# The Quale of Time

*Time is one of the greatest subjects of interest to both Science and Philosophy, being seen to have a greater importance in the workings of reality than other entities. In this paper, a phenomenological analysis of time based on the general workings of the emergent structure of consciousness will be done, and time will be shown to be no different than any other qualia. It will be shown that, like any other qualia, time is an emergent level of consciousness, manifesting all the properties of emergence: inheritance of qualities from the previous levels, top-down influence in levels received from the higher levels and top-down influence in levels impressed on the lower levels.*

## Introduction

Because of the importance of time given by both Science and Philosophy, a detailed phenomenological analysis of time is seen fit. The analysis that will be done in this paper is based on the general ideas presented in my previous paper "The Emergent Structure of Consciousness"[1]. An analysis of time is already presented there, but because the purpose of that paper was to present the general workings of the emergent structure of consciousness, the analysis of time was incomplete. This paper will thus undertake the task of exposing all the details of time as they derive from direct phenomenological experience and as they are then framed by the more general theoretical framework of the emergent structure. Thus, no new fundamental ideas will be present in this paper. But the details of time that will be presented will benefit both the understanding of time as such and of exemplifying even better the workings of the emergent structure that have been presented in the previous paper. A reading of the previous paper might help the reader grasp some general ideas. But in order to make the current exposition self-contained, all the required concepts will also be presented here.

The easiest element of the phenomenology of time, the one that has also been taken by Physics, is the succession. Interestingly enough, this proved so successful that Physics didn't make the effort to investigate more into the nature of time. But there is more to time than succession. Actually, there is so much more that the succession part is only a minor aspect of what time is. A proper investigation of the phenomenology of time will even show that there cannot even be a physical time, the only time that exist being the time of consciousness. The investigation will also show how the time of consciousness is no different in its properties from any other qualia, displaying properties such as inheritance of qualities from the lower levels of the emergent structure of consciousness, receiving of top-down influence in levels from the higher levels and impressing its own top-down influence on the lower levels. In what follows, by "time" I will only refer to the time of consciousness. If the need for the physical time will appear, it would be called specifically the "physical time". So, let's start our detailed analysis of time.

# The Retention

The first extra element of the phenomenology of time beyond succession starts from looking critically at the nature of succession itself. Succession implies the existence of infinitesimal moments of time that follow one after the other. But if we look carefully at our experiences, they don't seem to be made up of infinitesimal parts. For example, the qualia of words don't seem made up of an infinitesimal succession of letters or even of sounds. A word seems perceived as whole, even though in the succession view of time it should be made of many infinitesimal temporal parts. Hearing music is not just a succession of infinitesimal sounds, but it is heard in a rather holistic way. So somehow, time seems to be made up of more extended temporal chunks, instead of infinitesimal ones. If this is the case, a discrepancy seems to appear between it and the physical time. If we are to put on the axis of the physical time an entire quale of a word, where will we put it? A word being perceived as a whole in consciousness, it cannot be split into letters or sounds and then make correspondence between each sound in consciousness and a certain moment of physical time. This aspect of time was characterized by Bergson in his writings about duration as being a continuous, immeasurable and unquantifiable flow and then Husserl identifying time as being made out of primal impressions, retentions and protentions[2][3]. More recently, Susan Blackmore[4] argues for the fact that there is no stream of consciousness, offering some revealing examples of how time should not be viewed in a linear manner.

Let's detail a little Husserl's account of time and have in mind for reference the experience of listening to music. I refer the music and not other experiences, like hearing someone talking, because in music the continuity of time is better manifested. A good capture of Husserl's view of time is depicted by Dan Lloyd[5] in Figure 1. He explains: "Once we have clearly in mind a present that includes a nonsensory anticipation of the future and a nonsensory trace of the past, we are ready to follow Husserl and launch the present, which *is* time, in motion *through* time. What appears as time passes is a continuous slippage of the present into retention (along with a continuous resolution of protention into primal impression). What slides into retention is not merely the present primal impression, the momentary sensory inputs, but rather the entire tripartite structure, moment by moment in a continuous temporal flow. At 10:10, present consciousness includes the sensory content at 10:10, along with an occurrent retention of (formerly) present consciousness at 10:09. But that lapsed present consciousness at 10:09 included its primal impression (sensory information at 10:09) *and* retentional consciousness at 10:09, itself enfolding retentional consciousness from 10:08, and so on into the past, as if into a bottomless well. But all this recursive nesting is experienced, all at once, at 10:10. Similar recursion opens into protention. We anticipate not just the next primal impression, at 10:11, but a next moment that will include a retention of the present package at 10:10 (and a further protention toward 10:12 and beyond).

Figure 3 [Figure 1 in this paper] presents a schematic outline of the present moment of consciousness, as understood (in outline) by Husserl. Both the example just above and the diagram suggest discrete time steps and sharp boundaries between phases of temporal experience, but this is just for clarity. Husserl imagined a continuous slippage or flow of time. In addition, the nesting depicted reaches into retention only, omitting equally complicated structures of protention."

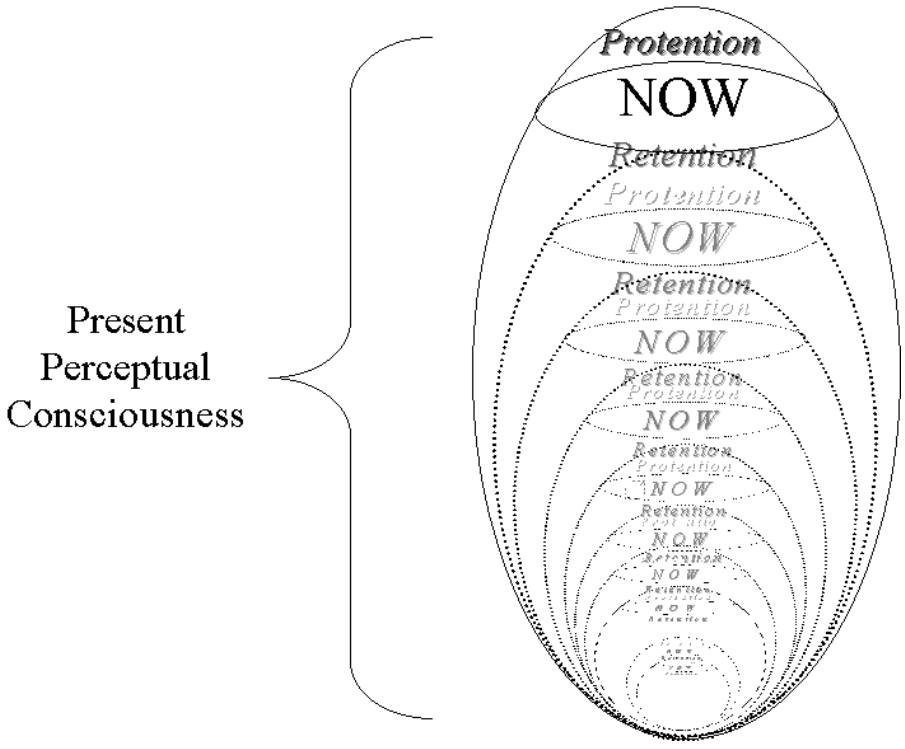



*Figure 1. Phenomenology of the present, according to Husserl.*

As we can see, because of the continuous slippage of present into past (while being continuously kept into the present), there is no place where a cut can be made in order for the events to be neatly disposed on an axis of physical time. The structure of time exposed by Husserl is rather an eternal structure than something that actually passes. Any new experience that appears into the Now is automatically subjected to this structure of time. The slippage into past of a new experience is not something done dynamically, but is a property that the experience acquires by the fact of appearing into the Now. We will further discuss this when we will integrate the phenomenology of time into the phenomenology of the emergent structure of consciousness.

Husserl's analysis is not complete though. While at first, if we have as reference the experience of listening to music, indeed it appears that the phenomenology of the present depicted in Figure 1 does account for the experience of music, closer looks at the phenomenology of time will reveal some more general manifestations of which the structure in Figure 1 is but a qualitative approximation (in the same way that Newton's theory is an approximation of Einstein's theory). A false impression that might arise from the music example is that when a new experience first appears into the Now it is of an infinitesimal duration (like a single musical note) and only then through storage into the Now as retention, does the Now becomes extended. But as we will see next, actually experiences can appear into the Now directly with their retentional structure constructed and with durations of up to few seconds, making "physical time" an even weaker concept.

# Temporal unities

Let's take another example and see how experiences that appear into the Now can already have retentional structures of durations of up to few seconds. Let's say that you are John and you are at a party with lots of people talking around you. Let's say that you are also caught in a conversation and your attention is directed to what your dialogue partner is saying. So, what you have in your consciousness are her words. But then, someone around you, talking with some other people, says something like: "Guess who I saw at this party! It's our high school colleague, John!". What is interesting and of most importance here, is that you somehow hear the entire sentences! And the way in which you hear the sentences is as if you were paying attention to them as they were being spoken, even though you were actually immersed in a totally different conversation and you were clearly hearing the words of your dialogue partner, and not at all hearing what other people around you were talking. So, what is going on? To understand what is going on, let's look at Figure 2.

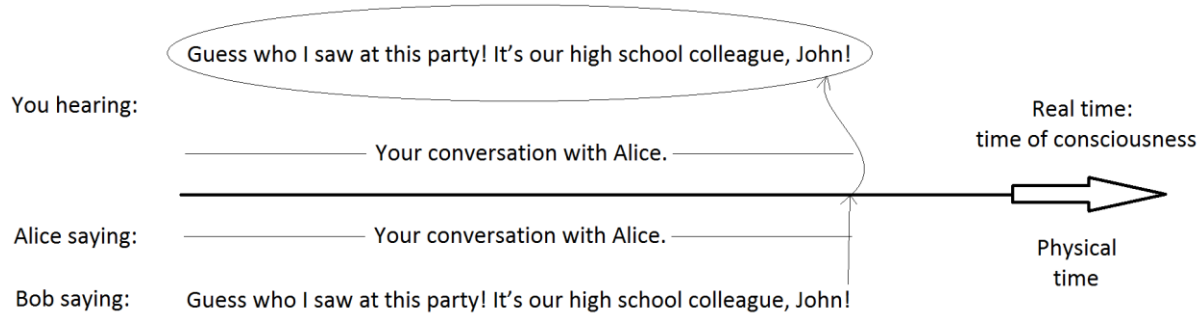



*Figure 2. Temporal unities.*

To make the graph easier to follow, let's name the characters. You are John and you are having a conversation with Alice. Your former high school colleague is Bob. In the lower part of the graph we will draw the events as they take place in the physical time. In the upper part of the graph we will draw the events that take place in the time of consciousness. Let's now follow carefully what is happening. In the physical time, two events are happening at the same time. One is your conversation with Alice, the other is Bob's remark. In the time of consciousness, as long as you talk with Alice, only one thing happens: you hearing your conversation with Alice; Bob is talking, but you don't hear anything of what Bob is saying. Then, Bob reaches the moment when he utters your name. Then, something apparently magic happens: you not only hear your name, but you hear the entire Bob's remark! And it's more than this. The way in which you hear Bob's remark is not as if it has been recorded somewhere in your brain as it was being spoken without you being aware of it, and now it is being played back to you, having a physical time extension of the same extension that it had when it had been uttered. This doesn't happen because given the fact that to utter the remark takes few seconds, you would need for the next few seconds to be deaf to what Alice is still telling you. But you are not deaf to Alice; you continue to hear what she is telling you. So, there is no place in the physical time to squeeze those few seconds. Yet, you still hear Bob's remark! And the way you hear it is as if you were hearing it as it was being uttered.

I want to insist even more on this example, because being used to regard time as something ordered linearly in a successive fashion, we might be faced at this moment with a difficulty of properly

appreciating what is happening here. We need to understand that if the time of consciousness would be structured in a linear manner as its extrapolation to the physical world is taken to be, then what Alice and Bob were saying would be superimposed and you would only be able to hear only what one of them is saying. So, if you were paying attention to your conversation with Alice, you would at most hear only your name when Bob would finish his remark, because your name would draw your attention. And the interval in which you would hear your name would be taken from the time of hearing the conversation with Alice. But this is not what happens. What happens is that until your name is being uttered by Bob, you only hear the entire conversation with Alice. And then, after your name is being uttered, you don't hear only the name, but you hear the entire Bob's remark. Where can this be squeezed? The readers are asked at this moment to search in their memory for when this phenomenon also happened to them. Because without finding this phenomenon in reader's own introspection, this example would not be properly appreciated.

The only conclusion that I can draw from here is that the entire Bob's remark is being heard in our consciousness in an instant of physical time. Therefore, no word of the remark can be placed anywhere on the axis of the physical time. Reported to the physical time, the entire remark takes place all at once in consciousness. On the other hand, in consciousness it has an extended temporal duration, and one that feels as if we were hearing it as if we were paying attention to it as it was being uttered. We are dealing here with a more extreme case of retention. We see that time in consciousness is not being experienced moment by moment as it happens in the physical time, but that events from the physical time are first gathered somewhere (i.e. the brain, or somewhere else), and when meaningful information is detected, then a holistic temporal construct is created that contains the proper meaningful information, and this construct has the feel of a temporal passage. Time in consciousness is a holistic retentional entity that has the feel of passing in a continuous manner. Notice here that if no meaningful information is detected, no time is constructed. If Bob would have finished his remark by a different name, you wouldn't have heard anything from what Bob said.

Going once again back to the above example, let's finally make proper sense of it. First, as we were having the conversation with Alice, smaller retentions were being constructed, for example words or small groups of words, and we were experiencing the passage of hearing the conversation with Alice. At the same time, somewhere the words of Bob and the words of other people in the room were being gathered for analysis. Then, when Bob uttered our name, an entire meaningful piece of information was detected: the fact that Bob was our high school colleague. Therefore, a bigger retention was created and was given to consciousness to experience it. One aspect of this retention is that it also has physical time references. Therefore, given the fact that Bob remark happened at the same time with Alice conversation, the construction of the retention took into account this fact and the final retention that was given to consciousness to experience also contained this temporal reference.

Therefore, the experience in consciousness is that we were being aware of Bob's remark as it was being spoken at the same time as the conversation with Alice. Notice that there is no moving back in physical time here. Is just the construction of a quale, of a temporal unity, that has as a content a past temporal reference, an "as if" component with reference to the past. Because of this content, the quale acquires the quality of being heard as if we were paying attention to it as it happened in the past. And now let's make the most important remark of this section: time is just a quale, like any other quale, like for example color red. Yes, color red seems static and time seems dynamic. But this is not a difference in nature; it is just a difference in quality, quality that is generated by content. For example, hunger feels

the way it feels because it has the content that we need to eat something, thirst feels the way it feels because it has the content that we need to drink something. In the same manner, the quale of time seems to pass, seems to be dynamic, because it has the content of temporality. It might seem circular: "time seems to pass because it is temporal", but it is not circular. There are 2 different meanings here. First, "time seems to pass", refers to the felt quality. Second, "because it is temporal" refers to its semantic content. The analogue for hunger is: First, "hunger feel the way it feels", refers to the felt quality. Second, "because it has the content that we need to eat something", refers to the semantic content.

The conclusion would be: there is nothing dynamic in the universe. As also noted by Zeno: there is no change. There are only qualia that acquire their qualities from the semantic content that they have.

Let's take more examples in order to show that this phenomenon happens more often than expected. For example, you are in a room in which a background noise is being heard, for example the noise from a refrigerator. At the beginning you might notice the sound, but after a while you start doing other things and stop hearing the sound. But when the refrigerator stops, you notice its stopping. But the way in which you notice it is not just by hearing the moment of stopping. Instead, the experience has an "as if" component with reference to the past, so you hear as if you were being aware of the noise as it was being produced and only then you notice its stopping. Another example, from the visual domain this time: you just used your phone and you let it turned on on your desk and you start doing something else, like typing on the computer, and stop seeing the phone. Then, when the screen of the phone turns off, you don't notice only its turning off. But the experience that you have it that of seeing the phone screen still being on and only then you see its turning off. So, we see that this phenomenon happens all the time. It is not some exotic manifestation of the time of consciousness, but is the most mundane of its manifestations, extended retentions being experienced in consciousness on a regular basis.

Another interesting example of temporal unities is in the case of dreams. Let's take the following situation and try to make sense of it. It sometimes happens that we are woken up from sleep by a powerful sound like an alarm clock. And we were just having a dream. And the dream was something like this: I was preparing to go to war, I was dressing nicely in front of the mirror, I was getting outside of my house, I was taking the train to the battlefield, I was talking to people on the train, I was getting on the battlefield, and then, an explosion happened by my side and I woke up. What is peculiar about this experience is that somehow the dream, even though it is a long dream, it nevertheless has as main subject right from the beginning a story that is leading precisely to a point in the story that matches perfectly the reason of waking up. We can come up with few explanations for what is happening here.

- First, we can consider it just a coincidence. We can consider the dream unfolding at the same speed with the waking state. Indeed, the sound of the alarm clock did generated the explosion in the dream. But if the alarm was to sound earlier, like when we were in dream in the train or while we were dressing in front of the mirror, then the train would have exploded or the mirror would have exploded.
- Secondly, we can consider that a precognition took place. Consciousness somehow knew that the alarm clock will wake us up and then generated a dream (that unfolds at the same speed with the waking state) of whose story would match from the very beginning to the end such that

by the time we would get on the battlefield, the bomb would explode precisely where it should: on the battlefield.

- Thirdly, we can consider that the dream takes place all at once at the moment of waking up, with the story taking place all at once and being made up in a coherent way from the beginning to the end such that the end would match the moment of waking up by the alarm clock.

In the light of this section, I favor the third explanation. We already saw in the Alice and Bob example that temporal unities can take place all at once in the "physical time", so it is equally possible that the case of the dream is the same case of an extended temporal unity that takes place all at once in the "physical time". We can even see in this case that the extension is longer than few seconds, taking up to few minutes or more depending on what story is being constructed. Some might argue that there are cases of sleepwalking and in those cases the dream clearly unfolds at the same speed as the waking state. But the cases of sleepwalking don't contradict the present case. They are only cases where the retentions are smaller, like in the case of hearing the conversation with Alice, so an approximate coordination between dream and waking state is being realized. But, as there is also the case with hearing the sentences of Bob, there can be dreams in which longer retentions are being created, and those dreams highlight even better how there can be temporal extended periods in consciousness that take place all at once in the "physical time".

We see thus that experiences can appear in the Now with their retentional structures already created with durations of up to few seconds or more. We have thus a first departure from Husserl's structure of time. As opposed to Husserl where there was only 1 stream of consciousness happening, we are actually dealing with multiple streams happening at the same time. Husserl's structure is thus only the structure that one stream has. But in the Now there can be multiple streams happening at the same time, thus Now having a "multi-dimensional" structure. We will see next that there is actually even more structure in the Now. So far, we showed how the Now can contain multiple retentions at the same time. But we will next see that the retention itself can suffer further modifications. Before going to the examples in which the retention suffers modifications, we will present a short summary of the emergent structure of consciousness because we will need the emergent phenomenology to make sense of the modifications that retention suffers.

# The Emergent Structure of Consciousness

In the first place, the clarification of the concept of emergence needs to be done because of the highly misleading ways in which it is used in literature. Usually, people use the word "emergence" to mean things like "the emergence of water from oxygen and hydrogen", "the emergence of table salt from natrium and chlorine", "the emergence of a flock of birds from individual birds", etc. The problem with all these examples is that they don't refer to real existing entities. "Water", "oxygen", "hydrogen", are not really existing entities, they are only invented concepts in our human consciousness in order to make sense of an equally invented "physical world". So, the phrase "the emergence of water from oxygen and hydrogen" is a fundamentally meaningless phrase. The way in which the concept of emergence is being used today makes it in the end an empty concept. Since "water", "oxygen" and "hydrogen" don't ultimately exist, the inexistent entity "water" cannot emerge from the equally inexistent entities "oxygen" and "hydrogen". If we are to truly use the concept of emergence and take advantage of its spirit, we should only be allowed to apply it to entities that really exist. And since the

only existing entities are qualia, if we are to use the concept of emergence anywhere, then we are allowed to used it only when talking about qualia and only talk about certain qualia emerging from other qualia; of course, it this is the case, if qualia really emerge one on top of another.

Having clarified the correct usage of the concept of emergence, let's now apply it to consciousness and see that indeed qualia emerge one on top of another. The entire phenomenology of emergence is actually rather simple and it can be exemplified in a simple example. For this, let's have a look at Figure 3. I will ask the reader now to not read further. For the moment just look at Figure 3. Now, after the reader has looked at Figure 3, let's ask him: "What do you see?".

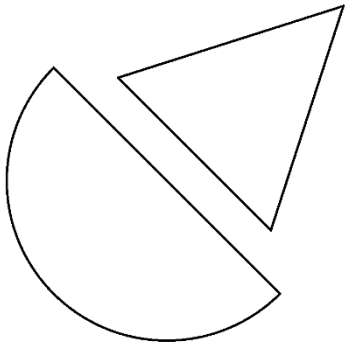


*Figure 3. Emergence.*

Probably the first answer will be: a semicircle and a triangle. And this is a truly existing experience in consciousness. Now, let's modify this experience and see emergence in action. I will tell the reader: It is a radiotelescope. Now I will ask the reader to look again at the image. Something new happened. Now the image is not a semicircle and a triangle anymore, but it is a radiotelescope. Of course, it is highly simplified, but nevertheless it is a radiotelescope. For diversity, let's alter the original experience in another direction. I will tell the reader now that that image is actually a space probe entering atmosphere. Again, having this new information, the experience of the reader changes once more and now he has a different experience when he looks at the image. What we are dealing with here is the true functioning of emergence. And we see several properties. First of all, indeed there is a new entity coming into existence that was not there before. And it really is a new entity. The experiences of seeing a radiotelescope or a space probe are certainly not the same experiences as seeing a semicircle and a triangle. Secondly, the new experiences are not totally independent from the previous experience. The new experiences inherit in themselves the previous experience. The experience of the radiotelescope is not an abstract experience, but it has a semicircular base and a triangular antenna. The space probe is not an abstract experience, but it has a semicircular capsule and a triangular trail of flames. So, the previous experience of mere shapes is inherited in the new experiences of objects. We are dealing here with true emergence: the appearances of new qualia on top of other qualia.

Note here that only because the phenomenology of emergence is simple, it doesn't mean that the phenomenology of qualia that appear through emergence is simple. On the contrary, the phenomenology of qualia is of the outmost complexity and it takes a great deal of introspection to make it as clear as possible. The phenomenology of emergence should be viewed as a framework that can help us out in unraveling the more complex phenomenology of qualia themselves. Let us take a more

complex example to gain a broader view of how emergence and inheritance of qualities work. For this I will take the entire visual qualia domain and show how a final quale can have many emergent levels in its structure. Let's have a look at Figure 4.

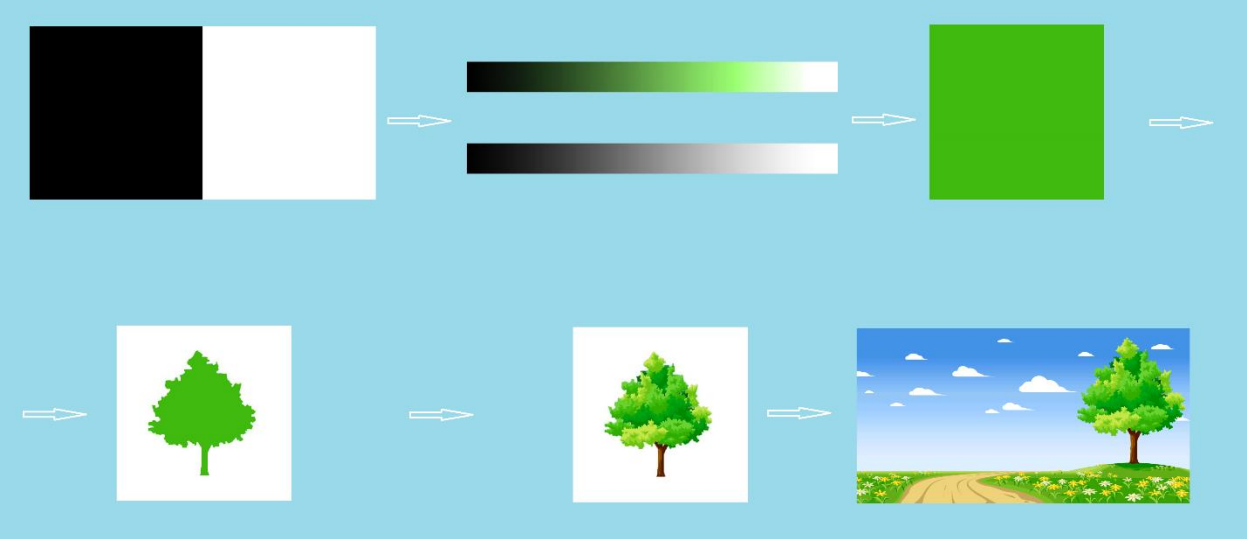


*Figure 4. Emergent levels in the visual domain.*

What we see in Figure 4 is that the base of the visual domain is represented by the black-and-white qualia. Then the qualities of black-and-white are inherited in the emergent level of shades-of-gray. We can see this inheritance by the fact that shades-of-gray display a darker-and-lighter variability. Then the qualities of the shades-of-gray are inherited in the emergent level of colors. We can see this in the fact that a color is never pure, but displays a range of shades varying from lighter shades to darker shades. Then colors are inherited in the emergent level of shapes. A shape is not an abstract entity but it is always created from at least 2 colors. Then shapes, like we also saw in the previous Figure 3, are inherited in objects, in this particular case in the quale of tree. Finally, objects are inherited in the full visual scene. Notice as a side note that emergence is not linear, but from a certain level there can be a whole family of branches emerging. For example, from shades-of-gray all colors can emerge (even colors that we cannot imagine from our human consciousness), not only one. Also, from the shape in Figure 4, a quale of tree can be emerged or a quale of leaf, and so on. In principle, the number of qualities that can be obtained through emergence is infinite.

A point to note is that a quality is not inherited only on the level immediately above a certain level, but it is inherited in all the levels from above, and it is not necessarily manifesting in the same way that it does on the level immediately above. For example, black-and-white manifests in the level immediately above as the variability of shades-of-gray. But black-and-white is also inherited in the full visual scene and the way in which it manifests there is to allow for the visual scene to be seen at all. The true quality of black-and-white is not black and white as such, but is the quality of being visual, and this quality lies at the base of the entire visual domain. To see is at least to see black and white. I will give another example in this direction, because this subtlety of qualities inheritance is important when we will investigate it in the case of time. For this, I will take the emergent structure of the written language, and I will take the

levels of shapes, letters, words and sentences. We will see what qualities are we dealing with and how they manifest themselves in the various levels that emerge along the line.

**Shapes**: quality of "visual objects": entities with spatially defined boundaries.

**Letters**: inherits the quality of the Shapes, thus becoming themselves visual objects, and emerges on top of it its own quality of "unities of language".

**Words**: inherits the quality of the Shapes, being themselves visual objects, inherits the quality of the Letters, being themselves unities of language (just more complex than letters), and emerges on top of them all its own quality of "carriers of linguistic meaning".

**Sentences**: inherits the quality of the Shapes, being themselves visual objects, inherits the quality of the Letters, being themselves unities of languages (just more complex than both letters and words), inherits the quality of the Words, being themselves carriers of linguistic meaning, and emerges on top of them all its own quality of "carriers of ideas".

Another point to make here is that the above emergent structure from Figure 4 was presented starting from the bottom and highlighting the various qualia that emerge as we go up the tree. From a practical point of view though, the analysis can only start from the top level, because the top level is the one that we actually experience directly. And the way in which the descent in level is being done is to search in the current level for qualities that might come from lower levels. For example, in the quale of the full visual scene we identify various objects, then in the quale of the tree we identify a shape, then in a shape we identify a color, and so on. We will see shortly that by doing this we can also reach the level of time and even deeper to the base level of consciousness which is the level of the Self.

We can thus see in these examples that having at our disposal the phenomenology of emergence we can make beautiful sense of the phenomenology of qualia, and a science of consciousness can be constructed on general principles. Instead of dealing with what appear to be countless random qualia that are impossible to be sort out in some kind of periodical table of qualia, we actually obtain a tool that lets us make order in the qualia that we experience.

Having got this phenomenology of emergence, we can even tackle the quale of time. What we need for this is to continue the descent in levels from any qualia domains that our human consciousness provides to us. We will continue from the visual domain, but it can also be done from the auditory domain for example. What we notice in the visual domain is that the visual qualia that we have are not static, but they are always in motion. Without the emergent phenomenology at our disposal, we would not know what to make of the motion that we find in our experiences. But having the tool of emergence, we can actually understand that the motion that appears in a visual scene is actually a quality of that visual scene. In the same way in which a visual scene contains objects and colors and shapes, etc., it also contains motion. The proper vocabulary that I would suggest here is not to say: "objects are moving", but "objects contain motion", no different than "objects contain colors". This way, motion is not viewed as a mysterious metaphysical category unlike any other, but it is viewed as a quality like any other, like colors for example. This way, we conclude that there is a quality that comes all the way down from under the visual domain, so we identify time as an emergent level of consciousness below the levels of the visual domain. Also, because of the branching of emergence, the emergent level of time is inherited in other higher domains as well, like in the auditory domain.

Next, let's see that the choice of vocabulary that we made is not an artificial one, but that time actually is just a quality, no different than colors, and see thus that, as an emergent level of consciousness, time manifests the same inheritance of qualities from the lower levels as all the other emergent levels do. The way in which we proceed is to go down in levels one level at a time by identifying in the present level qualities that might come from lower levels. One such quality that we identify in the quale of time is the retention, the fact that the present moment has in itself the former present moment that has just been. This way, we identify the quality of memory that must come from a level below time, which is the level of memory. Next, we notice that for memory to make sense, there must be diversity, otherwise there would be nothing to be memorized. We thus get to a level below the level of memory, which is the level of diversity. In diversity we next notice that diversity can have various degrees, ranging from less diversity to more diversity. This way, we identify the level below diversity to be the level of vividness, that has the quality of increasing the qualities of all the other levels. And here we find something interesting if we consider more carefully what would be the best way to characterize the quality of vividness. For this, we can compare the effect that vividness has when it is inherited in color red for example and take the case of seeing red in imagination and seeing red in waking state. From one point of view it is the same red, but there is however a difference between the 2 cases. The red from imagination is barely seen, it has a low vividness, while the red in the waking state is of high vividness. We can characterize this state of affairs in the following way: the red in imagination is less of itself, while the red in the waking state is more of itself. Using this characterization, we can identify the quality of the emergent level of vividness as being the quality of "more of itself". Thus, in this quality we see another quality that is being inherited from the level below, and that is the quality of "itself". And so, we finally get to the base level of consciousness, which is the level of the Self, which has the quality of "itself", which can also be called the quality of self-reference.

We are now in the possession of valuable knowledge about consciousness that we can use to explain the structure of time. Although Husserl did a good description of the structure of time, as it is being drawn in Figure 1, he didn't make the next step of explaining why is time like this. Why is the former present moment still retained in the current present moment? What makes it remain in retention instead of vanishing immediately? Having now the various emergent levels of consciousness at our disposal, we can understand where the structure of time comes from. Let's recapitulate the emergent levels that are below the level of time and that through qualities inheritance contribute to the quality that time has. They are: the Self, vividness, diversity, memory, time. We will not concern ourselves here with the effects that all of them have on the level of time. For our present purposes, the Self and memory would be enough. Let's see what effects these 2 levels have on the level of time. For this, let's have a look at Figure 5.

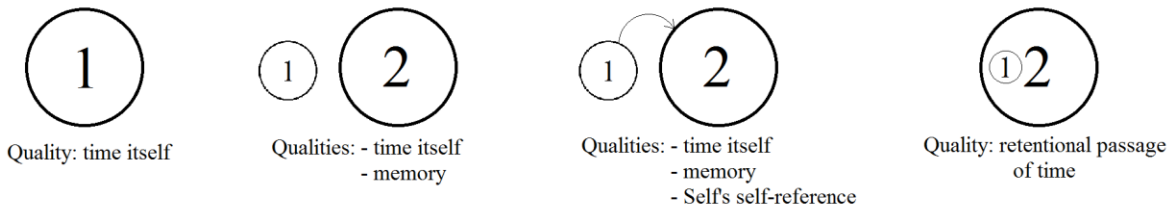



*Figure 5. The emergent structure of time.*

First of all, time has its own quality of time itself. But this cannot be experienced on its own without a prior emergent structure upon which to emerge, in the same way that red cannot be experienced on its own if it doesn't emerge on top of shades-of-gray. A first effect that time encounters from the level of memory is to become itself a memory. The present moment "1" becomes a memory and it slides down into the past, a new present moment "2" appearing into the Now. A second effect that time encounters is from the level of the Self. Time inheriting the quality of self-reference from the Self, becomes itself self-referential, and the former present moment "1" that has just become a memory because of the quality inherited from the level of memory, is self-referred back into itself as present. This way, the former present moment that has just been is kept as retention into the present moment that currently is. We thus obtain the final quality of time, which is the quality of the retentional passage of time, which is the structure of time as described by Husserl in Figure 1. A point to make here is that inheritance doesn't happen sequentially, as a false impression that might arise because of the way we described it above, but it happens all at the same time. There is no actual sliding-down-into-the-past that might happen in a dynamical way. But the sliding-down-into-the-past is a quality that is present in the emergent level of time. As also mentioned in the Retention section, when a new experience appears into the Now, it doesn't slide down into the past in a dynamical way. What happens is that it just inherits the quality of time, and by inheriting the quality of time, it becomes itself timely, and the sliding-down-into-the-past becomes its nature. The structure of time should be better viewed as an eternal structure.

Another comment to add here is regarding the way in which we exposed the emergent structure of time. We started by noting that time is retentional and from this we got to the idea that this might come from a level of memory that might be below the level of time. We could have equally observed right from the beginning that time is self-referring its former present moment back into its current present moment, so we could have directly got to the level of the Self, and the above explanation for how time obtains its retentional structure would have become empty. It would have become just a description, not an explanation. But choosing to go on the memory -> diversity -> vividness -> Self route, we showed that even if we don't see from the very start the self-referential nature of time, it nevertheless follows naturally from the qualities the other sublevels of memory, diversity and vividness have in themselves. Thus, we go beyond merely describing time, as Husserl did, but we actually explain it. And this is a step forward in understanding both time, and consciousness generally, showing that the emergent structure is a powerful tool that we acquire in our quest to understand consciousness and reality.

# Top-down influence in levels

Emergence presents us with another piece of phenomenology, and that is the top-down influence in levels. We will first take some examples from the higher levels of consciousness to first see what this phenomenon is about, and then we will show that it also takes place in the case of time, time both receiving top-down influence from the levels above it and impressing its own top-down influence on the levels below it.

The best example of top-down influence in levels is the act of speaking. When we speak, the thing that we have in mind is just an idea that we want to communicate. Then somehow, the idea is transformed automatically in sentences qualia. But since sentences cannot exist on their own, they bring their entire emergent structure with them. Each sentence brings with it the necessary words. Then again, words cannot exist on their own, so they bring their own letters with them, letters which bring with them the

necessary sounds. We see thus that the highest level of the holarchy brings with it the entire emergent structure that can expresses itself. We don't need to produce each sound or each word individually. We only need to wish for the ideas to be expressed and they automatically bring the necessary emergent structures in order to satisfy our intention. Note that all that exists is only the highest level, but the highest level selects its proper sublevels in order to structure itself in a meaningful way. Also, each level receives influence from above and impresses influence on below. Words are selected by the sentence, and in turn impress their own influence on the letters that they need.

Another example, from the visual domain, is shown in Figure 6. The level of the full visual scene impresses a top-down influence upon the level of colors and makes the squares highlighted by the arrows to become blue and yellow, when in isolation they are gray. As in the case of speech, the influence is done such that the overall highest level is meaningful in a certain way. In this case the meaning is that there are yellow and blue filters added on top of the original images of the cubes, so if the filters would be subtracted then the indicated squares would truly be blue and yellow, so they are made to be seen blue and yellow also with the filters applied.

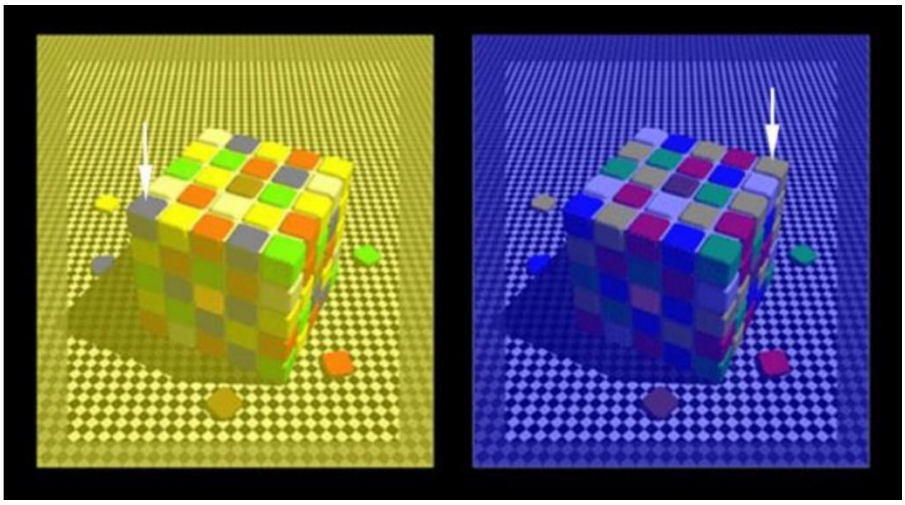


*Figure 6. Top-down influence in levels.*

We see thus that the higher levels of the holarchy are exercising top-down influence on the levels below them in order to make them compliant with the higher meanings that they want to offer to consciousness to experience. So, if time is indeed an emergent level of consciousness then it should manifest similar phenomena. Let's see that indeed it does.

### Top-down influence received from above

The best example of top-down influence that the level of time receives from the levels above it are the so-called "motion illusions". This is of course a misnomer that starts from the false assumption that there is actually a "physical world" out there in which there is no motion, and since we see motion in these images, that motion is an illusion. But since there is no physical world, then they are not illusions. There is actually motion in them, because motion is nothing else but a quale in consciousness, is the way the level of time manifests its quality when it is inherited in the visual domain. Let's take some examples and take a careful look at what is happening in them. For simplicity of expression I will still call them "motion illusions". Let's look at Figure 7.

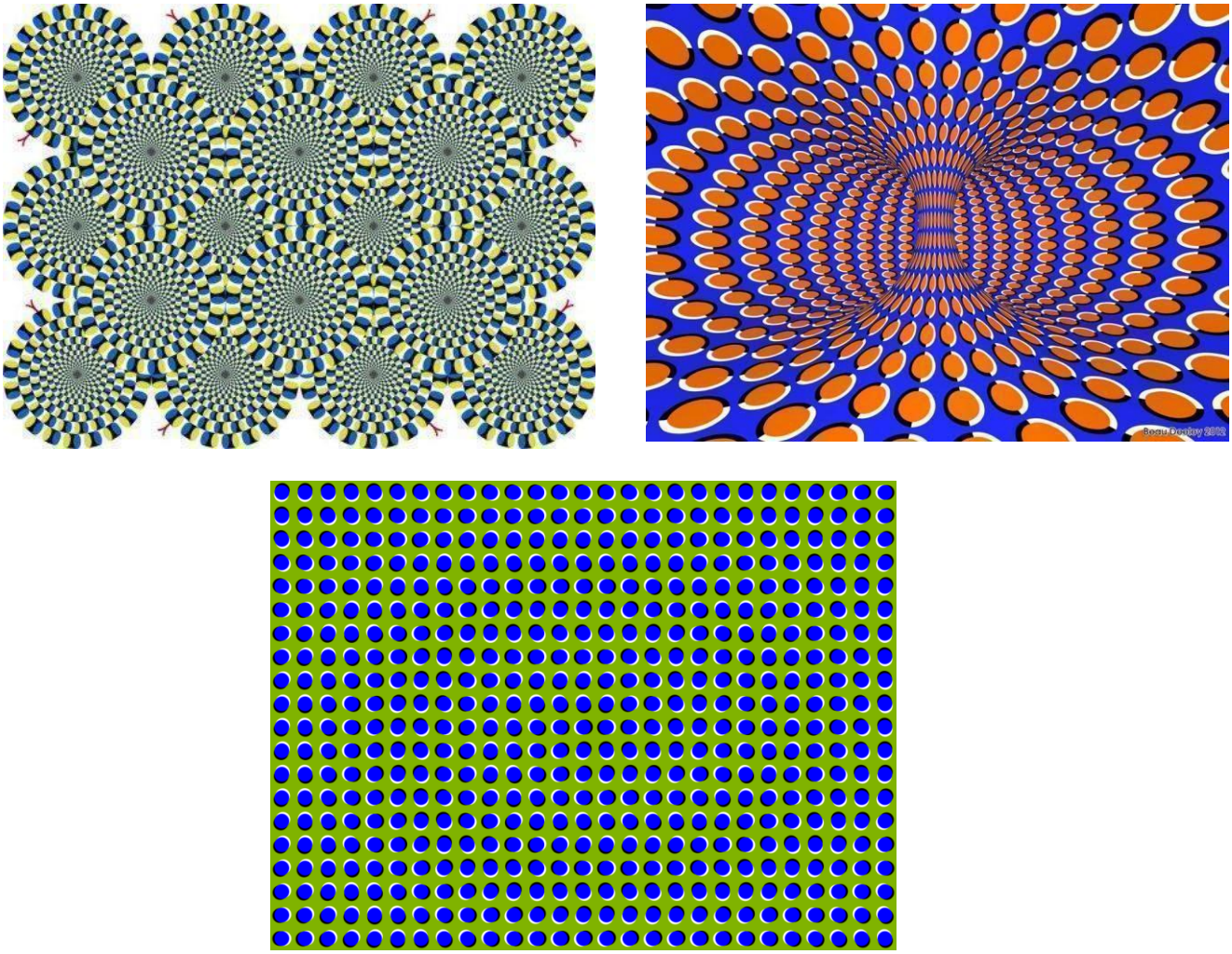


*Figure 7. Motion "illusions".*

How do we explain these images? What is it that generates motion in them? If we look carefully, we see that they all have black-and-white shapes disposed in symmetrical contrasting ways. They are actually specifically designed this way in order for motion to be generated. What we are dealing with here, in the light of emergence, is a top-down influence in levels from the level of black-and-white to the level of time. As we argued, time is an emergent level of consciousness that is situated below the higher domains like visual or auditory. Given this disposition, we predicted that time should encounter top-down influence from the higher levels. And this is precisely what we see here: a certain geometrical disposition of the higher level of black-and-white impresses its influence upon the lower level of time and thus, motion appears in the final qualia. We need though to distinguish here between mechanism and reason. What we presented here is just the mechanism through which motion is generated, but we didn't bring any reason for why the level of black-and-white should impress its influence in this way on the level of time. The reason might well be contingent and is a subject for empirical science. To understand this, let's look at Figure 8.

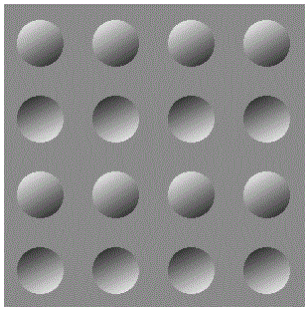


*Figure 8. Bumps and dimples.*

What we see in this image is that the first and third rows are bumps and the second and forth are dimples. What is it about the specific dispositions of shades-of-gray that creates us these qualia? The reason is an evolutionary contingent one: the only source of light in our evolutionary history was the Sun, and the Sun was always shining from above. So, if the light from the Sun was disposed on a vertical wall of rock like on the first row, then that meant that there was a bump on the rock. And if the light was disposed like on the second row, then that meant that there was a dimple on the rock. As we can see, there is no reason in the shades-of-gray as such that can explain these qualia. But the reason is contingent and is hidden in our evolutionary history, and it can only be revealed by empirical science. And this is generally true for all of our qualia. The emergent structure only explains how qualia inherit qualities from the lower levels and how the levels influence one another. But ultimately, the specific quality that a new level brings into existence when it emerges on top of previously existing levels, can probably be explained only by properly understanding our evolutionary history or the other reasons that might be responsible for bringing new qualia into existence. More on this on the last section.

Getting back to the motion illusions, let's see that not only the level of black-and-white impresses its influence on the level of time, but things can be more complex, a certain interplay between higher levels might be contributing to generating motion or not. For example, in this modification of the rotating snakes illusion in Figure 9, the positions of the contrasting yellow and blue are modified and motion doesn't arise anymore. So, the higher level of colors impresses its own influence upon the lower level of time. Once again, the reason for why this disposition of colors doesn't generate motion can only be revealed through empirical studies.

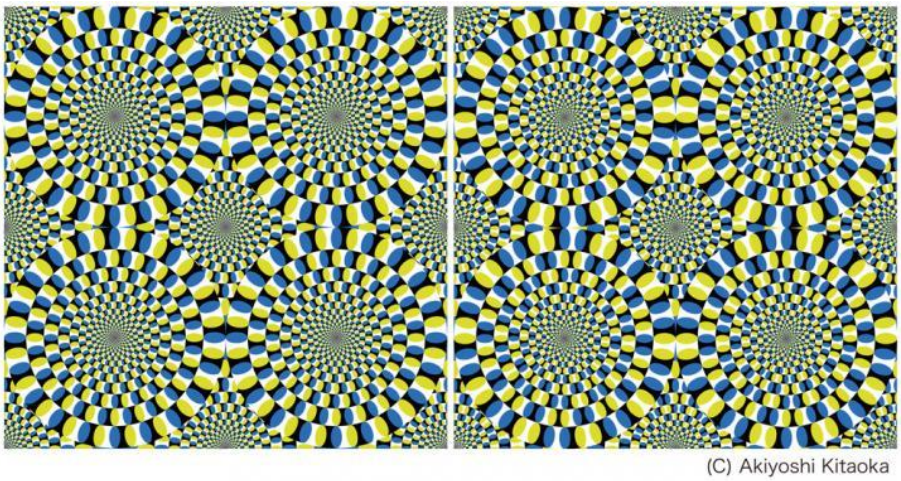



*Figure 9. Modified rotating snakes "illusion".*

Other example of top-down influence that time receives from above are the well-known cases of pleasure and pain, where time flies so fast when we are having pleasure and passes so slow when we are in pain.

### Top-down influence impressed on below

Time, like any other emergent level, can also impress its own influence upon the levels below it. We will show here the influence that time has on the level of memory. The influence that time has on the level of memory will do one more thing for us and that is to go beyond the structure of time described by Husserl in Figure 1. We will see that retentions can be completely sent to oblivion by the influences that the level of time impresses upon the level of memory, and be replaced by new retentions that tell a more meaningful story. We will actually see that "retention" is not even the proper way of characterizing the structure of time, so Husserl's structure of time is but a qualitative approximation of what time actually is.

The influence that time has upon memory can be observed by looking carefully at how hearing works. We will analyze now basically the same Alice and Bob phenomenon from Figure 2, but we will be subtler in our analysis. When we hear someone speaking, we initially hear only sounds. But when the person speaking finishes a word, we lose all the memories of the sounds previously heard and we only keep in retention the word in a holistic way, word which contains the "as if" component with reference to the past, so we hear the word as if we were hearing it in a holistic way right from the beginning. And here we understand why the retentional description given by Husserl is actually not the right description. The reason is that a word being a holistic entity, is not possible to be heard retentionally sound by sound. A series of sounds is nothing more but a series of sounds. They can never amount to something more than themselves. A word is not a series of sounds. A word is an emergent level above the level of sounds and, as any emergent level, it cannot be reduced to the lower levels. Indeed, it inherits the qualities of sounds, but like any emergent level, it is something more than the sum of the previous levels. So, if a word is a holistic entity then it cannot be described as a retentional collection of sounds. Indeed, at a first look it might appear that it is made up of a succession of sounds that slide-down-into-the-past in the retentional way described by Husserl. But the proper description should be that what we are dealing with is a holistic quale that has in its component the quality of "as if" with reference to the past. The quale of a word takes place all at once in the Now. But because of its "as if" component, the felt sensation is that we were hearing it as if we were paying attention to it as it was unraveling from the beginning to the end, and we already knew from the beginning what word it will be. And the "as if" component, because it refers the past, it gives us the false impression that we are dealing with a retention that acts dynamically moment by moment to keep in the present the former present moment. But all that there is, is a holistic quale that appears into the Now with its temporal structure already constructed.

The second part of the analysis that shows the retentional structure to be only a qualitative approximation of the nature of time, is the deletion of memories when larger holistic qualia are being created. As we just saw, we first hear sound by sound, but when the person speaking finishes a word, the experience that we remember having is of the word as such being heard as if we were hearing it right from the beginning. There is no memory left whatsoever of hearing individual sounds. Then the process continues. We hear word by word, but when the person speaking finishes a sentence, the experience that we remember having is of the sentence as such being heard as if we were hearing it

right from the beginning. There is no memory left whatsoever of hearing individual words. Indeed, we can then take the sentence and analyze it and say the words it is made up of, or the sounds the words are made up of, but this is a different thing. We are talking here about the experience of hearing the sentence. And in the experience of hearing the sentence, there is no memory anymore of hearing the words individually. All that we are left with is the experience of hearing the sentence as if we were hearing it holistically right from the beginning. We can see once again why the retentional description is not the right description. In the retentional description, an experience that appears into the Now is kept retentionally into the Now in the same way that it was first experienced. But this is not what happens. When a greater holistic meaning is detected, a totally new holistic quale is constructed that replaces completely the previous experiences of smaller holistic qualia. Indeed, it is constructed to feel as if it has the proper length of time and it has the proper beginning in the past, and it has the proper attending-along as it was being spoken. But nevertheless, it is a new holistic entity that appears into the Now all at once, and which replaces the previous smaller holistic entities.

Another example, from the visual domain, is as follow: A dot is displayed on the screen, and 200ms later after the first dot disappears, another dot is displayed on another place on the screen. What the experience that is obtained in consciousness is, is that of a dot moving from the first position to the second position. The situation is illustrated in Figure 10.

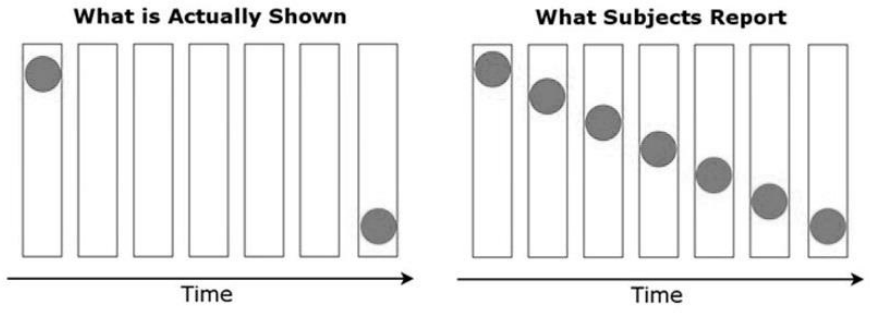



*Figure 10. Top-down influence impressed by time on memory.*

This example shows two things. First, the motion can only be generated after the second dot is being displayed, otherwise it wouldn't know in what direction to be generated. So, there are 200ms of time in consciousness that take place in 0ms of physical time at the moment when the second dot is being displayed. We are dealing again with temporal unities that take place all at once in an assumed physical time. The second thing, that is important for this section, is that there is also memory deletion involved in this example. First of all, if only the first dot is being displayed, all that we experience is a static dot. If then, in another round, after the first dot is being displayed, the second dot is displayed after 200ms, the experience that we have is only the experience of a moving dot. But we know from the first case that initially we see a static dot. But the new experience of the moving dot erases any memory that we had of a static dot, and all that we feel that we experience is only the movement of the dot. We are dealing thus with the same phenomenon of time impressing top-down influence upon the level of memory in order to construct a greater holistic meaning in the level of time.

A doubt that might arise here is: If retention is not the proper way of characterizing time, then it means that also memory is not an emergent level below the level of time, because we got to the idea that there is a memory level below the level of time precisely because we started from the idea that time is retentional and former present moment is kept in the current present moment as retention, so this implied that retention is possible because there is a level of memory below the level of time. The conclusion still holds though. This is for the reason that even though retention is not the proper way to characterize the structure of time, the quality of time nevertheless feels as if it takes place retentionally. There is still a feeling of a passage and there is still a feeling of the present moment sliding-down-into-the-past by being kept retentionally into the present. The difference is that the retention is not a dynamical structure anymore that acts dynamically moment by moment upon the Now, but is just a quality that any holistic quale that appears into the Now with its temporal structure already constructed has. So, the quality of time is the same and supports the same analysis regarding qualities inheritance. Actually, precisely because time has the emergent structure described in Figure 5, it can also impress top-down influence upon it and change things in the way described in this section.

We thus see that time impresses top-down influence upon the level of memory in the same way that in Figure 6, the level of the full visual scene impresses top-down influence upon the level of colors. And similar to the case in Figure 6, the influence that time impresses upon memory is in the direction of the construction of a greater meaning. A subtle clarification that needs to be made here is that the process described in this section is actually top-down influence in levels from the level of time to the level of memory, and not deletion as normally understood. There are no memories deleted per se, but the proper way of understanding this phenomenon is that the level of memory receives top-down influence from the level of time and this way it is changed in accordance to the greater meaning that the level of time creates. We are only calling it “deletion” for ease of expression.

Going through all these various elements of the phenomenology of time as they present to us in direct experience and comparing them to the phenomenology of the emergent structure of consciousness: qualities inheritance, top-down influence in levels received from above, top-down influence in levels impressed on below, we conclude that time is one of the emergent levels of consciousness, and not some independent aspect of consciousness that requires independent analysis. Seeing time as an emergent level of consciousness, no different than any other qualia, gives us a more coherent picture of consciousness and a general framework for further studying consciousness in detail.

# Open problems

However, as we are not yet in the possession of a full understanding of existence, the analysis of time presented in this paper leaves several problems unsolved. The problems will actually seem in contradiction with the vision of time presented here, so the tendency might be to accept the open problems as true manifestations of reality and the analysis of time presented in this paper as false. My feeling though is that the analysis of time presented in this paper is in essence correct and what needs to be done is to see the open problems in a new light and search for deeper understanding for them. We will talk about three of them.

## The consensus reality

Our most immediate intuition about our place in the world is that we live in a shared physical world that runs on its own and that it has a general temporal frame (which today is described by General Relativity as space-time) in which we all live. If there is no physical time, then our understanding of the consensus reality is in trouble. Our first intuition is that there must be a physical time in which we all live, so the analysis of time done in this paper must be false. But as we showed, since holistic temporal unities that can last for seconds or even minutes in the case of dreams, appear into the Now all at once, there are no criteria that we can use to arrange the events in consciousness on an axis of physical time. Moreover, each temporal unit that appears into the Now appears itself as if unfolding in time with new experiences appearing into the Now independently. Take the Bob example. Even though the entire Bob's remark appears in our consciousness only after Bob uttered our name, each of Bob's words seem in their turn to be independent new experiences appearing into the Now, even though the entire Bob's remark is the one that appears all at once into the Now. So even though we might try to create an axis of physical time based on the temporal unities that appear into the Now (even accepting that they are extended - like the entire Bob's remark counting as one single point of physical time), we still cannot do this, because each part of a temporal unity seems on its own to be a new temporal unity that appears into the Now. We have no criteria to distinguish between parts of a greater temporal unity and the greater temporal unity of which they are parts. They all seem to be equally new experiences that appear into the Now independently.

Also, the deletion of smaller temporal unities to be replaced by larger and more meaningful temporal unities adds another layer of difficulty to any attempt of ordering the events of consciousness on an axis of a physical time. Since we don't recall the memories that are being deleted, we also cannot spot in our experience of time in consciousness when the moment of deletion takes place. The temporal experiences that we have seem at all times continuous. We never experience any discontinuity that might take place at the moment of deletion. The deletion is done in such a way that the deleted memories are replaced immediately by larger temporal unities that feel as if we were having them in a continuous way right from the beginning. So being blind to deletion, there is no way in which we can arrange on an axis of physical time the moments of deletion. The concept of the "physical time" is pretty much an impossible concept, that only appeared in our attempts of understanding the world from superficial looks at the experience of time in consciousness. Deeper looks at the experience of time in consciousness show quite clear that there can be no physical time. However, the problem of the consensus reality still holds, because there still is a kind of synchronization that happens between consciousnesses. If time is solely a quale in consciousness, then how is it that we can still interact among each other in meaningful and stable ways? A solution to this problem must indeed be sought. What I think though is that the solution will not make use of any concept of a physical time, but it will look in a totally different way. It will be very interesting indeed to see what account we can give to the consensus reality without making use of any concept of a physical time.

Also, a related problem is how to account for the appearances of new experiences into the Now without making use of any concept of a "physical time". The reason why we cannot use the "physical time" to account for the appearances of new experiences into the Now is explained just above in the Bob example: since we cannot distinguish between the entire Bob's remark being the one that appears all at once as a new experience into the Now and each individual parts of Bob's remark, like individual words, that appear all at once as new experiences into the Now, then we cannot pinpoint a specific point to

count for a specific experience to be considered “The Experience” that appears into the Now. There is no difference between a greater temporal unity that appears into the Now and its parts. They all appear to be new experiences that appear into the Now. There might even be the case that our entire life is a holistic temporal unity that appears all at once into the Now.

## Precognitions

Another interesting challenge to a theory of time is the phenomenon of precognition. Precognition is troublesome even for our present physical concepts of time. Precognitions appear to be ways of seeing the future. But if time is just a quale in consciousness that exists in the eternal Now, how can there be any future already existing? And even if it exists, how are we able to see it? And if it already exists, in what way does it exist? Are there already consciousnesses there experiencing it? Or it exists as mere possibility? And if the future exists, doesn’t this mean that there is actually a physical time? Also, what about its implications upon free will? And why is it more prevailing in cases of loved ones being in suffering? There are lots of problems that the existence of precognitions rises. If we are to get a theory of consciousness, we need to take precognitions and other psi phenomena seriously. What I would suggest as a guidance towards a solution is the observation that consciousness seems to be about knowledge acquisition. Each quale is a form of meaning and they appear as solutions to problems. So instead of regarding precognition as the phenomenon of seeing the future, maybe regarding it as a type of knowledge that consciousness acquires might be a better way of approaching the problem. This way, we preserve the conclusions about time obtained in this paper, including the inexistence of the physical time, while also having a shot at understanding precognition. The problem thus reduces to the problem of what are the conditions that determine consciousness to acquire knowledge. Note that superficially, knowledge is considered to be obtained by reading books. But this is not how knowledge is obtained. Books are merely tools. If you give to a monkey the same books, the monkey will not obtain any knowledge. So not the reading of books is what gives us knowledge, but something else happens. Whatever that something else might be that gives us knowledge, the same conditions that work in what are considered “normal” ways of acquiring knowledge, must also work in “paranormal” ways of acquiring knowledge. So, understanding the mechanisms of knowledge acquisition might be a better strategy for understanding precognitions and other psi phenomena. We might find this way that precognition has nothing to do with seeing the future, so our analysis of time done in this paper might be saved. It might also provide a solution to where the experiences that appear into the Now come from. However, whatever the solution, we will accept it and we will change our present conclusions about time.

## Evolution

A third great challenge for the idea that time is only a quale in consciousness is evolution. Evolution is eminently a phenomenon that takes places across physical time. If there is no physical time, then where does that leave us in our understanding of evolution? Does that mean that evolution is false? Certainly not. Evolution is clearly true, even if we are to deduce it solely from the qualia that we have. Our qualia are selected in order to solve evolutionary problems. One example was already given in Figure 8, and more examples can be found especially in our psychology that is mainly oriented towards survival and reproduction. Probably all of our emotion qualia are serving evolutionary purposes. Even the qualia of colors can be argued to have appeared as solutions to evolutionary problems: red and green appeared in order to help us spot the fruits in the trees, yellow and blue appeared in order to help us spot the Sun

on the sky[6], and so on. So clearly, the human form that consciousness takes in our cases is a conscious form shaped by evolution. We cannot drop evolution. But equally, in the light of the many arguments presented in this paper, we can also not easily drop the conclusions that time is only a quale in consciousness. In my view, the way out of this is a complete rethinking of evolution. First of all, as all the basic qualia that we have were probably selected by evolution, the quale of time itself was selected by evolution. So, there was a period in the history of conscious beings where they didn't experience time. Time appeared later on as an adaptation that the atemporal beings needed to do in order to survive. What we need to do is to imagine an evolution that takes place atemporally. This is a difficult attempt, because as we can see, our very vocabulary of speaking about the world is impregnated with temporal references. We say: "there was a period when there were atemporal beings, and then temporal beings appeared" as if this transition from atemporal to temporal already presupposes a temporal background on which to take place. I think the problem doesn't lie in the logic of the situation that we try to describe, but in our language that is fundamentally temporal. We need to develop a way of thinking that is independent of time. Only then we can understand what an atemporal evolution would look like. And note that even if we today, as temporal beings (beings that have the quale of time), we notice evolution unfolding in a temporal way: parents giving birth to babies, evolution itself should actually be atemporal. What we see as a temporal unfolding of evolution must turn out to be a distant effect of the true nature of evolution that should be atemporal. I think the proper attitude at this moment should be to not shallowly discard the concept of atemporal evolution only because intuitively it sounds clearly false. The proper attitude should be to actually have a shot at trying to image what such an evolution might look like and what it might imply. There already are people working on this, as for example Donald Hoffman[6], which in his interface theory of perception also acknowledges that space and time are only species specific desktop interfaces, and he too is working on trying to recover physics and evolution from his theory. His theory of evolution will also turn out to be fundamentally atemporal, with temporality being only an appearance that certain species experience in their interfaces. Also, his theory of interacting conscious agents is also an atemporal theory of interaction, time only appearing by comparing the equation that he obtains for the interaction of conscious agents with the equation of the wavefunction of the free particle. Thus, certain elements of the atemporal interaction of the conscious agents are equivalent to the time parameter that appears in the wavefunction of the free particle. This is an example of how an atemporal evolution might be conceived.

In the end, we can see that if we take time to be just a quale in consciousness, many difficult challenges appear. But equally, we cannot discard the idea that time is just a quale in consciousness. The many aspects of the phenomenology of time explored in this paper all point toward this conclusion. Therefore, the way forward for science must be a rethinking of some of its concepts that it holds most dearly, like the consensus reality and evolution. Nevertheless, this should not be viewed as an obstacle, but as an opportunity for science to grow and to offer us a picture of the world closer to truth.

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