Deconstructing the Physical World: The Substructure of Language[1]

Context: *Deconstructing the Physical World* (the *main text*) provides a conceptual framework (CF1) that deconstructs what is commonly called 'the physical world' into three 'levels': a single, unified 'noumenal world', W[r], upon which everything supervenes; a 'phenomenal world', a W[i], that each person privately and directly experiences through their perception of phenomena; and a 'collective world', a W[z], that people within any given 'language using group' experience through learning, using and adapting that group's language. CF1 holds that each of these 'worlds' contains its own distinct type of contents – which respectively can be called quiddities,[2] qualia and common features – and outlines how these types of contents can be understood to relate to each other.

In this respect, CF1 describes a paradigm that can be opened out into three interdependent research programs respectively aimed at more deeply exploring: (i) how the contents of a person's W[i] relate to the contents of W[r]; (ii) how the contents of a person's W[i] relate to the contents of a W[z]; and (iii) how the contents of a W[z] relate to the contents of W[r].

Research program (i) has de facto been underway for many years given that – as shown in §7 of the main text – both the phenomenal self-model and predictive processing approaches to neuropsychology and philosophy of mind can only succeed by differentiating between W[r] and its contents and a person's W[i] and its contents, and then by working to show how those two types of contents relate to each other. For example, in predictive processing approaches, the contents of W[r] are held to relate to the contents of a person's W[i] through the operation of one or more generative models housed within, and operating across and between, the cortical layers of that person's brain.[3]

Beyond what has been provided in the main text, research programs (ii) and (iii) are unexplored. The main aim of this appendix is to look further into research program (ii). In keeping with this aim the introduction below leads directly on from §5*(ii)* of the main text, which provides an initial proposal as to how contents of a person's W[i] relate to contents of the W[z] of their language using group.

Because this appendix deals largely with qualia (the contents of a person's W[i]), and how these relate to common features (the contents of a W[z]) – where the idea of common features has been introduced for the first time in the main text – the level of novelty and abstraction is high, and the approach is exploratory.

But for readers willing to persevere, the payoff is provision of a set of powerful new conceptual tools – including provision of means by which qualia can be systematically categorised[4] – that can be used to extend CF1 in ways that deliver a logically coherent, highly novel set of insights into:

- core aspects of how language learning and use might work;
- precisely what is going on in inverted qualia thought experiments and in relation to the knowledge argument; and
- how properly incorporating qualia into a theory of language learning and use can be applied to more clearly describe how we apply what we call 'concepts' and 'imagination' in our understanding and communications about the physical world.

In support of this, an End Note (5) has been developed that validates many of the foundational concepts proposed from §B2 to §B5 in this appendix by showing how readily and effectively they can be used to model, explain and predict the Stroop effect and related effects, which are a range of empirically reproducible effects studied extensively in cognitive psychology (5).

[1] NB: This is Appendix B to the article *Deconstructing the Physical World* (1), herein referred to as the *main text*.
Before reading this appendix readers should read or review this article. The latest verison is at: https://philpapers.org/rec/HAMDTP and https://www.researchgate.net/publication/369624068_Deconstructing_the_Physical_World.
[2] Reasons for calling the contents of W[r] quiddities are provided in Hammer, B.C. (2023) *Deconstructing the Physical World: Relationship to Russellian Monism* (2). The latest version of this article can be found at: https://philpapers.org/rec/HAMDTP-2 or https://www.researchgate.net/publication/375718967_Deconstructing_the_Physical_World_Relationship_to_Russellian_Monism.
[3] See for example refs (3,4).
[4] For a sense of this see §B14 at pp 38 below.

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B1 Introduction

The initial aim of this appendix is to better describe and explore what has been meant by phrases such as 'language learning operations', as applied in the conceptual framework (CF1) proposed in the main text.[5] It is assumed in what follows that readers are familiar with the main text and CF1.

The example of infant Jane learning red was used in the main text, as follows:

> "Pre-language, infant Jane will directly experience a given pure quale. She will then learn from others – through the language learning process[6] – to find and recognise this quale as being a concrete common feature that is named, identified and described by use of the word 'red' among members of her language using group. Having learned this, she will then be able to use the word 'red' to tell others, and to learn from others, about something that she originally – and at that earlier stage could *only* – experience as a pure quale.
>
> "A crucial concept may now be introduced. It is that *in learning* to recognise that a given specific quale, as she directly perceives it, is *also* a common feature named 'red', Jane will reflexively *cojoin* that specific quale to that specific concrete common feature. In this process Jane will recast what has previously been for her a pure quale, into what from thereon will be for her an *attendant quale*."

In further describing the concept of *cojointness* the following points were then made:

> "To correctly grasp the concept of cojointness it is important to recognise that the common features that make up contents of W[z] are not equivalent to their names or descriptions, but that agreement on a name or description among a group of language users is an agreement that a given name or description *points to* a given common feature to be held in each of those language users' W[z]. In this respect, for example, either one of the spoken or written names 'vomit' points to the one common feature, as does the description – spoken or written – "stuff that people throw up".
>
> "At the same time, for any given language user in that group, they will *also* – in having learned to name or describe a given concrete common feature – have set some specific quale or qualia that they have already experienced as a direct perception to *point to* the name or description that has been adopted for that concrete common feature by members of their language using group.
>
> "So when a person such as Jane identifies a pure quale and – in learning a language[6] – sets it to *point to* a specific name or description used by people in that language using group, that act of learning recasts the quale as an attendant quale and cojoins it to the specific concrete common feature which that name or description points to for language users in that group.
>
> "In this respect, the names and descriptions used in a language can be understood to form a kind of 'hinge'.[7] For example, for *all* English language users the word 'red' will point to what will – for all of their practical purposes of communication – be the same, specific set of common features[8] in what they all hold to be W[z]. But for any English language user taken as an individual, the word 'red' will *also*, by the agency of that user's *individual* language learning process, have been set to point to – *and* to be pointed to by – members of some specific set of qualia which that user – and that user *alone* – can perceive directly within their own individual and private W[i], and that will therefore remain *unique* to that user."
>
> "In other words, to be as clear as possible, when you experience a direct perception of vomit, you will not only experience this as a direct perception of your own, unique, attendant quale[9(a)] for vomit, you will *also reflexively and inexorably* experience it as the concrete common feature English language users call 'vomit', without need of any *explicit* presence of that name or description. This is because for a mature language user *all* of the relevant pointing referred to above will have become so reflexive that it will go 'straight through' the hinge[10] – i.e. the relevant words or descriptions – to give a *unified experience* of the attendant quale *cojoint* with its concrete common feature."

The following section describes language learning operations for the example of Jane learning to use the word red. The description given below is more detailed and complete than would have allowed for an efficient flow of ideas in the main text. The objective here then, and in subsequent sections, is to clarify, underpin and extend what has been claimed in the main text concerning relationships among qualia, words, descriptions, and common features.[11]

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[5] The part of the main text that deals most with language learning operations is §5*(ii)*. CF1 refers to the overall thesis proposed in the main text.
[6] Take phrases such as 'language learning processes' to be equivalent to 'language learning operations', and phrases such as 'in learning a language' to be equivalent to 'in implementing language learning operations'.
[7] The proposal introduced in the main text that names and descriptions form a 'kind of hinge' should be considered a conceptual shorthand. This shorthand is unpacked in §B3 below.
[8] The set of concrete common features whose members are shades of red.
[9] NB: (a) There may be a question for some readers as to whether one or another of the things a person experiences as contents of their W[i] should be considered a *quale* – singular – as distinct from other things they experience as contents of their W[i] that might be considered composites of *qualia* – plural. The purpose of this footnote is to emphasise that trying to draw such distinctions is not only difficult, but that any such distinction – however made – turns out to have little consequence for the purposes of this appendix and of the main text. For example, it is of no consequence to the points made here or in the main text whether, when a person experiences the phenomenon they name 'vomit' among the contents of their W[i], they are considered to be experiencing a quale – singular – or some composite of qualia – plural. (b) For later reference, this consideration also applies to what are defined below as *i*-qualia including, for example, the *i*-quale that it is proposed will, for any given nuclear physicist, attend the imaginary common feature, neutron (see §B4, but also with application in §B9 and subsequently).
[10] In this sense the 'hinge' will in such cases be transparent to mature language users (and see §B3 below).
[11] Appendix C (in preparation) will better describe and explore what has been meant in the main text by phrases such as, 'agreed measuring procedures' and 'rule sets', as part of advancing a research program into how the contents of a W[z] relate to the contents of W[r].

B2 Jane learns red

The language learning operations by which it is proposed here that Jane learns to use the word red are set out below in three idealised stages. Call these the *naïve stage*, the *nascent stage* and the *cojoined stage*.

(1) Naïve Stage

When the infant Jane first sees the colour red she will experience it as a pure quale, and when she first hears the words that others speak, she will also experience those word sounds as pure qualia.

So at this stage assume Jane can experience, and will have experienced:

red[colour as seen, pure quale] + red[word sound as heard, pure quale] L1

where Jane's experience of red[colour as seen, pure quale] and red[word sound as heard, pure quale] are each experiences solely of contents of her W[i], and she does not connect them to each other in any significant way.

(2) Nascent Stage

In this stage Jane begins to learn to hear, speak and understand language and – as part of this – has available to her the experiences/memories of relevant qualia from the naïve stage (L1), but also now has an emerging if implicit sense of a kind of 'abstraction':

red[colour as seen, pure quale] + red[word sound as heard, pure quale] + red[concrete common feature] L2

where this 'abstraction' can be described as her implicit sense that there is a concrete common feature (CCF) that is named 'red' by her language using group.[12, 13]

Call this stage the nascent stage because it can be viewed as taking place in a period following Jane's beginning inductively to sense and identify the CCF named red, but *before* she has completed *cognitive assembly* of a 'cojoint complex', where such assembly is described immediately below.

(3) Cojoined Stage

Over the period of the nascent stage, however long or short that may be, it is proposed here that Jane, in learning to use the word red – as she increasingly learns to hear, speak and understand her language – will in effect be learning cognitively to assemble the components laid out in L2 such that, as she enters the *cojoined stage*, she will have begun reflexively to experience and use those components in a form that can be called a *cojoint complex*. Figure B1 shows a diagram of the cojoint complex for the spoken word red.

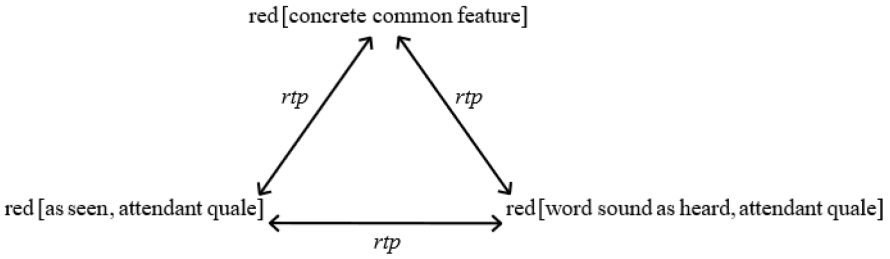

Figure B1

Figure B1 shows the *cojoint complex* it is proposed describes how Jane will experience the spoken word red once she has become proficient in its use in communications with other members of the English language using group. At the corners of the triangle of double headed arrows are respectively, from the bottom left anticlockwise, (i) the quale that is the colour red that Jane can directly visually experience among the contents of her W[i]; (ii) the quale that is the sound of the word red that Jane can directly aurally experience among the contents of her W[i]; and (iii) the concrete common feature red as it is collectively, if implicitly,[12] held to be among the contents of their W[z] by members of the English language using group. The double headed arrows represent that each of (i), (ii) and (iii) are *conjoined* to each of the others. The arrows are marked *rtp* to denote that cojointness means that a *reflexive two-way pointing (rtp)* will inexorably and involuntarily be cognitively implemented by Jane between any two things linked by such an arrow. What is proposed here then, is that once Jane has fully cognitively assembled this complex, enabling her to use the word red in a natural way as part of her language use, she will no longer be able to experience any one or more of (i), (ii) or (iii) without reflexively and inexorably experiencing it in a combined sense with the occupants of the other corners of the triangle.

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[12] For Jane, her emerging sense of a CCF named red – coming hand-in-hand with her emerging tacit adoption of the three world praxis – will amount to her tacit belief that when other people see what they call red they are experiencing something exactly the same as that which she experiences when she sees red, and that they name this experience red. But as shown in §2, and teased out in §5*(iii)*, of the main text, Jane's actual phenomenal experience of red will be private to her, as will the respective phenomenal experiences of red of each other individual member of her language using group. Logically then, that which they each name red can only be some 'aspect' (for want of a better term) – labelled here 'red[concrete common feature]' – that all of these individual experiences of red have in common, but which cannot be identical to any one of those individual experiences. In this respect, common features, can be considered to arise entirely implicitly in the course of the evolution of a language, can never be experienced by any individual as entities in their own right, but from an objective perspective must actually be what are being named when people name experiences such as red in their use of language.

[13] One way Jane's emerging sense of a CCF named red could be stimulated would be the frequency with which she hears red[word sound as heard, pure quale] at the same time she sees red[colour as seen, pure quale]. For example, Jane's mother may at times repeatedly point to a red ball while at the same time repeatedly saying, "red ball". At other times Jane's father may do the same thing with a red sock, or a red cardigan, and so forth. But regardless of the means by which Jane's emerging sense of a CCF named red might be stimulated, this will be by one or another of a range of familiar and natural means – such as a mother's repeated naming and pointing – by which we know children can learn language, and where it seems clear that they can draw upon an evolutionarily refined, human species-wide neurology[r] and other requisite physiology[r] that is in place within normal children such as Jane, that generates for them an intense predisposition to implement language learning operations to inductively identify CCFs such as that named 'red' and organically with this, to cognitively assemble and learn the relevant cojoint complexes.

B3 Replacing the idea of a 'hinge', the idea of natural and synthetic qualia

In light of the three stages of language learning operations proposed above, the shorthand notions introduced in the main text of words or descriptions 'forming a 'hinge'' – and of 'all of the relevant pointing going straight through the hinge' – can be replaced with the simpler and more complete idea that it is the irreversible and involuntary cognitive assembly and use of a cojoint complex that gives 'a unified experience of the attendant quale cojoint with its concrete common feature.'

In this light, the final paragraph from the main text excerpts quoted above can be recast as follows, such that there is no need to invoke the idea of a 'hinge':

> "… when you experience a direct perception of vomit, you will not only experience this as a direct perception of your own, unique, attendant quale for vomit, you will *also reflexively and inexorably* experience it as the concrete common feature English language users call 'vomit', without need of any *explicit* presence of that name or description. This is because for a mature language user *all* of the relevant pointing referred to above will – in the course of their cognitive assembly of the relevant cojoint complex – have become so reflexive that it will give the language user a *unified experience* of the attendant quale *cojoint* with its concrete common feature."

Apropos, Figure B2 shows the relevant cojoint complex for vomit.

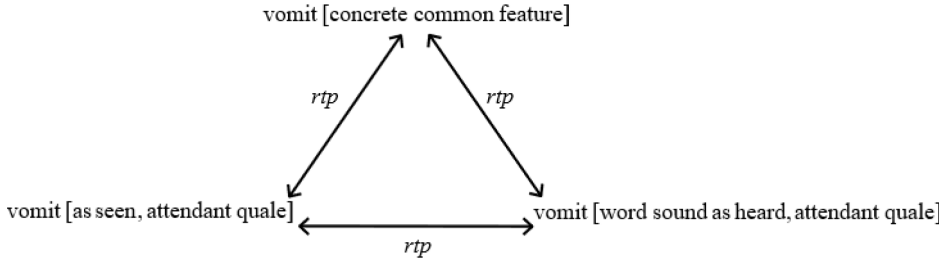

Figure B2

Figure B2 shows the cojoint complex it is proposed describes how Jane will experience vomit[as seen, attendant quale] once she is proficient in use of the word vomit in verbal communication with other members of the English language using group. For purposes of future discussion call the types of attendant qualia that sit at the bottom left-hand corner of such diagrams *natural* qualia, and those that sit at the bottom right-hand corner *synthetic* qualia. So, in the example of the cojoint complex shown here, vomit[as seen, attendant quale] is the way that a person experiences contents that they take to arise *naturally* within their phenomenal world, W[i], whereas vomit[word sound as heard, attendant quale] is the way a person experiences contents of their phenomenal world that they take to arise as *expressions of a language*. On this basis, call the bottom left-hand corner of a cojoint complex its *natural corner* and the bottom right-hand corner its *synthetic corner*.

B4 Experiencing cojoint complexes, the idea of concrete and imaginary qualia

In B2 and B3 above it is proposed that once Jane has fully cognitively assembled a cojoint complex she will no longer be able to experience any one or more of the occupants of corners of complex's triangles without reflexively and inexorably experiencing it in a combined sense with the occupants of the other corners of the triangle. In other words, for a mature language user all of the reflexive two-way pointing they have learned and begun to implement in the course of their cognitive assembly of a cojoint complex such as that described above will have become reflexive to the point of giving them a unified experience of its natural qualia cojoint with its synthetic qualia cojoint with its CCF cojoint with its natural qualia, *all as one*.

What is being proposed here is, for example, that if you directly perceive – i.e. actually experience – seeing vomit[as seen, attendant quale] then, with this, a *sense* of vomit[word sound as heard, attendant quale] will become cognitively present – i.e. will be evoked, if fleetingly – as an integral part of that experience, as will the CCF vomit[concrete common feature]. Reciprocally, if you directly perceive – i.e. actually experience – hearing vomit[word sound as heard, attendant quale], then with this a sense – an imagined 'seeing'/perceiving of vomit[as seen, attendant quale] will, even if fleetingly, become cognitively present – i.e. will be evoked – as and integral part of that experience, as will the CCF vomit[concrete common feature].[14]

As an empirical underpinning to this, again recall that at the naïve stage – before you learned English – if you had heard someone yell the word vomit, you would have experienced it only as a *meaningless sound* and *pure quale* – i.e. you would have directly perceived and experienced vomit[word sound as heard, pure quale]. But now, once you have entered the cojoined stage through having learned to use the word vomit in your communications with other members of the English language using group, you will never again be able to hear someone yell the word vomit without reflexively and inexorably experiencing a sense – an imagined perception – of vomit[as seen, attendant quale] and of vomit[concrete common feature] – i.e. without reflexively and inexorably experiencing it as a *meaningful* sound and *attendant quale*.

[14] Cognitive presence of vomit[concrete common feature] can be understood simply to mean the presence of a personal sense – a tacit belief – that vomit[as seen, attendant quale] and vomit[word sound as heard, attendant quale] *are available to be subjectively experienced in the same way* by other members of the English language using group, amounting to a personal sense that, 'people know what this is.' (And see footnote 12). The same will apply with respect to the cognitive presence of *any* X[common feature] where X is a commonly understood name (for example the name 'red' as used in §B4*(ii)-(iii)* below).

(i) Imaginary qualia

To better grasp what is being proposed, note that it is empirically clear to each of us that we are not only able directly to perceive qualia as the contents of our respective phenomenal worlds, i.e. our W[i]s, but that we are also able to imagine such qualia, even when they are not present here-and-now in the contents of our W[i]. So, for example, you can imagine holding, biting into and savouring the crunchiness, flavour and juiciness of a fresh crisp apple, even though there may be no apple physically present when you imagine this.

This example allows empirical identification and differentiation of a special class of qualia. Call these *imaginary* qualia. Denote them *i*-qualia, and denote any imaginary quale an *i*-quale. Imaginary qualia can be differentiated from those qualia a person directly perceives and experiences as contents of their here-and-now W[i], where such here-and-now qualia can be called *concrete* qualia. Denote concrete qualia *c*-qualia and any concrete quale a *c*-quale.

Experiments to empirically demonstrate these ideas are straightforward. For example, say you take some eggs and put them in a saucepan to boil them. First you see and handle the eggs, and in so doing you perceive and experience them as here-and-now contents of your W[i], i.e. you experience them as *c*-qualia. But after you place the eggs in the saucepan and put an opaque lid on it, you will no longer perceive and experience the eggs as *c*-qualia but you will now, *and in a cognitively entirely natural way*, experience them as *i*-qualia. You will never think of the eggs as having disappeared. And when, after a few minutes, you remove the lid, you will once again experience the 'same' eggs as *c*-qualia.

Differentiation between *i*-qualia and *c*-qualia allows for a more refined description of cojointness, and of what has been meant above by saying that, for a mature language user, all of the reflexive two-way pointing they have learned and begun to implement in the course of their cognitive assembly of a cojoint complex will have become reflexive to the point that it will give them a unified experience of each of the occupants of the corners of the complex.

(ii) Constituent cojoint complexes

Refer back to Fig. B1 and call the cojoint complex shown there for red a *primary cojoint complex*. This primary cojoint complex can now be better viewed as a summary expression for four kinds of *constituent cojoint complex*, where constituent cojoint complexes can be considered fundamental units that make up all primary and other kinds[15] of cojoint complex. It is possible to identify six kinds of constituent cojoint complex. Figures B3 to B7 give examples of each.

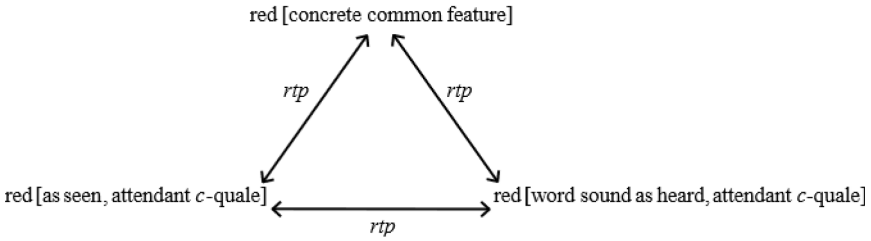

Figure B3

Figure B3 shows the constituent cojoint complex it is proposed Jane will experience when she both sees red[as seen, attendant *c*-quale] and at the same time hears red[word sound as heard, attendant *c*-quale] as part of the here-and-now contents of her W[i] and is proficient in use of the word red in communication. In this case, when Jane sees red[as seen, attendant *c*-quale] and at the same time hears red[word sound as heard, attendant *c*-quale], she will reflexively and inexorably have a unified experience of red[as seen, attendant *c*-quale] cojoined to red[word sound as heard, attendant *c*-quale] cojoined to red[concrete common feature]. Call this a constituent cojoint complex of the *first kind*.

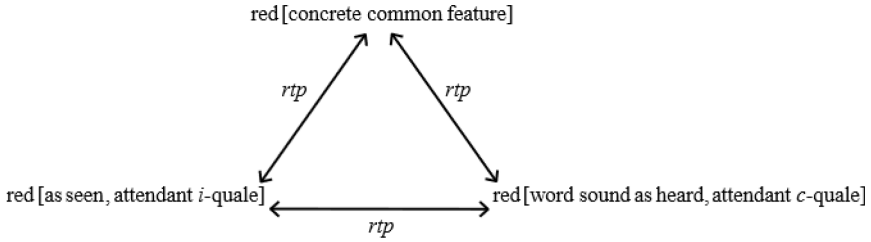

Figure B4

Figure B4 shows the constituent cojoint complex it is proposed Jane will experience when she hears red[word sound as heard, attendant *c*-quale], but does *not* see red[as seen, attendant *c*-quale], as part of the here-and-now contents of her W[i] and is proficient in use of the word red in communication. In this case, when Jane here-and-now hears red[word sound as heard, attendant *c*-quale] she will reflexively and inexorably have a unified experience of red[word sound as heard, attendant *c*-quale] cojoined to red[as seen, attendant *i*-quale] cojoined to red[concrete common feature]. (In other words, hearing red[word sound as heard, attendant *c*-quale] will reflexively evoke in Jane a sense of red[as seen, attendant *i*-quale] and of red[concrete common feature][14].) Call this a constituent cojoint complex of the *second kind*.

[15] For example, it is proposed that *aggregate cojoint complexes*, which are introduced in §B10 as means of describing the construction and use of sentences, are made up of multiple constituent cojoint complexes.

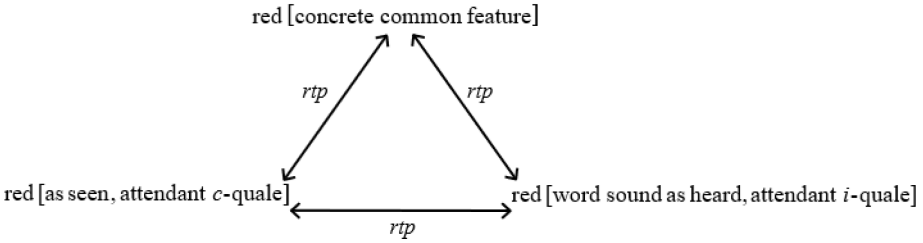

Figure B5

Figure B5 shows the constituent cojoint complex it is proposed Jane will experience when she sees red[as seen, attendant *c*-quale], but does *not* hear red[word sound as heard, attendant *c*-quale], as part of the here-and-now contents of her W[i] and is proficient in use of the word red in communication. In this case, when Jane sees red[as seen, attendant *c*-quale] she will reflexively and inexorably have a unified experience of red[as seen, attendant *c*-quale] cojoined to red[word sound as heard, attendant *i*-quale] cojoined to red[concrete common feature]. (In other words, seeing red[as seen, attendant *c*-quale] will reflexively evoke in Jane a sense of red[word sound as heard, attendant *i*-quale] and of red[concrete common feature].) Call this a constituent cojoint complex of the *third kind*.

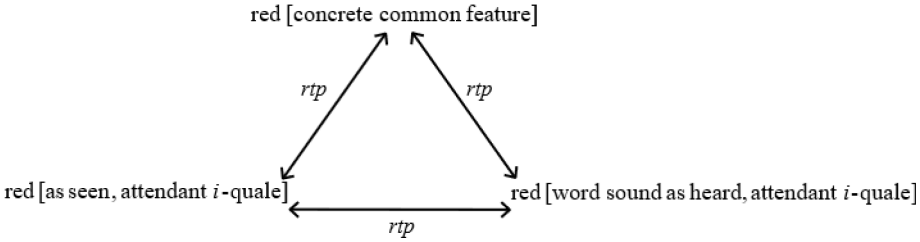

Figure B6

Figure B6 shows the constituent cojoint complex it is proposed Jane will experience when she can neither see nor hear any attendant *c*-quale for red but – say in daydreaming – comes to imagine (or recall) seeing red (or to imagine hearing the word red) and she is proficient in use of the word red in communication. Here, in imagining the colour red as seen (or imagining the word red as heard) she will reflexively and inexorably have a unified sense of red[as seen, attendant *i*-quale] cojoined to red[word sound as heard, attendant *i*-quale] cojoined to red[concrete common feature]. Call this a constituent cojoint complex of the *fourth kind*.

(iii) Concepts of physical things and the meaning of names of physical things

The constituent cojoint complexes shown above can be used broadly to describe how people conceptualise physical things. So, for example, in considering Fig. B4 it can be proposed that what Jane is experiencing when she experiences red[as seen, attendant *i*-quale] is her concept of red as a *phenomenon*. Call this her *phenomenal concept* of red. Likewise, in considering Fig. B5 it can be proposed that what Jane is experiencing when she experiences red[word sound as heard, attendant *i*-quale] is her concept of red as a *name* that she and other members of her language using group use to describe, and to communicate about, their respective – and unique – phenomenal concepts of red. Call this her *semantic concept* of red.

By the same method, the cojoint complex shown in Fig. B6 can be considered to encompass Jane's *net concept* of red, since it describes what Jane will experience when she is conceiving of red in circumstances where she can neither here-and-now see red nor here-and-now hear the word red. Jane's net concept of red can be considered to be her phenomenal concept of red cojoined by reflexive two way pointing to her semantic concept of red.[16]

With this, it seems reasonable to assume that Jane's phenomenal concept of red will be informed by her net recall of all of the instances, and wider phenomenal contexts, within which she has previously experienced red as a phenomenon, and that her semantic concept of red will be informed by her net recall of all of the instances, and wider semantic contexts, within which she has experienced the word red as a communication.[17]

Further in relation to the situation described in Fig. B6, it is expected that if Jane imagines seeing the colour red in her 'mind's eye' she will not only experience red[as seen, attendant *i*-quale] – i.e. her phenomenal concept of red – she will also, due to reflexive two-way pointing, experience a sense of red[word sound as heard, attendant *i*-quale] – i.e. her semantic concept of red.

Equally in this situation, it can be expected that if Jane imagines hearing the word sound red in her 'mind's ear' she will not only experience red[word sound as heard, attendant *i*-quale] – i.e. her semantic concept of red – she will also, due to reflexive two-way pointing reflexively experience a sense of red[as seen, attendant *i*-quale] – i.e. her phenomenal concept of red.[18]

---

[16] Where she will experience both of these concepts cojoint with red[concrete common feature], where the latter can be considered to be her experience of a sense that her phenomenal and semantic concepts of red are available to be experienced in the same way as she experiences them, and are available to be communicated about, by other members of her language using group (as per the case described in footnote 14).

[17] Here 'phenomenal context' refers to the wider arrangement of phenomena (natural *c*-qualia) present when Jane experiences red[as seen, attendant *c*-quale] as part of the contents of her W[i]. Similarly, 'semantic context' refers to the wider arrangement of word sounds (synthetic *c*-qualia) present when Jane experiences red[word sound as heard, attendant *c*-quale] as part of the contents of her W[i].

[18] The claim made in this paragraph parallels the more fully described claim made for 'vomit' in the last paragraph on pp 4.

Importantly, it is proposed here that when Jane either hears red[word sound as heard, attendant *c*-quale] or imagines hearing red[word sound as heard, attendant *i*-quale], it will be her phenomenal concept of red that she holds each of these to *mean*. Thus, in experiencing her semantic concept of red, Jane will understand that concept to mean – and in a certain sense to be *describing* – her phenomenal concept of red. In the general case, this is simply to claim that when any person hears, or imagines hearing, the name of a physical thing, they will understand that name to *mean* their phenomenal concept of that thing.[19]

(iv) Describing imaginary common features

The idea of *i*-qualia enables description of cojoint complexes for *imaginary common features* (ICFs).[20]

Figure B7 shows the two constituent cojoint complexes for centaur. Consistent with the definition of an ICF, a centaur is something people can conceive of, but that no-one has ever perceived in the here-and-now contents of their W[i].

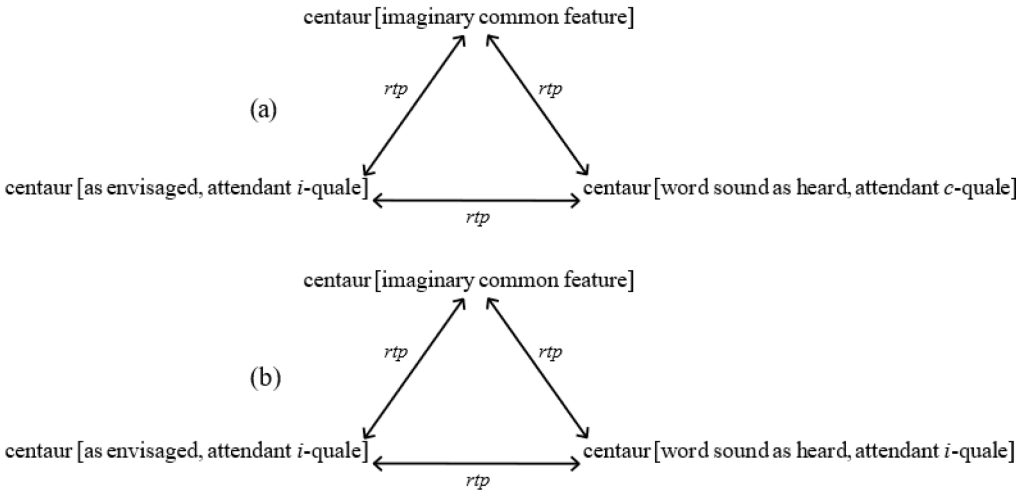

Figure B7

Figure B7 shows at **(a)** the constituent cojoint complex it is proposed Jane will experience when she *hears* centaur[word sound as heard, attendant *c*-quale] and is proficient in use of the word centaur in communication. Here, when she hears centaur[word sound as heard, attendant *c*-quale] she will reflexively and inexorably have a unified experience of centaur[word sound as heard, attendant *c*-quale] cojoined to centaur[as *envisaged*, attendant *i*-quale][21,22] cojoined to centaur[imaginary common feature]. Call this a constituent cojoint complex of the *fifth kind*. (Here, as for red in Fig. B4, the *i*-quale, centaur[as *envisaged*, attendant *i*-quale], shown in **(a)** can be considered Jane's *phenomenal concept* of a centaur.) **(b)** shows the constituent cojoint complex it is proposed Jane will experience when she imagines seeing a centaur (i.e. experiences centaur[as envisaged, attendant *i*-quale]) or imagines hearing the spoken word centaur (i.e. experiences centaur[word sound as heard, attendant *i*-quale]). Call this a constituent cojoint complex of the *sixth kind*. (Here, as for red in Fig. B6, the constituent cojoint complex at **(b)** can be considered Jane's *net concept* of a centaur.)

The key difference between the constituent cojoint complexes for centaur described in Fig. B7 and those for red described in Figs B3 to B6 is that, since centaurs don't exist, Jane can never directly perceive or experience a centaur[as seen, attendant *c*-quale] in the contents of her here-and-now W[i], whereas it can be reasonably proposed – as per §B2 – that as a normal person Jane can, and has, experienced red[as seen, attendant *c*-quale] as part of the contents of her W[i].

The fact that Jane and others in her language using group – including you and I – can talk about centaurs, and agree on what they are, seems only to require that we are able to come to a mutually acceptable degree of agreement on our descriptions of the characteristics of centaurs in our communications with each other. But in learning about centaurs we each *also* seem invariably to seek to imagine/envisage some form of sensory experience of a centaur – i.e. centaur[as *envisaged*, attendant *i*-quale][22, 23] – to serve as our phenomenal concept of what a centaur is.[24] Moreover, as per §B4*(iii)*, it is this envisaged phenomenal concept that we each then seem to take the word centaur to *mean*.

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[19] NB: For an empirically grounded validation of the ideas presented so far in this appendix – particularly in the current section– see End Note 1 (5).
[20] The definition of an imaginary common feature (ICF) is provided in §5*(iii)* on pp 13 of the main text.
[21] Where to *envisage* an *i*-quale will be to imagine having some, although perhaps relatively vague, form of sensory experience of it.
[22] NB: From hereon the term *envisage* and phrase, *as envisaged*, will refer to situations where a person is evoking/experiencing an attendant *i*-quale in circumstances where they have *never previously experienced* its 'counterpart' *c*-quale. So, for example, no-one has yet experienced centaur[as seen, attendant *c*-quale], but many have experienced red[as seen, attendant *c*-quale]. Hence for a person who has never previously seen a centaur the notation for the relevant *i*-quale will be centaur[as *envisaged*, attendant *i*-quale] and for a person who *has* previously seen red the notation for the relevant *i*-quale will be red [as *seen*, attendant *i*-quale]. This distinction becomes important below (for example, immediately below in discussion of neutron[as *envisaged*, attendant *i*-quale] and in §B9, in discussion of what Mary knows before and after she has seen red).
[23] Note with this, and apropos the caption to Fig. B2, that the ideas of natural and synthetic qualia can be extended in a quite natural way to include that: (1) any imagined sensory experience of an attendant *i*-quale, where this is *not* imagined to be an experience of the expression of a language, can be considered an experience of a natural *i*-quale, and (2) that any imagined sensory experience of an attendant *i*-quale that *is* imagined to be an experience of the expression of a language, can be considered an experience of a synthetic *i*-quale. By this means *all* forms of *c*-qualia and *i*-qualia encountered can be classified as either natural or synthetic.
[24] This act of imagination is facilitated for many of us through artists' communications of their impressions of centaurs.

Now recall that the main text defines such things as centaurs and unicorns as *fictional* ICFs, where these are held by our language using group to correspond to nothing that is, or has been, physically real. But the main text also defines as *proven* ICFs such things as atoms, small molecules and Higgs bosons, where these things are held by our language using group actually to exist, or to have existed, in physical reality.[25] Figure B8 shows the primary cojoint complex, and constituent cojoint complexes, for the proven ICF neutron.

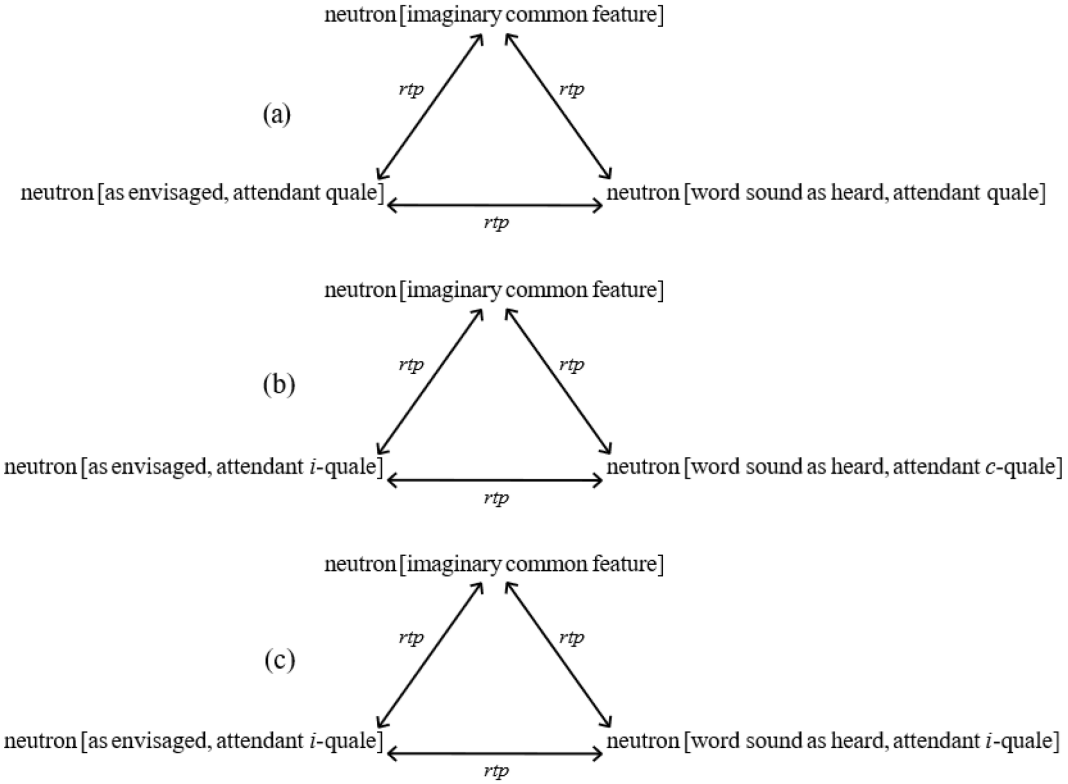

Figure B8

Figure B8 shows at **(a)** a primary cojoint complex for neutron, which expresses in summary form both of the constituent cojoint complexes shown at **(b)** and **(c)**, which are of the fifth and sixth kinds respectively. **(b)** shows the constituent cojoint complex it is proposed that nuclear physicist Joan will experience when she hears neutron[word sound as heard, attendant *c*-quale] – say, as part of a sentence said to her by another physicist – while **(c)** shows the constituent cojoint complex it is proposed Joan will experience when she simply imagines (thinks about/conceives of) a neutron or neutrons – where Joan is proficient in use of the word neutron in communication with others in the nuclear physics language using group.

While the constituent cojoint complexes for neutron can be expected broadly to have the same cognitive characteristics and role as those shown for centaur in Fig. B7, a key difference will be that Joan's net concept of neutron – which can be described as her experience of the constituent cojoint complex shown at Fig. B8(c) – will be a form of knowledge that is crucial to her effectiveness as a practicing and communicating physicist, whereas Jane's net concept of centaur will likely be less consequential.

But just as for centaur, being able to talk about neutrons, and to know what they are, seems only to require that physicists such as Joan can come to a mutually acceptable degree of agreement on their descriptions of the characteristics of neutrons in their communications with each other. And again, it also seems that in learning about neutrons each physicist seeks to imagine/envisage some form/s of sensory experience of a neutron – i.e. of neutron[as envisaged, attendant *i*-quale] – to serve as their phenomenal concept of what a neutron is.[26(a), 27] Moreover, and as per §B4*(iii)*, it seems also almost always to be the case that it will be the phenomenal concept built (envisaged) by each physicist that each then takes the word neutron to mean.[26(b)]

So just as for Jane's net concept of red,[28] it is proposed here that Joan's net concept of neutron will be composed of her semantic concept of neutron cojoined to her phenomenal concept of neutron. But importantly, Joan will *only* be able to imagine/envisage a phenomenal concept of neutron that is somehow based on her semantic concept of neutron, whereas Jane will be able to imagine/recall a phenomenal concept of red based on her net recall of actually seeing red. (This kind of distinction matters in relation to the knowledge argument (see §B9 below)).

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[25] See main text, §5*(iii)*.

[26] (a) Where, as per footnote 21, it is being proposed here that such conceptualisation will entail imagining having – as a kind of working 'place holder' – some form or forms of sensory experience, perhaps a form of visualisation, even though it may be relatively vague, of the attendant natural *i*-quale being envisaged. (b) The practice in science of imagining forms of sensory experience as part of conceptualising ICFs, and of conceptualising relations among such ICFs, is described extensively in the literature, e.g. (6, 7), including, for example, with respect to electromagnetism (8), and to atoms and molecules (9). Discussion of Werner Heisenberg's approach at pp.128 – and Ch.4 – of (6) provides a remarkable account of this practice.

[27] As discussed in footnote 9 and 9(b), there is no distinction being drawn here between the term quale and the term qualia. In other words, for the purposes of this discussion the term neutron[as envisaged, attendant *i*-quale] is considered to be precisely the same term as neutron[as envisaged, attendant *i*-qualia].

[28] See §B4*(iii)* above.

B5 Extending cojoint complexes

The approach described in §B1 can be extended to include cognitive assembly of cojoint complexes for written as well as spoken words, as illustrated in Figure B9.

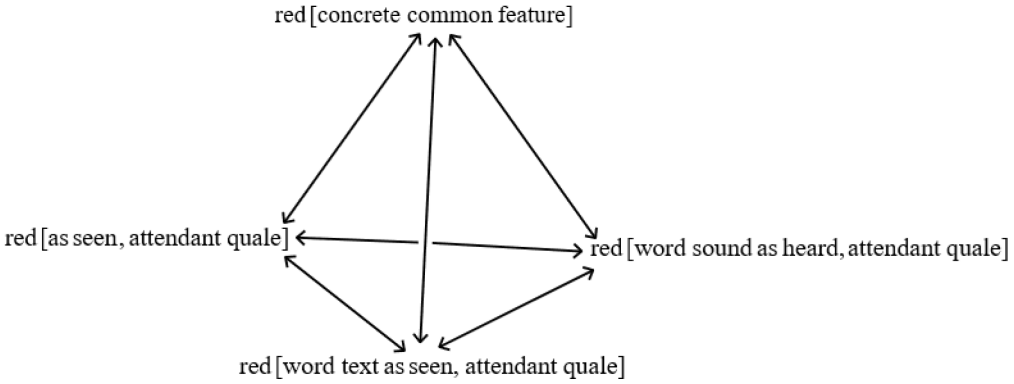

Figure B9

Figure B9 shows a primary cojoint complex describing how Jane will experience both the spoken and written words red once she has become proficient in their use in both verbal and written communication with other members of the English language using group. This is a simple extension of the primary cojoint complex shown in Fig. B1, with the *rtp* labels removed to reduce clutter.[29]

In relation to Fig. B9, it is again – as for Fig. B1 – envisaged that once Jane has fully cognitively assembled the cojoint complex shown, and in so doing can come to experience and use the word red in a natural way – both verbally *and* textually – as part of her language, she will no longer be able to experience any of the occupants of one corner of the tetrahedron without experiencing it in a combined sense with occupants of the other corners of the tetrahedron.[30]

So, for the specific example of red[word text as seen, attendant quale], after she has learnt to read, Jane will no longer be able to experience as a *pure* quale the marks of ink that make up the word red but, involuntarily and inexorably, must experience those marks as an *attendant* quale that reflexively points to – and is pointed to from – all of the occupants of the other corners of the tetrahedron. In other words, Jane will be unable to help *reading* – as opposed to simply *seeing* – the text of the word red.[31]

Figure B10 shows how this approach can be applied to a simple phrase.

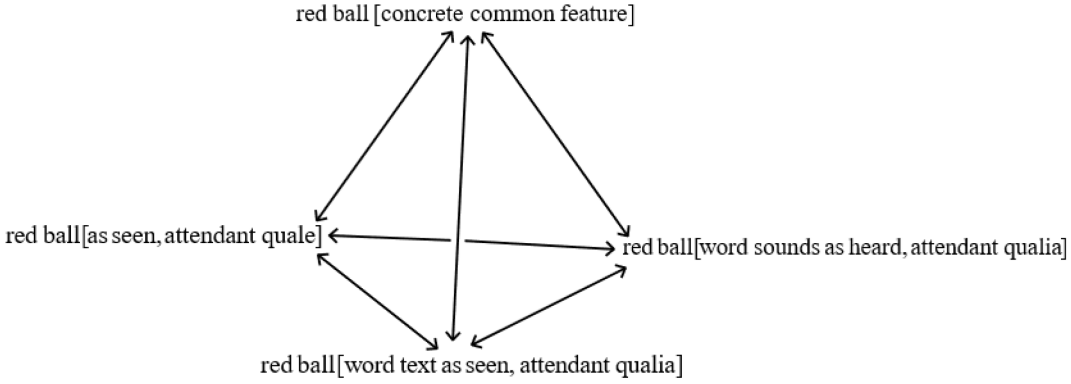

Figure B10

Figure B10 shows a primary cojoint complex describing how Jane will experience the spoken and written phrase red ball once she is proficient in verbal and written communication with members of the English language using group. Here red ball[concrete common feature] can be considered a 'compound' common feature since it can be thought of as made up of two differentiable CCFs, ball[concrete common feature] and red[concrete common feature].[32]

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[29] And with respect to footnote 23, note that red[word text as seen, attendant quale] is a further example of a synthetic quale.

[30] Again, as for the simpler primary cojoint complex shown in Fig. 1 – the nature of this 'combined sense' can be described in terms of viewing the primary cojoint complex shown in Fig. B9 as a shorthand representing its constituent cojoint complexes. These can be derived in the same way as was demonstrated in the preceding section for the primary cojoint complex shown in Fig. 1. So this will give eight constituent cojoint complexes for the extended primary cojoint complex shown in Fig. B9, corresponding to the number of permutations of *c*-attendant qualia and *i*-attendant qualia that can apply around the corners at the base of the tetrahedron.

[31] In the main text this point was made using the parallel example of your having lost – in the course of learning to read – your ability to experience the written word vomit as vomit[word text as seen, *pure quale*] and for ever after only being able to experience it as vomit[word as text, *attendant quale*] cojoined with experiencing it as vomit[concrete common feature]. (See §5*(ii)*, pp 11, main text.)

[32] NB: The idea of compound common features is subsumed into the more encompassing idea of *assemblies* of common features introduced in §B10 as a part of a proposal as to how sentences may be constructed and deployed in the normal use of language.

Note then, where all such pyramids are diagrams of primary cojoint complexes, that Jane can be expected through language learning operations to be able to cognitively assemble similar pyramids where:

(a) say, using honey as an example, the pyramid could include as occupants of its base corners: honey[as seen, attendant quale], honey[as smelled, attendant quale], honey[as felt, attendant quale], honey[as tasted, attendant quale], honey[word text as seen, attendant quale], honey[word sound as heard, attendant quale], and so forth, where the occupants of each of these corners will be cognitively conjoined to all other such occupants by reflexive *poly-directional pointing*; [33, 34]

(b) the apex of the pyramid could be a *dynamic* common feature – for example, running man[concrete common feature] – where the pyramid could include as occupants of its base corners: running man[as seen, attendant qualia], running man[word sounds as heard, attendant qualia]; running man[word text as read, attendant qualia], and so forth; and where

(c) the apex of the pyramid can be a dynamic, compound common feature – for example, bouncing red ball[concrete common feature] – where the base of the pyramid could include, for example: bouncing red ball[word sounds as heard, attendant quale], bouncing red ball[as seen, attendant quale], and so forth;[35] and that

(d) in the normal course of language learning operations Jane can be expected irreversibly to cognitively assemble countless other similar pyramids (cojoint complexes), for example with apices such as stone[concrete common feature], bird[concrete common feature], falling star[concrete common feature], spinning wheel[concrete common feature], dragon[imaginary common feature], atom[imaginary common feature], and so forth.

B6 Akari and Bob apply language learning operations

The following examples show how language learning operations can work in practice. In doing so they also more explicitly express the ideas proposed in preceding sections in terms of relations among contents of W[r], W[i] and W[z].

(i) General scenario

Bob and Akari are normal, intelligent children with the usual human predisposition for language learning. They are in a well lit room with white walls. The room is featureless except that sitting on the floor between them is a red ball. They are both looking at the red ball and seeing it. This general scenario applies in all of the scenarios discussed below.

(ii) Scenario 1

Akari and Bob are too young to know any languages.

When Akari[r] sees the red ball[r], sensory input will be processed by her own unique D[r] – denote this $^{\mathbf{A}}$D[r] – which, in implementing her own unique RBC – denote this $^{\mathbf{A}}$RBC – will give her a direct perceptual experience of $^{\mathbf{A}}$red ball[i] as part of the contents of her unique W[i] – denote this $^{\mathbf{A}}$W[i].[36, 37]

Without language, Akari will be experiencing $^{\mathbf{A}}$red ball[i] as $^{\mathbf{A}}$red ball[as seen, pure *c*-quale].

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[33] Where by 'reflexive poly-directional pointing' (*rpp*) is meant that any one corner of the pyramid will reflexively point to all other corners and will itself reflexively be pointed to by all other corners.

[34] NB: (a) This example is a useful addition to that of red because, unlike for a colour, attendant natural qualia for honey can be more than just seen, they can be felt (tactile), smelled, and tasted. In this respect, such extended cojoint complexes can inter alia be considered cognitively to bind together the various phenomenally experienced attributes of a given thing[i] through reflexive poly-directional pointing.

NB: (b) Given there are many cases where some X[concrete common feature] – for example, honey[concrete common feature] or gasoline[concrete common feature] – can have one or more here-and-now directly perceived natural *c*-qualia and/or one or more previously perceived natural *i*-qualia attending it, these may then be collectively denoted X[*as sensed*, attendant *c*-qualia] or X[*as sensed*, attendant *i*-qualia], where – under this definition – the phrase 'as sensed' is being used to denote any, and all, of the 'as seen', 'as heard', 'as felt' (tactile), 'as smelled' or 'as tasted' natural *c*-qualia or previously experienced natural *i*-qualia that for any given person attend X[concrete common feature]. Recall here also, as per footnotes 21 and 22, that for any X[*imaginary* common feature] its attendant natural *i*-qualia will be denoted X[*as envisaged*, attendant *i*-qualia].

NB: (c) By the same approach, collectively denote all of the different ways a person can experience synthetic qualia which are words as either, X[*word as sensed*, attendant *c*-quale] or X[*word as sensed*, attendant *i*-quale], where these can be used to collectively denote all forms of perception or recall of, 'word sounds, as heard', 'word text, as read', 'word shapes, as felt' (Braille), 'word signs, as seen' (sign language) and so forth.

NB: The nomenclature introduced above – particularly in relation to natural qualia – becomes indispensable in describing ideas developed from §B10 onwards, where the concept of *aggregate cojoint complexes* entailing assemblies of common features and assemblies of attendant qualia, is introduced to describe the construction and use of sentences.

[35] Where it can be proposed that such cognitive assembly of cojoint complexes could be further extended to involve say, the construction of much larger, *aggregate cojoint complexes*, where a person's ongoing real-time cognitive assembly and use of such aggregates could play a major role in cognitive processes underway as that person uses and understands their language in real time. This proposal is systematically explored in §B10.

[36] The meanings of the terms D[r] and RBC are provided in §1 of the main text.

[37] The left superscript **A** will from hereon denote anything unique to Akari, the left superscript **B** will denote anything unique to Bob and, in the general case, the left superscript **P** will denote anything unique to any given person, P.

When Bob[r] sees the red ball[r], sensory input is processed by ^{B}D[r] which, in implementing ^{B}RBC, gives him a direct perceptual experience of ^{B}red ball[i] as part of the contents of his unique W[i], ^{B}W[i].[37]

Without language, Bob will be experiencing ^{B}red ball[i] as ^{B}red ball[as seen, pure *c*-quale].

(iii) Scenario 2

Bob has learned only English. Akari has learned only Japanese.

As in Scenario 1, when Bob[r] looks at the red ball[r] sensory input is processed by ^{B}D[r] which, in implementing ^{B}RBC, gives him a direct perceptual experience of ^{B}red ball[i] as part of the contents of his unique W[i], ^{B}W[i].

But now that he knows English, as Bob here-and-now perceives the red ball he experiences ^{B}red ball[i] as ^{B}red ball[as seen, attendant *c*-quale] and as the cojoint complex[38] shown in Figure B11:

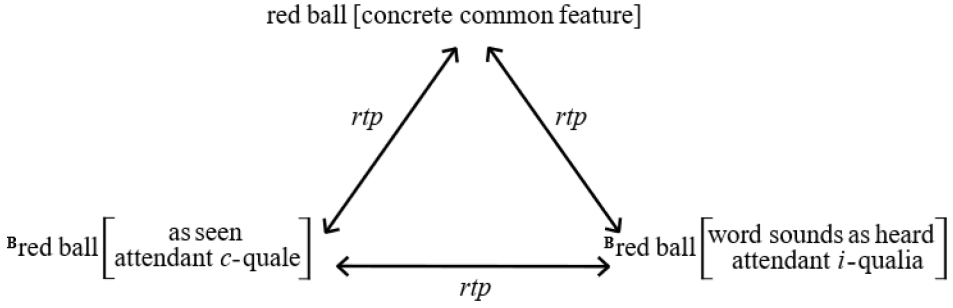


Figure B11

Figure B11 shows the cojoint complex Bob experiences as he here-and-now perceives ^{B}red ball[i] and is proficient in use of the English phrase, 'red ball', in verbal communication with other members of the English language using group.

As in Scenario 1, when Akari looks at the red ball[r] sensory input is processed by ^{A}D[r] which, in implementing ^{A}RBC, gives her a direct perceptual experience of ^{A}red ball[i] as part of the contents of her unique W[i], ^{A}W[i].

But now that she knows Japanese, as Akari here-and-now perceives the red ball she experiences ^{A}red ball[i] as ^{A}red ball[as seen, attendant *c*-quale] and as the cojoint complex shown in Figure B12:

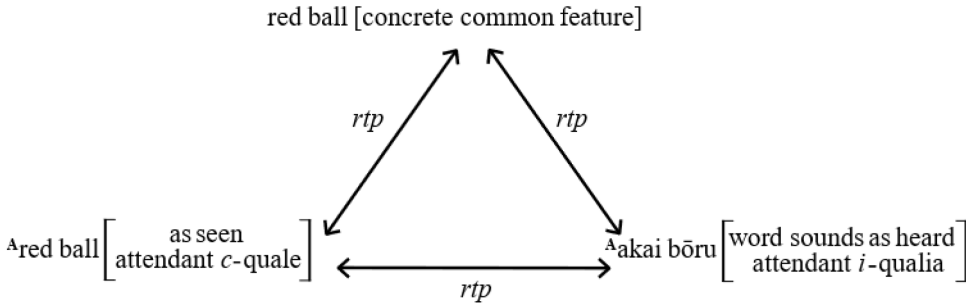


Figure B12

Figure B12 shows the cojoint complex Akari experiences as she here-and-now perceives ^{A}red ball[i] and is proficient in use of the Japanese phrase, 'akai bōru', in verbal communication with other members of the Japanese language using group.

The two cojoint complexes shown in Figures B11 and B12 describe what Bob and Akari respectively experience as they stare at the red ball.

[38] NB: from hereon in this appendix, *unless it is otherwise stated*, the term 'cojoint complex' will be used to refer only to *constituent* cojoint complexes, and *not* to primary cojoint complexes. This is not only to simplify the text, but is also because the fundamental units being discussed here are constituent cojoint complexes, as has been shown in §B4 and recalling that the term primary cojoint complex has always been used only as a summary expression encompassing two or more constituent cojoint complexes.

Still staring at the red ball, Bob points to the red ball and makes speech such that he experiences as his own speech sounds, [B]red ball[word sounds as heard, attendant *c*-qualia], while experiencing these in the form of the cojoint complex show in Figure B13:

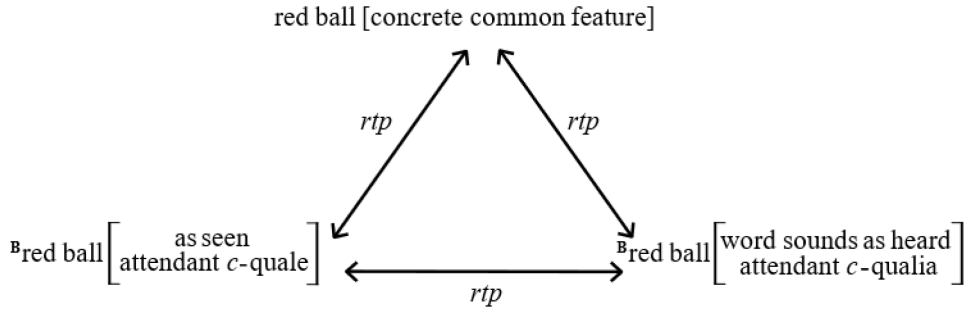


Figure B13

Figure B13 shows the cojoint complex Bob experiences as he here-and-now says, "red ball" and is proficient in use of the English phrase 'red ball' in verbal communication with other members of the English language using group.

When Bob speaks, Akari sees Bob pointing, hears Bob's speech sounds, sees the red ball, and experiences the cojoint complex and the pure *c*-qualia shown in Figure B14:

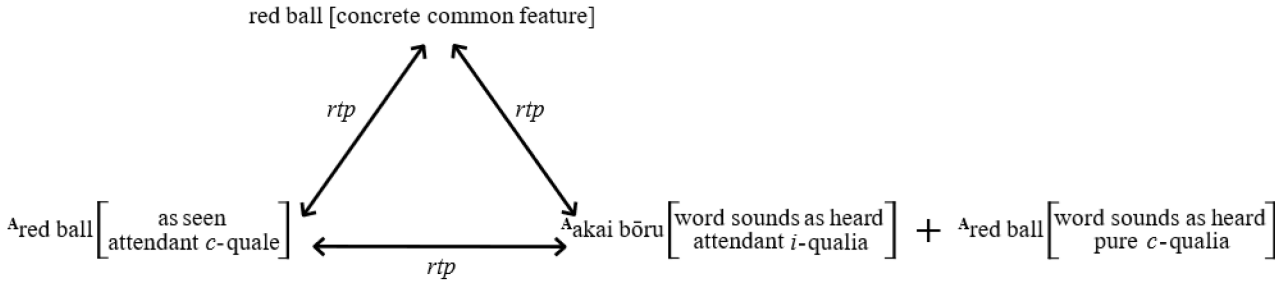


Figure B14

Figure B14 shows the cojoint complex and pure *c*-qualia Akari experiences here-and-now as Bob says, "red ball" and Akari is proficient in use of the Japanese phrase, 'akai bōru', in verbal communication with other members of the Japanese language using group, but does not know English.

Still staring at the red ball, Akari responds to Bob by pointing to the red ball and making speech such that she experiences as her own speech sounds, [A]akai bōru[word sounds as heard, attendant *c*-qualia], while experiencing these in the form of the cojoint complex show in Figure B15:

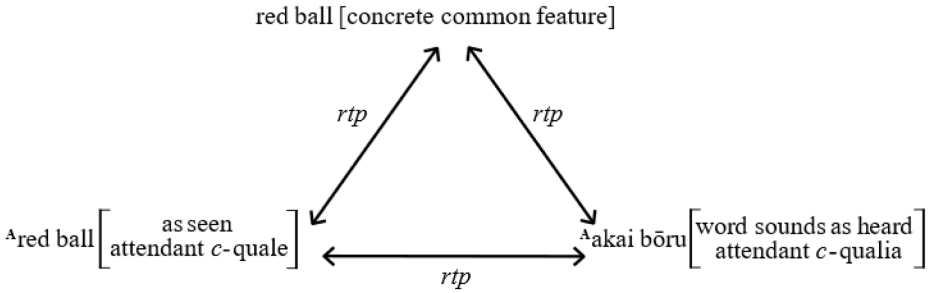


Figure B15

Figure B15 shows the cojoint complex Akari experiences here-and-now as she says, "akai bōru" and is proficient in use of the Japanese phrase, 'akai bōru', in verbal communication with other members of the Japanese language using group.

When Akari speaks, Bob sees Akari pointing, hears Akari's speech sounds, sees the red ball, and experiences the cojoint complex and the pure *c*-qualia shown in Figure B16:

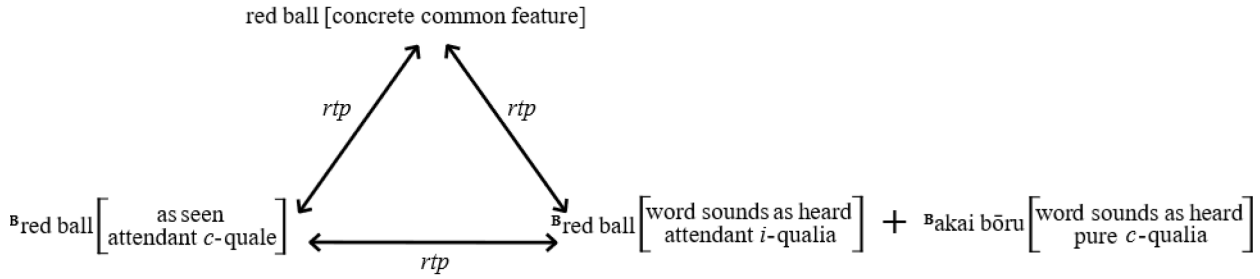


Figure B16

Figure B16 shows the cojoint complex and pure *c*-qualia Bob experiences here-and-now as Akari says, "akai bōru" and Bob is proficient in use of the English phrase, 'red ball', in verbal communication with other members of the English language using group, but does not know Japanese.

But since Akari and Bob are normal, intelligent children with the usual strong human predisposition for language learning – i.e. for implementing language learning operations – after a few cycles of the mutual pointing and naming described above, Akari will have begun cognitively to assemble the primary cojoint complex shown in Figure B17:

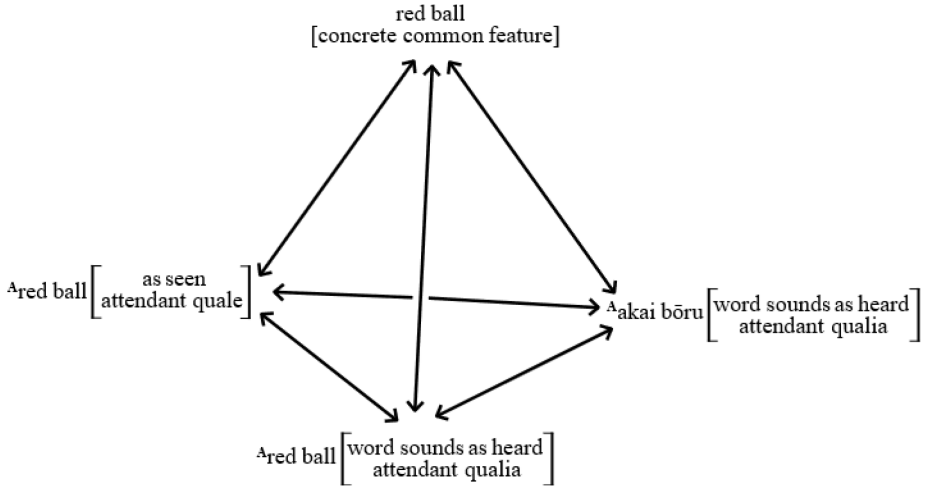


Figure B17

Figure B17 shows the primary cojoint complex Akari begins cognitively to assemble as she repeatedly sees Bob point at the red ball, and hears him say "red ball".

Likewise, after a few cycles of the mutual pointing and naming described above, Bob will have begun cognitively to assemble the primary cojoint complex shown in Figure B18:

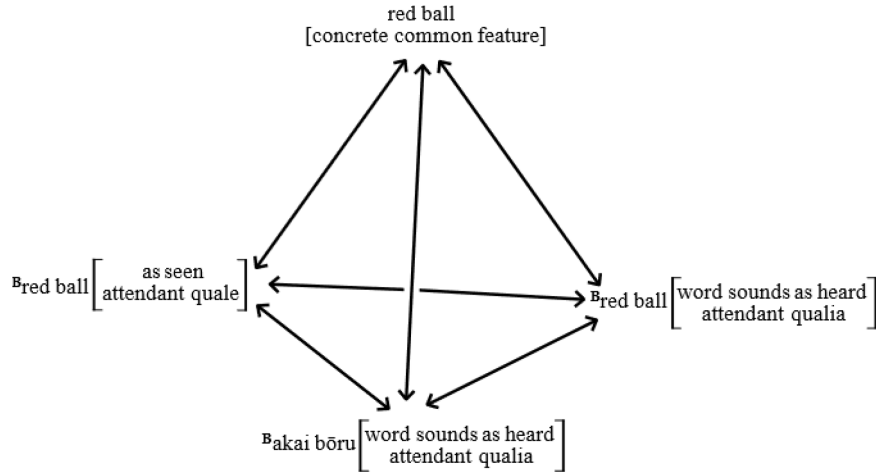


Figure B18

Figure B18 shows the primary cojoint complex Bob begins cognitively to assemble as he repeatedly sees Akari point at the red ball, and hears her say "akai bōru". It is the same as that shown in Fig. B17, but it is being cognitively assembled from a different starting point.

(iv) Scenario 3

In this scenario, Bob has learned English and Akari has learned from Bob how to use, say and understand the English phrase, 'red ball', as part of her wider learning of English. Figure B19 broadens the perspective by providing a diagram showing how to conceptualise such a system at the W[r], W[i] and W[z] levels, while still showing the relevant cojoint complexes. Call this type of diagram a *world level diagram (WLD)*.

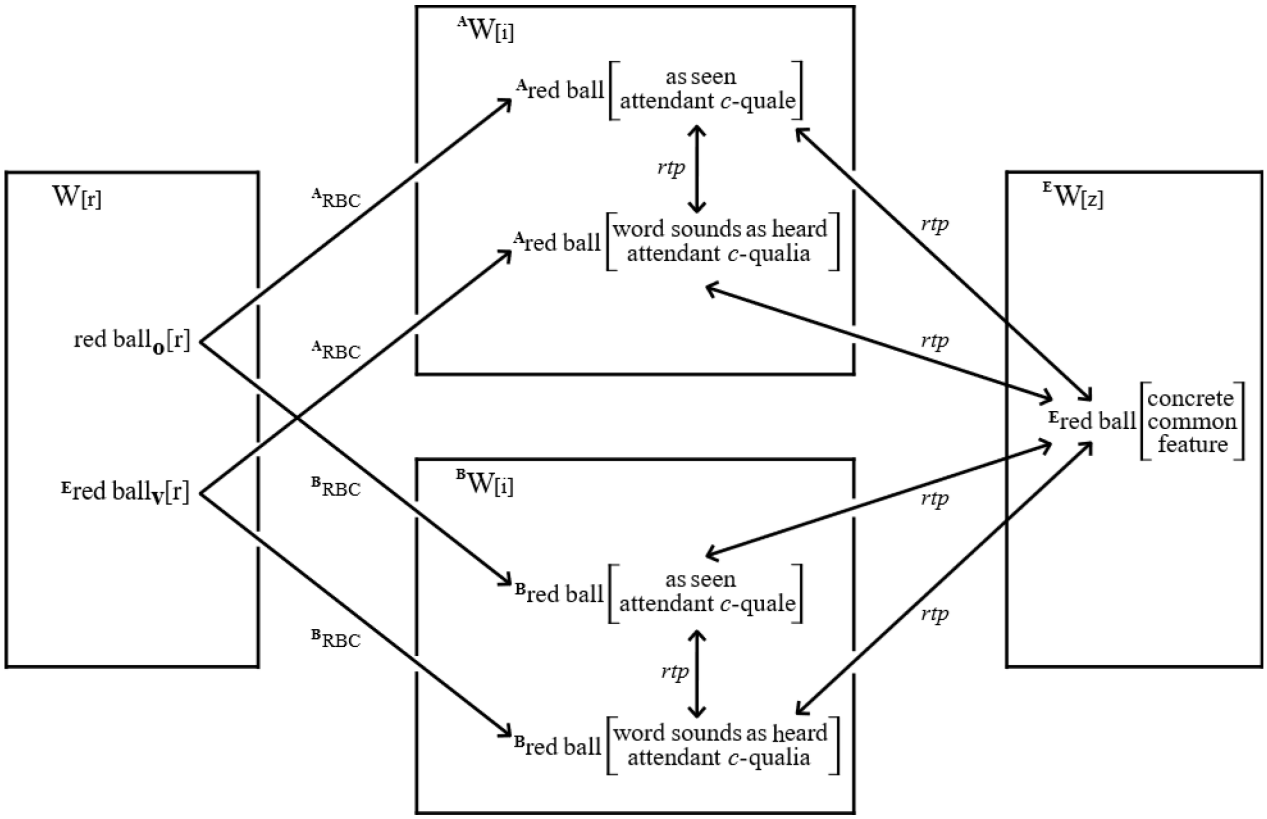


Figure B19

Figure B19 is a world level diagram (WLD) of the system for Scenario 3, showing the W[r], W[i] and W[z] levels described in the main text. It is a tailored derivative of main text Figure 3 that has been designed to show the specific case which is under consideration here. Specifically, it shows a here-and-now in which Bob is saying, and both Bob and Akari are hearing, the English phrase, 'red ball', while both are looking at a red ball. The rectangle on the left of the diagram shows the noumenal level, W[r], and its two relevant contents: red ball**o**[r], which is the noumenal thing: *object* red ball[r]; and ^{E}red ball**v**[r], which is the noumenal thing: *English word sounds* 'red ball'[r]. The upper central rectangle shows Akari's separate and unique phenomenal world, ^{A}W[i], with its two relevant contents: ^{A}red ball[as seen, attendant *c*-quale] and ^{A}red ball[word sounds as heard, attendant *c*-qualia]. The lower central rectangle shows Bob's separate and unique phenomenal world, ^{B}W[i], with its two relevant contents: ^{B}red ball[as seen, attendant *c*-quale] and ^{B}red ball[word sounds as heard, attendant *c*-qualia]. The rectangle on the right shows the W[z] of the English language using group, ^{E}W[z], and its relevant contents: ^{E}red ball[concrete common feature].[39]

Beginning at the left side of Fig. B19, the contents shown for W[r] relate to those shown for ^{A}W[i] and ^{B}W[i] through implementation by Akari's and Bob's respective D[r]s – ^{A}D[r] and ^{B}D[r] – of their respective rules based connections – ^{A}RBC and ^{B}RBC – consistent with the general case provided in §1 of the main text.

Specifically, red ball**o**[r] – the actual noumenal object, red ball[r] – is being perceived and experienced uniquely by Akari as ^{A}red ball[as seen, attendant *c*-quale] and uniquely by Bob as ^{B}red ball[as seen, attendant *c*-quale], due to their respective unique D[r]s processing relevant sensory information originating from red ball**o**[r] through application of their respective unique RBCs.[40]

Likewise, ^{E}red ball**v**[r] – the English word sounds 'red ball'[r] – are being perceived and experienced uniquely by Akari as ^{A}red ball[word sounds as heard, attendant *c*-qualia] and uniquely by Bob as ^{B}red ball[word sounds as heard, attendant *c*-qualia], due to their respective D[r]s processing relevant sensory information originating from ^{E}red ball**v**[r] through application of their respective RBCs.

[39] Note that if – after some global disaster – Bob and Akari were the only two people left alive, then their mutual knowledge of language would constitute the only such knowledge. In that case their W[z] could be labelled ^{AB}W[z]. Likewise, the W[z] of the whole English language using group can be labelled ^{E}W[z], as in Fig. B19, where the superscript E denotes the set of all people who know English.

[40] Note that here the more nuanced term, red ball[as seen, attendant *c*-quale] would, in the main text, simply have been covered by the more general term, red ball[i] – just as the term red ball**o**[r] would simply have been covered by the term red ball[r] – consistent with the more general context of the main text, and in view of the absence in the main text of any need to differentiate at the W[r] level between an actual object[r] and the speech sounds[r] used in some given language to refer to that object.

Consider now that when Bob and Akari learn from others how to vocalise the relevant English word sounds enabling them to communicate about a red ball, what they are learning is how to get their respective noumenal bodies, ^{A}B[r] and ^{B}B[r], to generate ^{E}red ball$_{V}$[r] at the noumenal level as contents of W[r].

More specifically, in learning how to say in English, "red ball", what Bob will have learned by listening to, and then by *mimicking* other English language users, is how to make, at the noumenal level, a specific vocalisation, call it X$_{V}$[r], such that when he hears himself – or anyone else – say it, it gets processed through his own unique RBC – i.e. through ^{B}RBC – such that what he then perceives and experiences is his own unique ^{B}red ball[word sounds as heard, attendant *c*-qualia]. This learning process will be the same for Akari, and for any other person, learning English.

More precisely, when Bob first starts teaching Akari how to say in English, "red ball", the first thing that will happen for her is that her B[r], i.e. ^{A}B[r], will be exposed to Bob's noumenal level vocalisation, X$_{V}$[r], where, when she first hears X$_{V}$[r], it will be processed through ^{A}RBC to give her a perception and experience of ^{A}red ball[word sounds as heard, *pure c*-qualia], as described in Scenario 2, Fig. B14. In other words, because her cognitive assembly of the relevant cojoint complex will barely have begun, what Akari perceives will at first seem to her to be meaningless sounds in a language she does not know.

But then, as Bob repeatedly points and makes at the noumenal level the vocalisation X$_{V}$[r], say that Akari will – in concert with her cognitive assembly of the relevant cojoint complex for ^{E}red ball[concrete common feature], and as a natural part of her language learning – also practice making noumenal level vocalisations such that when she hears herself – and not only Bob – make these vocalisations, they are processed through her ^{A}RBC such that what she perceives and experiences gets closer and closer to what is at the same time becoming for her ^{A}red ball[word sounds as heard, *attendant c*-qualia].

By this rote procedure of practicing vocalisation – familiar to anyone learning a new language – Akari must be learning via her efforts to *mimic* Bob to make what is, for all practical purposes of English language use, the *same* noumenal level vocalisation – X$_{V}$[r] – that Bob has been making in teaching her to say, "red ball". This must be so since – once she has mastered the English phrase, 'red ball' – when the vocalisation X$_{V}$[r] that Bob makes at the noumenal level is processed through Akari's ^{A}RBC she will perceive and experience ^{A}red ball[word sounds as heard, attendant *c*-qualia] and then, when she makes at the noumenal level the perfected mimicked vocalisation that she has been working to learn, it too will be processed through her ^{A}RBC such that she also perceives and experiences it as ^{A}red ball[word sounds as heard, attendant *c*-qualia].

By induction, the general case for all people who learn English in this way will then be that – for all practical purposes of English language use[41] – there will be only one thing at the noumenal level, namely X$_{V}$[r] – which is that thing already labelled red ball$_{V}$[r] – that will serve for any, and all, competent English language users as that one noumenal thing which, when it is here-and-now processed through *any* of their respective RBCs, will give them *each* their own unique perception and experience of those qualia that they have so learned to perceive and experience as red ball[word sounds as heard, attendant *c*-qualia].

Importantly then, throughout the language learning process, what exists as contents of W[r] will – as described in §1 of the main text – always remain conceptually differentiable from anything which any one or other person perceives and experiences directly and uniquely as contents of their W[i], including word sounds and, by extension of the same reasoning, the appearances of written or printed words, or words in other forms.

Returning to Fig. B19, the relevant qualia – unique to each of Akari and Bob – are shown as contents of ^{A}W[i] and ^{B}W[i], where – as in previous diagrams – they form the base of cojoint complexes that have, via Akari's and Bob's respective language learning operations, been separately cognitively assembled by each.

So overall, Fig. B19 describes a situation where Bob, as ^{B}B[r], is saying, ^{E}red ball$_{V}$[r], and where:

- Bob is directly perceiving and *separately* experiencing his own *unique* ^{B}red ball[as seen, attendant *c*-quale] and ^{B}red ball[word sounds as heard, attendant *c*-qualia]; and
- Akari is directly perceiving and *separately* experiencing her own *unique* ^{A}red ball[as seen, attendant *c*-quale] and ^{A}red ball[word sounds as heard, attendant *c*-qualia]; but where
- *both* Bob and Akari – thanks to their each having previously cognitively assembled the relevant cojoint complexes – must be *sharing* an experience of ^{E}red ball[concrete common feature]

where ^{E}red ball[concrete common feature] is the *only* aspect of their experiences that Akari and Bob can share – and can communicate about to each other – since all of the rest of what they are experiencing are qualia, where these respectively are the contents of each of their individual and unique W[i]s and are thus private experiences unique to each of them.[42]

[41] This caveat is included because people speak with different accents and intonations, such that what is being defined here as X$_{V}$[r] will have some degree of variation from one source or iteration to another, but in the current context such variations can be taken to be inconsequential, "for all of the practical purposes of English language use". The same will, by extension, apply to written or printed words, where fonts and handwriting also make for degrees of variability, and to all other forms of 'words as sensed' (as per footnote 34(c)).

[42] Where this example again demonstrates the necessity and utility of the idea of common features, consistent with the proposals made in §B2, the reasoning provided in footnote 12, and as described from §2 onwards in the main text.

This description can be extended to help develop a general case as to the structural relationships among:

- relevant specific contents of W[r]
  - where in this example these are, red ball$_{o}$[r] and ^{E}red ball$_{v}$[r];
- those contents in, and unique to, the respective W[i]s of *any* typical English language user that correlate to those contents of W[r]
  - where in this example these are
    * for Akari, her own unique, subjectively experienced qualia: ^{A}red ball[as seen, attendant *c*-quale] and ^{A}red ball[word sounds as heard, attendant *c*-qualia];
    * for Bob, his own unique, subjectively experienced qualia: ^{B}red ball[as seen, attendant *c*-quale] and ^{B}red ball[word sounds as heard, attendant *c*-qualia]; *but also*
    * for each and *any* other English language user/s 'added to the conversation', their own respective, unique, subjectively experienced versions of the qualia: red ball[as seen, attendant *c*-quale] and red ball[word sounds as heard, attendant *c*-qualia][43]

  and
- those contents in the W[z] of the English language using group that correspond to those contents of W[r]
  - where in this example these are, ^{E}red ball[concrete common feature].

The general case can then be made that for any given language using group that speaks some language, L:

- a massive array of relatively stable relationships will be created and sustained through the emergence and ongoing learning and use of L by members of that group
  - and will, in the vast majority of cases, be used and handed down from one generation of members of that group to another, as they each continue to learn and use L
- where those stable relationships – let these be called *meta-semantic relationships* – will exist between any given contents in that language using group's W[z] (in the example above, ^{E}red ball[concrete common feature]) and their correspondent contents in W[r] (in the example above, red ball$_{o}$[r] and ^{E}red ball$_{v}$[r]).

Viewed in this way, it can be seen that such meta-semantic relationships between contents of a language using group's W[z] and their corresponding contents in W[r] can, in a certain sense, be considered to exist independently of whether or not any one or another specific member of that group is alive and using the language – as long as *some* members of the group are alive and are using the language.

Moreover, in a similar sense, these stable relationships can be considered to exist independently of how any one or another of those members' uniquely subjectively experiences what, for each of them, are the attendant qualia that mediate between any specific contents of the group's W[z] and their correspondent contents in W[r]. In other words, these meta-semantic relationships can be considered, in the sense identified above, to be *qualia-independent*, where this implies that any description of contents of W[r] that members of any language using group are able to communicate to each other – which under CF1 must be in terms of contents of their shared W[z] – will also be qualia-independent.

With regard to thought experiments such as Mary's Room[44] and to the knowledge argument (10), the general case described above shows why it is so hard to communicate just what it is that Mary learns when she first sees colours. It is hard to communicate about what she learns because all of our communications – i.e. all our languages and the ways we use them – are, in the sense just described, qualia-independent.[45]

Yet at the same time, it is clear that without the intermediary role played by a language using group's individual members' direct and independent experience of their own unique qualia, the meta-semantic relationships that allow those members to describe contents of W[r] to each other in terms of contents of their shared W[z] could not exist. This is clear from inspection of Fig. B19, where it is obvious that the central column – comprised of individual W[i]s, each with their own unique contents of qualia – is indispensable to the establishment and maintenance of such meta-semantic relationships, even though in all normal discourse this middle column effectively is 'invisible'[46] to language users due to qualia-independence, and is conceptually obscured by the tacit implementation of the three world praxis[47] that such qualia-independence enables.[48]

---

[43] Adding one or more people 'to the conversation' can easily be conceived of by visualising the addition of one, two – or as large a number as desired – of further W[i] boxes into the central column in Fig. B19, each linked to red ball$_{o}$[r] and red ball$_{v}$[r] via its own unique RBC, which will map these to its own unique red ball[as seen, attendant *c*-quale] and red ball[word sounds as heard, attendant *c*-qualia], with each of these then cojoined – due to each added person having learned English – to ^{E}red ball[concrete common feature].

[44] See §5*(ii)* of the main text.

[45] Moreover, if it is held that all knowledge must be communicable – i.e. can only be conceived of, and expressed, in terms of the contents of a W[z] – i.e. in a language – then by that standard Mary cannot have learned anything new. Note however, that under CF1 it is held that Mary does learn something, it is just that what she learns cannot be described in terms of the common features (see §5*(ii)* of the main text) that form the contents of a W[z]. (For a precise description of what Mary learns, see §B9 below.)

[46] More precisely, in normal circumstances (see footnote 48 below for a pointer to 'abnormal circumstances') the contents of the central column will be *functionally* invisible; i.e. its contents will be *functionally transparent* to any group of language users as they go about learning and using their language.

[47] See §3 of the main text for an account of the three world praxis (TWP).

[48] Notably, thought experiments have been devised that expose the intermediary role of qualia by envisaging an intervention that disrupts qualia-independence for a person in a way that leads to an 'observable' destabilisation of some of the meta-semantic relationships that person has previously learned when learning their language. One such experiment is Ned Block's intrapersonal inverted spectrum (11), for which see §B8 and §B8*(i)* below.

For completeness, and consistent with Fig. B19, Figure B20 shows WLDs for the four constituent cojoint complexes for "red ball", for the general case of a person, P, where P is any member of a language using group that uses a language, L, and has at some previous time seen a red ball.[49]

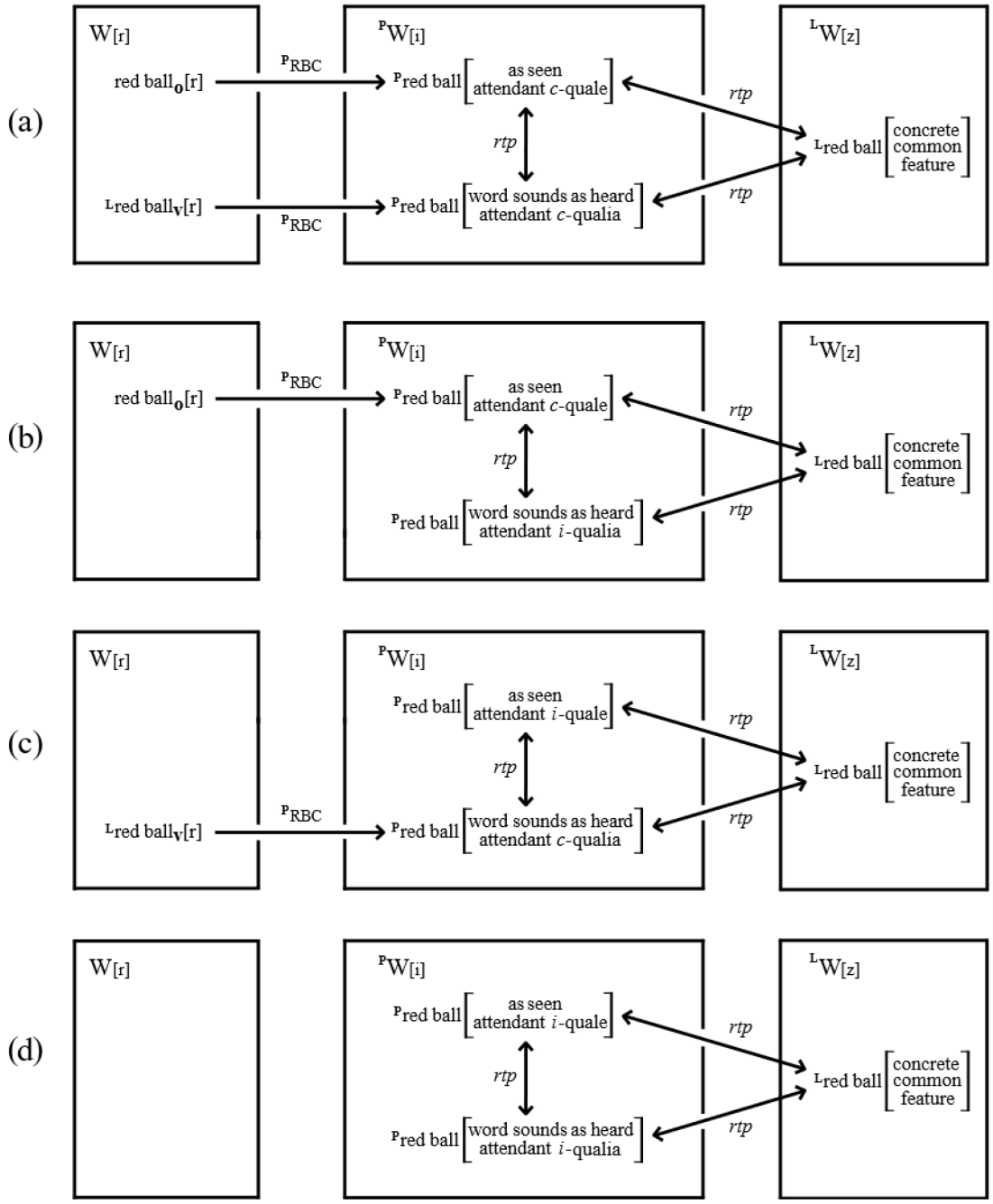


Figure B20

Figure B20 shows WLDs for each of the constituent cojoint complexes for "red ball" for any person P, speaking any language L, from the wider perspective of contents of W[r], and of the person P's W[i] and W[z] levels, where these respectively are denoted ^{P}W[i] and ^{L}W[z]. The same notation conventions apply as for Fig. B19. Here, for example, if the person is an English speaker the relevant W[z] could be denoted ^{E}W[z] and would contain ^{E}red ball[concrete common feature], or if they were a Chinese speaker the relevant W[z] could be denoted ^{C}W[z] and would contain ^{C}red ball[concrete common feature]. An important issue raised by this diagram flows from its inclusion of *i*-qualia as contents of a person's W[i]. Strictly, the contents of a person's W[i] – consistent with how these are defined in §1 of the main text – should all be *c*-qualia, i.e. phenomena a person is here-and-now experiencing as part of their phenomenal world as driven by here-and-now sensory inputs from W[r]. This raises a question of where, if anywhere, *i*-qualia – which have been described in §B4 as phenomenal and semantic concepts – should be placed as contents among W[r], W[i] and W[z]. This question is addressed in §B13. Meanwhile, all *i*-qualia will *provisionally* be treated as contents of a person's W[i] on grounds that they can be considered to function as simulants of contents – i.e. as virtual contents – of a person's W[i] (see §B15*(vi)*).[50]

[49] For those rare cases where P is not here-and-now seeing red ball$_{o}$[r] and has *never previously seen* red ball$_{o}$[r] two further WLDs apply, where these will be the same as for Fig. B20 (c) and (d) except that in each of these the term ^{P}red ball[as *seen*, attendant *i*-quale] will be replaced with ^{P}red ball[as *envisaged*, attendant *i*-quale]. For reasoning and definitions behind this distinction see §B4, including footnote 22, noting that addition of these two further WLDs would give Fig. B20 a coverage that includes each of the six kinds of contributing cojoint complexes described in §B4.

[50] (Note for future reference that if proposals made in §B13 below are adopted and implemented consistent with observations made in §B15*(vi)*, the diagram above can be made fully accurate simply by having the central rectangles bound the sets ^{P}W[i] ∪ ^{P}W[a] – not just ^{P}W[i] – where all contents of a person's phenomenal world, i.e. ^{P}W[i], are *c*-qualia and all contents of a person's *abstract world*, i.e. ^{P}W[a], are *i*-qualia. (This method can also be applied to Figures B24, B27 and B28 to make them fully accurate.))

B7 Type, token and tone

The proposals made above can broadly be related to the work of Charles Sanders Peirce (12) and also to mainstream concepts of *type* and *token* (13).

The following brief exploration regarding Peirce draws mainly on Marc Champagne's interpretation of some relevant aspects of Peirce's semiotic (14,15).[51] These focus on the idea of a *sign* as an entity that may, by a cognitive procedure called *prescission*, be *prescinded* into a trichotomy of type, token and tone. More precisely, it is proposed that, by application of prescission, a person can view a sign at the levels of *Thirdness*, *Secondness* and *Firstness*, where at the level of Thirdness it can be considered a type, at the level of Secondness a token, and at the level of Firstness a tone.

Consider the following quote from Champagne (16):

> "Signs, as we saw, are individuated by their triadic structure. If what we have in view is the whole triad, then we are at the level of what Peirce called Thirdness. In such a case, we have a relation between two relata grasped as a relation by some third thing beyond it …
>
> "If we suppose this relation between two relata as it would be without any further recognition of it as a relation, we are dealing with Secondness. Two and only two things are now involved, so we have effectively left the realm of intelligibility and entered that of brute contiguity.
>
> "Prescinding still further, we may also want to suppose one of the relata without it entering into any relation with another … If we do this, we eliminate whatever alterity allowed that relatum (the term now becomes a misnomer) to have a "contour." Thus, when we prescind relation away so as to consider only that which is related, we may no longer think of the resultant tone as we do a token, since doing so would require us to delimit it in some fashion and ascend back to Secondness. The prescissive analysis leaves its initial object of study untouched. But, if we choose to prescind all the way, Firstness is as far as we can go, and we obtain a quality that *could* be actualized but isn't."

The following uses the example of primary and constituent cojoint complexes for red to describe potential relationships between the Peircean concepts outlined above and concepts developed in the preceding sections of this appendix.

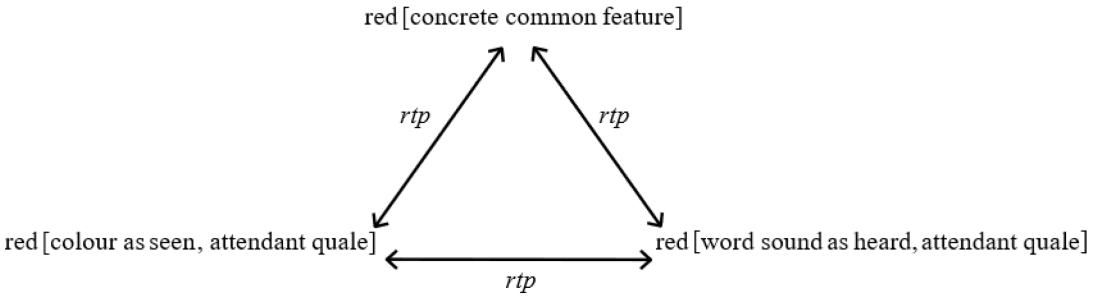


Figure B21

Figure B21 reproduces Fig. B1 and shows the primary cojoint complex that describes how Jane will experience the spoken word red once she is proficient in its use in verbal communication with other members of the English language using group.

In considering Fig. B21, recall that the proposal from §B2 is that once Jane has fully cognitively assembled this complex,[52] enabling her to use the word red in a natural way as part of her language use, she will no longer be able to experience any one or more of the occupants of the corners of the triangle without reflexively and inexorably experiencing it in a combined sense with the occupants of the other corners of the triangle.

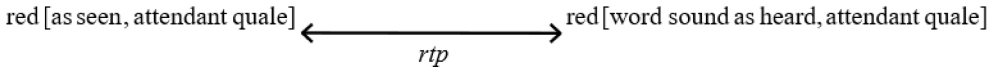
On this basis – and with close reference to the above quote from Champagne – it is apparent that the overall primary cojoint complex for red can be aligned with the Peircean idea of the sign 'red' viewed at the level of Thirdness, and that the occupant of the apex of the complex, red[concrete common feature], may be aligned with the sign 'red' viewed as its type.

[51] Peirce's work is vast, and he revised it over his lifetime. The brief comparisons made here must therefore be cursory, and are reliant on Champagne's understanding of certain aspects of Peirce's work. So the intention here is to show there are rough parallels and to encourage interest, rather than to present any rigorously worked through claims.

[52] By virtue of the language learning operations described in §B2.

In this sense, what have been defined and referred to in the main text as 'common features' – and as the contents of a person's, and of their language using group's, W[z] – can be aligned with the Peircean idea of types.

It can also be proposed that a first application of prescission to the cojoint complex shown in Fig. 20 will yield the occupant of its bottom right-hand corner – i.e. the synthetic quale,[53] red[word sound as heard, attendant quale] – and that this can be aligned with the Peircean idea of the sign 'red' viewed at the level of Secondness and as its token. Here the attribute of 'Secondness' is carried in holding red[word sound as heard, attendant quale] to be an *attendant* quale, not a *pure* quale, and in its reflexive two-way pointing to the quale red[colour as seen, attendant quale]:



It can then be proposed that further application of prescission, this time to red[word sound as heard, attendant quale], will yield red[word sound as heard, *pure* quale], which can broadly be aligned with the Piercean idea of the sign 'red' viewed at the level of Firstness and as its tone.

Although these alignments are broad, they clearly demonstrate some overlap in the ideas presented above – of pure and attendant qualia, cojointness and cojoint complexes – and those of Firstness, Secondness and Thirdness, and of tone, token and type proposed by Peirce.

In the period since Peirce, the terms type and token have taken on new meanings and usages, while use of the term tone has fallen away (17). Even so, more recent meanings of the term type (13)[54] seem still to align well with the concept of a common feature, as described in this appendix and in the main text.[55]

Likewise, more recent meanings of the term token (13) align well with the concept of attendant qualia.

Hence the term token can readily be seen to apply to the concrete here-and-now of attendant *c*-qualia. For example, in Scenario 3 of §B6 above,[56] when Akari hears, $^{\mathbf{A}}$red ball[word sounds as heard, attendant *c*-qualia] she clearly can be considered to be encountering a token for the type, $^{\mathbf{E}}$red ball[concrete common feature].

Moreover, if Akari were to imagine hearing – perhaps by subvocalising – $^{\mathbf{A}}$red ball[word sounds as heard, attendant *c*-qualia], then she would be encountering $^{\mathbf{A}}$red ball[word sounds as heard, attendant *i*-qualia], where this might equally be considered an encounter with a token for the type $^{\mathbf{E}}$red ball[concrete common feature].

B8 Inverted spectra and Inverted Earth

The primary purpose of this section is to show that the conceptual framework developed in the main text, CF1, as further developed in this appendix – call this CF1b – can be used to precisely describe and lend context to the results of thought experiments that rely on the idea that a person's colour perception might – by some proposed means – be inverted such that they go from perceiving colours 'normally' to perceiving them inverted.[57]

Whatever those proposed means, it is clear by inspection of Figs B19 and B20 that under CF1b *all* such means must involve an 'intervention' that either:

(α) modifies the RBC that is processing input from contents of W[r] and is mapping that input into the contents of a person's W[i]; *or*

(β) modifies the input from contents of W[r] ahead of that input arriving to be processed by a person's RBC.

---

[53] See §B3 Fig. B2 for the definition of a synthetic quale.
[54] Since ref (13) provides a comprehensive, readily available description of the conventional and general usages of the terms type and token, readers are referred to that reference to satisfy themselves that the term type as it is described in (13) aligns well with the concept of a common feature, and that the term token as it is described in (13) aligns well with the concept of an attendant qualia, as further explained above.
[55] With this the idea of universals (18) – including properties, relations and kinds – can also to some extent be aligned to the idea of common features, as can the Platonic idea of forms (19), where Plato's idea of a 'realm' of 'forms' can roughly be aligned to the idea advanced in the main text of a 'world' or 'level' of 'common features', i.e. W[z].
[56] See §B4*(iv)*.
[57] Typically, a person starts out seeing coloured objects respectively as say red, yellow, blue and after such inversion sees the same objects as green, purple, orange, but see (20) for a full description of various kinds of qualia inversion, including colour inversion.

Modifications to the neurology[r] of those parts of a person's D[r] that implement their RBC could constitute the first type of intervention, whereas fitting the person with colour inverting lense[r]s – perhaps by having such lense[r]s implanted in their eye[r]s – would be an example of the second.

Both kinds of modification are to the contents of W[r], which is consistent with the proposal in the main text that all information processing takes place among the contents of W[r].[58]

(i) Colour inversion – the intrapersonal inverted spectrum thought experiment

The following example recasts Ned Block's thought experiment of an intrapersonal inverted spectrum (11) in terms of CF1b. Here, the following four stages for an English language using test subject, Alice, parallel the four stages of the intrapersonal inverted spectrum described by Block.

1. Initial stage

(a) Alice's RBC is stable and operating as it normally has for her.

(b) Alice's cojoint complexes are stable and are operating as they normally have for her.

In this situation Alice has that:

- red**o**[r] input to her RBC causes her to experience $^{\mathbf{A}}$red[as seen, attendant quale], which for her points to, and is pointed to by, $^{\mathbf{A}}$red[word sounds as heard, attendant qualia] and $^{\mathbf{E}}$red[concrete common feature]
- likewise, green**o**[r] input to her RBC causes Alice to experience $^{\mathbf{A}}$green[as seen, attendant quale], that for her points to, and is pointed to by, $^{\mathbf{A}}$green[word sounds as heard, attendant qualia] and $^{\mathbf{E}}$green[concrete common feature].

So for Alice red**o**[r] causes her to experience $^{\mathbf{A}}$red[as seen, attendant quale] which, through her *previous* language learning operations, she has learned to experience as an attendant quale cojoined to the CCF $^{\mathbf{E}}$red[concrete common feature] that she and members of her language using group call "red".[59]

Likewise, green**o**[r] causes Alice to experience $^{\mathbf{A}}$green[as seen, attendant quale] which, through her previous language learning operations, she has learned to experience as an attendant quale cojoined to the CCF $^{\mathbf{E}}$green[concrete common feature] that she and members of her language using group call "green".[60]

Alice tells people blood looks red and grass looks green. They agree. (Figure B22 provides a WLD describing Alice's situation at Stage 1.)

2. Transition stage A

Alice takes a blow to the head such that immediately afterwards:

(a) Alice's RBC is altered: it is stable, but it is now abnormal for her relative to where it was at 1(a) above.

(b) Alice's cojoint complexes are operating as they normally have for her – i.e. just as at 1(b) above – but they are now unstable.

In this situation the blow to the head has altered Alice's RBC such that:

- red**o**[r] input to her RBC now causes her to experience her quale $^{\mathbf{A}}$green[as seen, attendant quale] that for her, due to her initial language learning operations, points to, and is pointed to by, $^{\mathbf{A}}$green[word sounds as heard, attendant qualia] and $^{\mathbf{E}}$green [concrete common feature]; and
- green**o**[r] input to her RBC now causes her to experience her $^{\mathbf{A}}$red[as seen, attendant quale] that for her, due to her initial language learning operations, points to, and is pointed to by, $^{\mathbf{A}}$red[word sounds as heard, attendant qualia] and $^{\mathbf{E}}$red[concrete common feature].[61]

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[58] See §6 main text.

[59] Where, to be precise, they call it "red" by saying at the W[r] level the word sounds, $^{\mathbf{E}}$red**v**[r] (as per the ideas and notation developed in §B6*(iv)* above).

[60] Where, as per ibid, they call it "green" by saying at the W[r] level the word sounds, $^{\mathbf{E}}$green**v**[r].

[61] So here the blow to Alice's head is an 'intervention' of the first type, as described at (α) in introduction to this section. In Block's scenario (11) the intervention is of the second type, described at (β). Whether the intervention is of type (α) or (β) makes no material difference to the key features of this experiment or its analysis, but using an intervention of type (α) here is helpful with respect to ideas presented in the closing paragraphs of this section.

So for Alice red**o**[r] now causes her to experience her ^{A}green[as seen, attendant quale], which she has learned to experience as an attendant quale cojoined to the CCF ^{E}green[concrete common feature] that she and her language using group call "green".

Likewise, green**o**[r] now causes Alice to experience her ^{A}red[as seen, attendant quale], which she has learned to experience as an attendant quale cojoined to the CCF ^{E}red[concrete common feature] that she and her language using group call "red".

Alice tells people that, following her head injury, blood now looks green to her, and grass now looks red to her. They tell her something is wrong with her. She agrees with them, because she remembers blood used to look red to her and grass used to look green.

People tell Alice that for them blood still looks red and grass still looks green. She tells them it is not just blood and grass that have inverted for her, but that all of the things she earlier saw as red or green have, to her eyes, changed over.

Even so, Alice's need to communicate effectively with others forces her to start to call things "green" that she would previously have called "red" and visa versa. This is a struggle at first, but it gets easier with practice.[62]

3. Transition stage B

After a year, the change that Alice has made to her use of words has become second nature and entirely automatic for her. Here then:

(a) Alice's RBC remains altered: it is stable, but still abnormal for her relative to where it was at 1(a). But because it has been stable for so long it can be considered to be at a *new* normal.

(b) Alice's cojoint complexes are now abnormal for her relative to where they were at 1(b), but after a year they are also stable and can also be considered to be at a *new* normal.

In this situation Alice now has that:

- red**o**[r] input to her RBC causes her to experience ^{A}green[as seen, attendant quale], that for her, due to her *further* language learning operations, now points to, and is pointed to, by ^{A}red [word sounds as heard, attendant qualia] and the CCF ^{E}red[concrete common feature].
- green**o**[r] input to her RBC causes her to experience ^{A}red[as seen, attendant quale], that for her, due to her further language learning operations, now points to, and is pointed to by, ^{A}green[word sounds as heard, attendant qualia] and the CCF ^{E}green[concrete common feature].

What has happened is that Alice has, by her further language learning operations, *re-learned* some language – where her need to communicate clearly, has forced her to *disassemble* and *reassemble* her relevant cojoint complexes – such that she now experiences the quale she has always experienced as ^{A}red[as seen, attendant quale] as an attendant quale cojoined to the CCF ^{E}green [concrete common feature] that she and her language using group call "green".

Alice also now experiences the quale she has always experienced as ^{A}green[as seen, attendant quale] as an attendant quale cojoined to the CCF ^{E}red[concrete common feature] that she and her language using group call "red".

Alice tells people blood looks red and grass looks green. They agree.

In Block's thought experiment (11) the only thing that now leads Alice to believe anything is abnormal is that she can remember having once experienced ^{A}red[as seen, attendant quale] as an attendant quale cojoined to the CCF ^{E}red[concrete common feature] called "red" by her language using group, and having once experienced ^{A}green[as seen, attendant quale] as an attendant quale cojoined to the CCF ^{E}green[concrete common feature] called "green" by her language using group.[63]

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[62] In terms of the general case described in the closing paragraphs of §B6 (pp 14) what has happened to Alice is that the intervention envisaged at Stage 2 disrupts the qualia-independence of her cojoint complexes for colour, leading to an 'observable' destabilisation of the meta-semantic relationships she has previously learned to apply between red**o**[r] and ^{E}red[concrete common feature], and green**o**[r] and ^{E}green[concrete common feature]. Another way of saying this is that, with respect to Alice's ongoing language use, this disruption leads to contents of the W[i] sets in the middle column of the diagram shown below in Fig. B22 becoming 'functionally visible' to her and others during Stage 2, and – the caveat at footnote 63 notwithstanding – functionally visible to her during Stage 3.

[63] In Block's thought experiment, this form memory is allowed for Alice at a proposed Stage 3. But if such a strange thing as the spectrum inversion Block envisages ever actually happened to a person, and forced them to relearn their language use for colour, it is not at all clear that the relearning of language proposed above would actually permit the person to retain a memory of how they had previously experienced colour.

4. Final stage

Alice takes another blow to the head. With it she loses all memory that she had once experienced ^{A}red[as seen, attendant quale] as an attendant quale cojoined to the CCF ^{E}red[concrete common feature] called "red" by her language using group, and had once experienced ^{A}green[as seen, attendant quale] as an attendant quale cojoined to the CCF ^{E}green[concrete common feature] called "green" by her language using group.

By Stage 4 it may seem there is no difference between Alice at Stage 1 and Alice at Stage 4 and, as Block argues (11), there will indeed be no *functional* difference.

But scientists using instruments able in enough detail to record Alice's brain physiology and activity as she passes through all four stages will – if CF1b is sound – have been serially able to observe:

- normal Alice at Stage 1;
- an enduring and stable change in Alice's brain (a change that affects her RBC) due to the first knock to her head, at Stage 2;
- the beginnings of change in language centres in Alices brain (as she begins remedially to reassemble her relevant cojoint complexes) at Stage 2;
- completion and stabilisation of that change in language centres in Alice's brain, at Stage 3; and
- the change in the memory centres in Alice's brain due to the second knock on the head (leading her to forget the way she experienced colour at Stage1) accompanying completion of Alice's 'return to normal' at Stage 4.

So it would be clear to the scientists that Alice's brain at Stage 4 is different in these specific ways to Alice's brain at Stage 1. What the scientists will have been able to test and describe – and by this means collectively to describe and agree upon at the level of contents of their W[z] level – will correspond[64] to clear differences in the contents of W[r] between Alice's brain[r] at Stage 1 and Alice's brain[r] at Stage 4.

A second version of this thought experiment can also be considered, with the difference being that at Stage 1 above, Alice has not yet learned any language. Call this pre-language Alice, Alice2.

So say that at Stage 1 Alice2's RBC is stable and operating as it normally has for her. Then say that Alice2 takes a blow to the head that makes the same alteration to her RBC as was made to original Alice at Stage 2. Alice2's colour qualia invert. But because she has not yet learned any language, Alice2 will not yet have cognitively assembled any cojoint complexes. She may notice the sudden qualia inversion, but she can't tell anyone about it.

Alice2 can then go on to learn language in an entirely normal way, because in this revised scenario she will not experience a need to re-learn any words. So Alice2's counterpart to achieving Stage 3 will be a normal – as opposed to remedial – language learning operation. Still, as for original Alice, Alice2 might just possibly remember at stage 3 that at some point her colour qualia inverted. (But since the inversion will have caused her no inconvenience, such a memory would probably barely, if ever, cross her mind.)

Then, after a second blow to the head removing that memory, Alice2 would become functionally identical to Alice at Stage 4 of the original scenario. Through these stages, scientists would also be able to track the relevant changes to Alice2's brain, just as they were able to do for Alice's brain.

What this second version of this thought experiment shows is that pre-language, there is no reason why an infant's RBC could not be formative, and might not be evolving, leading to alteration or adjustment in any qualia, T_1[i], that she experiences as a mapping into her W[i] of any given T_1[r].[65] All that will matter is that her RBC is approaching stabilisation onto one or another more-or-less fixed and effective mappings of contents of W[r] onto the contents of her W[i] by the time her language learning commences.

In other words, in the example of colour – and presumably for the more general case – if pre-language shifts occur in a person's RBC relative to the RBCs of others, these might have little impact on how that person performs relative to others in eventually learning to use a language.[66]

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[64] Where the term 'correspond' is used here as it is used in §4 of the main text.
[65] For a reminder of the meaning of terms such as T_1[r] see §1 of the main text.
[66] This possibility could allow for some fluidity in a person's RBC as they begin the process of language learning, where this might assist – as they work to learn how to communicate with others in some specific language using group – in getting their RBC to settle and stabilise in a way that maximises its similarity to the RBCs of those others, pursuant to the need for such 'similarity' as described under requirements (ii) and (iii) in §4 of the main text. If such fluidity exists, it might then lead to some degree of linguistic relativity among the contents of the W[i]s of members of one language using group in relation to the contents of the W[i]s of members of some other language using group – i.e. to some difference in perceptions of the physical world among people in one language using group versus perceptions of the physical world among those in another. Evidence has been found to support linguistic relativity in colour perception (21), which is the most heavily researched area of relevance (22), but more research is needed to show whether such relativity might apply more broadly to people's perceptions of the physical world.

(ii) Describing Block's intrapersonal inverted spectrum experiment using world level diagrams
Figure B22 uses WLDs to describe the initial and final stages – i.e. Stages 1 and 4 – for Alice as detailed above. In the diagrams Alice is the test subject and Bob is the control, such that Bob can be held to be typical of all normal English language users relative to Alice.

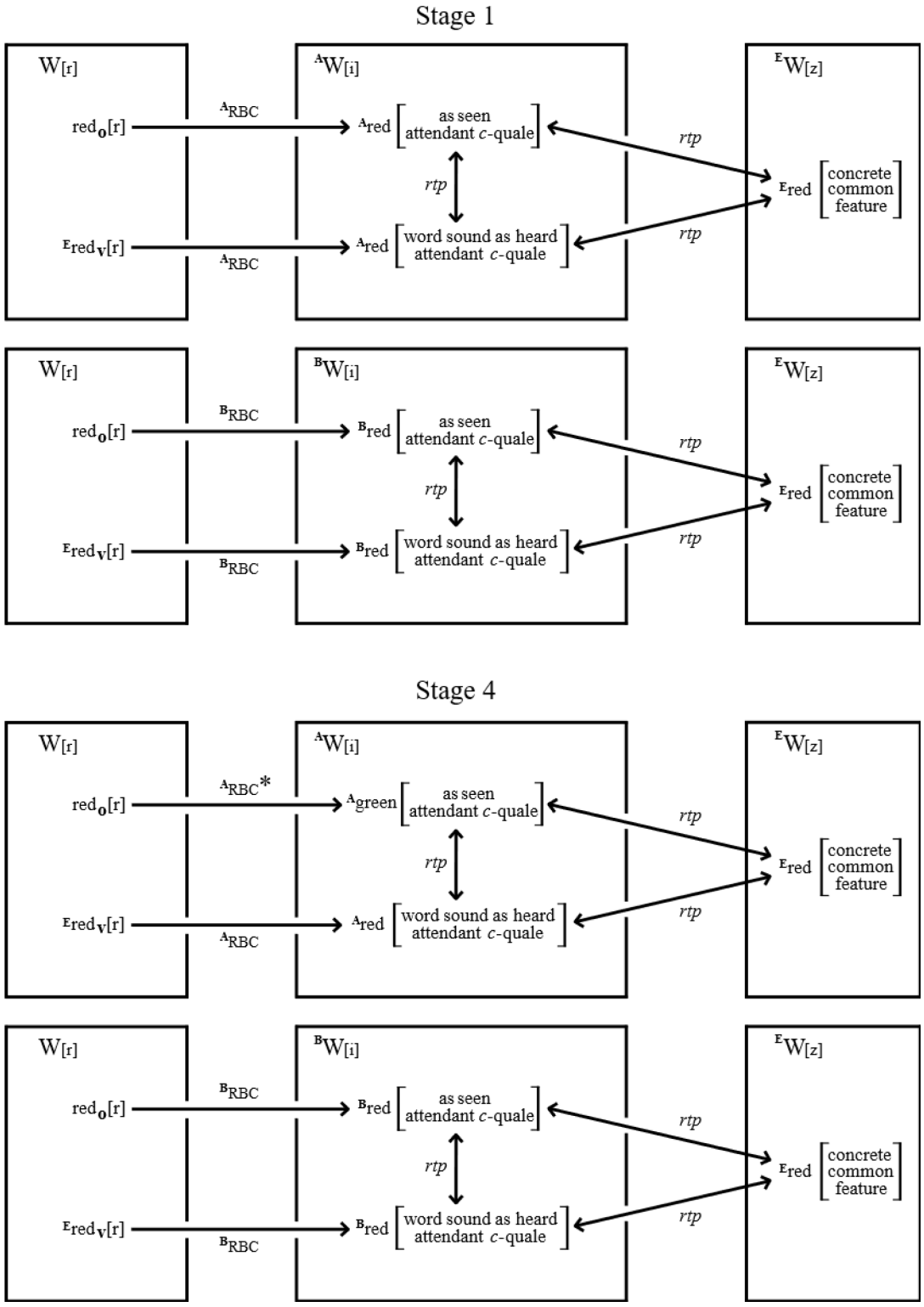

Figure B22

Figure B22 uses world level diagrams to describe the situation for Alice – and for a control subject, Bob, who can be considered typical of all people in the English language using group – at Stages 1 and 4 of Block's intrapersonal inverted spectrum thought experiment. The diagrams show two situations where both Bob[r] and Alice[r] are here-and-now seeing red**o**[r] and Bob[r] is pointing at it and saying red**v**[r]. The asterisk on Alice's RBC at Stage 4 flags that it has been modified to colour invert sensory input. By Stage 4 Alice has relearned her cojoint complex for ^{E}red[concrete common feature] so that she can again communicate about it in an entirely natural and reflexive way with other members of the English language using group. Hence by Stage 4 – as Block proposes – Alice will be functionally identical to herself at Stage 1, even though in going from Stage 1 to Stage 4 her qualitative experience of red**o**[r] will have changed, as will the neurology[r] of the RBC operating within her D[r], and of her language centre[r]s.

(iii) Describing Block's Inverted Earth scenario using world level diagrams

Figure B23 uses WLDs to show, from (a) to (d), each of the four kinds of people in Block's Inverted Earth scenario (11),[67] where two Earths are envisaged: Our Earth, where everything is normally coloured and named using 'Our English', and Inverted Earth, where all colours are inverted relative to Our Earth and all of the names for colours are inverted, which means they are named in what can be called 'Colour Inverted English'. In Fig. B23 all people are here-and-now looking at the sky and naming out loud the colour they see.

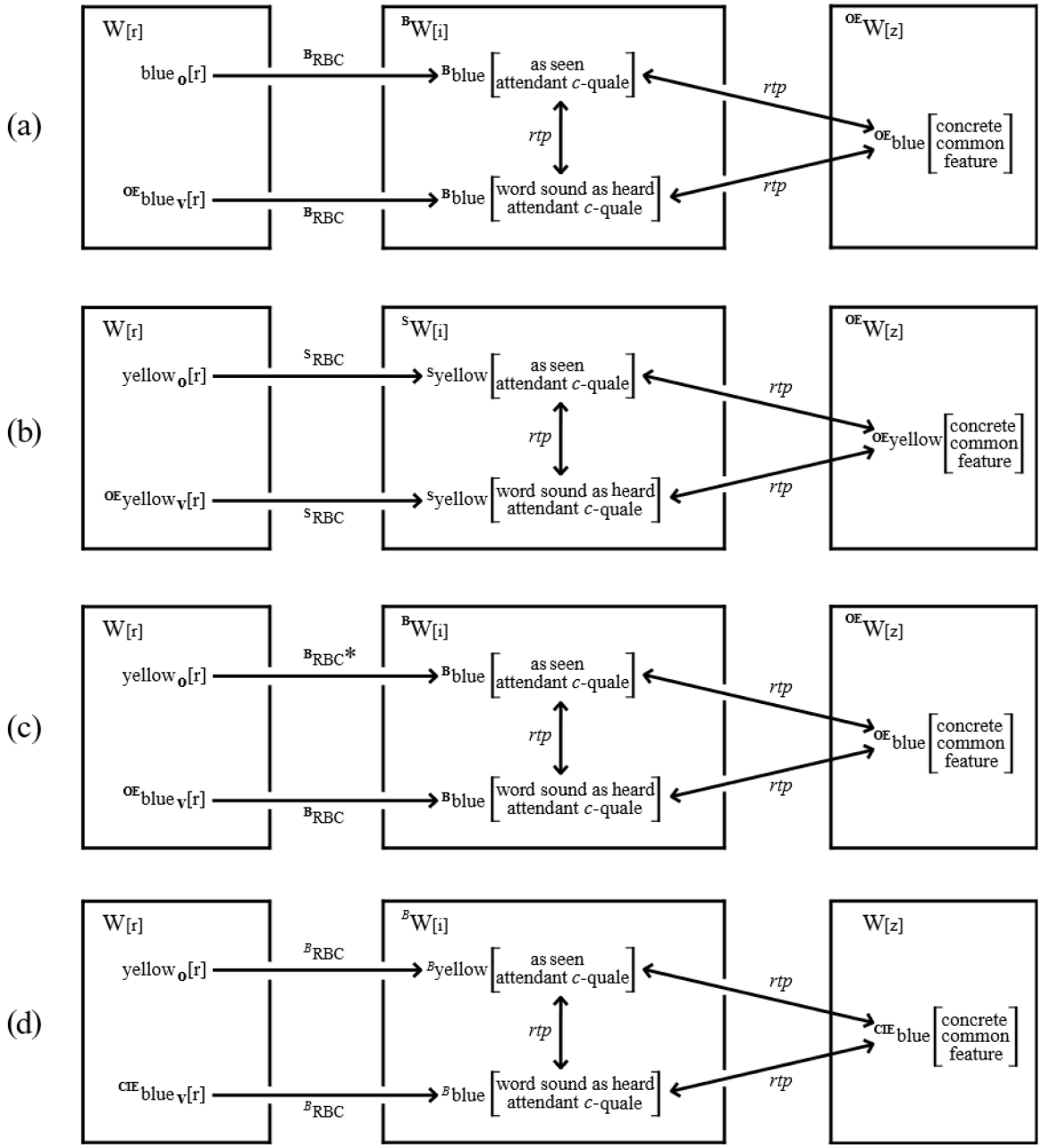

Figure B23

Figure B23 gives a WLD for each of the four kinds of people envisaged in Block's Inverted Earth scenario as they stare at the sky, naming out loud the colour they see. **(a)** shows Normal Earth Bob on Our Earth. **(b)** shows a normal scientist from Our Earth visiting Inverted Earth. **(c)** shows Normal Earth Bob, unknowingly on Inverted Earth and unknowingly implanted with colour inverting lenses, signified ^{B}RBC*. **(d)** shows Inverted Earth twin Bob on Inverted Earth. Block uses the scenario to argue that if Normal Earth Bob (a) is unwittingly modified to become (c), unwittingly smuggled to Inverted Earth and unwittingly substituted for his twin (d), he will seamlessly find his phenomenal and language use experiences to be identical to when he was on Our Earth, even though seeing yellow$_{\mathbf{o}}$[r] is now causing him to experience ^{B}blue[as seen, attendant *c*-quale] and to name it as for ^{OE}blue[concrete common feature] whereas previously it was seeing blue$_{\mathbf{o}}$[r] that caused him to experience ^{B}blue[as seen, attendant *c*-quale] and to name it as for ^{OE}blue[concrete common feature]. In other words, as Block claims, in going from (a) to (c) Normal Earth Bob will have become functionally identical to the Inverted Earth twin he replaces, even though in going from (a) to (c) his RBC will have changed such that his qualitative experience of yellow$_{\mathbf{o}}$[r] will have changed and will remain different to Inverted Earth twin Bob's qualitative experience of yellow$_{\mathbf{o}}$[r]. So again, as for Alice's inverted intrapersonal spectrum scenario at §B8*(i)*, Block's proposals and positions in relation to Inverted Earth: (i) can effectively be described and understood using CF1b; (ii) do not undermine CF1's claims as to how qualia can be generated for a person within a supervenience physicalism;[68] and (iii) are supported by CF1b in exposing limits to functionalism.

[67] Readers are referred to (11) if they are unfamiliar with the set up for Block's Inverted Earth scenario.
[68] As per §6 of the main text.

B9 What Mary and Jane learn

Figure B24 uses WLDs to describe precisely and fully what it is that Mary learns – i.e. what forms of knowledge she gains – when she leaves her room and sees colours, including red, for the first time, in the scenario originally described by Frank Jackson (23), and discussed in §5*(ii)* of the main text.

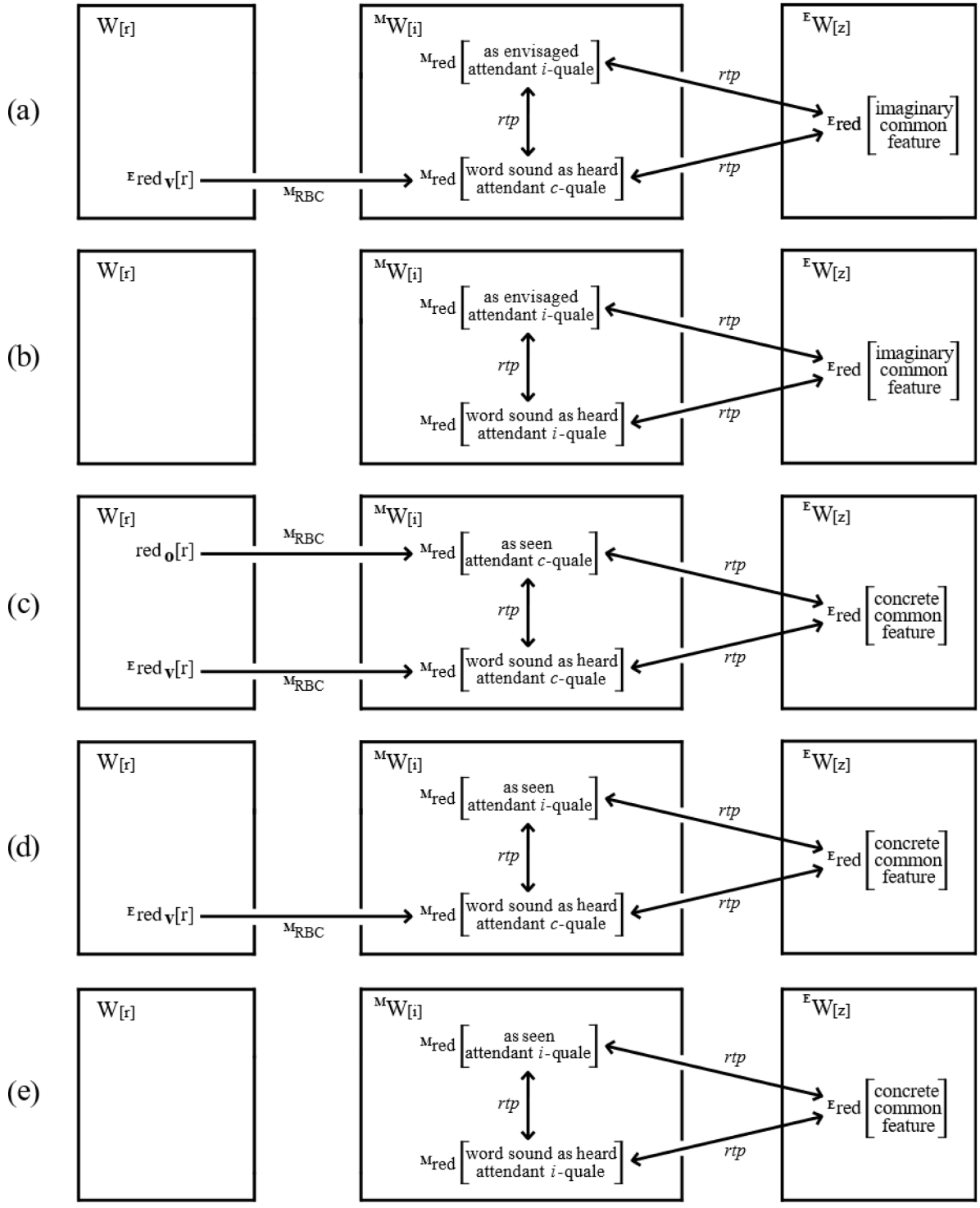

Figure B24

Figure B24 (a) shows a WLD describing what Mary knows/experiences as she hears the word 'red' spoken aloud at any time *before* she has left her room and has ever seen the colour red. **(b)** shows a WLD describing what Mary knows/experiences as she imagines seeing the colour red or imagines hearing the word 'red' at any time *before* she has left her room and has ever seen the colour red. **(c)** shows a WLD describing what Mary knows as she hears the word 'red' spoken aloud at any time *after* she has left her room, is actually here-and-now seeing the colour red, and has become familiar with seeing red and with accurately naming the colour she sees. **(d)** shows a WLD describing what Mary knows as she hears the word 'red' spoken aloud at any time *after* she has left her room, and has thus previously seen the colour red, but is not here-and-now seeing the colour red. **(e)** shows a WLD describing what Mary knows as she imagines seeing the colour red or imagines hearing the word 'red' at any time *after* she has left her room and has thus previously seen the colour red, but is not here-and-now seeing the colour red.[69]

[69] The caveat applied to Fig. B20 – which is that the status of *i*-qualia as contents of a person's W[i] be regarded as provisional pending §B13 – applies to the *i*-qualia shown in Fig. B24. Again, this provisional status can reasonably be applied since, as discussed in §B15*(vi),* *i*-qualia can be considered to function as simulants of contents – i.e. as virtual contents – of a person's W[i].

The WLDs at stages (a) and (b) in Fig. B24 describe what Mary can know/experience before she has left her room and has actually experienced seeing colours. Here Mary's situation in relation to red parallels Joan's situation in relation to the neutron, as described in §B4*(iv)*.

Consistent with ideas developed in §B4*(iii)-(iv)*, it is proposed here that Mary – as a scientist who knows all that can be known through scientific study and communication about the colour red, but who has never actually experienced red as a phenomenon – will have developed (learned to envisage) some form of attendant natural *i*-quale for red and in so doing will have developed her own *phenomenal concept* of red.

In exactly the same way, Joan – a scientist who knows all that can be known through scientific study and communication about the neutron, but has never actually experienced a neutron as a phenomenon – will have developed (learned to envisage) some form of attendant natural *i*-quale[9,9(b)] for neutron and in so doing will have developed her own phenomenal concept of neutron (see §B4*(iv)*).

Because these phenomenal concepts are qualia – specifically, [as envisaged, attendant natural *i*-qualia] – they will be *entirely private* forms of knowledge/experience for Mary and Joan. But when either woman refers in communication with other scientists to red or to neutron these phenomenal concepts will form an integral part of what they believe they are talking about, and will be an integral part of what they believe other scientists are talking about, when those scientists refer to red or to neutron.

Although Joan will never be able directly to experience a neutron as part of the contents of her phenomenal world, W[i] – and so the neutron will always be an imaginary common feature for her – Mary will, on leaving her room, be able directly to experience red as part of the contents of her W[i].

Accordingly, the WLD at stage (c) in Fig. B24 describes what Mary knows/experiences as she here-and-now hears the word 'red' spoken aloud and here-and-now sees the colour red, at any time after she has left her room and has become familiar with seeing the colour red and with accurately naming the colour she sees.

Stages (d) and (e) describe what Mary will know/experience at any time after she has left her room and has become familiar with seeing red and with accurately naming the colour she sees and is: at (d), here-and-now hearing the word 'red' spoken aloud but is *not* here-and-now seeing the colour red, and is at (e) neither here-and-now seeing the colour red nor hearing the word 'red' spoken, but is simply conceiving of red.

On this basis, the forms of knowledge Mary will gain in going from being locked in her room, having never seen red, and being able only to know/experience what is described in (a) and (b), to getting out of her room and becoming familiar with seeing the colour red and accurately naming the colour she sees, and thereby being able to know/experience what is described in (c) and (e) will be:

(α) a here-and-now – in the moment – 'what it is like' knowledge of a raw experience of $^{\mathbf{M}}$red[as seen, attendant *c*-quale] in the contents of her W[i] whenever she actually here-and-now sees red; and

(β) when she is not here-and-now seeing red, but imagines red – an *entirely private* phenomenal concept of red that will include $^{\mathbf{M}}$red[*as seen*, attendant *i*-quale], and will thereby have *more to it* – specifically, her net recall of 'what it is like' actually to see red – than her earlier *entirely private* phenomenal concept of red as the 'place holder', $^{\mathbf{M}}$red[*as envisaged*, attendant natural *i*-quale].

Figure B25 uses WLDs to describe what it is that Jane learns when, in learning English, she learns to use the word 'red', as per the scenario described in §B1 and §B2 above, and in §5*(ii)* of the main text.

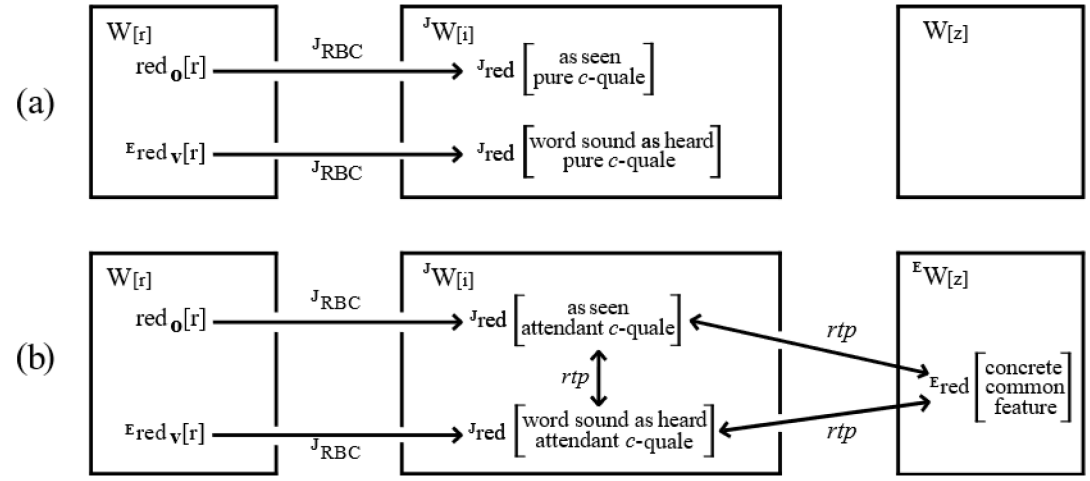

Figure B25

Figure B25 (a) shows a WLD describing what Jane experiences/knows when she sees the colour red and hears the word 'red' spoken aloud at a time before she has learned English (or any other language); **(b)** shows a WLD describing what Jane experiences/knows when she sees the colour red and hears the word 'red' spoken aloud at a time after she has learned English. Within the paradigm of CF1b, and as described at length in §B2, what she will have learned through her cognitive assembly and retention of the cojoint complex shown in (b) will be of the existence of – and how to name and communicate about – $^{\mathbf{E}}$red[concrete common feature].

B10 Sentences

Having developed the idea of common features and of how – through learning and use of a language – these may be formed and sustained as contents of a language using group's W[z], the following section extends the approach developed above – particularly in §B4 and §B5 – to propose how the idea of common features, and the cojoint complexes that for each person subtend them, can be applied to understanding how people commonly communicate and think about the physical world.[70]

Clearly, people mainly learn to understand and use language by practicing listening to, and speaking in, sentences and larger arrangements of words made from sentences.[71] This raises a question of how what have been described above as common features, attendant qualia and cojoint complexes can be related to the learning and use of sentences.

One way this question can be addressed is by introducing the idea of *aggregate cojoint complexes.* Say that, beyond cognitively assembling the kinds of constituent cojoint complexes described in preceding sections, that in learning a language a person will reach a stage where they will – either when hearing or reading, or wanting to say or write, a typical sentence about physical matters – spontaneously cognitively *construct* an *aggregate cojoint complex* by combining two or more constituent cojoint complexes.[72]

Say then that all aggregate cojoint complexes, so constructed, will be such that all typical sentences that refer to the physical world can be viewed as forming the synthetic corner of an aggregate cojoint complex in the same way as it has been proposed above that a name of any common feature, such as 'red', can be viewed as forming the synthetic corner of a constituent cojoint complex.[73]

Now consider a scenario where Jane is proficient in English, has a wide vocabulary, and communicates in grammatically correct sentences, and that Bob is also a capable user of English.

Say then that Jane enters a room by one door, closes it, and that Bob then enters by another door, and that they are now both looking at the door Jane entered by, as Jane says the English sentence, K, to Bob where:

K = "Behind that door there is a crate of hot platinum bars sitting on a table."

The proposal here then – consistent with the idea of aggregate cojoint complexes described above – is that when Bob here-and-now hears what Jane says, it inexorably evokes in him spontaneous cognitive construction of an aggregate cojoint complex of the form shown in Figure B26.

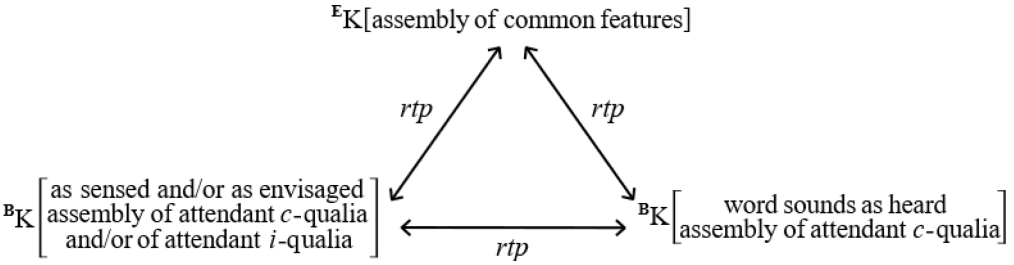

Figure B26

Figure B26 shows the aggregate cojoint complex Bob will spontaneously construct and experience as he hears a typical English sentence, K[word sounds as heard, assembly of attendant *c*-qualia], as part of the here-and-now contents of his W[i] and is proficient in English. The generic form 'as sensed' is used since more than one sensory mode applies.[74] The aggregate cojoint complex shown is a *general form* in so far as it allows Bob to have previously experienced either some or all of the natural qualia he is spontaneously assembling at the bottom left-hand corner – i.e. the natural corner[73] – of the complex as he hears Jane speak. A maximally general form of aggregate cojoint complex would, for any typical person, P, be precisely as given in Fig. B26 but would instead have at its synthetic corner, PK[words *as sensed*, assembly of attendant *c*-qualia and/or of attendant *i*-qualia]. This maximally general form would then also cover the possibilities of someone spontaneously constructing an aggregate cojoint complex (i) by here-and-now sensing a sentence by hearing word sounds, reading text, seeing hand signing, feeling Braille etc.; *or* (ii) by invoking such a complex through imagining hearing, reading, feeling etc. a sentence, e.g. through sub-vocalisation.[34(c)]

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[70] NB: The main text, and this appendix, focus on what people call 'the physical world' and its contents, including how we each experience and communicate about those contents. Other matters people communicate about – e.g. social matters or emotions – fall outside the scope of this work.
[71] Although word-by-word learning will dominate the earliest stages of a person's language learning.
[72] See §B4, and specifically Figs B4 and B7, for the definition of the term constituent cojoint complexes, and what is meant by constituent cojoint complexes of the first, second, third, fourth, fifth and sixth kinds.
[73] To remind, as defined in §B3, at Fig. B2: (1) Natural qualia are those qualia that a person experiences as arising as 'natural' contents of their phenomenal world, W[i], whereas synthetic qualia are those qualia that a person experiences as arising 'synthetically', i.e. as expressions of a language, in the contents of their W[i]; (2) In the diagrams developed here, the convention adopted is that the natural corner of a cojoint complex is shown as the complex's bottom left-hand corner and the synthetic corner is shown as the complex's bottom right-hand corner.
[74] The definitions of 'as sensed' and 'as envisaged' are provided at footnotes 34(b) and 22 respectively. For Bob, two sensory modes here are visual and thermoceptive.

Note that the aggregate cojoint complex shown in Fig. B26 has at each of its respective corners what is being called an *assembly* of synthetic qualia, an *assembly* of natural qualia, or an *assembly* of common features. Now, say that when a sentence, K, is grammatically sound, this means that *each* of these assemblies will have its own specific *configuration*. Respectively call these proposed configurations an aggregate cojoint complex's *semantic configuration*, its *phenomenal configuration*, and its *common configuration*. Say then – as will be explained below – that the way these configurations relate to each other is fundamental to enabling people to use and understand sentences to communicate with each other.

To elaborate, the aggregate cojoint complex shown in Fig. B26 has at its synthetic corner:

B "Behind that door there is a crate of hot platinum bars sitting on a table" [word sounds as heard, assembly of attendant *c*-qualia]

Now have it that the assembly **B**[word sounds as heard, assembly of attendant *c*-qualia] that is the sentence K as Bob here-and-now hears it as part of the contents of his W[i], exhibits a semantic configuration that is expressed in, and is defined by the *grammatic structure* of K, which for any sentence is taken here to include what Bob perceives to be:

- the order of the sentence's word sounds;
- the expression – through those word sounds and their order – of all of the different parts of the sentence, including any of what we call:
  - nouns, verbs, adjectives, adverbs, pronouns, prepositions, conjunctions, articles, etc.
- and including any of what we call:
  - subjects, predicates, objects, complements, modifiers, etc. in the sentence

where the word sounds Bob spontaneously hears as names of common features will be embedded within, and be part of, the grammatic structure of the sentence.

Crucially, say that in learning language Bob will not only have learned word sounds that name many of its common features but, integral to that process, he will also have learned *reflexively* to interpret the grammatic structure of any sentence such that, when heard as a whole, that sentence will *automatically define* for him the phenomenal configuration of the assembly of attendant qualia evoked for him at the natural corner of the aggregate cojoint complex that he spontaneously constructs when he hears the sentence.

Put slightly differently, what is being proposed is that the names of common features contained in any sentence, K, combined with how these are embedded as part of the grammatic structure of K, will *define* for Bob the configuration of **B**K[as sensed and/or as envisaged, assembly of attendant *c*-qualia and/or attendant *i*-qualia] that he will spontaneously experience as part of experiencing the aggregate cojoint complex that is evoked in him when he hears that sentence as **B**K[word sounds as heard, assembly of attendant *c*-qualia].

So when Bob here-and-now perceives in his W[i] the grammatically correct sentence **B**K[word sounds as heard, assembly of attendant *c*-qualia] (synthetic corner) that Jane is saying above, he will inexorably and reflexively construct and experience an aggregate cojoint complex that will entail his experiencing a *specific* phenomenal configuration of **B**K[as sensed and envisaged, assembly of attendant *c*-qualia and attendant *i*-qualia] (natural corner) that will be his own *private* and *unique* way of imagining/conceiving of/conceptualising what it is that Jane is seeking to communicate – i.e. is seeking to describe – by saying K.

In other words, when Bob – as a proficient user of English – hears the sentence K, he will reflexively envisage the physical circumstances the sentence is describing in the form of his own private and unique imagining of a specific phenomenal configuration of his own natural *c*-qualia and *i*-qualia, where this can be considered to be Bob's own, private *phenomenal concept* of what Jane *means* by saying, "Behind that door there is a crate of hot platinum bars sitting on a table".[75, 76]

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[75] The term 'and/or' has been replaced by 'and' in this and the previous paragraph because, for the specific sentence under consideration, Bob will be both *directly* perceiving as *c*-qualia some of the qualia at the natural corner of the aggregate cojoint complex he is reflexively constructing – namely, door[as seen, attendant *c*-quale] – and he will be *imagining* perceiving as *i*-qualia some of the qualia at that corner – including table[as seen, attendant *i*-quale], hot[as felt, attendant *i*-quale] and platinum[as envisaged, attendant *i*-quale].

[76] NB: (a) The example K being used here is typical of most sentences people use when communicating about the physical world in that the aggregate cojoint complex it evokes for any listener or reader entails evocation of *i*-qualia. Sentences involving *only c*-qualia are relatively uncommon and are usually reports about shared physical circumstances. An example would be where one person accurately reports to another: "Here we are sitting in the sun having a cup of tea." The question of whether any 'imagining/conceiving of/conceptualising' is going on when a person hears/reads such sentences is left to readers to consider. Meanwhile, the key point being made in the text above is that whenever *i*-qualia *are* evoked as constituents of the configuration of qualia at the natural corner of any aggregate cojoint complex that a person constructs when hearing/reading a sentence, that person will certainly be 'imagining/conceiving of/conceptualising' what is being meant by the sentence, and that in so doing they will be forming their own phenomenal concept of what the sentence means.

(b) Note here also that the term 'phenomenal concept' is being used above in relation to aggregate cojoint complexes in precisely the same way that it was introduced in §B4*(iii)* for use in relation to constituent cojoint complexes. (See §B11 for more on this).

Figure B27 shows a WLD describing the specific system for Jane and Bob, as Jane says the sentence K.

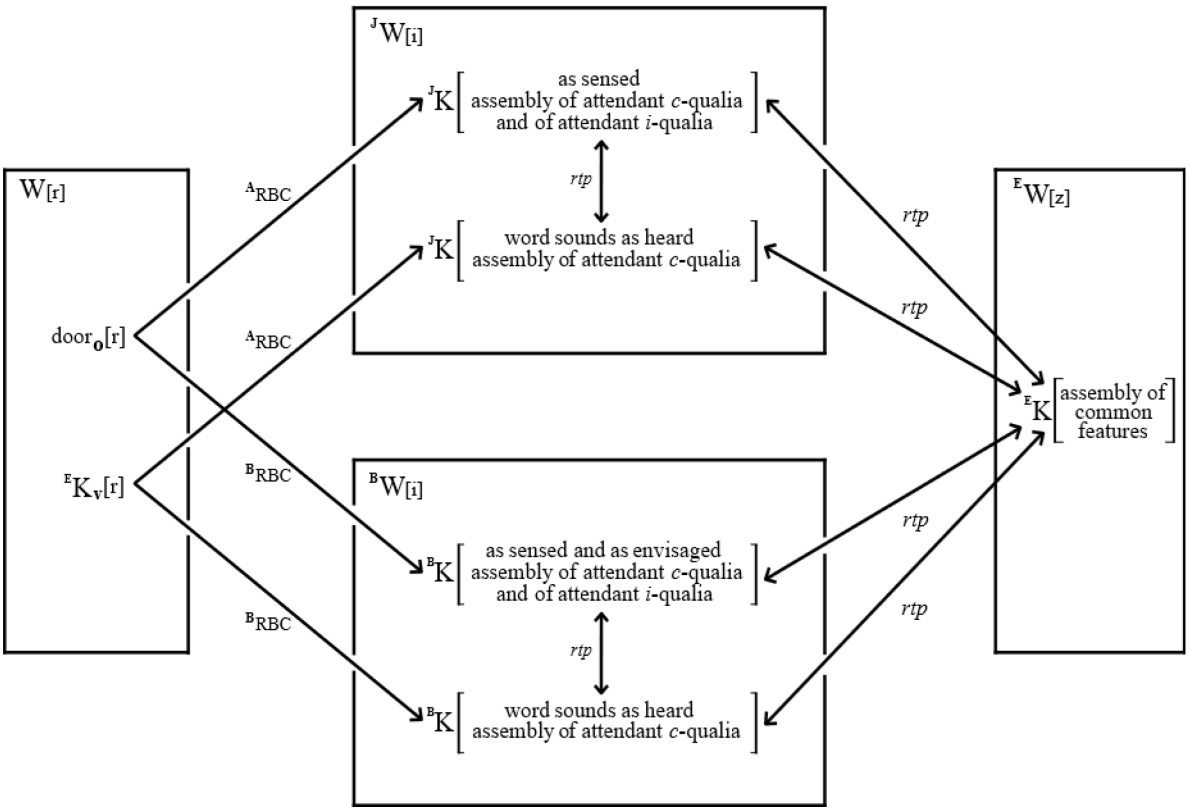

Figure B27

Figure B27 shows a WLD describing the system for Jane and Bob, where: both are here-and-now in a room together looking at a closed door; Jane but not Bob has just previously directly perceived what is behind that door; and Jane is saying to Bob the English sentence, K, where K = "Behind that door there is a crate of hot platinum bars sitting on a table." The rectangle on the left of the diagram shows the noumenal world, W[r], and those of its contents most salient to this example: door**o**[r], which is the noumenal thing: *object* door[r]; and ^{E}Kv[r] which is the noumenal thing: *English word sounds* 'K'[r]. The upper central rectangle shows Jane's unique phenomenal world, ^{J}W[i], and those of its contents most salient to this example: ^{J}K[word sounds as heard, assembly of attendant *c*-qualia] and ^{J}K[as sensed, assembly of attendant *c*-qualia and of attendant *i*-qualia]. The lower central rectangle shows Bob's unique phenomenal world, ^{B}W[i], and those of its contents most salient to this example: ^{B}K[word sounds as heard, assembly of attendant *c*-qualia] and ^{B}K[as sensed and as envisaged, assembly of attendant *c*-qualia and of attendant *i*-qualia]. The rectangle on the right shows the W[z] of the English language using group, ^{E}W[z], and those of its contents most salient to this example, which are ^{E}K[assembly of common features].

The proposal here then is that when a competent English language user hears, at the level of their B[r] a sentence ^{E}Kv[r] – where this will be a *noumenal* configuration of sound[r]s – operation of their RBC will deliver to them a here-and-now perception of a *semantic* configuration of attendant synthetic *c*-qualia[77] that will then lead them spontaneously and reflexively to cognitively construct and experience an aggregate cojoint complex whose natural corner will have a *phenomenal* configuration of [as sensed and/or as envisaged, assembly of attendant *c*-qualia and/or of attendant *i*-qualia] that is determined by that semantic configuration.

So it is being proposed here that when Bob[r] hears ^{E}Kv[r], areas of his brain[r] will reflexively cognitively construct for him an experience of an aggregate cojoint complex that will include his experiencing the assembly of natural qualia at the bottom left-hand corner of the complex – which are for him ^{B}door[as seen, attendant *c*-quale], ^{B}table[as seen, attendant *i*-quale], ^{B}crate[as seen, attendant *i*-quale] and ^{B}hot platinum bars[as envisaged, attendant *i*-qualia][78] – in a phenomenal configuration that will have been determined for him by the semantic configuration of the assembly of synthetic *c*-qualia he is experiencing at the synthetic corner of that aggregate cojoint complex, as his brain[r] hears and processes through ^{B}RBC the noumenal configuration of sound[r]s that is ^{E}Kv[r].

[77] Where this configuration of attendant synthetic *c*-qualia will be that user's own private perception of the words and grammar of the sentence K.
[78] Where – as per footnote 34(b) – this is ^{B}hot platinum bars[as envisaged, attendant *i*-qualia], because it turns out Bob has never seen or in any other way sensed platinum bars before. Assume that in the scenario presented Jane is telling the truth, has indeed just seen and touched some platinum bars, and has accurately recognised these because, in working as a jeweller's supplier, she has previously seen and touched platinum bars presented in crates of the same type she has just seen. This why Fig. B27 shows [as sensed, assembly of attendant *c*-qualia and of attendant *i*-qualia] at the natural corner of the aggregate cojoint complex Jane has just constructed, whereas at the natural corner of the aggregate cojoint complex Bob has just constructed, Fig. B27 shows [as sensed *and as envisaged*, assembly of attendant *c*-qualia and of attendant *i*-qualia].

To demonstrate how these proposals work, put yourself in Bob's shoes and consider what you will understand Jane to be saying if she were to say to you the following modified versions of K:

K_1 = "Behind that door there is a table sitting on a crate of hot platinum bars";

K_2 = "There is a crate of hot platinum bars beside a table behind that door";

K_3 = "There is a crate of hot platinum bars cooling off on a table behind that door";

K_4 = "There is a crate of hot platinum bars spinning on a table behind that door"; or

K_5 = "Soon a crate of hot platinum bars will be placed on a table that is behind that door."

where these sentences contain the same names of common features as the original sentence, K, but each has a different grammatic structure to K.

Note then, that when you read these sentences it is the difference in their grammatic structure that leads you spontaneously to sense/envisage an assembly of natural *i*-qualia that is in either one phenomenal configuration or in another, where any such phenomenal configuration can be considered to be your phenomenal concept of what K means.[79]

Specifically, in these examples it is the difference in their grammatic structure that determines a difference in the way each of these sentences cues you, Y, to sense/envisage a distinct phenomenal configuration of ^{Y}door[as seen, attendant *i*-quale], ^{Y}table[as seen, attendant *i*-quale], ^{Y}crate[as seen, attendant *i*-quale] and ^{Y}hot platinum bars[as envisaged, attendant *i*-qualia].[80] Note also that these phenomenal configurations can specify dynamic relations – as cued by the words 'spinning' and 'cooling' in K_3 and K_4 – as well as temporal and spatial relations, among their natural *c*-qualia and *i*-qualia.

To summarise some central points:

(a) The configuration of sound[r]s that a person's B[r] makes in saying a sentence ^{L}Kv[r] will be processed by the B[r] of each person who is hearing that sentence and is proficient in language L, such that:

(b) Each person's RBC will process that configuration of sound[r]s into their own unique semantic configuration of attendant *c*-qualia, which in turn will lead each such person spontaneously to cognitively construct an aggregate cojoint complex, where:

(c) In experiencing that aggregate cojoint complex, each person will experience their own unique phenomenal configuration of natural attendant *c*-qualia and/or *i*-qualia where this phenomenal configuration will be determined for them by the semantic configuration of synthetic attendant *c*-qualia described at (b).

The examples provided above as K_1, K_2, K_3, K_4 and K_5 illustrate what is being meant at (c) by, "experience their own unique phenomenal configuration of natural attendant *c*-qualia and/or *i*-qualia", where this has been illustrated for you, Y, by referring to the different phenomenal configurations of ^{Y}door[as seen, attendant *i*-quale], ^{Y}table[as seen, attendant *i*-quale], ^{Y}crate[as seen, attendant *i*-quale] and ^{Y}hot platinum bars[as envisaged, attendant *i*-qualia] that you will have spontaneously cognitively constructed and experienced as you read either K_1, K_2, K_3, K_4 or K_5.

So it is inherent to the proposal being illustrated here that the semantic configuration of synthetic qualia in the aggregate cojoint complex that a person spontaneously constructs upon hearing a sentence, $^{L}K_{V}$[r], will, for all listeners who are proficient in using a language L:

- determine for each such person, *but in a unique way for each as an individual*, the phenomenal configuration of natural *c*-qualia and/or *i*-qualia that they spontaneously sense and/or envisage as they spontaneously construct that aggregate cojoint complex; where

- the way that each such person senses and/or envisages that assembly of natural attendant qualia, so configured, can be considered to constitute their own private and unique phenomenal concept of the sentence K, and will be what they understand the sentence K to *mean*.

[79] Noting again – as per footnote 76(b) – that the term 'phenomenal concept' is being used here in relation to aggregate cojoint complexes in precisely the same way that it was introduced and used in §B4*(iii)* in relation to constituent cojoint complexes. §B11 provides more on this.
[80] Where use here of ^{Y}hot platinum bars[as envisaged, attendant *i*-qualia] assumes that, like Bob, you have never actually seen or in other ways sensed platinum bars. If you have, the relevant correct attendant *i*-qualia would be ^{Y}hot platinum bars[as sensed, attendant *i*-qualia], as per footnote 34(b).

Consider now the processes underway for Jane as she says one of the above K; that is, as Jane[r] expresses the word sound[r]s, ^{E}Kv[r], into W[r]. These processes can be considered an inversion of the processes underway for those who are hearing K and are proficient in the use of English.

Specifically, it is being proposed here that in acting to say any of the K above Jane – as a proficient English speaker – will, all in one bundled-up, reflexive stroke:

(α) be conceiving of a specific phenomenal configuration of natural qualia, ^{J}door[as seen, attendant *i*-quale], ^{J}table[as seen, attendant *i*-quale], ^{J}crate[as seen, attendant *i*-quale] and ^{J}hot platinum bars[as sensed, attendant *i*-qualia]; where

(β) in conceiving of that specific phenomenal configuration she will spontaneously have cognitively constructed an aggregate cojoint complex that has at its synthetic corner a specific semantic configuration of synthetic qualia; where, with the automaticity of natural speech

(γ) she will, as Jane[r], express the noumenal word sound[r]s, $^{E}K_{V}$[r], such that what she hears herself to be saying is precisely that specific semantic configuration of ^{J}K[word sounds as heard, attendant *c*-qualia] that she would – *if anyone or anything else were saying it, and she were hearing it* – spontaneously experience[81] as the specific phenomenal configuration of natural qualia that she is conceiving of at (α).

Note that if Jane is not an English language user, she will not have learned how to cognitively construct the aggregate cojoint complex referred to at (β) and that without this learning her brain[r] would not, at the noumenal level, be able to drive her B[r] to generate the needed noumenal word sound[r]s, $^{E}K_{V}$[r]. This is because she will, quite literally, not have learned what the required English language sentence – the sounds of its grammatic structure as well as the embedded names of its common features – would have to sound like *to her*, in order for it successfully to describe to other English language users what it is that she is conceiving of at (α).

So what is being claimed here essentially is that the language learning process for sentences – i.e. the process of learning how to grammatically structure sentences, including how to correctly embed the names of common features into such grammatic structures – will be highly similar to, and will entail, the process by which a person can learn to understand and vocalise the names of common features. This latter process has already been described at length in §B6, and in particular §B6*(iv)*, for Akari and Bob, where Akari learns to understand and vocalise the name of an English language common feature ^{E}red ball[concrete common feature].

Put slightly differently, the claim here is that a more elaborate – but essentially *isomorphic* – learning process to that by which people learn to hear and to say the names of common features in their communications with other members of their language using group, is how people will learn to apply and use a grammar – entailing word order and use of words other than names of common features – to express[82] and to understand sentences in their communications with other members of their language using group.

Readers may wish to revisit §B6*(iv)* to satisfy themselves that such an isomorphic learning process can indeed apply to the way a person learns to understand and use grammar and sentences, where a central consequence of the isomorphism of this learning process will be that all communications made up of sentences (aggregate cojoint complexes) – and not just communications made up of the name of a common feature (constituent cojoint complex) – will be qualia-independent by the same reasoning that is presented in the later paragraphs of §B6*(iv)*.[83]

In conjunction with the language learning process just referred to,[84] an indispensable part of learning how to construct and use sentences will be that which a person can learn from the feedback they are able to get by seeking through trial-and-error accurately to communicate 'what they are thinking'[85] to other members of their language using group.

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[81] Where she would spontaneously experience this specific phenomenal configuration of natural qualia as part of her spontaneous cognitive construction and experience of an aggregate cojoint complex that would be identical to that which she has had to cognitively construct to say K.
[82] Where it is proposed that learning to express sentences, including their grammar, will entail a degree of learning by mimicry through processes isomorphic to those described for Akari's learning to make the noumenal level vocalisation ^{E}red ballv[r] to communicate the name for ^{E}red ball[concrete common feature] to other English language users, as described on page 15, §B6*(iv)*.
[83] See in particular page 16, §B6*(iv)*.
[84] Which will include a person's use of trial-and-error mimicry to learn how to make the sound[r]s of the names of common features, as per Akari's learning to make the noumenal level vocalisation ^{E}red ballv[r] referred to at footnote 82 above.
[85] Where 'what they are thinking' can here be equated to the specific phenomenal configuration of natural qualia – i.e. to the phenomenal concept (as this term has been defined above) – that the person wants to communicate to other people.

For example, say that after saying K to Bob, Jane then says K_6, where:

K_6 = "Please go through that door and check for yourself what is behind it."

The only way Jane can then know if she has successfully communicated 'what she is thinking' to Bob is if he somehow shows that he understands what she has tried to communicate to him. He could do this by actually walking through the door, or by successfully communicating back to Jane 'what he is thinking' in response to what he has understood to be her thoughts, perhaps by saying K_7, where:

K_7 = "OK, I will go through that door and check what is behind it."

Importantly, no matter how he does it – either by physically doing what Jane asks him to do, by saying K_7, or by other means[86] – Bob's only ways to communicate back to Jane his successful understanding of what she has tried to communicate to him will have to be by taking some form of action at the level of W[r] using his B[r], which she can then perceive as contents of $^{\mathbf{J}}$W[i]. He will either have to move his B[r] through the door[r], move his B[r] to say $^{\mathbf{E}}K_{7V}$[r], or move his B[r] in some other way to achieve this.

Through reference to this example – and consideration of how failures in communication can occur – it should be evident to readers that as language learning operations proceed, a child's grasp not only of the names of common features, but of how to successfully communicate their thoughts about the dynamics and relations of such common features through the use of correctly grammatically structured sentences, seems certain to be learnt not only by processes described earlier – such as mimicry – but predominantly and most importantly, by the child's trial-and-error observation of the physical responses, including physically spoken responses, that their attempts to communicate their thoughts to other people evoke in those people.[87]

It is success at this level of language learning – enabling a person successfully to communicate their thoughts (including their plans for action) about common features through the use of correctly grammatically structured sentences – that is crucial to allowing languages to fulfil their primary purpose at the level of the survival advantages they confer upon the human species (as per §3 and §4 of the main text).

B11 Concepts and their communication through use of sentences

It was proposed in §B4*(iii)-(iv)* and §B9 that when a person, P, who speaks a language, L, imagines some physical thing, X, where by so doing they experience a constituent cojoint complex for X that has an *i*-quale at its *natural* corner, that this $^{\mathbf{P}}$X[as sensed or as envisaged, attendant *i*-quale] can be considered to be their concept of X as a *phenomenon*, and called their *phenomenal concept* of X.[88]

It was also proposed that if P imagines that physical thing, X, where in so doing they experience a constituent cojoint complex for X that has an *i*-quale at its *synthetic* corner, that this $^{\mathbf{P}}$X[word as sensed, attendant *i*-quale][89] can be considered to be their concept of X as a *name* that they and other members of P's language using group can successfully use to describe, and to communicate about, their respective phenomenal concepts of X, and can be called P's *semantic concept* of X.

These ideas can be extended to sentences as follows.

When a person, P, who speaks a language, L, spontaneously constructs and experiences a given aggregate cojoint complex – for example through hearing some sentence, K[90] – where that aggregate cojoint complex has *i*-qualia among the phenomenal configuration of qualia at its natural corner – then that phenomenal configuration, i.e. $^{\mathbf{P}}$K[as sensed and/or as envisaged, assembly of attendant *i*-qualia, and perhaps attendant *c*-qualia], can be considered to be that person's phenomenal concept of K, where this phenomenal concept of K will be what that person understands the sentence K to mean.[91]

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[86] Perhaps they can both also speak French or can use sign language.

[87] The claim here then is that, in learning their first language the main way that people will succeed in learning to construct and use sentences able effectively to communicate to others what they are thinking is by trial-and-error attempts to express what they are thinking through expressing trial sentences and then monitoring the impact of those sentences on the behaviour of others. If so, it then seems highly likely that people will normally – except perhaps in the very earliest stages of their language learning – learn the names of their language's common features as *part and parcel* of learning how to use their language's grammar, rather than by learning the names of its common features by some other means. Certainly relatively artificial ways of learning names of common features and grammar may be used when people seek by formal means to learn a foreign language, or are learning to read and write (which are cases where formal means are the only means), but such formal means are not central or critical to the natural language learning operations used by an infant to learn their first language/s.

[88] In the example discussed in §B4*(iii)* the X Jane is thinking about is red, and her phenomenal concept of red is identified as red[as seen, attendant *i*-quale]. In the example discussed in B4*(iv)* the X Joan is thinking about is neutron, and her phenomenal concept of neutron is identified as neutron[as envisaged, attendant *i*-quale]. More generally, such an experience will arise as a person spontaneously cognitively constructs a cojoint complex in the course of thinking about some physical thing, X, including when they think about saying something about the X they are thinking of – or in response to their hearing or reading a communication about X in a language they know.

[89] The idea that words can be sensed by means other than hearing or reading – e.g. by feeling in Braille – was introduced in footnote 34(c).

[90] Or in response to reading, or acting to say or write, some sentence, K, as has been described, for example, for Jane and Bob in §B10 above.

[91] For a demonstration of this proposal by example see §B10, pp 30.

Further, when a person, P, who speaks L, experiences – say in formulating a sentence, K, to describe a physical situation they are imagining – an aggregate cojoint complex where that complex has *i*-qualia in the semantic configuration of qualia at its synthetic corner, then that semantic configuration:[92]

- can be considered that person's concept of the sentence K as a grammatic structure,[93] where that grammatic structure will be that which they and other members of their language using group have learned they can use successfully to describe to each other their respective phenomenal concepts of sentences such as K, and
- can be called that person's semantic concept of K.

Figure 28 illustrates these proposals.

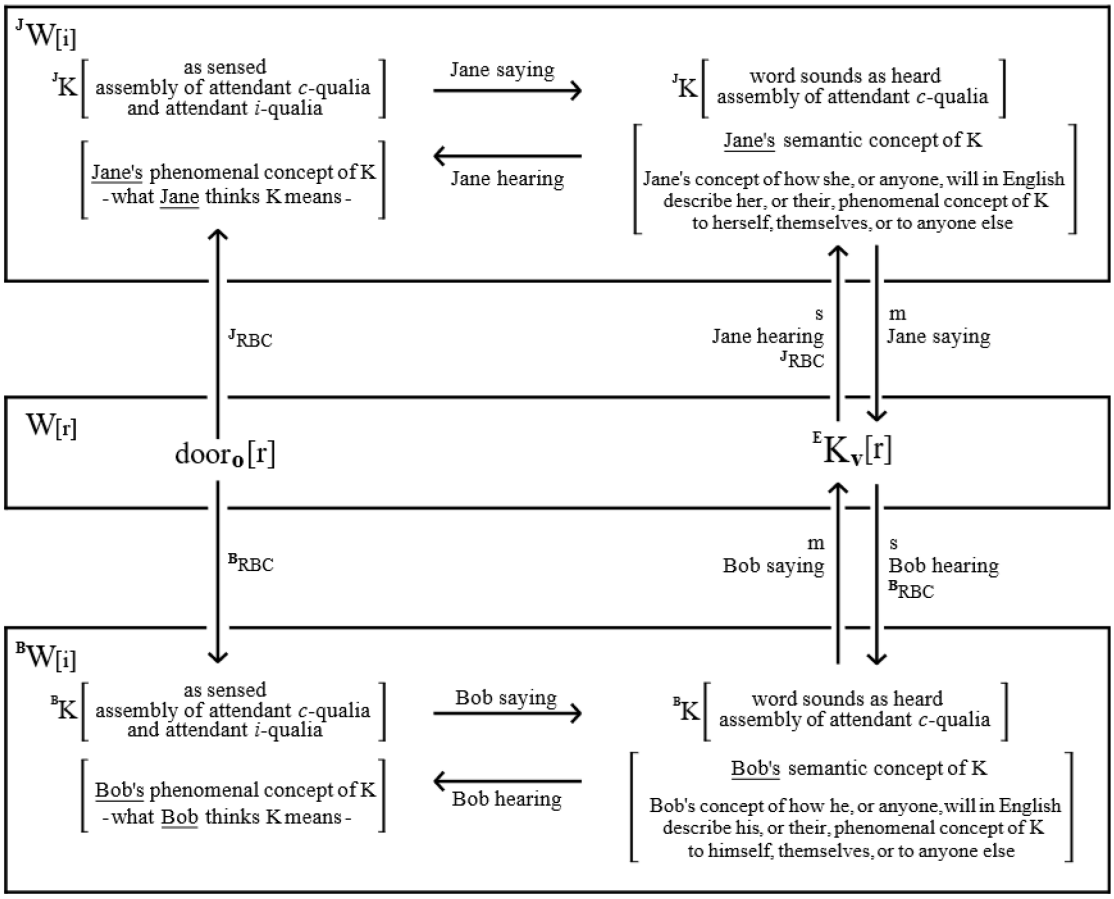

Figure B28

Figure B28 shows a modified version of the system described for Jane and Bob in §B10 and Fig. B27, where both remain here-and-now in a room together looking at a closed door, but where here *either* (a) Jane is saying to Bob, *or* (b) Bob is saying to Jane, the English sentence, K, where K = "Behind that door there is a crate of hot platinum bars sitting on a table." In this figure the rectangle at its centre shows the noumenal world, W[r], and those of its contents most salient to this example: door$_O$[r], which is the noumenal thing: *object* door[r]; and ^{E}K$_V$[r] which is the noumenal thing: *English word sounds* 'K'[r]. The upper rectangle shows Jane's unique phenomenal world, ^{J}W[i], and those of its contents most salient to this example: ^{J}K[as sensed, assembly of attendant *c*-qualia and of attendant *i*-qualia], which is shown as synonymous with Jane's phenomenal concept of K – i.e. what she thinks K means; and ^{J}K[word sounds as heard, assembly of attendant *c*-qualia], which is shown as synonymous with Jane's semantic concept of K.[94] In case (a) the figure should be read from the top left hand corner, starting with Jane forming a phenomenal concept and seeking to communicate it to Bob, then by following the 'Jane saying' and 'Bob hearing' arrows clockwise around the diagram. A textual description of what is going on for the clockwise direction is provided in §B10 on pp 30, but without explicit use of the terms 'phenomenal concept' and 'semantic concept'. In the case of (b), the diagram can be read by starting at the bottom left hand corner and following the 'Bob saying' and 'Jane hearing' arrows anticlockwise around the diagram. The point of showing both directions is to demonstrate that there is a symmetry across these two situations that *conserves* the noumenal thing ^{E}K$_V$[r], which then clearly will be conserved for *all* English speakers 'added to the conversation'.[95, 96] The diagram will work equally well for any grammatically sound sentence K as written and read, where the term ^{E}K$_W$[r] can be used to denote the noumenal thing: *English word text* 'K'[r]. Our reliance on the contents of book[r]s and other written material[r]s to record and widely communicate/translate concepts to current and new generations of English language users is possible only because all such ^{E}K$_W$[r] are conserved.

[92] Where that semantic configuration can be expressed, ^{P}K[words as sensed, assembly of attendant *i*-qualia, and perhaps attendant *c*-qualia] and where, for example, *c*-qualia would arise should P be muttering some of the sentence under their breath as they formulate it.
[93] Where the term *grammatic structure* is as defined in §B10.
[94] ^{E}W[z], and its relevant contents, ^{E}K[assembly of common features], have been omitted from the diagram (vice Fig. B27) simply to minimise clutter and highlight the new material being presented.
[95] As with the situation discussed in §B6*(iv)*, including at footnote 43, adding one or more people 'to the conversation' can easily be conceived of by visualising the addition of one, two – or as large a number as desired – of further W[i] boxes, one for each added person, in parallel to the central box in Fig. B28. Each person's W[i] would be linked to door$_O$[r] and ^{E}K$_V$[r] via their own unique RBCs, which would map those noumenal things into each of the added people's own unique assemblies of natural and synthetic qualia, giving rise to their own respective and unique semantic and phenomenal concepts of what the sentence K is saying and what it means.
[96] Noting, moreover, that the proposals demonstrated in this example can also be applied to any language, L, simply by substituting L for English.

B12 Sentences in sequence

The proposals made in §B10 and §B11 can be extended to cover use of sequences of sentences. First consider Figure B29:

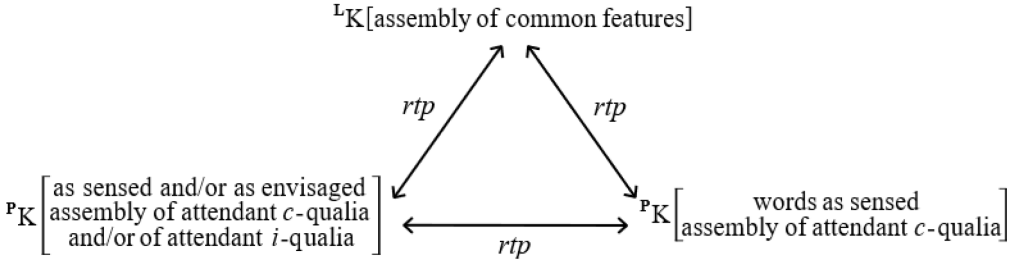

Figure B29

Figure B29 shows the aggregate cojoint complex a person, P, will spontaneously construct for a grammatically correct, typical sentence, K, where in initiating that construction they will generally either here-and-now: (i) begin by generating (sensing and/or conceiving of) the natural configuration ^{P}K[as sensed and/or as envisaged, assembly of attendant *c*-qualia and/or *i*-qualia] to form the natural corner of that complex; or (ii) begin by perceiving or imagining the synthetic configuration ^{P}K[words as sensed, assembly of attendant *c*-qualia][97] to form the synthetic corner of that complex.

Then consider that when a person, P, conceptualises – i.e. when they think about – a physical situation and, with this, they act to communicate what they are thinking to others by speaking[98] to them in one discrete sentence after another – call this sequence of sentences K_1, K_2, K_3, … , K_n – in a language, L:

(a) the way that they conceptualise that physical situation will have to be parsed into a time series, $^{P}K_1$, $^{P}K_2$, $^{P}K_3$ … $^{P}K_n$, of phenomenal configurations of natural ^{P}K[as sensed and/or as envisaged, assemblies of attendant *c*-qualia and/or attendant *i*-qualia], each at the natural corner of each in a series of aggregate cojoint complexes of the type shown in Fig. B29;

(b) where such conceptualisation will entail that the person's spontaneous and progressive cognitive construction of that series of aggregate cojoint complexes will allow them to express – and to hear themselves say[99] – the series, $^{P}K_1$, $^{P}K_2$, $^{P}K_3$ … $^{P}K_n$, of semantic configurations of synthetic ^{P}[words as sensed, assemblies of attendant *c*-qualia] that are each at the synthetic corner of each in that same series of aggregate cojoint complexes;

(c) where, through language learning operations, they will have learned to the point of automaticity to be expressing at the noumenal level through their B[r], the series, $^{P}K_1$, $^{P}K_2$, $^{P}K_3$ … $^{P}K_n$, referred to at (b), in the form of the series of noumenal configurations of sound[r]s, $^{L}K_{1v}$[r], $^{L}K_{2v}$[r], $^{L}K_{3v}$[r] … $^{L}K_{nv}$[r];

(d) where these are the series of noumenal configurations of sound[r]s that constitute the series of discrete sentences, K_1, K_2, K_3 … K_n, at the noumenal level.[100]

And in the inverse, consider that when any other person, Q, who is proficient in L, receives at the noumenal level, sensory input to their B[r] of a time series of configurations of sound[r]s, $^{L}K_{1v}$[r], $^{L}K_{2v}$[r], $^{L}K_{3v}$[r] … $^{L}K_{nv}$[r]:

(e) they will, through operation of ^{Q}RBC, perceive these as a time series, $^{Q}K_1$, $^{Q}K_2$, $^{Q}K_3$ … $^{Q}K_n$, of semantic configurations of synthetic ^{Q}[words as sensed, assemblies of attendant *c*-qualia] that are each at the synthetic corner of each in a series of aggregate cojoint complexes which – because Q knows L – Q will spontaneously cognitively construct in response to their B[r] receiving and processing $^{L}K_{1v}$[r], $^{L}K_{2v}$[r], $^{L}K_{3v}$[r] … $^{L}K_{nv}$[r];

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[97] The idea that words can be sensed by means other than hearing or reading – e.g. by feeling in Braille – leading to a more general formulation, including [words as sensed, assembly of attendant *c*-qualia], was introduced in footnote 34(c) and discussed in caption to Fig. B26.

[98] Noting that the case used here of generating speech – i.e. speaking – can equally be applied to cases where what is generated is text, sign language, Braille or any other expression of a language.

[99] Where – with respect to footnote 98 – this could equally be to see themselves write, see/feel themselves sign (in a sign language), and so forth.

[100] It seems possible that people use discrete sentences due to information processing limits on the size and complexity of the natural and synthetic configurations of qualia that human brain[r]s can construct and sustain. For example, if someone said a long, grammatically complex sentence to you, you might still 'lose track' of some or all aspects of the sentence's intended meaning even if the sentence is grammatically correct. In terms of the conceptual framework being developed here, your 'losing track' would be how you would experience your brain[r] exceeding a limit in its capacity reflexively to 'compile' and translate the grammatic configuration of synthetic qualia that you are hearing into the natural configuration of natural qualia that you will need to experience as your phenomenal concept of what the sentence means.

(f) where, in constructing this series of cojoint complexes, Q will spontaneously and reflexively experience their own phenomenal concept of what is being communicated by what they are perceiving at (e) in the form of the series, ${}^{Q}K_1$, ${}^{Q}K_2$, ${}^{Q}K_3$ … ${}^{Q}K_n$, of phenomenal configurations of natural ^{Q}[as sensed and/or as envisaged, assemblies of attendant *c*-qualia and/or attendant *i*-qualia], that will spontaneously arise at each of the natural corners of each of those cojoint complexes.

The only idea introduced in this section that goes further than ideas already proposed in §B10, is that in acting to communicate what they are thinking about a physical situation, the person making the communication will need previously to have learned, in learning how to use the language L, how to parse out those thoughts into a series of aggregate cojoint complexes such that these can be expressed as a series of sentences that are intelligible – as per footnote 100 – to other members of their language using group.

B13 The need for a W[a] level

To support clarity in presentation of ideas it has been useful to proceed as if all qualia can be considered contents of a person's W[i]. But as flagged in caption to Figs B20 and B24, this has been provisional. Strictly, the processes by which the contents of a person's W[i] are generated – as described in §1 of the main text – only provides for those contents to be *c*-qualia.

Essentially, the contents of a person's W[i] are defined in §1 of the main text as elements that together form a dynamic 'map' of the person's situation in W[r], where this map is produced in real time by processing sensory inputs from W[r] through an RBC run by a processor, D[r], within the person's brain[r].[101]

But under the definitions of *c*-qualia and *i*-qualia provided in §B4, it is clear that such phenomenal experiences – which are given to a person by their real time processing of incoming inputs from W[r] – i.e. by sensation – must always be experiences of *c*-qualia, while it is equally clear that experiences of *i*-qualia are given to person by processes of *imagination* – i.e. by processes of *envisagement* and/or *recall* – and not by real time processing of sensory inputs from W[r].

Consider again the following example from §B4. Imagine holding, biting into and savouring the crunchiness, flavour and juiciness of a fresh crisp apple. Most people can achieve this regardless of whether there is a 'real' apple present in the physical environment that they perceive to be surrounding them. In other words, there need be no apple in the contents of a person's W[i] for them successfully to imagine an apple.[102]

So if *i*-qualia cannot be counted as contents of a person's W[i] – and plainly they are not contents of either W[r] or of any W[z] – a question arises of where they might be 'placed' as contents. Consistent with how CF1[103] has been structured so far, the simplest solution is to posit one further conceptual level. Call this level a person's *abstract world*. This will be a 'world' whose contents are made up only of *i*-qualia, where these are generated by processes of imagination – i.e. by processes of envisagement and/or recall – and not through real time processing of sensory input by a person's D[r]. Call this abstract 'world', W[a].

A fundamental feature of CF1 is that it shows how what is commonly called 'the physical world' can, for any person who knows a language, be deconstructed into three distinct sets – the noumenal world, W[r]; the person's W[i]; and the W[z]/s of any language using group/s that the person belongs to – with members of those sets also being called their contents.

Under CF1, these sets are each cast as having their own distinct and exclusive contents, with the proposed relationships among those contents shown in Figure 3 of the main text. As an aid to memory, this figure is reproduced below as Figure B30, with some minor amendment to its caption.

[101] For the details of this see §1 of the main text.

[102] This can be reduced to saying a person can have a clear experience of apple[as sensed, attendant *i*-quale] without at the same time experiencing apple[as sensed, attendant *c*-quale]. For example, if you are holding an apple in front of your eyes you will be experiencing it as contents of your W[i] and as apple[as sensed, attendant *c*-quale], but if you drop the apple and it rolls under the couch and out of your sight or touch, it will have ceased to be contents of your W[i]. Even so, you will know that the apple is under the couch and, as you feel around under the couch to retrieve it, you will be experiencing it as apple[as sensed, attendant *i*-quale]. This example is similar to that which was applied to eggs when the idea of *i*-qualia was first introduced in §B4.

[103] Where CF1 refers to the conceptual framework proposed in the main text.

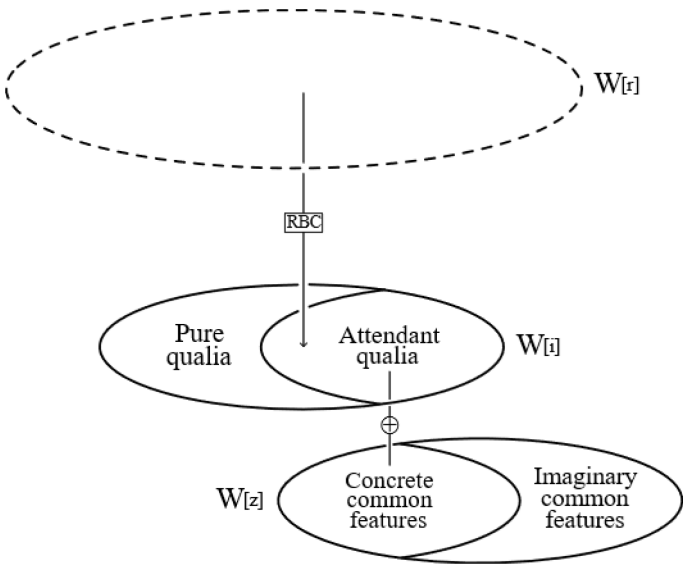

Figure B30

Figure B30 reproduces Figure 3 from the main text, which uses a graphic akin to a Venn diagram to describe the proposed structural relationships among W[r], W[i] and W[z] for a normal language using person. The figure shows some of the contents of W[r] [104] being 'mapped' into the contents of a person's W[i] through operation of their D[r] as it applies an RBC to incoming sensory input[r].[105] These latter contents are shown as qualia, which are the contents of a person's direct and private perceptual experience of their phenomenal world, which is their W[i]. These qualia are cast either as pure qualia or attendant qualia where – as described in Figure 2 and §5*(ii)* of the main text – for any given person attendant qualia will be cojoined to concrete common features to form a meta-intersection between the person's W[i] and what they hold to be W[z]. What they hold to be W[z] is shown as containing common features, where these are cast either as imaginary common features or as concrete common features and where – as described in Figure 2 and §5*(ii)* of the main text – for any given person, concrete common features will be cojoined to attendant qualia to form a meta-intersection between what that person holds to be W[z] and to be their W[i].

Figure B31 shows a version of Fig. B30 extended to show a person's abstract world, W[a], as described above, where W[a] can be considered to be that set which exclusively has as its members – i.e. as its contents – any *i*-qualia being experienced by the person in the here-and-now to which the figure applies.

Fig. B31 also extends Fig. B30 to accommodate all possible forms of synthetic as well as natural qualia, noting that at the stage of discourse at which it was introduced in the main text Fig. B30 (i.e. main text Fig. 3) could only be drafted with what subsequently have been more precisely defined as natural *c*-qualia in mind.

Fig. B31 should be viewed in conjunction with reading §B14. This is because Fig. B31 shows – and §B14 lists – all of the possible forms of qualia that a person can experience, either through use of their senses or their imagination, as contents or potential contents of a physical world. Interestingly, only eight such forms of qualia seem possible.

Moreover, within the extension of the conceptual framework CF1 being presented here – i.e. CF1b – all those possible forms of qualia can be accommodated as contents either of a person's W[i] or of their W[a] where – through the structure shown in Fig. B31 – all of those forms of qualia can be related:

- to each other;
- to the two forms of common features – CCFs and ICFs – that can be contents of a person's W[z]; and
- to all relevant contents of W[r].

This means that with introduction of the idea of an abstract world, W[a], nothing more is required to allow CF1 – in the form of CF1b – to fully describe the ways in which, in normal everyday circumstances, any language using person can experience, imagine, conceive of, and communicate about, the contents of what they – and what each of us – call the physical world.[106]

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[104] Where the dashed line is to indicate that the set of contents of W[r] may be boundless and where, at the least, the overall contents of W[r] can be expected to be far greater than the subset of contents of W[r] that may be mapped at any given time into the contents of any one person's W[i].
[105] As per arrangements described in §1 of the main text.
[106] Extending CF1b to include the quantitative measurements, rule sets (see §5*(iii)* of the main text) and mathematics that form part of scientist's and other specialists' means of conceiving of, describing and communicating about the physical will be explored in detail in *Deconstructing the Physical World – Appendix C* (in preparation).

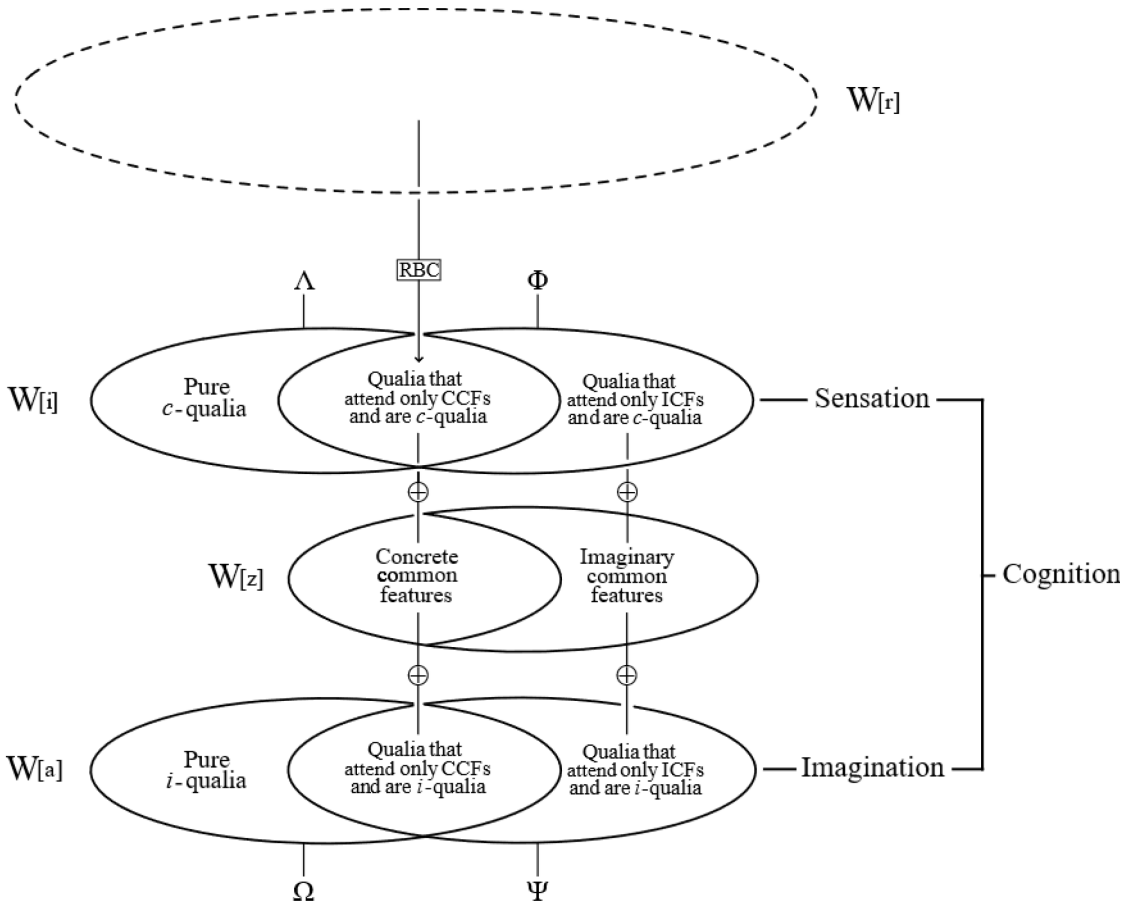

Figure B31

Figure B31 shows the proposed structure of relationships between contents of W[r], W[i], W[z] and W[a] for a normal language using person. The sets Λ, Φ, Ω, and Ψ are constructed such that W[i] = Λ ∪ Φ and W[a] = Ω ∪ Ψ, and serve a useful purpose in §B14 (below). As with Fig. B30, Fig. B31 shows some contents of W[r] being 'mapped' into the contents of a person's W[i] through operation of their D[r] as it applies an RBC to incoming sensory input[r]. These contents of W[i] are shown as *c*-qualia, which are the contents of a person's direct and private, here-and-now perceptual experience of their phenomenal world, which is their W[i]. These qualia are cast either as pure *c*-qualia or as attendant *c*-qualia. In extending Fig. B30, attendant *c*-qualia have been further cast as attending either concrete common features or as attending imaginary common features (noting that under the definition of imaginary common features, the only *c*-qualia that can attend these are synthetic *c*-qualia such as, for example, neutron[word as sensed, attendant *c*-quale]). The contents of W[a] are shown as *i*-qualia, which are defined as those things that a person experiences either by envisaging or recalling something of a physical kind. These qualia are cast either as pure *i*-qualia or as attendant *i*-qualia and, as with attendant *c*-qualia, attendant *i*-qualia have been further cast as attending either concrete common features or imaginary common features. Fig. B31 provides an expanded, more refined description of meta-intersections of the type originally described in caption to Figure 2 of the main text. As for Figure 2, these meta-intersections are simply to show where qualia have been cojoined to common features through language learning operations, ⊕. The expansion and level of definition in Fig. B31 compared to Figure 2 has been enabled by introduction in this appendix of new forms of qualia, specifically *i*-qualia, and drawing a distinction between natural and synthetic qualia.

The way that Fig. B31 accounts for all of the possible forms of qualia that a person can experience in relation to actual, possible or fictional contents of the physical world is provided in §B14, specifically through the references under each form of qualia as to where that form sits among the memberships of the oval shaped sets marked in Fig. B31 as Λ, Φ, Ω, and Ψ.

The annotations in Fig. B31 referring to sensation, imagination and cognition are intended only to reflect the author's intuitions about how to view the arrangements shown in the figure as a whole.

B14 Orders of qualia

Within the conceptual framework proposed in this appendix – i.e. CF1b – all contents of a person's W[i] are *c*-qualia, all contents of a person's W[a] are *i*-qualia, and all qualia will be either pure or attendant, concrete or imaginary, and natural or synthetic. This allows for eight forms of qualia:

Pure natural *c*-qualia	Attendant natural *c*-qualia	Attendant synthetic *c*-qualia	Pure synthetic *c*-qualia
Pure natural *i*-qualia	Attendant natural *i*-qualia	Attendant synthetic *i*-qualia	Pure synthetic *i*-qualia

The following lists these forms and provides examples of each.[107]

A. Pure natural *c*-qualia

Any contents of a person's W[i] that are unnamed and undescribed in any language that they know, including contents of their W[i] as they experience these before they have learned a language.

Example
While travelling in a distant land you experience the flavour of a fruit that is unlike any flavour you've experienced before or since. You never learn the name of the fruit, and have no words to describe its flavour. As you experience that flavour you will be experiencing a pure natural *c*-quale.

Set: $A \subset \{\Lambda \backslash \Phi\}$ See Fig. B31

B. Pure natural *i*-qualia

Any contents of a person's W[a] that they can:

(a) *recall*, where these are *imagined* versions of contents that a person has previously experienced as pure natural *c*-qualia and which remain unnamed and undescribed in any language that the person knows; *or*

(b) *envisage,* where these are contents of their W[a] that a person *imagines de novo* – i.e. creates – either by deduction and/or some other cognitive means, and which are unnamed and undescribed in any language that the person knows.

Examples
(a) What you will be experiencing should you *imagine* by *recall* the flavour of the fruit that you once tasted in a distant land, as described in the example above under pure natural *c*-qualia.

(b) What the first person to *imagine* a centaur would have been experiencing in *envisaging* a centaur for the first time and *before* any name or description of a centaur had yet been proposed or agreed upon among members of their language using group.[108]

Set: $B(a) \subset \{\Omega \backslash \Psi\}$; $B(b) \subset \{\Omega \backslash \Psi\}$ See Fig. B31

C. Attendant natural *c*-qualia

Any contents of a person's W[i] that are named or well-described in a language that they have learned.

Example
While having lunch you experience the flavour of a banana, which is a named, well-known flavour among members of your language using group. As you experience that flavour you will be experiencing an attendant natural *c*-quale.

Set: $C \subset \{\Lambda \cap \Phi\}$ See Fig. B31

[107] Readers are invited to find – and let the author know of – any further forms of qualia they can conceive of, where these must be forms of qualia that a person can experience or imagine to be an actual, hypothetical or a fictitious part of what they – and we – call the physical world. The claim here is that there can be no more than the eight forms listed in this section.

[108] Envisagement by people of pure natural *i*-qualia of this type – i.e. the type described above at B(b) – would seem an unavoidable part of the process by which new imaginary common features (ICFs) are created. (See §5*(ii)* of the main text for the definition of an ICF.) For example, such envisagement – driven in large part by inference based on experimental evidence – would have to have been practiced by individual scientists engaged in the earliest stages of creating the ICF eventually named 'electron'. Only after these earliest stages of envisagement – i.e. these early, creative acts of conceptualisation by individual scientists – could there then have been attempts by scientists and others to communicate to each other descriptions of what they were envisaging/conceptualising, leading into back and forth communications among those scientists, eventually resulting in a narrowing of agreement on the properties, name and physical reality of the ICF, electron. (For relevant insights into the history of the development of the ICF, electron, see ref. 24(a) and for a wider sense of the course of creation, agreement on, and occasional abandonment of various ICFs in the history of particle physics, see ref. 24(b) and other articles in the journal volume cited at (24).

D. Attendant natural *i*-qualia

Any contents of a person's W[a] that the person can:

(a) *recall*, where these are contents that a person imagines based on their previous experience of attendant natural *c*-qualia, where these attend CCFs that are named and/or well-described in a language that they know; *or*

(b) *envisage,* where these are contents that a person imagines in learning to communicate about ICFs – whether hypothetical, proven or fictional – where these ICFs are named and/or well-described in a language that they know.

Examples

(a) What you will be experiencing in recalling the flavour of a banana.

(b) What Jane will be experiencing as she envisages – i.e. conceives of – a centaur; what Joan will be experiencing as she envisages – i.e. conceives of – a neutron (see §B4); or what Mary will be experiencing as she envisages – i.e. conceives of – the colour red *before* she has left her room (see §B9).

Set: $D(a) \subset \{\Omega \cap \Psi\}$; $D(b) \subset \{\Psi \backslash \Omega\}$ See Fig. B31

E. Attendant synthetic *c*-qualia

Any contents of a person's W[i] – any sound, sight or other sensory experience – that the person recognises and experiences as a communication made by one or more members of their language using group. In their simplest forms such contents can attend either a:

(a) CCF; or an

(b) ICF.

Examples

(a) What you are experiencing as you read the word, 'ball', where – in seeing it – you recognise and experience it as a communication made by a member of your language using group.

(b) What you are experiencing as you read the word, 'centaur', where – in seeing it – you recognise and experience it as a communication made by a member of your language using group.

Set: $E(a) \subset \{\Lambda \cap \Phi\}$; $E(b) = \{\Phi \backslash \Lambda\}$ See Fig. B31

F. Attendant synthetic *i*-qualia

Any contents of a person's W[a] – any sound, sight or potentially other sensory experience that they can recall – that are imagined versions of contents they have previously recognised and experienced as communications made by one or more members of their language using group. In their simplest forms such contents can attend either a:

(a) CCF; or an

(b) ICF.

Examples

(a) What you will be experiencing if, after reading this text, you look away and imagine (perhaps you subvocalise) the word, 'ball', where – as you imagine it – you recognise and experience it as a communication that could be made by a member of your language using group.

(b) What you will be experiencing if, after reading this text, you look away and imagine (perhaps you subvocalise) the word, 'centaur', where – as you imagine it – you recognise and experience it as communication that could be made by a member of your language using group.

Set: $F(a) \subset \{\Omega \cap \Psi\}$; $F(b) \subset \{\Psi \backslash \Omega\}$ See Fig. B31

G. Pure synthetic *c*-qualia

Any contents of a person's W[i] – sounds, sights or potentially other sensory experiences – that a person recognises to be a communication being made in a language, or part of their language, that they have not learned and cannot understand.

Example
What you will here-and-now experience as you see the text of a book written in a language that you have not learned, and recognise it to be text in a language you do not know.

Set: G ⊂ {Λ\Φ} See Fig. B31

H. Pure synthetic *i*-qualia

Any contents of a person's W[a] that they can imagine – i.e. recall or envisage – that they recognise and experience to be a communication being made in a language (or part of their language) that they have not learned and cannot understand.

Example
What you will here-and-now experience if you cannot read kanji, but recognise that its characters are made by foreign language users to communicate with each other, and you look away from this page and *imagine* how one or more of the following kanji look:

小 市 下 大 山

Set: H ⊂ {Ω\Ψ} See Fig. B31

(i) Frequency of experience

The four forms of attendant qualia – C, D, E and F – are those that people most commonly experience. That's because our lives are immersed in language learning and use and, integral to this, they are immersed in our cognitive assembly and use of constituent cojoint complexes and aggregate cojoint complexes.

The four forms of pure qualia – A, B, G and H – are also experienced, but less so than attendant qualia.

In particular, pure synthetic *i*-qualia – H – seem to have little role, except in some intermediate stages of a person's learning a language, or among those who are conceiving of certain oral or textual forms of abstract art – e.g. nonsense verse such as Lewis Carroll's *Jabberwocky* (25)[109] – or among those who for other reasons are conceiving of possible new words.

Pure synthetic *c*-qualia – G – will be experienced by a person visiting a country where nearly all of the text and speech sounds they encounter are in what they recognise to be language, but language they do not understand. Such qualia will also frequently be experienced in the early stages of a person's learning their native language, but – if they stay among members of their language using group – will be far less frequently encountered once the person has mastered that language and, by so doing, has irreversibly cognitively converted nearly all such pure synthetic *c*-qualia into attendant synthetic *c*-qualia.

Pure natural *c*-qualia – A – will dominate an infant's pre-language experience of contents of their W[i], but will be less frequently encountered once a person has learned a language and, in so doing, has irreversibly cognitively converted many such pure natural *c*-qualia into attendant natural *c*-qualia.

Like pure synthetic *i*-qualia, pure natural *i*-qualia – B – will be rare in most people's experience. Even so, it seems sure that envisaging such qualia must play a crucial role in the first steps a person takes in creating a new concept of something physical. Thus familiarity with pure natural *i*-qualia can be expected among people involved in first conceiving of new entities in areas such as physics – for example, among those first envisaging the electron[108] – or among those who conceive of certain physical forms of abstract art, or among those who have recollections such as described in example B(a) above.

(ii) Relationships among sets and members

With respect to the sets shown in Fig. B31:

$W[i] = \Lambda \cup \Phi$; $W[a] = \Omega \cup \Psi$; $W[z] = \{CCFs\} \cup \{ICFs\}$; $W[r] = \{quiddities\}$[110]

$\Lambda = \{pure\ c\text{-qualia}\} \cup \{c\text{-qualia that attend only CCFs}\}$; $\Phi = \{attendant\ c\text{-qualia}\}$
$\Omega = \{pure\ i\text{-qualia}\} \cup \{i\text{-qualia that attend only CCFs}\}$; $\Psi = \{attendant\ i\text{-qualia}\}$

[109] For example, Carroll's first conception of the nonce word 'wabe', which he then wrote into *Jabberwocky*, seems most likely to have been in the form: wabe[as envisaged, pure synthetic *i*-quale].
[110] Use of the term 'quiddities' to name the contents of W[r] is pursuant to its use in (2).

B15 Correlation, attendance and correspondence

The following summarises and refines definitions applied in the main text and its appendices, including this appendix, of the terms correlation, attendance and correspondence, where these terms have been used respectively to name the relationships between:

- contents of a person's[111] W[i] and contents of W[r];
- contents of a person's W[i] and contents of the W[z] of a language using group they belong to;[112] and
- contents of the W[z] of a language using group and contents of W[r].

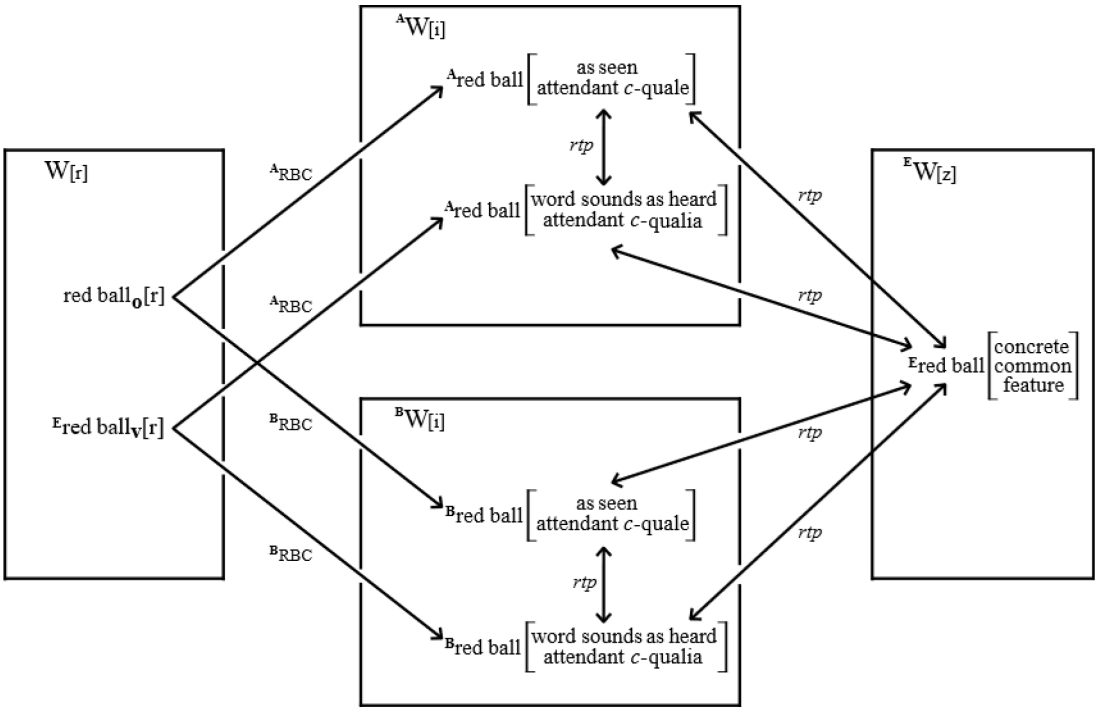

Figure B19

Figure B19, reproduced from §B6*(iv)*, will be drawn upon in this section to illustrate the definitions described below. The figure shows a here-and-now in which Bob is saying, and both Bob and Akari are hearing, the English phrase, 'red ball' while both are looking at a red ball. The rectangle on the left of the diagram shows the noumenal level, W[r], and its two relevant contents: red ball$_{o}$[r], which is the noumenal thing: *object* red ball[r]; and ^{E}red ball$_{v}$[r], which is the noumenal thing: *English word sounds* 'red ball'[r]. The upper central rectangle shows Akari's separate, unique phenomenal world, ^{A}W[i], with its two relevant contents, ^{A}red ball[as seen, attendant *c*-quale] and ^{A}red ball[word sounds as heard, attendant *c*-qualia]. The lower central rectangle shows Bob's separate, unique phenomenal world, ^{B}W[i], with its two relevant contents, ^{B}red ball[as seen, attendant *c*-quale] and ^{B}red ball[word sounds as heard, attendant *c*-qualia]. The rectangle on the right shows the W[z] of the English language using group, ^{E}W[z], and its relevant contents, ^{E}red ball[concrete common feature].

(i) Correlation

The relationship between contents of a person's W[i] and of W[r] can be defined as a *correlation*.[113]

Hence the contents of a person's W[i] can be said to *correlate* to contents of W[r] and vis versa.

T_1[i] correlates to T_1[r]. This can be considered a *mapping* relationship.[114]

For example, in the diagram:

- For Akari ^{A}red ball[as seen, attendant *c*-quale] correlates to red ballo[r]
  - $^{A}T_1$[i] correlates to T_1[r].
- For Bob ^{B}red ball[as seen, attendant *c*-quale] correlates to red ballo[r]
  - $^{B}T_1$[i] correlates to T_1[r].

So for any English speaking person, P, ^{P}red ball[as seen, attendant *c*-quale] correlates to red ballo[r]
- $^{P}T_1$[i] correlates to T_1[r].

[111] For the purposes of this section the term 'person' refers to a normal waking human adult.
[112] The relationship between contents of a person's W[a] and contents of the W[z] of their language using group is discussed in §B15*(vi)* overleaf, along with a way to view how the contents of a person's W[a] can be related to the contents of their W[i]. No clear cut relationship can be drawn between the contents of a person's W[a] and contents of W[r].
[113] As described in §1 of the main text, where inter alia any T[r] is a thing at the noumenal level – i.e. part of the contents of W[r] – and any T[i] is a thing at some given person's phenomenal level – i.e. it is part of the contents of that person's W[i].
[114] As described in §1 of the main text.

(ii) Attendance
The relationship between contents of a person's W[i] and the contents of the W[z] of that person's language using group is defined as an *attendance*.[115]

Hence contents of a person's W[i] *attend* contents of their W[z].

T_1[i] attends T_1[z]. Call this a *cojoint* relationship.[116]

For example, in the diagram:

- For Akari ^{A}red ball[as seen, attendant *c*-quale] attends ^{E}red ball[concrete common feature]
  - $^{A}T_1$[i] attends $^{E}T_1$[z].
- For Bob ^{B}red ball[as seen, attendant *c*-quale] attends ^{E}red ball[concrete common feature]
  - $^{B}T_1$[i] attends $^{E}T_1$[z].

So here, for any English speaking person, P, ^{P}red ball[as seen, attendant *c*-quale] will attend ^{E}red ball [concrete common feature]
  - $^{P}T_1$[i] attends $^{E}T_1$[z].

(iii) Correspondence
The relationship between the contents of the W[z] of a language using group and contents of W[r] can be defined as a *correspondence*.[117]

So the contents of the W[z] of a language using group can be said to *correspond* to contents of W[r] and vis versa.

T_1[z] corresponds to T_1[r]. Call this a *meta-semantic* relationship.[118]

For example, in the diagram:

- For Akari ^{E}red ball[concrete common feature] corresponds to red ballo[r]
  - $^{E}T_1$[z] corresponds to T_1[r].
- For Bob ^{E}red ball[concrete common feature] corresponds to red ballo[r]
  - $^{E}T_1$[z] corresponds to T_1[r].

So here, for any English speaking person, P, ^{E}red ball[concrete common feature] corresponds to red ballo[r]
  - $^{E}T_1$[z] corresponds to T_1[r].

(iv) Qualia independence
Note then, that within this scheme – and as proposed above[119] – the meta-semantic relationships encoded in a language are *qualia independent*.

This is captured immediately above in the expression: – $^{E}T_1$[z] corresponds to T_1[r] – where it can be seen by inspection of Fig. B19 that this expression will be true for all members of the English language group 'added to the conversation', regardless of 'what it is like' for any one or other of them to experience the attendant qualia shown in the W[i] sets in middle column of the figure.[120]

(v) Synthetic qualia
All of the examples of correlation, attendance and correspondence provided in *(i)*, *(ii)* and *(iii)* above refer to natural qualia but there is no reason why synthetic qualia could not have been substituted for these.

So, for Akari, just as her phenomenal experience of ^{A}red ball[as seen, attendant *c*-quale] will *correlate* via her sensory processing to the noumenal thing red ballo[r], her phenomenal experience of ^{A}red ball[word sounds as heard, attendant *c*-qualia] will correlate via her sensory processing to the noumenal thing ^{E}red ballv[r].

Similarly, just as her phenomenal experience of ^{A}red ball[as seen, attendant *c*-quale] will *attend* ^{E}red ball[concrete common feature] by virtue of the cojoint complex for red ball that she has assembled in learning English, her phenomenal experience of ^{A}red ball[word sounds as heard, attendant *c*-quale] will by the same means also attend ^{E}red ball[concrete common feature].

Finally, just as ^{E}red ball[concrete common feature] for Akari – and for any other English speaking person – will *correspond* to red ballo[r], ^{E}red ball[concrete common feature] will also for Akari – and for any other English speaking person – correspond to ^{E}red ballv[r].

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[115] The idea of attendance was introduced in §5*(ii)* of the main text. Any T[i] is a thing at a person's the phenomenal level, i.e. it is part of the contents of that person's W[i]. Any T[z] is a common feature, or an assembly of common features, at the collective level of that person's language using group, i.e. it is a part of the contents of the W[z] of a language using group that the person belongs to.
[116] Consistent with terminology introduced in §5*(ii)* of the main text.
[117] The idea of correspondence is introduced in §4 and further applied in §5*(iii)* and §6 of the main text. Any T[r] is a thing at the noumenal level – i.e. part of the contents of W[r] – and any T[z] can be considered a common feature, or an assembly of common features, at the collective level of a language using group – i.e. part of the contents of a language using group's W[z].
[118] Consistent with terminology introduced in §B6*(iv)*, pp 16, above.
[119] See§ B6*(iv)*, pp 16.
[120] How to conceive of adding one or more people 'to the conversation' is described in detail in §B6*(iv)* (pp 16, see footnote 43).

(vi) Contents of W[a]

The relationship between contents of a person's W[a] and contents of the W[z] of that person's language using group will also be one of attendance. This is since the *i*-qualia that make up the contents of a person's W[a] bear the same relationship to the common features that make up the contents of that person's language using group's W[z] as do the *c*-qualia that make up the contents of the person's W[i].

This is reflected in the relationships between *i*-qualia, *c*-qualia and common features as have been proposed for each of the six kinds of constituent cojoint complexes introduced in §B4, and results from the fact that for any given person contents of their W[a] can be considered to serve as simulants of possible contents of their W[i], where any given *i*-qualia can be considered to be that by which a person imagines (simulates) 'what it is – or would be – like' to experience some given *c*-qualia, either as recalled or as envisaged.

However, unlike *c*-qualia, which it has been proposed are generated through D[r] processing of sensory inputs originating in parts of W[r] outside a person's B[r], *i*-qualia must be generated by some further system[r] almost certainly inside the person's B[r] and within their brain[r]. Part of this system[r] would entail what might loosely be called 'memory', that will enable the person to recall previously experienced *c*-qualia in the form of *i*-qualia, while another part of this system[r] might loosely be called 'ideation', that will enable the person to envisage natural *i*-qualia to attend imaginary common features.

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