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From perception to the Digital World: phenomenological observations

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Abstract
This article is based on Gibson's "experimental phenomenology" and ecological perspective. It aims to develop Merleau-Ponty's concept of "incarnate" by relating it to the more general concept of "illusion" in order to apply it to digital environments and immersive virtual realities. First of all, we should clarify, from a phenomenological point of view, the notion of "world." Although the concept of "world" is closely linked to that of "reality," it cannot be superimposed on it. We will analyze this distinction by focusing on specific cases of optical-geometric illusions and their ontological and epistemological implications. We will then extend them from the natural to the digital world.

Keywords World · Phenomenology · Perception · Illusion · Digital world · Virtual world

1 § 1

Our *experience* does not allow for superimposing the concept of "world" (and environment) to that of "physical reality." In other words, we cannot reduce perception to "physical stimulus" (or "distal stimulus"). *Gestalt* Psychology has highlighted this aspect since the beginning, followed by Gibson (1986), among others. Let us take the case of optical illusions: the analysis of the physical stimulus does not allow us to grasp the characteristics of an illusory phenomenon, that is, the very nature of the phenomenon we intend to examine. The illusory nature of a phenomenon, its *sense*, emerges from the analysis and description that we can make of it, assuming the immediate experience as reference (Taddio, 2013).

Let us consider a specific case of optical-geometric illusion: the "Müller-Lyer illusion." The two segments appear to have different lengths. However, an analysis circumscribed to the distal (or proximal) stimulus shows that the two segments have the same size: this implies that the illusion exists only on the level of direct or phenomenal experience. Illu-

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sion, as well as the perceived world in general, is the result of the process that underlies direct perception (Bozzi, 2019, pp. 130–155). The body, understood as a perceptual system, is "incarnated" in the world. This implies taking a position with respect to the appearance of a certain "thing." We act and perceive the world and reality in space and time, always starting from a certain perspective. The comparison between the perceived figure and the measurement produces an ambiguity: the eye and the ruler do not match. Notwithstanding, the illusion remains a stable phenomenon on the level of direct experience. In fact, even after having measured and verified that the two segments have the same length, we continue to see the figure exactly as before. There is a kind of sight impermeability with respect to the abstract cognitive activity. We know that the segments are equal (past experience) but this does not affect our sight. Müller-Lyer's illusion is a phenomenon that can be repeated and observed intersubjectively. Its irreducibility to the physical stimulus is further evidenced by the fact that we cannot measure Müller-Lyer's illusion with the ruler. The ruler measures the segments, not the phenomenon called, as a whole, "Müller-Lyer's illusion." When we measure this phenomenon with the ruler, we act and operate on it: we carry out a series of measurement operations and, implicitly, we *strip* it of the expressive richness captured in its entirety. If, by isolating a part of the figure, we measure only the two segments—neglecting the extremities—then they would not only have the same size but also *appear* as the same size. In this sense, we can reiterate that the ruler does not measure Müller-Lyer's illusion. But how can we measure an illusion?

We cannot do it *with* a measuring tool (in this case, a ruler) and base our judgment on the consequent data extrapolation and comparison. Rather, we do it by directly observing the figure as a whole. We can affirm that the two segments are equal after performing the following operations: (a) isolate a part of the figure; (b) measure the two segments, and (c) judge the figure based on the extrapolation of the measured data. This quantification of the phenomenon does not justify the illusory phenomenon. It rather operates on it by means of gauging tools. Therefore, based on a consolidated attitude toward the world, we "value" the measurement data, our actions, and our judgment more because of our tendency to manipulate things on a quantitative basis (Husserl, 1989).[1] Nevertheless, the perceptual dimension maintains a degree of independence and stability, and this distinguishes the world as we experience it. Based on this, we may measure the figure as an "illusion" through direct observation. Such an evaluation cannot be "disincarnate" since it depends intrinsically on our being "incarnate" subjects in the world (Merleau-Ponty, 1968). We can measure the figure directly through a systematic variation of the extremities. In doing so, we can notice the effect it has on us in terms of direct experience. By observing a figure changing, we grasp its deception character and its expressive force: we can evaluate the figure's illusory effect and pregnancy. The implicit "reference system" below all our evaluations is our "lived body" (*Leib*).

Optical-geometric illusions are a repeatable and intersubjectively shared experience. So are other non-artificial phenomena, for example, a stick that looks bent in water, which we can observe in the environment around us. Now, repeatability and interobservation are the fundament of scientific objectivity. Indeed, illusion can offer us a double criterion of evaluation. However, as a phenomenon, it is absolutely stable like the rest of the world-

[1] The use determines the meaning of the "thing," and this conditions our actions. When we act, we are no longer in the original dimension of "amazement" toward things and the world. Rather, we enter the practical dimension where, for us, things become "means" for achieving "ends" (Heidegger, 2013; Severino, 2016).

environment. The phenomena we observe depend on us being "incarnated" in the world (Gallese 2018). The relationship between our body (meant as a "perceptual system") and reality links the "world" and our "subjectivity." The "internal" and "external" distinction implies a "consciousness" that feels and *localizes* the phenomenon. From an ontological point of view, perception stresses our immediate experience. In order to further problematize it, we should grasp the entire process, i.e. the entire involved relationship. Accordingly, what we call "world" on the one hand and "subject" on the other are nothing more than the experiential poles that emerge from the process itself, from the exchange of information between the body, understood as an integrated physical system and the surrounding physical environment. It is a matter of problematizing phenomena at their corresponding level of complexity: the perceived world is, in this sense, an emerging complex phenomenon that cannot be reduced to mere physical stimulation.

2 § 2

In addition, the "stroboscopic movement" confirms that phenomena cannot be reduced to the distal stimulus. If we analyze the physical stimulation phase, then we find two isolated lights that turn on and off autonomously in two different points of space. On the contrary, with an optimal *interstimulus interval* (ISI) of 50/70 ms, we no longer see two autonomous light sources, i.e. two points that have their own distinct phenomenal unity-identity, but *one* luminous ball moving from one point to another in space. The various situations can be schematized with reference to the first light (L-1) and the second light (L-2) as follows:

1. We observe a movement from left to right.
2. But lights L-1 and L-2 do not move.
3. L-1 turns on first, followed by L-2.
4. I call the turning on of L-1 the *cause* of the movement, and I call the occurrence of the movement the *effect*. In fact, if L-1 does not turn on, then I only see a still L-2.
5. However, if L-2 does not turn on, then L-1 also stands still.
6. Therefore, I call the turning on of L-2 the *cause* of the movement.
7. But L-2 turns on when L-1 is already off. Therefore, it cannot have *caused* the movement of something that is no longer there.

In short: in what kind of "time" can a *subsequent* event influence what had happened *before*? Since the movement has its own *duration*, what kind of duration begins from a subsequent event and ends with what happened before? The situation is paradoxical because, at first glance, everything happens as if L-1 were set in motion *before* L-2 is turned on without knowing, of course, whether L-2 will turn on or not (Vicar, 2005, p. 187). We can observe the same phenomenon in the light "scrolling" of an amusement park or in any cinematic show. In old cinemas with film, we could see the flow of moving events rather than still images. Even here, we find a difference between the distal stimulus, the individual frames, and, on the other hand, the movement, i.e. what happens in the phenomenal present of a movie narration. The "phenomenal present" is a structured event. It does not correspond to a mathematical moment, which, by definition, has no time. The phenomenal present happens "here and now," has a temporal thickness, and is made of the past (retention) and the

future (protention): the event retains the past and gives structure to what is about to happen (Merleau-Ponty, 2012, p. 420). The properties of moving images, which emerge during the 0.24 s projection of the film, are not the same as those found in the individual frames. Those properties, the event, the movement, what we see in the movie (its plot, rhythm, emotions, etc.) occur only at a certain time interval of projection—not below and not above a certain threshold, but only within a specific temporal arc (ratio-relationship). The world that the movie ontologically reveals to us does not "exist" within the frames because it is not there: it exists, emerges, and can only be experienced in the world. What happens in the movie exists only at this level of analysis (direct experience) and complexity (assumption of the event in the entirety of its manifestation and not in its individual parts). The same could be said of our body, our experience, and our mind: all these phenomena cannot be reduced to the analysis of their parts. The body as a physical object does not correspond to the perceived body, nor can the physiology of the brain fully account for mental phenomena. Feelings from a movie scene, for example, the fear felt with its expressive characteristics while watching Alfred Hitchcock's famous shower sequence in *Psycho*, is not in the group of corresponding frames on the film. Although the frames are the condition for the movie to emerge, the two planes of the movie and the film reel do not have the same properties.

If we were to consider the cinematic spectacle as a merely illusory phenomenon, then we should interpret every movement in the world as if it were illusory since our very experience of movement is based on strobe movement (Merleau-Ponty, 2020). However, even if it were an illusion, *where* would reality belong? If the event—the film—were an appearance, *where* would reality belong? In order to say that a world is illusory, we must assume a further, real world. However, is such a distinction between appearance and reality implicitly epistemological or ontological? In the end, it is an epistemological position because it depends on *how* we know the world, i.e. on our implicit reference system (Taddio, 2012).

For example, we define illusory, for example, as the "stick bent in water" with respect to the "stick out of water." We judge the apparent "virtual reality" with respect to the "current world" (assuming the place where our body lives normally as a reference system). We assume the reality of the "physical world" with respect to the "apparent world" in which we live (making it depend on our "image apparatus"). We assume the reality of the "static images" with respect to the appearance of the "moving images" of the film. We assume the "movement of the sun" as apparent with respect to the "immobility of the Earth." We assume the "apparent color" (fusion of a half-white and half-black disk) with respect to the "immobile disk" (Agostini, 1999, p. 474). We assume something as apparent *with respect to* another world that we consider real, yet such an "appearance" status can be reversed when we accept another system of reference. What we previously understood as apparent or illusory can now be assumed as our reference reality. We can sleep and dream immersed in a virtual reality. In this dimension, the dream would be the appearance with respect to the reality of the virtual world in which we live. In turn, the latter would be apparent with respect to the world in which we are now. Furthermore, I could say that the table perceived within virtual reality is apparent with respect to the table present here in the natural world. And yet, even the present table would become apparent with respect to the reality described by a physicist because it is dependent on our image apparatus.

We shall reflect on a further example, the Gelb effect (1929). A projector can illuminate a dark gray disc on a threshold between two shaded spaces. In this case, the dark gray disc is perceived as white and poorly lit. Now, let us insert a piece of white paper on the gray disc

within the cone of light: in doing so, the observer returns to perceive the gray disc (Massironi, 1998: 179). We classify the white disc as apparent compared to the disc that we say is actually black. Now, let us take a disc and divide it into two parts: one white and the other, the bigger one, black. Substitute the previous, dark gray disc with it and make it rotate at a certain speed to get the same dark gray as before. Is the (surrogate) gray color that emerges from the optical fusion as real as the previous one? Let us illuminate the dark gray disc with the projector again: it looks white. Again, let us insert a white sheet. It looks gray. So where does reality belong? What is real? The gray disc compared to the white one, or the partly black and partly white disc compared to the gray one? Under what assumption (reference system) do we judge this as apparent or that as real?

On the chromatic level, the point of fusion corresponds to the point of the cinematic example where the images gather in a seamless movement. A precise numerical relationship can express such a point. In other words, at some point, a certain quantity (numerical relationship) establishes a *qualitatively* different plan (metastability). The theory of complexity shows us that the properties that emerge on this plane of reality cannot be traced back to the underlying level.[2]

In the world, we can experience a multiplicity of aspects that do not exist (i.e. do not emerge) from the analysis of the distal stimulus. Vice versa, there may be things that exist on the level of the stimulus but cannot be perceived. Everybody knows the "masking" (or mimicry) examples. From a phenomenological point of view, everything that appears lies on the same phenomenal plane of phenomenal immanence: the "virtual" world in this sense is an extension (prosthesis) of the world. Illusion is part of it, as well as colors, shapes, shadows, and reflections. These are all phenomena that exist, as they are parts of our lifeworld. In this sense, there are several worlds intertwined with a single reality. Bees, for example, can distinguish a painting by Picasso from one by Monet: they share with us the perception of shapes and even paintings, even though we certainly assign a different meaning to these works (Vallortigara, 2021, pp. 57–60).

3 § 3

Multiple "forms of life," such as human and non-human subjects, *inhabit* the world. To further clarify the meaning of the term "world," we can make it correspond to what a subject (a certain "form of life") *directly* perceives. The external world corresponds to the entire class of phenomena that we "encounter" (Metzger, 1963) in the surrounding environment: trees, houses, rivers, and mountains, but also the green of the leaves, the shadows of buildings, the light reflections on water, illusions, the mountains depicted in a painting, or the events of a movie. Every aspect we see in the surrounding environment is part of our "lifeworld" (*Lebenswelt*), that is, of the place where we act and interact in relation to "things," "events," and other subjects (Husserl, 1970). The "physical world" does not embrace all the events that we can *encounter* in the phenomenal world. In this sense, we use, based on this mismatch, the term "phenomenon." It indicates that what appears cannot be reduced to physical or material reality. Instead, we can assign the term "world" a meaning that corresponds to the entire

[2] In this sense, *Gestalt*'s theory also falls squarely within the paradigm of complexity. A *Gestalt* expresses exactly this non-reducibility to the parts. It emerges as an autopoietic dynamic from parts that share certain characters and metric relationships.

class of phenomena *encountered*. Most of them are ostensible and intersubjectively shareable aspects. The world-environment in an eminently phenomenological sense corresponds to what a "form of life" perceives through its "body," meaning a "perceptual system."

These examples show that the world-environment is not reducible to the physical world. Some world elements are "subjective" as they are linked to our existence. Think, for example, of the classic distinction between primary, secondary, and tertiary qualities. Although a long tradition has considered only the primary ones real, all can be counted as part of the world-environment (Bozzi, 1990). We perceive qualities in the world that convey information and meaning about the environment that surrounds us. In this sense, the "perceptual field" is never neutral: the "forces" (Arnheim, 2004) that inhabit and cross it are "vectors" capable of giving a "sense" and a *direction* to our action. Gestalt psychologists have long described these forces. Gibson added the notion of *affordance* to them. These same vectors act and operate on the pictorial image.

In distinguishing the "experienced space" from the "objective space," Merleau-Ponty compares the "experienced body" to a "work of art." With this equivalence, he means that, on the one hand, the body is not a mere thing and, on the other, we cannot reduce an artwork to a physical object (Merleau-Ponty, 2012). In this sense, the work of art can be equated with the living body: it opens up a world to us. The sense of the image is not reducible to its material substrate. Heidegger, commenting on Van Gogh's painting entitled *Shoes*, highlighted the sense of the "thing" (Heidegger, 2008). Leaving aside the broader implications developed by Heidegger in this essay, he highlights how the artist, through the painting, brings the "world" of the peasant back to us. We are able to see the wear and tear of the shoes, the fatigue of work, and the time spent in the fields as elements of the human world. The forms that preserve this meaning imply a system of equivalences established by our body (experienced body) that puts us in relation to the world of the peasant. The shoe as a mere physical object does not embrace the whole world that the artist unfolds through his work. When we immerse ourselves in the painting, we can inhabit that dimension, grasping that sense of the thing and the world: it is the very sense of inhabiting that Merleau-Ponty intends to theme through painting.

The virtual does not go too far from this: it is like inhabiting a painting, that is, we immerse ourselves in a world made of painting. Merleau-Ponty (1964, p. 162) wrote that "it is by lending his body to the world that the artist changes the world into paintings." The artist filters the world through his body, and his action in the world establishes the dynamic where this occurs: the body (*Leib*) establishes a sense in the world because it belongs to the same *Gestalt* (Merleau-Ponty, 2002). There would not be this world if we did not have this body, and vice versa.

The world does not depend solely on the fact that the perceiving subject possesses a certain "world-image apparatus" (Lorenz, 1978): the perception of the world is the result of the whole perception process involved, not only of the "subjective" or "objective" pole taken individually, and not even of any part of the process. We can map the activity of our brain in detail, but we will not find the sense of the peasant's shoes by Van Gogh or Cézanne's *Mont Sainte-Victoire*. The sense that we find by experiencing Van Gogh's work implies the reference system of our experienced body. In *Mont Sainte-Victoire* by Cézanne, we see the becoming of things *and* the flow of our consciousness. The observer and the observable in their interaction structure both the "world" and the "subject," i.e. two sides of the same coin. In this sense, Merleau-Ponty (2002) goes beyond traditional "realism": it

does not make sense to question the existence of the world, regardless of the subject. The world is the *result* of the perceptual process, which matches our immediate experience. This implies considering "our body" as a "perceptual system" integrated (incarnated) into the environment. Emerging properties of the physical processes that underly and are involved in the perception give rise to both "consciousness" and the world. But what we mean as a "subject" should not be understood in a "subjectivistic" sense, i.e. in the sense of "arbitrary" (the world as a subjective construction). This does not indicate at all that everyone can perceive the world as they want.[3] What we see, as in the case of the "Kanizsa triangle," may not have a corresponding distal stimulus. Nevertheless, it is still part of the visible, meaning intersubjective, intercultural, and trans-historical world. For example, an optical illusion was equally visible in Lucretius' time, just as it is in ours. In fact, in the fourth book of *De rerum natura*, Lucretius describes a phenomenon that is well known to psychologists of perception: a horse is in the center of the river, the knight observes his horse's legs and, at a certain point in the visual exploration, the knight has the feeling that the water is still and that, instead, he and the horse are "moving away." We can experience the same phenomenon—illusion of movement—when we stand on a bridge and look at the central pillar under our feet. After observing the water for a certain period, we feel like being on the stern of a ship that sails the sea: the water acts as a "reference system" and we perceive the movement. These phenomena could have caught the attention of a writer like Lucretius in his day, just as they can be rediscovered and reproduced in today's labs of psychology of perception (Bozzi, 1989, p. 18). The phenomena remain the same because we share the same world: the same movement effect can also be reproduced in different virtual worlds.

4 §4

The difference between "physical environment" and "phenomenal environment" were outlined in the Koffka *Principles*(1999, p. 36)[4] and later by Merleau-Ponty, when he states that the environment is the place where our bodily action finds expression: the "landscape" that we see, the things we perceive, do not correspond to the geographical environment or the image that we can draw from it. Merleau-Ponty (1964) distinguishes the direct experience of the environment from science (in the example, geography), understood as an attempt to grasp the world through a "glance of flight" (disincarnated). Experience (in the example, the landscape) implies an "incarnate gaze" in the world, full of meaning and oriented toward things. The scale of the environment in which we live differs from that of the "physical reality" (entities such as atoms, electrons, particles, and molecules, but also planets and galaxies) or from all those realities that are too small or too large to be perceptible (Gibson, 1986, p. 8). Direct observation of the world implies a reference scale that is established by our body and made up of medium-sized bodies. Take, for example, a micron of a ceramic material observed under a microscope: in this case, the size of the image we perceive is expressed in centimeters, not microns. We are *aware* that such an image "stands for" (represents) a micron, but we do not see a micron. Conversely, the same holds true when we look at Jupiter

[3] Other people cannot observe such a "subjective" sphere of the perceived world that belongs solely to us. However, these are limited cases: much of what we mean by the term "visual perception" can be displayed and, as such, shared.

[4] This distinction was further developed by Gibson (1986).

through a telescope. We see an image coordinated with reality, a spherical object of a few centimeters that we know is a planet of 69,911 km, yet we do not see it as such (it is different if we look at the sky with the naked eye since the depth indexes highlighted by Gibson intervene). In fact, we never abandon the scale offered by our body's immediate experience. A first reference system is offered by perception, and our body is a perceptual system.

The measurement scales adopted to interpret the subatomic world (millionths of a second) or the light-years used to describe galaxies also express figures that are hard to imagine. In fact, we always imagine based on[5] our experience. Experience provides the information we process through imagination, and our visualization always occurs within a "world." In the virtual world, we can experience "fantastic objects" that do not exist in the natural world: these are variations of the starting reference system. Our world becomes a "fantastic world"—a subject of variation and new possibilities. Such a starting point establishes a first and original sense of the world and of things: variations are precisely variations "starting from" this world. The creation of too diverse worlds implies an abstract vision that would be difficult to share—like the digital world of the individual who created it and knows how to read and interpret it. Any coherence of such a world should be discovered and decoded: the environment would be "abstract" and its "logic" would not be directly intuitive. Unlike reality, the world is the expression of our body (meant as a system of perception-imagination) and its variations. By abstracting and disincarnating our gaze, we can consider the world as a subclass of reality. In this sense, as mentioned, a series of as many worlds as there are forms of life in the universe entangles with reality. The "entanglements" indicate the world points shared by different forms of life, i.e. the intraspecific aspects, which, in most cases, *Gestalt* psychology has highlighted.

The too big or too small realities described by physics cannot be considered an "environment." Only the "things" that fall or may fall under our experience belong to the lifeworld. We perceive a "world" that fits into a certain temporal and spatial scale: the space we perceive goes from millimeters to meters, and so do the things that make up our environment (Gibson, 1986, p. 8). If we compare our actions in the environment to the known scales, then it is easy to see that we move and operate within a very small scale. The same size of animals in the world does not differ from a measurement order of millimeters to meters. Just as there are no 3-ft long cells, there are no animals that are miles long. In fact, kilometric animals could not adapt to the environment for structural reasons: they need to operate and move in the environment and cannot just be the result of a sum of cells. In short, as Gibson states, "the sizes and masses of things in the environment are comparable with those of the animals" (Gibson, 1986, p. 9).

[5] [5] Gibson's reflections (1979, p. 8) fall into a broader epistemological framework of complexity. This leads to affirming that units at a certain level of analysis (scales) give rise to forms with autonomous properties that are not in the subunits (*nesting*). In this sense, a physical description of the environment does not capture—as in the case of *affordances*—the characteristics of the environment. These holistic properties are key. They shape the environment and the lifeworld. Hence, they determine the adaptive behaviors of living beings (Gibson, 1979). See also Barrow (1999) and West (2017).

5 § 5

Physically, color corresponds to certain vibrations of an electromagnetic wave. For example, red has a wavelength of 625–740 μμ and a frequency of 400–484 THz: this is the "objective red." Another is "subjective" red sense, that is, our sensation of red. As Heidegger notes, regardless of any theory of knowledge, we do not grasp, in any way, the "cause" that produces the "effect" on us when observing the red color of a thing. We do not perceive red as an effect, but we see that red thing directly (Heidegger, 2018). Red perceived in its immediacy (quality) is *different* from its wavelength (quantity), just as water transparency and freshness are not qualities deduced from a water chemical formula. This would be like imagining the taste of a dish by reading the ingredients of its recipe. While looking at a table, we see neither atoms nor particles. Yet *we know* they compose the table. We see a thing (the table), a phenomenon that has its stability, its own shape, and a certain color—but these elements do not exist in the physical world. There is no such a thing as the world-environment "table" in the physical world. Its *individual* table characteristics, that is its shape, color, etc., exist only in the world. Although seeing and thinking play a synergistic role in daily practice, Kanizsa (1983) has shown—in particular through the study of amodal completion—how "seeing" possesses its autonomy with respect to higher-order cognitive activities.[6] What we know of one thing (science) must be distinct from what we perceive (experience): for Köhler, failing to distinguish the plane of direct experience from our knowledge of reality is called "stimulus error" (Köhler, 1929, p. 162).

The analysis of the "Kanizsa triangle" shows us the mismatch between the phenomenal world, which, in this case, is the unity and identity of the triangle and the physical world (distal stimulus). We analyze the "triangle" starting from the Fechnerian causal chain of events to the scheme referred to by Bozzi as the "S-D Psycho-Physical Scheme" (Bozzi, 2019, p. 136). The Scheme can display any possible causal explanation of the perception. We begin to draw the first point on the board that corresponds to the distal physical stimulus. In our case, the figure has black marks. However, at this level of analysis, the triangle is not given to us: the white of the background is identical—from the point of view of distal stimulation to that of the "triangle." On the contrary, when we *look at* the white inside the figure, we see it qualitatively different. In the Diagram, we can trace the optical-geometric projection from the thing (physical object) to near the eye (proximal stimulus). This is the level where Gibson (1986) speaks of "information" as the content of the optical structure, depending on the movement and angle of the object. Finally, we should indicate all the activity inside the subject: the activity of our brain.

The causal chain displayed through the S-D Scheme can be more or less detailed depending on what we want to address about perception. The Scheme can be investigated in different disciplines (physics, physiology, chemistry, etc.). But where can we indicate our immediate experience within this Scheme? In fact, there is no place for it since the Scheme represents an explanation and not a description of what we personally perceive. The analysis of a part of the Scheme, however detailed, can never fully account for our direct experience of the observed "triangle." Rather, this results from the entire sequence, the entire process, and, therefore, the full integration of our body into the environment.

Although appearing independently from the subjective pole of the relationship, the "world" is ontologically, i.e. structurally, linked to it. This is the limit of realism, which

[6] For this controversial point, see Kanizsa (1991), Gibson (1986), Bozzi (2019), and Taddio (2011a).

traditionally aims to support the reality of the world, regardless of who perceives it.[7] Reality exists independently of the perceiving subject. The world does not. In fact, how could the world exist independently from the *form of life*? What is the meaning of this "realistic" perspective if, through the concept of "world," we aim at expressing the result of the integration of our way of life into the "environment?" The *lifeworld* is the expression of a certain *form of life* (Taddio, Tagliagambe, 2021).[8]

The receiving subject and its environment "are complementary" (Gibson, 1986): the environment we perceive is, for the most part, intersubjectively shared. So are optical illusions (but not hallucinations). We have learned this through the example of Müller-Lyer's illusion. As they are intersubjective, they are part of our environment. If it were the "subject" to constitute the world in a subjectivistic sense, then we would fall into an error that is symmetrical to realism (idealism-constructivism): in this perspective, we should entrust the task of *building* the image of the world *only* to brain activity. In this case, however, the world may no longer have "constraints": we may find ourselves faced with an "arbitrary" construction beyond any adaptive perspective, which, instead, must account for the surrounding reality—the interaction with the environment. Gibson, in fact, from his ecological perspective, highlights that the *information* that comes from the "physical" environment is already *structured* and therefore conveys non-arbitrary information.

Perception is the result of a complex process that goes from stimulation to perception, understood as the "conscious" result of the process.[9] Consciousness is not the last outcome in the chain since a *new* exchange of information begins from consciousness. This, in turn, acts on the body: as in the tape of Möbius, the inside and the outside intertwine and fall onto each other. It is at this level that we can place a new type of, let us say, *relational* realism. Realism involves our way of conceiving the "relationship" that is not the result of the individual terms of the "SrO" relationship, where "S" (subject) and "O" (object) are conceived in their own right and, then, would give life to the relationship. It is not the isolated terms "S" and "O" that give rise to "r": we must reverse the analysis.[10] It is "R" that determines the existence of "s" and "o". The "sRo" report should be understood as a "structure" (*Gestalt*). The properties that we experience emerge from the structure. The "Kanizsa triangle" is the result of these properties of field self-organization: in this sense, the experienced "world" is not "arbitrary." It is not a "construction" of the subject, and it is not a mere elaboration of our brain. The triangle exists. *It is out there* in the world where we *locate* it.

One could argue that the "triangle" does not exist in the physical world (distal stimulus). However, we know the physical world starting from the phenomenal world that we *encounter*. Furthermore, science defines an intersubjective and repeatable phenomenon as

[7] In fact, we cannot consider Earth as an environment before the appearance of humankind. This would be a contradiction in terms because we have defined the environment as what is perceived by a form of life. We can study and investigate some characteristics of Earth (different scientific disciplines such as geology go in this direction) and consider it a potential environment. However, Earth was an environment for other forms of life that had existed long before man. This physical reality does not coincide with what we have called "the world." Our "lifeworld," to use Husserl's expression, is what we see, manipulate, etc. (Gibson, 1986).

[8] When dealing with the theory of knowledge, we cannot absolutize a position. We need to accept some methodological relativism, even in phenomenology. This is closely connected to the type of problem we address.

[9] We should reconsider the very link between perception and consciousness in light of the experiments by Vallortigara (2021) and other scholars. These have highlighted that visual cortex-impaired patients show residual visual skills and "inferential logic" skills well below the state of full awareness.

[10] Regarding the physical analysis of this aspect, see Rovelli (2018, p. 117).

"objective." An optical illusion, as we have seen, matches these parameters because it is intersubjective and repeatable. They are things that are part of our environment, just like movies, illusions, reflections, shadows, trees, and mountains. They appear in different ways: the things we see are inscribed in the world. They are never isolated, and they at least presuppose a (constitutive) relationship with the background, as highlighted by Wertheimer (1923). Things have properties and exist in the sense that we can experience them, relate to them, and interact with them (we do not perceive any direct dependence relationship between us and the world, and that is why we are all initially "naive realists"). The things we observe in the world possess varying degrees of independence, stability, and resistance to change. Even the object that we see and manipulate in the immersive worlds must possess the same phenomenal characteristics. Otherwise, we would not be able to experience it.

6 § 6

Each *form of life* participates in one physical reality. It fits into reality by relating through the body with the environment. The world emerges with the phenomenal *properties* we know. If the world were not the result of a physical process, then the underlying reality would be unknowable. We can discover reality starting from the investigation of the "world-environment" (direct experience) that we see and experience because of a degree of coherence (monism) between the "world" and the "reality." If we consider "thought" as the only founding moment of knowledge that is not yet the fruit of the relationship with the world, then we would not be able to grasp reality. Like Descartes, we too would need God to regain our original contact with the world. We cannot imagine any form of thought without coordinating it with a world: it is always a second, not first, expression of the world. Thought is never perfectly autonomous—so much so that prolonged sensory deprivation determines forms of cognitive regression. If the world has a "sense," then it is because subject and object are aspects of the same "structure" (*Gestalt*).

Can we even conceive that a "state of consciousness" may emerge from a body deprived of any sensory perception of the surrounding world? If the answer, as we believe, is negative, then we can repeat the same mental experiment in the digital world. Can we conceive the emergence of a form of artificial intelligence from a *non-integrated* (discarnate) system? Let us imagine a form of perfectly rational intelligence, with no emotions, sensations, or "irrational" elements. The question stays the same: would such an entity "want" to live? Life is not the expression of a rational choice. The body "thinks"—it is *oriented toward* existence. The field of perception is organized and full of meaning. A "perfectly rational" entity would value each direction as equal. Precisely for this reason, the choice of one direction over another would lose meaning. On the contrary, the alive body is oriented toward the world, crossed by impulses and stimuli that are functional to its survival. The world speaks to us because we are *world-shaped*. In this sense, things, like *affordances*, are full of meaning. For imagining a form of life integrated with the digital world, we must find equivalent dynamics: a digital form of life must be integrated with its digital environment. If this is true, then our hybridization with technology is no longer a contingent element. We can manipulate things in a coherent and functional way to interact with the world, extend their virtuality, create new worlds, and adapt to them. To do this, we can use prostheses even if, for now, the implicit reference system is our body. In order to exchange information with

the digital world, we must integrate our body with it. From this perspective, the modification and redesign of our body becomes a necessary element: digital development involves integration into a complex system. Integration must gradually increase for exchanging and processing more information and strengthening the system. As difficult as it is to predict the development and integration between the digital worlds and us, the absorption of our body into this world necessarily implies a change and an enhancement of our body. Technological hybridization makes us able to adapt to the digital world by conveying more and more information between us and the digital environments in which we belong.

We are able to experience potentially *everything* imaginable within the virtual world. What does this imply? What is the relationship between the "world" and the "virtual world"? Through its "digital image," the "thing" relates to our "image of the world." Thus, like every natural process, it becomes an ever-changing object. The virtuality of the "thing" from its image status expresses our will to transform and manipulate the world. All its potentialities can become actual and manifest without any *limit*. The only exception is the very stability of the phenomenon perceived in the new digital environment, that is, the possibility of becoming object of our experience.

If this were true, then our digital life would be "analog." Digital worlds show us an analog, *seamless*, and non-discrete world: we do not live in the "matrix" but in the result of the operation. Our "digital body" establishes a world which, in order to be inhabited, must have its own internal coherence. This means terms that allow for our belongingness and action in reference to our virtual body and its new capabilities. We can expand the space and time of the digital world. However, this implies a form of life that inhabits and evaluates it according to temporal and spatial perception thresholds. The latter make the world experiential, habitable, and relatively stable for us. This implies a reference system that is established by *our* body and capable of *embodying* the digital space and experiencing it as such.

Our immersion in the digital world requires a fitness to the system and its internal coherence: we establish its reality by *acting* in it. The environment remembers our actions, and keeps track of our passage and our actions. It is not a matter of establishing its "appearance" with respect to another world. The world contains our actions. It expresses a system of internal coherences, i.e. stable phenomena that allow us to take sensible actions within it. In the digital world, we can do things that we could not do in our environment because the world is our interface with reality—a necessary illusion, as Nietzsche said. The substrate of our actions, no matter if *software* or *hardware*, is not the object of our direct experience. Hence, it does not constitute the world, that is, the object of our behavioral evaluations.

The limit of our ability to manipulate the entity in a digital environment is given by the laws that govern its transformation: it is therefore an expression of its virtuality. Experimental phenomenology has highlighted the conditions of appearance of some phenomena. It is a zero-grade metaphysics, as Bozzi (1989) put it in reference to this world. Merleau-Ponty highlighted the same metaphysics from a different perspective. Dependent and independent variables probably indicate the conditions of appearance of the phenomenon not only in our world but also in the digital worlds. In fact, our body always remains the implicit reference system. I say "probably" since an accurate experimentation of *Gestalt* in immersive environments has yet to be conducted. For example, we can find the tunnel effect (Burke, 1962), not only in other worlds but also in the animal and the digital worlds, as long as we maintain our subjectivity as invariant: the same image apparatus. In principle, this should also apply to fantastic objects if they have their own unity and their own phenomenal stability. In any

virtual world, you want to reproduce the same phenomenal effect. You need to rediscover the same emergent conditions of our world-environment, provided that the receiving subject remains the same (i.e. maintains the same image apparatus).

Expanding the manipulation of things and the possibilities of our virtual body responds to a reference system. In principle, this should maintain, up to a certain point, the same phenomena (meaning the conditions that allow any appearance). In the digital worlds, we can rediscover the painters' discoveries by leveraging the conditions of appearance of things on canvas. In fact, more or less consciously, they played with the same principles of appearance highlighted by the psychology of perception (Taddio, 2011b). This will hold true until we change the image apparatus to such an extent that it will affect the very nature of the perceptual relationship. However, such a situation of body invariance with respect to the new digital environment should be contingent. In fact, in order to adapt fully to it, we will have to modify part of our subjectivity and thus integrate into the new system. For fully expressing its full potential, we need to make the environment and the body digitally isomorphic. Only a technology-body hybrid can accelerate the exchange of information between our body and the digital environment. But here, we venture into territories that only science fiction and fantasy have explored.

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