

# Qualia are no exception

Bernd Lindemann<sup>1</sup>

## *Summary:*

The continuous sensory input, distributed over many monomodal channels, is subjected to neuronal processing which generates properties and with them models of objects owning the properties. The models become conscious as mental representations, the percepts. I propose that each sensory channel is associated with an intrinsic and unique quality, a quale. Variable channel activity *A* and associated contextual quale *Q* become an *AQ* property of a percept, the quale serving as channel-identifier and *A* as its attenuator. *AQ* or qualia may be expressed in the figurative idiom of the conscious mind and mentally experienced as qualities of the varying channel activity. By extension over channels of several modalities, a percept attains multimodal properties as a construct mentally representing an object of world or body or memory or fantasy.

I propose that a quale has a constitutional role as an essential part of a percept. It marks the identity of just one of the sensory channels contributing to the percept. Notably, as percepts have a function, they are reducible to neuronal base and their parts (including the qualia) with them. In view of a plausible hypothesis about the role of qualia, these need not be an exception in an otherwise reducible mental world.

**Key words:** Neuroscience, Functional reduction, Role of qualia.

---

<sup>1</sup> FR Physiologie, Medizinische Fakultät, Universität des Saarlandes, 66424 Homburg Saar. Tel: 06841 62349. mail@Bernd-Lindemann.de

## The riddle of qualia

Qualia as qualitative aspects of a mental experience were introduced by C.I. Lewis in 1929.<sup>2</sup> In the philosophy of mind they are today seen as the controversial “tipping point between physicality and the meta-physical”.<sup>3</sup> The study of qualia promises insight into the making and function of mental objects.

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>4</sup> 'Indescribable' is probably the most curious of these features. For how another human being feels when sensing qualia like red or cold, let alone when having a headache or tasting a wine or how a bat feels when just being a bat, cannot be described, remains a mystery to others.<sup>5</sup>

Qualia, also known as 'raw feels', were claimed to be *without role, task or function*. Notably, according to Jaegwon Kim qualia are not functionisable. In consequence, they cannot be subjected to Kim's strategy of “reduction guided by function”. Assuming that they cannot be reduced at all, qualia are an *exception* in an otherwise functionally reducible mental domain.<sup>6</sup>

### ...but is it plausible?

Thus, leading opinion holds that qualia are phenomena which have no task, role or function. Is this plausible? Would not evolution have erased such qualia long ago without loss of function?

Introspection shows that qualia raised by taste, smell, vision or one of the other senses differ strikingly. They seem to be stable, well preserved phenomena, quite suitable to serve a purpose. Below I suggest that, deprived of qualia we would be unable to mentally distinguish sensory data. Given a role as identifiers of sensory channels, then, are qualia reducible to neuronal base?

To untangle the qualia problem, we shall carefully distinguish between the constitutive *role* of a quale as part of a percept and the *function* of the percept as a whole. 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.

### Sensory channels in the neuronal perspective:

This view, also known as 3<sup>rd</sup>-person's 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

---

2 [7]

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

4 These properties are contradictory: [3]

5 Lewis, C.I., 1929, l.c. // [12: p. 435-450] // [5]

6 [6: p.101] A 'role' different from a 'function' is not considered by Kim.

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 pattern of data, the activity spectrum.

Hence the sensory input is represented by a changing pattern of activity of many neurons.<sup>7</sup> 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>8</sup> A and B can be observed under favourable circumstances. They relate to each other, as is known from the structure of data. The quantity-property A answers the question '*How much?*' or '*How high is excitation intensity of fibres of quality B right now?*' The 'quality'-property B of a fibre carries contextual information about the '*what and where*' of the activity. B identifies the monodal sensory input and is implicitly given by connectivity and type of the fibre.<sup>9</sup>

A *channel* collects the activity of one or several fibres serving the same quality and modality, limited by the spatial resolution of the modality. Thus any A in the above notation accumulates 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 may collect the activity arising from several blue-on receptive fields of the retina. A toothache channel may collect, say, activity of several pain-fibres 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>10</sup> is a relation of properties, it means 'by virtue of'. Let M and N stand for specific properties of mind and neuronal brain. M supervenes over N if M cannot change unless N changes.

I take M-over-N supervenience as an asymmetric relation which allows M ← N effects (*bottom-up*), but not M → N effects (*top-down*). For phenomenal objects in M are not separate and independent but are dependent on activities in N. Therefore objects in M cannot encounter each other, as would be required for *top-down* causal interaction. For only real, separate objects will interact.

---

7 [e.g. 11]

8 In 'Constructivism', B was on occasion overlooked entirely.

9 [e.g. 9: Chapter 5]

10 [2]

*Perspective dualism*<sup>11</sup> is based on the observations that (1) mental phenomena generally depend on neuronal phenomena<sup>12</sup> and that (2) neuronal phenomena remain unnoticed when viewed introspectively from the mental perspective. Both observations are expected from supervenience of M over its realizer N.

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, then 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>13</sup>

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

Crossing the perspective divide, we now enter the 1<sup>st</sup>-person's or mental world with its familiar but illusionary 'user interface' connecting to the neuronal 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>14</sup> into an intuitively accessible mental phenomenon, the **quale**.

A quale is a unique intrinsic sensory quality consciously experienced.

11 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. 13: p.28] [as quoted in 9: p.3]

12 [e.g. 9: p.3]

13 [e.g. 9: Figure on p.92]

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

Each quale relates (I suggest) monomodal input (quantity A) from a sensory channel to contextual information (Q) experienced as channel-ID. Formally, A serves as a 'scale-factor' of Q, with AQ indicating a scaled **property**. (To be discussed in detail in the context of Figure 1.)

### **Introspection:**

As a mental phenomenon, qualia may be investigated by introspection. It turns out that qualia evoked by different sensory modalities differ strikingly across modalities. For instance, the taste-quale generated by licking salt is by introspection quite different from the vision-quale evoked by the colour orange. Generally, qualia seem to be stable, well preserved phenomena, quite suited to play a role. My hypothesis is that qualia Q provide fixed contextual (or quality) information about the variable quantity information A of the sensory data.

Then the elimination of all qualia in a thought experiment will have severe physiological consequences. Deprived of qualia we would be unable to mentally distinguish sensory data and build recognizable percepts. Thus, as proposed, qualia may well have a key role as mental identifiers of sensory channels.

### **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 features of qualia, like those 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 being the channel-ID, qualia have to be distinguished, that is the 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>15</sup> by qualia is a possibility. This apart, qualia might be otherwise as long as they are discernible. Like with names of numbers<sup>16</sup>: 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.

---

15 [1]

16 One, uno eins, un.

### **AQ property and 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 sub-maximal spike rate of the channel.<sup>17</sup>

*Quantification:* For anyone of n sensory channels of one modality the construct AQ is formed. The resulting n-fold array of AQ constructs 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 overall-property as a single unique vector in n-dimensional space.

*Flavours distinguished:* For example, consider the modality “taste”. It is constituted of 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 have the scaled values

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.

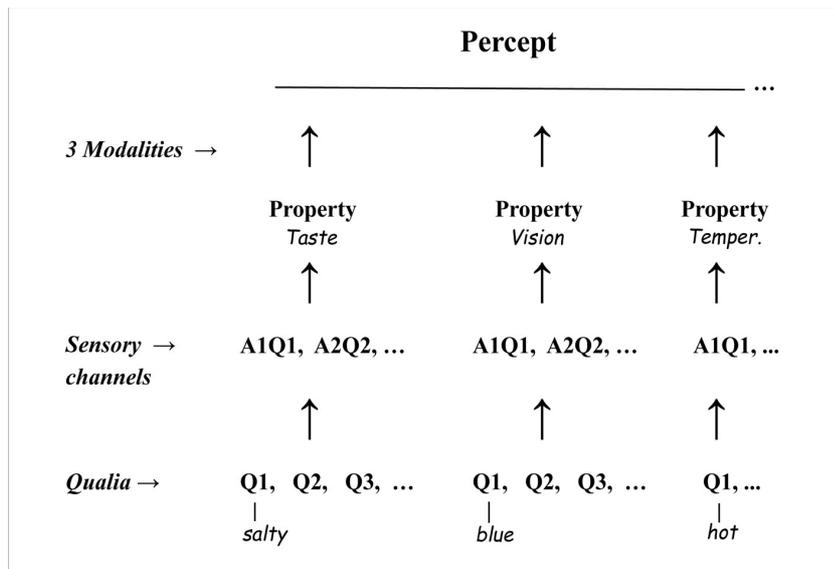
*Phenomenal object:* Along with the taste-property there are properties based on other senses (or modalities), like on smell, vision, hearing, touch, heat, pain etc. They are entangled in multiple ways. Here it suffices to repeat that together the properties constitute a multimodal **percept**, a phenomenal mental object. A percept is a (partially) reconstructed mental object serving as representation of a distal object of the world (or of an object of body or memory or an imaginary object) by means of its properties, as experienced by the Self-agent.

---

<sup>17</sup> Quantity A is extrinsic (relational), quality Q intrinsic (not changed by relation).

Both are processed as arrays of AQ constructs forming properties of percepts.

<sup>18</sup> [8]



**Figure 1:** From quale to mental percept. Hierarchy of sensory stations. The modalities shown are taste, colour-vision and heat / cold sensation. Processing associates variable (A) with not variable, contextual (Q) properties. The arrays of AQ constructs (A<sub>1</sub>Q<sub>1</sub>, A<sub>2</sub>Q<sub>2</sub>...) constitute properties of percepts. A little introspection will show how strikingly different the qualia of these modalities are experienced.

**The bottom-up step:**

Neuronal processing is, of course, a complex series of biophysical events which remain unconscious. Sensory processing involves the AB properties of many afferent nerve fibres. Unnoticed from the mental perspective, subconsciously the information is collected in multiple sensory channels, where the channel-IDs are implicitly given by, say, origin and destination of the fibres. The  $M \leftarrow N$  or *bottom-up* step cannot raise such neuronal detail into consciousness. Instead the channel-IDs are mentally represented in an entirely different idiom and 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 multiple 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 causally with each other. Without causal interaction on M, then, the neuronal cannot be

noticed *top-down* from the mental perspective. Further, the  $M \leftarrow N$  or *bottom-up* information generates mental qualia, properties, percepts, other mental objects and scenes, which are presented in a special format. This seems related to an ancient figurative idiom. Sometimes called “language of thought”,<sup>19</sup> it presents experiences and images which evoke feelings easily and are understood by the 'Self'. The idiom describes events of “mental processing” and interaction of mental objects at level M. This, however, is an illusion. Mental objects, not independent, cannot interact. 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>20</sup> In my understanding mental causation is indirect if not illusory: I take the mental to be immaterial in the way language or experiences or abstracts are immaterial. Anything mental cannot be expected to cause (which would require interaction of separate, independent objects on M<sup>21</sup>), nor can it be 'saved' from being causally powerless. Rather, with the *bottom-up* steps discussed above, the mental Self-agent *experiences* the causal workings of the realizer of mental items in its own figurative idiom. Causation is neuronal, its related experience is mental.

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

Reduction is the highway of scientific explanation. A macro-property is explained by micro-processes and their laws at a lower system level. Consider the reduction of experienced mental properties to neuronal mechanisms: We seek a neuronal causal chain of events which is realizer of the mental property. In case of functional reduction,<sup>22</sup> the search for the realiser is guided by the function fulfilled by the mental property, 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.

---

19 Language of thought or LOT, see [4]

20 [6: Chapter 3]

21 [10: p.12]

22 [6: p.101]

**Role and function:**

A property  $P_N$  on level  $N$  plays a *causal role* if its alteration makes a difference to other properties on this level.

A *function* is the predictable alteration of the near environment effected by a constituted object on  $M$  or  $N$ . 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, they have an implicit role supporting this function.

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

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

*Monomodal property:* An array of AQ constructs 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 cross-modal properties constitute their multimodal percept. Each is essential for this co-constitution, thereby contributing to the function of the percept as a whole without fulfilling this function by itself.

*Percept:* A mono- or typically multimodal construct integrating the activity of neuronal fibres into sensory channels of one, several or all senses. Percepts supervene over neuro-sensory input arising from a 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, many non-sensory properties 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'.

### **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>23</sup> Still, the plausibility-gap poses an acceptance problem for reductive physicalism.

### **Reduction of percepts and qualia:**

A percept is a whole on level M composed of parts, including AQ properties with their qualia. Further, a percept has a function: to represent objects and be recognisable as a representation. Then a percept can be functionally reduced to neuronal base, where the same function is presumably found.<sup>24</sup> The whole of these parts (the percept) fulfils the FoW. If the FoW is reducible, the parts and their roles are included.

Jaegwon Kim concluded in his well-known '*Physicalism, or something near enough*' that qualia do not have task or function. They are an epiphenomenal experience without functional consequences. Therefore qualia are not functionally reducible, are an exception.<sup>25</sup>

It is true, qualia, being parts, do not fulfil the FoW. Yet, I argue, they play an essential role as parts of percepts. Then, as percepts are functionalisable, qualia are part of this.

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 or emotional responses.<sup>26</sup> Their minimal role is to be distinguishable as a unique channel-ID.

### **'User interface' and qualia:**

The perspective divide or  $M \leftarrow N$  interface connects the conscious mental world M with its realizer, the unconscious neuronal world N. I suggest that qualia have an essential role in this interface. Following classification of some complex N-events arising from sensory input, these are marked with a basic tincture or flavour which can be experienced and emotionally evaluated.

The role of a quale, then, is to provide such a shorthand label for a

---

23 [9: Chapter 4]

24 [6: p.101]

25 [6: p.101]

26 [1]

distinct class of complex sensory N-events, a label or ID which is unique.<sup>27</sup> 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 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' provided insight into the making and function of mental representations, the percepts. As a hypothesis a constitutive role for qualia was formulated. Associated with the variable activity A collected in a sensory channel, a quale is mentally experienced as the intrinsic quality Q acting as identifier of this channel. Qualia co-constitute 1. certain AQ constructs, thereby 2. monomodal sensory properties (arrays of AQ constructs) and 3. a multimodal percept owning many such properties. Percepts represent objects and qualia, being constitutive parts of percepts, remain essential for this function.

Notably, as percepts have a function, they are reducible to neuronal base and their parts (including the qualia) with them. Hence the promise of a general reductive physicalism need not be punctured by exceptions for qualia. Rather, physicalism founded generally on reductions guided by role or function remains an attractive option.

### **References**

1. Damasio, A.R., *Self comes to Mind. Constructing the conscious Brain.* 2010, London: Vintage Books. 368 pages.
2. Davidson, D., *Mental Events*, in *Essays on Actions and Events.* 1970, Clarendon Press: Oxford.
3. Dennett, D.C., *Consciousness explained.* 1991, Boston, MA: Little Brown.
4. Fodor, J.A., *The Language of Thought.* 1975, Cambridge, MA: Harvard

---

<sup>27</sup> It might be arbitrary, like the name of a number is unique but arbitrary or contingent for counting.

- University Press. 214.
5. Heckmann, H.-D. and S. Walter, eds. *Qualia*. 2001, mentis. 524 pages.
  6. Kim, J., *Physicalism, or something near enough*. 2005, Princeton: Princeton University Press. 186 pages.
  7. 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.
  8. Lindemann, B., *Receptors and transduction in taste*. Nature, 2001. **413**(6852): p. 219-25.
  9. Lindemann, B., *Mechanisms in World and Mind. Perspective dualism, systems theory, neuroscience and reductive physicalism*. 2014, Exeter, UK: imprint academic. 152 pages.
  10. Lindemann, B., *A whole affects its parts? Bottom-up and top-down changes reconsidered* 2015, Homburg, Germany: invococo-verlag. 64 pages.
  11. Lindemann, B., *Olfaction, Philosophy, and the Missing Object*. Chemical Senses, 2018. **43**(2): p. 79.
  12. Nagel, T., *What is it like to be a bat?* The Philosophical Review, 1974. **83**(4): p. 435-450.
  13. Nagel, T., *The view from nowhere*. 1986, New York: Oxford University Press. 244 pages.