Conscious Representations, Intentionality, Judgements, (Self)Awareness and Qualia

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The problem of consciousness is discussed by considering and commenting on theories of mental representations, judgements, feelings and a subject's self-aware qualitative experience. These characteristics of consciousness are correlated with materialistic background processes, except qualia which have, as it is argued, no obvious connection with naturalistic explanatory framework.

1 Introduction

Recently, the problem of *qualia*, i.e. the nature and origin of qualitative subjective experience, "how it is to be like" (the first-person perspective), and the problem of phenomenal consciousness (as opposed to its informational aspect) have been identified as the "hard" problem (Chalmers, 1995; Tucson II, 1996). The problems of system-dynamical background of consciousness and information processing (the naturalistic, third-person perspective) have, on the other hand, been defined as the "easy" problems, because they are not as puzzling as the phenomenal qualia (Banks, 1996; Hubbard, 1996).

Searle (1993), as a philosopher with non-reductive views (as opposed to eliminativist materialists like the Churchlands), defines consciousness as a subjective qualitative process of awareness, sentience or feeling. We can assume that consciousness has a multiple nature which is at the same time synthesized into a unity: multi-modal perceptions and representations are always unified into a single undividable experience (binding problem). Self-referential dynamics is essential for consciousness, but it can be understood in the framework of *multi-level neural, quantum or/and subcellular network processes* which obey *analogous collective dynamics* (Peruš, 1997a,e). On the other hand, qualitative phenomenal experience can not be described using conventional naturalistic, functionalist and information-theoretical models. Therefore some new, multi-disciplinary and non-reductionist approaches are necessary.

From the *naturalistic* point of view (Burnod, 1990; Pribram, 1991; Nagel, 1993; Baars, 1997; Newmann, 1997), multi-level coherence of various fractal-like complex biosystems is necessary for cognition and consciousness. Similar collective information processes in neural and quantum networks, which remind one of holography, support this view (Peruš, 1997b,c). The most important neuro-quantum analogy, beside the interference-based memorization, is that the reconstruction of a neuronal pattern (the recall of a pattern from memory) is analogous to the so-called "wave-function collapse". In the neural case, from a superposition of neuronal patterns one pattern alone is made clear in the system of neurons (representing the object of consciousness), all the others remain implicitly stored in the system of synaptic connections (in memory) only. In a quantum system, the wave-function "collapses" from a superposition of eigen-wave-functions to a state which can be described by a single eigen-wave-function, all the others are latent, enfolded in the implicate order (Peruš, 1995c, 1996). These processes provide a processual background for consciousness, and can explain bi-directional *consciousness–memory transitions* as well as *unconsciousness–consciousness transitions*. There is an interesting parallelism between making a pattern or thought conscious and transforming quantum implicit or potential states into explicit or actually existent states. This is also related to the "arrow of time" (Hameroff et al., 1996).

2 Transitional mental representations

Intentional consciousness needs mental representations in order to represent the objects we are conscious of. In the usual neural network models (Amit, 1989; Peretto,

1992), they are approximated by neuronal patterns-qua-attractors (Peruš, 1995a,b). These models may (or even should) be used in a generalized manner – as networks of *formal* "neurons". These formal "units" can be implemented in various media, e.g. neural, quantum, virtual, etc. (Peruš, 1995c).

Existence of mental representations was in the centre-point of discussions between cognitivists (representationalists) and ecologists (e.g., J.J. Gibson). Ecologists emphasize the importance of the environment and its continuous mutual interactions with the organism which unites the organism and its environment into an indivisible dynamical whole.

But the question remains whether specific external patterns are projected into specific internal *representations* (cognitivists' position), or does the brain only make *specific transformations* of specific input patterns to a specific output, i.e. a specific response of the organism to the stimuli from the environment (ecologists' position). In the first case representations (pictorial, propositional, linguistic) are more fixed and stable. They have well-defined semantic kernels which are relatively independent from their context. In the second case "representations" would be purely dynamic and transitional, with strong dependence on the context.

In connectionist models, there are two main levels – cognitive (symbolic) and sub-cognitive (sub-symbolic) level. It must be emphasized that they coexist and that there are also many quasi-levels in-between (McClelland et al., 1986). The connectionist level constitutes an underlying system-processual medium for high-order mental representations – in the same way that quantum physics is a necessary processual background for classical physics. The invariance of cognitive representation-patterns is only an "envelope" for very complex internal dynamics on the sub-cognitive or sub-symbolic levels.

The neural medium is able to "absorb" each external pattern in order to "get into its shape", as Aristotle would say. Each external pattern is not constantly represented in the brain, but only when the influence from environment forces it to reconstruct the corresponding representation. All un-interesting or un-important patterns are only abstractly coded in the system of synaptic connections and wait there for reconstruction or "unfolding" when necessary. The brain makes a combination of environmental influences and of the use of representational codes in the memory, i.e. pattern-correlations encoded in the system of synaptic connections. It makes a superposition of external patterns and already stored internal codes (which represent the organism's expectations). The environmental influence selectively extracts those features from the memory which are the most similar to the actual state in the environment. [1] So, mental representations get into correlative coherence with external patterns, or, with other words, mental processes get into parallel synchronous dynamics with environmental processes. Computer simulations (e.g., Peruš, 1995a) also show that neural network dynamics depends very much on the structure (e.q., correlation structure) of the input data.

The conclusion would be that there *are* some *strongly environment-dependent representations* in the mind, but these are not static at all – they are *very dynamic, flexible* and *adaptive*, carrying only the *filtered (abstracted) main characteristics* of the patterns.

The structure of internal representations (and their semantic relation-network) is an isomorphic virtual image of the structure of environment (Peruš, 1995b), including its individual patterns, their spatial and temporal correlations, and groups of environmental patterns. Brentano says (Brentano, 1973, pp. 9) that our spatial and temporal world exhibits the same relations as those exhibited by the object of our perceptions of space and time.

To summarize, associative neural network models and their computer simulations support the view that epistemic intermediaries exist, but are strongly environment-dependent, dynamic, and only *transitional.* Phantom limbs offer evidence that virtual representations exist – injured people, after the amputation of their limb, continue to feel that they still have it. For this feeling, transitional (temporary) virtual intermediaries are responsible. Such intermediaries are not states, they are processes. The rate of transitionality varies inverse-proportionally to the rate of stability, invariance and importance of external patterns and their internal representational counterparts, to their frequency of occurence, and to the amount of attention paid to them.

3 Informational background of phenomena

Specific mappings of specific objects into specific mental representations (i.e., specific patterns of neural activity acting as *attractors*) constitute the *intentional and representational basis of phenomenal experience* (Sajama et al., 1987), but cannot explain the *qualitative* nature of phenomena. Therefore I will postpone the discussion of qualitative component of phenomena, and now consider merely their informational (so-called "access"-consciousness) component (Davies & Humphreys, 1993) (Marcel & Bisiach, 1988).

From a purely informational view-point, a phenomenon is an object perceived "through" the state of the neural system (Nelkin, 1996). In all phenomena, objects and their representations are always "bound

[1] Detailed descriptions of these processes, based on author's computer simulations, are given in (Peruš, 1995a,b, 1997a).

together". Both, objects (as far as they are phenomena to us) and their representations, have no meaning or no existence one without the other. Furthermore, phenomena represent correlation or coherence, or even effective unification of objects with their mental representations. Brentano says that objects of sensations are merely phenomena, and that color, sound, warmth, taste etc. do not really exist outside our sensations, even though they may point to objects which do so exist (Brentano, 1973, pp. 9). He also says (ibid., pp. 69) that color is not seeing and sound is not hearing. We could say that color is a characteristics of an object (only when this object acts as a phenomenon to us!) only as much as it was gained through the process of seeing. Namely, we might have uncoupled object and neural system initially.

Objects and "their" characteristics (color etc.) can be phenomena only when they are perceived (seen etc.). So, seeing always effectively unifies everything that is denoted by the notions of object, phenomenon and its color into a virtual whole. Neural system must be coupled with the object through this process of seeing. This unification is only virtual and effective one – as it would establish a sort of higher-order metagestalt which compounds the mental (virtual, emergent) and the physical (system-processual) into one – into a "virtual unity". So, we must speak not about a man and an object separately, but about a man-seeing-an-object (Sajama et al., 1987).

Phenomena do not have properties like shape and size, but they do posses analogues to those properties. Phenomenal states are not coloured, yet they correlate to colours: their variations (including varying scales, intensity, etc.) are "read out" in such a way that we are led to judge a conclusion that a property of external objects varies in a similar way (Nelkin, 1996). In such a way, phenomena act as image-like qualitative representations. An epiphenomenalist would say that they have no role in perception itself, but are co-effects of the processes that result in percepts. They somewhat indirectly accompany perception and alter in parallel with the external objective situation. On the other hand, non-reductionists would attribute a causal role to phenomena. I would say that the latter are right, except in automatic (e.g., reflex) behaviour which is triggered before the irreducible conscious control of the subject's I is switched on and may, somewhat later, freely alter the actions.

4 Intentionality, judgements and emotional attitudes

According to Brentano, we never only think, but we think about something. This is, in philosophy, called *intentionality* (sometimes a more direct word – "aboutness" – is used). A pattern of neural activity is "carrier" of a specific content (correlated with an external pattern – object).

Due to Brentano (1973, pp. 278), representations, judgements and emotional attitudes are three basic, but interdependent, classes of mental reference. Brentano (1973, pp. 265) writes: "The inner consciousness, which accompanies every mental phenomenon, includes a presentation, a cognition and a feeling, all directed towards that phenomenon." Later (Brentano, 1973, pp. 276): "Every mental activity is the object of a presentation included within it and of a judgement included within it, it is also the object of an emotional reference included within it". "Nothing can be judged, desired, hoped or feared, unless one has a presentation of that thing."

Using the neural network theory, we can describe how patterns get associatively connected, because they (like their constituent neurons) are connected to each other and represent the context and content of each other. A representation is not only connected with other representations, but can also be symbolically represented (coded) by the firing of a cardinal neuron or a cardinal ensemble of neurons, or virtually by so-called order parameters (Haken, 1991). The firings of cardinal neurons symbolizes the occurence of their corresponding representations.

Judgements are intentional, even volitional, psychical events. They have neural correlates which may in our model be realized as "flipping" of cardinal neurons (or changing order parameters), which codes the mean-field situation ("general atmosphere", average) of the neural system and its global transitions. Judgements are affirmations or denials. In our model, the essential neural correlates of judgements may be represented by an excitatory or inhibitory action of a cardinal neuron towards corresponding pattern which is the object of judgement. The strength of activity of a cardinal neuron symbolizes the degree of conviction with which judgement is made.

Here we should add that in biological neural networks special "veto"-cells exist, which are protagonists of processes underlying judgements. But the role of "veto"-cells is limited to the context of system-dynamics only, i.e. the system triggers them. So, nothing *volitional* can be traced on the neural level. Our free will exists merely on the irreducible subjective level.

In a larger sense, emotional activity is love or hate which is correlated with higher-order pattern-agreement (mutual supporting) or disagreement. This causes convenience (pleasure etc.) or inconvenience (suffering etc.). The system-dynamic mechanisms underlying judgements (how they arise and what mental effects they have) and emotions can be modeled by neural networks, but the involvement of consciousness in the sense of free will, self-awareness and qualia cannot be satisfactorily understood this way.

5 Intentional consciousness and self-awareness

Intentionality means that every mental process always has a reference to a content or is directed upon an object (phenomenon). This is particularly characteristic of consciousness (except in transcendental mystical states which are un-intentional). According to Brentano (1973), intentionality represents a typically psychical phenomenon which cannot be reduced to physical phenomena, so it is an example of essential difference between the psychical and the physical. [1]

Dennett adds that action is intentional only if the actor is aware of action spontaneously ("automatically", without observation of the action). His example (Dennett, 1969, pp. 165): If somebody is tapping in the rythm of "Rule, Britannia" and is not aware of this (other people recognize this), then such tapping-in-a-rythm is not intentional.

Before we start to discuss the problem of consciousness and self-awareness (consciousness of consciousness) from the points of view of Brentano and of neural network theory, we have to emphasize tight connections and inter-dependence between representations and re-representations (Oakley, 1990). Brentano (1973, pp. 127) claims that there is a special connection between the object of inner representation and the representation of the representation, and so on. Let us quote Brentano (1973, pp. 127):
"The presentation of the sound and the presentation of the presentation of the sound form a single mental phenomenon; it is only by considering it in its relation to two different objects, one of which is a physical phenomenon and the other a mental phenomenon, that we divide it conceptually into two presentations. In the same mental phenomenon, in which the sound is presented to our minds, we simultaneously apprehend the mental phenomenon itself. What is more, we apprehend it in accordance with its dual nature insofar as it has the sound within it, and insofar as it has itself as content at the same time."

Brentano's introspective observations remain valid also if we understand the term "(re)presentations" as "neuronal patterns-qua-attractors". Namely, neuronal patterns are "reflecting each other" (heteroassociation) or are "reflecting themselves (into themselves)" (autoassociation) (Peruš, 1995a). *Neurons and patterns consisting of neurons represent context and content to each other, and patterns represent context and content to themselves within themselves*, because *the neurons, which constitute them, are constantly interacting.*

The recursive "self-intentionality" is the basis of the process of self-awareness. Memory consists of superpositions of correlation-patterns in the system of synaptic connections. The object of consciousness is represented in the pattern of the system of neurons which is involved in a global associative connection or interplay with many other stored patterns. Awareness and self-awareness might correspond to Brentano's discussion of reflective re-representations (although Brentano did not explicitly mention self-awareness). Brentano (1973, pp. 128) continues:
"If an inner presentation were ever to become inner observation, this observation would be directed upon itself.
One observation is supposed to be capable of being directed upon another observation, but not upon itself. The truth is that something which is only the secondary object of an act can undoubtedly be an object of consciousness in this act, but cannot be an object of observation in it. Observation requires that one turns his attention to an object as a primary object. (...) Thus we see that no simultaneous observation of one's own act of observation or of any other of one's own mental acts is possible at all. We can observe the sounds we hear, but we cannot observe our hearing of the sounds. On the other hand, when we recall a previous act of hearing, we turn toward it as a primary object, and thus we sometimes turn toward it as observers. In this case, our act of remembering is the mental phenomenon which can be apprehended only secondarily."

Thus, Brentano offers a representative of a "copy-theory" of self-awareness. A man can be aware of a copy or recalled image of a just-passed-away mental event, but not of this mental event directly.

We must note that there is one exception to the exclusion of simultaneous representations and re-representations: experiences of mystical unity – insofar they are *un-intentional* (Raković & Koruga, 1996; Peruš, 1997d). They correspond to *coherent* symmetrical dynamics of the neural substrate on biological level and global-attractor-formations on higher virtual levels (pattern-superpositions or simultaneously coexisting representations merge into an uniform whole). Quantum correlates (e.g., Bose-Einstein condensates) of such processes are very probably also relevant.

Brentano admits the complementarity of the first-order consciousness and the accompanying second-order consciousness (1973, pp. 129):
"The consciousness of the presentation of the sound clearly occurs together with the consciousness of this consciousness, for the consciousness which accompa-

[1] The second difference is, according to Brentano (1973, pp. 85), that all physical phenomena have extension and spatial location, but mental phenomena (thinking, willing etc.) appear without extension and spatial location. On the other hand, quantum physics and parallel-distributed complex systems show that this division can be melted away. It is namely only a result of being-inside-an-attractor (extension, localization) or being-beyond-local-attractors ("flowing freely" across the set of possible system's states).

nies the presentation of the sound is a consciousness not so much of this presentation as of the whole mental act in which the sound is presented, and in which the consciousness itself exists concomitantly. Apart from the fact that it presents the physical phenomenon of sound, the mental act of hearing becomes at the same time its own object and content, taken as a whole."

We shall conclude with Brentano (1973, pp. 134) that, if we see a color and have a representation of our act of seing, the color which we see is also present in the representation of this act. This color is the content of the representation of the act of seeing, but it also belongs to the content of seeing. It is well known that there are good candidates (they incorporate self-interactive dynamics) of correlates of these self-reflective mental processes on the levels of neural, sub-cellular and/or neural networks arising from iterative fractal-like dynamics (Peruš, 1997b).

6 Consciousness entailing self-consciousness

The relation of consciousness and self-consciousness was discussed in detail recently by Rosenthal and Gennaro. Gennaro (1995), following the higher-order-thought theory of (self)consciousness by Rosenthal (e.g., in Davies & Humphreys, 1993, pp. 197-224), shows that consciousness entails self-consciousness. [1]

Gennaro (1995) argues that a mental state S becomes conscious if it is accompanied by a meta-psychological thought M that one is in that mental state S. Examples of meta-psychological states are thoughts, beliefs, desires, wishes, hopes, fears. But not all such second-order states can render a first-order mental state conscious - it must be a meta-psychological *thought* directed at the first-order state, Gennaro says. "Self-consciousness does involve an explicit (albeit unconscious) thought and accompanies all conscious experience." (Gennaro, 1995, pp. 18)

Introspection is having a conscious thought about own mental state. Having conscious thought does not entail introspective awareness. In conscious states we are often not consciously thinking about our own thoughts, but we are nevertheless thinking about or having (unconscious) "thought awareness of" them. So, introspection is a special form of self-consciousness which includes conscious, not ordinary, higher-order thoughts. A meta-psychological state M is conscious when a higher meta-psychological thought MM is directed on it. In introspection, a mental state S is accompanied by M, and, furthermore, there is a MM directed at M. Deliberate introspection is the most sophisticated kind of a S-M-MM loop.

One can have a particular phenomenal state without its typical quality, like in the following case. One can have muscle twinges while sleeping, and that causes changing position (Gennaro, 1995, p. 8). Thus, unconscious phenomenal states are possible and they may share (because they are *potentially* conscious) certain underlying neural processes with conscious phenomenal states.

Gennaro identifies the following conscious states: *conscious phenomenal states* (conscious bodily sensations, e.g. pains, and conscious world-directed perceptual states), *conscious world-directed non-perceptual intentional states* (e.g., desires, thoughts), and *self-consciousness* (non-reflective self-consciousness, i.e. unconscious meta-psychological thought awareness; momentary focused introspection and deliberate introspection).

Gennaro concludes that mental states (e.g. beliefs) *per se* do not require self-consciousness. However, episodic memories, self-directed thoughts and self-modification of behavior are needed for consciousness and they entail some form of self-consciousness. However, the nature of meta-thought remains an open question, at least partly because of the unsolved qualia problem.

The *I (ego)* as a proposition-like self-representation can be treated as an attractor or gestalt of the highest order (as far as its phenomenal character could be neglected – strictly it could not). Deep meditators can transcend their *I*s (egos) as soon as the corresponding global attractor is erased (see also Deikman, 1996). However, *I* is an irreducible trigger of volitional actions. These are connected with subjective motivation. And here again, qualia come into play, because of having an important role in motivation.

7 Qualia make consciousness an aspect beyond physicalism

To conclude, we will consider a characteristic attempt by a non-reductionist philosopher (N. Nelkin) to discuss (self)consciousness with phenomenal qualia. Phenomenal consciousness is a mental state with subjective feelings, i.e. something it is like to be in that state. It is essential for sensations like colourful visual and soundful auditory experiences, kinaesthetic feelings, pains. On the other hand, there is nothing it is like to be a conscious thinking itself, or a conscious feeling itself (Nelkin, 1996). So, if one is aware of his phenomenal quale, this is because one has a second-order, noninferential, proposition-like aware-

[1] The English notion "consciousness" cannot be well translated into many other languages, because it is used in a relatively broad sense. For example, German "das Bewußtsein", or "zavest", "svijest", "svest" in South-Slavic languages, which are usually translated as "consciousness", have implicit meaning of "self-consciousness" (much more than in English). This situation is in agreement with Gennaro's welcome, and in English context not trivial, idea that consciousness entails self-consciousness.

ness that one is in that first-order or phenomenal mental state. The awareness of qualitative states (making these qualia conscious) is an apperceptive second-order thought or even judgement, and as such this second-order state is more important for personality and self-identity than qualia (first-order phenomenal states) themselves. Nelkin (1996) distinguishes three types of conscious states: *first-order proposition-like representational state* (C1), *high-level, neurally-based, image-like representational state with phenomenality* (CS), and *second-order, direct, noninferential accessing and proposition-like representation of some C1 and of some CS* (C2).

CS is already a kind of phenomenal awareness, but C2 is a distinct apperceptive awareness (a real self-awareness).

Consciousness, in spite of its relative primitivity, un-analysability, un-effability and phenomenal unity (Kihlstrom, 1993), has several aspects, even unconscious implicit ingredients. Many beliefs we are apperceptively conscious of do not seem tied to phenomena. For example, one can be conscious that one believes tomorrow is Friday, but no set of phenomena is required for that consciousness (Nelkin, 1996). Secondly, phenomenal experience may alter because of physiological change. Patients with implanted new lenses complain that their colour phenomena are different.

It seems that non-phenomenal (i.e. "access-conscious", "purely" informational) states are those which, when directed toward C1 or CS, make the subject aware of them (C1 or CS). Nevertheless, in spite of not being universal and omnipresent, phenomenal qualitative states remain the central mystery (Hubbard, 1996). What really is the hardest problem is not awareness or self-directed awareness itself, but the qualitative nature of (self-)awareness. That is to say, with a theory of higher-order propositional-like thoughts we can somewhat trace the (cybernetic, recursive, iterative) essence of self-awareness (see also Železnikar, 1990), but we have no way to explain their phenomenal character. In spite of the fact that Nelkin tried to consider qualia a little bit more than Gennaro and Rosenthal, he did not succeed - as did not any other consciousness researcher (Flanagan, 1992; Hendriks-Jansen, 1997).

In this paper, selected theories of representations (following a connectionist line), intentionality (following Brentano's tradition) and consciousness together with self-reflective consciousness, i.e. self-awareness (starting with Brentano, then following Rosenthal and Gennaro) were discussed. At the end, the qualia enigma was stressed as the central and still unsolved problem.

Brain processes are merely a "centre of weight" of intentional consciousness. A non-local (sub)quantum coherent background, as transcendental mystical experiences suggest, is the origin of non-intentional consciousness or collective unconscious. The qualia problem, I believe, shows that consciousness is irreducible to neural, quantum and any other network processes, including their emergent, higher-level virtual, or informational processes, respectively. So, consciousness seems to be a *primary and irreducible aspect*, as primary as material processes. *A sort of "pre-consciousness" emerges in a primitive and rudimentary way as soon as complex material systems arise* (e.g., in sub-quantum "vacuum"), because *every complex system is accompanied by virtual attractor structures.* In a human-like form, however, consciousness (especially intentional consciousness) has evolved in the last millenia.

Pre-consciousness (rudimentary consciousness) is not prior to matter and matter is not prior to pre-consciousness. They both emerge together as soon as the fundamental sub-quantum symmetry is broken. On the other hand, our *phenomenal world* (i.e., objects *we* perceive) is a co-product of our intentional consciousness and of environment. We never know what the real world is, i.e. as it exists (probably it does) on its own, without us perceiving it. We only know how the world looks after it has been processed by our brains and our consciousness. In that sense, (intentional) consciousness is not prior to any thing-in-itself (Kant's "Ding an sich"), but it is prior to our phenomenal perception of a thing or object. There are no phenomena without (intentional) consciousness, but there may perhaps be things-in-themselves without it. However, pre-consciousness as well as matter are both essentially connected with overall sub-quantum background processes as their common "origin".

Because the origin of qualia is still unknown, and because of dependence on intersubjective definition of what consciousness is, the nature of consciousness remains a matter of hypotheses.

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