



Perceptual Relations in Digital Environments

Floriana Ferro¹ 

Accepted: 31 May 2022 / Published online: 24 June 2022
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Abstract

The aim of the paper is to develop the concept of perceptual relation and to apply it to digital environments. First, the meaning of perceptual relation is phenomenologically analyzed and defined as the interaction between the whole and its parts, which is theorized by the founders of Gestalt psychology. However, this relation is not considered as an intrinsic, but as an extended one, implying also the relation with the surrounding world (Umwelt). Subsequently, this concept of extended relation is applied to a chosen object (a ball) as it is perceived in four different kinds of digital dimensions (on-screen, virtual, augmented, and hybrid). Through a phenomenological analysis, I argue that, whereas the whole-part configuration remains the same, some modes of appearance of the object (multisensoriality, figure-ground interaction, affordances, and persistence) are different. In order to define this dynamic, I have coined the concept of transdimensional analogy.

Keywords Phenomenology · Perception · Umwelt · Digital environments · Transdimensional analogy

1 Introduction

In this paper I try to discuss and problematize the concept of perceptual relation through a phenomenological framework, in order to apply it to objects perceived in digital environments. The first section is introductory and raises the question of perceptual relation, of its meaning, and of different perspectives, depending on the adoption of classical and experimental versions of phenomenology.

The second section consists in a theoretical part, aimed at analyzing and defining perceptual relation in both a broad and a narrow sense: the former consists in the *Zwischen* (“inbetween”), which puts in relation the subject and the object of perception, whereas the latter turns to be more interesting for my purpose, since it consists in the interaction between the whole and its parts. This narrow meaning is theorized by the founders of Gestalt psychology, however, I do not consider perceptual relation as an intrinsic, but as an extended one. By assuming this position, I state that the relation between the whole and its

✉ Floriana Ferro
floriana.ferro@uniud.it

¹ Department of Humanities and Cultural Heritage (DIUM), University of Udine, Udine, Italy

parts also implies the relation with the surrounding world (*Umwelt*), which is an object of explicit interest in phenomenology.

The third section is dedicated to the application of this concept of extended relation to a specific object (a ball), which is considered as belonging to four different kinds of digital dimensions (on-screen, virtual, augmented, and hybrid). I will perform a phenomenological analysis, in order to show that there are both similarities and differences in perceiving some modes of appearance of the object (multisensoriality, figure-ground interaction, affordances, and persistence) between analog and digital environments. Whereas these four modes of appearance configure the analog object as divergent from the digital one, the whole-part relation remains the same. In order to define this dynamic between the whole and the parts and, at the same time, the specific features of each digital environment, I have coined the concept of transdimensional analog, which is made explicit in the concluding part of the paper.

2 Correlation, Intrinsic Relations, and Digital Environments

At first glance, the concept of relation in perceptual processes does not seem particularly complex, especially from a phenomenological perspective. The latter implies a connection between subjects and their objects. As far as perception, which constitutes the foundational level of every other process, is concerned, the object is grasped through the transcendental features of the perceiving I and its specific perspective. The object is defined as such in relation to the subject and, by contrast, there would be no subject without an object to which intentionality is directed.¹ This particularly applies to those who deal with experimental phenomenology, whose principles may be retraced to Gestalt psychology and ecological theory. Experimental phenomenology studies perception, its laws and dynamics through the use of experiments. This way to investigate perceptual phenomena shares with classical phenomenology some assumptions and interpretative tendencies, due to their common origin, which, in the experimental version, is practically oriented (Kubovy & Pomerantz, 1981). Even in this case, the subject perceives the object through configurations, called *Gestalten*, which apply to empirical data and configure them immediately, during the act of perceiving (Köhler, 1920, p. 9).

At this stage, it could be easily said that perceptual relation is nothing but the bond between the subject and the object, constituting the act of perceiving. These words seem exhaustive and able to summarize the meaning of perceptual relation. Actually, something is missing in what I have just written. I have outlined perceptual relation only in a very broad sense, without explaining specifically how this relation occurs and what it is grounded on. Moreover, my argument was limited to a dichotomic concept of reality, taking place only between subjects and objects, without mentioning a fundamental concept, which is the idea of *Umwelt*, of surrounding environment. This concept will allow us to step outside the narrow and suffocating dichotomy between subject and object, in order to delineate a more complex and dynamic relation, involving what surrounds us.

¹ In classical phenomenology there may be also subjective acts which do not have a specific object, such as panic or anxiety. However, it does not mean that they have no object at all: they are intentional experiences which are “characterized by indeterminateness of objective direction, an ‘indeterminateness’ which does not amount to a privation, but which stands for a descriptive character of one’s presentation” (Husserl, 2001, p. 111)

In this paper, I aim to delineate the specificity of perceptual relation, linking it to the concept of intrinsic relation theorized by Gestalt psychology, which consists in the relation between the whole and the parts of a configuration (Koffka, 1955, p. 570). However, “intrinsic relation” is a problematic expression, characterized by a certain narrowness: on the one hand, it allows us to conceive configurations as wholes, thus avoiding associationist and extrinsic models, on the other hand, it is limited to field processes occurring inside a specific Gestalt and does not include broader interactions. I will show the reason why perceptual relations should not be considered as intrinsic, but as extended relations, including the *Umwelt* as well.

Supporting this position distances me from an orthodox view of *Gestalttheorie*, according to which the relations between the whole and its parts are intrinsic. I will thus work on the concept of perceptual relation as an extended one (Ferro, 2021b). Such a reference to the extended mind (Clark & Chalmers, 1998; Gallagher & Zahavi, 2020, chap. 7; Matteucci, 2019, p. 139) may be applied to different kinds of environment. I am referring here not to specific portions of what we usually call the “natural environment”, where we were fully immersed before the digital revolution, but to technological environments. Our life has radically changed in the last decades, not only with the advent of internet, but also of different kinds of reality, especially virtual and augmented ones, and smart objects, which are connected through the world wide web to other objects and extend our possibilities of perception. Given that humans are technological beings since their very beginning (Ferraris, 2021; Malafouris, 2013), I will not refer here to a dichotomy between nature and technology, but between analog and digital dimensions. I will pose a specific question: how is perceptual relation configured in analog and digital environments? I will specifically bring some examples of digitization: the mere object on screen, in augmented reality, in virtual reality, and in hybridized humans. I will show how perceptual relations are configured in non-analog environments, showing, through my argument, that the digital *Umwelt* is not neutral and influences our way to relate to the object, beyond the whole-part interaction of its main configuration. This tendency shall be considered as a dynamic one and, most of all, related to an extended concept of mind.

3 Perceptual Relations as Extended Relations

According to phenomenology, perception is the primary way through which we enter into relation with what surrounds us, namely what we see, feel, touch, and recognize as such, giving them the name of “objects”. The latter constitute the stream of subjective experience itself: perception, memory, imagination, etc. are referred to something perceived, remembered, imagined, etc. (Husserl, 2001, Investigation V). The latter are constituted as unities, as soon as the “raw material” offered by our senses (the so-called “hyletic datum”) is grasped by the synthetic structures of the subject (Husserl, 1983, sect 85). The unification of the object, which is exactly due to this synthesis, consists in a *Sinngebung* (“meaning bestowal”): the object is included in more comprehensive experiences, to whom subjective intentionality gives sense. Both the subject and the object are in a relation, where the former does not “imprison” or dominate the latter,² but the latter is just perceived according to

² The concept of theoretical activity (perceptual, representational, etc.) as an expression of power is particularly sustained by Emmanuel Levinas (1969)

the structures of the former. In this way, the object is seen as something unified to whom an identity is given: if I see an object with six square faces, I will identify it as a cube (Taddio, 2009). No matter if I am able to see only three faces or less at once, I will perceive three or more other faces behind the visible ones. I recognize that object as a cube, because it has *the meaning of the cube*. However, meaning bestowal is not arbitrary: I cannot say that the same object is a pyramid or a cylinder, since it is not given to me with curve or triangular faces, but with square ones.

This process, where unification and recognition take place, involves both the subjective pole and the objective pole. The subject is *that which every act and experience is referred to*, the zero-point of one's own orientation in the world (Husserl, 1989, sect 41, p. 165), namely the body and its capacity of perceiving. The object is *the thing in its modes of appearance to the subject*. It is important to point out that the object, in the phenomenological tradition, appears "in its modes", thus standing in front of me (*Gegenstand*), "against" (*gegen*) me (Meinong, 1981). This implies that I cannot perceive it differently from how it presents itself at me. It does not matter whether it exists or not outside my mind, as both Meinong (1981, sect 3) and Husserl (2001, p. 120) state: yet, they insist that the object is the intentional reference of an act and appears in a certain way. The subject and the object thus enter into a relationship, an "inbetween" (*Zwischen*), distinguishing the movement of the one towards the other: on the one hand, the object is given to the subject through certain modes, on the other hand, the conscience of the subject is intentional, therefore is directed towards the object (Husserl, 1983, sect 84, 146). In order for this relation to occur, one needs to encounter the other.

According to Husserl, the object appears to the subject in its modes of givenness (Husserl, 1983, sect 3), from a certain point of view, partially and from a specific angle, therefore through ongoing "shading" (*Abschattung*), regarding sight, but also hearing, touch, etc. This aspect, as I will show further, is very important for my discussion on the perception of digital objects. For now, I would like to point out that, through perceptual acts, the subject grasps the object from a specific perspective and in a certain condition, moreover, perspectives and conditions change continuously. For instance, I will see three faces of a cube if I look at it from a certain angle, but I may also see one or two faces if I change my position or rotate the cube. As far as conditions and the consequent *Abschattungen* are concerned, the color of something changes with respect to the light: if this varies, I will see the red surface of a ball as more or less bright, or, if it is dark, as black. The same could be said for any other individual property of an object. Phenomenology therefore takes into consideration the variability and dynamism of perceptual relations, without making the object coincide with a bundle of established properties, and without hypostatizing the relationship between the subject and the surrounding reality.

Phenomenology thus tries to overcome neuroscientific reductionism (openly sustained, for instance, in Bickle, 2003), which claims that every aspect concerning human knowledge, feelings, relationships, etc. may be understood in terms of neural processes. According to phenomenology, instead, experience can never be reduced to what physically happens inside the brain, but is distinguished by a dynamic and changing interaction with the *Umwelt*. The latter concept is of particular interest for phenomenologists, since it has been considered both from the socio-cultural point of view, as Husserl (1983, sect 28, pp. 53–56; 1960, sect 58, pp. 133–136) and Schutz (1967, pp. 140–142) claim, and the biological one, sustained by Merleau-Ponty's research on von Uexküll (Merleau-Ponty, 2003, pp. 167–177). In this respect, there is an exchange between the subject and the surrounding environment: a bell, for instance, has "an effectual side (*Wirkseite*) that affects our senses and a perceptual side (*Merkseite*) that is impressed on the bell by our perceptual centres

in the brain and which consists in human perceptual cues” (Uexküll, 2001, p. 111). Every animal, including humans, have thus a meaningful relation with the environment, so that perceptual processes are not simply the effect either of physical stimuli or brain structures, but consist in an overall combination of the two which involves the surrounding context of perception. The subject and the object, which are the ontological preconditions of the correlation, display a phenomenological permeability (Matteucci, 2019, p. 27), a somewhat fluidity depending on their dynamic relation with the environment. By virtue of this, as soon as perceptual context shifts from analog to digital, the perception of an object is not supposed to remain the same, but to be differently configured.

This does not lead to a doctrine of the omnipervasivity of the context, to a super-individual entity which may encompass what is contained into it and is at risk of being itself hypostatized. The risk of holism, well highlighted by object-oriented ontologists (Harman, 2011, p. 25), may be prevented only if perceptual relations are conceived as taking place between two specific poles—the subject and the object—and their extension is referred to the perceptual field and the environment where they are situated. The body of the perceiving subject is a living body in situation, as phenomenology classically states (Husserl, 1989, pp. 61–62; Sartre, 1992, p. 455; Merleau-Ponty, 2012): it is not related to everything, but to a specific context, containing various objects and other living beings. Perceptual relations tend not to be holistic, but wide-ranging: they take place between the subject-object dichotomy, but are also affected by and affect the surrounding environment. This is valid both from the socio-cultural the biological point of view. More precisely, perceptual relations refer to an ecological and bio-cultural niche, built by the *Homo sapiens*, who is permeated by the interaction with the world (Kendal, Tehrani, & Odling-Smee, 2011). A similar position is sustained also by enactivist theory, which is particularly focused on perception and on its active nature, which involves an interaction with the surrounding context (Noë, 2004).

Perceptual relation, in a broad sense, is a *dynamic relation between subjects and objects*, a relation which is inseparable from its components and constitutes the *Zwischen* bringing subjects and objects into contact with themselves and the *Umwelt*. In a narrow sense, instead, it indicates *the relation between the whole and the part of a configuration*. This definition is inspired by Gestalt psychology and is particularly useful when it is applied to specific objects. My hypothesis is that it particularly fits to perceptual processes in digital environments, so that I will mainly use the narrow meaning rather than the broad one. However, I take distance from *Gestalttheorie*, since I intend perceptual relations in an open sense, as influenced by and capable of influencing other configurations and the surrounding environment.

According to the narrow definition of perceptual relations, the latter take place between the whole and the parts of a configuration, of a Gestalt. Since von Ehrenfels (1890), great importance has been given in experimental phenomenology to this relation, according to which the whole is different than the sum of its parts: it simply means that the whole has a structural function in defining the roles of the composing parts, as other Gestaltists specify (Wertheimer, 2020, p. 100; Arnheim, 1992, p. 203; Calì, 2017, pp. 39, 97; Ferro & Taddio, 2019). The relation between the whole and its parts is not static, but dynamic, as Köhler specifies when he defines *Gestalten* as psychic “situations” and “processes” (Köhler, 1920, p. 9). First, the Gestalt is considered as a situation; this may be interpreted as being not a pure and invariant a priori, but as a transcendental configuration, which is made explicit only in the effective perceptual act: I grasp the Gestalt of roundness only through my experience of round objects. Configurations express tendencies which are shared by humans, revealing themselves when subjects are face to face with objects. Moreover, the Gestalt

is a process, because it is developed in a temporal synthesis which implies changes. The latter takes place through a dynamic balance, which depends on field processes (Köhler, 1920, pp. 248–250; Arnheim, 1969, p. 40; Toccafondi, 2019). The Gestalt shall be thus defined as a synthetic and dynamic process, where the whole is not seen as a sum, but as a balance between its parts. For this reason, the whole-part relations do not derive from a principle of association, which is extrinsic (Wertheimer, 1922, p. 52), but are intrinsic. In Koffka's words, "there are numberless possibilities of organization in which the members of the whole are held together by *intrinsic* relations, which in our theory must be regarded as *dynamic* relations of the nervous processes" (Koffka, 1955, p. 570). Koffka's definition turns out to be particularly powerful, since it states that relations between the whole and its parts are independent from external factors, regulating themselves according to our nervous processes. This applies not only to visual perception, which provides us with many figurable examples, but even to other sensory spheres, which are entangled and involve the body as a whole, opening to a synaesthetic discourse (Bruno & Pavani, 2018). Our brain works dynamically and this dynamism arises from the encounter with the perceived, with the object belonging to the surrounding world.

The extension of sensorial fields regards also the so-called *affordances* (Gibson, 1986; Parovel, 2012; Sinico, 2018), the expressive qualities studied by Gibson. The latter depend on a "practical shade" I ascribe to the object according to the way my body is part of its environment. In Gibson's words, the "*affordances* of the environment are what it *offers* the animal, what it *provides* or *furnishes*, either for good or ill. [...] It implies the complementarity of the animal and the environment" (Gibson, 1986, p. 127). Gibson also provides us with the example of some properties of a surface (horizontal, flat, extended, and rigid), which, when they are not considered as physical properties, shall be measured as "*relative to the animal*. [...] They have unity relative to the posture and behavior of the animal being considered. So an affordance cannot be measured as we measure in physics" (Gibson, 1986, pp. 127–128). I am taking into consideration this definition of affordance, which is also connected to Arnheim's idea of perceptual activity. He writes that the "shape of an object we see does not, however, depend only on its retinal projection at a given moment. Strictly speaking, the image is determined by the totality of visual experiences we have had with that object, or with that kind of object, during our lifetime" (Arnheim, 1974, p. 47). Perceptual activity is not just a sum of data caught by our senses and processed by our brain. It is directed to objects as wholes and as we experience them in our daily life: this applies especially to tertiary qualities, which imply a practical relation between us and the objects. Even if the orthodox positions in Gestalt psychology tend to assign tertiary qualities to the objective side of the perceptual process, thus considering them intersubjective (Köhler, 1938, p. 78; Bozzi, 2019, p. 356), I share the position of other authors, like Arnheim, who consider also the influence of individual experience on perception.

4 The Specificity of Digital Environments

This reasoning, which has been just developed about perception of objects in the analog dimension, may be applied to digital environments as well. I will take into consideration how the same kind of object (a ball) is perceived in four kinds of digital dimensions: (1) on-screen, (2) virtual, (3) augmented, and (4) hybrid. If we consider perceptual relation as a mere interaction between the whole and its parts, then an object shall be considered as the *same* in all these dimensions. However, our immediate experience of the object

makes us sense it as *different*. I decided to take into consideration four basic modalities in which differences usually take place: (a) sensory spheres, (b) figure-ground connection, (c) affordances, (d) persistence. I have specifically chosen these ones, since they connect the whole-part relation to the surrounding environment. In this way, I will apply to digital dimensions the theoretical assumptions and arguments on perceptual relations I have made in the previous section. I will also argue that, if we take into consideration an extended concept of perception and its reference to the *Umwelt*, this relation will not involve either identity or radical difference, but analogy.

(1) Let us think about an on-screen ball and how we perceive it. The relation between the whole and its parts, which characterize the configuration of sphericity, is exactly the same. However, we immediately sense the on-screen ball as not coinciding with the analog one. (a) First, it happens because some sensory spheres are certainly inhibited: on a screen we may see the ball, but we cannot touch it, whereas in an analog environment the ball may also be an object of haptic perception. The sound of it bouncing on the ground may be somewhat reproduced, but the ground should be on-screen too. Olfactory and gustative experiences, even if we usually do not consider them in this specific case, are completely erased: the smell or the flavour of the rubber of the analog ball are absent and I may only perceive a sort of metallic sensation, which belongs to the screen, not to the ball it displays. It is immediately clear that, synesthetically speaking, there are perceptual differences between an analog and on-screen object.

Let us stick only to the visual dimension now. In our daily experience we may walk around the ball, look at a mirror in order to see other sides of it, manipulate or rotate it. If the on-screen ball is a tridimensional and not a bidimensional object, it may be rotated and seen from different angles as well. However, a question arises: do I see the 3D ball in the same way I see the analog ball? The relationship between the whole and the parts of the configuration through which I perceive the ball, that is sphericity, is on the screen the same as out of the screen? If perceptual relation was just an intrinsic relation, as *Gestalttheorie* classically states, a ball seen on a screen would not be distinct from a ball seen outside it. (b) However, if one carefully analyzes the figure-ground relation, a clear answer may be more difficult to give. Is the 3D ball, intended as a digital figure on the digital ground of a screen, the same as the analog ball, which is an analog figure on an analog ground? The texture of the background screen, which is also the same of the ball, is considerably different than the one belonging to the analog ground, made by different objects, and to the analog ball. Human eyes immediately perceive these differences in texture: even the best on-screen reproductions are seen by us as different from analog objects and situations. Figure-ground relation is just one of the elements (even if a very significant one) of visual perception.

(c) More differences may be individuated if one considers the affordances theorized by the ecological theory: in this case, the practical aspect of my interaction with objects influences also its perceptual modality. I cannot play with the ball on the screen, at least not in the same way as in analog reality, so that the affordances of the on-screen ball are different from the ones of the analog ball: the on-screen ball is not graspable and I cannot bounce it. (d) Other differences concern the relation between us and the persistence of the object. I can easily get rid of an on-screen ball: I just turn the screen off and the ball disappears. Getting rid of an analog ball, instead, is definitely more difficult: I must walk away, hide it somewhere, or tear it into pieces. If the ball is in front of me, I cannot just close my eyes and open them again: the ball will keep on being in front of me. The relation with the persistence of the object is thus evidently different.

If, as I have hypothesized, the relation between the whole and the parts of a configuration is inherent not to an isolated dimension, but to an extended one, this relation will change depending on whether its environment is analog or digital. Does it mean that the shape of the ball is completely reconfigured? I would say no, otherwise I could not perceive the ball on the screen as a sphere, but as a different object. Notwithstanding differences, there must be a somewhat *relation of analogy* between the two balls, an analogy which maintains the validity of Gestalt theory and allows the object to be recognized as such, to have “the meaning of the ball”, as classical phenomenology would say.

It may be objected that on-screen reality is not immersive and that, in order to test our perceptual structures, we should rather refer to other kinds of digital environments. (2) Let us think to virtual reality, where the perceiving subject, through a headset and/or other devices, just as a haptic glove, is projected in a simulated dimension. (a) Suddenly, it becomes clear that synaesthetic relations are different, since immersive devices which can reproduce smells or flavours have not been invented yet and we do not know if they ever will. (b) Figure-ground relations, instead, tend to be quite similar in virtual and analog realities, since the presence of other objects, close or far to the virtual ball, with similar textures in the surrounding environments may be simulated. (c) Even some affordances, when they do not involve other sensory spheres than visual, auditory, and haptic ones may similarly take place in virtual and analog realities. If I see and touch the virtual ball through a headset and haptic gloves, the sensation and the manipulation of the ball will show similarities with the approach to the real ball. I can see it, walk around it, touch it, grab it, bounce it, etc. The ball is touchable, graspable, “bounceable”, etc., so that its practical relation to me mostly resembles the one taking place in the analog dimension.

Yet, even in this case, I am able to distinguish analog from digital dimensions. I will say, for instance: “This ball *looks like* a real one!” or “I play with this ball *as* I play with a real ball!”. I will not say: “This ball *is* real!” or “I play with it *because* it is real!”. The immediate experience of a virtual ball is different from the immediate experience of an analog one. For instance, I recognize the virtual ball as a non-analog object, so much that, if I have not devices attached to my legs or feet, I will not be able to kick it. However, even if I had them, the practical relation to the virtual ball would be different than the one in the analog dimension, because I immediately recognize the virtual ball as such. (d) Just as it happens with the on-screen ball, even the persistence of the object is perceived differently. When I take off headset, gloves, etc., the ball will disappear. The same cannot be said about the analog ball. However, just as in the previous case, I recognize it as a ball anyway, by virtue of its relationship of analogy due to the entanglement of our perceptual structures and the things we meet in the world.

I would like to point out that an increasing number of studies on Human Computer Interaction (Slater, 2018; Piryankova et al., 2014; Kilteni et al., 2013; Burin et al., 2019; Jong et al., 2017; Tosi et al., 2020) find that experiences of immersive virtual reality change our bodily conscience, both from the theoretical (awareness that the virtual bodily parts belong to me) and practical (awareness of one’s actions in the virtual world). Such effects have been proved to persist even after the end of a virtual experience. It means that the immersion in another dimension affects our way to relate to analog reality, so that the relation of analogy is not easy to be defined.

What does it happen, instead, in mixed situations, just as augmented reality or hybridization between humans and digital technology? (3) In the case of augmented reality, there is an interaction between on-screen and analog reality. I was particularly impressed by the technology used at Gaudí’s *House Batlló*: here the visitors receive some devices and, through their screen, extensions of the elements of the house of the famous architect

appear, along with animations, reproductions of the original aspect of the objects, etc. If we apply this concept to the ball, we may see it, through specific glasses or screens, as multicolored or with informative writing on it. In this case, how do we perceive the ball in augmented reality? Actually, we grasp it as the same object, but developing different and extended perceptual possibilities. The model of augmented reality is very close to what I intend with perceptual relation: it concerns whole-part relations of an object, extending out of the object itself and expanding the possibilities of experiencing that object.

(a) As far as sensory spheres are concerned, the tactile, olfactory, and gustatory experiences of the object remain the same. There is also an addition of new auditory elements: I may still hear the ball bouncing on the ground, but also rings or tunes coming from the device. Visual stimuli tend to be different instead: the reference ball is the analog one, but I see other characteristics of it (a different size or color, for instance). (b) The figure-ground relation is configured as a composite one, since the extended version of the figure of the perceived object relates to the extended version of its ground. In this way, the digital device allows our perception not to lose contact with analog reality, but shaping it differently: for instance, we see an augmented ball on an augmented floor with an augmented chair next to it as the extended version of an analog ball on an analog floor next to an analog chair. Even if color, contours, or other elements are different, we do not perceive a radical change of configuration, but only its modified version, as I have previously stated. (c) Something similar may be said about affordances. Because of the entanglement between analog and digital configurations, the augmented ball may be seen as touchable, graspable, “bounceable”, etc. I cannot individuate evident differences with an analog ball, even if the adjustment of our body in space may be slightly affected: when I try to reach the augmented ball with my hand, I will perceive an extended space, which will affect my kinaesthetic sense of it. (d) As far as persistence is concerned, if I turn the augmented reality device off, I cannot see the modifications and the additions allowed by the device anymore, but the object is still there: I would say that it is the same ball I see and touch, even if I experience different possibilities of it, depending on whether the device is turned on or off. In this case, the relation of analogy is more evident than in the previous cases (on-screen and virtual reality).

(4) What happens, instead, in the case of cyborgs, of the hybridization between human body and mechanical parts, namely digital ones? Following a Merleau-pontian interpretation given in a recent paper (Ferro, 2021a), devices may be ontologically considered as extensions of our bodies, of our flesh. Moreover, there is a common texture, an element that, according to what Merleau-Ponty states in *The Visible and the Invisible*, is shared by all beings (Merleau-Ponty, 1968, p. 144). This texture is the flesh, also called “the flesh of the world”, which indicates the presence of an “original connectedness” (Clarke, 2002, p. 213), wiping out the dualism between subject and object: it is not the phenomenal body anymore, but the body as such, which is the expression of both subjectivity and objectivity.

By applying Merleau-Ponty’s concept of flesh, I may state that the digital prosthesis can become a part of me and that I can interact with other objects through it. If I was blind and a bionic eye was installed on my body, this eye would allow me to see, to gain access to a set of sensible data that I could not perceive otherwise. Through an ocular prosthesis a blind person may gain sight and perceive the world similarly as those who can see without the help of a prosthesis. We should wonder, however, if the former blind person who sees, through a bionic eye, an object in an analog environment has an identical perception to those who have “fleshy” eyes. Is the ball perceived by the former blind person the same object as perceived by a sighted person? Even in this case, I would answer both yes and no. a) Synesthetically speaking, an interaction of all the sensory spheres is possible. The only difference is that the presence of a prosthesis may affect some specific sensory spheres. Let

us think to a former blind person seeing an analog ball with a digital prosthesis. He or she will touch it, hear it, etc. as he or she did before, singularly speaking. However, synaesthetic perception requires an interaction between different spheres. How is sight affected by the prosthesis? Are the signals that the bionic eye send to the brain identical to the one sent by the “fleshy” eye? As far as I know, such a technology has not been developed yet, allowing blind people to see exactly as sighted people, so that I may speak only hypothetically. Still talking about the domain of possibilities, technological development will not allow the person using a prosthesis simply to “catch up” with the others, but also to gain access to further information. Let us think to the bionic eye, which looks at the ball and, at the same time, perceives its inner structure and reads information written on it: here hybridization is even mixed with augmented reality. If sight is affected, then synaesthetic perception, which involves a relation between all the sensory spheres, will be differently reconfigured as well.

b) As far as figure-ground relations are concerned, the ball perceived by a prosthesis is seen in relation to background objects, belonging to a specific sensorial field. In this case, there are many similarities with augmented reality: we do not perceive a radical change of configuration, but only some differences due to the medium of the prosthesis (contours, shades of color, etc.). c) About affordances, there are some similarities with both analog and augmented reality. If I have a bionic hand which allows me to regain sensitivity, then I can touch, grab, and bounce the ball anyway. However, the way in which I do it will be different: the ability to move my fingers or to adjust my strength will not be the same, since the prosthesis extends my body, but does not entirely coincide with it. I will feel and move my right “fleshy” hand and my left prosthetic hand differently, even if I am able to use both effectively. The prosthesis may also have augmented reality features: for instance, I touch the ball and the number of its temperature appears on my prosthetic hand or a voice linked to my ear tells it to me. In this case, there are clear modifications of affordances as well.

d) The issue of persistence, instead, seems to show evident similarities with analog reality: I cannot either let the ball disappear (unless I destroy it or walk away) or change my extended perception of it. A prosthesis is by definition an ineliminable part of my body, thus making me a hybrid or a cyborg.³ In augmented reality, instead, I can switch the device off and come back to the analog object as such. The object perceived in a hybridized situation, then, persists as much as an analog object.

In this case, are perceptual relations, taking place between the whole and the parts of a configuration, defined in the same way whether they refer to purely human subjects or to hybrids between humans and digital technology? Devices are extensions of our bodies, which are bond to their perceptual modalities, entangling with the latter and allowing the body itself to feel differently from when the prosthesis are not there. My hypothesis is that there is a relation of analogy, not of identity, between the perception of a non-hybridized and the one of a hybridized body. This issue shall be taken into consideration, since we are increasingly moving towards a “hybrid intentionality”, just as the post-phenomenologist Verbeek (2008) states, and towards artificial extensions, namely digital ones (Callus & Herbrechter, 2012; Longo, 2002).

³ A cyborg is a hybrid between cybernetic and organic components (Clynes & Kline, 1960), so that humans cannot survive without their cybernetic components. For instance, a man who wears a pacemaker is a cyborg, one who has a digital hand is only a hybrid.

5 Transdimensional Analogy

In the light of the previous argument, a definition of what a perceptual relation in digital environments may be developed. First of all, this definition starts from a general idea of perceptual relation, which shall be considered as an *extended relation*, whose meaning was developed in the third section of the paper. The interaction between the whole and its parts, defined by the founders of Gestalt psychology as intrinsic, shall not be seen as a closed relation, referring to an isolated configuration and its specific field processes. It is better to define it as a perceptual relation in an extended sense, an open and situational relationship, which takes place between the parts of a configurational whole, but also interacts with other configurations.

Perceptual relations are, more generally, relations with otherness, namely with the thing in its modes of appearance, the surrounding world, and other subjectivities involved. Unfortunately, I cannot discuss here extensively the intersubjective importance of a shared perceptual process. I will only state that perception does not concern the solipsistic sphere of the I, but the intersubjective one: it is our ostensive ability, through which we indicate to the other person what we perceive, deriving from original structures of coupling or pairing (Husserl, 1960, sect 51) and allowing us to obtain a shared knowledge. In this respect, the so-called “intrinsic relations” theorized by *Gestalttheorie* are not fully intrinsic. The relationship between the parts and the whole is influenced by and influences other objects, subjects, and surrounding realities: as I have previously written, it is an extended relation, regarding perception as a whole. For this reason, I prefer to define whole-part relations not as intrinsic, but more generally as “perceptual” ones: they are relations occurring inside a restricted field, but also referring to wider contexts, to the *Umwelt* indeed.

In the fourth section of the paper, I showed that the idea of extended relations may be also applied to other dimensions of reality, which relate to the analog one in their specific ways. My proposal is based on the idea of *transdimensional analogy: perceptual relations* may be considered as *analogies applicable to different dimensions* (on-screen, virtual, augmented, or hybrid reality). As it was argued before, a ball perceived in digital environments maintains the same whole-part interaction as in analog reality, but not its extended features, regarding sensory spheres, figure-ground connection, affordances, and persistence. For this reason, perceptual relations in digital environments may be considered as *extended transdimensional analogies applicable to perceptual configurations*. However, my hypothesis is still a theoretical one and should be subject to experimentation, in order to find what these analogies are and how they are articulated. Phenomenology is a rigorous discipline, which refers to experienced reality and looks for its overall sense. Thanks to the great tradition of Gestalt psychology and ecological theory, phenomenology may find new applications and the possibility of redefining itself. Research based on this approach, considering perception in digital dimensions, is ongoing and requires special attention.

Funding Open access funding provided by Università degli Studi di Udine within the CRUI-CARE Agreement.

Declarations

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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Floriana Ferro is assistant to the chair of aesthetics at the University of Udine. She has also worked in the same institution as adjunct professor and post-doctoral researcher in theoretical philosophy and history of philosophy. She was Visiting Scholar at Stanford and Chercheuse Libre at Paris I, then she obtained her PhD

at the University of Catania. Her papers were published in both Italian and international journals, such as *Philosophy Kitchen*, *International Lexicon of Aesthetics*, *Open Philosophy*, *Aesthetica Preprint*, and *Scenari*. She is also a member of research centers, academic societies, and editorial boards of academic journals regarding aesthetics and theoretical philosophy. She published two monographies: *Alterità e Infinito* (2014) and *Amore e bellezza. Da Platone a Freud* (2021). She currently studies experimental phenomenology, Object-Oriented Ontology, and, more generally, aesthetics of relations, regarding perception and human interactions in analog and digital dimensions.