some data about the world (but only prior to times before t) and the thoughts of everyone including Kripke prior to time t . If two sets of data d and d' agree on all sets of times up to but not including t , then $M(p,t,d)$ and $M(p,t,d')$ are required to be the same.

Definition: Suppose that at time t , some agent a is thinking some expression p , and the meaning function of a 's community at time t is $M(t, \cdot)$ then agent a is said to be thinking of the object $M(t,p)$.

I am ignoring issues where what the agent intends to think of is not denoted by the expression that the agent is actually using. For instance suppose Paul says to Shamasundar, "How is the weather in Madras these days?"

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Then Shyamansundar might respond, “There is no such place as Madras. You are probably thinking of Chennai. The weather in Chennai is fine”. Here we would say that in using the expression “Madras” Paul is actually thinking of Chennai. I will ignore this problem since it is not germane to Kripke’s worries in [Kp]. That issue is, however, addressed by Kripke under speaker meaning [Ks]. See also [D].

Suppose now that Kripke decides to think " S_0 " at time t_0 . That fact is not part of the data at time t . So $M(S_0, t_0, d)$ is already determined and either contains t_0 or does not. What Kripke thinks at time t_0 is not part of the data, and does not affect M , but he certainly is free to use an already existing M to think whatever he likes.

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That Kripke is thinking “ S_0 ” is certainly allowed to be an argument to M , but is not allowed to interfere with M itself. What if we want M to be able to depend on physical facts like the sun turning into a giant red star, **after** time t ? We can accommodate such a need by making M depend on two kinds of data, linguistic data d_l up to but not including time t , and physical facts d_p including those from times after t .

The Santa Fe bar problem

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The El Farol is a bar in Santa Fe, New Mexico which plays Irish music on Thursdays and many people want to go. But they do not want to go if the bar will be crowded. Let us say that the bar has a capacity of 100, and 60 or more attending constitutes the bar being crowded.

Suppose the entire community of possible bar goers has access to the data about attendance on previous Thursdays and based on this they form a theory T of whether the bar will be crowded on [this Thursday](#).

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If T predicts that the bar will not be crowded then everyone will go and the bar will be crowded.

The isomorphism between the El Farol problem and Russell's paradox can easily be seen if we assume that only one person wants to go and **crowded** is equivalent to **not empty**.

Conclusion: Can I enter an empty room? Yes, I can, provided that I decide beforehand that “empty” means “empty before I enter.”

Groucho Marx's Remark

I would not join any club which would have me as a member!

The **no trade** theorem of Milgrom and Stokey has a similar flavor to Groucho's remark.

One can think of other, more benign cases as well. For instance, suppose Kripke thinks at a certain time t_0 of the set T_0 where T_0 contains all times t at which he is thinking of a given set T_t of times, and T_t **does** include t itself. Is t_0 then a member of T_0 ? Here, instead of no solution, we have two consistent solutions, rather like the situation with Henkin's problem.

Henkin [H] asked if the formula of Peano Arithmetic which “says”, “I am provable” is provable. The formula could be true and provable or it could be false and unprovable. Unlike the Gödel formula which said “I am not provable”, Henkin’s formula gives no such trouble but leaves us with a choice. Löb [L] eventually gave a positive answer, the Henkin formula is provable. But before Löb did so, both answers, positive and negative, were plausible. Kripke’s theory of truth [Kt] goes into similar issues in great depth, but we shall simply stop here.

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