18.0 The Problem

What is the structure of thought? Are thoughts more like sentences, or more like pictures? To what extent do thoughts mirror our language? How is it that pre-linguistic children can have thoughts? To what extent do their thoughts have the same structure as ours?

These are the basic problems to be addressed in the next two chapters. And they are difficult. Historically speaking, these problems are not currently as contentious as the problems of consciousness. Most of these debates took place in the late 80’s and early 90s, and have generally faded into the background – that is not to say that the issue has been settled, only to say that the two sides appear to have reached a mutually beneficial cease-fire.

19.0 Preliminaries

Many (some say all) of our mental states can be described using an indicative that clause. I believe that the Democrats will win the next election. I hope that the Democrats will win the next election. I desire that the Democrats will win the next election.

The part following the that in the sentence is proposition – it can be either true or false. The part proceeding the that clause is the attitude I take to that proposition – I believe that it is true, I hope that it is true, I desire that it is true.

Terminology: Propositional attitudes are often referred to as intentional states, meaning that they are about something - the content of that intentional state. In this way, we can say that my belief that the fountain of youth exists has the same status as my belief that Philadelphia exists. The intentional objects of my beliefs are the fountain of youth and Philadelphia respectively. But one exists and the other does not. The problem of how these beliefs can be about something that does not exist is a difficult one – but it really is a problem for Metaphysics, so we can set it aside. Notice that the problem is not just a problem for this particular way of thinking about our mental life. It is a fact that we think about things that do not exist, and as far back as Plato, Aristotle, and through to the ontological argument of St. Anslem, the problem has been an issue for philosophers and metaphysicians.

Propositional attitudes are said to have ‘content’ - that to which the attitude is directed. My belief in the fountain of youth has the fountain of youth as its content.

20.0 The Language of Thought Hypothesis

20.1 The Hypothesis

The language of thought hypothesis is that thoughts have a certain sentence-like structure. My belief that show is white and my belief that snow is cold share a certain atomic component ‘snow’, and they are differentiated insofar a different quality is predicated of that thing.
Likewise, My belief that snow is white and my desire that snow be white shares certain 'atomic' components: snow and white. How they come together, and the attitude I take to them is what differentiates the one thought from the other. The hypothesis is in two parts:

1st. It concerns how a mental state gets to express a certain proposition

2nd. It concerns what attitude is taken toward that proposition.

20.1.1 Propositions

Thoughts get to express certain propositions in much the same way that sentences do – they start with atomic components and are built up according to certain rules of structure.

The Hypothesis is that a completed cognitive science will identify physical properties of the brain which will identify syntactic tokens of the same type – that is, certain brain states that play a specific type of role in the brain. This allows us to reidentify a certain brain state as representing, for example, snow (How we do that is a huge problem, and is one of the central topics of the next chapter).

Let us suppose that brain state \( ? \) represents snow. Let us further suppose that brain state \( ? \) represents white. The hypothesis is that there is some purely syntactic operation of the brain analogous to predication, which operates on \( ? \) and \( ? \), such that \( ?? ? \) is a sentence of mentalese.

We know have a proposition that is compound, and has a truth value - ‘\( ?? ? \)’ is true just in case \( ?? \), or in other words, snow is white.

20.1.2 Attitudes

The second part is about what attitudes one takes to \( ?? ? \) is \( ?? ? \) believed? desired? etc.

What attitude one takes to a proposition depends on the causal-functional role of the sentence token of mentalese that encodes it. Crudely, if \( ?? ? \) occurs in the ‘desire’ box, one desires that snow is white. If \( ?? ? \) occurs in the ‘belief’ box, one believes that snow is white.

Note that this is perfectly consistent with common-sense, as if someone believes that beer is near, they will behave in a very different way than if he or she desires that beer is near.

What proposition a token of mentalese expresses depends on the semantic or representational properties of the syntactic or structural constituents and one the way they are put together.

20.1.3 Contrast with Functionalism

Functionalism holds that what determines the meaning of a mental state is its functional role. The language of thought hypothesis only holds that the functional role determines whether it is a belief or desire. The meaning of the proposition – the truth value – is determined by what the atomic components of the proposition represent.
But this is a problem, as the belief that a tiger is near will play a very different functional/causal role in the mental life of a possessor of such a thought than the belief that beer is near.

The meaning of the proposition is causally relevant, and the account must be able to explain how. This is explained by the syntactic properties of the token of mentalese. Think of proteins. Proteins get their causal efficacy from their shape. Tokens of mentalese are analogous. The type of mentalese tokens that represents ‘snow’ will be a different shape than the type of mentalese tokens that represent ‘white’. After all, if they are different types, that difference must lie somewhere. As a result, they will have different causal efficacy.

20.2 Arguments for the Language of Thought Hypothesis

Argument from explanatory power – only it can explain the phenomena.

(after all, this is the way in which most scientific debates are settled. We agree that there is a certain phenomena, and they attempt to figure out which theory best explains that phenomena.)

Which phenomena are relevant? The phenomena of how our thoughts are structured, after all, this was the original problem. So, how are our thoughts structured?

20.2.1 They are systematic and productive.

20.2.1.1 Systematicity

The thought that Jill loves Bill and Bill loves Jill are both meaningful. If you can think the one, you can probably think the other.

Therefore, anything theory of thought must posit a structure according to which if it is possible to think ‘R(???)’, it is possible to think ‘R(????)’.

If the physical states of the brain that represent ?, ?, and R had no physical syntax, it is difficult to see how thinking the one entails that you can think the other.

If the physical states of the brain that represent ?, ?, and R have a physical syntax, it is easy to see how if R(???) fits together, R(???) fits together.

20.2.1.2 Productivity

We can think new thoughts made out of old atomic components.

We can think ‘grass does not grow on kangaroos’, and we understand the sentence.

We understand sentences of this sort because of our ability to understand the atomics ‘grass’, ‘grow’ and ‘kangaroos’, and that the sentence is predicating, of the grass, a property of not growing on kangaroos. The second half of this understanding is the understanding of the structure of our language.

So how can we think new thoughts? We think new thoughts, according to this theory, in much the same way – we take atomic
components that we already knew, and arrange them in ways we hadn’t before.

20.2.2 There are similarities in behavior arising from similarities in thought.

The thought that coffee is here and the thought that coffee is there will cause different behaviors, but the difference will ultimately be directed towards coffee. That is, it will have something in common.

Like effects mean like causes, and this theory posits exactly that. The mentalese token ‘coffee’ has a characteristic causal efficacy, and it will be cause similar behaviors when it appears in sentences of mentalese.

20.2.3 Thought tends to evolve causally.

One thought leads to another, but one thought does not lead to totally unrelated thoughts. The language of thought hypothesis has an attractive explanation – it is the nature of the structures of mentalese that determines which other structures of mentalese it can cause.

21.0 The Map Alternative

21.1 Preliminaries

It must be the case that mental states that have content are structured, and that structure must play a causal role in determining their representational content.

Suppose that Jones’s head has states S1, S2,... that represent things around here as being, respectively R1, R2, ...

What is unbelievable is that the similarities between various Rs in now way corresponds to similarities amongst Ss.

Suppose an example. Recently, some psychophysicists have hypothesized an ‘opponent-processing’ system as the internal states that correspond to the hues.

It has long been noted that there are certain pairs of colors that cannot exist in a singular hue: nothing can be reddish-green, or bluish-yellow. But there are other hues that can be described as combinations of other hue: purple is reddish-blue, lime greenish-yellow.

According to the theory of opponent-processing, there are two chromatic channels, activity on which represents the particular hue of a color. Maximal activity on these channels represents opposite colors. Activity greater than zero on the red-green channel represents something reddish. And activity less than zero on the red-green channel represents something greenish. Likewise, activity on the blue-yellow channel less than zero represents yellow, greater than zero, blue.

A binary hue, like lime, can exist insofar as there can be activity less than zero on the blue-yellow channel, and less than zero on the red-green channel.

It follows that in order for there to be a reddish-green, there must be activity both less than and greater than zero on the red-green channel. But that is impossible.
The structure of the states in my head (some believe that they are in the Lateral Geniculate Nucleus) corresponds to the structure of hues in the world. The point is a general one about the representational systems. When we learning the representational system of arabic numerals, we only need memorize 10 symbols, and the rules for putting them together. All systems of representation that are open-ended must exploit structure, and the brain is no different.

Thus, a general representational system can make appeals to the productivity and systematicity of thought in much the same way that the language of thought hypothesis does.

But the problem for the map thesis is to say how the brain represents systematically.

21.2 The Hypothesis

The hypothesis then, is that the brains’ representational system is like a map. Maps give information in a very rich way. A map cannot represent that NY is north of Philly without representing that Philly is south of NY. Second, every part of a map is related to the whole in a certain systematic way, block out a part of the map, and the information maps carries is systematically degraded.

It may be objected that there is no minimum unit of truth on a map, but there is a minimal unit of truth in thought (i.e. ‘Boston’ represents, ‘Bosto’ does not.

But the map thesis can just appeal to the detail of the map - just like a map of the US can represent Boston as a unified whole, a map of Boston will not.

The thesis is not that there is literally a map inside one’s head, but rather that there is a structure inside one’s head that operates like a map. The representational atoms stand with respect to one another in much the way they do in the world. For example, consider the thought “My coffee mug is to the left of my book”. That entails “My book is to the right of my coffee mug”. On the map view, there are two representational tokens in my head corresponding to ‘coffee mug’ and ‘book’, and they are arranged within a spatial predicate that can be read as either ‘to the left of’ or ‘to the right of’. That is not to say that there are literally brain states A and B that are literally to the left of / right of one another. Rather, they are arranged within a structure that counts as ‘spatially located next to one another’.

21.3 Arguments for the Map Alternative

As the arguments for the language of thought hypothesis turn on its explanatory power, arguments for the map alternative attempt to show that it has the same explanatory power. That is, it can ‘save the phenomena’ at least as well as the language of thought hypothesis.

21.3.1 Systematicity

A map that represents that NY is north of Philly can represent the opposite, new thought that Philly is north of NY by flipping it upside down.

21.3.2 Productivity

A map maker can certainly make maps of something no one has ever seen- i.e. the maps that are contained in the intro to the Lord of the Rings, e.g.
21.3.3 The Causal Argument

Maps can be more or less similar to one another, and those similarities and differences show up in the decisions made based on those maps. I.e. if I have a map that represents that St. Augustine center is next to the train station, and you have a map that represents the same thing, we will arrive at the same location. If not, not.

21.3.4 Evolution of Thought

One can certainly adjust maps according to changes in the world. Similarly, if we have a map that is incorrect, or puts two things together that have not been together before, we can simply draw a new map.

21.4 Objection

The language of thought hypothesis hypothesized an actual structure inside the head that corresponds to mentalese. The Map hypothesis has simply waved its hands, and said that thoughts are like maps, but has not hypothesized a map-structure in the head.