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Anent Isomorphism and its Ambiguities: From Wertheimer to Köhler and Back to Spinoza*

1. Introduction

In his very last paper, Gaetano Kanizsa (1994), who in previous essays had stressed the frequent misinterpretations of Gestalt theory (f.i. Kanizsa 1970), pointed out that often Gestalt theorists themselves were responsible of these misinterpretations. Some key ideas of Gestalt theory are ill-defined, ambiguous or used with different meanings by different authors. But, as Kanizsa noted, “to develop a theory does not only mean to defend its orthodoxy. When necessary, it means also to clarify ill-defined concepts and to isolate possible fixations or errors, with the aim of eliminating them” (1994, 162). It is what Kanizsa highlighted with the distinction between primary and secondary process (Kanizsa 1979), the criticism of Prägnanz as “tendency to singularity” (Kanizsa & Luccio 1986), the analysis of the law of “parts and whole” (Kanizsa 1991; Kanizsa & Luccio, 1990), and so on.

In the same spirit, it is difficult to not agree with Henle (1984a), who pointed out that few Gestalt ideas have been the object of so many misinterpretations as “isomorphism”. However, I am increasingly persuaded that at least in part one must charge such misinterpretations to the ambiguities that surround this concept, as Gestaltists used it. It is also, however, undoubtedly true that, as Köhler (1938, 185) points out, in the discussion on isomorphism the obstacles to overcome belong less to “intellectual difficulties” than to “the emotional sphere”. One result is the interpretations that were given by scholars of different fields, like psychologists, philosophers, and historians of science, reflect an unbelievable variety of different visions. From time to time, as Toccafondi (2002) recently stressed, Gestalttheorie was considered a neo-Kantian theory, or an idealistic theory, or also an empiricist theory.

The term “isomorphism” belongs to the domain of mathematics, and in particular it is an algebraic term. Indeed, in abstract algebra we say that between two

* Many friends have read previous drafts of this paper and given useful suggestions to the author. In particular, I wish to mention gratefully Fiorenza Toccafondi, Alberto Peruzzi and Giovanni B. Vicario. Of course, I'm the lone responsible of the errors and misinterpretation that the reader can find here.

domains there is an *isomorphism* if there exists bijective morphism, which is a *preserving structure mapping*. One can argue with some reason that the choice of this term by Köhler was not fortunate. Köhler himself used this term late, only in 1929 (see Scheerer 1994), and used it only parsimoniously in his written works (see von Fieandt 1983). Of course, Köhler designed the corresponding principle, dating back to 1920, with different terms, for instance “congruence”. To put Pribram’s question (1984), what is “iso” and what is “morphic”, here? In other words, what is equal, and in which sense? Köhler is clearly stating the isomorphism applies only to the “system properties” (*Systemeigenschaften*) of the two domains considered, that is experience (phenomenal world) and physiological processes, but which are the system properties at play?

We will return to this issue (but for an accurate reconstruction of the problem in Köhler, see Scheerer 1994). I think that here is the mother of most of the misinterpretations of this concept, because here are the ambiguities that surround it. In a trivial sense, we could say that isomorphism means simply that when we are aware of something, something else must happen in connection in our nervous central system. It is known that, according to some odd philosophical stances, there are people that could challenge (and indeed deny) that the central nervous system really exists, but I believe that most people should agree with this as an inescapable need. This is trivial. When we try to work the idea further, we meet many ambiguities and difficulties.

The first ambiguity concerns the domains of the isomorphism. According to Luchins & Luchins (1999), at the birth of the so-called “Wertheimer’s problem” (Brunswik 1929) both Wertheimer and Köhler agreed, in a sense that we will clarify later, about the fact that the isomorphic domains were the neurophysiologic and the phenomenological ones. In the 1930s, however, Wertheimer had a shift conceiving the isomorphism as between the domains of the phenomenological field and of the geographical environment. Of course, there is a great difference! Not all the authors, however, agree on this point (see Newman 1989). The second ambiguity concerns the domain of the phenomenological field. According to some authors, we could better represent this domain by consciousness, while for others, by representations. Of course, also here we have ideas that are difficult to subsume under the same category, and if conceiving *Gestalttheorie* as a representational theory (as in Lehar 2003a, b; or Opie 1997) is inadequate (see Luccio 2003), one must be more careful about the distinction between field of consciousness and phenomenal field.

The third ambiguity concerns which isomorphism is at play. It is clear that speaking about a “pictorial” isomorphism involves a misunderstanding of the problem (Henle, 1984), but what can we say about structural versus functional isomorphism? It is undoubtedly true that Köhler (f.i. 1940) always spoke about a *structural* isomorphism, but what really meant with this?

All these ambiguities refer to the empirical side of the problem of the isomorphism. There is, however, another important ambiguity that refers to a more philosophical question. In reading different accounts of what isomorphism is, there is a continuous oscillation between an account in terms of correlation and another in terms of identity. It is not a problem of dualism or monism; in general, one can safely take for granted that Gestalt theorists held a monistic approach, materialistic in Wertheimer, “neutral” (see below) in Köhler. However, we must take in account carefully and suspiciously all the classical philosophical categories when we discuss *Gestalttheorie*; but in general Gestalt authors, I believe, did not care so much of this side of the mind-body problem. Here the question is do the two domains of the isomorphism correlate, or they are simply the two sides of the same coin?

In this paper I'll try to clarify these controversial points, in the order above. I will finish by trying to find a unifying vision of the problem in the light of the doctrine of Spinoza. Indeed, as we know (see Luchins & Luchins 1982), Spinoza deeply influenced at least one of the founders of the Gestalt school: Max Wertheimer. I believe rereading carefully Spinoza is a good exercise for mental health, and can suggest the best way to find the exit of a so intricate maze. We will start with a short historical glance to Wertheimer's problem.

2. A Short Historical Sketch

2.1 The Forerunners

The origin of Wertheimer's problem is of course not in Köhler, but in Wertheimer himself. It is in his well-known account of the phi phenomenon, and precisely in his neurophysiologic hypothesis of the *Querfunktionen* (cross functions) and of the physiological *Kurzschluß* (short-circuit) (Wertheimer 1912a, 246 f.). As any idea in the history of science, isomorphism too had noteworthy antecedents. Arnheim (1949) points out that Theodor Lipps anticipated it. Indeed, Lipps (1900, 439) wrote that often we recognize in the expressive qualities of the objects the same pattern of forces that act in ourselves:

“In other words, there is attached the representation of possible kinds of my own activity, which in a similar fashion, involves forces, impulses, or tendencies, freely at work or inhibited, yielding to external effect, overcoming of resistance, arising and resolving tensions among impulses, etc.”

This is a peculiar acceptance of the meaning of isomorphism, typical of Arnheim, and, I believe, little shared by other representatives of Berlin school.

We will see later a sketch of the history of parallelism; here we will see shortly in Hering's and G. E. Müller's contributions. One should mention at least also

Lotze (1852)¹, and the mathematician H. G. Grassmann (1853), and his celebrated theory of mixture of colours. As regards Lotze's theory of the local signs, let us remark only that no difference in sensation is necessary as its ground. It is enough to point out that different retinal elements, on discharging in the brain, must form part of different association tracts; therefore they form the basis of different ideas of locality, whether they produce different sensations or not. As remarked by Franklin (1896, 340), "for Lotze the association was a purely spiritual process; [with G. E. Müller] we take now a more material view of it".

According to Grassmann, instead, a continual change of stimulus must result in a continual change of sensation, with a correspondence between stimulus intermediate and sensory intermediates. So, for every colour must exist one other colour which, when mixed with the first in the right proportions, will give grey. This axiom of correlated continuities fixes the locus of the intermediate mixtures which will give an exact grey.

One correctly considers Hering to be one of the most direct forerunners of Gestaltpsychologie. As for Grassmann, in a more sound way from the theoretical point of view, at least for psychology, his starting point was the perception of the colours. At the basis of Hering's idea (1878) were the ideas of *assimilation* and *dissimilation*. The concept of assimilation is not original: it is the well-known physiological mechanism that allows the organism to replace the substances that it has lost during metabolic activities when stimulated. Hering, by analogy, calls dissimilation the creation of the catabolic products. Assimilation and dissimilation are well demonstrated for visual sensation. Vision is a chemical sense, and the metabolic processes that take place here are well known; in particular, the dissimilation, that is the decomposition of the photochemical substances under the influence of the light, has been largely studied. It would be curious if only the dissimilative side should be influential in the perceptual process, and more curious when this process would be exclusive of vision.

The importance as a forerunner of isomorphism of Georg Elias Müller, however a fierce opponent of Gestalt psychology (see Müller 1923), refers to his famous 1896 paper on the five psychophysical axioms (Müller, 1896). Let's summarize them:

(1) The ground of every state of consciousness is some material (psychophysical) process.

¹ Lotze's theory is so complex and so "many-sided" (Proctor Robins 1900) that is impossible to try to give also a little sketch of it. Note that we have scholars that qualify him as a realist with a strong anti-idealism; others that qualify him as an idealist; other that find in him an utter contradiction between his abstract monism and his realism; other again that say that his philosophy is not monist nor dualist, but pluralist. And all catch some part of truth.

(2) To every equality, similarity², or difference of a sensation corresponds respectively an equality, similarity, or difference of the underlying psychophysical process, and vice versa [*umgekehrt*]. This axiom holds not only for sensation, but for every state of consciousness.

(3) If the changes of a sensation have the same direction, or if the differences between a series of sensations have the same direction, the like will be the case in regard to the corresponding psychophysical process. If a sensation is variable in n directions, so also is its psychophysical process.

(4) The fourth axiom regards the distinction between intensive (with zero at one end of the scale) and qualitative attributive series (with no zero at either end of the scale). The directions, in which a sensation can be varied, are of different kinds. If a given direction is towards zero (that is, if the sensation, changing in this direction, tends to vanish), we say that the *intensity* of the sensation decreases, and conversely. If the change in one direction or in its opposite, happens by passing through the smallest number of perceptible intervals, we say that it is a change of *pure intensity*. In any other case the change is one of mixed intensity and quality. When a change leads neither towards nor from the zero point of sensation, we say that it is purely *qualitative*.

(5) The matter for the fifth axiom is less simple. The psychophysical processes may be either simple or mixed; a simple process is either such, or is never separated in our experience into parts, and is never composed of its parts mixed in different proportions. The sensation corresponding to this is a *pure* sensation, but a mixed sensation is not such in the sense that it is a complex of several distinct *sensations*. If μ is a mixed sensation, and a and b are the intensities of the two partial psychophysical processes which call it forth, and if α and β are the sensations which these processes would call forth if acting by themselves, then for the *degree of resemblance* of the mixed sensation to α we have (as the simplest and most plausible expression) $\frac{a}{a+b}$, and for its degree of resemblance to β , $\frac{b}{a+b}$.

But if α and β resemble each other to a degree represented by $R(\alpha, \beta)$, then these two expressions must be modified, and they become respectively

$$\frac{a + R(\alpha, \beta)b}{a + b} \text{ and } \frac{b + R(\alpha, \beta)a}{a + b}.$$

Of these five axioms, as we will see, particularly important are the first three. These three, with Hering's above discussed doctrine on psychophysical correspondence in perception of colours, are at the basis of the first formulation of the doctrine of isomorphism by Köhler. However, as Vicario (2001, 88 f.) points out,

² According to Boring (1941), it should be better to translate in operational terms *similarity* with *functional equivalence*.

the *umgekehrt* of the second axiom is unnecessary, unproved and unmotivated. On this basis, according to Vicario, all the building of the isomorphism cannot stand, and Gestalt theorists, mainly Köhler, saved it only to preserve a metaphysic assumption, namely the materialistic monism.

Note that Ernst Mach in the *Analyse der Empfindungen*, from the 1900 edition on, in discussing the psychophysical parallelism, said: “Das hier verwendete Princip geht über die allgemeine Voraussetzung, dass jedem Psychischen ein Physisches entspricht und *umgekehrt* in seiner Specialisirung hinaus.” (50) [The principle here used in its specific form goes beyond the general premise that a physical fact corresponds to each psychical fact, and *conversely*]. Mach, however, never quotes Müller, and the sentence doesn't appear in the first edition (1886), which appeared nine years before Müller's paper. Despite the coincidence, it is unlikely that Mach was inspired in this by Müller. Instead, both shared the same feeling on this matter.

As we will see, however, Köhler never accepted the *umgekehrt* as such, and we can subsume his position only with some difficulty under the label of “materialistic monism”.

2.2 The Phi Phenomenon

The idea of a hypothetical physiological explanation of the stroboscopic movement as *Querfunktionen* and *Kurzschluß* went to Wertheimer from observations of several investigators before him: Exner (1875), Marbe (1898), Dürr (1900), Wundt (2002), Schumann (1907). All assumed the need to postulate a central physiological mechanism to explain the stroboscopic movement. Two observations in particular impressed Wertheimer. The first was Exner's aplosopic (with independent stimulation of the two eyes) observation, which confirmed that one had to invoke something beyond the retina to explain the perception of apparent movement. The second arose from a neuropsychological case: Otto Plötzl, an important neurologist from Vienna, had observed a patient with a lesion of both occipital lobes; presenting to her one moving light, she saw a sequence of separate lights³. Wertheimer contacted Plötzl, and could test the patient on the stroboscopic movement: it was impossible for her to see the apparent movement (Wertheimer, 1912a, 75). Goldstein and Gelb got similar results on another patient, as did more recently Zihl, Cramon, Mai & Schmidt (1991), Saito, Kanayama & Takahashi (1992), and Nawrot & Rizzo (1998). One must point out that this interest for neuropsychological disorders was not episodic in the scientific life of Wertheimer: between 1905 and 1909 he conducted relevant research on aphasia (see Sarris & Michael Wertheimer, 2001).

³ Wertheimer quotes erroneously Plötzl's paper, that was indeed published by Plötzl and Redlich (1911)

According to Max Wertheimer (*ibidem*, 247), the present (at the time) physiological research was indeed sufficient to assume

“as likely that to excite a central point *a* elicits a physiological effect in a definite area around it. When are two the points *a* and *b* that are excited, a similar effect in both points should result.

When the point *a* is excited, and after the point *b*, within some specifically short time interval, then a sort of physiological short-circuit from *a* to *b* should occur. There is a specific passage of the excitation in the space between the two points. If for instance the extent of the disturb in the area around *a* has reached the maximum of the temporal curve of its process, and the disturb in the area around *b* takes place now, then the excitation flows (a specific physiological event), and its direction is determined by the fact that the excitation around *a* occurred first.”

We can here omit several interesting observation made by Wertheimer to further qualify this physiological hypothesis, considering spatial and temporal factors, figural factors, and so on. In an interesting recent appraisal of Wertheimer’s work, Sekuler (1996) stresses that, when the short-circuit idea is in light of present knowledge wrong, more complex parallels between psychophysical evidence and brain activity in apparent motion are today well established. (See for example Mikami, Newsome & Wurtz 1986).

It is wrong to say, as somebody did, that for Wertheimer this approach was “axiomatic”. For instance, Carini (1970, 378; *contra*, see Seaman 1989) argues that “Wertheimer was using an axiomatic method of explanation; he conceived isomorphism as an axiom through which to explain all perceptual phenomena”. According to Carini, in doing so Wertheimer employed a “new mode of explanation [... He] was no arguing from observation; he was arguing from the axiom or postulate of isomorphism”. It is not clear from what source Carini gained this information. For Wertheimer (1912a, 246), who never used the term “isomorphism”, this idea was only a “sketch of a physiological hypothesis” (*Skizzierung einer physiologischen Hypothese*), subject to experimental testing, as all the scientific hypotheses, and not an axiom. Wertheimer clearly states this idea:

“In experimental research, the roles of a physiological theory are two. From one side, it must comprehend the different single results and their regularity in a unified way, to make them deducible. From the other, and this seems the essential point, this unifying sum must serve to a further progress of research, posing some concrete experimental questions. At the beginning, they serve to verify the theory itself, but after are apt to go further inside the regularity of the phenomena” (Wertheimer, 1912a, 247).

As we will see below, instead Carini could be in some sense correct with Köhler.

2.3 The Physical Gestalts

In 1911, in Frankfurt am Main, shortly after the end of the experiments on phi phenomenon, in which Koffka and Köhler served as subjects, Wertheimer had a private conversation with Koffka (1935, 53 f.). After this he said “something that impressed me [Koffka] more than anything else, and that was his idea about the function of a physiological theory in psychology”: in Koffka’s vocabulary, his hypothesis on relationships between “behavioural [phenomenal] and physiological field”. This hypothesis was the focus of the discussions among the young co-founders of the new psychological school. They shared an atmosphere that was almost revolutionary, a great common enthusiasm. As Köhler (1959, 728) put it,

“it was not only the stimulating newness of our enterprise which inspired us. There was also a great wave of relief—as though we were escaping from a prison. The prison was psychology as taught at the universities when we still were students.”

Wolfgang Köhler, and not Koffka, fully developed Wertheimer’s insight. His book “Die physischen Gestalten in Ruhe und im stationären Zustand” [*Physical Gestalten in rest and in stationary state*] gave the first complete account of the hypothesis of isomorphism; however a name had to come later. Köhler wrote the book when he was in Tenerife, Canary Islands, during the First World War, studying apes. We know that in such research he developed the concept of insight, another milestone of Gestalt psychology⁴. As Köhler (1969) remembers, when he was in Tenerife, he read the great treatise “Electricity and Magnetism” written fifty years before by Clerk Maxwell, and he was “greatly relieved to find so fundamentally similar an approach” (ibidem, 75) between great physicists, like Maxwell, or Max Plank (Köhler had been a student of him), or Kirchoff, or Ed- dington, and Gestalt psychologists: “I was greatly surprised by these statements of eminent scientists which so obviously agreed with statements made by Gestalt psychologists” (ibideOne must add that in Köhler’s book the influence of another eminent physicist, Ernst Mach, was obvious. It is impossible here to avoid mentioning a disagreeable debate on this point, caused by a hypothesis put forth by Keiler (1980). According to Keiler, Köhler avoided to quote here Mach, because he wanted to succeed Stumpf on his chair in Berlin, and he was aware of Stumpf’s strong dislike for Mach. Keiler (ibidem, fn. 2) “thanks” for this sugges- tion M. Asch, in a personal communication, but Asch (1982) denies that he was

⁴ Köhler was in Tenerife from 1913 to 1920, the year in which he was eventually able to go back to Germany. An excellent report on the activity of the Primate Station, founded by Eugen Teuber on a suggestion by Max Rothmann, was given by Marianne L. Teuber (1994 – see also Lück,1987). One must add that in 1990 R. Ley wrote a sensationalist book, arguing that Köhler’s research on apes was a cover for a World War I German spy ring, proved by the alleged building by Köhler of a radio for the German Consulate there. This view was bitterly rejected by Harris (1991) and Teuber (1994), with a rejoinder by Ley (1997). In my opinion, also if this should prove true, I do not find nothing of less than honest in helping one’s own country – the Germany - in war.

the source of such a suggestion, and simply states that Keiler had communicated to him his hypothesis. In defence of the honour of Köhler many representatives of the Gestalt tradition rose: Hoeth (1980), Arnheim (1981), Asch (1982) and von Fieandt (1983). Keiler (1982b) replied to the first three.

Apart from some accent that I feel excessive (Arnheim 1981, 268, speaks of “wickedness” [Bosheit] and “ignorance” [Unkenntnis]), I think the criticisms against Keiler are in, general, well-grounded. The influence of Mach’s ideas on Köhler was always clear and explicitly stated, before and after the 1920 book. Remember that, as Asch points out, Köhler wrote the book in Tenerife, and it is likely that he had not at his disposal at the time all the references, though it is almost impossible that Stumpf did not know the influence of Mach on Köhler. However, as Asch (1998) points out, more important than the problem of the sources are the deep differences between Köhler’s and Mach’s doctrines. The epistemology of Köhler and Wertheimer was incompatible with the sensism.

Anyway, it is a pity that the discussion on the papers by Keiler (1980, 1981, 1982a) had focused on this marginal problem, leaving in the shadow many merits that they undoubtedly have.

Eventually, in 1920 Köhler was able to go back to Germany, and his book on physical Gestalts appeared. Köhler (1969, 77) recalls that

“When the book was published in 1920, both Wertheimer and Koffka greatly enjoyed its content: It showed that the alleged mysteries of Gestalt psychology agreed with perfect clear procedures and facts in natural science. In a sense, Gestalt psychology has since become a kind of application of field physics to essential parts of psychology and of brain physiology.”

The book is complex, and it is almost impossible to sketch here an account of it. We will confine ourselves only to a glance on its content. We recall that von Ehrenfels (1890) had defined *suprasummativity* (the parts are “poorer” than the whole, in Köhler’s words⁵) and transposition as key concepts for Gestaltqualitäten. The point of departure of Köhler consists in individuating the same properties in an electric field that is in the distribution of electric charges around a conductor. The second step is to hypothesise that in the brain there are chemico-physical fields having the same properties. The final step is individuating the same system properties [*Systemeigenschaften*] in domains, the experience (the phenomenal field) and the brain.

In particular, according to Köhler there are four properties that are similar in phenomenal and in brain fields. 1) The total processes appear in both fields as

⁵ Many times we were told that one of the typical misinterpretations of Gestalt psychology consisted to attribute to Gestalt theorists the assumption that the whole is less than the sum of the composing parts. We have here an other example of possible attribution of this misinterpretation to Köhler himself.

units with dynamic properties. 2) In both the unity is compatible with a structured articulation [*Gliederung*] of the component parts. 3) In both one can individuate gradients because of the distance from one region to another that consent to consider the regions as independent from the ones that are faraway. 4) In both we can individuate limited regions (Gestalten, in the phenomenal field) on a ground.

It is interesting, as von Fieandt (1983) points out, that Köhler stated this last property five years after that Rubin (1915) had published his famous research on figure-ground inversion. However, Rubin always refused to be enrolled in the Berlin school – while many textbooks consider him a proper Gestaltist.

Last but not least, we criticised above Carini (1970) for defining isomorphism as an axiom. Indeed, Köhler in several instances, but in particular in his important chapter on the isomorphism in the book “The Place of Values in a World of Facts” (1938, 224 f.), says that “the thesis of isomorphism [...] is not yet a theory, but remains a postulate”⁶. Some lines below:

“Isomorphism is a postulate. It becomes a theory by virtue not of one hypothesis, but a whole set of definite assumptions. It is by one such assumption that a cortical correlate of visual continuity is indicated; a second hypothesis refers to the correlate of visual segregation, a third to the isomorphic representation of topological relations in visual space; a fourth will be needed in the case of metrical relations, a fifth for the third dimension of space, and so on for all discernible structural characteristics of the phenomenal world.”

Now, in logic as in mathematics axiom and postulate are almost synonyms, to design a self-evident proposition, whose truth one takes for granted, that is the basis to deduce and infer other propositions that are therefore necessarily true. In other words, what I can understand in what Köhler is saying here is that isomorphism is a logical need, or something similar. Assuming this need, we create some assumptions, which will have the status of scientific hypotheses to test experimentally. So, the postulate will transform into a theory. I do not think that here the term “postulate” is fortunate. If this is Köhler’s real position it is difficult to contradict Vicario (2001), when he states that the isomorphism is maintained not because of a scientific need, but for metaphysical urges. However, clearly this is not the position assumed by Köhler after the Second World War.

Indeed, also a second interpretation is possible. According to Köhler, the “postulate” can become “a theory” only if one assumes several additional “hypotheses” [Köhler sometimes call them “assumptions”], about the correspondences between phenomenal and physiological processes. In the examples given by Köhler, these are continuity, segregation, topological relations, third dimension, and so

⁶ Bagnara and Sambin (1977), in an accurate reconstruction of Köhler’s doctrine, gave on the basis of this quotation the title “Il postulato dell’isomorfismo” [*The postulate of the isomorphism*] to their review.

on. Notice that “our freedom in introducing such hypotheses is greatly restricted. Not only they must agree with the available physiological and psychological evidence; they must be also mutually compatible” (Köhler 1938, 225).

This quote can help us to interpret Köhler’s “postulate”: it doesn’t mean an equivalent of “axiom” (in Carini’s meaning), but a hypothetical theory still imperfect. Of course, we have here another unnecessary ambiguity.

3. Why “Isomorphism”?

Köhler used first the term “isomorphism” only in 1929. Köhler himself used in his writings the term with great parsimony. For instance, in his celebrated book of 1947 the term appears only six times, albeit he treats largely the concept, and in the first edition of 1929 it appears more often, but not in the index. Aas von Fieandt (1983) notes, in many places in which it appeared in the 1929 edition, Köhler replaces it in 1947 by “equality”. Only in the 1938 book is there an entire chapter devoted also in the title to the isomorphism. I think that the choice of this term was unfortunate. Indeed, it had a great success, but this success was also the source of plenty of misunderstandings, misuses in improper areas, and so on. Other terms, like homomorphism (see Kubovy & Epstein 2001) were surely more suitable.

As we said before, in abstract algebra we say that between two domains there is an *isomorphism* if there exists a bijective morphism that is a preserving structure mapping. What does this mean? As Madden (1957) points out, the concept of isomorphism in mathematics has two components. Let’s have two domains, for who must exist a definite set of axioms ruling the relations of the elements inside them. To say there is an isomorphism between them, there must exist a correspondence one-to-one between the elements of the two domains, such that to any element of the first corresponds to one and only one element of the second, and conversely. Very important for our topic is the fact that the system of axioms specifies in each domain their internal structure (see Cohen & Nagel 1934). I think that in all that Gestalt authors say about the relations between the domains, there is no respect for the first aspect of the isomorphism, so the use of the term is in this respect inappropriate. Wertheimer directly admits it, in a letter written in the thirties to Boring during a long correspondence in which Wertheimer tried to clarify to Boring, without great success, several key concepts of Gestalt theory (cit. in King & Michael Wertheimer 2005, 262): “Now, we have never asserted isomorphism in the sense, defined by you, of a ‘one-one’ correlation”. In general, Luchins & Luchins (1999, 208) state: “In Gestalt psychology, the one-to-one correspondence between elements is not required; similarity of structures is required.” As a matter of fact it is difficult to hypothesize such a correspondence, when one of the domains is the physiological one. For example,

the same perception of a given colour could be the effect of different physiological mechanisms. (Note that the hypothesised physiological mechanisms must run beyond the sense organs). There is an important limit given by Köhler (1920, 193): he hypothesises a sort of “material similarity (*sachlicher Ähnlichkeit*)⁷ between psychophysical process and phenomenal field, as far as their Gestalt properties are concerned”. This material similarity refers to what Köhler calls “structural”. In other words, both in the phenomenal field and in the brain processes could exist other aspects, but the isomorphism applies only “as far as Gestalt properties are concerned”. One could object that here there is some suspicion of circularity. In my opinion, we can reject safely this suspicion. To use an expression introduced by Agnès Desolneux and other scholars of computer vision in their work on “computational Gestalts”, in defining Gestalt properties we must proceed *a contrario* (see Cao, Delon, Desolneux, Mus & Sur 2004). In other words, in this way the definition of Gestalt property is not a circular one but an operational one (see Cao 2004; Luccio 2008).

However, in the last few decades, thanks to the popularity gained by the term “isomorphism”, we have seen in the cognitive field an almost unlimited increase of proposals of isomorphism of all sorts. The most popular is of course the second-order isomorphism proposed by Shepard (1975, 1981; Shepard & Chipman 1970). However, we must take in account also Vandervert’s (1995a) “isomorphism in NP”, Uttal’s (1988) “dimensional isomorphism” (or “nonisomorphism”), Pessoa, Thompson & Noë’s (1998) analytic isomorphism, Palmer’s (1978, 1999) natural isomorphism or isomorphic constraint and Wright’s structural isomorphism (1986, from Sellars’ critical realism, 1922). The list could be longer. Note that sometimes these authors criticize the Gestalt view (“discredited”, according to Shepard & Chipman, cit.), giving a caricatured version of it (coloured neurons to perceive colours in Shepard; or “naïve, geometrical isomorphy proposed by Wolfgang Köhler”, in Vandervert, 1995b, 144), so showing an inadequate knowledge and/or understanding of what Gestalt authors really said.

4. The Domains

In the above quoted well regarded paper by Sekuler (1966), there is a remark that I find revealing. Sekuler says: “Note that the assumed isomorphism is not between stimulus and brain activity, but between brain activity and perception” (p. 1253 – we would say, instead of perception, “phenomenal content”). In reading this, my first comment was: Why does Sekuler want to stress such a trivial issue? Everybody knows that the isomorphism is not between real world and brain, but

⁷ Scheerer (1994) translates *sachlicher* with “natural”. Of course, I don’t question Scheerer’s superior linguistic competence, but I feel that “material” conveys better the connotation of reality, positivity, implicit in the German adjective. Scheerer (fn. 2) prefers *natural*, because, according to him, captures the meaning of “required by the very nature of things themselves”, and so “non-arbitrary”.

between phenomenal world and brain! But obviously the issue is not trivial, and Sekular testifies that it is not true that everybody knows it. The general recognized acceptance of isomorphism is between stimulus and physiological activity, or, in the other case, it is between stimulus and phenomenal world.

Hatfield (2003, 358-359) credits a “threefold” model to Köhler (1929, 1947):

“He proposed, as an empirical thesis, that during perception the shape of a spatial structure in the world causes brain events exhibiting similar shape (“isomorphism” means same shape), which yield phenomenal presentation in experience of that shape (as seen from a point of view)”.

I was surprised in reading this, because I must say I found nowhere the first leg of this table. On the contrary, often Köhler says that we cannot consider the proximal stimuli a reliable image of the “real” world, for the intrinsic ambiguity of the distal stimuli. (Maybe it is this that Hatfield means speaking of “seen from a point of view”.) Besides, Köhler stresses that the proximal stimuli cannot have a field structure, with the possibility of self-organisation. As a matter of fact, this is not what Köhler says, but what Shepard (1981) (that Hatfield quotes immediately after) says about what Köhler says. And, in turn, this is what Skinner (1963, which Shepard, 284, quotes immediately after) says that Köhler says. This is what happens in the house of the isomorphism that Jack built out of Gestalt’s quarter. As Henle (1984, fn. 3) correctly states, this third leg implies that “no distinction is made between perceptual and physical objects. The identification of these two objects (naïve realism) makes [this] discussion irrelevant to the Gestalt concept of isomorphism”.

The problem of the domains involved in the isomorphic relation is also the problem of the alleged differences between Wertheimer’s and Köhler’s conceptions of the isomorphic relations. It is well known that, contrary to Köhler, in his writings Wertheimer appeared less interested in developing this idea. Indeed, after the 1912 paper on the phi phenomenon he seldom referred to any physiological hypothesis as a correlate of the experience. According to Arnheim (1981), this does not mean that Wertheimer did not believe any more in this hypothesis, as Keiler (1980) seems to imply. More simply, in his research on perception and thinking he did not need this hypothesis. Apart from Arnheim, we have enough testimonies of Wertheimer’s enduring interest in all his scientific life for the isomorphic problems, from the “seminars” edited by Luchins & Luchins (especially Luchins & Luchins 1973, 151 f.) to the memories of another pupil of Wertheimer, Newman (1989). According to the latter, who followed Wertheimer’s courses of *Erkenntnistheorie* in Frankfurt in 1931, and after was his assistant at the New School for Social Research, he was a “deeply committed monist”, that always believed in the physiological hypothesis. However, Luchins & Luchins (1999, 209) support the idea that this interest was not so deep: “We suggest that Wertheimer, who might have been influenced by phenomenology, was more oriented than

Köhler to experimental phenomenology and less interested in physiological hypotheses. Such differences might help account for differences in their conceptions of isomorphism”.

We said at the beginning that usually, both outside and inside the Gestalt psychology, the domains considered isomorphic can be three: the domain of the “real” world, the psychological domain of the phenomenal world, and the physiological domain. The problem that arises is that these domains are less clearly defined than one can imagine, and this not in the interpretations of the scholars external at the field, but in the writings of the Gestalt psychologists themselves. For example, according to Arnheim (1987, 210) the concept of isomorphism “is not limited to the relation between perceptual phenomena and the corresponding neurological processes. It refers to any structural analogy between patterns located in different media, and in this broader sense it is of central relevance to Gestalt theory itself”. In this paper, Arnheim is particularly interested in the psychology of art, and its examples go in this direction. For instance (*ibidem*),

“when one tries to understand how the melodic and harmonic patterns of music or the motions of a dancer convey their expressive meaning with such striking immediacy, the isomorphic relation between the shapes and colours perceived and the meanings transmitted by them is the only base from which a concrete analysis of practical examples can be undertaken. The same is true for the spontaneous symbolism of compositional patterns in painting, sculpture and architecture”.

In this case, however, it is not clear if the asserted isomorphism is between contents of the phenomenal world and the “real” world, or between (as seems more likely) different domains inside the phenomenal world. For Arnheim, however, the first interpretation is the valid one. Indeed, in another paper (Arnheim, 1943, 75, *italics* added) he writes: “we call the movements of a dancer mournful not because we have often seen sad persons behave in a similar manner but because the dynamical features of mourning are *physically* present in these movements and can be directly perceived”.

Some years later, Arnheim (1949, 160 f.) develops further his idea of isomorphism, envisaging different “isomorphic levels”. If we have an observed person and the observer, the isomorphic levels, according to Arnheim are five for the observed person, and three for the observer. The levels for the observed person are i) the state of mind (psychological); ii) its neural correlate (electro-chemical); iii) the muscular forces (mechanical); iv) their kinesthetic correlate (psychological); and v) shape and movement of the body (geometrical). For the observer, the levels are: i) retinal projection of shape and movement of the body (geometrical); ii) its cortical projection (electro-chemical); iii) its perceptual correlate (psychological).

I think that this stance is at most unfortunate, and is a clear contribution to ambiguities and misunderstandings. In my opinion, it is indeed difficult to find a strict isomorphism between music and dance; here we have relations which are in both senses many-to-many, and the criteria to define what the structure is here are almost always impressionistic. This “weak” use of the term isomorphism is at the basis of many misuses. A similar interpretation of the isomorphism also appears in the work of other authors, e. g. S. E. Asch (1958).

It is worth noting that Metzger (1941, 291 f.) says that in the cases of which Arnheim speaks, one should speak of “Gestalt affinity” [*Gestaltverwandschaft*]. He points out that when one such affinity occurs, for example between the physical and phenomenal worlds, one can hypothesize a causal chain (from physical world to physiological level to phenomenal world), but not a structural identity – a true isomorphism. Note that Metzger does not quote Arnheim, and vice versa. The domains were, however, considered by different authors in a very scattered way. Hartmann (1935, 210), for instance, states:

“[...] we must realize that from the configurational point of view, perception and action cannot be separated, the one flows over into the other. Consequently, there is no break in continuity between the phenomenal and behaviour patterns. This is the standpoint of *isomorphism*, i.e., the view that the form of mental events is the same as physical. It is the fundamental thesis of Köhler’s “Physische Gestalten.” From the Gestalt view on methodology and experimentation, it is first necessary to understand the effect of the world upon the organism; hence, an introspective report may throw light upon explicit behaviour. Since the configurational concepts are not limited to static events in the nervous system, perception may be regarded as a stage preparatory to action. If an object appears “friendly,” this appearance implies my reaction to it as well as my perception of it.”

In other words, according to Hartmann the domains are perception and action. In some sense, there is some likeness between this acceptance and that of Arnheim’s one.

Was this an interpretation of the concept of isomorphism peculiar to Arnheim and few other authors, or did it have a more substantial place in Gestalt theorising? Apparently this is the case, and this is the difference between Wertheimer and Koffka, at least according to Luchins & Luchins (1973, 71 f., summarized in Luchins & Luchins 1999 – see also M. Scheerer 1954). According to their story, during the 1937-1938 seminar at the New School for Social Research, Wertheimer asked the class members to describe the behaviour of another moving student. The student moved in one case self-confidently, in another one very cautiously. The other students had to draw a graph of the student’s movements. These graphs showed Gestalt qualities of the behaviour. With this and other demonstrations he showed the similarity between Gestalt qualities of behaviours and feelings. In this way he defined the isomorphism as “a thesis that the Gestalt quality of psy-

chological events is similar to the quality of the physical world". Wertheimer admitted that his own formulation differed with Köhler's one, and went further saying that his own isomorphism "does not always hold". Anyway, this strange isomorphism that "does not always hold" in my opinion has at most a very weak meaning of the term.

We must stress another point. Usually, we take for granted that in *Gestaltpsychologie* all psychological processes must be considered in a unitary way, and there is neither distinction nor definite boundaries between perception, thinking, memory, and other cognitive processes. One strong supporter of this view has been Arnheim (for instance, Arnheim 1969), but also inside the Gestalt movement some scholars felt the need for a functional differentiation of the different moments of the psychological functioning. One radical proposal in point was Kanizsa's distinction between primary and secondary processes (Kanizsa 1979). What is interesting here is that, according to Köhler (1960, 20 f), one must distinguish "between phenomenal facts and psychological facts in a wider sense, such as retention in memory, our various dispositions, and our habits". The problem is strictly linked to the question of the isomorphism. These "psychological facts" have no phenomenal correspondence, and so it could be easy to interpret them purely in terms of brain processes, but the real problem is to interpret phenomenal facts in isomorphic terms, avoiding the drawback of the parallelism, which Köhler utterly rejects. The keyword here for Köhler is *emergence*, an idea, once more, full of ambiguity, which deserves a careful analysis.

According to Köhler (1950, 1960), the laws that rule the natural events are invariant, and leave no room to evolutionary changes. As we will see below, in the last section, the evolution instead acts on the constraints in which the invariant laws act. This postulate of invariance is in sharp contrast with every possible emergentist stance. As Köhler (1960, 20-21) says,

"Nobody who has studied physics would predict that, when physical processes occur in brains, they will affect events in a different realm, the mental world, and that in turn, they will be affected by such mental events. [...] From the point of view of science, causal relations of this kind would have to be regarded as instances of an incomprehensible emergence. [...] Parallelists [...] view also implies that what happens in brains when we perceive, feel, think, and so forth, is a *novum* from the standpoint of natural science [...] this once more means emergence."

It is interesting that Köhler does not exclude that an identity stance, like Feigl's, also implies emergence, and then a contradiction with all the natural sciences. The "bold step" that Köhler says that is conceivable to take is also of interest: that is, to suppose that "*all* events in nature have phenomenal characteristics of a more or less primitive kind." Köhler panpsychist? No, Köhler excludes also this possibility as a "greater error". His conclusion, however, is to reserve judgment.

Another point is relative to the second domain: consciousness or phenomenal world? In my opinion, it is not consciousness. If we consider the years in which Gestalt psychologists developed this idea, it is clear that consciousness refers to another field of theorising. So, the great philosopher of the religion Bissett Pratt could write (1936, 155), “the identity of physiological processes with subjective states, observed by introspection, is sometimes maintained by [Gestalt psychology] on the basis of their isomorphism”. Of course, this is not what Gestalt psychologists argue.

A point that we must clarify further is internal to the physiological domain. Does it also include the peripheral level of the sense organs, or is it limited to the central brain functions? The latter is clearly the case. On many occasions Gestalt authors say overtly that the self-organisation is possible only centrally, and not proximally. Köhler (1966, 76), for example, says that “local retinal stimulations are mutually independent facts, just as the elements of all physical surfaces before the organisms reflect light independently, then these stimulations must be regarded as a mere mosaic.” Note parenthetically that in saying this Köhler excludes also the world of the physical objects as a possible domain. So, it is a little surprising that somebody proposes “a second meaning to isomorphism, which focuses on the structural likeness between the proximal stimulus (retinal image) and its representation on the cortical surface” (Ehrenstein, Spillmann & Sarris 2003, 446). Of course, this kind of “isomorphism” is congruent with some recent developments in neuroscience, but this has nothing to do with Gestalt psychology.

5. Consciousness, Phenomenal Contents or Representations

Apart from the problem of the very nature of the isomorphic relation, all Gestalt authors maintain that one of the domains is the direct experience – the phenomenal content, the directly accessible world. Of course, the phenomenal field is that of which the subject is directly conscious – the content of consciousness. Could this mean that this is the domain of the “representations”? This is what some authors believe, and in a very clear way is what Lehar (2003, a and b) and Scheerer (1994) maintain. Lehar states that “there have been different schools of Gestalt” (2003 b, 437), but he concedes that we are allowed to consider Köhler, Koffka and Wertheimer together. We are very curious about this variety of schools under the label “Gestalt”; we can understand that for Lehar a representative of another “Gestalt school” is Gibson (*sic!*), but here it is not important to discuss the appropriateness of such attribution: we too are concerned mainly with Köhler, Koffka, and Wertheimer, and, according to Lehar, they “were definitely representationalists”. Moreover, he says quoting Koffka (1935), with him we have that Gestalt theory is a representationalist theory (Koffka, for Lehar, is indeed “the most clear representationalist case”). Why? Koffka says (1935, 40) that the behavioural environment is located inside the geographical body in the

geographical environment. This is right, but what is the relation of this statement with the problem of the representations? Besides, Lehar asserts that Köhler clearly states a representationalist doctrine. The locus cited by Lehar is wrong⁸, but I suppose that he refers to Köhler 1929b, 395. There we read:

“Why are the objects of the phenomenal world perceived as before us, outside ourselves, even though today everybody knows that they depend on processes inside us, in the central nervous system”. Once again, is this a “most clear” expression of a “representationalist view”? Or, on the contrary, does it not mean exactly the contrary? Indeed, Köhler is saying that the real objects are the objects of the phenomenal world.”

Of course, in democracy every person has the right to use every word giving to it the meaning that he prefers, but in science it is correct to conform to the use of the term made by most of the authors – or to specify why we give to a certain term a meaning at odd with the usual meaning. At least, we must conform to Humpty-Dumpty’s law. Now, the term “representation” has a clear story with a long philosophical past, and an intense present-day life. We stay on the English term, because in German the case is more complex, because in different contexts we can use different words: *Vorstellung*, *Darstellung*, *Repräsentation*, *Aufführung*, and so on, but in English representation means solely “something staying for something other”. I agree completely with the definition that Hubbard (2006, 38) gives of it:

“The notion of ‘representation’ implies at least two separate but functionally related domains or worlds: a represented world and a representing world. The representation is an element within the representing world, and it reflects, stands for or signifies some aspect of the represented world. In understanding a representational system, it is important to specify (a) which aspects of the represented world are being represented, (b) which aspects of the representing world instantiate or otherwise encode the representation, and (c) what are the correspondences between the represented world and representing.”

So, a representationalist view in the philosophy of mind is a view in which in the mind of the subject there are representations that stay for the events of the internal and/or external world. Of course, as in Haselager, De Groot, and van Rappard, H. (2003), one can build an isomorphistic representational theory - ready to answer criticisms like those put forth by Putnam – but it is not a Gestaltist theory. In the same vein, one can propose an anti-representationalist theory that can be isomorphist or not, as in the cases of the proposals of smart mechanisms: *Polar Planimeter* for Runeson (1978), *Watt Governor* for van Gelder (1995). Again, Gestalt theory is another matter.

⁸ Lehar quotes Köhler’s paper “A task of philosophers” as a chapter of Köhler (1971a, 125). But this page corresponds instead to the paper on the pseudoproblems (Köhler 1929 b), which appears more appropriate in this context.

If we use the term in the most trivial way, only to mean “some content of the consciousness”, yes, Gestalttheorie is a representationalist theory, but we must consider that there is a tradition in European psychology of this concept. In particular, there is a line that goes from Brentano, to Graz school, to Berlin school. Now, the concept of *representation* (and *presentation*) is very important in Brentano’s system, linked to the Thomistic idea of “intentional in-existence” (Brentano 1874). Gestalt theorists rejected clearly this part of Brentano’s theory – as they rejected Meinong’s production theory.

Another important remark: Often, in European tradition, we use the term “phenomenal field” to point to the “second” domain of our interest. This is particular true in Italy, where, mainly after two important books by Kanizsa (1984) and Bozzi (1989), the usual name of all this field of research is “experimental phenomenology”. Classical Gestalt authors seldom used this term. For Koffka, it was better to speak about “behavioural environment”. More interesting, Köhler, who speaks of “directly accessible world” (1966, 73), says that “another name of this part is the ‘phenomenal’ world. I have not used this name because it almost sounds as though it referred to mere appearances of other, more substantial, and therefore more important, facts”. I think that this is the eventual tombstone of any attempt to qualify Gestalttheorie as a “representational” theory.

Moreover, we can ask to ourselves why, if *Gestalttheorie* is a representational theory, the authors almost never use the term “representation”, or its many German synonyms. At least from Brentano onwards, the term was widely present in the scientific and philosophical tradition, to which the Berlin school belonged. I know only one exception: a book by Koffka (1912) on “*visuelle Vorstellungen*”. Note, however, the year of publication: the book appears before, or just at the beginning of the Gestalt school, and it is theoretically far from Gestalttheorie. After this, Koffka did not use the term any more. And one could use it safely in different contexts, also without any theoretical commitment to a representational theory. The Gestalt psychologists, however, preferred other terms. For instance, in the paper on thinking of primitive peoples, referring to the mental constructs of numerical structures, Wertheimer (1912a) prefers to speak of *Gebilde*.

More subtle are the arguments put forth by Scheerer. Referring to Köhler (1913), he admits (1994) that

“regarding the phenomenology of perception Köhler, like all other Gestaltists, was not representationalist. Qua experience, our perceptual acquaintance with things, persons, and events is not mediated by some “intermediate” entities such as sensations.”

Note that according to Lehar, instead, Gestalt theory is a representationalist theory *qua* perceptual theory. According to Scheerer, however, things are different for the knowledge that we have of the “real” world, of the physical objects. This is

certainly not representationalism like that we find, for instance, in Fodor (1975), and in general in the computational theory of mind. However:

“if we take a more liberal reading of ‘representational theory’, reducing it to the mere assumption that our knowledge of the outside world is not direct but mediated by mental entities “standing for” the “physical” entities that form the ultimate objects of knowledge, then Köhler’s theory is representational, because it rejects phenomenalism and endorses realism. According to Köhler (1938, Chapter 4), phenomenalism is wrong in denying the existence of a transphenomenal world. [...] If an entity outside of the phenomenal world is able to “make itself felt” in the phenomenal world, then we are justified to “make reference” to it as a real entity.”

In other words, according to Scheerer the very fact that we believe in a transphenomenal world is sufficient to argue that our cognitive system is representational. This means simply that we can consider “representational” all we can call “secondary processes” in Kanizsa’s sense, but these, according to Köhler (1960, 21) in the quote above, are exactly the processes that have no likenesses in the phenomenal world. I have no reason to reject this view; simply I consider this less important in the economy of Gestalttheorie. Besides, where are these representations, in brain or in mind? Are they the “mental entities” that stand for something else, or instead “our knowledge of physical objects [that] is mediated by brain processes” (ibidem, *italics* added)? I do not think that to call the mediating brain processes “representations” is correct, because to speak about representations I must be aware of them. Neither am I satisfied when one solves out the problem saying (ibidem) that “our knowledge of physical objects is mediated by brain processes, and though physical objects share some structural properties with phenomenal objects, they are not identical with them”.

I think that all this shows clearly that Gestalttheorie rejects the idea of representation. At most we can say that the Gestalt authors had an *indifferentist* stance on this problem (Luccio 2003). For them, the contents of the “directly accessible world” do not stay for something else, as “representation” would imply, but stay for the contents themselves. This has induced some authors (for instance, Keiler 1980) to accuse the Gestalt psychologists (in this case, Köhler) to be

“a biased idealist since he took the percepts and not the “real objects” to be immediately given entities. [But this accuse is unfair.] In my opinion, rather, Köhler was right: psychologically speaking the immediate experiences are in fact what is real. (von Fieandt 1983, 39).”

Here it is important to stress the difference that Köhler proposes between *subjective* and *objective* experiences, both “results of organic processes” (Köhler 1947, 23), when the subjective experiences are the contents of the phenomenal world that are felt as belonging personally to the subject, and are

“in so far *subjective*, such a dreadful fear upon a certain occasion [...] For instance, a chair as an objective experience will be something there outside, hard, stable, and heavy. Under no circumstances will it be something merely perceived, or in any sense a subjective phenomenon. (ibidem, 20-21)”

Still more clear is Wolfgang Metzger (1941, 2. Kap.), in his classic treatment of the psychic reality [*seelisch Wirklichen*]. According to Metzger, the first distinction that one must perform is between the physical or metaempirical world [*physikalische oder erlebnisjenseitige Welt*] and the phenomenal or lived world [*anschauliche oder erlebte Welt*]. These are the first and second meanings of psychic reality, and according to Metzger in psychology there is often confusion between these two meanings. There is, however, another dangerous confusion that often occurs, and it is between the second meaning and a third, the represented world [*vergegenwärtigte Welt*]. The real world in the second meaning has the characteristics of the “met” [*Angetroffene*]. The met things, events, actions and beings are a reality of things, events, actions and beings as such, while when represented are felt completely differently, as “pointing to” [*hinweisend auf*] another reality. Parenthetically, we can note that some authors (for instance, Sambin 1990) assume other levels of realities, in a sort of gradient of phenomenality. I follow this line of argument with some difficulty between met and represented reality. That’s all.

6. Structural v. Functional Isomorphism

As we said, isomorphism means structural identity. Again, however, some authors argue that it is “identity of function” – for example, Lehar (2003); or Hubbard (2008), but King & Michael Wertheimer (2005) too, in their beautiful book on Max Wertheimer, say (376, *italics added*) that “Gestalt psychology assumes a kind of *functional and structural* comparability of phenomenal experiences and of their underlying physiological events”.

Structure and function are, of course, different concepts. When we oppose structure to function, we mean that a functional approach dictates that different structures can serve the same function, while a structural approach means that the same structure can serve different functions. So, for both approaches function and structure are independent concepts. When we speak about functional isomorphism I mean that the correspondence is between functions, and not between structures, and conversely. Remember, the similarity must be *sachlicher*, which function for definition is not.

What is interesting to explore is if in some Gestalt writing the interpretation of isomorphism as identity of function is present, and when so, if this is in general compatible with the argument of the Gestalt theory. Once again, we must remark that there is some uncertainty in Gestalt authors about this term; for instance, Arnheim (1943, 75) writes: “this theory of isomorphism (identity of form)”, a definition that is, without many qualifications, substantially ambig-

uous, and that can contribute to the “picture-in-the-head” idea of the isomorphism.

Anyway, let us return to the problem of structure v. function. Now, in Köhler the fact that the isomorphism is structural and not functional is clear, and this is often stated, directly and indirectly. For instance, Köhler (1938, 193), in discussing why so many philosophers and psychologists share a negative attitude towards every hypothesis on the relations between body and mind, states (*italics added*):

“Intimacy of mental life and brain-function would disturb me so long as brain-function must be regarded as foreign to my mental operations and still as practically determining such activities. I should fail to understand the relationship and, besides, I should regard it as oppressive. If, instead, it were found that in certain major respects the same happens “on the other side” as happens mentally “on this side,” I should certainly feel a great relief. Whatever else the intimate relationship between cortical events and phenomena might mean, it would no longer imply that the course of my mental processes is secretly determined by the principles of an altogether different world.

The other view would be the most remarkable example of what I tried to indicate when I mentioned the outstanding characteristic of sponges. If we could show that cortical processes *share some of the main structural aspects* of phenomenal experience, they would to that extent become equivalent to such phases of the phenomenal realm; they would therefore be exactly as “good” as are such mental facts; and thus an attitude of resentment would become simply unreasonable”.

Again (*ibidem*, 217):

“Continuity is a *structural* trait of the visual field. It is also a *structural* fact that in this field circumscribed particular percepts are segregated as patches, figures and things. In both characteristics, we have found, the macroscopic aspect of cortical processes resembles visual experience. To this extent, therefore, vision and its cortical correlate are *isomorphic*.”

As an indirect argument, in denying any soundness to the Materialistic approach, Köhler (*ibidem*, 185) states (*italics added*):

“Still cruder ideas were held by those who in their Materialistic doctrines tried to apply science where, with its insufficient knowledge, it could not really be applied. On the other hand, some of the essential characteristics of mental life were well known to philosophers. For this purpose no special research is needed. The very simplest observation will find *some structural traits of mental operations for which there are no analogues in the realm of “moving matter.”* The statement, therefore, that mental life is a product of matter and its motions, could hardly have a very clear meaning.”

We could add plenty more quotations of the same kind. I have found nowhere any support for functional isomorphism, nor in Köhler neither in other Gestalt

writers, but on several occasions Köhler explicitly denies a functional isomorphism. For example (*ibidem*, 220):

“Thing-processes, we said, occur *outside* the body-process. What does “outside” mean in this sentence? As a matter of fact, the correlate of a thing-percept and that of the body-percept will quite generally have different locations in the visual cortex. But, if we wish to think consistently, we cannot contend that this geometrical fact has as such any psychophysical significance. Rather such terms as “being outside” have to be given a *functional* interpretation, just as has been done with the terms “continuous” and “segregated.” In assigning isomorphic correlates to the various structural properties of visual space we cannot in one case point to functional realities and in another case to mere geometrical relations.”

This means we cannot often observe a correspondence between functional and structural relations (for instance, geometrical relations), but the isomorphism applies to the structure, not to the function.

The distinction between structure and function will result from an analysis of the “additional assumptions” that Köhler (1938, 223 f.) assumes to be necessary to transform the “postulate of the isomorphism” into a “theory”. In the visual realm, the first assumption refers to *continuity*. So, in the phenomenal world we can have two or more elements that are in continuity; this is a structural property, which can serve several phenomenal functions. For instance, as in the case of Wertheimer’s principle of good continuation (1923), the function is to ensure the belongingness of a series of points to the same curve. We then assume that this continuity corresponds to a continuity of electro-physiological processes in the visual cortex of the person that is experiencing the phenomenal continuity. Of course, this continuity in the physiological processes is structurally identical with the phenomenal continuity, but it is clear that the function that it serves is quite different. For instance, it could serve to ensure an apt physico-chemical condition to develop further physiological processes.

Köhler (1960, 18) also gives a demonstration *a contrario*:

“For instance, if the comparison were to show that, say, in perception, brain processes with a certain functional structure give rise to psychological facts with a *different* structure, such a discrepancy would prove that the mental world reacts to those brain processes as a realm with properties of its own – and this would mean dualism.”

Köhler utterly rejects dualism however. In this case, the Gestalt authors are in part responsible for misunderstandings. So, for instance, Köhler (1958, 151), writes:

“Thus, a given process may occur in different locations; and, if this is true, we have to deal with a functional problem which studies of localization alone cannot solve. My own work in physiological psychology refers to functional questions in this sense.”

Or S. E. Asch (1958, 325), sketching an “approach to the experienced relation between physical and psychological events”, writes:

“The conclusion we have reached is that when we describe psychological events in the same terms we employ for the description of the forces of nature of fire, sea, wind we are referring to functional properties they share. We see natural events as conductors of the same fundamental forces that we find in the human sphere. Therefore we speak spontaneously of seeing a point, of shedding light on or illuminating a problem, of penetrating to the heart of a matter. The dual terms of this study derive from this source, being shorthand names for functional relations and forces.”

However, once again Scheerer (1994) invite us to assume a more “liberal” attitude on two grounds. First, “the states of the system cannot be individuated in an absolute fashion but only in relation to other states”. Second, “evolution works under the physics of dynamical systems and for that reason often has reached one and the same functional solution (e.g. for sensory projection areas) with diverse materials and topographical arrangements”.

Of course, we can find in Gestalt authors, mainly in Köhler, several statements in support of both these sentences, but here we are in front of the problem of postulate of invariance versus principle of change of constraints. What Köhler says is not that in the same individual is irrelevant what is the substratum that instantiates a given function. The change of constraints can induce instead at different levels of evolution the realisation of the same functional solution with different substrata. However, this is another case of an ambiguous way to express some concepts in Gestalt writings.

Note that for some scholars to speak of “structural isomorphism” was a limit. It is the case of Sellars (1932), that states that sensory experiences are only “structurally isomorphic” to input at the sensors, that is, they are “differentially correlated” to it, not necessarily in direct ratio (Sellars 1932, 86).

7. Dualism v. Monism

In the history of the mind-body problem, if the father of all this family of theorising about mind-body problem was undoubtedly Spinoza, the most direct antecedent of the isomorphism was the “psychophysical parallelism”, a term created by Fechner (1851, Vol. 3, Chap. 19), in the frame of his panpsychist conception of the relationship between soul and body. It is ironic that the parallelism is considered in many essays on philosophy of psychology a “dualistic” position (in post-Cartesian sense). This is, for instance, the case of Mario Bunge (see, for instance, Bunge 1980; Bunge & Ardila 1987, 8 and 92 – but it is not the lone case of gross misunderstandings made by Bunge).

Of course, in Fechner, as in Wundt, the parallelist position was rightly a mon-

istic position – a monism that cannot be considered in Cartesian terms neither idealistic nor materialistic, and therefore was called “neutral” by Bertrand Russell (1912, 1914). The psychophysical parallelism in Wundt’s work had a different flavour. It was indeed yet another monistic position, but Wundt clearly was on anti-materialistic position. It is true that for him body and soul were “manifestations of one substrate” (*Erscheinungsformen eines Substrats* – Wundt 1902-03, 776), and that he was a fierce opponent of the theory of “reciprocal effect” (see Wundt 1863, 1880, 1889, 1894), but he rejected the idea of a necessary correspondence between *all* psychical and physiological phenomena. There are instances for which we have proofs of this parallelism, particularly for sensations, and in general for elementary processes. However, it is not possible to find such parallelism for more complex, sophisticated mental and physiological processes, for which the same mental processes can correspond to different physiological events – and conversely (Wundt 1894, 46). As Heidelberger (2003) points out, one can see this partial parallelism as an anticipation of today’s distinction between type and token identity theories. Anyway, if Wundt is right, we cannot speak of isomorphism at all.

We said before that according to Bunge the Fechnerian parallelism was a dualistic position. The same misunderstanding is also in Bunge for the Gestalt position: he considers isomorphism a variant of the parallelism, and so a dualistic position. Indeed, Bunge is not alone in considering the doctrine of isomorphism an instance of metaphysical dualism. Boring (1936; see also Boring 1933) has the same stance, and his criticism to isomorphism is rather a criticism to ontological dualism. At the end of his paper, there is some doubt:

“However, the Gestalt psychologists, though speaking dualistically of phenomena and physiological processes, doubtless intuit the fact that introspection itself is a physiological event which reflects the differentiation of central processes, so that it becomes a description of the neural processes themselves” (375).

Here, however, we have some other gross misunderstandings. In his attempt to drive the Gestalttheorie to the monistic materialistic home (for which Boring is sympathetic), he reduces the phenomenal world to the contents of the “introspection”, and them to neurophysiologic processes. To earn this curious result, he must reduce every content of consciousness to a discrimination process of the kind “*A* or *not-A*”, that could be easily represented in the activity of the nervous system. Of course, Gestalt psychology is a quite different matter. One can add that in the thirties (see King & Michael Wertheimer, 2005) there was an intensive and respectful correspondence between Boring and Max Wertheimer, the latter trying to convince the first without succeeding of his errors of interpretation.

Indeed, in some respect Boring must be taken seriously; and similar arguments are put forth by De Laguna (1933). Indeed, we could translate what Boring says in Gestalt terms, given that we consider the Gestalt doctrine not a dualistic con-

ception of the relationships between soul and body, but a monistic one. Erickson (1942) strongly criticises Boring's paper, defending Gestalt psychology, but as a matter of fact Erickson's position is a parallelist one. This is clearly revealed by the following statement (355, *italics* added): "[according to] the Gestalt position [...] consciousness is not assumed to play a causal role but *merely to accompany* the neural process". But Köhler (1960, 81) clearly rejects this last argument:

"But, so long as phenomenal events are still said to 'accompany' structurally similar patterns in the brain, the Gestalt psychologists would find themselves in the same situation as the parallelist: structurally similar or not, those phenomenal events would appear as partners of physical facts only in brain."

In some sense we could say that Köhler's position was closer to that of Boring than to that of Erickson.

As Feigl (1934) has clearly stated, isomorphism is an instance of the *identity theory* and according to him (Feigl 1975) Bertrand Russell (with his *neutral monism*) and Moritz Schlick had the same idea about it. Feigl (1962, 575) points out that the term "parallelism" is "somewhat ambiguous, sometimes implying that there is a correspondence between mental and neurophysiologic causation. According to Feigl, the problem is to find a language for experience (the *language of data*) and a language for neural (physiological) events (the *physical language*), such that we can build sentences in the two languages related to the same events that are *isomorphic*:

"To every proposition describing introspectively what, as we say, is given as a datum of my consciousness, there would be a corresponding proposition in physical language describing, as we say, the condition of my nervous system. From the intersubjective point of view these two types of proposition are only verbally different" (436).

According to Feigl, this means that one can translate every proposition given in one language into a proposition in the other, but "mutual translatability means nothing but identity of structure. Logically mutual translatability, isomorphism, means simply *identity* of the two proposition" (*ibidem*). The difference that we can feel depends on the "pictorial connotations" of the propositions: but "images are not concepts; and it is the concepts only which are of logical relevance" (*ibidem*). So (Feigl 1962, 577) states that

"the solution that appears most plausible to me, and that is entirely consistent with a thorough going naturalism, is an identity theory of the mental and the physical – in the following sense: certain neurophysiological terms denote (refer to) the same very events that are also denoted (referred to) by certain phenomenal terms. Utilizing Frege's distinction [...] we may say that neurophysiological terms and the corresponding phenomenal terms, though widely different in *sense*, and hence in the modes of confirmation of statements containing them, do have identical referents."

Köhler (1960, 21-22) appears prone to accept Feigl's proposal, with some qualification in terms of emergence.

Gestalt psychologists were definitely not dualists. As Köhler writes, "we do not assume, as the philosophers of the past did, that the mind and the body are two substances" (1960, 3); and "we are less and less inclined to believe that the dualistic view can be accepted as final" (1960, 4). This necessarily means that they endorsed a monistic view, as Newman (1969, 1989) says about Wertheimer's stance. Newman in this is very clear:

"My main thesis is that the essence of Gestalt psychology, contrary to popular belief and to the statements of many eminent psychologists, lies in its insistence upon a monistic approach to psychological fact – upon a kind of physicalism, if you will, and a rejection once and for all of dualistic premises, however deceptive may be the packaging" (1969, 400-401).

My hypothesis is that things are more complex, and I am afraid that we must enrol among the "eminent psychologists" also Wolfgang Köhler. From this point of view, maybe in Köhler there was some evolution: as Stadler & Kruse (1994) note, in 1920 Köhler's language was often parallelist, and Metzger (1941, 286 f.) endorses a clear parallelist position.

8. Back to Spinoza

We now finish our work, trying to answer to a complex question: what are, in reality, the relationships between Gestalt isomorphism and Spinoza's identity theory?⁹ It is well known that the most direct philosophical antecedent of every mind-body doctrine supporting an identity or a parallelism must be found in Spinoza. In particular, the doctrine of the psychophysical parallelism in Fechner is so strictly linked to the ideas of Spinoza that Fechner himself (1851, Vol. II, 155) states: "Von gewisser Seite erscheint unsere Ansicht ganz spinozistisch, ja, kann als reiner Spinozismus erscheinen." (For a comparison between Fechner and Spinoza, see Sprink 1912)¹⁰. However, in Spinoza, according to Baensch

⁹ The references to Spinoza's work are made on the basis of the last critical Italian edition, edited by Filippo Mignini (Spinoza 2007). The quotations will derive from *Korte Verhandeling van God, de mensch en deszelus welstand – Short Treatise on God, Man, and his Well-Being* (KV) (pp. 73-205), *Ethica Ordine Geometrico Demonstrata – Ethics* (E) (pp. 784-1086), *Tractatus de Intellectu Emendatione – Treatise on the Emendation of the Intellect* (TIE) (pp. 21-69), *Tractatus Theologico-Politicus – Theologico-Political Treatise* (TTP) (pp. 425-735), and *Epistolae – Correspondence* (Ep, pp. 1219-1522). In the quotations I'll indicate in order the part of the work in Roman numbers, and the number of the section or proposition in Arabic digits. Pr will stay for Praefaction, A for Appendix, P for Propostion, S for Scholium, D for Demonstration, and n for footnote.

¹⁰ Sprink (ibidem, 62) so synthesizes with a nice image the differences between the two philosophers: "Bei Spinoza und Fechner haben wir das Gefühl, vor dem unendlichen Ozean zu stehen; aber wir sehen ihn bei beiden verschieden. Der Philosoph der klaren Erkenntnis zeigt uns trotz des hohen Wellenspiels auf der Oberfläche die ewige Ruhe in der Tiefe des Ozeans: bei dem Denker und Dichter empfinden wir hauptsächlich die Schönheit und Poesie in der Brandung."

(1907), one must distinguish three kinds of parallelisms: 1. Metaphysic; 2. Ideal; 3. Cognitive (*erkenntnistheoretische*). In Fechner the similarities are, in my opinion, between the second and the third aspect, and the differences are overall for the first. We could say the same of Mach (1903, 38), who, pointing out his philosophical antecedents, states: “Sollte ich dieselben vollständig aufzählen, so müsste ich wohl bei Spinoza beginnen”(see also *Erkenntnis und Irrtum*, 1906, 26).

Here we have something more direct. We know (see Luchins & Luchins,1982; King & Michael Wertheimer 2005) that, by means of his grandfather Jakob Zwicker, as a child Wertheimer, then about 10 years old, was acquainted with Spinoza’s ideas. Jakob Zwicker was an influential member of the Jewish community of Prague, and he liked to educate his nephews at a level certainly higher than the average children of the time. In particular, “while he was still a child, Wertheimer’s reading of Spinoza probably offered a glimpse of the power of holism” (King & Michael Wertheimer 2005, 42), holism that had to be a constant landmark of all Gestalt psychology. We know that this precocious Spinozian influence imprinted all Wertheimer’s *Weltanschauung*. From this point of view, a memory of Edwin Rausch (cit. in King & Michael Wertheimer, ibidem, 193), who was Wertheimer’s graduate student in Frankfurt, is highly revealing. At his *Staatsexamen* for high school teacher, Wertheimer, who was also his supervisor for philosophy, asked how in Rausch’ opinion Spinoza had answered a letter sent to him about ghosts. Furthermore, as we will see below, there is a direct line from Maimonides [Moshe ben Maimon, Rambam], the great Jew theologian of the XII century, to Spinoza. As King & Michael Wertheimer (2005, 22) say, their parents strongly encouraged Max Wertheimer and his brother Walter to read religious books during their education. Therefore, it is quite possible that Wertheimer had known of Maimonides, who was a milestone of the religious education in Jewish families at his time. However, we know that Hasdai Crescas, a Jew philosopher of the XIV-XV Century, and a fierce opponent of Maimonides, and his pupil Yosef Albo, exerted a great influence on Spinoza’s thought (see Waxman 1920; Wolfson 1934). However, it is difficult to hypothesize that they influenced Wertheimer.

While usually, as described above, the influence of Spinoza on Wertheimer is seen mainly in terms of holism and optimism, my hypothesis is that Spinoza influenced also the theorising about mind-body relations. It is worth stressing that Spinoza did not only influence Wertheimer. The more direct reference is in Köhler’s book, “The place of Value in a World of Facts” (1938) – a book where the idea of isomorphism occupies a central position, with an entire chapter devoted to it. Here, a key idea is “requiredness”, that is, as Köhler (ibidem, 62) states, directly drawn from Spinoza, and precisely: “In no case do we strive for, wish for, long for or desire anything because we deem it to be good, but on the other hand, we deem a thing to be good, because we strive for it, wish for it, long for

it, or desire it” (E III, 9). Maybe, in other Gestalt writings the name of Spinoza is less present than one can expect. Anyway, his name is present in some remarkable writings; I confine myself to recalling Henle’s outstanding essay on freedom (Henle 1960).

Of course, it would be simply crazy to try to summarize Spinoza’s doctrine here, so I’ll briefly review only some of his ideas about the mind-body problem. It is worth remembering that Spinoza’s conclusions were revolutionary also in the XVII Century, not only respect to the Cartesian dualism, but also versus the Christian tradition, from Thomism on, not to mention the Jewish tradition, from Maimonides¹¹ onwards.

Commentators have long neglected Maimonides’ influence on Spinoza. One must notice that Spinoza seldom refers directly to Maimonides, and almost exclusively in the *Tractatus Theologico-politicus*. Here, he criticises severely the Jew theologian on the problems of the relationships between faith and understanding, quoting also long excerpts of the *Moreh Nevuchim*. Indeed, the parallels between Maimonides’ and Spinoza’s doctrines are deeper than one usually admits. For example, as Pearson (1883) noted, Spinoza’s definition of God looks almost like a translation of that of Maimonides. So, in Spinoza (E, A) God is “unic; free cause of all things; all things are in God, and all from him depends, so that without him nothing can be or can be conceived”. Note the likeness with Maimonides’ *Yad haKhezakah*¹² (Bernard 1832, 73-74):

“This God is one—not two, nor more than two, but one—whose unity is not like the unity of any one of the individuals existing in universe - not one as a kind [is one], for this includes many individuals; nor one as a body [is one], for this is divisible into parts and portions; but one, and such an One, that there is no other Unity like His, in the universe.”

We can find similar definitions also elsewhere, in Jew as well as in Christian theologians. However, there is also a stronger parallel with Spinoza, and particularly with Spinoza’s celebrated *amor Dei*, with the necessary link between love for God and knowledge of God. Maimonides’ argument (Bernard 1832, 320-321) says that the aim of the life is the love of God; but to know God means to love Him, and to love Him means to know Him¹³.

¹¹ For a historical setting of Maimonides, see Baron (1934-1935).

¹² “*The Mighty Hand*”, also known as *Mishne Torah*, translated in part (first of XIV Vols.) by Bernard 1832, 73-74; other excerpts are translated in other collected books, for instance Cohen 1927. Maimonides finished to write it in 1180, ten years before the celebrated *Moreh Nevuchim*, the “*Guide of the Perplexed*” – Maimon 1910.

¹³ “A man, however, can love the Holy One, blessed be He ! only by the knowledge which he has of Him; so that his love will be in proportion to his knowledge; if [the latter be] slight, [the former will also be] slight ; but if [the latter be] great, [the former will also be] great. And therefore a man ought solely and entirely to devote himself to the acquisition of knowledge and understanding, by applying to those sciences and doctrines, which are calculated to give him such an idea of his Creator’, as it is in the power of the intellect of man to conceive; as was stated by us in the Precepts relating to the foundations of the law.”

More interesting in our context is the parallel between “quality” and “matter”, and the attributes of thought and body in Spinoza’s doctrine. The following passages of the *Yad* could be very excerpts of the *Ethica*: “You can never see matter without quality, nor quality without matter, and it is only the understanding of man which abstractedly parts the existing body, and knows that it is composed of matter, and [that it also possesses] quality.” (105); “All [the things] which the Holy One, blessed be He ! has created in His Universe, are divisible into three classes. Of these, there are creatures composed of matter and [possessing] quality; and these are perpetually coming into existence, and perishing. Such are the bodies *of men, of beasts, of plants, and of minerals*” (82, *italics added*); “All the planets and orbs are beings possessed of soul, mind and understanding. Moreover, they are alive, they exist, and know Him who spoke [the word], and the Universe existed.” (97-98). This sentence will be echoed by the celebrated E II, 13 S: “all things, while in different grades, however are animated”, the origin of all panpsychist *Allbeseelung* doctrines.

As a matter of fact, it is better to be a little cautious on this matter. What Bernard translates as “quality”, specifying that could be interpreted as “intelligence”, could be nothing else than the Aristotelian “form” (see Cohen 1927, 21). The Hebrew term is צורה (*Ṣurah*), that literally means *shape* or *form*, and in metaphysics it is opposed to חומר (*khomer*) *substance* or *matter*.¹⁴ However, as Bernard (1832, 82, fn. 2) points out, Maimonides uses in this context for matter גולם (*golem*) instead of חומר. The definition of Angels as pure צורה can justify Bernard’s translation. Anyway, in general “soul” is not צורה, but נפש (*nefesh*).¹⁵

Of course, it would be unfair to neglect the differences between Maimonides’ and Spinoza’s doctrines. We can infer the most important difference from the definition of the Angels, still from the *Yad* (83):

“Again, of these, there are creatures [owning] quality (intelligence), but no matter at all. Such are the Angels, for the Angels are not bodies or frames, but qualities (intelligences), distinguished one from another. “

Remember also that for Spinoza God was *the* Substance, for Maimonides He is incorporeal.

From this passage apparently according to Maimonides we can have quality (form, mind, צורה) without matter. It implies an ontological difference between

¹⁴ The problem is far too complex to be fully clarified here. Notice that Efros (1924, 102-104 lists at least nine different usages of צורה in Maimonides, with meanings ranging from “intellect” to “shape”.

¹⁵ More precisely, Hebrew has three main terms for “soul”: נפש, רוה, נשמה (*nefesh, ruach* and *neshamah*), which in general correspond to the Platonic tripartition of the soul. Notice that Hebrew philosophy lacks of an unitary conception of the soul, and the terms are used in different ways by different authors. Furthermore, as Malter (1912, 457-458) points out, in the rabbinic literature of the Middle-Age most of the Hebrew authors draw a clear line between *soul* (נפש) and *intellect*, that is שכל, not צורה.

the two, and not mere differences of attributes (and modes) of the same substance. In *Igereth Tekhiyath haMetim*¹⁶ he says that when we will have the resurrection of the dead, they will resurrect with soul and body but the body will have all the normal equipment of living bodies, so it will be subject to all the natural laws, and eventually will die a second time. Otherwise, one should assume that God has created something superfluous, and this is self-contradictory, but after this second death the soul will remain alone, without body, in an everlasting life. A last point that should deserve a deeper analysis refers to the concepts of interaction of forces in Maimonides (1910, I, § 72) and in Spinoza, that show a clear parallelism. These concepts anticipate the idea of field, as developed in contemporary physics, as Sachs (1976) has persuasively taught. We know how important this idea in Gestalt psychology was in general, and on isomorphism in particular. According to Pearson, the rather scarce diffusion of the *Yad* (compared to the *Moreh Nevuchim*, in which the differences between Maimonides and Spinoza are more obvious) was the cause of the neglect of the influence of Maimonides on Spinoza.

The first thing that one must have clearly borne in mind is that for Spinoza the *substance* (that is, for Spinoza, God) is eternal, without limits and undivided: “No limited substance exists” (K VI,2,1); “One cannot conceive no attribute of the substance, from whom follows that the substance can be divided” (E I,P12). When we consider a man, his body and his mind are only modes of appearance of the same substance: “mind and body are one and the same thing, which is conceived now under the attribute of thinking and now under the attribute of the extension” (E II,2S). The individual too is such only as a mode, as well for the body and for the soul, not for the substance that makes up it. Spinoza was also the first to propose a monistic solution by a true identity theory (see Bennett 1981): “The mind and the body are one and the same thing, which is conceived now under the attribute of thought, now under the attribute of extension” (E III,2S). Of course, extension is the body, thought is the mind. This is also a clear introduction of the doctrine of identity that, as Koistinen (1996) points out, Spinoza introduces rather casually (E II,7S):

“whatever can be perceived by an infinite intellect as constituting an essence of substance pertains to one substance only, and consequently the thinking substance and extended substance are one and the same substance, which is now comprehended under this attribute, now under that. So also a mode of extension and the idea of that mode are one and the same thing, but expressed in two ways [. . .] For example, a circle existing in nature and the idea of the existing circle, which is also in God, are one and the same thing, which is explained through different attributes.”

In a letter to S. J. De Vries (Ep XXX), Spinoza rejects the objection that by giv-

¹⁶ “*Treatise on Resurrection of Dead?*”, written in 1191 – Maimon 2005.

ing two different names to mind and to body we imply that they are different things. He says that “one and the same thing can be stamped with two names”. Note that an important distinction (but not always so clear) has to be made in Spinoza between *attribute* and *mode*. “For attribute I mean what the intellect perceives of a substance as constituent of its essence” (EI,D4); “For mode I mean the affections of a substance, that is what exists in other, by mean of whom it is also conceived” (E I,D5). The attributes are undivided; the modes refer to individuals.

I think that there is an almost perfect parallelism between this Spinozian conception of the substance in his relation with the body, and what Gestalt writers say. For example, Köhler (1960, 3-4, *italics added*) argues that

“we have the very best reasons for regarding the bodies of animals and men as *processes* or, more specifically, as approximately *steady states*, that maintain their shapes and other characteristics by self-regulating activities [...] Similarly, there is no evidence that mental functions represent the activities of a mental substance [...] The relative constancy of a person’s self is likely to be basically of the same kind as the relative constancy of his heart, his muscles, his brain, and so forth – that is, a *constancy of state of affairs*.”

In other words, Köhler says that there exists a substance that one can identify neither with the body nor with the mind. As substance, body changes continuously, as “the material of all organs of the body is continuously being eliminated, and at the same time replace, in the course of metabolic events” (*ibidem*). But the same is true also for the mind: “the *self* is not a permanent entity [...] although, among the various states [...] there is a great deal of coherence” (*ibidem*).

One can find some contradiction between Spinoza and Köhler, because in Spinoza’s conception the substance can never change, it is eternally so. In Köhler’s conception, instead, there are intense dynamics, with a continuous change in the arrangement of the substance. However, such contradiction is only seemingly real: in Köhler too the substance never change, it is its mode to compose the body that continuously changes. The body itself and the mind too, is in Köhler a coherent arrangement of steady states, in Spinoza a *mode*.

Let us go back to Spinoza, and let us try to see how his identity theory goes (for recent analysis of the identity proposal in Spinoza, see Koistinen 1996; Della Rocca 1993). A first proposition to consider states: “The order and the connection of the ideas are identical to the order and the connection of the things” (E II, 7P).

In the Scholium Spinoza made clear that in saying this he refers to the relationship between thought and body: “we can conceive the nature under the attribute of the extension as well as under the attribute of the thought, or under any other attribute, but in every case we will find one and the same order, or one and the

same connection of causes, that the same things that follow each other in both sides" (E II, 7S). Remember, "a mode of the extension and the idea of that mode are one and the same thing", and "the thinking substance and the extended substance are one and the same substance, which is understood now under this attribute, now under that" (ibidem). It follows that "the order of the actions and of the passions of our body is simultaneous in nature at the order of the actions and of the passions of the mind" (E II, 2S). In my opinion, this is the best possible definition of isomorphism in Köhler's sense.

We now need at least another step. The question is: how we can perceive, feel or image? Here we have in Spinoza a perfect solution to this problem. First,

"in the extension there is no other *modification* than *motion* or *rest* [...]. So the human body is only a certain proportion of motion and rest" (KV A, 14). "*So, the objective essence of this real proportion that is in the thinking attribute is (we can say) the mind of the body.* And when one of these two modifications (motion or rest) varies more or less, also the idea varies proportionally" (KV A, 15). "And when the external causes, which produce these changes, differentiate themselves, and do not have all the same effects, it follows the difference of sensation" (KV A, 16).

In other words, perception, sensation and feeling are the ideas in the thinking attribute (the mind) produced by changes in the state of the extensional attribute (the body), but here, "produced" is not meant in causal sense, because mind and body is the same thing; when external or internal causes modify the body, the idea is changed.

Of course, it would be at least utopic to try to find in Spinoza several key concepts of Gestalt psychology, from the concept of field to self-organization, and so on, but there is an important point in Gestalt theorizing, in Köhler's version that parallels surprisingly with Spinoza's doctrine: the relationship between mind and nature, with the discussion of the meaning of the evolution in psychological context.

Köhler (1938, 1950, 1960, 1971; see also Henle 1993) was highly interested in settling the position of the psychology of Gestalt in reference to the doctrine of evolution. The solution that he gave was original, and at odd respect to the usual solutions of the other psychological schools. In this case, as in many other cases, one may say that Gestalt psychology escaped from a traditional antinomy, the one between anti-evolutionism and pro-evolutionism.

Indeed, Köhler (for instance 1950, 289 f) was opposed to the *principle of change*, or *development*, characterising evolution, a *postulate of invariance*, characterising actions of the physical world. Both are valid: the Vitalists can only maintain that the physical laws do not work in living bodies, but nobody can at the same time deny that the time has produced significant changes in living organisms; that strong differentiations *emerge* during the evolution. Now, how can one reconcile

invariance and change? Köhler's solution takes into account the concept of *constraint*, given conditions which exclude certain possibilities of action: the physical laws act invariantly in the living bodies, but the constraints change with the evolution.

Notice that the constraints act also (and always) in the purely physical systems. "If a gas is surrounded by the firm walls of a container, the walls are constraints [...] thus the gas cannot expand as it would otherwise do" (1950, 291). For living systems, we can say that

"while the general postulate of invariance in evolution claims that no essentially new kind of action appears [...] it imposes no limits upon the constraints which may develop when certain inanimate systems assume the characteristics of organisms, and when the various species acquire their distinguishing traits" (ibidem, 291).

Note that

"we cannot accept the statement that the explanation of all unlearned perceptual facts has to be given in terms of histological conditions [...]. It is only another form of the same mistake if all unlearned functions are attributed to achievements in evolution" (ibidem, 293-294).

Instead, we must ask to what degree the constraints are imposed on the human brain. Now, it is clear that the invariant principles are for Köhler those that are at the basis mainly of the field effects and of the self-organisation of the physical phenomena in the brain. The perfect parallelism that we can find at the level of the directly accessible world is what is called isomorphism.

The principle of isomorphism itself represents a precise support to the theory of evolution. As Köhler (1938, 396, Köhler's *italics*) puts it,

"The principle of evolution postulates that certain processes of which the organism is capable have the structural characteristics of mental operations. If there are any such processes, they must obviously be the neural correlates of these operations. Thus mental operations and their neural counterparts must structurally resemble each other. In other words, *the principle of psychophysical isomorphism follows from the principle of evolution*. Isomorphism represents, indeed, the only way in which mental life can be dynamically interpreted, in which it can become a subject-matter of physics. In this sense we attempted a dynamic theory of mental facts when we pointed to certain properties of macroscopic dynamic states which appear as isomorphic with characteristics of mental facts, and which seem likely to be the neural correlates of these mental characteristics: the continuity of the visual field, the segregation of circumscribed entities in this field, the topological relations in phenomenal space, the more "material" relationships between phenomenal objects, and eventually, requiredness."

In my opinion, given the different language and conceptual framework because

of three centuries of distance, we can find a close parallelism in what Spinoza says. Köhler's postulate of invariance is so stated in Spinoza:

“In nature nothing can exist that can oppose itself to his laws, but all acts according his determinate laws to produce determinate effects in a determinate concatenation, from whom follows that the soul, when it conceives something with truth, proceeds to form objectively the same effects” (TIE XVI, n).

The invariance is absolute, and in no circumstance can be changed, neither for God's will: “When the Scriptures say that this or that was made by God or for God's will indeed mean only that it was made according to the laws and the order of the nature” (TTP VI,12).

The postulate of the invariance in Spinoza is clear, but there is also room for the principle of change of constraints. In fact, he says that the laws of the nature cannot change under any circumstances, but somebody can ask: “*how it is possible [...] that in the nature one can see everywhere such a disorder?*” (KV I, 6). Spinoza's answer is clear:

“First, nobody can legitimately affirm that in the nature there is disorder, because nobody knows all the causes of the things, being so able to judge. But such objection bears from this ignorance, to maintaining universal ideas and thinking that particular things must convene to them to be perfect” (KV I, 7).

In other words, it is not true that God does not “care Bucephalus”, but only the horse *in se* (ibidem). Particular things appear different to each other, in disorder, evolving, sometimes fruit of a miraculous intervention of God's will, because the same universal laws act on a series of constraints, making it impossible to see in the world an absolute uniformity. We agree with Tanne in saying that indeed we can consider Spinoza's doctrine in some sense an evolutionary theory (see Tanner 1907).

A last point is worth emphasizing. As Michael Wertheimer (1974) points out, Spinoza was the first to pose the problem of perceptual organisation.

“Saying that a definition is perfect, it must explain the intimate essence of a thing and be able to not design instead its properties. To explain this issue, and neglecting other examples [...], I'll take only the case of an abstract thing that is indifferent how it is defined: The circle. If it is defined as a figure, such that all straight lines drawn from the centre to the circumference are equal, everyone can see that such a definition does not in the last explain the essence of the circle, but solely one of its properties” (TIE, 95).

We can see here an immediate antecedent of von Ehrenfels' Gestalt qualities (1890). Unfortunately for the history of Western culture also this lesson of Spinoza was not understood for at least two centuries. One can wonder if Gestalt psychology could be possible without such an antecedent.

With all this (and several other quotations could be taken in support) I do not want to argue that Spinoza anticipated exactly what Gestalt authors said three centuries later, nor that they were directed inspired by Spinoza. More simply, I think that the influence of Spinoza's doctrine on their way to put the fundamental questions of the psychology was possibly deeper than is usually acknowledged. Such influence was not confined to a generic holism and optimism. In any case, *Gestalttheorie* and Spinozism are highly compatible, and therefore it is worthwhile to reread Gestalt writing in a Spinozian framework. Last, but not least, I think that both these heredities, Spinoza's and Gestalt's, have much yet to say to our present-day psychology.

9. Conclusion

The Berlin school was a revolutionary movement, which broke several well-established habits of thinking and usual philosophical distinctions. In his essay on this school (surely not the worst that appeared on this subject in the thirties, and interesting to witness how the new ideas were accepted in Europe, out of Germany), Paul Guillaume (1937, 200 f.) lists several classical antinomies of the philosophy of mind, showing the impossibility of locating the *Gestalttheorie* on one pole of them. *Gestalttheorie* was neither *spiritualist* nor *materialist*, neither a *metaphysical* nor a *positive philosophy*, neither an *empiricist doctrine* nor a *rationalist* one, neither a *psychology of consciousness* nor a *psychology of behaviour*. Today some of these categories can appear a little out-of-date; but in the first half of the last century these were the touchstones to evaluate a theory.

Similar considerations were made also from inside psychology. So, Henle (1987) shows how it is impossible characterize Gestalt theory, and in particular Wolfgang Köhler, inside some classical dichotomies largely used to characterize psychological theories: nativism v. empirism, mechanism v. vitalism, value v. fact, explaining v. understanding. Interesting enough is the attempt made by Luchins & Luchins (1981) to apply the 18 pairs of contrasting dichotomous terms individuated by Watson (1967, 1971) to characterize the psychological schools: conscious v. unconscious mentalism, contentual objectivism v. subjectivism, determinism v. indeterminism, and so on; they demonstrate the inapplicability of such dichotomies to the categorisation of *Gestalttheorie*. In the preceding section, we have seen how another antinomy, the one between evolutionism and anti-evolutionism, do not apply to this school. As a consequence, as Epstein & Hatfield (1994, 196) note, "the Gestalt position on the mind-body problem and on the place of mind in nature is difficult to characterize.

Of course, as Henle points out (1987, 148), one must not conclude that all dichotomies are false and need to be superseded, but it is not surprising that the Gestalt authors themselves, or their pupils, in some instance have used a lan-

guage burdened with the categories that they wanted to dismiss, so contributing to some misunderstanding.

An example at point could be the problem of the possible causal linkages between the physiological domain and the phenomenological one. We have seen above that Köhler states (1929b, 395) that “the objects of the phenomenal world [...] depend upon processes inside of us, in the central nervous system”. What is the meaning of “depend” here? As Arnheim (1981, 269) points out, “for all of us it was clear that it was impossible to affirm every causal relation between nervous system and consciousness” (“Es war uns allen deutlich, daß jede kausale Beziehung zwischen Nervensystem und Bewußtsein unausdenkbar war”). Nicholas Pastore (1971, 284-285), one of the most careful followers of the Gestalt approach in the U.S.A., writes to explain isomorphism: “The phenomenal facts of organization, the factors of organizations, and so on, represent a description rather than an explanation of the phenomenal field. These must be related to their immediate *cause* in brain processes in order to explain perception” (italics added). Of course, this would imply the possibility of an interaction between the phenomenal and the physiological domains; and/or could induce us to consider the consciousness an epiphenomenon of the nervous activity. On the contrary, Arnheim, in the paper quoted above, stress several times that “the psychical” (*das Seelische*) is “a reflection” (*ein Widerschein*) of what happens in the nervous system, and that “the neurological processes reflect themselves in the phenomenal world” (*die neurologischen Prozesse ihrerseits sich in Phänomenalem widerspiegeln*).

To summarize, I think that we can conclude safely along the following points:

1. The concept of isomorphism constitutes an epistemological break with reference to the preceding forms of psychophysical parallelism;
2. The name is unfortunate: this is not a case of isomorphism in a technical sense;
3. We must restrict the isomorphic domains to phenomenal world and brain processes, beyond the proximal stimulation level;
4. The contents of the phenomenal world cannot be considered in any way to be representations;
5. The isomorphism is between structures, not functions;
6. The doctrine of the isomorphism can be considered a sort of neutral monism, neither a dualism nor a monism, materialistic or idealistic, in a Cartesian sense; it is close to the identity in Feigl's sense;
7. Many points in this doctrine can be traced back to Spinoza, if not Maimonides; however, it is difficult to argue that a direct conscious reference to Spinoza was present in Gestalt authors;
8. Last but not least, many ambiguities that originated errors of interpretation were caused by ambiguities that are present in Gestalt writings.

Different authors gave different meanings to the same idea, and one can find also different treatments of the same problem in the same authors.

Once Köhler (1966, 80), discussing playfully the “symptoms” that could affect the population of the psychologists, wrote:

“One of my major findings is that psychologists are astonishingly liberal in their use of certain words. At one moment a given term is meant to refer to a certain fact, but the very next moment it may be applied to a different fact. One is seldom told which meaning it is supposed to have in a particular situation.”

To be sure, also Gestalt psychologists were not immune from this syndrome.

Summary

The Gestalt concept of isomorphism has been subject to many misinterpretations, which at least in part must be credited to some obscurities in classic Gestaltist writings. One refers to the very name “isomorphism”: why Köhler chose it? Another ambiguity refers to the domains supposed isomorphic: external world, phenomenal world and physiological world. A third ambiguity contrasts the direct experience to the representations. The fourth contrasts structural versus functional isomorphism. The fifth is ontological: why some authors can interpret isomorphism as a dualistic concept? I try to solve all these ambiguities going back to Spinoza, possibly a primary source of inspiration, at least for Wertheimer.

Keywords: Gestalt psychology, isomorphism, soul-body problem.

Zusammenfassung

Das Gestalt-Konzept des Isomorphismus ist Gegenstand zahlreicher Fehlinterpretationen geworden, die zumindest teilweise einigen Unklarheiten in den klassischen gestalttheoretischen Schriften zugeschrieben werden müssen. Eine davon bezieht sich auf den Namen “Isomorphismus”: warum hat Köhler ihn gewählt? Eine weitere Unklarheit bezieht sich auf die Bereiche, die angeblich isomorph sind: Außenwelt, phänomenale Welt und physiologische Welt. Eine dritte Doppeldeutigkeit stellt die direkte Erfahrung den Vorstellungen gegenüber. Die vierte kontrastiert strukturellen versus funktionalen Isomorphismus. Die fünfte ist ontologisch: warum interpretieren manche Autoren Isomorphismus als ein dualistisches Konzept? Im Rahmen des Versuchs, alle diese Unklarheiten aufzulösen, gehe ich zurück zu Spinoza, möglicherweise eine primäre Quelle der Inspiration zumindest für Wertheimer.

Schlüsselwörter: Gestaltpsychologie, Isomorphismus, Leib-Seele-Problem.

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Karl Duncker

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Karl Duncker – 1903 in Leipzig geboren, 1935 aus dem nationalsozialistischen Deutschland in die USA emigriert, wo er 1940 aus dem Leben schied - zählt zu den bedeutendsten Vertretern der Gestaltpsychologie. Sein bekanntestes und wohl auch einflussreichstes Werk ist seine 1935 erschienene „Psychologie des produktiven Denkens“ (Verlag Springer, zweite Auflage 1963), das auch der so genannten „kognitiven Revolution“ in den USA und Europa wesentliche Impulse gab und bis heute die Denkpsychologie anregt.

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