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The Dilemma of Intentionality

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1. The Naturalistic Project of Intentionality

One central project in the studies of the mind is to explain, in terms of the proprietary vocabularies of natural sciences, how a mental state can come to be representational, or come to have content, in virtue of being a physical state. This is the naturalistic project of intentionality.

The conviction of those who embrace the naturalistic project is that mental phenomena belong to the natural world and obey to the natural order, and hence are, at least in principle, reducible to physical phenomena. Accordingly, mental phenomena are investigable through the methods of the empirical sciences, without resorting to a traditional and distinctively *a priori* project of conceptualizing.

The success of the empirical sciences has been one of the key factors for the methodological shift of many contemporary philosophers (e.g. W. V. O. Quine [1953], Nelson Goodman [1978], Hilary Putnam [1981]) from the position of 'first philosophy' to naturalism. The sciences have proved to be a better way of understanding the world. The explanations they offer are more systematic, rigorous, and generate much higher predictive power. The commonsense explanations, on the other hand, are criticized as being "stagnant" (Paul Churchland [1984]) and circular, since they are couched in the very terms that are the subjects of expla-

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nation.

1. 1. Intentionality

Intentionality is basically about a representational character that most, if not all, of our mental states exhibit. Pick any example from our everyday mental phenomena, such as believing, desiring, dreaming, hoping, loving, and the like, the representational character of the mind can be readily shown. For instance, my belief that "Peter is at his home" is a mental state that *refers to* a person named "Peter", a place regarded as "Peter's home", and a relation between the two.

As far as the example is concerned, both the belief that "Peter is at his home"and the constituent of the belief, "Peter", are mental representations. What distinguishes the two is that one is a complex representation whereas the other primitive. Whether a representation is complex or primitive purely depends on its compositional structure. The representational content of a primitive representation is not constituted by any other representation, whereas the representational content of a complex representation is constituted by at least one other representation. A complex representation is a combinatorial product of representations in compliance with some combinatorial rules, whereas a primitive representation is not. A primitive representation, so to speak, is an atomistic representation that serves as the fundamental constituents of mental representations in general.

Since primitive representations are the fundamental constituents of mental representations in general, a naturalistic explanation of mental representations ultimately depends on an explanation of what a primitive representation is; couched in the vocabularies that do not themselves utilize intentional or semantic concepts.

Viewed from a naturalist's perspective, it would be ideal if the intentional relations were straightly reducible to causal relations. That is, it is in virtue of a causal relation with the intended object that a mental state qua physical state becomes representational. But this simple and straightforward reduction is doomed to encounter some grave difficulties, because the intentional feature of our mental states is famous for being peculiar.

1. 2. The Peculiarity of Intentionality

There are basically two kinds of cognitive activities that make intentionality peculiar, namely the actions that are directed at non-existents and actions that exhibit intensionality.

1. 2. 1. Actions Directed at Non-Existents

To see the activities that are directed at non-existents, consider the representation, "water". Without any question, in some cases one can come to have "water" tokened by spotting water. For convenience, let me call this kind of cases *Case-1*. In *Case-1* what "water" refers to is what causes the tokening of "water". And in *Case-1* what "water" refers to is also in harmony, at least from a general perspective, with the causal role that "water" plays in one's cognitive activities ; i.e. one's actions that are caused by the "water" tokens are directed at water, and hence the actions are consistent with what "water" tokens refer to.

However, everyday life shows that tokenings of a primitive mental representation do not always causally related to what makes the representation true. Clearly, we are not only capable of representing water in the water spotting situation or other similar sort of situations that we have causal experiences with water. There are indefinitely many other

cases in which the tokenings of "water" can be caused, but the "water" tokenings in those cases are not causally related to water. For example, among many other cases, my representation about water can be caused by my reading the term "water" in a newspaper, or hearing Mary talking about water, etc. Let me call this second kind of cases *Case -2*.

In *Case -2* "water" tokens also refer to something, but what they refer to is not what causes their tokenings. This is indicated by the 'inappropriateness' of the causal role that the representation plays in one's cognitive activities. That is, in *Case -2* one acts in exactly the same way as one acts in *Case -1*, as if there were water nearby. But one's actions in *Case -2* are inappropriate because it is not true that there is water nearby.

1. 2. 2. Intensional Actions

We have just seen one's identical cognitive actions in response to different parts of the world. But it can also be seen through one's different cognitive actions in response to basically the same part of the world. These are the cognitive actions that exhibit what has been conventionally called intensionality. Consider the famous example of "Hesperus" and "Phosphorus". "Hesperus" and "Phosphorus" are names that basically refer to the same planet—Venus, although they refer to it in different ways. "Hesperus", which is also called "the Evening Star", was a name given to the planet on the basis of its being conspicuous in the evening. "Phosphorus", which is also called "the Morning Star", was a name given to the planet on the basis of its being conspicuous in the morning, in a different part of the sky, and at a different time of year. From a purely referential point of view, since "Hesperus" is coextensive with "Phosphorus", the predicate position that "Hesperus" occupies in a

statement, e.g. "Hesperus is Hesperus", should be transparent. That is, "Hesperus" should be substitutable with "Phosphorus" without affecting the truth-value of the statement. But the same substitution is not always allowable as far as mental representations are concerned. When one believes that "Hesperus is Hesperus", it does not at all follow that one believes that "Hesperus is Phosphorus". And accordingly, one acts differently regarding the belief that "Hesperus is the brightest star" and the belief that "Phosphorus is the brightest star". The predicate position that "Hesperus" occupies in the belief is therefore not transparent, but, as Quine put it, "referentially opaque".

1. 3. The Dilemma of Intentionality

The peculiar cases of intentionality invite us to question what the true nature of intentionality is. And when the answer is placed under scrutiny, it reveals a dilemma of intentionality: Either intentionality is genuinely relational or pseudo-relational, but neither alternative seems attractive as far as a naturalistic theory of intentionality is concerned.

On the one hand, if intentionality is genuinely relational, then the intended object must really exist, and intentional relation is but a causal relation. Obviously, this choice would pave a solid ground for a scientific theory of intentionality. But at the same time the choice would also undermine such theory for two main reasons. First, the theory would have difficulty in explaining the intentional phenomena generally experienced. No doubt we often have thoughts and experiences that concern the real objects. But most of the time we have thoughts and experiences that do not concern the real objects. Perceptual illusions and hallucinations, dreams, fantasies, thoughts about Sherlock Homes, and thoughts in *Case -2* (see 1. 2. 1), are just a handful of examples that highlight our

mental phenomena in general. Since the intended objects in these cases do not really exist, it is difficult to provide a smooth scientific explanation about how the mental states in general are causally related to their intended objects. Second, as far as intentional acts are concerned, the theory would not be able to provide a significantly different explanation about the intentional relations that are directed at non-existents. As I have demonstrated in *Case-2*, although one's mental states in this case are directed at the objects that do not really exist, there is no significant difference between cognitive actions of this kind and cognitive actions that involve the real objects as far as one's actions followed from those intentional states are concerned. Since the intentional relations are indistinguishable according to the generated actions, they deserve to be treated as intentional acts of the same type, explainable by appeal to the same theory.

On the other hand, if intentionality is pseudo-relational, then having thoughts or emotions about something does not require the real existence of the intended objects; they are merely some sorts of configurations within mental space. Since intentional phenomena in this sense are only mental configurations that do not require the support of an objective reality, it is hard to see how the mind makes contact with the objective reality. Thus it is hard to see how a scientific theory of intentionality is possible.

1. 4. The Implication

The dilemma of intentionality implies that in order to have a view about the content of a primitive mental representation that is compatible with the causal role of the representation, we have to give up either the claim that the content is constituted by the causal relations with states

of affairs in the world—call this claim *the claim about content*, or the claim that a primitive mental representation is individuated by its referential relation—call this claim *the claim about individuation*. What to choose?

One choice is to give up the claim about individuation and adopt a Fodorian approach of understanding primitive mental representations in terms of Mentalese symbols, or the symbols that are computationally implementable and constitute what Jerry Fodor calls the Language of Thought.

2. Fodorian Notion of Mental Representations

In his celebrated Representational Theory of Mind (1975, 1987, 2000), Fodor argues that a primitive mental representation, or a primitive Mentalese symbol, is a computational product that is individuated by both of the symbol's semantic property and syntactic property.

Fodor's notion of mental representations is basically grounded on two theses, namely (i) the Language Of Thought Hypothesis (LOTH) and (ii) the Computational Theory of Mind (CTM).

2. 1. LOTH

LOTH is a thesis about intentional realism. It claims that our mental states, such as beliefs, desires, hopes, intentions, imaginations, thoughts, hallucinations, dreams, loves, fears, and many more, which are technically called propositional attitudes, are basically reducible to a set of real, and intentional, states of a human brain. Furthermore, the intentional brain states are constituents of a language-like representational medium called *the Language of Thought or Mentalese*.

2. 2. CTM

Fodor's LOTH is intimately connected with his CTM. Roughly, CTM claims that our thinking and other psychological events are just like computational processes, which are basically manipulations of symbols or physically realizable structures that have a combinatorial syntax and semantics. To see how our thinking and other psychological events are computationally implemented, let's consider how a computer or a calculator processes a simple mathematical equation, $2 + 2 = 4$.

A computer or calculator processes the equation by taking the inputs, "2"; "+"; "2"; "=", manipulates them, and generates the output, "4". What is amazing about this computational or functional process is that although the symbols have semantic values (i.e. "2" means *2*), the entire process can be understood on a level which only invokes the syntactic properties (e.g. shapes) of the symbols, and yet the causal relations among the syntactic properties of the symbols preserve the inferential relations among the symbols' semantic values.

The reason that the causal relations among the symbols preserve the inferential relations is due to a "prearrangement" set by the machines' "machine table" or programming specifications along with how the calculator is used. The machine table is an exhaustive specification of the machine's operations over the given symbols.

According to Fodor, mental representations are in fact Mentalese symbols because they, like computer symbols, have a combinatorial syntax and semantics. And processes involving Mentalese symbols, like processes involving computer symbols, are functional processes that involve input, manipulation and output. What makes the processing of certain Mentalese symbols a particular belief is that a particular input from the perceptual systems causally interacts with some particular desires (i.e.

some other sort of computational operations that may or may not involve the same symbols) in the inferential system and generates particular actions. But more importantly, Fodor argues that the processing of Mentalese symbols, like the processing of computer symbols, are conducted purely based on the causal relations among the syntactic properties of the symbols and yet preserve the inferential relations among the semantic properties of the symbols.[2]

2. 3. Three-place Relation

By claiming that mental representations are Mentalese symbols that are computationally implementable, Fodor accounts for primitive mental representations in terms of a three-place relation, namely a cognitive agent, syntactic properties of primitive Mentalese symbols, and semantic properties of the symbols. This Fodorian explanation of mental representations in terms of a three-place relation is significantly different from the classical (Russellian) explanation of mental representations in terms of a two-place relation, which is between a cognitive agent and the states of affairs in the world, or in the case of a Fregean, between the agent and a "sense".

As far as the Fodorian explanation of mental representations are concerned, there isn't a direct causal relation between a cognitive agent's behaviors and states of affairs in the world; the relation between the two is mediated by computational operations over one's Mentalese symbols, particularly the syntactic properties that the computational operations are defined over.

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(2) Fodor, J. A. 1987. *Psychosemantics.* p. 19.

2. 4. Solution to The Dilemma?

Having introduced the additional component into a notion of mental representation, Fodor proposes to use it to account for the peculiarity of intentionality. According to Fodor, since one's mental representations are Mentalese symbols that are computationally implementable, the causal role that one's mental representations play in one's cognitive activities come from the computational operations over one's Mentalese symbols. And since the computational operations over Mentalese symbols are sensitive only to the syntactic properties of the symbols, it follows that the causal role that one's mental representations play in one's cognitive activities ultimately come from the syntactic properties of one's Mentalese symbols.

By appeal to the syntactic properties of Mentalese symbols as the source of the causal efficacies, it seems that the peculiarity concerning the causal role of one's mental representations in one's cognitive life can be dismissed straightaway. The identical causal roles that the mental representation plays in one's cognitive activities in both *Case -1* and *Case -2* are due to the identical computational operations in the two cases. That is, one bears the same computational relation to the Mentalese symbol, "water", in both cases. Accordingly, what directly cause one's cognitive activities are the causal properties of one's Mentalese symbols rather than the causal properties of the states of affairs in one's local environment.

A similar explanation can also be applied to the activities that exhibit intensionality. One's cognitive activities that are based on the belief that "Hesperus is Hesperus" are different from one's cognitive activities that are based on the belief that "Hesperus is Phosphorus" because the beliefs, despite having the same truth condition, are composed of two dif-

ferent sets of computational operations involving two Mentalese symbols with two different sets of syntactic properties; the Mentalese symbol— "Hesperus is Hesperus" —is syntactically different from the Mentalese symbol— "Hesperus is Phosphorus". Thus, by appeal to the computational operations over Mentalese symbols, Fodor seems to have dismissed the peculiarity of the causal role that mental representations play in one's cognitive life. But does it follow that Fodor's notion of mental representations has solved the dilemma of intentionality?

2. 5. The Coherency Requirement

As we have seen in section1, everyday experiences show that there is an unrelatedness between the causal role of a primitive mental representation and the content of the mental representation as long as the content is constituted by the causal relations to the non-intentional and non-semantic properties in the world. It follows that either a primitive mental representation doesn't cause one to act in virtue of its content, or the content is not constituted by the causal relations.

Now, having proposed that primitive mental representations are Mentalese symbols that are computationally implementable, Fodor can explain the causal role of a primitive mental representation by appeal to something that exists within a cognitive agent; i.e. computational operations over the agent's Mentalese symbols, particularly the computational operations that are defined over syntactic properties of the symbols. And thus we do not have to refer to states of affairs in the outer world (or at least, not by virtue of them being referents) in understanding the causal role of a primitive mental representation. However, although Fodor provides, by taking primitive mental representations as Mentalese symbols that are computationally implementable, a way of understanding the

causal role of a primitive mental representation independently of what is semantically exterior to a cognitive agent (hence dismissing the unrelatedness between the causal role and what is happening in the outer world), the computational operations involving Mentalese symbols have to be kept in phase with the naturalistic relations that are ultimately responsible for the semantic properties (or contents) of Mentalese symbols (call this *the Coherency Requirement*), because the very reason for coming up with such a proposal is to hold onto the claim that content is constituted by the naturalistic relations with states of affairs in the world. Accordingly, in order for Fodor's notion of mental representations to be free from the dilemma, it has to meet the coherency requirement following from the rejection of the claim about individuation (see section 1.4.).

To begin with, there is one way that the semantic properties of Mentalese symbols can be kept in phase with the symbols' computational operations. The Mentalese symbols in such a case are complex Mentalese symbols, whose semantic properties are constituted by computational operations rather than referential relations. For example, the Mentalese compound "2 + 2 = 4" is a combinatorial product of computational operations over the Mentalese symbols "2", "2", "+", "=" and "4", in compliance with the syntactic transformation rules. Although the computational operations that give rise to the semantics of complex Mentalese symbols involve primitive Mentalese symbols, the processes are sensitive only to the syntactic properties of the symbols, such as their physical shapes, spelling, spatial order, etc. Thus the semantics of complex Mentalese symbols is derived purely from the causal relations among the physical properties that exist within a cognitive agent, and the explanation of them can be given without having to make use of any

semantic notions like truth, reference, etc.

But obviously, this way of keeping computations in phase with semantics does not meet the coherency requirement, for the semantics in question is not entirely naturalistic. Although the explanation of the semantic properties that CTM provides does not make use of any semantic notions, it nevertheless makes use of the intentional states that embody the semantic notions! Clearly, the semantic properties of complex Mentalese symbols can only be explained computationally in so far as there are primitive Mentalese symbols. And primitive Mentalese symbols are nevertheless full-blown intentional states that have not only syntactic properties but also semantic properties. Thus the explanation of the semantic properties that CTM provides actually falls into the "intentional circle", and remains incomplete as an explanation of semantics until we have a naturalistic explanation for what makes something a primitive Mentalese symbol.

Indeed, Fodor's CTM works by assuming that there is an independent explanation for what makes something a primitive Mentalese symbol, and that is the explanation of semantics by appeal to the referential relations.

2. 6. Semantic Atomism

Fodor calls the theory that accounts for the semantics of primitive Mentalese symbols Information-Based Semantics Theory (IBST). Roughly, IBST claims that a primitive Mentalese symbol is semantically related to, or expresses, a property in the world basically in virtue of a nomic relation.

One important factor that makes a relation nomic is that the relation is supported by a set of counterfactual supporting conditions. Coun-

terfactual supporting conditions that subsume an event X enable us to know (independently from the actual experiences) what would happen (or would have happened) to X if the circumstances involving X were (or had been) thus and so. For example, if certain conditions were fulfilled, such as that a cow were located within an appropriate distance from my visual system, and the lighting condition were appropriate, and my visual system were unimpaired, then, ceteris paribus, the presence of the cow would reliably cause the tokening of "cow" in my head.

Another remarkable characteristic of the nomic relation is that it is an atomistic relation. That is, the nomic relation between "cow" tokenings and cow instantiations is not dependent on either the existence of any other semantic relation or any particular sustaining mechanism. In other words, tokenings of "cow" are 'exclusively' dependent upon, or under the control of, instantiations of cow.

The exclusiveness of nomic relations enables one to break out of the "intentional circle". However, it also introduces a dilemma between the computational processes that operate on tokenings of a primitive Mentalese symbol and the nomic relation that the symbol tokenings bear to instantiations of the property / properties in the world.

3. The Dilemma Again

Recall that in order for a notion of primitive mental representations to be free from the dilemma about what a primitive mental representation is, it has to meet the coherency requirement following from the rejection of the individuation claim. In particular, it must meet the following conditions : (i) primitive mental representations are not exclusively individuated by their contents ; (ii) contents of primitive mental repre-

sentations are reducible to naturalistic relations ; (iii) whatever (else) individuates primitive mental representations must be kept in phase with the naturalistic relations that are ultimately responsible for the contents.

So far we have seen that Fodor has two independent theories that meet the condition (i) and condition (ii) respectively, namely CTM and IBST. What is needed, in order for Fodor's notion of primitive mental representations to be free from the dilemma is that the computational processes are kept in phase with the nomic relations that give rise to semantic properties of primitive Mentalese symbols. But that is exactly where the problem lies.

As we have just seen, semantics of a primitive Mentalese symbol is constituted by a nomic relation between tokenings of the symbol and instantiations of the property / properties in the world, which is a semantic relation whose existence is not dependent upon the existence of any other semantic relation nor any particular sustaining mechanism. The atomism that the nomic relation entails makes the semantics of primitive Mentalese symbols fundamentally different from the semantics of complex Mentalese symbols. Unlike semantics of complex Mentalese symbols, which is (partly) constituted by internal relations, semantics of primitive Mentalese symbols is constituted exclusively by external relations. As long as the computational operations are internal relations and the nomic relations are external relations, it is highly doubtable as to how the two can be kept in phase with each other. Unless there is a way in which the two processes can be kept in phase, Fodor's theory will have to give up either the computational explanation of psychology or the IBS explanation of semantics, which is just to say that the theory will fall into the dilemma again.

4. Solution to the Dilemma

There is a strange phenomenon regarding our study of primitive mental representations so far. Despite the fact that primitive mental representations are something that we possess, we have been studying them by mainly referring to the properties the representations possess. And that, I think, is basically why we are in a dilemma with respect to understanding primitive mental representations.

We have been trying to understand primitive mental representations by reference to their contents as well as the causal role that primitive mental representations play in one's cognitive activities. And we have been asking questions that are specifically concerning the nature of these properties. The consequence of this line of pursuit is familiar by now ; we are in the dilemma about what a primitive mental representation is because the representation's causal roles are not consonant with the representation's content as long as the content is determined entirely by the aspects of the world which the representation refers to.

Although Fodor forcefully unites the inconsonant properties by appeal to the combinatorial syntactic and semantic properties of Mentalese symbols, his notion of primitive mental representations has not really led us out of the dilemma ; it only kicks it downstairs. In particular, although Fodor takes primitive mental representations to be products of the computational operations over Mentalese symbols, he has not given us a notion of primitive mental representations that is based on a fundamentally different perspective. He only translates the commonsense talk about primitive mental representations into a sub-personal, industrial-strength talk about Mentalese symbols. Instead of looking at the properties of primitive mental representations, he is looking at the properties

of primitive Mentalese symbols. But as we have seen, the consequence of this rigorous line of pursuit is basically the same as the other one : Fodor explains the causal efficacies by appeal to the computational operations over primitive Mentalese symbols, and the contents by appeal to nomic relations of primitive Mentalese symbols, but since the computational operations are typically internal relations whereas nomic relations are typically external relations, a satisfactory solution to the dilemma still requires a further explanation as to how there can be a harmony between the two independent processes.

The quest for the further explanation suggests that it is question-begging to understand primitive mental representations by merely looking at the properties of primitive mental representations. In fact, the perspective of primitive mental representations qua properties of primitive mental representations necessarily begs the question as to why primitive mental representations have the properties they have, which is a question that cannot be answered by merely looking at their properties or the nature of their properties. For example, there must be reasons why my representation of water refers to water, and why the representation token causes me to act in such and such a way.

In order to answer the why-question, we have to transform the Fodorian notion of primitive mental representations into a notion of primitive mental representations that is based on a wider perspective. And this wider perspective, in my view, is the perspective of homeostatic maintenance seen from which the computational operations over primitive Mentalese symbols are practically necessary for the maintenance of our survival. If the computational processes operating on a primitive Mentalese symbol are *practically necessary* for survival maintenance, then the computational processes operating on the symbol are guaran-

teed to be kept in phase with the directedness of the symbol however the syntactic processes involved in the computational operations might be different among different people.

5. Practical Necessity

Practical necessity is defined by survival on the one hand and practical circumstances on the other. Survival implies a metaphysical necessity ; i.e. it is metaphysically necessary for our survival to depend on the fulfillment of survival conditions. Needless to say, we need nutrients, oxygen, water, etc, in order to survive. These survival conditions are inalterable under any circumstance, because they are what make us who we are.

Furthermore, survival also implies that there must be means that function to maintain the fulfillment of survival conditions, simply because no survival condition can be self-fulfilled. However, the relation between survival and the means that function to maintain the fulfillment of survival conditions is merely contingent. That is, although it is metaphysically necessary that our survival depend on the fulfillment of survival conditions, it is not metaphysically necessary that our survival depend on the operation of any particular sort of means that function to maintain the fulfillment of the conditions. But the contingent relation between survival and the maintenance means does not suggest that we are absolutely free to do anything we want with respect to survival maintenance. In fact, we are given absolutely no choice regarding how survival can be maintained, and we are imposed upon by various constraints regarding what we can get and do to maintain survival under various sorts of practical circumstances. Thus, even though we are given

plenty of choices with regard to how survival can be maintained, as far as survival maintenance in a particular sort of practical circumstances is concerned, we are left with no choice but to get and do things that constitute the fulfillment of the survival conditions by using the means that are appropriate in those circumstances.

5. 1. Homeostatic Maintenance & The Water Preservation Mechanism

The notion of practical necessity is fundamentally about homeostatic maintenance in a typical human lifestyle. The function of homeostatic maintenance is to maintain the constancy of an organic system's internal environment by 'negating' the external changes experienced by the system through appropriate feedback responses.

A familiar example of homeostatic maintenance is the preservation of water level inside a human body, or water preservation mechanism. Clearly, a healthy human body is constantly losing water. As soon as the body is in a state of deviation due to the water loss, and as long as the body is not malfunctioning, certain homeostatic activities are automatically carried out to prevent the loss from immediately reaching the extreme level. Specifically, messages are continuously sent to a special part of the brain called the hypothalamus until the deviation state is relieved. In response to the messages, the hypothalamus will release a hormone called the antidiuretic hormone or ADH, which is carried by the blood to the kidneys where it functions to diminish the formation of urine. Since the urine formation is diminished, the water level inside the body can be detained at a relatively steady level for a certain period of time. And during the period of time we can continue to live without being seriously disturbed by the bodily deviation.

Surely there are various kinds of homeostatic means whereby water

in the body can be preserved. For example, one can drink continuously, or one could have one's body hardwired with an unlimited source of water supply via a high-tech regulation device whose functions are to continuously detect the proportion of water being lost from the body and to perform an immediate and accurately regulated refill according to the proportion of water being lost, etc. But not all of the homeostatic means that can bring about water preservation can bring about a water preservation that is compatible to a typical human lifestyle.

Roughly, the kind of lifestyle that most of us are living is far more complicated and mobile than the kinds of lifestyle that frogs and many other animal species are living. Most of us are living in a kind of environment where water is not always within a direct reach (for convenience, let me call such kind of environment the W-Environment). And most of us are capable of traveling to places that are far away from water resources. In order to preserve water in the W-Environment, we really have to use a very sophisticated water preservation mechanism that can allow us to survive without having to carry out frequent and immediate water intakes.

However, in order for the operation of the water preservation mechanism to be practically necessary for survival maintenance, it not only has to be compatible with the practical circumstances in which survival maintenance takes place ; it also has to be directed at preserving water. Obviously, not all water preservation mechanisms operations can deliver the requisite water preservation. Indeed, a water preservation mechanism can always be defective—diseased, malformed, broken, etc. —hence may be unable to bring about the requisite water preservation. But since it is metaphysically necessary for our survival to depend on, among other things, the presence of a satisfactory proportion of water in the

body, and since it is practically necessary for us to bring about the presence of a satisfactory proportion of water in our kind of body living in our kind of lifestyle by preventing the body from rapidly losing water, we are given no choice but to use a water preservation mechanism that can bring about the water preservation that survival maintenance in a typical human lifestyle entails.

So even though the water preservation mechanism can be defective, in order to maintain human survival as well as the lifestyle, we are given no choice but to cure the defective homeostatic means before it is too late. Thus, survival guarantees that, no matter what sort of water preservation mechanism is being used, its operation is or will be directed at preserving water even though the directedness is not metaphysically necessary for either the survival maintenance or the water preservation mechanism. And as far as our survival maintenance in the practical circumstances that entail the water maintenance is concerned, there is a harmony between the operation and the directedness of the sort of water preservation mechanism that we have. In other words, the practical necessity guarantees that there is a harmonious but nevertheless contingent relation between the operation and the directedness of the water preservation mechanism.

6. Practical Necessity & Computation

We are complex organic beings who are born with a set of relatively sophisticated homeostatic mechanisms to maintain the internal environment of our body. The inborn homeostatic mechanisms typically include the internal regulatory activities (e.g. the regulation of bodily temperature, the diminution of the urine formation, etc), the signaling activities

(e.g. the feeling of thirst, the feeling of pain, etc) and other instinctive behaviors (e.g. crying, avoiding, pursuing, etc). As Claude Bernard said : "It is the fixity of the 'milieu intérieur' [the internal environment], which is the condition of free and independent life".

However, merely having a sophisticated set of inborn homeostatic mechanisms is not enough to keep up with the free and independent life that most of us have. In order to live the free and independent life, it is required that one has both the sophisticated mechanisms and the sophisticated abilities to search the environment and obtain from it the things that constitute the survival conditions. For example, having been born with a sophisticated water preservation mechanism, one does not have to live a life that is confined in the nearby area of a water resource. One could travel to, or live in, a place that is far away from the water resource. However, should one live a life that is far away from the water resource, in order to continue to survive, one needs to know how to come back to the water resource or search for a new water resource so that the proportion of water inside one's body can be continuously maintained at a relatively steady level. In doing so, one is required to have, above all, a mental representation that is directed at water, or specifically, a primitive Mentalese symbol "water", so that one could produce water-directed behaviors that are not directly caused by the presence of water. In addition to the symbol "water", one is also required to have Mentalese symbols that are directed at things that could lead one to the reach of water ; e.g. the symbol "dam", "well", "coconut", "apple", "tree", "flower", etc. as well as Mentalese symbols that are directed at things that one should try to avoid in the processes of seeking and obtaining water ; e.g. the symbol "desert", "sea water", etc.

Frogs and snakes do not have such sophisticated abilities to form

mental representations, which is why they cannot survive in an environment where one always has to go to the kitchen tap to get water. Since one cannot live in an environment where one always has to go to the kitchen tap to get water unless one has the ability to perform the computational operations that produce, among other things, the primitive Mentalese symbol "water", it is fair to suppose that the computational operations that produce "water" are practically necessary for the survival maintenance in the environment where one always has to go to the kitchen tap to get water.

Surely from time to time one might obtain water by accident or through other means that are not due to the computational operations. But clearly, the obtainment of water by accident and the like are ipso facto random and rare activities in an environment where one always has to go to the kitchen tap to get water. And we can't just rely on random and rare activities to deliver a reliable and regular maintenance of our survival, let alone a reliable and regular maintenance of our survival in a complicated environment. Thus, a more specific way of putting the practical necessity claim about the computational operations is this :

(1) The computational operations are practically necessary for the survival maintenance by virtue of producing certain computational result (e.g. the tokening of "water") that can cause one to produce certain discriminatory and persistent actions, which can reliably and regularly lead one to the obtainment of the things and activities that constitute the fulfillment of one's survival conditions.

(2) Survival maintenance is taking place in a sort of practical circumstances in which the computational operations are the only

means that can reliably and regularly lead one to the obtainment of the things and activities that constitute the fulfillment of one's survival conditions.

7. A Major Challenge

There are several major challenges to the contentious practical necessity claim. But due to the limited space here, I can only look at one, which goes like this : although it is practically necessary for one to have primitive mental representations about water in order to survive in the kind of environment where one always has to go to the kitchen tap to get water, it does not seem to follow that all the tokenings of "water" are practically necessary for the maintenance of one's survival.

Indeed, I can make it happen that most of my primitive mental representations about water are not practically necessary for the maintenance of my survival, e.g. I can sit here and think about water a million times. And I can process the symbols in any way I like, e.g. I can think that water is pure or water comes from sky, etc. So in order for my practical necessity claim about the computational operations to be convincing, there has to be an explanation why so many (sets of) computational operations do not seem to be practically necessary for the survival maintenance.

To begin with, the practical necessity claim about the computational operations is neither a normalcy claim nor a statistics claim. That is, if the computational operations are practically necessary for survival maintenance, it does not matter how many times the computational operations have been practically necessary for survival maintenance in the past. It is not the case that the more the computational operations have

been carried out in the past ; the more the computational operations are practically necessary for survival maintenance. Whether or not the computational operations are practically necessary for survival maintenance is determined by whether or not there is any other option in maintaining the survival under such and such a sort of practical circumstances. If the computational operations are the only means that can deliver survival maintenance in the practical circumstances, then the computational operations are practically necessary for survival maintenance in the practical circumstances, regardless of how survival maintenance was delivered in the past and whether the computational processed had been carried out in the past or not.

Practical necessity is about survival maintenance in the practical circumstances. And as far as survival maintenance is concerned, it does not matter what sorts of homeostatic means are used to deliver it. It is metaphysically necessary for survival to depend on the fulfillment of survival conditions, but not on the means that are operated to maintain the fulfillment, let alone the statistics of the operations. Since the metaphysical necessity of the survival has nothing to do with the statistics, ipso facto, we cannot argue against the practical necessity of the computational operations by appeal to the statistics of the operations.

Furthermore, in understanding the practical necessity of the computational operations, we cannot merely look at what the computational operations currently bring about. No doubt, if the computational operations are practically necessary for survival maintenance, the reason why they are practically necessary is because they can bring about certain effects that are beneficial to survival maintenance in the practical circumstances in which nothing else can or can help to bring about.

In the case of the computational operations, the effects that are

beneficial to survival maintenance are the discriminatory and persistent actions that are directed at the obtainment of the things or activities that constitute the fulfillment of the survival conditions. Since the computational operations bring about the effect by means of producing certain computational results, the practical necessity of the computational operations has something to do with the particular computational result that the computational operations produce in the practical circumstances. But the relation between the computational operations and the production of the computational result is merely contingent. In the same sense that the water maintenance mechanism does not have to be directed at maintaining water during its operation, the computational operations do not have to produce the appropriate result during their operations. Thus what the computational operations actually bring about may not reflect why their operations are practically necessary for survival maintenance.

What we need to look at, in understanding the practical necessity of the computational operations, are the practical circumstances that require the computational operations.

The computational operations that involve certain symbols (such as "water" and "food", etc) are singled out as practically necessary for survival maintenance under certain sorts of practical circumstances. Surely one can do whatever one likes in those practical circumstances, but since one is not given any other choice regarding to how water can be regularly obtained in the circumstances, one cannot persistently perform the computational operations that involve something other than the symbol "water". Sooner or later, the computational operations that produce the appropriate result would have to be carried out in order for one to survive.

8. Conclusion

In this short paper, I have introduced a solution to the dilemma of intentionality by incorporating a notion of practical necessity into the Fodorian notion of mental representation. By incorporating the practical necessity, we have a sustaining mechanism that keeps the computational operations and the intentional relations in phase with each other; hence allowing the Fodorian approach of naturalizing intentionality to be completely free from the dilemma. However, the present introduction to the incorporated theory is far from being a satisfactory theory of intentionality. Many clouds have yet to be cleared, and several major problems have yet to be tackled. Among the major problems, one is the notorious disjunction problem (Fodor, 1987, 1990), and the other, which is the most fundamental, is how homeostasis is related to mental content. We can claim the victory in naturalizing intentionality only when these problems are solved.

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