

# Qualia are no exception

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*Summary:* The study of 'raw feels' or qualia promises insight into the making and function of mental representations, the percepts, and (modestly) progress with the mind-body problem. Here my proposal:

For mental processing, sensory activity is collected in monomodal sensory channels. Each channel is labelled with a quality-identifier, a quale, which can be mentally experienced in a figurative idiom which induces feelings. Channel identification is the first stage in the processing of conscious sensations, the second stage being quantification. By extending this scheme over channels of several modalities, the percept becomes multimodal, a construct representing a distal object of body or world.

A quale cannot fulfil a percept's function, but has a role in its constitution as an essential ID-discriminator of sensory channels. Qualia are reducible, guided by their role. Thus qualia are no exception, are not an irreducible relict in an otherwise reducible mental world.

## The riddle of qualia

Qualia as qualitative aspects of a mental experience were introduced by C.I. Lewis in 1929.<sup>1</sup> In the philosophy of mind they are today seen as the controversial “tipping point between physicality and the metaphysical”.<sup>2</sup> The study of qualia promises insight into the making and function of mental objects and into mental experience.

In common understanding qualia are very peculiar feelings: possibly contingent, further “unobservable in others and unquantifiable in us”. They are usually found to be ineffable, intrinsic, private and consciously directly apprehensible.<sup>3</sup> 'Indescribable' is probably the most curious of these features. For how a mental Self-agent feels when sensing red or cold, let alone when having a headache or tasting a wine or being a bat, cannot be described, remains a mystery to others.<sup>4</sup>

Qualia, also known as 'raw feels', mark the first stage in the processing of mental sensations into functional percepts. Arguably, qualia were found to be without *role, task or function*.<sup>5</sup> This, according to Jaegwon Kim, makes qualia irreducible. Their reduction is not guided by a (role, ) task or function common to mental phenomenon and neuronal realizer. This is an *exception* in an otherwise functionally reducible mental domain.<sup>6</sup>

To untangle the problem, we shall carefully distinguish between the role of a monomodal quale and the function of a multimodal percept. Our task, to find a role for qualia, concerns the mental world and its foundation in the brain. Let us begin with the latter, with the neuronal world.

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1 Lewis, C.I., *Mind and the World Order. Outline of a Theory of Knowledge*. Dover, New York 1991 (Nachdr.) ISBN 0-486-26564-1 ed. 1929, New York: Charles Scribner's sons. 121 pages

2 See: <https://en.wikipedia.org/wiki/Qualia>

3 These properties are contradictory: Dennett, D.C., *Consciousness explained*. 1991, Boston, MA: Little Brown.

4 Lewis, C.I., 1929, l.c. // Nagel, T., *What is it like to be a bat?* *The Philosophical Review*, 1974. **83**(4): p. 435-450; // Heckmann, H.-D. and S. Walter, eds. *Qualia*. 2001, mentis. 524 pages.

5 I take *function* to be the predictable alteration of the environment effected by a whole.

6 Kim, J., *Physicalism, or something near enough*. 2005, Princeton: Princeton University Press. 186 pages. A 'role' as opposed to a 'function' is not considered by Kim.

## Sensory channels, the neuronal perspective:

This view, also known as 3<sup>rd</sup>-person perspective, observes neuronal events in the brain objectively. The sensory input, on occasion rapidly changing, might be displayed in a diagram which plots on the abscissa nerve fibre kinds according to their origin in the body and on the ordinate the present spike activity arising from that location. Thus the abscissa posts contextual information and the ordinate quantity information, forming a constantly updated activity spectrum or pattern.

Hence the sensory input is represented by the changing pattern of the activity of many neurons. In this population the quantity-property (A) of each sensory neuron is highly variable while the contextual-property (B) is fixed for anyone fibre.<sup>7</sup> A and B can be 'measured' under favourable circumstances. They relate to each other, as is known from the structure of data. The quantity-property A of fibre xy answers the question '*How much?*' or '*How high is excitation intensity of fibre xy right now (with xy implying quality B)?*' The 'quality'-property B of a fibre carries contextual information about the '*what and where*' of the activity. B identifies the monomodal sensory channel and is implicitly given by connectivity and type of the fibre.<sup>8</sup>

A channel collects the activity of one or several fibres serving the same quality and modality, limited by the spacial resolution of the modality. Thus any A in the above notation is the sum of activities of several fibres of the same B. For instance, in olfaction the left vanilla-channel will collect the activity of the many sensory neurons responding to vanilla in the left nasal cavity. In vision, a blue-channel will collect the activity arising from the local blue-receptive field of the retina. A toothache channel may collect, say, pain-fibre activity from an upper left molar.

## The perspective divide:

The divide metaphorically separates the conscious mental world from its realizer, the unconscious neuronal world. Notably there is an interface bridging the divide.

*Supervenience:* According to a hypothesis of mainstream physicalism, the mental world of conscious experience has a realizer, the unconscious neuronal world, to which it is related by supervening over it. Supervenience<sup>9</sup> is a constitutive relation of events, it means 'by virtue of'. Let M and N stand for specific events of mind and brain. M supervenes over N if M cannot change unless N changes. Further, let  $M \leftarrow N$  stand for the process of N becoming conscious. Since this process is time-consuming,<sup>10</sup> we may say: M supervenes over N if M cannot change unless N changes first.

I take M-over-N supervenience as an asymmetric relation which allows  $M \leftarrow N$  events (*bottom-up*), but not  $M \rightarrow N$  events (*top-down*). For phenomenal objects in M are not separate and independent but are dependent on events in N. Therefore they cannot encounter objects of N, as would be required for *top-down* causal interaction. For only real, separate objects will interact.

Further, if M supervenes over N, which is its realizer, then M is reducible to N. The supervenience hypothesis implies reduction of mental events to N-base without exception.<sup>11</sup> *Perspective dualism*<sup>12</sup> is based on the observations that 1. mental events generally depend on neuronal events<sup>13</sup> and that 2. neuronal events remain unnoticed when viewed introspectively from the mental perspective. Both observations are expected from supervenience of M over its realizer N.

7 In 'Constructivism', B was overlooked entirely.

8 e.g. Lindemann, B., *Mechanisms in World and Mind*. 2014, Exeter, UK: imprint academic. 152 pages. Chapter 5.

9 Davidson, D., *Mental Events*, in *Essays on Actions and Events*. 1970, Clarendon Press: Oxford.

10 e.g. Roth, G., *Aus Sicht des Gehirns*. 2003, Frankfurt: Suhrkamp. 214 pages, p.133

11 The hypothetical character of M-over-N supervenience prevents us to conclude this treaties right here

12 For roots of perspective dualism and the mind-body problem, see René Descartes, Franz Brentano, Ludwig Bertalanffy, and Thomas Nagel's 'dual aspect theory' e.g. Nagel, T., *The view from nowhere*. 1986, New York: Oxford University Press. 244 pages. See page 28.

13 e.g. Lindemann, B., l.c. 2014, p.3.

The *first-person* perspective is the point of view of a conscious agent, the Self, experiencing 'from within'. It is **mental**, private, subjective, phenomenal. According to the above hypothesis, the mental world supervenes over neuronal-physical base, accounting for observation 1.

The *third-person* perspective is that of an objective investigator observing **neuronal** or physical events. If neuronal events are subvenient realizers of mental events, i.e. if M supervenes over N, then M does not consist of separate independent objects. Thus mental objects cannot causally interact with N, for instance in an introspective process revealing details of N. This accounts for observation 2.

*Causal events:* N is found to be physical, in the brain it supports a causal network of interaction-events and causal roles of independent items. In contrast, the existence of M depends on its realizer N. While mental objects are *experienced* to interact causally on the mental 'scene', this interaction is merely a construct. Actually the apparent causal events do not happen in the mental but are realized by interactions in the neuronal world N. This world, however, is transparent from the mental perspective.<sup>14</sup>

### **A quale as a sensory quality in the mental perspective:**

Crossing the perspective divide, we now enter the 1st-person or mental world with its familiar but illusionary 'user interface' connecting to the real world. The mental is the experience of phenomenal objects, through their properties, presented on a virtual stage complete with the surrounding 'scene'. At the centre the experiencing Self-agent may be expected.

As mentioned, from the mental perspective neurons and their data are **transparent** to introspection, they remain subconscious, do not seem to exist for the observing Self-agent. This remarkable blindness is expected from supervenience (see above). The mind cannot process, say, the activity of individual neurons. Rather, it deals with mental items. Thus the activity of multiple neurons of a sensory channel is cast <sup>15</sup> into a intuitively accessible mental phenomenon, the **quale**.

A quale is a unique intrinsic sensory quality consciously experienced. It is based on monomodal input from one sensory channel and serves as the channel-ID. Together, several of these qualia constitute experienced mental properties. Several properties of different modality, in turn, constitute a multimodal percept. A quale may be re-experienced from memory. Then it may be activated by a symbol, for instance when summoned by its name 'sweet' or 'red' or 'cold'.

### **Are qualia arbitrary?**

Various authors stress that qualia are private (not objectively knowable and ineffable), contingent (could be otherwise) or without obvious function (not task-oriented). However, how certain can we be about their contingency, for instance, if qualia are subjective and ineffable? By way of example I like to shed doubt on the strict privacy of qualia, using a biological argument.

*Private but guessable:* Suppose the basic organisation of qualia, like that of many other mental phenomena, were inherited, therefore similar or equal in related individuals. Then your qualia experience is not entirely incomprehensible to others but similar or equal to that of members of your species. To them the common qualia are known by own experience and are at least guessable in others. Even though they are not communicated, "I know how you feel." Then intrinsic qualia cannot be arbitrary, as future research may show.

*Could qualia be otherwise?* A quale is the channel-ID, qualia have to be distinguished, that is the

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14 e.g. Lindemann, B., l.c. 2014, Figure on p.92.

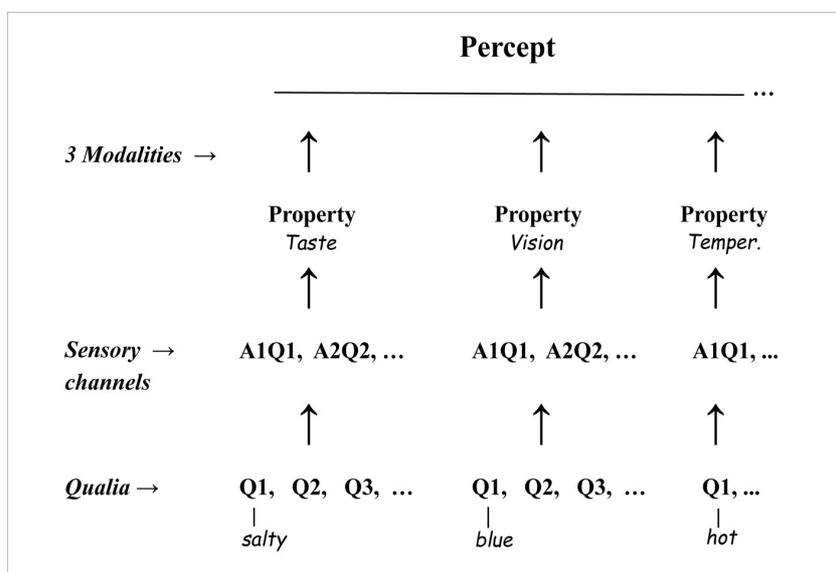
15 It must be a neuronal mechanism, which effects this 'casting'. The process remains to be investigated.

important feature. Yet a particular quale may need to be just so because its neuronal genesis and processing requires the corresponding pattern of sensory input. The subsequent triggering of specific feelings<sup>16</sup> by qualia is a possibility. This apart, qualia might be otherwise as long as they are discernible. Like with names of numbers: they are distinct but otherwise irrelevant for the task of counting. Or take pseudo-colours in maps. They must be distinct, otherwise their choice may be arbitrary.

### AQ product, property, percept:

Let Q be a quale, an intrinsic mental quality which is experienced and identifies a sensory channel, like 'blue' or 'soft'. It will seldom be experienced in full strength. Rather, there will be attenuation, say, by a scale factor A which accounts for the often sub-maximal spike rate of the channel.<sup>17</sup>

*Quantification:* For anyone of n sensory channels of one modality the product AQ is formed. The resulting array of AQ products forms a monomodal **property**, which indicates the present activity of n qualities of one sensory modality (Figure 1). Vector addition may be employed to represent the property as a single unique vector in n-dimensional space.



**Figure 1:** From quale to mental percept. Hierarchy of sensory stations. The properties (modalities) shown are taste, colour-vision and heat / cold sensation. A little introspection will show, how different the qualia of these modalities are experienced.

*Flavours distinguished:* By example, consider the taste-property. Suppose it contains 5 taste channels for the qualities sweet, sour, salty, bitter and umami.<sup>18</sup> A stimulus on the tongue may be carried by an artificial sweetener which evokes a strong sweet sensation and in addition a mild bitter sensation. Then the AQ array may be 1, 0, 0, 0.1, 0, quantifying the taste experience due to 5 channels. Suppose further that each A may have one of 20 intensities. Then already 5 x 20 variations of taste flavour will be distinguishable by the taste-property.

*Phenomenal object:* Along with the taste-property there are properties based on other senses (or modalities), like on smell, vision, hearing, touch, heat, pain etc. They are entangled in multiple

16 Damasio, A.R., *Self comes to Mind. Constructing the conscious Brain*. 2010, London: Vintage Books. 368 pages.

17 Quantity is extrinsic (relational), quality intrinsic (not changed by relation). Both are processed as AQ products.

18 Lindemann, B., *Receptors and transduction in taste*. Nature, 2001. **413**(6852): p. 219-25.

ways. Here it suffices to repeat that together the properties constitute a multimodal **percept**, a phenomenal mental object. A percept is a (partially) reconstructed mental object serving as representation of a distal object of world or body by means of its properties, as experienced by the Self-agent.

### **The *bottom-up* step:**

Neuronal processing starts with AB products of many nerve fibres. Unnoticed from the mental perspective, subconsciously, it continues to the stage of AQ products of multiple sensory channels, where the Qs serve as channel-IDs. The  $M \leftarrow N$  or *bottom-up* step raises the A and Q information into consciousness. The Qs are experienced as qualia. On the neuronal level processing continues. Only a few highlights of this, i.e. properties, percepts and particularly the updating of the mental 'scene' become conscious. Here the sequence of 'scenes' creates the illusion of a mental causal chain, while actually the chain is realized by causal interactions in the transparent world of N. Since all information is present in N, any  $M \rightarrow N$  step (*top-down*) would be superfluous, the causal chains in N suffice.

Mental objects, not independent, cannot interact with neuronal objects. Thus the latter cannot be noticed from the mental perspective. Therefore all *bottom-up* information, from qualia to percepts and scenes, is mentally presented in a special format. This seems related to the ancient figurative format of body-language. It presents images which evoke feelings easily and are experienced by the 'Self'. Thus qualia are assigned in the first stage of apparent mental processing, while the real processing, of course, happens at level N, below.

### **No mental causation:**

For Jaegwon Kim the mental is material because this alone guarantees mental causation.<sup>19</sup> In my understanding mental causation is indirect if not illusionary: I take the mental to be immaterial in the way language or experiences or abstracts are immaterial. Then the mental cannot be expected to cause (which would require interaction of separate, independent objects<sup>20</sup>). It cannot be 'saved' from being causally powerless. Rather, the mental Self-agent *experiences* the causal workings of the realizer of mental items in its own figurative idiom. Provided these are made accessible to the 'Self' (raised into consciousness) by the *bottom-up* steps discussed above. Causation is neuronal, its related experience is mental.

### **Role and function:**

An item plays a causal *role* if its absence makes a difference to other items.

A *function* is the predictable alteration of the environment effected by a constituted object. In particular it is the reliable action of a biological object on its environment, in its organism. This typically requires a neuronal mechanism reliably functioning to specifications. If reduction of the function holds, the neuronal mechanism is realizer of an experienced mental function, e.g. the function of a percept.

Given properties and their constituents down to qualia as proper parts composing a percept (or whole), each of these parts is essential for the function of the whole (FoW). Therefore, while individual qualia cannot fulfil the FoW,<sup>21</sup> they have an implicit causal role enabling this function. They are subject to reduction guided by role (see below).

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19 Kim, J., 2005, l.c. Chapter 3.

20 Lindemann, B., 2015, l.c. p.12.

21 A single part cannot have the function of its whole if other parts are also essential for the function of the whole.

### **Role of a quale and function of a percept:**

*Role of quale Q:* The basic role of Q, I suggest, is to label a sensory channel, to be a distinct though possibly contingent channel-ID.

*Monomodal Property:* An array of AQ products of n sensory qualities (like sweet and bitter etc.) of the same sensory modality (like taste or touch or vision etc.).

*Role of a property:* A property provides processed sensory information concerning one sensory modality. Several properties constitute their multimodal percept. Each is essential for this co-constitution, thereby contributing to the function of the whole-percept without fulfilling this function by itself.

*Percept:* A mono- or typically multimodal construct integrating the activity of neuronal fibres and their sensory channels of one, several or all senses. Percepts supervene over neuro-sensory input arising from one world-object. They are constituted of properties and their property-bearer. Properties of a percept include the monomodal AQ arrays of one or several senses and associated parameters like location, duration, degree of arousal, pleasantness.

*Function of a percept:* The function of a percept is to represent a world-object and to be memorised, recognized and evaluated by the Self-agent. In fulfilling this function the percept appears to alter its surrounding 'scene'.<sup>22</sup>

### **Reduction guided by function:**

Reduction is the highway of scientific explanation. A macro-phenomenon is explained by micro-processes and their laws at a lower system level. Consider the reduction of experienced mental phenomena to neuronal mechanisms: We seek a neuronal causal chain of events which is realizer of the mental phenomenon. In case of functional reduction,<sup>23</sup> the search for the realiser is guided by the function fulfilled by the mental phenomenon, which should also be fulfilled by the realising neuronal events. The mental role will be experienced as *causal* because the realizing neuronal events are causal. Supervenience of the mental will assure bottom-up manipulability. Thus interruption of the neuronal process abolishes the mental experience.

### **Plausibility of reduction:**

We speak of *single-level* reduction, relating a level to a level below, and *multi-level* reduction. The latter summarises a chain of single-level reductions, it reduces, say, psychological predicates like 'remembering' stepwise to elementary physical events. As intermediate explanations are skipped, the result, though formally correct, may be difficult to comprehend. Therefore, subjectively convincing explanations are not expected from multi-level reductions. The scientific assessment, of course, relies on the formal proof, the explanatory satisfaction being secondary.<sup>24</sup> Still, the plausibility-gap poses an acceptance problem for reductive physicalism.

### **Reduction guided by role:**

Given a mental phenomenon serving a distinct role, one seeks its neuronal realizer, a subvenient neuronal set of causal events serving the same role. The role, common to both perspectives, helps to

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22 For mechanisms causing changes in their environment, see Lindemann, B. 2015. l.c., p.13, footnote 16.

23 Kim, J., 2005, l.c.

24 Lindemann, B., 2014, l.c. Chapter 4.

identify the realizer. Mental supervenience will assure that bottom-up manipulability holds: i.e. interruption of the neuronal process abolishes the mental experience. Reduction by role includes functional reduction, as function is a role played by the functioning item.

### **Reduction of qualia:**

The neuronal realizer for a percept will be composed of sub-realizers for the mental roles of properties, AQ products and qualia. These sub-realizers correspond to their mental items and their roles on level M. Here they form an apparent causal network of proper parts. Its whole fulfils the FoW. If the FoW is reducible, the parts and their roles are included.

When accepting the hypothesis of M-over-N supervenience, we can be more general. Supervenient items have a subvenient realizer which is their reduction base. Therefore, if qualia are mental and the mental supervenes over the neuronal, then qualia are in principle reducible to neuronal base. Of course, the particular realizer still has to be identified within the neuronal world, guided by a quale's role.

Jaegwon Kim concluded in his well-known '*Physicalism, or something near enough*' that qualia do not have task and function, therefore are not functionally reducible, are an exception.<sup>25</sup> It is true, qualia do not fulfil the FoW. Yet, I argue, they play an essential role as markers of channel-ID. Thus they are reducible, may be subjected to a reduction which is guided by their ID-role. Qualia are no exception, they are reducible.

But what about the intrinsic qualia themselves, the sensation of 'red', 'sweet', or 'soft'? Are those qualities arbitrary or are they there for a reason, do they play a role of their own? As mentioned, this question should be answered by empirical research. It may well be that qualia need to be just so because they trigger specific feelings, emotional responses.<sup>26</sup> Their causal role, however, whatever it may be, will be reducible by role. The minimal role, as discussed above, is to be distinguishable as a unique channel-ID.

### **Perspectives and qualia:**

The perspective divide, as mentioned above, connects by means of its  $N \rightarrow M$  interface the conscious mental world M with its realizer, the unconscious neuronal world N.

I suggest that qualia have an essential role in this interface, they encode  $N \rightarrow M$  messages. They classify some complex N-events arising from sensory input and label them with a basic tincture or flavour which can be experienced and emotionally evaluated. Conscious experience, of course, is the hallmark of the mental. Any mental sensory experience requires its specific quale.

The role of a quale, then, is to provide a shorthand label for a certain class of complex sensory N-events, a label or ID which is unique. (It might be arbitrary, like the name of a number is unique but arbitrary or contingent for counting.) Notably, the label is a sensation, it is to be *consciously experienced*, as is characteristic for the mental perspective.

### **Why conscious?**

Why are qualia and AQ arrays and their percepts *consciously* experienced? Because evaluation of scenes and the mental processing which follows evaluation requires consciousness. Conscious processing deals with 'novel' scenes, saves events in autobiographic memory, provides experience

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25 Kim, J., 2005, l.c.

26 Damasio, A.R., 2010, l.c.

and execution of Self-agency, insight into processes (understanding), simulation, prediction, accumulation of knowledge, use of language, sharing of cultural concepts and techniques etc.

### **Conclusion:**

The study of qualia or 'raw feels' promises insight into the making and function of mental representations, the percepts. Discussing aspects of the mental-neuronal relation, it is concluded that any causal interaction must be material (i.e. neuronal), its related experience mental-immaterial.

We found a role for qualia (Q). They are experienced identifiers (IDs) of single sensory channels, intrinsic qualities which co-constitute 1. AQ products, thereby 2. a monomodal sensory property and thereby 3. its multimodal percept. Like parts generally, qualia are unable to fulfil the function of their whole, the percept, but remain essential for this function.

The neuronal realizer for the function of the percept or whole on level M is composed of sub-realizers for the causal roles of proper parts. The sub-realizers, including those of qualia, may be found by reduction guided by role.

Hence the hypothesis of a general reductive physicalism is not punctured by an exception specifically for qualia. Physicalism founded on reductions guided by role or function remains an attractive option.

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