

On perception and ontology in the context of subjectivity and modern physics

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I argue that our direct experience and some physical facts do not go well with an understanding of perception as a mechanism producing a *representation* of a “truly” outer world. Instead, it is much more coherent to treat what is traditionally considered an image in this context as a closed structure equipped in its own ontology, replacing the “truly” outer one from the point of view of an agent possessing it. In such a framework, the notion of existence is taken to be defined by consciousness in a way similar to qualia, making it subjective on the one hand, and reducing it to a tool on the other. This implies, in turn, that we *need* a form of mind-brain dualism; the best we can do in such circumstances about explaining consciousness as an epistemic device - a role intuitively imposing itself in a variety of situations - is to embed it in an abstract ontology merely *servicing the purpose* of a “true” reality with the help of the mind-brain link. Obviously, the approach favors subjectivity as a foundation in the ontological sense. Objectivity is considered here only as a suitably understood product from an “observer’s” point of view, although a functional and useful one.

The paper is addressed to readers with interest in both the mind-body problem and ontological foundations of present-day physics, specifically quantum theory. The main conclusion can be absorbed without the quantum part, although it is a bit less convincing then.

I. INTRODUCTION

This paper is about a common-sense modification of the common-sense notion of perception, introduced primarily in order to build a basis for a reconciliation of the subjective aspect of the mind and neuroscience. The conceptual load of this redefinition is quite heavy, but its consequences seem to be worth the price. Against a naively conceived scientific attitude, I accept here that the subjective is not fully reducible to brain behavior - our intuition insists that they can be at most isomorphic. Even more, I claim that it is natural to *expect* the two to be parallel in a certain, well-defined manner. This change of perspective is almost automatic after one takes into account that we should not treat what we consider produced by our perceptive apparatus as a set of images of a “truly” outer world, but allow it to be a part of a distinct, ontologically closed structure. Understood in this way, the direct content of perception [20], together with a few abstractions, defines the totality of what exists from the point of view of an agent possessing it; for other agents observing the former one, this closed structure, materialized as brain behavior, looks like an “artificial”, virtual ontology, influenced by surroundings of the body. The role of neuroscience here is to verify that *ontology is subjective and that the first-person perspective is not reducible to brain behavior from the point of view of its owner*. The essential aspect of such an approach would be finding brain states describing an agent’s inner, personal ontology. Obviously, in order to achieve that one needed to be able to follow thought processes with a good resolution, allowing to recognize particular notions. Since it appears to be hopelessly difficult at the moment, I will not elaborate on this point in the following, concentrating merely on its philosoph-

ical context. In principle, though, it should all be in the brain, and it is perhaps only a matter of time for neuroscience to achieve an appropriate state of development.

Let us be a bit more concrete now. In order to operate, the mechanism of perception as we know it needs two ingredients. First, an objective world to be observed; conventionally, it contains all there exists and is called “reality”. Second, an agent with an apparatus able to reflect at least some aspects of objects inhabiting the world. From the very beginning, this picture assumes a universal ontological layer, of which the content of perception is merely an element. What I propose is to abandon it and pull the very definition of ontology (or the notion of existence, in fact) *into* the content, making it inapplicable “outside” from a particular agent’s point of view. This might seem inconsistent at first, because one seemingly leaves no entities which could be perceived with such a move. I argue below, however, that it is the most natural thing to do, for there is not a single element of a “truly external” ontology in our minds. Since we know that we have perception only from its content, not from the point of view of “reality”, we actually never embed our most direct consciousness in a more general ontology; we only do it with the objective brain. As we will see, this is what forces us to treat the relevant parts of the subjective at most *as if* they were produced by perception. The latter might sound like unnecessary conceptual gymnastics, but is the only consistent way to conceive observation of an unreachable world.

Regardless how natural or not this may seem, there are two important phenomena that encourage one to believe in such a framework. One is the presence of so-called *qualia*, which seem ontologically irreducible to matter, and thus call for a dedicated kind of ontology; the other - a sort of decay of physical quantities in quantum theory [21], suggesting a lack of a fundamental ontological level, which is very much consistent with limitation of perceptive powers on the one hand,

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and supposed ontology-defining capabilities of perception on the other. Since both of them appear to require a possibly far-reaching discussion of the notion of existence, in the following I choose to take into consideration both qualitative, phenomenal consciousness [22] and quantum physics at the same time. A consequence is that I have to seriously discuss certain aspects of two extremely controversial and seemingly very remote issues, the mind-body problem and the problem of quantum-to-classical transition.

Both of these issues are well established in philosophy. The literature devoted to them is abundant and diverse, to say the least, especially in the case of the mind-body problem, for it covers a huge timespan and many sub-branches (see [1]). However, the two areas are also highly differentiated regarding quality. With a bit of luck, one may find brilliant observations in each of them, supported by careful and detailed analysis. At the same time, the topics belong to those unfortunate ones to which “vagueness” is almost a synonym. Even worse, putting them together in a single paper seems to be the best prescription on how to loose audience - due to all the unfounded attempts to mix the quantum with the mental. For this reason, I state it clearly that *by absolutely no means do I claim that consciousness causes collapse or that any particular quantum phenomenon should have any significance here; moreover, I do not treat the subjective, qualitative aspect of the mind as beyond physics in any sense.*

The main reason of the problem of mind and body having such a bad press is that it seems impossible to even roughly reconcile the existence of a subjective, qualitative domain with the physical knowledge about the world, regardless of the state of the latter. Perhaps because of that it is not difficult to find confusing denials of the problem being meaningful at all in the literature. The attitude of treating the traditionally conceived physical layer as rock-solid (obviously due to an enormously successful empirical enterprise it is associated with) easily leads to neglecting factors which, in the opinion of a given researcher, seem to undermine its status. A frequent manifestation of this is that the subjective is considered non-scientific; first, because science is defined to be objective, second - for the strange qualitative material the subjective is furnished with is persistently irreducible to behavior of what is described with equations of physics. Ignoring something the existence of which could not be more obvious in order to, in fact, save a definition or not to even slightly modify a cherished methodology seems to be acceptable quite often.

On the positive side, that there indeed is a subjective qualitative aspect of our lives which should be taken into account was also noted in numerous publications. If I were to choose some standard - and contemporary at the same time - references to begin with, these would be [2] and [3], introducing the now famous terms, respectively, “*what is it like to be*” and *the hard problem of consciousness*. Both positions serve as a background in a short discussion of arguments in favor of irreducibility of qualia I give below.

There is a plethora of proposed solutions of the mind-body problem. Regardless if a given author claims there really is something to be solved or not, these follow the lines of dualism, materialism (or physicalism), idealism, functionalism, representationalism, epiphenomenalism, eliminativism and others. I refer the reader to [4], [5] and similar publications for a thorough exposition. Since my reasoning departs from the mainstream at an early stage, I find covering other approaches to consciousness out of the scope of this paper, although I make a short comparison with some of them in due time.

The problem of quantum-to-classical transition, often associated with the process of measurement, is in many respects similar to the previous one. First of all, many physicists react to it as to a deadly plague. The reason is well known - debates aiming to solve the problem introduced a heavy metaphysical baggage, which is not considered to have improved quantum theory in any way. Moreover, the transition, whatever one considers it to be, can be safely swept under the rug, for it does not produce any practical problems for the theory - the numbers one obtains from calculations are not influenced by understanding of this phenomenon. Thus, many people seem to claim there is no problem at all. As with the presence of subjectivity, however, it is easy to convince oneself that there indeed is something unexplained in quantum measurement (see [6]). Suffices it to say at this point that quantum theory does not dictate how different experimental outcomes are materialized, and does not give a clue why, in the first place, one should expect any need for such a materialization. In the following I stress that both are natural provided one recognizes the lack of physical ontology in quantum theory.

Issues surrounding the quantum-to-classical transition are, of course, by far younger than the mind-body problem, nevertheless a significant number of approaches to them have already been proposed. The canonical ones include Bohmian mechanics, many-worlds (and many-minds) interpretation, spontaneous collapse theories, proposals related to quantum information, to decoherence, and others. I refer the reader to [6] for more details, although - contrary to the case of the mind-body problem - these will not facilitate understanding of the following, except maybe decoherence and its generalizations, like quantum Darwinism [7].

Going back to the mind-body problem for a moment - although it is mostly disrespected by physicists, there are at least a few reputable exceptions. To mention only researchers involved in the birth of quantum theory, they include Schroedinger [8], Wigner [9] and von Neumann [10]. The latter two are most often associated with an unconvincing interactionist view, although their motivation for incorporating the mind into the scientific picture is very sound. Quite recently, also d’Espagnat proposed to treat the problem seriously [11].

The core of the approach I adopt can be briefly summarized in the following way. The starting point is the problem of deciding if the presence of our loosely defined sensory data is enough to infer the existence of

objects we are supposed to be observing; this is actually another well-known problem that fits the paper's context, which I did not mention explicitly above - the problem of external world. On the one hand, there are intuitive reasons to believe that consciousness should not be considered an image representing in this or that way an outer reality, but rather a "closed world" with its own ontology (in-principle possibility of a brain-in-a-vat and a "sense of existence" contained in consciousness, for instance). On the other, a different intuition tells us that it should be influenced by "surroundings", for it is isomorphic to brain behavior; from a certain angle there is a clear distinction between the image and the object. I argue that it is possible to reconcile these two positions: first, by making ontology private, exactly like it is with qualia, second - by building an abstract, quasi-objective derivative of it, as a substitute of a "true" reality. As for the latter, I claim its existence to be undecidable and irrelevant, if one agrees for the notion of ontology to be defined by consciousness [23]. Naturally, I also show that manipulations around the notion of existence I make are harmless for scenarios in which multiple agents with a quasi-objective ontology each take part.

The solution of the mind-body problem presented below is significantly different from all the canonical ones, at the same time combining their essential ingredients. In a sense it is dualistic, since qualia are accepted to be at most isomorphic to brain behavior, it is also monistic to a degree, for they do not "stand next to" matter. Perhaps, I come closest to idealism, but I manage to avoid its central disadvantages, like solipsism (a position according to which other subjective minds do not exist, since they are not directly accessible for an external agent), exactly through making the notion of existence relative, or dependent on the point of view, or - by disallowing for a common ontological layer for different minds [24]. There is also a significant role reserved for aspects of functionalism, as we will see in the discussion of the "Chinese nation" thought experiment. Even though I am not fond of eliminativism, insisting that development of neuroscience will contribute substantially to our understanding of the mind-body interface is well-motivated also here - as I mentioned, finding brain states interpretable as describing an agent's internal ontology will ultimately prove the main idea.

Quantum theory remains untouched by the above reasoning, with the exception of how it should be understood in case one gives up a global, objective ontology of a "true" reality - quantum-to-classical transition can be complete only in an ontology derived from the subjective one.

Last but not least, a word of caution. If I am unlucky, the paper will turn out to be of value neither to philosophers, nor physicists. This is for a few reasons. First of all, it is non-technical (and thus "not serious enough" at first sight). For a philosopher, it is reflected in the fact that it can be read with no more than a glimpse of mind-body intuition, for a physicist - that there is not a single equation to be solved here (although some are given in due parts of the paper). However, I have a good excuse

for adopting such an approach. On the philosophical side, I am convinced that what is still lacking in the mind-body area is an agreed direction in which the research should follow; working out intricate details at this point will not help much. On the physical side, the problem of quantum-to-classical transition is of conceptual nature, and no internal-to-the-theory mechanism can solve it (although decoherence, or more recently quantum Darwinism, plays an important role in applications of quantum theory to macroscopic systems, it is not able to explain the collapse of the quantum state). Secondly, as already mentioned, problems touched here are rather controversial, to the point that many people even doubt their existence. Thirdly, it mixes two very remote issues, which are, moreover, mixed too often, giving rather unsatisfactory and exotic (in a bad sense) results.

Let me now give an outline of the paper. I begin by briefly recalling why existence of qualitative subjectivity poses a problem for our current physicalist understanding of the world. In the main part, I elaborate on our notion of existence, arguing that it actually does not point that much at what it is usually assumed to - i.e. entities inhabiting an objective reality - and that it should be considered subjective in the same sense as consciousness. I then show how this is related to the problem of other minds and the content of messages we communicate between ourselves. Finally, I discuss how all this is connected with conceptual problems surrounding observation and measurement in quantum theory, as well as its classical limit.

II. WHY QUALITATIVE SUBJECTIVITY SEEMS TO BE A PROBLEM

Assuming intuitive, objective Newtonian physics, as it is usually done in consciousness research, the main problem with subjectivity and qualia is that their role is at best unclear [3] - they seem physically redundant, since brain behavior apparently explains everything there is to explain about functioning of the mechanism of perception. From the scientific point of view, the only reasonable way to locate anything like a private impression of greenness in a consistent worldview seems to prove its physical reducibility to neuronal functions. This, however, is in no way more feasible than explaining why it exists at all - there is a kind of *explanatory gap* [12] here. The problem is that whenever one tries or is somehow forced to explain qualitative subjectivity in terms of any established or even imaginable physical machinery, it sooner or later starts to look inconceivable - instead of a bridge between the canonical domain of physical theories and the habitat of qualia, one encounters a conceptual void.

Let us take a look at some thought experiments making this statement more evident. My review of claims against reducibility of phenomenal consciousness to brain behavior follows a short orthodox list. There is a well-known argument about logical possibility of philosophical zombies [3], there is an old one about in-

verted qualitative spectrum [13, 14], there is also the story of Mary the super-scientist [15], and the “what is it like to be” argument [2]. I report them very briefly, just to define a point of reference - in case the reader had doubts about their soundness, I strongly encourage them to go through the literature collected in [3].

A. Philosophical zombies

The reasoning behind zombies is the most direct one about qualia being apparently redundant in the light of brain functions. It is conceivable, so the argument goes, that there exist physically identical copies of us without any kind of subjective, qualitative side - no sensations, no feelings etc. If one admits that behavior of neurons is enough to explain the functioning of perception and other necessary apparatuses connected with it, this mere observation seems to prove that qualia do not play any role at all.

B. Inverted spectrum

The spectrum argument is in a sense very much similar to the story of zombies. Here, however, a consciousness and its associated brain are contrasted with an identical brain, but consciousness built with the help of altered qualia, specifically inverted color spectrum. Since occurrence of such a scenario in the real world seems conceivable, it is natural to ask: how are qualia related to physics, if in principle there is a many-to-one relation between them?

C. Mary the super-scientist

This one often goes under the name of the knowledge argument. Imagine a lab, organized in such a way that a scientist occupying it for a lifetime - Mary by convention - perceives everything monochromatically. At the same time, she is a world-class specialist regarding human vision and physics of light. Technically, she knows in great detail what happens in a human brain when light of a given wavelength (say red) impinges on a healthy human eye. Yet, as the reasoning goes, she still does not know in what way a red quale is different from the monochromatic ones she is familiar with.

D. “What is it like to be”

This is perhaps the easiest of the arguments from the list to capture, making it a very powerful one - if imagining other people’s qualia might seem conceivable, at least to a zeroth approximation, it is almost certainly impossible in the case of bat’s sonar. This encourages one to think that there is an indispensable element of subjectivity in our world, since objective science cannot reach all of reality.

Each of these arguments seems quite plausible - there is certainly a fair amount of qualitative subjectivity in us. On the other hand, however, there is physics with an apparently different attitude. Again, in the light of current scientific knowledge it is unnatural to assume that consciousness is something more than just a physical structure. What a scientist usually does at this point is questioning the common sense and assuming that somehow, in more or less distant future, qualia will be explained by neuroscience. With such an attitude, however, it is easy to reach a - confusing from an intuitive point of view - conclusion that qualia are just an illusion.

The two positions, each one seemingly correct, have been competing for a long time in the literature. Pushing argumentation in any of these directions, however, is not likely to give any real progress. In such a paradoxical situation what might help is a redefinition of some basic notions quietly assumed to be valid. Two candidates emerge very naturally in the present context: *reductionism*, because qualia seem irreducible to a material basis, and *observation*, since there would be no problem of reducibility were there no observed material entities. In some sense fortunately, exactly the same two notions cause problems in current physics. Reductionism - because no matter how many elementary quantum objects one glues together, Newtonian physics (or the classical limit of the quantum formalism) is not reached by this procedure alone, observation - because the mysterious *jump* from quantum fuzziness to sharply defined physical quantities (the famous collapse of the quantum state) seems to be present only in one’s consciousness. On a closer look, it turns out that these difficulties lead to the notion of ontology - or existence - and that this is the one that should be carefully reconsidered in the first place. Instead of explaining why, let me point to the result of the whole reasoning presented in this paper as a justification for this move.

Before we proceed, a side remark. In order to avoid an unnecessary misunderstanding, let me stress that I assume subjectivity to be an empirical fact, and that the notion of “content of the mind existing for me” is as obvious as the notion of point in geometry; subjectivity itself is not a problem - only explaining it with objectivity is.

III. EXISTENCE AND PERCEPTION

“To exist” is a notion of such fundamentality and simplicity that one should not expect it to be adjustable in any way, nor that such an adjustment was ever necessary. However, I argue - as briefly mentioned - that we should consider existence to be *subjective* in a sense, and not pertaining to an objective reality. Roughly, this means that each of us has their own ontology (and no need for a “truly external” one), and that it should be treated as defined by the subjective mind in the same way qualia are. It seems a bit like this was leading directly to typical traps of idealism, but this is not so. The key is to suitably re-evaluate the notion of percep-

tion so that one may safely do without a “truly external” world, and still retain a construct mimicking an objective ontology (different from the “mental” one). It all happens in the mind, as one could say.

The argumentation presented below is restricted to a single point of view, leaving the problem of other minds and communication for section IV.

A. How to make an ontology from the content of a mind?

In philosophy of mind it is relatively simple to hit upon an idea that the mental is what each of us knows best, or even that it is the only thing we truly know (some physicists also share this point of view, see [11] for instance). As noted many times, perhaps most notably by Descartes [16], one cannot be misled as regards *having* a subjective mind. In this context, let us consider his profound thought experiment, but in a slightly more modern version - “brain in a vat” - and perhaps with a bit nonstandard circumstances. Imagine a human observer immersed in a world, surrounded by a herd of pigs insisting on being offered their promised dinner. Anyone who is familiar with these otherwise very bright and entertaining animals knows that alertness is highly recommended in their vicinity whenever food comes into consideration. The observer, thus, will definitely have very sharp content of their consciousness, full of snouts, ears, squealing and mud occasionally flying over. Assume that after some - usually quite short - time the meal is finished and the observer remains intact, but they have a good reason to live again through this on-the-edge experience without waiting another several hours. It is not that surprising, for pigs’ passionate attitude and devotion to their interests is extremely appealing, moreover due to development of their brains they are very likely to share (unconsciously, so to say) some cognitive issues with us, making them thought-provoking partners for human agents in such thought experiments. Going on, one may accomplish the task by introducing a disturbance on the way from the observer’s senses to their consciousness (whichever regions of the brain it is spread over), provided it is global and adequately organized, in the sense that the observer in fact undergoes a kind of simulation of being in a world. Since this particular observer is mostly interested in the kind of experiences we are discussing, one might eliminate all parts of the their body and its surroundings except the brain (and perhaps immerse it in a vat), which then would have to be properly stimulated. The conclusion, to the observer’s delight, is that they would not be able to tell the difference between the real scenario and the simulated one from their point of view. Regarding subjectivity, this shows that the observer’s “inner” domain has to have a significant degree of independence from surroundings.

Various attitudes have been developed in the literature regarding this argument, nevertheless I propose to treat it very seriously. The subjective is, first of all, *the only* sphere the existence of which is certain for each of

us, as mentioned. Secondly, it contains what one might call a feel or impression of existence. This feel comes at least in two variants. The more basic one is what accompanies *conscious having of subjective experience*, like simple, “flat” sensations and thoughts (their existence, as it goes, is *given*). The other one is related to recognizing entities to some degree objective in character in one’s sensory data, whose existence is - to use a metaphoric language - “revealed” by the window of consciousness, be it that of a pig brought on the edge of sanity by a delaying meal. Either way, one can say that the content of the mind *just exists*. I guess this is what makes idealists convinced that the real (from our point of view) ontology lies in the mind.

Subjectivity can be treated in a twofold way here, depending on whether it is to be viewed from the outside, or from the inside. The first approach is objective, in the sense that it is based on the internal workings of the brain (and not the qualitative, phenomenal side of the mind; the first-person perspective is described then actually from the third-person perspective). In this setting it is most natural to use the language of the problem of external world:

- the content of perception either, in some way, points to a “truly” outer world, so that the observer is aware of them observing it (this is what I mean by “representationalism” in the following),
- or it is a closed structure in itself, mirroring “true” reality, but the observer being unaware and unable to verify that this is indeed some mirroring, or how it occurs (i.a. how quantities describing the outer world are translated into perception’s internal quantities or virtual objects).

Many philosophers choose the first option. This is understandable to some extent, for we can distinguish within the content of our perception “us” and “our surroundings”. On the other hand, it seems very tempting to adopt the second one - *brain-in-a-vat (treated here specifically as an objective phenomenon, not relating to the qualitative regime) would not be possible otherwise*.

The other view is focused solely on the qualitative first-person perspective, for it is the natural “inside” of the mind. Intuition tells us that if one accepts the second stance from the previous paragraph, one is forced to *effectively get rid of the notion of objective reality* (the world from the previous picture), even if there are traces of objectivity in one’s consciousness. For clarity, I stress that indeed this is the position I adopt in the following, and that it can be looked upon as the central idea of the paper, crucial for the whole reasoning. Continuing, it has two significant implications. First of all, any observer-observed relation can occur only inside the content of perception, from our point of view. It means, by the way, that if we wanted to view the above scenario properly, it could be located only in the mind, not in any “true” reality. Secondly, a consequence is that *our most basic notion of ontology comes with the mind, in the same way as qualia do - they both are subjective and can be considered tools of the mind to exactly*

the same degree. In other words, one could say that *the source of our understanding of the term “exists” is directly in the phenomenon of possessing the content of subjective mind*. It is very important to note here that the first point - the division between a bodily “T” and its surroundings, present in the content of perception - is irrelevant for the second point. In order to avoid complications it suffices to take a very simplified state of consciousness, like a uniform visual field.

The claim I make here is a bit at odds with scientific intuition, for existence is usually something considered completely independent of us, or “imported” from outside the mind. If the above argument is counterintuitive - recall that if we talk about existence of objective entities (as in physics, either folk, or sophisticated), we have to *imagine* this existence. The process of imagining it very much resembles imagining *having* some subjective entities, unrelated to this physics, like sensations. Thus, the mind, in a sense, seems to serve as a model here; it is not difficult to accept that we “learn” the notion of existence by having the direct content of consciousness. We will develop this line of thought in the next section. Specifically, we will argue that *if a mind is to produce the notion of existence, its scope has to stay limited to its qualitative and abstract content*.

Of course, one might object that “possessing qualitative sensations” or “subjective experience” are not very precise terms. Is this act of possessing a phenomenon with a structure? How much is there pure “material” in it, and how many surrounding thoughts? How exactly should one treat qualia? As objects? As properties? Is there a possibility of having a sensation in one’s consciousness without being aware of it? I admit, similar issues make the mind-based ontology a bit fuzzy at times. These are due in part to introspection being an imperfect method and should be addressed at some point. However, if one is to base ontology on the workings of the mind, these ambiguities are not such a big surprise.

Imagine now we were able to break the just defined rules and take two points of view - the internal and the “truly” external one. Immediately, we would notice that there was no need for the internal and the external ontology to be the same. Perception, as we generally understand it, is designed to provide only particular kind of data to an observer, and if the latter is to produce their own ontology, *it is to be expected that this ontology will contain elements remote in nature from the ones living in the “truly” outer world*. In such a hybrid approach, that is how we *could* arrive at qualia. Of course, since each of us can take only their internal perspective, what we can say at most is that it looks *as if* qualitative consciousness were the content of some perception, itself being immersed in a world out of our direct reach. Even more, considering the existence (employing our notion of existence) of such a world as we do with direct content of our minds seems in fact meaningless, or ill-defined; if it made sense, we would not need subjective ontologies. In this view, i.e. when we are closed in our minds, qualia have to be postulated.

Obviously, what we have just said does not amount

to a complete picture. What remains to be explained, most importantly, is how to reconcile ontological superiority of the subjective with our intuition that there exist things independent of the mind.

B. How to make a quasi-objective ontology within a mind?

Let me now come back to our observer and take their perspective (i.e. stand inside their subjective mind). Assume that my perception is extremely simple in the beginning, or that:

- I know nothing about my or any other brain;
- my visual field is very simplified, i.e. I have only “flat”, uniform visual sensations, of simple qualia;
- I have simple thoughts about these sensations, e.g. I can compare my qualia along a timeline and I can consider having them (or rather their “givenness”, since the concept of “T” is very limited now - I can only imagine having subjective sensations without thinking that it is *me* that is having them);
- no other content of my subjective mind is present.

We make these assumptions in order to erase as much objectivity as possible, so that the subjective regime can be conveniently exposed. Note that at this point consciousness does not contain information about senses, nor even the concept of a body; if I were to use the term “observer” here, this would obviously be in advance. Let us now imagine we gradually complicate the above scenario by adding qualitative ingredients, in order to reconstruct the content of consciousness as we know it from everyday life. We could add auditory and tactile sensations, for instance, but it is much more enlightening to enrich the structure of visual data. Now, two significant transitions may occur along this way. The first one - when I become able to recognize spatial (three-dimensional) objects within my visual field (with some parts, obviously, hidden), the second one - when I notice that spatial objects made of visual data can leave my visual field without being “destroyed” (in other words, I can follow their history in my imagination when I do not see them). Both of them extend the primary notion of existence by pushing it into imagination to a degree. It is extremely important to understand that at this point I cannot have the slightest clue that these objects *represent* something - they just arise within my mind from a mixture of “sense data” connected in this or that way by some thoughts. Going on, among spatial objects falling in and out of my visual field I notice a body with a head. If by any means I reach my brain (which might require some inquisitiveness), it is relatively easy to find out that it has a peculiar relation with the totality of my visual field. If something happens to this distinguished organ - for instance, because a curious piggy mistakes my head for a delicious Halloween pumpkin - the field could in principle become very much distorted.

This observation prepares the ground for the final, scientifically most important step in the development of the structure of consciousness - construction of what is naturally called “a physical model of reality”. It occurs when I notice that the brain-surroundings picture, when copied (more or less faithfully) and located outside the mind - in a so defined objective regime - explains very well what happens when my mind is “off” or irrelevant in a sense (like when I realize that the velocity of light is not infinite). Effectively, that is how I create the study object of physics; until we reach section VI it is assumed that this physics is classical, so that indeed an ontology can be unambiguously defined. Now, there is an *extremely* important relation between this newly introduced layer and the subjective sphere - *the former is intuitively and automatically defined in such a way that the latter is, broadly speaking, dependent on it*. In a sense, this dependence is causal, but causality acts here on the level of brain and its surroundings, not on qualitative subjectivity itself. In other words, we say that the objective acts on the subjective because environment acts on brain *and* there is a one-to-one mind-brain isomorphism. To forget about this subtle fact, i.e. to embed the subjective in an abstract ontology built on its basis, is to introduce the mind-body problem.

We see that a form dualism has to be left. However, it is not a typical dualism of entities. It is more like the mind can be looked upon from two radically different angles - what is a thing in one of the regimes (the mind), is a behavior (of brain) in the other, none of these angles being the “proper” one. It is neither a dualism based on having two different *kinds* of entities (Descartes), nor one kind of things with two *types* of properties in a single ontology. Rather, *we introduce two radically different ontologies*, consisting of different types of objects, exhibiting different kinds of behavior, but which are related with the help of the mind-brain isomorphism. We are in no way able to locate qualitative subjectivity in the “physical” world, for this physical reality is *designed* by us not to contain it. The very reason for introducing it is that we notice some things “happening” (in a very abstract sense) where our mind does not reach. Thus, by treating the objective layer *not* as a “truly” outer world, but only as an *idea* of something akin, serving as an economical means of organizing and predicting subjective sense data, *defined and living in the subjective regime*, we avoid the mind-body problem. The only obstacle might be a false impression that something built within a mind cannot play the role of something on which this mind depends. It can, if we make a separate ontology out of it - living in imagination, and different from the one containing raw, live-experienced sensations.

The justification for what we are doing right now is quite straightforward - nowhere along the way from simple to complicated consciousness did we encounter even a tiny element of a “truly” external ontology. I notice, of course, my body and its surroundings in my consciousness, but this is *not enough* to introduce a “truly” objective, external ontology, in which consciousness is embedded. Indeed, since what we in this or that sense

call the physical ontology plays the most fundamental role in organization of our sense data, it is very tempting to assume it to be universal and include the qualitative subjective regime as its subset. It is not possible, however, for the brain can at most be considered a representation of the mind in itself. The only thing I might say is that *it looks as if* there was an outer reality which is “observed”, but this reality - whatever it might be - will never be accessible for the mind. Again, this does not have to prohibit us from treating “the physical” more basic than “the mental” - it is only about arranging things properly in the dualistic collage forced on us. To put the above in slightly different words, we are not able to tell the difference between there really being an outer ontology shaping our consciousness, and its mental model - all ontology we have is either sense data, or is an idea. Even more, since ontology is so much based on the mind, whatever patterns I notice in my consciousness, and whatever abstractions I make, I can never be sure that the notion of existence my subjective mind produces in order to use the subjective ontology and its derivatives actually applies anywhere else.

The general conclusion from the above is that each of us uses three different ontologies, intricately linked, and differing, so to say, in *the mode* of existence they introduce. It appears that the first one can be chosen to be related to the most direct content of consciousness, or to be more concrete - the direct *live experience of what we conventionally call sense data, of thoughts etc.* As I mentioned, I would even go as far as proposing that the prototype of our notion of existence is *experiencing the content of consciousness*. The intuition behind it is that this content *simply exists, or is given*. (Even if one finds this questionable or unclear, the consequences of it are so appealing that one can surely assume this claim to be a suitable approximation.) Next, there is the “middle” ontology, which is the one we use most often, on a daily basis. It consists of entities apparently constructed from sense data, like spatial objects in our visual fields. Their significant feature is that they can move in and out from the mind to a degree (restricting oneself to the visual field, such objects can be directly seen or not, depending on circumstances). The last of the three ontologies, considered fundamental, is what we might call the physical ontology - “physical”, because it is a collection of (broadly speaking) objects we describe in physics with a mathematical formalism (in the following I will also use the name “quasi-objective”). These objects are abstract in nature, but of course based on the “middle” ones to some extent (this concerns, for instance, spatial properties). However, they *never* enter the mind as the “middle” ones do, which is due to the manner in which they are introduced - as entities “working” when the subjective mind is out of the picture. Customarily, we *think* about this ontology as of a “truly” outer world. It is, however, merely *a given agent's* objective world.

A terminological comment is in order here. It is *extremely* important not to confuse the subjective ontology with a part of any objective one. To see how easily this might happen it is enough to consider an imagined or retrospective state of the former - the same way I

can put a three-dimensional object “out there”, I can do it with a collection of qualia, like a view of such an object. If I forget to add that the view was experienced by me, the mind-body problem reoccurs - the qualitative and neuronal sides of the mind are again put in the same layer. For this reason, I propose to reserve the word “exists” for entities equipped in an aspect of objectivity, i.e. for the ones from the “middle” ontology, as well as for quasi-objective ones (even though these two ontologies differ substantially). In the subjective context one replacement for it could be the term “experiencing subjective content”. It is not very fortunate, however, because for something to be experienced an experiencing agent is also needed. In the case of the mind this agent is objective in character, unnecessarily mixing the two realms. Thus, it is crucial to get rid of “I”. What I consider more fundamental than “to exist”, in conclusion, is “to be experienced in a depersonalized subjective mind”.

Before we proceed, let us consider one more issue, tightly connected with the subjective sphere. Some authors (see [17] for instance) point that in a fully objective approach (i.e. one with a “truly” outer world in our terminology) it is totally unexpected that a single mind is somehow ontologically distinguished over the rest. In short, why is it my mind that “just exists”, not some other one? The answer is immediate in the framework I propose. If the notion of existence comes with the mind, and the only ontologies at its disposal are internal or are derivatives thereof (like the quasi-objective one), my mind should be expected to be “ontologically distinguished”, for it is distinguished in its own ontology.

IV. MULTIPLE AGENTS

Let us now add a few crucial details to the above reasoning. They concern, firstly, the problem of other minds, which should be solved if the proposed solution of the mind-body problem is to be of any value; secondly - the way we communicate in a scenario in which a common, “truly” objective ontology has been wiped out.

A. Other minds

The problem of other minds can be formulated as follows: since I can observe only brains of other conscious agents, what can I say about the existence of their subjective, qualitative minds? If we were to formulate an intuitive answer to this question (without demanding too much of conceptual precision), this would perhaps be: each subjective mind *exists for* its owner, thus it is natural that I cannot know subjective qualities experienced by other people or animals with brains complicated enough (I bet pigs belong to this group). Now, the framework I have described in the previous section allows for this answer to be correct even on the formal side. Since we eliminate any common, objective ontology, only subjective ontologies of different agents are

left. Of course, no single view on all these ontologies is possible for us - it is always necessary for a certain singular point of view to be taken (for instance mine). If I formulate any claim with an ontological context, it is always from *my point of view*. The impression that there is a common layer for all of us arises in me because I have a quasi-objective ontology at my disposal, in which there are objects I can consider as other agents with their perceptions. Any possible problem I may have with neglecting a global ontology containing every consciousness arises because I am *used to* treating the notion of existence as absolute.

In a sense, I do not need to know the subjective side of other people’s minds (qualia), since I can potentially find “it” as these people’s internal ontologies through investigating the behavior of their brains (which, in the most general case, belongs to my quasi-objective ontology). In this way I can even check if a conversation I am conducting with another person is indeed about their ontology, provided I have enough understanding of their neuronal network. The fact that I do not have access to their qualia *per se* as I have to mine is only a harmless manifestation of the fact that we, as agents, do not have an ontology which we share between us. Moreover, exactly for the same reason we can escape solipsism and *not* observe other subjective minds directly at the same time.

As mentioned, notions of existence of other people (i.e. their subjective ontologies) are necessarily “artificial” for me, since they are “just” behavior of their brains. On the other hand, what I *do* treat quite seriously (i.e. as belonging to *my* ontology), is their brain behavior.

B. Communication

Another sphere where a need for a common ontological layer arises naturally is communication. Our everyday concept of it is quite straightforward. There is a world of things (the “true” reality), together with communicating agents, sharing certain observations on these things. This means that any two agents express their opinions on exactly the same entities, or that they look on the same world. In the scientific context we link it with *verification*. This view is useful in everyday life, but, obviously, causes serious problems if one wishes to discuss fully subjective ontologies.

Let us now consider communication in the proposed framework. First of all, if we wish to introduce “a world”, we need to choose a subjective point of view, for only there, as we concluded, any arena can be meaningfully defined (as a given agent’s quasi-objective ontology). Assume this agent is me and let us introduce in this world several other observers. All these agents should be looked upon as being *within* the chosen quasi-objective ontology; moreover, I am allowed to treat myself to some degree analogously to the other ones only because *I can look at my own brain from the outside* within my ontology. Can we now say that different observers indeed observe the same set of (quasi-

)objectively existing entities? No. Each observer, other than me, talks about elements of their virtual (artificial for me) ontology, not of objects I have in my, distinguished quasi-objective ontology. Of course, objects belonging to the surroundings of the observers' brains influence their perceptions, but the observers themselves do not recognize these surroundings as elements of their ontologies - their ontologies are *virtual* and contained in higher-order behavior of their brains, from my point of view. Nevertheless, communication is still possible as long as the arena is defined - the only difference between this and the traditional view is that from my perspective we are discussing my quasi-objective ontology, not a "truly" objective one. Moreover, by examining other agent's brain behavior I can potentially see their own quasi-objective ontologies, i.e. arenas (in classical physics - identical in terms of structure to mine, if we are to be able to *verify* each other's views). In this sense, it does not matter which quasi-objective ontology we choose as the one defining "the world".

By the way, this illustrates how the notion of observation changes its original meaning. Since a virtual object appearing in an agent's subjective ontology is not considered by them as a representation of anything, it only looks *as if* an observation was made - by agent *A* from the point of view of agent *B* (i.e. within the quasi-objective ontology of the latter).

V. COMPARISON WITH EXISTING VIEWS

In order to introduce a general context, I recall the founding principles of the most grounded approaches to problems considered above and point relevant areas of conflict with mine. I avoid diving into details, as well as commenting on recent developments, for the differences involved are quite fundamental. For a general introduction to the discipline see, for instance, [4, 5].

A. Monism

Monism presupposes existence of one type of entities in reality. Its two most well-known variants are materialism (or physicalism) and idealism. From the point of view of the mind-body problem, this type is defined by objects inhabiting the realm of body in the first case, and the realm of subjective mind in the latter. Material entities are those described by the laws of physics, mental ones - officially hard to tell by what.

Materialism can be further divided into more or less reductionistic as well as eliminative approaches. The first class tries to reduce the qualitative to the physical (qualitative consciousness to brain behavior), the latter - claims that the phenomenal aspect of one's life simply does not exist. It is generally known that the first group of views tries to be fair with broadly understood science, nevertheless it does not provide any means of achieving the reduction (it is relatively easy [3] to convince oneself that the explanatory gap between the two realms effectively prohibits it). Eliminative materialism

avoids the problem of reduction, but at a rather high price.

Idealism claims, in this or another way, that the mental is more fundamental than the physical, the latter being an idea or illusion. As a consequence of treating the mental as distinguished, it is easy for an idealist to adopt solipsism. Moreover, it is considered problematic for idealists to explain existence of objects independent of one's mind.

There is also a third category of monistic views - neutral monism. It assumes that the fundamental realm is neither "physical" nor "mental", but both of the can be somehow derived from it.

B. Dualism

Dualist approaches accept that reality is composed of two types of entities - yes, physical and mental. It is up to a specific doctrine whether these are treated as separate substances (substance dualism) or separate classes of properties of a single substance (property dualism).

When it comes to possible influence of the mental on the physical, one distinguishes interactionism (both regimes affect each other) and epiphenomenalism (the mental is influenced by the physical, but not the other way round). Interactionism is known for causing some discrepancy with physics, particularly with its causal closedness.

Regarding commonness of the mental - panpsychism claims that every physical entity possesses its mental "side".

Being agnostic relative to the monism-dualism distinction, one should recall two other approaches: representationalism, mentioned at the beginning, and functionalism. The former claims that mental images we possess indeed represent what is "out there" to some degree (it is also called "indirect realism"). The latter view, in turn, proposes that the form and structure of the mental depends only on functional aspects of its carrier (for instance, it should not matter if we had biological or silicon brains - phenomenal consciousness should stay the same provided these brains behaved in the same way).

C. Comparison proper

Let me now contrast the framework I propose with defining aspects of traditional views. First of all, as I mentioned, I do not allow ontology to be global - one has to begin with a subjective domain and develop a quasi-objective ontology on its basis. Then, one might contrast the subjective ontology of experienced entities, like sensations, with the quasi-objective one, which *plays the role* of the customary physical ("true") one. I would call this both monism and dualism. Monism, because the foundation for the two ontologies is the content of consciousness (either "live", or imagined). Dualism, for the subjective ontology is given and experienced, while the

quasi-objective one is a heavily abstract construction. The difference from the traditional monism is that only the source of the two ontologies is common, from dualism - that the mental and the physical are not present “along” one another (one is either on the subjective, or on the quasi-objective side). The quasi-objective affects the subjective and *vice versa*, but it is not the kind of superficial influence known from interactionism. There is not much to talk about epiphenomenalism here, since the mental is not a byproduct (epiphenomenon) of the physical. As for representationalism, we started from its negation - an agent’s consciousness is considered a closed world with its own ontologies, so as to allow for brain-in-a-vat, which we expect to be possible in principle. Regarding panpsychism, since each of us treats their own consciousness *as if* it were a virtual ontology developed by perception acting in a world inaccessible to us, it does not make much sense to look for anything alike “somewhere else”, for this somewhere else is - as has just been said - inaccessible to us. Trying to ascribe such qualities to elements of a chosen quasi-objective ontology, on the other hand, also seems unfounded, for qualities are absent by definition of this ontology.

We might, however, say something constructive, if we make a comparison with idealism and functionalism. Concerning the former, it seems worthwhile to describe once again how it is possible to introduce mind-independent entities not leaving the mind in a sense. First of all, I stress that the mental and the physical are not parts of a single ontology in the presented framework. Thus, making the physical independent of the mental does not automatically make the former literally *exist outside* the qualitative mind (in a reductionist view, for instance, where mind is reducible to brain behavior, there necessarily is a lot more in the global ontology besides - and thus “outside” - the mind). Instead, we *construct* the physical (the quasi-objective ontology) as an abstract sphere, not containing qualities, define its behavior (through equations of physics), immerse a brain there (also an abstract structure, obviously) and postulate the mind-brain isomorphism. Thus, the quasi-objective surroundings do not “really” exist outside the subjective mind, but outside an abstract brain whose behavior is to some degree *functionally* isomorphic to the subjective.

Regarding solipsism, one is indeed tempted to say that other subjective minds do not exist. However, since ontology is not global now, I should say that other subjective minds do not exist *for me*, while they exist for their owners. I am fully entitled to claim that other agents’ ontologies are not equivalent to mine, because they, from my point of view, are merely *behavior* of their brains; thus, these ontologies are less ontological, so to say. Of course, these other agents say the same about my subjective ontology.

Since I mentioned solipsism - one cannot forget to mention philosophical zombies here. Essentially, if zombies were conceivable when ontology was global, it does not make much sense to consider them here. This is because *for me* minds of other agents have the form of brain behavior - it is meaningless to “turn on and off”

their qualia in my picture. Their qualia exist *for them*, and it is completely irrelevant from my point of view what these qualia are *for these agents*.

Let us now turn to functionalism, particularly to the “Chinese nation” argument [18]. Imagine we ran out of spare neurons, but have a pressing need to simulate the behavior of a human brain. Since neurons communicate, we might choose people to play their roles, and since they communicate quite well *and* are quite abundant at the same time, we pick a numerous group speaking the same language, say the Chinese. Their total number is not as large as that of neurons in a typical human brain, but is at least of the same order. Imagine now that they perform their roles very meticulously and succeed at reproducing major functions of the brain, together with the whole apparatus of perception. Imagine also that one day someone dares to ask this enormous system about its subjective sensations (qualia). The answer can be only one: “I have them.” But for the one who poses the question the answer seems even more absurd than in the case of an ordinary brain, for each constituent of the system is magnified to a macroscopic size and clearly visible. That is, however, the essence of the experiment - from the perspective of the one who asks there is, in a sense, no point in asking this question, for it just does not have an answer in terms of experienced qualia *on their side*. One cannot expect to be given someone (or something) else’s qualia in other terms than behavior of a bunch of neurons (or pseudo-neurons). The only aspect that might be investigated in such a situation is whether higher-order behavior of a structure like the Chinese brain indeed contains something like the human private ontology, emergent in a real brain.

VI. PHYSICAL CONTEXT

The above discussion could in principle be considered self-contained. I encourage the reader, however, not to stop at this point. The physical part is of great value, for it provides additional motivation to treat the philosophical one seriously - quantum theory taken at face value suggests very convincingly that it does not possess its own ontology. Since it is a fundamental theory in reductionistic terms, this lack of ontology should propagate to the macroscopic level. This, in turn, shakes the foundations of any traditionally conceived outer (relative to the subjective sphere) world in our theories.

Let us pull some relevant points from the philosophical discussion. First of all, we noticed compelling reasons to treat what we broadly call “existence” as defined by the subjective mind in the same way as its phenomenal elements. It looks *as if* creating internal ontology was a fundamental part of the mechanism of perception, making its content a closed world in itself. If an observer possesses their own ontology and their perception is “closed” in this sense, the “truly” outer world is necessarily an ill-defined notion for them. We concluded that we can only have a “substitute” of such, built as an abstraction based on the “given” content of the mind;

we called it “quasi-objective ontology”.

Now, let us break the rules again for the moment, as we did in subsection III A. One could imagine that the same kind of relation there is between a brain (specifically perception) and its surroundings in a given agent’s quasi-objective ontology occurred also between a “true” brain and some “true” surroundings, in a “true” reality. It is conceivable that the mapping between the content of consciousness and the surroundings had non-perfect accuracy. This means that in general only some aspects of the outer ontology would be transferred to the inner one. The observer, however, would not know that. If we assume that in such a scenario only some aspects of the outer ontology are to be translated into, for instance, features of objects in the inner ontology, the observer has at their disposal only this limited set of features. This is an extremely important “possibility”, for it goes very well with what we see in quantum theory.

It is a well-known fact that physical quantities tend to become more and more fuzzy on the way from the macro- to the micro-world - they are the less well-defined the smaller the scale. If on the macroscopic level one unambiguously talks about a point-like localization of a particle at \vec{x} , on the microscopic one this turns into “smearing” over a spatial region Ω , which corresponds to an observable given by

$$\Pi_{\Omega} = \int_{\Omega} d\vec{x} |\vec{x}\rangle \langle \vec{x}| \quad (1)$$

(I refer the reader to [6] or any textbook on quantum mechanics for an introduction to its mathematical formalism). Within this region, on the one hand, nothing like a particle’s position is defined, on the other - such a particle can still be considered point-like in some sense (take an electron as an example). If one performs a position measurement on an eigenstate of Π_{Ω} with another projector $\Pi_{\Omega'}$ ($\Omega' \subset \Omega$), a new “position” emerges, or is produced by the process of measurement [25]. How this happens is not described by the theory. If such a state of affairs is here to stay for good (i.e. if this feature of quantum theory cannot be eliminated by a theory superseding it), this could in principle be treated as an example of a limited-accuracy-mapping in action. From our perspective quantum measurement evidently perturbs ontology (the quasi-objective one), but we are not able to find a lower-level mechanism for explaining that. In other words, it is *as if* we were limited by the structure or character of our minds in recognizing physical quantities applicable in our theories (that there is something like position or velocity to us can be known to come only from the subjective mind) [26].

Turning to biology for a moment, it is sometimes mentioned that evolutionism could provide a clue why qualia are present. Without what has been said above, this would be hard to believe, for within physics familiar to us biological evolution acts on the level of brain - which does not make it any easier to grasp how neurons were to produce phenomenal aspects of the mind. However, things change if one looks at it from the side of a “truly” outer ontology, something we agreed was inaccessible to us. If a process akin to evolution really

acted there, it could be considered a force that shaped our subjective minds to recognize the observables we recognize.

Last but not least, the same circumstances that could lead to emergence of properties in the act of (quantum) measurement, could be blamed for the probabilistic nature of quantum theory. If we imagine something beyond our control that makes our ontology shaky, as with quantum objects, it is even natural to introduce stochasticity in its behavior. Of course, we as agents cannot confirm that - again, from our perspective it only looks *as if* this was so.

Let me now elaborate a bit more on the ontology of microscopic entities described by physics as *we* use and understand it.

A. Physical ontology and reductionism in quantum theory

Conceptually, there is one fundamental difference between a classical and a quantum particle. It is not in type of properties or behavior, but in their relation to broadly understood physical ontology. Classical particles are fully defined on their own. Quantum ones, on the other hand, balance on the edge of potentiality - they need measurement to acquire properties (only to a limited degree, as we noted); thus, alone they cannot be used to define an objective ontology. To illustrate the last point, imagine one is to build a world with their help. It has been noticed long time ago that regardless of how many quantum objects one glues together along the lines of quantum formalism, one always ends up with a quantum object - nowhere near a classical one. If one wishes to recover classicality, the only consistent way is to apply collapse at some point in order for the big object to gain (almost) definite properties. As a consequence, quantum theory is defined by its classical limit, not the other way round, as one might expect (one may find similar claims for instance in [19]). Various approaches to this problem have been developed over the last decades, none fully satisfactory [6]. I do not want to review them here, or discuss if they are correct or not. Instead, I try to look at the problem in the most straightforward way possible - if we substitute classical objects with quantum ones on the microlevel, we lose the classical definiteness on the macroscopic one, and along with it the classical, objective ontology.

Having such a peculiar form of reductionism seems quite paradoxical (a word that must have appeared at least once in this context), for quantum theory is known very well to have arisen in order to explain behavior of atoms and elementary particles - in a sense, to make the reductionistic approach more solid than it used to be before. Thus, if one looks at the situation from the point of view of a physicist living in late-nineteenth century, the time of Newtonian statistical mechanics, this stance simply failed, for one is not able to recover the most basic ingredient of the classical theory - ontology. And yet, to call quantum theory anything else than a triumph of reductionism would be highly disputable,

for the numbers coming out of experiments cannot be explained without dividing a physical system into an appropriate number of sectors in a Hilbert space.

Thus, it is hard to make sense of the theory if one insists that quantum objects should exist objectively. Things change substantially, however, if we take the subjective approach. Since we are not given access to a “true” reality, the only objective sphere we might introduce in this context is a quasi-objective ontology built inside a mind. Now comes the input from the philosophical discussion: because subjectivity is fundamental, we *can* modify quasi-objective ontology inherited from classical physics without any harm - it is not a foundation of everything that exists, but rather an abstract set of rules formulated with the help of qualitative experience. Before we do that, however, let us recall what is understood by quantum measurement problem.

B. The measurement problem

Formally, the issue arises if one wishes to treat measurement as an ordinary interaction, engineered to extract information about an object. In a wider view, it exposes the central theme of quantum-to-classical transition.

Let me give a simple illustration (again, for an introduction to the formalism of quantum theory and its description of measurement the reader is referred to [6]). Consider states $|s_i\rangle$ of a quantum system S and states $|a_j\rangle$ of a measuring apparatus A , with a “ready” state, $|a_0\rangle$. If A can measure S , then there exists a unitary operator U with the following property:

$$|s_i\rangle|a_0\rangle \xrightarrow{U} |s_i\rangle|a_i\rangle \quad (2)$$

(for every i). From the linearity of U we have:

$$\left(\sum_i \alpha_i |s_i\rangle\right)|a_0\rangle \xrightarrow{U} \sum_i \alpha_i |s_i\rangle|a_i\rangle. \quad (3)$$

Since we expect measurement to be an interaction like any other, we should be able to stop at this point. It is far from clear, however, that one can treat the right-hand side of (3) ontologically as a result of measurement - neither the apparatus, nor the object is in a definite state. Only after performing an appropriate projection,

$$\sum_i \alpha_i |s_i\rangle|a_i\rangle \xrightarrow{P_j} |s_j\rangle|a_j\rangle, \quad (4)$$

can one finish the whole procedure. When exactly to apply P_j in an experiment and what kind of phenomenon it corresponds to is not indicated by quantum theory. Moreover, as mentioned, quantum measurement involves *creation* rather than uncovering of properties. The reason is that quantum superposition, from which measurement picks an option, is not the same as statistical mixture. Overall, it is as if measurement was in part pushed from the domain of epistemology to the ontological one.

How to modify a quasi-objective ontology to account for that? We can either restrict quantum theory to particular events, like singular interventions from the quantum regime occurring on the classical level, or apply it on every scale at once, as a universal description. The former is essentially the approach of Bohr, with an arbitrary division between the classical and the quantum. A possible problem here is that, as we agreed, quantum theory does not allow us to build a macroscopic ontology in the bottom-up manner. Fortunately, we do not actually need that - we can build a *top-down* one. This is possible, for the content of consciousness is naturally associated with macroscopic physics. That is, we start on “our” level and keep dividing matter more and more. Of course, at some point we should notice a deviation from classical physics. What is important, however, is that the macroscopic level in a (very particular) sense can be considered to float in the air, and be ontologically independent of what happens beneath. This allows us to forget the purely reductionistic attitude and include a one-time quantum intervention (for instance a measurement of an electron’s position) as a stochastic extra event. If we are good at isolating things from their surroundings, the size of this intervention loses its relevance (i.e. during the process of dividing matter we might encounter a quantum intervention at an early stage). Thus, the cut (as Heisenberg would say) between the quantum and the classical can be in a sense freely shifted over a wide range.

In the second approach we are allowed to be more precise, so as to find out what happens “on the border” between a quantum system of interest and its surroundings; we have then to approach the latter also from the quantum side, and include our bodies in the quantum world for completeness. The only thing to be done here is to collapse the state of the whole quasi-objective ontology (of a single “observer”), focusing on brain sectors in the Hilbert space corresponding to the state of the associated subjective mind. Temporal resolution of consciousness is of course different from the one of the time-evolution operator, but it suffices to find an appropriate “brainy” ingredient in the total quantum state, regardless of how heavily spread in the macroscopically defined time it is - the exact point at which collapse happens has to be empirically adjusted with the state of one’s qualitative mind.

Thus, quantum measurement is complete only when I check the state of my consciousness. It can happen only then, for this process is *de facto* responsible for introducing ontology into the picture; ontology which is absent in pre-measurement time-development of quantum state. Put differently, the only true ontology I have is constituted by having of subjective mental content; only from there can I start building what possesses any (quasi-)objective aspect. As it happens, due to quantum decoherence (giving rise to quantum theory of large composite objects) I find most parts of what I build to contain in practice only classical correlations.

It is now evident where the peculiar relation between epistemology and ontology in quantum theory comes from. By doing measurements on the classical level we

are able to uncover properties of objects, for a lucid ontology is defined there. If we build everything in a Hilbert space, however, it becomes clear that the “phenomenon” of epistemology itself does not work there at all. Since there is no “us” immersed in a “truly” objective world according to quantum theory, there is nothing to uncover. Epistemology is at most approximate for us, and is applicable only in the classical regime [27].

C. Wigner’s friend

Let us now switch from a single agent to a multiplicity of them, analogously as in sec. IV. In the context we are discussing consequences of such a move are illustrated in the “Wigner’s friend” thought experiment [9]. Assume we have two quantum measurement processes. The first one includes a measured quantum system - a decaying atom is a frequent choice - and an observer. From the point of view of the latter (their quasi-objective ontology, if we are to adjust the experiment to our needs) the situation looks like above, i.e. the process ends up with a definite result after preparation (left-hand side of eq. (3)) and collapse (right-hand side of eq. (4)) take place. Imagine now that we treat this setup, together with the observer, as an isolated quantum system - close them in a “hermetic” room, for instance - and include another observer in the picture, who measures it from the outside. With this we define the second measurement process. Let us now assume that the first observer indeed conducts their measurement at some point; thus, from their point of view the state of the inner system - the atom - is perfectly definite (from a different angle, the state of the room’s interior is a trivial, one-element statistical mixture for the observer staying inside). However, the situation looks quite different in the second observer’s quasi-objective ontology - the whole system inside the room is still in a quantum superposition, which is known *not* to be equivalent to an ordinary statistical mixture.

How can it be that two observers have so radically different descriptions of the same situation? It is a good idea to recall here again the discussion from sec. IV: since each observer has their own quasi-objective ontology, they are never talking about *the same* collection of objects. Thus, one always has to choose a *single* observer and describe the situation from their point of view. There is nothing contradictory in the fact that the internal observer is involved in a superposition from the point of view of the external one. A problem arises only if one insists that the room’s interior should be a part of a global ontology, accessible for and described by both observers.

VII. CONCLUDING REMARKS

We are very much accustomed to thinking that the content of consciousness is in a direct way a representation of a surrounding world. This makes us convinced that existence, as a “phenomenon”, has to be “imported”

from outside consciousness so that we can know what it is. At the same time, it causes an impression that ontology described by our physics should only be *one*. What - I hope - I have shown in this paper is that these claims are not that obvious, after all. What is more, if one gives them up in a clever way, a couple of problems that seemed to be hopelessly difficult for a long time, suddenly find an intuitive solution. I do not claim that there are no details left to be worked out (quite the contrary - the current proposal is barely adds up due to vagueness introduced by introspection), or that a neuroscientific confirmation is round the corner; I find the general approach, however, unlikely to change.

Let us summarize the philosophical part. First of all, one might convincingly argue that subjective experience provides us with the most fundamental, from our perspective, type of ontology. Pushed to the limit, this means that the notion of existence associated with the latter (depersonalized *having*, or *being given*) is in fact a prototype of any kind of existence as we conceive it, including the objective one. It is then a matter of some gymnastics to introduce an abstract (although modeled on the contents of subjective experience) ontology *playing the role of the traditionally understood objective reality*; we called it quasi-objective. Its abstractness does not mean that it is made up; rather, if we introduce objective existence, it has to be an *idea*. Neither does it mean that it is trivially *contained* inside the mind, like the contents of the latter. Since it is abstract, we are free to define it as such that the qualitative mind is *dependent* it - what happens in the mind depends on what happens in this constructed ontology. The link between the two (we called it the mind-brain link) is of peculiar nature; it does not resemble any type of relation known, for instance, from our physical theories. Rather, it is one of a kind, for it is a cross-ontology one. All this shows that a suitably and carefully defined form of dualism is natural. Concerning the mind-body problem, we clearly see that trying to reduce qualitative consciousness to parts or behavior of any “physical” layer is ill-defined from the beginning. Regarding what we used to treat as objective reality, it only looks *as if* there was some “true” physics, inaccessible for us, radically different from its image we have, and so strange that it was able to produce an impression of pure existence - in the form of phenomenal experience - in us.

The lack of a global ontology and promoting subjectivity to a foundation allows for a fresh look at the problem of other minds, as well as for its easy solution; it is now easier to accept a claim that something *exists for someone*. Another consequence thereof is that we have to be careful what we understand by observation. When one has the ability to introduce a body with spatial surroundings (as in a quasi-objective ontology built within a consciousness), then this notion retains its traditional meaning. However, contrary to a brain, a pure subjective mind as a whole cannot be embedded in a wider ontology from the point of view of its possessor. As can be intuitively verified, this lack of embedding is reflected in the fact one actually never claims existence of one’s consciousness as a whole (this would be

the “true” physical existence), but concentrates on the one which points at its content or a theoretical model living in a derived ontology - if I say “my consciousness exists” it actually means “a visual content exists” or “a set of auditory sensations exists”, it is thus a statement about something inside consciousness. We can go only as far as having a functional isomorph of consciousness *inside* itself, together with *some* external world, clearly not the “true” one. Moreover, because everything indicates that such a global, “true” ontology is beyond our reach - that it actually does not make sense to even consider it seriously as a notion from a point of view - we cannot fully treat consciousness as a *representation* of an outer world; we would have to reach beyond it in order to do that, which is impossible by definition, if we agree that it is consciousness which introduces the most basic ontology for us.

The above implies that each agent has their own ontology, either inaccessible by others (if it is looked upon as a set of qualia, for instance), or artificial for them (if it is seen as brain behavior). These ontologies do not share objects between themselves, but at the same time are not independent. Their dependence is, of course, always judged *from a subjective point of view*.

For quantum theory no formal changes have to be made - it suffices to solve its issues concerning the notion of objective existence. An ontology defined on the macroscopic level, like the one constructed inside consciousness, is exactly the missing part of the theory’s

interpretation. The well-defined, top level of the picture is governed by objective, observer-independent classical physics, while the remote, quantum one is in principle allowed to be ontologically deformed, for nothing is in fact built on top of it - reductionism in terms of Hilbert space can be defined only *relative* to the classical level, which is established in a sense independently (as an abstraction founded on the subjective). In other words, we have subspaces for quantum particles because we recognize quantum particles while being on the macroscopic level. Atomism itself is, of course, indisputable. However, elementary particles are rather conceptual constructs - quantum reductionism is not “ontological”. This is not to say that they are “fake”, but rather that according to quantum theory the best we can have as a material giving rise to our quasi-objective ontologies are conceptual constructs.

A better grounding of what has been proposed in this paper is in the hands of precise introspection and, as I mentioned at the beginning, neuroscience. The closest one can get to the subjective from the point of view of the latter is to recognize it as an agent’s internal ontology, visible in brain behavior. On the one hand, it would be fascinating to see the kind of neural organization this revealed. On the other, one should bear in mind that qualia or any other manifestation of subjectivity are to stay on the other side forever, since subjectivity is a fundamental aspect of the world as we understand it.

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- [1] <https://philpapers.org/browse/philosophy-of-mind>
- [2] T. Nagel, “What is it like to be a bat?”, *Philosophical Review*, 4: 435-50 (1974)
- [3] D. Chalmers, “The Conscious Mind”, Oxford University Press (1997)
- [4] W. Jaworski, “Philosophy of Mind - A Comprehensive Introduction”, Wiley-Blackwell (2011)
- [5] J. Heil, “Philosophy of Mind: A Contemporary Introduction”, Routledge (2012)
- [6] G. Auletta, “Foundations and Interpretation of Quantum Mechanics”, World Scientific (2000)
- [7] W. H. Zurek, “Quantum Darwinism”, *Nature Physics*, 5 (3): 181 (2009)
- [8] E. Schroedinger, “Mind and Matter”, Cambridge University Press (1958)
- [9] E. Wigner, “Remarks on the mind-body question”, in I. J. Good (ed.), “The Scientist Speculates”, Heineman (1961)
- [10] J. von Neumann, “Mathematische Grundlagen der Quantenmechanik”, Springer (1932)
- [11] B. d’Espagnat, “Veiled Reality: An Analysis of Quantum Mechanical Concepts”, Westview Press (2003)
- [12] J. Levine, “Materialism and qualia: the explanatory gap”, *Pacific Philosophical Quarterly*, 64: 354-361 (1983)
- [13] J. Locke, “Essay concerning human understanding”, Oxford University Press (1689/1975)
- [14] S. Shoemaker, “The inverted spectrum”, *Journal of Philosophy*, 79: 357-381 (1982)
- [15] F. Jackson, “Epiphenomenal qualia”, *Philosophical Quarterly*, 32: 127-136 (1982)
- [16] R. Descartes, “Meditations On First Philosophy”, in “Philosophy of Mind: Classical and Contemporary Readings”, ed. D. Chalmers, Oxford University Press (2002)
- [17] T. Nagel, “The View From Nowhere”, Oxford University Press (1989)
- [18] N. Block, “Troubles with functionalism”, *Minnesota Studies in the Philosophy of Science*, 9:261-325 (1978)
- [19] S. L. Adler, “Quantum theory as an emergent phenomenon”, Cambridge (2004)
- [20] Images in this or that sense, not the “external” subject of perception.
- [21] Such quantities are conventionally called “observables”. On the classical side they are solid and well-defined, in the quantum regime, however, they are clearly “smeared” and are associated with a fundamental stochasticity.
- [22] It is good to set the terminology as soon as possible. One of the central terms here is that of “sense data”. In order to be allowed to use it, one needs the notion of senses, i.e. to be in an objective sphere. For that reason, qualia should not be called “sense data”, but rather their qualitative, phenomenal and subjective *counterparts* (since the subjective always comes first, a body has to be defined *within* it). We may, however, bend the rules a bit and call qualia “sense data from their owner’s point of view”, or in short - yes - “sense data”; I will use this abbreviation quite often. Either way, the place where they reside will be called “consciousness”. The functional isomorph of the latter in the brain, sometimes *together with* a more or less well-defined apparatus producing

(objective) sense data, will be called “perception”. However, I will use the same term when treating qualia as sense data, in the above meaning (they will be “the content of perception” then; I used this term in the first paragraph). This will happen in scenarios in which the owner of qualia is not able to infer the nature of the objective perceptive apparatus (this is also the meaning of “perception” in the title). As for the term “mind”, it will mean either consciousness or its isomorph, depending on the context. Finally, there is the notion of reality we are traditionally supposed to be observing, and which is claimed to define a common ontological layer containing “everything that exists”. I will name it “«true» reality”, “«true» world”, “«true» objective world”, “«outer» world”, “«truly» outer world” etc.

[23] Perhaps the only two reasons to *imagine* that it made sense to talk about it are that it would explain why the isomorph of consciousness has surroundings (probably because consciousness is in a similar way embedded

in such a “true” reality); also, it would help visualize the idea that our physics, built on the content of consciousness, and “true” physics can be dramatically different, pointing to our perceptive limits (and suggesting why we cannot “explain” qualia, or why physical quantities gradually dissolve in quantum theory without any mechanism behind). If we agree for ontology to be private, however, there is no way to conceive consciousness in a different manner than *as if* it contained a form of sense data.

- [24] It is not that absurd as it sounds - even with different ontologies we can communicate, as I show later.
- [25] This effect is clearly and measurably manifested in the famous double-slit experiment with quantum particles.
- [26] By the way - even if our perceptions were more subtle, there is *a priori* no guarantee they would be subtle enough to mirror the totality of a supposed “true” world.
- [27] Of course, this concerns only pure states.