Is Purple a Red and Blue Chessboard?

Brentano on Colour Mixtures

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Abstract. Can we maintain that purple seems composed of red and blue without giving up the impenetrability of the red and blue parts that compose it? Brentano thinks we can. Purple, according to him, is a chessboard of red and blue tiles which, although individually too small to be perceived, are together indistinctly perceived within the purple. After a presentation of Brentano's solution, we raise two objections to it. First, Brentano's solution commits him to unperceivable intentional objects (the chessboard's tiles). Second, his chessboard account fails in the end to explain the phenomenal spatial continuity of compound colours. We then sketch an alternative account, which, while holding fast to the phenomenal compoundedness of the purple and to the impenetrability of component colours, avoids introducing inaccessible intentional objects and compromising on the continuity of the purple. According to our proposal, instead of being indistinctly perceived spatial parts of the purple, red and blue are distinctly perceived non-spatial parts of it.

Purple contains red and blue, orange contains red and yellow and (albeit more controversially) green contains yellow and blue. "Elementary colours" are colours such as yellow, blue, or red, which are not constituted by other colours but can themselves constitute other colours; "compound colours," by contrast, are colours such as green, purple, or orange, which are constituted by more elementary colours. A compound colour is a colour that consists of a mixture of two or more elementary colours different from itself. This paper aims to present and evaluate Brentano's theory of compound

colours, and to sketch an alternative approach to compound colours that, while avoiding the pitfalls of Brentano's own theory, remains strongly Brentanian in spirit.

Brentano first presented his theory of compound colours (which he calls interchangeably *multiple Farbe* or *Mehrfarbe*) at a lecture in Munich in 1896, which was later transcribed in his *Untersuchungen zur Sinnespsychologie* (Brentano 2009, 127–160) under the title "On individuation, compound quality and the intensity of sensory appearances." Although the question of compound colours may at first seem limited in scope, the theory that Brentano drew from its study—whose driving intuition, as we shall see, is that of the *indistinct perception of a chessboard of small coloured squares*—was to play central role in multiple areas of his later psychological and metaphysical research. Even in the initial text Brentano applies his theory of compound colours to the perception of sound chords and uses it to account for the intensity of sensations. Later on, he will recurrently come back to his account of compound colours, so as to account for internal perception (Brentano 1911, 127-130; English translation 1995a, 275-278)[1] and for the perception of contact and continuity (Brentano 1988, 8, 147), which will play a central role in his metaphysics of the continuous.

Brentano's theory is concerned with colours that are *phenomenally* compound. There are indeed two types of compound colours, which correspond respectively to two types of mixtures. First, there are colours that are physically compound, which correspond to mixtures of physical colours. For instance, on the macroscopic physical level that is of interest to painters, green is a mixture of yellow and blue pigments. Then there are colours that are phenomenally compound: they are compound in the sense that they appear to be compounds of more elementary colours to the perceiving subject. Brentano is here interested in this second type of complexity—phenomenal complexity, henceforth complexity tout court, which may be defined as follows:

[1] For discussion of this point, see Mulligan (2004), Textor (2006, 2012).

(Phenomenal) Complexity: compound colours—purple, orange, green…—are phenomenal colours that are presented as being composed of at least two other phenomenal colours.[2]

The colours examined in Brentano's descriptive psychology are all phenomenal colours, i.e., colours as they appear to us independently of how they relate to the underlying optical and biological episodes[3]. Henceforth, we shall use "colour" to mean "phenomenal colour," and "compound colour" to mean "phenomenally compound colour."

Once we have presented the problem posed by compound colours in the eyes of Brentano (§1), we will present his solution to the problem (§2). Then we will raise two objections against his theory (§3) before finally sketching an alternative solution (§4).

1. The Problem: Reconciling the Complexity and the Impenetrability of Colours

There were two main approaches to compound colours available at the time of Brentano's investigations, which he introduces as follows:

> *Cases of multiples qualities* (such as musical chords [*Mehrklänge*], colour shades in which several colours comes into play, etc.) have led many [respectable researchers] to believe in the possibility of an interpenetration [of qualities].
>
> Others have preferred to explain that in such cases, the multiplicity itself does not exist. (2009, 132)

Let us call the first theory the "Compenetration theory"; and the second, the "Simplicity theory." According to the *compenetration theory*, compound colours consist of a compenetration—that is, exact co-location—of the composing colours. Two colours, yellow and blue for example, can cover the exact same portion of visual space at the very same time. More generally, multiple sensory qualities of the same type (e.g., multiple sounds in a chord) can be perceived as occupying one and the same location in a sensory space at the same time. On this theory, purple, for instance, would be

[2] Brentano (2009, 93) makes explicit this notion of phenomenal composition in his lecture on phenomenal green. For a detailed examination of the concept of phenomenal composition, see Nida-Rümelin and Suarez (2009).

[3] They corresponds to what Chalmers (2006) calls "perfect colours": the colours as they are revealed to us in experience independently of any consideration about science or veridicality.

constituted by red and blue colours located in exactly the same place at the same time.[4] The colours that compose a compound colour genuinely compenetrate each other. The Compenetration theory therefore violates the impenetrability (*Undurchdringlichkeit*) of colours, which we define at first approximation thus (a refined definition shall be given in §1.2):

> **Impenetrability**: it is impossible for two colours to fill exactly the same area at exactly the same time.

According to the *simplicity theory*, on the other hand, the qualities that we think of as compound are in reality simple. Two reasons have been advanced, Brentano notices, in order to explain why simple qualities may wrongly be considered as compound (Brentano, 2009 132; 148–9 n. 2; 205–7).

The first is that "certain simple qualities are characterized and named in relation to several other qualities in between which they occupy some sort of middle position." (2009, 132). Compound colours would thus be simple colours described as lying between other simple colours in some resemblance order. For example, orange can be described as lying between yellow and red but this does not mean that yellow and red are somehow "in" the orange, that they are constituents of it. Alleged compound qualities (*multiple Qualitäten*) are, according to the simplicity theory, only intermediary qualities (*Zwischenqualitäten*).

A second explanation advanced by upholders of the simplicity theory, according to Brentano, is that we tend to consider as compound, actually simple colours which result from some complex causes ("antecedent conditions" —*Vorbedingungen*), whose parts, when occurring alone, cause the appearance of distinct simple colours[5]. Thus, if *a*, alone, causes the appearance of some blue shade; if *b*, alone, causes the appearance of some red shade; and if *a* and *b*, together, cause the appearance of some purple shade, one will be tempted to consider, erroneously, the purple shade as composed of the red and blue ones.

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[4] Although Brentano does not mention it, the Compenetration Theory of phenomenal colours displays clear affinities with the Stoic view of physical mixtures (see Alexander, *On Mixture*, in Long & Sedley, 1987).

[5] This proposal, for its part, displays clear affinities with Buridan (2010)'s account of mixtures.

Brentano mentions two ways in which such a complexity of causes, according to the simplicity theory, ends up being misleadingly attributed to the phenomenal colour in which they result. The first is that we may consider as compound, colours which we think of as resulting from some *mixing of pigments*.[6] We know that the painter mixed red and yellow pigments, and as a result, we believe, falsely, that orange is phenomenally compound of orange and yellow (2009, 148-149 n.2).

In a short appendix to his *Untersuchungen zur Sinnespsychologie* entitled "On the question of multiple qualities" (2009, 205-206), Brentano mentions a second way in which, according to the simplicity theory, the complexity of causes might get erroneously projected onto the appearances they brings about. Simplicity theorists, he writes, also argue that one tends to consider as compound colours, the colours that result from *complex physiological processes*, when such complex processes are composed of simple processes, each of which, in isolation, yields the appearing of some simple colour.

On the whole, therefore, Simplicity theory is an error-theory about compound colours: it denies that any colour is phenomenally compound— it rejects Complexity— and replaces the distinction between elementary and compound colours by some other distinction between two kinds of simple colours. In a first version, the simplicity theory replaces the elementary/compound distinction by the distinction between bounding and intermediary colours; in a second version, it replaces the elementary/compound distinction by the distinction between simple colours resulting from simple or complex causal antecedent. That second version comes itself in two sub-versions, one focusing on distal causes—pigmentary stimuli—; the other focusing on proximal causes—physiological processes.

As Brentano urges, Compenetration theory saves compound colours at the price of abandoning the impenetrability of colours; and Simplicity theory saves the impenetrability of colours at the price of abandoning compound colours. These are two costs that Brentano is unwilling to pay. As we shall now see, it is crucial for Brentano to maintain *both the reality of compound colours and the impenetrability of colours*.

[6] The distinction between the act of mixing and the resulting mixture is underlined by Fine (1998).

1.1 The reality of compound qualities

"*The complexity exists in reality, without any doubt"* (2009, 132), says Brentano with respect to colours and other qualities. Two qualifications are required. By "existence in reality" Brentano doesn't mean that compound colours exist in a manner that would be independent of the perception we have thereof. All colours of interest to Brentano are phenomenal colours, and he conceives of these intentional objects as *not existing independently of the perception that we have of them* (1995a, 10, 19, 88n.1, 92; 1995b, 17; 1981a, 208). The reality of compound colours is a psychological reality: there are genuine appearances of compound colours. The appearance of complexity cannot be explained away by appealing to similarity relations to other colours or to the genesis of compound colours (as simplicity theories have it). Purple, in and of itself, seems composed of blue and red. Within the family of phenomenal colours, some seem simple or elementary, while others appear to us complex or compound. Why, however, should we accept this distinction? Why endorse Complexity? Brentano here follows the lead of Hering (1878), whose opponent process model crucially relies on the distinction between unary and binary nuances.

However, although Brentano honours Hering, he disagrees with him when it comes to the nature of green. According to Hering, pure green, together with pure red, blue, and yellow, is one of the four elementary colours: green is opposed to red while blue is opposed to yellow. Binary colours are those that are located between these pure colours according to these axes of opposition. Orange and purple are then, contrary to green, binary colours. Brentano, on the contrary, holds that green is a compound colour. This is a controversial position that we shall not discuss here.[7]

It is important not to conflate the formal question—that we are concerned with here—of *what compound colours are* with the material question about *which compound colours there are*. The material question is important, for instance when it comes to determining the structure of the colour space. The simple or elementary colours typically occupy

[7] On this point, see Bouveresse (2004, Chap. 6) as well as Nida-Rümelin and Suarez (2009).

polar positions[8] therein. However, in the chapter under consideration, Brentano's interest touches the material question only incidentally—he examines it in detail in the preceding chapter entitled "On phenomenal green" (2009, 85–126)—; he rather focuses on investigating the question about what compound colours consists of *whichever they be*.

Still, this (material) disagreement between Brentano and Hering about the status of the green connects with our present (formal) question about the existence and nature of compound colours in the following way: the very existence of this debate, one may argue, shows that the status of a phenomenal colour as mixture is not exactly phenomenologically obvious. If even Brentano and Hering fail to agree on which colours are complex, shouldn't we give up Complexity and embrace the Simplicity theory?

Such scepticism, however, remains a minority view within colour science. The distinction between elementary and compound colours has proved quite fruitful,[9] and remains widely accepted —albeit not universally.[10] Two chief experimental paradigms motivate its acceptance. The first is constituted by *colour cancellation experiments*, along with Hering's opponent process theory,[11] to the effect that in a compound colour (i.e. purple), it is possible to cancel out one of the component colours (i.e., blue) by adding its opponent colour (yellow), leaving only the other compound colour apparent (red). The second experimental paradigm supporting the distinction between elementary and compound colours pertains to *colour naming*[12] and tends to show that only terms of elementary colours prove necessary to describe to whole colour spectrum.[13]

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[8] On the topic of different possible representations of the colour space, and of Meinong's and Wittgenstein's conception of compound colours, see Mulligan (1991), Bouveresse (2004, Chap. 7) and Seron (in press).

[9] For recent philosophical discussion on this topic, see in particular Hardin (1988, 2008); Byrne & Hilbert (2008); Allen (2011).

[10] See Mizrahi (2009) for a recent critic of the distinction, and defence of the first version of the simplicity theory.

[11] Following Hurvich and Jameson (1957).

[12] Following Sternheim and Boynton (1966).

[13] See again Mizrahi (2009) for a critical presentation of both paradigms.

But Brentano does not appeal to such experiments— and in fact, could not do so, since both experimental paradigms rely on the hypothesis that green is a simple colour. What then does motivate *his* acceptance of the simple/compound distinction within the colour realm?

The first argument advanced by Brentano is negative: each version of the Simplicity theory, he argues, face insuperable difficulties (2009, 148-149n.2). Take, first, the view that multiple qualities are nothing more than simple *Zwischenqualitäten* ("in-between qualities"). Brentano objects that we do not usually take intermediaries to be complexes made of the entities that bound them. Nobody takes the note *C♯* to be a chord composed of the notes *C* and *D*.

> Likewise, with respect to the division of time, nobody would say that the time we call 1:30 is less simple than the times that we call 1:00 or 2:00, or to consider it as composed from these two times because of its relative determination and dependent denomination. (2009, 148)

In a similar vein, Brentano objects to the second version of the Simplicity theory —the one that appeals to the complexity of causal antecedents— that not any colour appearance caused by a mixture of pigments is taken to be a compound colour:

> Were the painter to consider the orange to be a reddish-yellow because he can obtain such a pigment by mixing red and yellow, should he also consider the grey mixture obtained from red and green to be a reddish-green, and the green mixture obtained by mixing black and yellow to be a yellowish-black. But this is not what he does. (2009, 149)

On top of these two objections to each version of the Simplicity theory, Brentano develops a distinct objection to the first version of the theory —the one that appeals to intermediary qualities. According to him (2009, 205–6), the theory that identifies compound qualities with intermediary qualities suffers from an internal inconsistency.[14] His argument is this. If orange is simply an intermediary quality deprived of internal complexity, there is no reason for the line on which it lies to be bound by a yellow point on the one side and at a red point on the other. For since all qualities are equally simple,

[14] On this point, see Bouveresse (2004, 284)[15] See Johansson (2000) for a defence of this thesis and Massin, (2013) for a critic.

after yellow, one might continue towards green; and after red one might continue towards purple. Hence, Brentano argues, on this view every possible difference between compound and elementary qualities vanishes, as every colour becomes intermediary relative to some others—e.g. red is in between orange and purple. According to Brentano, therefore, the theory of intermediary qualities ends up abolishing the distinction between the bounding and intermediaries qualities on which it crucially relies. More generally, the upshot of Brentano's argument is that quality spaces cannot be structured —in the sense of being bounded by special points or *corners*— if one rejects multiple qualities.

We shall in what follows *grant* Brentano's thesis that compound colours exist. Our goal is not to assess Brentano's arguments in favour of compound colours, but Brentano's proposal to reconcile the existence of compound colours with the impenetrability of colours.

1.2 The impenetrability of qualities

According to Brentano, "*a quality is impenetrable by other qualities in the sensory space*" (2009, 132). No two colours can be located at the exact same place. Although Brentano doesn't explicitly dwell on this point in the text, it is important—in the light of theses that he defends elsewhere—to restrict this impenetrability thesis to colours that, on the one hand, are *maximally determinate* and, on the other, have the same *direction*, or *plerosis*. Let us explain.

Determinate colours. First of all, impenetrability holds true only for determinate colours: *this* particular nuance of red, *that* particular green—in opposition to determinable colours such as red, green, or 'colourful'. One needs to distinguish the problem of co-location of different determinate colours from the problem of co-location of a determinate colour with the determinable colour under which it falls. It may be that garnet red and generic red are colours of a different level of determination that both entirely cover the surface of a ladybird. This, at least, is the conclusion sometimes reached by those who defend, over and above the existence of determinate colours, that of determinable colours.[15] Brentano could well be one of them:[16] If Brentano is indeed

[15] See Johansson (2000) for a defence of this thesis and Massin, (2013) for a critic.

realist about determinable colours, he probably needs to admit that determinable and determinate colours are not impenetrable by one another.[17] This does not lead to inconsistency, for it is not this kind of compenetration that poses problems for Brentano. The compenetration that poses problem is the one that relates different determinate colours. In this context, a compound colour is itself a determinate colour, which is phenomenally composed of two other determinate colours.[18] When we speak of a "colour," "green" or "yellow," we thereby mean not only *phenomenal* colours, but *maximally determinate* phenomenal colours.

Colours of one and the same bearer. Second, colours that are impenetrable in Brentano's sense must be determinate colours that have the same direction, or "*plerosis*." The problem—which Brentano does not mention in the *Untersuchungen zur Sinnespsychologie* but considers in detail in *Philosophische Untersuchungen zu Raum, Zeit und Kontinuum (*—stems from the fact that things of different colours can come into contact. Most of the time, phenomenal colours are surface colours.[19] Surfaces are bi-dimensional entities that constitute the boundaries of things. According to Brentano's theory of the continuous, whenever two things touch, their boundaries overlap and are exactly co-located.[20] When these boundaries are surfaces, and when they are coloured, then Brentano admits that two colours are located at the exact same place at the same time: "If a red and a blue surface are in contact with each other then a red and a blue

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[16] See Brentano (1982 14–20); an interpretation in this sense is suggested by Mulligan & Smith (1985).

[17] However, this consequence doesn't follow immediately, since it is possible in principle to maintain that, while determinate colours are located in space, determinable colours aren't, or are so only in a derivative manner (we will come back to derivative location in the fourth part of this article).

[18] There may be a sense in which determinable red is composed of grenadine, carmine, magenta, etc. This doesn't turn determinable red into a compound colour in the sense that is of interest to us here, though. Indeed, when we say that determinable red is "constituted" by grenadine, carmine, magenta, etc., we say that red is either grenadine, or carmine, or magenta…: if determinables are constituted by determinates, they are constituted by disjunctions of determinates (Massin, 2013). Inversely, when we say that green is "constituted" by yellow and blue, we have in mind a conjunctive or aggregative sense of constitution: what is green is *both* yellow and blue *at the same time*.

[19] Not always, though: there exist voluminous colours as well, as has remarked early by Katz (1935).

[20] On Brentano's theory of contact, which is on the basis of his theory of the continuous, see Chisholm (1980), Zimmermann (1996), Varzi (1997).

line coincide, each with different plerosis" (1976, 51–2, see also 15–17; English translation 1988, 41; see also 10-12).

When we put a blue book on a red book, Brentano claims that a red and a blue surface coincide exactly. Yet this coincidence is compatible with the impenetrability of (determinate, phenomenal) colours since the surfaces have a different direction (*plerosis*): One of them bounds the red book, while the other bounds the blue book. For the impenetrability of colours to be violated, the surface of one and the same book would need to be both red and blue.

To Brentano, therefore, the colours are impenetrable only when it comes to *determinate* colours having the same *direction*, i.e., determinate colours bounding the same entities. Let us call "impenetrability," the view to which he subscribes:

> **Impenetrability**: it impossible for two determinate colours of a same bearer to fill exactly the same area at exactly the same time.

Why does Brentano accept the impenetrability of colours, and more generally, of sensory qualities? The corresponding thesis about physical bodies seems quite intuitive, but determinate colours certainly to not repel each other by exerting some repulsive force, so an argument might be expected.

Brentano presents the impenetrability of colours as having a tight link to the principle of spatial individuation of qualities, according to which *sensory qualities are individuated by their respective positions in the sensory space*. Thus, two qualitatively identical sensory objects that occur at the same time must have distinct locations (2009, 129). Thus, it might first seem that, according to him, the impenetrability of sensory qualities is grounded on some individuation principle. This initially tempting reading is, we shall now argue, erroneous. As far as we can see, Brentano offers no argument for the impenetrability of qualities: it takes it to be immediately obvious.

What exactly is the link between the impenetrability of colours and the principle of spatial individuation for sensory objects? Since Brentano claims in the appendix to *Kategorienlehre* that the impenetrability of bodies is explained by the principle of spatial individuation, it is natural to think that the latter grounds the former for qualities as well. There he adopts a strong interpretation of the principle of spatial individuation

for physical bodies by equating bodies to sub-regions of a unique spatial substance.[21] Accordingly, in a chapter entitled "The impenetrability of bodies is grounded in the fact that the spatial determinations are substantial and individualising" (1976, 178–184), Brentano derives the impenetrability of bodies from this principle of spatial individuation. He suggests that the essence of bodies consists solely in their spatial and temporal properties, and that their other physical and chemical properties are but accidental. If this theory is true, he adds, then any two bodies that exist in the same place at the same time are by nature one and the same. Nothing could be used to distinguish them from each other.

It is even more natural to think that this explanation of the impenetrability of bodies by the principle of spatial individuation generalizes to the impenetrability of sensory qualities, since in that very chapter of the *Philosophische Untersuchungen zu Raum, Zeit und Kontinuum*, Brentano alludes to the theory of the intensity of sensory qualities developed in the *Untersuchungen zur Sinnespsychologie*. What is more, Brentano makes an explicit comparison between the impenetrability of qualities and physical impenetrability in this chapter: "In the same way as matter is impenetrable by matter in the real space, in the sensory space *quality is impenetrable by quality*" (2009 132).

The parallel between psychology and metaphysics thus seems perfect: in the same way as, in real space, the principle of spatial individuation of bodies grounds their impenetrability, in the sensory space the principle of spatial individuation of qualities grounds their impenetrability.

However, as tempting as it may be, this interpretation of Brentano's position is erroneous, we believe. While on the metaphysical level the principle of spatial individuation grounds the impenetrability of bodies, it is the impenetrability of sensations that grounds the principle of individuation of sensory qualities on the phenomenal level: "It is precisely *in virtue of this impenetrability* that the sensory space,

[21] On the topic of Brentano's late ontology, see Smith (1989) and Schultess (1999). The later view of Brentano is a precursor of the contemporary view referred to as "supersubstantivalism," according to which objects are nothing by spatio-temporal regions (see Sider, 2001; Schaffer, 2009)

in opposition to other moments of sensation, is the most suited to individuate sensory qualities" (2009, 132, our emphasis).

Where does the asymmetry come from? The reason for it lies in the fact that while sensory objects are regions of the sensory space and necessarily bear some sensory qualities such as sounds or colours[22], physical bodies, in Brentano's late ontology, are possibly *empty* regions of space and time. In both cases the space is the bearer of physical properties and sensory qualities. But while the non-spatial properties are but accidents of bodies, they are essential to (most) sensory objects: a body is a location in a physical space, while a sensory object is not just a location in a sensory space, but a filled location, a quality-at-a-place.[23] In other words, a sensory object has spatial determinations, but also qualitative ones. This difference inverses the relationship between the principle of spatial individuation and impenetrability for the following reason: If bodies are but spatial regions, it is impossible by definition for two of them to be located in the same place at the same time. Spatial individuation grounds impenetrability. If, in contrast, sensory objects have both spatial determinations (locations) and qualitative determinations (colours), two different sensory objects can, in principle, be located at the same place at the same time provided their qualitative determinations differ. Their numerical difference is not threatened by the fact that they occupy the same place, as long as it is grounded in their qualitative difference. Because sensory objects are in that sense thicker than bodies, the principle of spatial individuation for sensory objects only ensures that *qualitatively identical* sensory objects cannot be located in the same place at the same time. But by itself it doesn't preclude two sensory objects of distinct colours from being co-located. This fact only follows from the impenetrability of colours: if phenomenal yellow and red cannot be in the same place at the same time, this is not in virtue of the principle of spatial individuation, but in virtue of their impenetrability.

As a result, the principle of the spatial individuation of sensory objects cannot ground the impenetrability of colours. Brentano needs to consider the impenetrability of colours as independent of, and more fundamental than, the spatial individuation of visual

[22] For details, see Massin (to appear).

[23] Brentano's view is here akin to the view defended by Clark (2000).

objects: it is because of the impenetrability of colours that we can count coloured objects by counting coloured locations in the sensory space. The impenetrability of colours, therefore, is a kind of brute impossibility for Brentano.

To sum up, Brentano wants to preserve both the *existence of compound colours* and the *impenetrability of determinate colours of a same bearer*. This position immediately gives rise to an important paradox: How can purple, to take an example, be composed of blue and red without them being located in the same place at the same time?

2. Brentano's Solution: the Chessboard

2.1 Presentation

Here is how Brentano attempts to reconcile Impenetrability and Complexity:

> [O]ne can very easily reconcile these appearances [of compound qualities] with the impenetrability of qualities. To do so, one only needs to remember that *there is a threshold of perceptibility* [dass es für die Merklichkeit eine Schwelle gibt]. *Hence, in the case of co-location of distinct qualities in the sensory space, an imperceptibility of the distances will be possible; it will be possible for a sensation to have imperceptibly small parts alternating in qualities. In such a case, the multiplicity of the parts will appear to the subject who perceives indistinctly* [undeutlich]*, while the particularity of their distribution will remain hidden to him*. (2009, 132–3; Brentano's italics)

So Brentano explains the complexity of qualities by a particular distribution of simple qualities in the sensory space. The qualities are distributed in such fine a manner that a confused or indistinct perception [*undeutliche Perzeption*] won't present the details of the distribution. Note that for Brentano, to say that the red and blue parts that compose the purple extent are indistinctly perceived, is not to say they their distinctness is not perceived. It clearly is: "*the multiplicity of the parts will appear to the subject who perceives indistinctly* [undeutlich]". It is rather to say that their exact spatial localisation is not perceived: "*the particularity of their distribution will remain hidden to him"*. The red and blue parts are perceived as *distinct* components of the purple extent, which exist *somewhere* within it, although *where exactly* they are in the purple extent remains inaccessible through perception. Hence, we perceive a colour as compound (orange, for example), when our phenomenal visual space is divided into very fine parts that are

alternately filled with different simple colours (red and yellow). This distribution can be refined to a degree that is impossible for us to apprehend.

> If we were to split up the subjective space of visual sensations into a chessboard of imperceptibly small squares [*schachbrettartig*], alternately red and blue, when having some sensation, then, as a consequence of what has been said so far, one would apprehend but the equal participation of both colours to the whole, which would appear as a medium purple. (Brentano 2009, 134)

A colour appears simple to us, in contrast, when all squares of the chessboard contain the same colour, e.g., yellow.

Brentano's presentation of his solution is very succinct, and is basically limited to these two passages (the remainder of the lecture consists of applying this solution to different examples, and of showing how it allows us to explain the intensity of non-visual sensations, too). This brevity is surely due to the fact that Brentano considers his solution to be "very simple." Brentano reformulates his chessboard account in several later texts.[24] One of the clearest and most detailed reformulations is to be found in the text "On what is continuous?" dictated eighteen years later. There, having described a chessboard of individually unnoticeable blue and red squares, Brentano wonders:

> But would we then see nothing at all? Not in the least; rather we would see the whole chessboard as purple, i.e. apprehend it as something that participates simultaneously in red and in blue; though of course not, strictly speaking, in the same positions, since red and blue do after all, as contrasting colours, exclude each other mutually. Thus one would indeed be able to say that both red and blue positions were to be found therein. But one would not be able to go beyond this general determination so far as to be able to determine down to the last details whether this or that point would belong to the red or to the blue ones. We see, therefore, that the limitation of our capacity to differentiate what is indisputably

[24] *Untersuchungen zur Sinnespsychologie* (2009 102), *Kategorienlehre* (1985 81; English translation 1981a 67-70), *Philosophische Untersuchungen zu Raum, Zeit und Kontinuum* (1976 12, 175, 180; English translation 1988 8, 147, 152); *Von der Klassifikation der psychischen Phänomene* (1911 129 English translation 1995a 275–278); *Sensory and Noetic Consciousness* (1981b 50-1); *Descriptive Psychology* (1995b 50, 122).

> involved here does not deprive us of the possibility of asserting with all certainty that the surfaces before us are here and here red, there and there blue. (Brentano 1988, 8)

It is possible, then, on Brentano's view, to apprehend the distinctness of the component colours, without apprehending their exact spatial distribution. It is this possibility of such an indistinct perception of the location of component colours that allows Brentano to reconcile the Impenetrability and the Complexity of colours.

Furthermore, the hypothesis that the sensory space is constituted by locations too small to pass the threshold of perceptibility allows Brentano not only to solve the problem of compound qualities, but also to explain the differences in the intensity of perceived qualities: The more empty parts there are, the lower the intensity of a perceived quality. Brentano notes (2009, 134) that the existence of phenomenally empty positions is nonetheless impossible in the case of vision (while it is possible in the case of other senses), since the absence of colour corresponds to a phenomenally positive colour: black (conversely, locations of the auditory field can contain no sound; silence, contrary to the colour black, is no sound). According to Brentano, this particularity of vision turns out to support his theory of intensity, since vision—as Hering noted earlier—is the only sense where no differences in intensity can be found (2009, 135).

To summarize, Brentano proposes to reconcile the impenetrability of colours with the existence of compound colours by embracing the idea that the visual space is constituted by coloured places that cannot be distinctly perceived.

2.2 The role of indistinct perception: dismissing a possible misunderstanding

Recall that Brentano's aim is to account for phenomenally compound colours, and not for physically compound colours such as painters' mixtures. Brentano's chessboard solution may seem to account for the question of compound colours' physical nature rather than for that of their phenomenology. Indeed, it is tempting to understand the chessboard as constituting the microscopic physical structure of compound colours. However, nothing could be further from Brentano's thinking. His chessboard is not a chessboard of chemical pigments or spectral colours. It is a mental chessboard, an intentional in-existent object. No optical instrument could be used to reveal its details.

One might then be tempted to raise the two following objections (which, we believe, are misguided). First, how can the chessboard be an intentional in-existent object if it is situated below our threshold of perceptibility? Second, how can the chessboard help explain the appearance of complexity if it is inaccessible to perception? The second objection may be expanded as follows:

> P1: What distinguishes compound from simple colours is their spatial constitution: the former consist in an alternation of various simple colours, while the latter consist in one and the same simple colour.
>
> P2: This spatial constitution does not appear to the perceiving subject, as it is located below the threshold of perceptibility.
>
> C: Hence, what distinguishes compound from simple colours does not appear to the perceiving subject.

This argument, if sound, would constitute *a reductio* of Brentano's theory, as its conclusion violates Complexity, which the theory is meant to explain.

Both objections fail, for they don't take into account the difference between distinct and indistinct perception, which lies at the heart of Brentano's solution. What is it to indistinctly perceive a mosaic of red and blue tiles? Brentano's response is worth citing again: *"the multiplicity of the parts will appear to the subject who perceives indistinctly, while the particularity of their distribution will remain hidden to him"* (2009, 133).

To perceive the chessboard of colours indistinctly, it is therefore necessary to:

> (i) fail to perceive the particular spatial distribution of the colours within the chessboard. The chessboard is not presented to us *distinctly,* as its parts are "imperceptibly small." Sensory space is constituted, in Brentano's view, by locations that are too small to be individually perceived;
>
> (ii) still perceive the chessboard as being constituted by multiple parts.

In other words, purple is a phenomenally compound colour because it is presented to us as having red and blue parts, whose exact location, however, remains hidden. We see purple as constituted by red and blue spatial parts without seeing their distribution in the form of a chessboard, i.e., without seeing the precise location of each and every one of these parts.

Indistinct perception allows us to answer the two objections above (to recall: first, how can the chessboard be an intentional in-existent object if it is situated below our

threshold of perceptibility? Second how can the chessboard help explain the appearance of complexity if it is inaccessible to perception?). First, the reason why the chessboard of colours can be in-existent without being distinctly perceived is that it is still indistinctly perceived. The chessboard is clearly not perceived *as* a chessboard, since the specific spatial distribution of its tiles is not perceived at all; but the chessboard is still *what* is perceived, albeit indistinctly.

Second, plugging the distinction between distinct and indistinct perception into the second objection above yields the following argument, which no longer constitutes a *reductio* of Brentano's solution:

> P1: What distinguishes compound colours from simple colours is their spatial constitution: the former consists in an alternation of various simple colours, while the latter consists in one and the same simple colour.
>
> P2': This spatial constitution does not appear *distinctly* but does appear *indistinctly* to the perceiving subject, as it is located below the threshold of perceptibility.
>
> C': Hence, what distinguishes compound colours from simple colours does not appear *distinctly* but does appear *indistinctly* to the perceiving subject.

Brentano would happily accept this conclusion. Denying that the specific spatial distribution of colours is distinctively perceived does not entail that it is not perceived at all. According to him, we *indistinctly* perceive the chessboard, without being able to distinguish its different parts. When Brentano says that the spatial distribution of component colours lies below the threshold of perceptibility, he clearly wants to maintain that it is nevertheless perceived *indistinctly*. The upshot is that, for Brentano, the phenomenology of perception is not exhausted by the phenomenology of distinct perception. We can perceive the red and blue parts of a purple extent without distinctly perceiving them, that is, without making out their specific spatial distribution.

3. Criticism of Brentano's Solution

There are however, we believe, two more conclusive objections against Brentano's account of compound colours. The first argues that, notwithstanding the above, Brentano's account is, in the end, committed to there being in-existent colour patches

that are inaccessible to any kind of perception, distinct or indistinct. The second objection purports to show that Brentano's chessboard runs afoul of the plausible thesis —which Brentano appears to accept— that purple is seen as spatially continuous.

3.1 Imperceptible phenomenal colours

According to Brentano, intentional objects in general, and colours in particular, do not exist independently of the perception we have of them. On this particular question, Brentano indeed supports Locke's theory of the veil of ideas. Anachronistic as it may seem, it is natural to assimilate Brentano's theory to Russell's theory of sense-data of 1912, which clearly alludes to Brentano's theory of intentionality.[25] Sense-data, like Brentano's intentional objects, are dependent on the consciousness that we have of them; and both are distinct from the physical reality that exists beyond ourselves.

Yet despite this striking proximity, Brentano's view on compound colours displays a fundamental divergence from Russell's theory of sense-data. According to the latter theory, the nature of sense-data is *entirely revealed* to us in our experience. According to Brentano, on the contrary, we do not entirely get to know compound colours by seeing them. We can extend our knowledge of them theoretically: Brentano's chessboard hypothesis contributes to such an extension of our knowledge. Brentano's chessboard is in itself *under-determined by experience*. Perception, in and of itself, does not allow us to tell that purple consists of alternating parcels of red and blue located in such and such a place. In fact, no good grounds can be had for answering one way or the other questions such as: are the elements of the chessboard squarish or are they hexagonal or triangular? Do they lie in staggered or aligned rows? Is their size the biggest size possible below the threshold of perceptibility, or are they even smaller? Does the chessboard alternate between one red square and one blue square, or rather between two red squares and two blue squares? Do the squares move? The answer is not to be found in perception itself (it is unclear in fact that even extra-perceptual considerations could help us answer such questions, since a wide variety of "chessboards" could play the very same explanatory role).

[25] Russell (2001).

Thus, although Brentano, like Russell, is interested in phenomenal colours as they are presented to us in perception, his account relies on a distinction between purple *as it is* and purple as *it appears*. To be sure, Brentano does not think the appearances of purple are deceptive. What is presented to us when we see purple—that it is constituted of red and blue— is *veridical*, but *partial*: not all there is to know about purple is presented to us in perception: the spatial location of its elementary parts eludes us. By introducing, *within the realm of in-existent intentional objects itself*, whose "esse est percipi" a distinction between appearance and reality, suggesting—in Russell's terms—that sense-data are but *partially* revealed in experience, Brentano's theory clearly gains some explanatory power: it promises to explain compound qualities and the intensity of sensations, among other things. As long as appearances of colours are not illusory but only partial, one might think, no problem ensues for the view that colours are mind-dependent objects. Yet, if what we see of colours is only part of what they are, then there has to be another part of colours that irremediably escapes us. This inaccessible, residual, part of the nature of colours, we want to press, cannot plausibly be held to be in-existent.

The problem arises when we think of *one* isolated square of the chessboard. Although the spatially heterogeneous parts of the chessboard that make up a compound colour are, according to Brentano, *collectively* perceived via indistinct perception, his theory implies that none of these parts can be *individually* perceived, *be it distinctly or indistinctly*. We have indeed noted that one of the essential conditions of indistinct perception lies precisely in the fact of not being able to access individual parts of the chessboard: only the chessboard as a whole can be indistinctly perceived. As a result, each individual blue part that constitutes the chessboard of purple is, in and of itself, too small to be perceived in any way. How then can an individual blue square be an intentionally in-existent object? How can it depend on the perception we have of it when it is, in Brentano's own terms, "imperceptibly small"? This theory leads to realism about colours, which Brentano officially rejects. Thus it seems that Brentano needs to admit that the atoms that constitute sensory space exist independently of the perception that we have of them—at least if he maintains that they are too small to be individually perceptible, distinctly or indistinctly.

One option would be for Brentano to weaken his anti-realism about sensory qualities in the following way: Colours depend for their existence either on the experience that we have of them, or on the perception that we have of the wholes of which they are parts. Thus as long as an individual blue square is a member of a collection of blue squares, which can be—at least indistinctly—perceived, the individual blue square could be maintained to be intentionally in-existent. On this proposal, although there could be no colours without perception, there could be imperceptible colours: the coloured squares that constitute the colour extents that we perceive—e.g., the blue tile that is a part of the purple colour that we see. That proposal has a strongly holistic flavour: the squares of the chessboard could not exist without being part of the chessboard. A solitary blue square, too small to be noticed, would be metaphysically impossible. It could exist only if appropriately surrounded. It is unclear to us whether Brentano's would have subscribed to such a holistic reading of his proposal,[26] and whether the chessboard analogy remains intelligible within such a holistic context. Be that as it may, Brentano's account of compound colours faces a second objection.

3.2. Phenomenal continuity lost

According to Brentano, indistinct perception is not *erroneous* but only *partial*. Brentano's view is not that through indistinct perception we see something that is not the case; it is instead that we fail to see something that is the case: the spatial distribution of the chessboard's squares. This is what allows him to maintain that purple is nothing over and above the red–blue chessboard, indistinctly —i.e. partially— perceived. Now suppose that purple is also presented to us as having some feature that the red–blue chessboard lacks. This would prevent equating purple with the red–blue chessboard indistinctly perceived. Our argument in this subsection is that our perception of the chessboard not only *omits* certain of its features —the specific spatial distribution of its parts— but also *adds* another: namely, the *continuity* of the purple. As a result the purple ceases to be identical to the indistinctly perceived chessboard, and becomes some sort of additional layer covering the chessboard. To re-use the analogy with Russell's

[26] See Textor (this volume) for considerations in favour of the view that holism may be congenial to Brentano's theory of intentionality.

sense-data, in §3.1 we have argued that Brentano is committed to something close to unperceivable sense-data, which are arguably inconsistent. In the present section we wish to argue that Brentano is committed, further, to something like *sense-data of sense-data*.

When we contemplate some uniformly red extent, say, redness appears to *pervade*, *fill*, or *cover* the region in question—to borrow expressions from Brentano himself (1995b, 95). As it appears to us, *no sub-region of the purple region is free from purple*.[27] Call this explanandum "continuity."

> **(Phenomenal) Continuity**: each phenomenal spatial part of a phenomenal purple (or blue or yellow...) extent is a phenomenal purple (or blue or yellow...) extent.[28]

Where by "phenomenal" we mean "presented"; and where by "spatial part" we mean:

> **Spatial part**: *x* is a spatial part of *y* iff (i) *x* is a part of *y*; (ii) *y* is exactly localized at a region *r*; (iii) *x* is exactly localized at a region *r'*; (iv) *r'* is a part of *r*.

There seem to be only two possible ways of accounting for phenomenal continuity, each of which entails that the phenomenal purple cannot be identical with Brentano's chessboard indistinctly perceived. The first is to appeal to phenomenal "gunk," that is, to the idea that colour extent appears to be infinitely divisible:

> **Phenomenal gunk**: (i) each phenomenal spatial part of a phenomenal purple extent is a phenomenal purple extent; (ii) each phenomenal purple extent appears to have proper spatial parts.

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[27] See Parsons (2007) on the cognate concept of sporadic location.

[28] That the continuity (uniformity, homogeneity) of mixtures is a mereo-topological concept has been argued by Sharvy (1983); Simons (1987), Needham (2007). It clearly won't do to simply say that purple is continuous iff all parts of the purple are purple, for ex hypothesis, purple has non-purple parts: red and blue ones.

If this is how a phenomenal purple expanse is presented to us, then it cannot be identical to a red-blue chessboard indistinctly perceived. For the purple expanses appears to have only purple expanses as spatial parts, no matter how small these parts are; the chessboard, on the other hand, has non-purple spatial proper parts (namely, red and blue ones).

The second way to account for the phenomenal spatial continuity of the purple (or any other simple or compound colour) is to appeal to phenomenally extended simples, that is, to the idea that some colour extents appear to be spatially indivisible:

> **Phenomenally extended simples**: (i) each phenomenal spatial part of a phenomenal purple extent is a phenomenal purple extent; (ii) some phenomenal purple extents appear to have no proper spatial parts.

Brentano sometimes seems to favour the second option, such as when he says that because we cannot distinguish the places filled by blueness and by redness "we assume we have only *one* place before us."(1981a, 72). But if this is how a phenomenal purple expanse is presented to us, then it cannot be identical to a red-blue chessboard indistinctly perceived either. For a phenomenal purple extended simple will then look to have no spatial proper parts; while, on Brentano's proposal, any phenomenal purple extent looks to have spatial proper parts —namely red and blue ones (even if the exact location of such parts is not given in indistinct perception).

Summing up, Brentano's chessboard hypothesis entails that the smallest visible purple extents seem to have non-purple spatial proper parts (namely, red and blue ones). But Continuity requires that all sub-regions of a purple extent seem purple. Whether Continuity is interpreted in terms of gunk or extended simples, it entails that the purple expanses we experience seem to have no non-purple spatial proper parts. The manifest purple is seen as spatially pervading some spatial area—either because it is seen as infinitely divisible into purple extents, or because it is seen as being made of indivisible purple extents—and therefore cannot be identified with the red-blue chessboard minus some unnoticed spatial peculiarity anymore. We see purple as having a certain property—spatial continuity—that the chessboard does not have. The purple we see becomes a colour in its own place, another layer of purple that covers the red-blue chessboard. We end up with a duplication of the purple: the purple as it manifests itself,

which is spatially continuous; and the purple as described by scientific psychology, discontinuous because constituted by alternately red and blue squares.

Couldn't Brentano bite that bullet and grant that the phenomenal purple and the red-blue chessboard are indeed distinct? Clearly not. The whole point of Brentano's theory of compound colours, recall, is to reconcile Complexity with Impenetrability. But if the purple, as it appears to us, is distinct from the red-blue chessboard, both Complexity and Impenetrability are lost:

> *Complexity is lost* for once the manifest, continuous, purple, and the red-blue chessboard are distinguished, the manifest purple ceases to be complex: red and blue patches are no longer parts of the manifest purple (they are only parts of the chessboard, which is no more identical to the manifest purple).
>
> *Impenetrability is lost* for once the phenomenal purple and the chessboard are distinguished, the purple and the chessboard end up compenetrating: depending on the squares under consideration, either purple and blue or purple and red will be found in exactly the same place at exactly the same time (in the case of extended simples, the purple extent and a red square will not however share *exact* location for no purple extent will be small enough to be exactly co-located with such imperceptible squares; but still a purple extent will be exactly co-located with a collection of red and blue squares, which is enough to violate Impenetrability).

In sum, if the chessboard hypothesis is true, then purple does not occupy its region of visual space in a pervasive or continuous fashion. Some of its sub-regions, namely all those sub-regions that are situated below the threshold of perceptibility, are not purple but alternately blue or red. The appearances of purple are, then, not only incomplete, but also deceptive: to account for the pervasiveness of the purple, one must abandon the identity between the apparent purple and the indistinctly perceived chessboard. To reconcile Impenetrability and Complexity, Brentano has to give up Continuity.

Why not do so? The chief reason is that the view that phenomenal colours seem to *fill* certain regions, in the sense that, apparently, no sub-region of these regions remain free of them, has a strong intuitive appeal. As a meticulous descriptive psychologist,

Brentano should be willing to accommodate this phenomenological aspect of our colour experience. As a matter of fact, he is. In various places but prominently in his *Descriptive Psychology*, Brentano stress that qualities "*fill*" , "*cover*", or "*pervade*" spatial extents. Brentano stresses that sensory objects have both a spatial and a qualitative determinations (which he also calls "inseparable" or "distinctional" *parts*). As to the qualitative determination, he writes:

> [Sensory objects] have a second specific determination which, as a *pervading* part of the spatial determination, *occupies* the place […], [i.e.] *fills* the space […] these second specific determinations are called qualities (colour in the widest sense, tone or its analogue). (1995b, 95; our italics)

Our second objection to Brentano, in sum, is that although he is committed to them, he fails to reconcile Impenetrability, Complexity and Continuity.

3.3. Brentano's account of the continuous to the rescue?

One possible reply on behalf of Brentano, is to appeal to his sophisticated theory of the continuous. Perhaps this theory provides a way of accounting for Continuity that is compatible with Impenetrability and Complexity? As we shall now argue, however, Brentano's theory of the perception of continuity, for all its virtues, fails to properly account for the perception of the continuity of *compound* colours (as he understand them).

Brentano develops his theory of continuity mainly in his *Philosophische Untersuchungen zu Raum, Zeit und Kontinuum* (1976, English translation, 1988).[29] To put it very succinctly, the theory consists, first, in the claim that each spatially extended entity is divisible into (potentially) infinitely many proper parts that are spatially extended themselves (Brentano is fiercely opposed to the idea that space is a dense set of points); second, in the claim that all these proper parts entertain a considerable number of contact relations between one another, where contact is understood as a coincidence of their (non-extended) boundaries.[30]

[29] On Brentano's theory of the continuous see notably Chisholm (1993), Zimmerman (1996), Albertazzi (2006, chap. 7).

[30] See section 2.1 above.

But how, Brentano asks, is it then possible to *perceive* continuity given that the proper spatial parts and the boundaries of the metaphysical continuous fall beyond our capacity of discrimination? Here again, Brentano makes use of his chessboard account, which he first introduces to deal with compound colours (Brentano 1988, 8, 147). Phenomenal spatial continuity, he holds, is the *indistinct perception* of metaphysical spatial continuity. His idea is that spatial continuity is presented to us as follows: we have the impression that the colour extent that we see has a high number of spatial proper parts, and that these proper parts entertain an important number of contact relations between one another, *without however seeing precisely what these parts or their boundaries are, nor where they enter into contact*. He writes:

> Certainly we cannot distinguish the individual points and boundaries in the continuum that presents itself to us, just as we could not distinguish the individual red positions in the divided chessboard. Yet this does not hinder us in apprehending with complete certainty that boundaries and coincidences of boundaries are innumerably present in the whole in question. (Brentano 1988, 9; see also 147)

We tend to think that it is neither necessary nor sufficient to be presented with numberless "coincidences of boundaries" in an extent to have the impression that that extent is continuously filled with a colour. This is not the place, however, to embark on a critique of Brentano's theory of the perception of the continuous. Our point is more modest: that *Brentano's account of the perception of the continuous fails to apply to the perception of the continuity of compound colours (as he construes them)*.

Let us grant both Brentano's account of the perception of the continuous (in terms of an indistinct perception of numerous coincidences of boundaries) and Brentano's account of the perception of the purple (in terms of an indistinct perception of numerous red and blue squares), and consider the experience of a uniformly purple extent. Brentano's view on the perception of continuity, we submit, accounts for the fact that the purple extent appears *entirely filled by colours*. But it does not account for the fact that the purple extent appears *entirely filled by purple*. To see that, consider first the perception of continuity in the case of elementary colours.

It is easy indeed to see how Brentano can account for the continuity of elementary colours: a yellow extent will be presented as continuously yellow, for it will be seen as

made up of numberless yellow sub-extents, whose boundaries coincide, although where exactly these sub-extents and overlapping boundaries lie will not be distinctly perceived.

But now consider compound colours. A purple extent will be presented as made up of numberless red and blue sub-extents, whose boundaries coincide, although where exactly these sub-extents and boundaries lie will not be perceived. Purple is seen as a multiplicity of red and blue patches somewhere entering in contact. But this does not help in explaining the phenomenal continuity of the *purple*. What would be needed, for get such a continuity, is an indistinct perception of numberless *purple* tiles with their numberless coinciding boundaries. This cannot happen in Brentano's hypothesis, for there are no purple unnoticeable tiles in contact: there are only blue and red ones.

Hence, thanks to his theory of the perception of the continuous, Brentano is perhaps in a position to explain why there seems to be no *colour-less* sub-region in a purple extent; but he cannot explain why there seem to be no *purple-less* sub-region in a purple extent. Yet, that no sub-region of the purple region seems free from *purple*, is precisely what Continuity is meant to capture.

Wrapping up this section, Brentano's proposal to reconcile Complexity and Impenetrability faces two objections. First, it entails the existence of intentionally in-existent objects too small to be perceived (each individual square of the chessboard). Second, it entails that compound colours, contrary to elementary ones, can never seem to pervade their regions: while all (distinctly or indistinctly) perceivable sub-regions of a yellow expanse seem yellow, there always (indistinctly) appears to be some sub-regions of a purple extent which are not purple. Continuity is lost.

4. An alternative to Brentano's chessboard: non-spatial parts

4.1 Brentano vs. Aristotle

The two problems that we have raised against Brentano's theory of compound colours—from the imperceptibility and discontinuity of colours—have a common origin. Brentano's theory essentially provides an *epistemological* solution to the question of compound colours: compound colours appear to us because of the limits of our discrimination capacities. Compound colours are not a new kind of intentional object but a configuration of elementary colours indistinctly perceived. On such an

approach, as Aristotle noted, a being of perfect acuity, such as Lynceus, could never have a sensation of phenomenal purple. Fundamentally, then, only elementary colours exist. If a mixture is a perfectly homogeneous combination of the elements it contains, then, according to Brentano, there are no mixtures of colour. Aristotle had already noted that epistemological theories of this kind lead to a negation of the reality of mixtures:

> When the combining constituents have been divided into parts so small, and have been juxtaposed in such a manner, that perception fails to discriminate them one from another, have they then been combined? […] so long as the constituents are preserved in small particles, we must not speak of them as combined. (For this will be a composition instead of a blending or combination; nor will the part exhibit the same ratio between its constituents as the whole. But we maintain that, if combination has taken place, the compound *must* be uniform—any part of such a compound being the same as the whole, just as any part of water is water; whereas, if combination is composition of the small particles, nothing of the kind will happen. On the contrary, the constituents will only be combined relatively to perception; and the same thing will be combined to one percipient, if his sight is not sharp—while to the eye of Lynceus nothing will be combined.) (*On Generation and Corruption*, trad. J. Barnes, 327b34-328a18)

Contrary to Brentano, Aristotle presents a metaphysical theory of the nature of mixtures. Although his theory has a different scope—Aristotle is interested in physical mixtures and not so much in phenomenal mixtures—it is still useful to contrast it with Brentano's theory. For Aristotle, the problem is not so much reconciling the multiplicity of the components of a mixture with their impenetrability, but reconciling the multiplicity and homogeneity of the mixture. His dilemma is the following: either the components continue to exist within the mixture, in which case the mixture is not really homogeneous—and, thus, is not a real mixture, or the components cease to exist when the mixture is created, in which case the mixture is not a real mixture, but a new simple element. Aristotle's solution to this dilemma consists in saying that the components of a mixture continue to exist *potentially* within the mixture.

Brentano (1981a, 69-70) raises the following objection against Aristotle: By conceiving of mixtures as a composition of existents and non-existents, Aristotle is led to attribute some degree of existence to non-existent entities. Brentano could have added that

Aristotle's solution does not really avoid the compenetration of ingredients: in the same way as the mixture they compose, the ingredients all exist, even if only potentially, in the same place at the same time.[31] This conclusion seems to confirm Brentano's initial doubts: the only solution for reconciling the impenetrability and complexity of colours is to adopt an epistemological theory of mixtures. Metaphysical theories, which attempt to account for mixtures without invoking the limits of our capacities of discrimination, end up violating the impenetrability of the components. In what follows, we shall suggest that this conclusion is too hasty and that a metaphysical account of compound colours can be given that reconciles Complexity, Impenetrability and Continuity.

4.2 A third way: non-spatial component colours

Let us recall our three *desiderata*:[32]

> **Complexity**: compound colours—purple, orange, green, etc.—are colours composed of at least two other colours.
>
> **Impenetrability**: it is impossible for two determinate colours of a same bearer to fill exactly the same area at exactly the same time.
>
> **Continuity:** each spatial part of a purple (or blue or yellow...) extent is a purple (or blue or yellow...) extent.

This may first seem to constitute an inconsistent triad, but that is not the case. It is only when we add the tacit hypothesis that the component colours are *spatial parts* of compound ones that an incompatibility appears. Because he accepts that the red and blue parts that compose purple must be spatial parts, Brentano is led to his chessboard account, which, we have argued, ends up conflicting with Continuity.

Rejecting that tacit hypothesis, we want to close by suggesting, paves the way for a metaphysical theory of compound colours that guarantees their *complexity* as well as the *impenetrability* of their components—important to Brentano—and the homogeneity or continuity of mixtures—important to Aristotle. This theory, in short, holds that *the*

[31] See Sharvy (1983) and Fine (1995).

[32] For ease of presentation, we have here dropped all explicit mention of *phenomenal* (colours, extents or parts) in these definitions. To the extent that, in accordance with Brentano, we only speak here of phenomenal colours, regions, and their parts, we shall henceforth assume that this restriction to phenomenal objects goes without saying.

component colours, instead of continuing to exist potentially *in the mixture as Aristotle thought, continue to exist* non-spatially *within it*. Let us define the non-spatial parts of a spatial thing as follows:

> **Non-spatial part**: *x* is a non-spatial part of *y* iff (i) *x* is a part of *y*; (ii) *y* is exactly localized at a region *r*; (iii) *x* is not located at any region.

Both Brentano and Aristotle consider the ingredients of a mixture to be spatial parts of it. They differ when it comes to the question about whether these parts are proper or improper. On Brentano's view, the composing colours are located at proper parts of the regions occupied by compound colours: they are not exactly co-located with the compound colour, but located at sub-regions of the region that the compound colour occupies (at every second parcel of the chessboard). He thus avoids compenetration. The cost of this is the loss of the real continuity of mixtures. On Aristotle's view, the composing colours are located at improper parts of the regions occupied by compound colours: they are exactly co-located with the compound colours that they constitute. The homogeneity of mixtures is thus saved, at the cost of abandoning the impenetrability of their components —a weak violation of impenetrability, however, for it remains true that *actual* colours never compenetrate.

To reconcile the multiplicity of the parts of a mixture, its homogeneity and the impenetrability of its components, it is sufficient, however, to reject the hypothesis, common to Aristotle and Brentano, that the parts that compose a mixture are spatial parts. That proposal seems to have never been envisaged seriously.[33] Our goal in the remainder of this paper is not to propose a full-fledged defence of that proposal, but only to provide some preliminary defence of it so as to suggest that the hypothesis might be worth exploring further.

So the proposal is that blue and red, although parts of purple, are not *spatial* parts of purple. Purple occupies a region of sensory space, but the blue and red that compose it do not. A chromatic mixture—purple—is a concrete entity located in space, which has abstract parts—red and blue—that are not themselves located in space. A purple extent

[33] Fine (1995, §1) touches upon the idea, but readily rejects it: "For suppose that one of the ingredients is part of the mixture. Then surely it has a location; and given that it has a location, surely that location is included in the location of the mixture."

also has spatial parts (sub-regions), but crucially, all its spatial parts are themselves purple extents. Consequently, each sub-region of a purple extent contains some blue and some red as non-spatial parts. Of course, when we see it as a single elementary colour, blue is located in sensory space in the same way as purple. Yet when it is a part of purple, blue ceases to be located in sensory space: in this case, only purple occupies sensory space. Thus, although it is true that every region and sub-region which seems purple seems partly blue and partly red, it is not true that the blue that contributes to make up purple seems extended. This is in marked contrast to the blue that occurs without red in a pure blue extent. So an inherent cost of the proposal is that some colours —the elementary ones— have two modes of existence: either they exist in space, or, when they are component colours, they exist non-spatially.

The proposal has several advantages. First, following Aristotle, it provides a *metaphysical* theory of mixtures (in opposition to Brentano's epistemological approach, which relies on thresholds of perceptibility). Second, it accommodates the two explananda dear to Brentano: purple is composed of red and blue; nevertheless red and blue never compenetrate—for the simple reason that, on this account, component colours don't have locations in sensory space. Third, Continuity is also accounted for: although some parts of a purple extent will be red or blue, no *spatial* part of a purple extent will ever be red or blue. Fourth, the proposal avoids the objection that Brentano raises against Aristotle: it doesn't lead to any sort of reification of non-existent entities: the elements of the mixture don't keep existing *potentially*, but *abstractly*, outside space.

These advantages notwithstanding, this suggestion invokes two sets of worries. The first pertains to the kind of parthood relation on which it relies. *Mereological* composition seems excluded, for it cannot take us from non-spatial entities (the component colours) to spatial ones. Even those who reject composition as identity are not willing to say that non-spatial parts can sum up to spatial wholes. So the composition at stake has to be non-mereological. Can we reach some more positive characterisation of it? Brentano, as we saw, introduced the concept of dependent/inseparable part.[34] Qualities and places

[34] Which he also call "distinctional" [*distinktionelle*] parts (1995b, 16)

are for him inseparable parts of sensory objects, for they are mutually dependent. The same seems to hold of component colours, we submit: they are mutually dependent parts of compound colours. Otherwise if would be possible for, say, yellow to exist non-spatially even when unmixed with other colours. So red and blue have to be non-spatial, non-mereological and mutually dependent parts of yellow. More needs to be said, clearly, about that specific sort of mutual dependence. For not all mutually dependent parts yield a mixture of those. The mutual dependence between qualities and extension, for instance, does not yield to any ratio or proportion. We cannot sensibly say that a red disc contains more redness than roundness, but we surely can say that some purple shade contains more redness than blueness.

A second set of worries pertains to the prima facie implausibility of the claim that several colours can be part of another without being spatially located in the place where the other is located. This *prima facie* implausibility, we submit, can partly be softened by mentioning other examples where dependent parts do not share the location of the whole they constitute. Let us discuss two such examples.

Consider, first, the conjunction of the views (i) that mental episodes are constituents of persons, (ii) that mental episodes lack spatial location (even if they do have a temporal location), (iii) that persons have spatial location. That conjunction of views was popular among modern philosophers, it was upheld by Brentano, and remains quite plausible, in our opinion, from the standpoint of *descriptive* philosophy of mind. When Julie is in the kitchen, neither her cheekiness, nor her love of Paul, are located in the kitchen. Yet they are constituents of Julie. So we have non-spatial constituents of a spatial thing. One limit of this example, however, is that Julie is only *partly* constituted by her mental episodes. She also has a body, which is a spatial constituent of her, and which explains her location. On our proposal, in contrast, the purple only has non-spatial constituents. Can we find examples of entities *entirely* composed of non-spatial constituents, but which nevertheless have a spatial location?

Consider, second, the view that bodies are bundles of universals. On this view, universals are (non-mereological and compresent) constituents of bodies. Now bodies are located in space. Does that entail that the universals that compose them are also located in space? Not necessarily. Costa draws the following useful distinction:

> According to immanentism, universals are present in space by being located at regions thereof. According to transcendentism, universals are present in space only by being instantiated by objects which, in turn, are located at regions of space. (Costa, forthcoming).

(As Costa notes, this distinction pertains to the *location* of universals, and is orthogonal to more familiar distinction, due to David Armstrong, between Aristotelian and Platonic universals, which pertains to the *exemplification* of universals.) The bundle theorist who endorses transcendentism holds a position akin to our proposal: non-located constituents (the universals) *entirely* compose a located whole (the body). Note that our point is not that this version of the bundle theory is true; all our argument requires is that it is intelligible. If it is, our proposal also is.

Costa's distinction is useful in another respect. For the transcendentist, although he rejects the location of universals, still grants that universals are *present* in space by being exemplified by objects located in space. Building on that proposal, we can maintain that component colours, although there are not *located* where the compound colours are, are nevertheless *present* in these locations —by composing the colours which is located in this place. The essential point is that purple doesn't occupy our sensory space in the same way as the elementary colours that *compose* it: purple is located in sensory space, while its blue and red components are not located in space, but may still be said to be present in space *via* the purple that they constitute.

Let us, to conclude, mention two more general reasons to prefer our proposal that the component colours of a compound colour are not spatial parts of it, to Brentano's chessboard account.

The first is that *the phenomenal difference between elementary and compound colours does not seem to have anything to do with the way they fill space*. Spatial pervasiveness holds in the same manner for simple and compound colours. As far as appearances are concerned, a purple extent does not leave more regions free from purple than a red extent leaves regions free from redness. If it is true that we have the impression that purple fills or pervades some sensory region uniformly, then we should have the impression that each and every one of the its sub-regions is also uniformly purple. The purple is not presented to us as possibly dissolving into blue and red parts below some threshold. In Aristotle's words, if phenomenal yellow is (spatially) *homeomerous* (i.e.,

if all the spatial parts of yellow are themselves yellow[35]), then the same is true for phenomenal purple. The simple fact that we can easily conceive of an appearance of purple infinitely divisible into purple proper-parts suggests that there is no sign whatsoever in the presentation of purple of the impossibility of a homogeneous division below a given threshold. The phenomenological difference between elementary and compound colours does not lie the fact that only the former seems to be spatially divisible in a homogeneous fashion. But this is exactly what any rejection or weakening of Continuity —à la Brentano— amounts to claim.

Second, in contrast to Brentano's theory that conjectures a phenomenal chessboard that is nowhere to be found in experience, our proposal sticks to the letter of what we see, according to Brentano's own description of such experiences. He rightly insists (i) that compound qualities are presented to us as having simple qualities such as their components or parts (=Complexity), and (ii) that the location of these component qualities is not presented in our perception. Instead of surmising that there is such a location by introducing an inaccessible chessboard, we suggest staying right there: if everything presented to us when we see purple is "a multiplicity of the parts," whose locations elude us, why should we introduce the troublesome hypothesis that these parts have a location? Why not stick to the appearances? If there is no phenomenological absurdity in the idea of seeing blue within purple without seeing where blue is in the purple (a description which Brentano rightly endorses), there should be no conceptual absurdity in admitting that blue is within purple without being anywhere within purple, either.[36]

References

Allen, K. 2011. "Revelation and the Nature of Colour," *Dialectica 65(2)*, 153–176.

[35] Aristotle, *On Generation & Corruption*, trans. J. Barnes, 328a10–12. See Sharvy (1983) for a detailed definition of homeomerity.

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Albertazzi, L. 2006. *Immanent realism: introduction to Franz Brentano*. Dordrecht: Springer.

Bouveresse, J. 2004. *Langage, perception et réalité. Tome 2. Physique, phénoménologie et grammaire*, Nîmes: Jacqueline Chambon.

Brentano, F. 1976. *Philosophische Untersuchungen zu Raum, Zeit und Kontinuum*, Hamburg, Felix Meiner Verlag.

———. 1911. *Von der Klassifikation der psychischen Phänomene*. Duncker & Humblot.

———. 1981a. *The Theory of Categories*. Trans. R.M. Chisholm & N. Guterman. The Hague: Martinus Nijhoff.

———. 1981b. *Sensory and Noetic Consciousness*. Trans. M. Schättle & L.L. McAlister. London: Routledge.

———. 1982. *Deskriptive Psychologie*, Hamburg: Felix Meiner.

———. 1985. *Kategorienlehre*, ed. by A. *Kastil, Hamburg: Meiner*.

———. 1988. *Philosophical Investigations on Space, Time, and the Continuum*. Trans. B. Smith. London: Routledge & Kegan Paul.

———. 1995a. *Psychology from an Empirical Standpoint*. Trans. B. Müller. London: Routledge.

———. 1995b. *Descriptive Psychology*. Trans. B. Müller. London: Routledge.

———.2009. *Schriften zur Sinnespsychologie*, ed. Thomas Binder and Arkadiusz Chrudzimski, Frankfurt: Ontos Verlag.

Buridan, J. 2010. *Quaestiones super libros De generatione et corruptione Aristotelis*. A Critical Edition with an Introduction. Leyde—Boston: Brill, éd. M. Streijger, PJ.J.M. Bakker & J.M.M.H. Thijssen.

Byrne, A. & Hilbert, D. 2008, "Basic Sensible Qualities and the Structure of Appearance," *Philosophical Topics 18*: pp. 385–405

Chalmers, D. J. 2006. "Perception and the fall from Eden". In Tamar S. Gendler & John Hawthorne (eds.), *Perceptual Experience,* Oxford : Oxford University Press 49-125.

Chisholm, R.M., 1980. "Beginnings and Endings," in P. Van Inwagen (ed.), *Time and Cause, Essays Presented to Richard Taylor*, Dordrecht: D. Reidel.

———. 1993. "Spatial Continuity and the Theory of Part and Whole: A Brentano Study", *Brentano Studien, 4*, 11-23.

Clark, A. 2000. *A Theory of Sentience*. Oxford: Oxford University Press.

Costa, D. Forthcoming. "The Transcendentist Theory of Persistence". *Journal of Philosophy*.

Fine, K. 1995. The problem of mixture. *Pacific philosophical quarterly*, *76*(3-4), 266-369.

———. 1998. "Mixing Matters." *Ratio, 11(3)*, 278–288.

Hardin, C.L. 1988. *Color for Philosophers*. Hackett.

———. 2008. "*Color qualities and the physical world*," in *The Case for Qualia*, ed. E. Wright. Cambridge, MA: MIT Press.

Hering, E. 1878. "Zur Lehre vom Lichtsinne," Wien: G.A. Agoston.

Hurvich L.M, Jameson D. 1957. "An opponent-process theory of color vision", *Psychological Review*, 64: 384-404.

Johansson, I. 2000. "Determinables as universals," *The Monist, 83(1)*, 101–121.

Long, A.A. and Sedley, D.N. 1987. *The Hellenistic Philosophers*, 2 vols. Cambridge: Cambridge University Press.

Katz, D. 1935. *The World of Colours*, London: Kegan Paul.

Massin, O. Forthcoming)-. "Brentano on Sensation and Sensory qualities", in Routledge Handbook of Brentano and the Brentano School, ed. U. Kriegel, London: Routledge.

———.2013 "Determinables and Brute Similarities," in C. Svennerlind, J. Almäng, R. Ingthorsson (Eds.), *Johanssonian Investigations*, Heusenstamm: Ontos Verlag, 388–420.

Mizrahi, V., 2009. "Is colour composition phenomenal?" in D. Skusevich and P. Matikas (eds.), *Color Perception: Physiology, Processes and Analysis*, Chap. 6, Nova Science Publishers, 185–202.,

Mulligan, K. 1991. "Colours, Corners and Complexity: Meinong and Wittgenstein on some internal relations" In B. C. van Fraassen, B. Skyrms & W. Spohn (Eds.), *Existence and Explanation: Essays in honor of Karel Lambert*, 77–101, Dordrecht: Kluwer.

———. 2004. "Brentano on the mind", In D. Jacquette (Ed.), *The Cambridge Companion to Brentano*, Cambridge: Cambridge University Press, 66-97.

Mulligan, K. & Smith, B. 1985. "Franz Brentano on the Ontology of Mind," *Philosophy and Phenomenological Research*, 45, 627–644.

Needham, P. 2007. "Macroscopic mixtures", *The Journal of philosophy*, *104*(1), 26-52.

Nida-Rümelin, M., Suarez, J. 2009. "Reddish Green: A Challenge for Modal Claims About Phenomenal Structure," *Philosophy and Phenomenological Research, 78(2)*, 346–391.

Parsons, J. 2007. "Theories of location", *Oxford Studies in Metaphysics*, *3*, 201–232.

Russell, B. 2001. *The problems of philosophy*. Oxford: Oxford University Press.

Schaffer, J. 2009. "Spacetime the one substance" *Philosophical Studies*, *145*(1), 131–148.

Seron, D. Forthcoming. "Des mots, des couleurs et des octaèdres", *Bulletin d'analyse phénoménologique*, XII, 2.

Schultess, D. 1999, "L'individuation selon Brentano." *Philosophiques, 26(2)*, 219–230.

Sharvy, R. 1983. "Aristotle on Mixtures," The Journal of Philosophy, 80(8), 439–457.

Sider, T. 2001. *Four-Dimensionalism*, Oxford: Clarendon Press.

Simons, P. 1987. *Parts: A Study in Ontology*. Oxford: Oxford University Press.

Smith, B. 1989. "The primacy of place: An investigation in Brentano's ontology." *Topoi, 8(1)*, 43–51.

Sternheim, C.E. and Boynton, R.M., 1966. "Uniqueness of Perceived Hues Investigated with a Continuous Judgmental Technique", *Journal of Experimental Psychology*, 72:770-86.

Textor, M. 2006. "Brentano (and Some Neo-Brentanians) on Inner Consciousness," *Dialectica, 60(4)*, 411–432.

———. 2012. "Brentano on the dual relation of the mental," *Phenomenology and the Cognitive Sciences*, 1–19.

———. This volume. "From Mental Holism to the Soul and Back".

Varzi, A.C., 1997. "Boundaries, Continuity, and Contact," *Nous, 31(1)*, 26–58.

Zimmerman, D. 1996. "Invisible parts and extended objects: Some philosophical episodes from topology's prehistory," *The Monist, 79(1)*, 148-180.