

EXPERIMENTAL PHENOMENOLOGY:
A HISTORICAL PROFILE

I

Those authors who have attempted to trace the evolution of Gestalt theory, or those who have had occasion to examine its origins, are unanimous in indicating an experimental study by Max Wertheimer (1880–1943) as marking its beginnings.¹ The subject-matter and approach of Wertheimer's study had none of the features typical of a manifesto for a new line of thought, such as those displayed, for example, by the article 'Psychology as the Behaviourists View It' published by John B. Watson (1878–1958) just one year later than Wertheimer's and which inaugurated the behaviourist movement.

Instead of setting out an epistemological programme, Wertheimer conducted wide-ranging and complex experimental inquiry into a specific type of apparent motion: stroboscopic movement. This was a phenomenon of which scientists had been aware for almost a century, and it was the basis of perception of cinematographic images. Wertheimer's experiments demolished almost all of scientific psychology's previously-held tenets. Admittedly, he attacked only theories of perception, which were then based on the two pivotal ideas of 'sensation' (the atom or minimum unit of sensory perception) and 'association' (the associative intervention of thought, memory or imagination on the material of the sensations). It is also true, however, that he thus struck at the roots of the general ideas sustained by any form of elementarism or summativism and, indeed, at the methodological assumption – which at the time encompassed almost every area of psychology – that it was possible to break every complex event of human experience down into simple parts without thereby losing what today is called information on its inner laws.

Was this a novel idea? In the 1930s, a number of scholars compared the Gestalt revolution to that accomplished by Einstein in physics. Others, however, and among them the most outstanding historian of psychology, Edwin G. Boring, did not regard it as anything particularly new. Nevertheless, following Wertheimer's study, an extraordinary quantity of empirical research – and an unprecedented amount of experimentation in controlled conditions – converged on his theory. And it was a theory which, in its turn, generated a very large number indeed of new discoveries, mainly in the field of perception but also as regards other cognitive activities and in social psychology. Still

today, Wertheimer's approach has great heuristic potential in psychological research.

In Boring's view, some aspects of Gestalt theory had roots that penetrated deeply into the history of Western culture. Several psychological theories of the nineteenth century had already modelled concepts that resembled those that would subsequently be utilized by the Gestaltists, and Gestalt theory itself comprised a philosophy of knowledge well aware of its philosophical, epistemological and scientific antecedents. Accordingly, it is necessary at the outset to mention certain ideas which, in the history of Western culture, anticipated some of the central notions formulated by the Gestalt movement.

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For the sake of brevity, I shall restrict my discussion to two themes. First I shall examine the whole/part relationship, which plays a crucial role in Gestalt theory both in its studies of perception and in those on memory and thought, and which the Gestaltists also used as an interpretative tool in their numerous experiments conducted in the area of social psychology. The whole possesses inner properties which are no longer apparent in the parts into which it is subsequently broken down, and which cannot be inferred from item-by-item inspection of these parts (the slogan 'The whole is something more than the sum of the parts' inadequately conveys the idea). The whole is not the totality of consciousness but the structure often possessed by specific events in ongoing experience.

Second, I shall discuss the primacy of the phenomenological method in experimental design and in the construction of explanatory models: that is, the Gestaltists' constant appeal to the forms of immediate experience, to the qualitative structure of the events of everyday experience, accompanied by the temporary 'bracketing' of what we know – or believe we know – from the other scientific disciplines or from psychology itself and which might hamper our capacity to conduct ingenuous observation of phenomena.

These are themes already to be found in Plato and Aristotle. In the *Theaetetus* (204 a), Plato poses the question: "Or do you wish to say that also the whole is made up of parts, although it is a single idea and differs from all its parts?" – a question which implies the answer 'no' – after having shown that "the syllable is not the letters, but rather some sort of single idea born from them, with a form unique to itself and different from the letters" (203 o).

In various passages in *Metaphysics*, Aristotle addresses the theme of the inner cohesion of the units of experience, arguing that the strongest unit is characterized by 'continuity'. There may, however, be increasingly weaker units, such as the bundle of wood lashed together with a cord, pieces of wood simply in contact with each other, and so on.

As far as phenomenological evidence is concerned, Plato's endeavour to "save phenomena" is well known, and so too is Aristotle's dictum that "to touch with the hand and describe, this is truth".

Interesting examples of phenomenological analysis and observations on the relationship between the whole and the parts are to be found in Descartes, Malebranche and Condillac, and also in the English empiricists (notably in Locke, who distinguishes sharply between summative aggregates and structures in which the organization of the parts gives rise to a coherent whole) – their programmatic sensism and elementarism notwithstanding. Nicholas Pastore's book *Selective History of Theories of Visual Perception*² provides an excellent account of these matters.

However, the history of the ideas relevant to understanding of Gestalt theory, understood as a twentieth-century scientific and philosophical programme (and, in this sense, still operating in certain cultural areas of Europe, Japan and the United States) began with Kant.

I shall devote the first part of my exposition (until Section 5) to certain aspects of the philosophical thought and specifically psychological theory which, from Kant until the early years of the twentieth century, highlighted the shortcomings of the method which broke facts analytically down into elements – although it was a method that led to numerous advances in the natural sciences (chemistry, for example) – and which instead emphasised the organic character, the objective structurality, of many mental experiences and of the experience itself of the outside world.

The second part of the essay (sections 6 and 7) will examine the foundation of the Gestalt movement, its falsificatory and polemical phase, followed by the open-minded research and theoretical enthusiasm which culminated in the systemization set out in Koffka's *Principles*³.

The third part will conduct a survey of the works which, once the philosophical debate on the foundations of the theory had died away, extended Gestalt principles to broader areas of psychological research, as far indeed as psychopathology and aesthetics.

As said, the most systematic anticipation of Gestalt theory is to be found in Kant. His restoration of the entire problem of knowledge to the realm of phenomena; his theorizing of an organizing function of subjectivity in the constitution of objects (*realitas phaenomenon*) without thereby overly emphasizing the relativity of the particular subjects; and finally – at variance with these premises – his constant assertion of a noumenon lying beyond phenomena to which none of the characteristics constitutive of the world of experience can be attributed without committing a gross theoretical error: all these made Kant one of the philosophers most frequently cited by Gestaltist texts. There is, of course, a fundamental difference between the two positions: the noumenon, or transcendent thing-in-itself, was for certain Gestaltists (Köhler, Metzger) the world treated by physics, while the only interpretation of mathematical physics was, for Kant, the world of phenomena. However, this difference may be not so much a divergence as a semantic shift due to the profound changes that physics has undergone in the last two centuries.

Kant's *oeuvre*, moreover, abounds with extremely subtle phenomenological analyses. By way of example we may take the following: if I observe a house before me, I explore it with acts of observation which follow each other in time and are dislocated in space; if the house were nothing but these sensations, its parts would be phenomenically successive in time. But the house *qua* phenomenon is the object of this exploration; it is simultaneous in its parts, it exists previously to the acts of observation and it is independent of them. This is said not of the house as a thing-in-itself but of the house as a phenomenon-in-itself. The perceptive structure possesses an autonomy pre-established with respect to the observer, and it is extraneous to the flux of momentary sensations. This passage from the *Critique of Pure Reason* already draws a sharp distinction between the phenomenal objects 'encountered' and the momentary properties of the visual field; a distinction which is crucial to understanding of the Gestalt phenomenology of visual perception.

In the *Critique of Judgment*, the whole/part relationship is treated thus: "we may also conceive of an intellect which, not being discursive like ours, but intuitive, moves [...] from intuition of a whole as such to the particular, that is, from the whole to the parts"⁴ Consequently we must admit "the possibility of the parts (according to their nature and their connection) as dependent on a whole [...] so that the representation of a whole contains the principles of the possibility of its form and of the connection thereto of the parts"⁵.

Some lines from this paragraph are quoted by Goethe in a posthumously published philosophical fragment. Goethe was, if one may say so, highly Gestaltist both in his experimental research on colours and in his philosophical-scientific speculations. Although less systematic than Kant, obviously, he was nevertheless an empirical researcher of considerable imagination and talent. The cornerstone of Goethe's epistemology is the immediacy of the outside world as given by perception: "It is not the senses that deceive but the judgment [...] man in himself, insofar as he makes use of his healthy senses, is the greatest and most exact physical instrument that there can be"⁶. Another key idea in Goethe's investigation of chromatic phenomena is that it is extremely difficult to see phenomena in their authentic nature, in their true constitution, because our eyes are clouded by theories, by the abuse of mathematical schematizations, by language itself. A third central component of Goethe's theory is the notion that there is continuity between laboratory research and the world observed in its free state, because it is possible to find ever richer situations starting from simple experiments, and to construct a factual continuum which comprises every level of complexity without omitting the "original phenomenon" (the law identified by means of experiments).

A striking feature of Goethe's theory of colour – although it is one both widely criticised and criticizable – is his insistence that colours are not pure chromatic shades but aspects of material structures endowed, besides chroma, with coarseness or brightness, hardness or softness (a theory which would be later experimentally corroborated by David Katz (1884–1943)): indeed, he

once wrote: “might it not be that colour does not belong to the sight?”⁷ A part of *Farbenlehre* is devoted to study of the expressiveness of colour, which Goethe calls “sensible and moral action”. Although this component of his research was not conducted using experimental method, it is rich with subtle insight, especially as regards the combinations of colours capable of generating impressions and affective states.

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As we know, to Goethe’s detriment is the fact that he waged a tenacious and (in terms of physics) baseless polemic against Newton’s optics. But there was another factor that undoubtedly helped to prevent the philosophical framework of his theory and the fecundity of his empirical findings from entering the mainstream of scientific research in the decades that followed publication of *Farbenlehre* in 1810: this factor was the birth of psychophysics.

In psychology, psychophysics was the exact opposite of the assumption that the unit of analysis – that is, the subject-matter – of scientific inquiry is the complex organizations of experience. Psychophysics was based on the principle that every complex structure of visual, acoustic, tactile, kinesthetic, and so on, experience had to be broken down into its elementary parts or minimal components (a sound, a colour, a weight), and that empirical research began once this decomposition into isolated elements had been accomplished. It was thus possible to have a sensation of sound insulated against the influence of other possible factors, and given that the sound can vary in pitch, timbre and intensity, these three sensory parameters could be applied with great precision to variations – measured by physical instruments – in the frequency, in the spectral make-up of the wave, and in the amplitude of the oscillations of a vibrating body (stimulus). Those wishing to study colours had first to dismantle the ingenious juxtapositions that interested Goethe and to draw a map of all possible variations in each individual colour observed. This map had borders which merged into nothingness because there are stimuli too weak to be noticed, physical impressions on the sense organs incapable of producing sensations. These borders represented the absolute threshold of the perceptible.

If we conceive the world of experience as an infinite collection of sensations, according to the fine description by David Hume, and the surrounding physical world as an infinite galaxy of stimuli, and if moreover we conceive of every sensation as standing in a univocal relation with a specific stimulus and varying in accordance with it, then the study of experience becomes just an analysis of the relations between stimuli and sensations. These relations were formalized in Weber-Fechner’s law, which is the basis of psychophysics. Of course, if this scientific programme was to achieve the results it desired, it had to accept *in toto* the chapter in J. S. Mill’s *Logic* (1843) which recommended the decomposition of complex phenomena into their elements. It was no coincidence that psychophysics was born in the very same years that British philosophy was

codifying the rules of a new associationistic empiricism.

The founders of scientific psychology worked for decades on this programme. The vast corpus of analysis produced by Hermann von Helmholtz⁸ was entirely based on these presuppositions; to the extent that, with impeccable consistency, whenever Helmholtz came across sensations in his experiments which did not fit the straitjacket of psychophysical laws – that is, sensations which could not be explained in terms of stimulation – he accounted for these facts by resorting to an “unconscious judgment” involving an unwitting memory of past experience or tacit forms of mental calculation able to modify sensations and render them more functional to identification of external physical objects.

However, these facts proved to be so numerous that the sensations of psychophysics came to be the exception rather than the rule, and the intervention of the higher faculties, or of Helmholtz’s “unconscious judgment”, was invariably cited in explanation when the segments of sensory experience being considered, like the objects of everyday experience or routinely occurring events, possessed a certain degree of complexity. If an object moved away in space, it was the mind that calculated its motion on the basis of the progressive reduction of its retinal projection; if a white sheet of paper was still white at sunset, it was again the mind that remembered its colour at midday and attributed this colour to the paper; and so on.

The deviant behaviour of complex objects with respect to the dictates of psychophysical laws compelled the theory to set off in a fresh direction; and it was this exigency that guided the efforts of the precursors of Gestalt theory.

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From the 1880s onwards, numerous mainly German authors carried out experimental research in specific areas or conducted thorough revision of their philosophical postulates, or worked on both of these tasks simultaneously. They thus developed a viewpoint (or a range of viewpoints) in sharp contrast with the tenets of psychophysics, and they indeed contemplated recasting the discipline on a more convincing basis.

Not coincidentally, the first of them, Ewald Hering (1834–1918), drew directly on the theory of colours developed by Goethe, who had been the first to attempt a classification of chromatic hues based on the oppositions ‘yellow/blue’, ‘red/green’, etc. Like Goethe, Hering did not attempt to formulate a physical theory of the genesis of colours (following Helmholtz); he instead started from the phenomenon of complementarity, that is, from the fact that prolonged fixation on red generates the after-image of green, and vice versa, and that blue likewise generated yellow, and vice versa, as well as the fact that when set against the background of a small grey field each of these colours induces its complementary colour within it. Hering was also interested in the interactions among chromatic areas and in the chromatic changes brought

about, not by stimuli, but by the perceptive setting of a particular area. His book *Zur Lehre vom Lichtsinne* (1872) describes numerous strictly phenomenological experiments conducted on complex chromatic structures without the use of psychophysical methods. A distinction is proposed between the colour of things and the ambient light which, from a strictly sensationalist point of view, is nonsensical. Moreover, Hering argued in several of his writings that phenomenological inquiry is physiological in nature because the law of a mental state is the law of a physiological process; which was one way of enunciating what W. Köhler would later call the “postulate of isomorphism”.

While Hering was constructing his phenomenological physiology, Franz Brentano (1829–1917) published his book that would be so influential, in various ways, on twentieth-century culture: *Psychologie vom empirischen Standpunkte* (1874). Brentano was not an experimentalist, although he was well versed in the psychophysical literature and in the works of Helmholtz and Wundt. Brentano’s “empirical point of view” was founded on direct observation of phenomena, insofar as they are immediately given in experience and ostensible to other observers. His criticism of psychophysics was based on the fact that sensations do not depend solely on the intensity of the stimulus; they also depend on at least the attitude of the subject and on the context in which they are observed. To ascertain this fact it is not necessary to conduct experiments, since mere observation suffices, bearing in mind that the phenomena of perception are “true in themselves”. Brentano pushed this argument so far as to contend that perceptive facts, and colours especially, are not psychic facts but immediately physical ones to which the consciousness is directed via intentional acts. *Psychophysical measurements are in reality ‘physical-physical’*. The subject-matter of an empirical psychology is intentionality and the act, and the dynamics of this act can be grasped by introspection. He had no misgivings concerning introspective methods because in the act every psychic state is exactly as it appears. Brentano borrowed from Hamilton – who in the mid-years of the century had already advanced a number of interesting phenomenological ideas in British philosophy – the expression “subjectively subjective” in order to describe this aspect of experience *ex parte subjecti*. This sphere comprises, besides sentiments, memories, intentions or will, also sensations; but the object of all of them are the complex things denoted by the term ‘physical phenomena’: “As examples of physical phenomena we may cite: a colour, a shape, a landscape that I see; a chord that I hear; the heat, the cold that I feel; the odour that I smell”. It is the task of phenomenology to identify the border or ‘watershed’ between these two realms. The object does not lie beyond the subject but at its limit.

Even more radical were the views set out by Ernst Mach (1838–1916) in his book *Beiträge zur Analyse der Empfindungen* of 1886 and subsequently developed in *Erkenntnis und Irrtum* (1905). What I have called the ‘watershed’ between the subject and the object becomes the ambit of the only reality amenable to scientific inquiry: the order of the sensations on the basis of which,

by means of two complex networks of logical relations both coupled to this same empirical material (i.e. sensory experience), it is possible to construct physics on the one hand, and psychology on the other. Physics is constructed – and this is the relatively easier task – by positing systems of relations among sensations which empirically manifest themselves independently of the presence of an observer endowed with a body and mental states. Psychology was born as an attempt to take account also of these latter complexes of sensations, which constitute approximately the ‘self’. The ‘self’ does not have substantial reality, nor does it have clearcut boundaries; it is instead constituted moment by moment in the overall field of experience as a special portion of it, an aggregate of sensations endowed with specific relationships with those that form the world of physics. We shall see below the extent to which this conception of the self was absorbed into the theory of the Gestalt.

To be sure, Mach was the originator of the concept of ‘structure’ (although this term was not part of his normal vocabulary) in the sense with which it came to play a fundamental role in the Gestaltists’ system. Chapter 6 of *Analyse* examines two cases decisive in the formulation of this concept. Consider a letter of the alphabet drawn in black on a white background, and the same letter drawn in white on a black background (but the letter could equally be blue on a red background, green on a yellow background, and so on). The identity of the form is immediately recognized, even though all the colour sensations have changed. The form is independent of the matter of the local sensations; it is a structure, precisely, although Mach calls it a ‘sensation of space’. Take these two shapes:



These are geometrically congruent but optically entirely different shapes. The first is a square, the second is what later authors called a ‘diamantoid’. The abstract geometric relations are the same in the two cases, but the structure changes with variation in the concrete relations (optical, physiological) between the figure and the surrounding space. Two different distributions of sensations may have the same structure; and two similar distributions of sensations may have different structures. The structure, therefore, is something independent of sensations. Although Mach treats it as a special case of sensation, the theoretical leap has been made: terminology apart, there are objects of the vision which are not reducible to sensations as the psychophysicists defined them.

In Chapter 10, Mach states that sensations are so closely interwoven in the complex objects of direct experience that only by intentional analytical effort can we separate them and consider them in themselves. But the analysis of music that Mach conducts in Chapter 13 gives concrete demonstration that this analytical effort is constrained by very narrow limits: it is the structure, that is to say the system of relations, which governs the parts.

A brief digression is necessary at this point. A history of the theoretical antecedents of Gestalt psychology should contain a chapter devoted to the development of musical theory, especially in the eighteenth-century treatises. The progressive codification of the rules of composition, and of contrapuntal composition especially, led musicians to the discovery of numerous laws of the structuring of sound material; laws based on the shared and unmentioned (because obvious) assumption that the 'whole' has properties which are not present in the 'parts', the individual sounds.

The vertical structures of sounds – that is, of chords – plainly possess perceptive and expressive properties which are not present in the notes that form them; and every note, while remaining materially the same, changes function as the notes of the chord to which it belongs change. As the succession of chords proceeds horizontally, it must be constructed according to the principle of the 'good conduct of the parts', which enables the individual voices to be kept separate. This 'good conduct' is based on the Gestalt law of 'proximity', which we shall meet later when discussing Wertheimer. All the most significant psychologists in the Gestalt school were, moreover, good or excellent musicians who were genuinely interested in musical theory.

Returning to Mach: he demonstrated the existence of a sensation of equality of rhythm with the same technique that he had used previously in analysis of visual shapes: the presentation of two sequences of entirely different notes but possessing the same rhythmic structure. It is therefore not sound sensations that constitute rhythm. Similar considerations concerning simultaneous combinations of sounds enabled Mach to enunciate what later became better known as the 'von Ehrenfels principle': a melody is the same melody if it is executed starting from any note but respecting the order of the intervals and the duration of the sounds. The example is absolutely decisive and it falsifies *a priori* any attempt to relate the properties of the whole to the qualities of the elements into which it can be analysed. In fact, the same melody can be executed – and be recognized as the same melody – in two different tonalities chosen so that no note present in the first appears in the second.

A wide-ranging discussion of these sensation-independent forms – which starts from the case of the transposability of melodies – was conducted in 1890 by Christian von Ehrenfels (1859–1932) in his essay 'Über Gestaltqualitäten' (1890), which gave currency to the term 'Gestalt' in scientific psychology. Von Ehrenfels work was substantially a logical analysis of facts such as those used by Mach which distinguished between sensory ingredients (*Fundamente, Grundlagen*) and the qualities of the whole irreducible to them (*Gestalten*), the

latter being classified into temporal structures (for example, melodies) and non-temporal ones (for example, chords or patterns). Von Ehrenfels's essay opened the way for the distinction between structures in the strict sense and expressive properties founded on structures, while it chided Mach for continuing to call such complex objects 'sensations'.

Von Ehrenfels was a pupil of Alexius Meinong (1853–1920) at Graz. Meinong developed the topic of the formal qualities in two important works: *Zur Psychologie der Komplexionen und Relationen* (1891) and *Über Gegenstände höherer Ordnung und deren Verhältnis zur inneren Wahrnehmung* (1899). Experience consists of *inferiora* and *superiora*, founding objects and founded objects – that is, sensations and structures. The latter are tied to the former by logical necessity, in the sense that they cannot exist without their relative *inferiora*. Accordingly, in Meinong's view, the whole depends on the parts; but it should be added that the joint presence of the *inferiora* in consciousness is not sufficient to give rise to *superiora*; there must simultaneously be a consciousness of their joint presence. Meinong did not accept von Ehrenfels's thesis of the sensory nature of complex forms: relations subsist, sensations exist. However, they both appear in full simultaneity and concreteness. This point becomes clearer if one bears in mind that Meinong's aim was to construct a theory of all the objects that can be experienced and thought, both real and unreal, possible and impossible, and all of them hierarchized by foundational relationships. In some way the formal qualities, based on sensations, are the first step towards ideas. Meinong developed this theory between 1904 and 1910, the year in which *Gegenstandstheorie* was published.

The superior intervention of the subject who organizes the material of the senses into higher-order objects, and thereby contaminates the sensations of ideality, was investigated empirically by Vittorio Benussi (1878–1927) and Stephan Witasek (1870–1915). Benussi sought to define the act of production which generates what he called the "a-sensory" (*aussinnliche*) structure founded on the *inferiora* by studying configurations in which a change in the observer's stance modifies the organization of the parts. Of course, this does not happen in melodies, but it may occur in certain cases of structural ambiguities, in the subjective grouping of dots, and even in the reduction of the intensity of certain optical illusions through practice, although Witasek, using very simple melodies, tried to demonstrate their non-sensory nature.

Between 1883 and 1890 two volumes of Carl Stumpf's (1848–1936) *Tonpsychologie* (1883; 1890) were published. A pupil of Brentano and Lotze, Stumpf had already made his mark with an essay in which he argued that extension and colour are properties intrinsic to the perceptive system and able to organize themselves independently of experience. He was an accomplished musician, and it was on musical grounds that he launched an forthright attack against classical psychophysics. He derived a rigorous and productive phenomenological framework from Brentano which enabled him to replace the fragile physicalist theory developed by Helmholtz to explain the consonance and

dissonance between musical notes. Stumpf's crucial discovery was that people without musical educations, and therefore not trained in the analysis of sounds, hear pairs of consonant notes presented together as if they were one single sound, whereas on listening to dissonant chords they are entirely aware that the simultaneously present sounds are two in number. It is very difficult for an octave to be recognized as two simultaneous sounds, and a fifth or a fourth is often taken to be a single sound. But a seventh or a second is readily apprehended as an aggregate of two notes, while a third – in Stumpf's statistics – occupies an intermediate position. The explanation of consonance thus shifts from a physical cause (the beats for Helmholtz) to a phenomenological condition (the 'fusion' or indiscernability of sounds tied by numerically simple frequency relationships).

The influence of Brentano's teaching is certainly apparent in Stumpf's musical psychology, but it is strikingly evident in his two works published in 1907, *Erscheinungen und psychische Funktionen* (1907) and *Zur Einteilung der Wissenschaften* (1907), which addressed themes drawn from Brentano under almost identical titles. The objects of psychology are psychic functions analysed introspectively, but psychology has its necessary propaedeutic in phenomenology – a science no more psychological than physical – whose subject-matter is the world of the things of immediate experience, the condition and outcome of the aggregative functions. Stumpf placed great emphasis on the independence of the properly psychic functions from phenomenal objects by citing cases of empirical evidence in which the function changes without the phenomenon undergoing alterations, or the phenomenon changes without involving the function. The independence of the external world from the subject accordingly finds its phenomenological foundation.

5

The first years of the twentieth century saw publication of the *Logische Untersuchungen* (1900–01) by Edmund Husserl (1859–1938).

The work was dedicated to Carl Stumpf, and one of the authors cited in it was Brentano, under whom Husserl had studied. Husserl's aim in the *Logische Untersuchungen* was to give an anti-psychologistic foundation of logic and the theory of knowledge. It should therefore fall outside the line of historical development from Locke to Gestalt theory expounded here. However, experimental psychology in general is anti-psychologistic, although Husserl himself was largely unaware of the fact.

Husserl tended to identify psychology with the theories of Wundt, who, after setting up the first laboratory of psychology, dominated the academic scene of the time. Following J. S. Mill, Wundt recommended the breakdown of every experience into elementary sensations or, more broadly, "mental elements". Husserl's notion of 'psychologism' may be applied directly only to this manner of proceeding. It should be borne in mind, however, that much of European

and American psychology at the turn of the century was of Wundtian derivation. Husserl therefore had a very broad target to attack.

It is impossible here to dwell at length on the analyses of the structure of experience that abound in the *Logische Untersuchungen*. Already in *Philosophie der Arithmetik* (1891), Husserl had based the apprehension of multiplicity on a concept similar to that of *Gestaltqualität* formulated by Mach and von Ehrenfels. In a commentary on Stumpf in *Logische Untersuchungen*, he analysed the functional dependency among the qualities constitutive of an object as evidenced, for example, by the fact that the colour of an object may change with its shape, or the timbre of a sound with variation in its intensity, although cases might arise in which this dependency did not occur. The entire work is traversed by a covert discussion with Stumpf and Brentano that surfaces in the appendix to the second volume: whether or not we call the objects of the intentional acts ‘physical’, they have the same evidence that Brentano attributed to our inner states. Thus: “inner perception and outer perception, to the extent that these terms are used in their natural sense, have exactly the same character from the gnoseological point of view”,⁹ and “I perceive that anguish squeezes my throat, a tooth causes me pain, sorrow torments my heart in the same sense that I perceive that the wind shakes the trees or that this box is square and is dark in colour”.¹⁰ Husserl’s subsequent works – although they seem to have exerted very little influence on the Gestaltists’ theoretical work – are extremely rich in observations that might belong to a scientific and experimental psychology inspired by Wertheimer, although Husserl’s prose style grew increasingly impenetrable, and the philosophical implications of his new language tended more towards a noumenology than towards an empirically verifiable phenomenology.

It is worth pointing out that a phenomenology of immediate experience was also outlined by Charles Sanders Peirce (1839–1914) in numerous notes written between 1895 and 1910. Peirce repeatedly recommended that logical constructs or natural prejudices should not rely on the observation of objects. His *phaneron* was the “complete set of everything that is in some way and in some sense present to the mind, irrespectively of whether it corresponds to some reality or not”,¹¹ but mention of the word ‘mind’ does not imply any form of mentalism, despite the fact that it normally carries “a psychological connotation which I intend carefully to exclude”.¹² Phenomenology, according to Peirce, “examines direct experience by combining the minutest accuracy with the most broad generalization” and it pits itself “against the reasoning according to which facts *should* be such and such”, because its task is the “simple and honest observation of appearance”.¹³

Although Peirce’s theories were not taken up, in those same years – that is, the first decade of this century – numerous scholars more or less consciously adopted phenomenological methods in their inquiries into perception and thought processes: most notably Georg Elias Müller and Freidrich Schumann, who identified the problem of unity in the visual field and indicated spatial

proximity as an organizing factor (besides proximity, Müller listed similarity, e.g. identity of colour, and continuity of direction, which we shall meet later when discussing Wertheimer). David Katz resumed one of Goethe's favourite themes and conducted numerous experiments to demonstrate that colours have various modes of appearance:¹⁴ for example the epiphanic colours, which are perceived as surfaces; the diaphanic colours, which appear penetrable to the gaze (fog); the volumetric colours (a turbid liquid), which are perceived as properties internal to the substance of a three-dimensional body; colours which admit to transparency; and so on. These are phenomenological structures which cannot be explained in terms of the physical properties of the light that strikes the eyes – which is subject to only three variables (frequency, amplitude and spectral composition) – but only in terms of the context in which a given colour is present.

At Würzburg, throughout the whole of the first decade of the century, under the supervision of Oswald Külpe (1862–1915) and later Karl Bühler (1879–1963) numerous researchers conducted phenomenological analysis of thought processes which took the form of controlled introspection.

The method – which consisted in the minute description of events occurring in the mind some instances before the subject answered a detailed question, or solved a simple logical problem – was fiercely criticised by Wundt as non-scientific. Nevertheless, replication of these experiments in the conditions described by the original researchers yields very similar results, showing that it is indeed possible to observe thought in its act of genesis and development, and to capture its emotive concomitants (uncertainty, stress, sudden lapses), as well as, sometimes, the images that accompany it (although, according to the Würzburg school, these do not perform an important role). Moreover, the fundamentally important work on thought that Wertheimer wrote some decades later invited its readers to perform the same sort of experiment in order to test the reliability of his theory empirically.

6

The essay that Wertheimer published in 1912, and which I mentioned at the outset, is not only an exhaustive account of the conditions and forms of stroboscopic movement, it is also the text which from an epistemological point of view inaugurated the first phase of Gestalt theory, which I shall call 'falsificatory'. In 1910 Wertheimer met Wolfgang Köhler (1887–1967) and Kurt Koffka (1886–1941) at Schumann's laboratory in Frankfurt: Köhler had been a pupil of Stumpf, while Koffka was from Würzburg. They were the first to see Wertheimer's experiments and to act as his experimental subjects. From their discussions was born the theoretical framework of Gestalt psychology. Enthusiasm for the new theory inevitably bred controversy, and falsificationism was the epistemological guise assumed by the polemic. One year after publication of Wertheimer's research Köhler's theoretical work *Über unbe-*

merkte Empfindungen und Urteilstauschungen (1913) appeared as the first explicit and rigorous theorization of the principle of falsifiability.

Wertheimer's main observations can be summarized as follows: if two lights are projected onto a screen, with a short distance between them, with a temporal interval of varying magnitude between the moment when the first light is switched off (*a*) and the second is switched on (*b*), we may see different things: if the interval of darkness is less than 30 msec we see the two lights as switching on and off almost simultaneously; if the interval is longer than approximately 60 msec, we see a single light moving from one position to the other, like an object travelling along a highly visible path; if the interval is extended even further, we again perceive two distinct lights, each of them briefly moving towards the position of the other. But with any further extension of the time interval, *a* and *b* alternately occupy each other's positions, while movement in the pure state occurs between them: a movement without an object in motion, the clear and distinct perception of motion in itself, what Wertheimer called movement ϕ . Only when the time interval is longer than 200 msec, or more, will *a* and *b* appear consecutively in their positions, with no trace of motion in the space between them. Thus, merely by adjusting the time interval, we obtain two facts which are phenomenologically irrefutable ("*esse est percipi*" taught the Brentano-Stumpf-Husserl tradition, with the external support of Peirce) and of exceptional theoretical importance: two objects in a *static* position become *one* object in *movement*; and the movement may detach itself from the object and present itself as pure phenomenon. It is extremely difficult to go beyond a phenomenon such as this in search of the elementary sensations of which it is constituted. The movement is *a primum* non-analysable, and it may provide the point of departure for analysis of further problems.

Movement in perception is an axiom to be posited in order to yield further logical developments. But the psychology of sensations had contended that stroboscopic movement is seen because the subject unwittingly moves his or her eyes from one spot to another when light *a* is switched off and light *b* appears. Wertheimer placed *a* to the right and *b* to the left, but just below them *a'* to the left and *b'* to the right, and then switched the lights simultaneously on and off. Thus, while *a* moved towards the right, *a'* moved towards the left; but the eye cannot move in two directions at once. Therefore the thesis was false.

The psychology of sensations had also claimed that stroboscopic movement was not really seen; it was thought, or imagined so vividly that it seemed almost real. Wertheimer arranged for an optimal stroboscopic movement (with 60 msec of interval) to be projected over the real movement of a light source. The apparent movement was more real than the real one. The phenomenological method thus confounded the most profoundly-held tenets of the doctrine of the sensations.

When Wertheimer's essay was published, Kohler was at work on his article on the unnoticed sensations and errors of judgment. The article waged a

somewhat acrimonious polemic against his master Stumpf and whatever of the sensationalistic his theory of perception still preserved. The current interpretation of perceptive facts, Köhler argued, ran as follows: the physical stimuli that affect the peripheral sense organs generate sensations which vary with the stimulus according to psychophysical laws: as soon as the sensations are formed (and before they are felt; that is, before they become true sensations), judgments in the unconscious sphere of the mind re-order them and transform them in accordance with what we know of the outside world, or in accordance with certain “schemes of calculation” (Helmholtz). This operation of the unconscious judgments on the unnoticed sensations means that we see true objects before us, rather than patches of colour; but a certain inertia or blindness of the mechanisms of judgment means that we also see deceptive things like optical illusions.

Köhler’s arguments against this thesis ran as follows:

- (a) To be sure, there exist examples of sensations connected univocally to stimuli, and they vary with variations in them. These examples are constructed in the laboratory so that every action on sensations not reducible to variation in the stimuli is rigorously excluded. By restricting the field of facts to experiments of this kind the psychophysical hypothesis of the constancy of the stimulus/sensation ratio can never be refuted.
- (b) Let us take a case in which matters do not add up from a psychophysical point of view: an optical illusion in which two psychophysical lengths appear to be different. With effort and a great deal of practice we may finally see them as equal – that is, ‘as they really are’ – except that when our effort ceases they revert to what they were before. Why do we not say, at this second moment, that we see them ‘as they really are’? Because from the beginning we have accepted the hypothesis of stimulus/sensation constancy as a general theory of the sensations.
- (c) When we encounter cases which contradict the hypothesis of this constancy, we say that they stem from an ‘illusion due to the judgment’. But this explanation is advanced only when the constancy hypothesis is contradicted by the facts; and moreover we are by no means aware of having this judgment in mind. An effectively thought judgment able to modify the sensations would offer at least a foothold for research, but unconscious judgment cannot give it any concrete indications.

The conclusions are evident and immediate: the classical theory of the sensations-perceptions is not falsifiable. There is no fact, not even an entirely imaginary one, that it cannot explain. In every imaginable case, indeed, either the perception matches the stimulus and the explanation is psychophysical, or the perception is at variance with the stimulus and the auxiliary hypothesis of

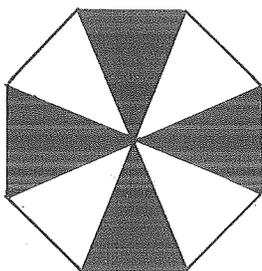
the unconscious judgment intervenes. "The auxiliary hypotheses, precisely because of their logical nature, bury faith in observation: specifically, faith in the facts that are the object of psychology, and the pleasure of observation, the taste for progress".¹⁵

In this way the new phenomenology no longer took the form of the descriptive recognition of immediacy (Brentano, Stumpf) but of recognition of the facts of direct experience which by virtue of their structure falsify general theses and explanations comprising mechanisms irreducible to experience itself. For a theory to be true it must foresee which facts should not come about. That is to say, it is not a theory if it explains every possible and imaginable fact. Only in 1934 would Karl Popper write that "an empirical system should be confutable by experience",¹⁶ thereby familiarizing philosophers by compelling analysis with this basic principle of scientific inquiry.

If viewed in the light of Köhler's epistemological proposal, Wertheimer's study of apparent movement marked the beginning of a new experimental psychology. The dismantling of theories by citing facts incompatible with whatever can be deduced from them became the preeminent style of researchers with Gestaltist training.

In the same years, moreover, and outside the Wertheimer-Köhler-Koffka group, Edgar Rubin working in Göttingen discovered the first phenomenological laws of the figure/background, articulation. The perceptive field is made up of objects detached from their background because of the shape of chromatically differentiated areas, not because of the individual sensations of colour into which the field can be decomposed. The entire organization of experience rests on this structure.

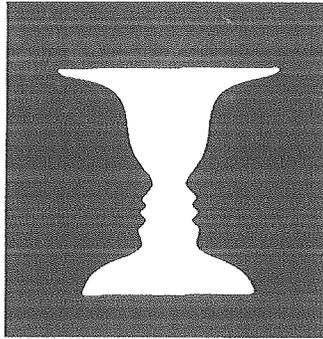
If a loop is drawn on a homogeneous surface, one sees that the area within the loop has a visibly different character from the area lying outside it: its colour and grain make it a 'thing' (*Dingcharakter*), while the remaining area does not stop at its boundaries but passes behind it. If a piece of paper is divided into two equal parts, one black and one white, with a straight border between them, it appears to be the juxtaposition of two surfaces. But if the border is curved to make, for example, the white part convex, it becomes a figure against a black background. In a figure like the following:



it is possible to see a black cross with horizontal and vertical arms, or a white cross set at 45°. Prolonged fixation on the figure enables the eye to pass from one perceptive pattern to the other. In this passage, all the roles of the parts are reversed. Whereas at first the black cross was figure, with the white between its arms as the background which also extended behind the cross, and the character of 'thing' concentrated in the black areas, now it is the black that appears as background and the white becomes more compact.

At the moment of the inversion, the margins dividing the white from the black change their function. They at first limit the black, leaving the white free to expand behind the cross; then they limit the white, with a black octagon lying behind. Therefore, where there are figures, the margins perform a unilateral function.

The shift in the unilateral function may give rise to different figures, as in the following example:



All this happens while the sensations – defined as the close correlates of the stimulus – remain the same. Indeed, the concept of sensation has no role to play in this analysis.

Moreover, the figures are remembered more readily than the backgrounds, and they arouse richer associations of ideas.

These results were published in 1915 in Danish, in 1921 in German, in a book entitled *Visuell wahrgenommene Figuren*.

In the year 1915, Köhler was living in Tenerife, where he had been trapped by the outbreak of the First World War. During this period he devoted himself to the study of intelligence in anthropoid apes. In his work with chimpanzees he conducted lengthy analysis of their behaviour in learning and problem-solving situations. Although the chimpanzees were caged, their movements were unimpeded (the animals were therefore not confined by laboratory equipment which restrained them according to the researcher's experimental design), and the problems set them involved various ways of obtaining a banana. In these conditions the animals revealed themselves to be highly ingenious. They were able to pile boxes on top of each other when the banana was hanging from the

roof, or to find a thread tied to a banana outside the cage but with one end just inside it, or to fit two sticks together and make a longer one when the banana was too far away to be reached with only one stick.

But the real theme of the inquiry was the following: already evidenced by animal behaviour is the fact that the solution to a problem consists in the improvised restructuring of the individual parts of the perceptive field. Thought has something in common with perception. Just as the eye suddenly sees the two profiles in the above illustration after first having seen the goblet, so in representation of the objects present in the surrounding field the intuition may abruptly arise of the relationship between the two short sticks which can be made into long one, on the one hand, and the goal to be achieved on the other. Even more so when solving the problem is made easier by arranging the sticks in line, thereby perceptively prompting the subject to fit them together.

The act of grasping the relations among facts and thus solving the problem was called *Einsicht* – ‘insight’ (intuition, restructuring act) in English – and it became the cornerstone of Gestalt psychology of thought. This body of research was published in 1917 under the title *The Mentality of Apes*. In that same year, Wertheimer was probably already making notes for a study of the psychology of logic, in which the notion of insight was to throw new light on the problem of syllogistic proof. He had in fact promised the study for Stumpf’s seventieth birthday. Although from a formal point of view the syllogism is a concealed deduction, as J. S. Mill had pointed out, there are cases in which the conclusion takes the form of a discovery – that is, cases in which the restructuring of the meaning of the premises produces the ‘insight’ of the conclusion, the evidence for its necessity.

The years of First World War, the period in which the foundations of Gestalt theory were laid, saw another theoretical contribution of major importance: Koffka’s polemic against Benussi, and in general against the Graz school. The aim of Koffka’s arguments was to demolish the idea of ‘production’ which, as we have seen, took the elements of sensory origin (sensations) and shaped them into experiences of a-sensory origin, true Gestalten, structures in which the whole is more than the sum of the parts. Koffka’s clarification – which is a model of the logical analysis of a theory – gave a new and definitive form to the Gestaltist idea of Gestalten. These do not arise from a combination of sense data, since they exist as objects of immediate experience from the outset. Hence the problem of their genesis is a false problem. Nor does the question of their correspondence or non-correspondence with the stimulus arise: given a constellation of stimuli, the structure of the object emerges just as it is, without being mediated by the sensations. The sensations of the psychophysics laboratories are simply what is obtained by decomposing the object. And it is this that should form the basis of a new physiology of the brain.

These theoretical assumptions gave rise to a substantial body of empirical research conducted both by the three founders of the school and by the various researchers who joined them.

Thus 1921 saw publication of the first fascicle of *Psychologische Forschung* (Psychological Research), a journal which gathered and published the research and debate generated by the new theory.

7

During the life of *Psychologische Forschung*, which ceased publication in 1938 as a result of Nazi persecution, Gestalt psychology extended the bounds of its inquiry beyond the phenomenology of perception to encompass the problems of thought, memory, emotional dynamics, social psychology and even psychopathology.

However, before considering these matters, mention should be made of an essay on natural philosophy which Köhler published in 1920. Entitled *Die Physische Gestalten in Ruhe und im stationären Zustand*, this essay won Köhler appointment to the professorial chair vacated by Stumpf. His discussion centred on the properties of suitably selected physical systems, and on their theoretical applicability in interpretation of certain classes of perceptive facts. The dynamic self-distribution of electrical charges on a semi-conductor, and more in general the properties of electrical and magnetic fields, illustrate in physics the peculiarities of the perceptive forms that Koffka had demonstrated to Benussi: once the appropriate conditions obtain, the structure is instantly realized, and it is the whole of this structure that determines the local properties of the field. If from a semiconductor of a particular shape, and with a certain distribution of electrostatic charges on its surface, some of these charges are eliminated, those that remain redistribute themselves immediately and re-establish the overall pattern of the field.

Besides these examples, Köhler lists numerous others taken from the mechanics of liquids and rigid bodies. Different physical patterns can be placed in relationship to the same perceptive structure. The permanence of a stable configuration in the visual and auditory field can be likened to the behaviour of an isolated physical system in stable equilibrium, but also to a stationary system in which a dynamic process takes place continuously over time (like the constant flow of a liquid in a cylindrical tube); or to an oscillating stationary process in which the dynamic properties of the system recur cyclically over time (like vibrating chords or pendulums).

The relationship between figure and background, for example, can be interpreted as a surge of potential in a homogeneous conductor. Assuming the region of the conductor, which here represents the *figure* (in Rubin's sense), to be considerably smaller than that of the *background*, there will be an average density of energy internally to the region of the figure that is proportionally greater than the energy distributed across the remaining region. In fact, the same quantity of energy is concentrated into a smaller space in the *figure*. It is not difficult, writes Köhler, to set this fact in relation to the salience possessed phenomenologically by the *figure* with respect to the background.

As his discussion proceeds, Köhler devotes four pages¹⁷ to an attack on universal interactionism. This attack should be mentioned because it rests on an entirely distorted interpretation of Gestalt theory.

A straightforward philosophical adjustment to the arguments set out so far yields the idea that ‘everything depends on everything’ and that, in psychology, only the totality of consciousness is able to explain individual events. From a Gestalt point of view this is an entirely erroneous assumption. The field of experience is made up of a myriad isolated systems, each of which is Gestalt in the sense explained above, but all of of which are independent of all the others, just as “the world of physics is sharply divided into physical systems, to which alone natural laws apply”.¹⁸ If universal interactionism were true, research would be in principle impossible: it would be impossible to control the variables of a phenomenon if the entire universe changed whenever one of them was altered. Experience is made up of definite things, and research investigates finite objects: it is precisely for this reason that it achieves results. With this specification Köhler rejects both the psychologistic holism of Felix Krueger – which is often erroneously cited as an example of Gestaltism – and the thesis of ‘ubiquitous relations’ (omnipresent functional dependencies) propounded by William James.

The appearance of *Psychologische Forschung* coincided with an essay by Koffka on the basic concepts of Gestalt theory¹⁹ aimed at the American scientific community, which was at that time almost entirely dominated by behaviourism. The origins of the theory in Brentano and Stumpf is evident from the outset in Koffka’s definition of the world of perception by negation. The world of perception is not what we represent to ourselves, nor is it what we think of objects, nor is it a content of the imagination; when these psychic activities have been removed, it is the objective residue of direct experience. “When I speak of perception [...] my intention is not to speak of a specific psychic function ... and I wish to use the term ‘perception’ in a sense which excludes any theoretical prejudice”,²⁰ in particular the prejudice that contraposes perceptions to sensations as a more refined product of the mind.

A year later, *Psychologische Forschung* published Wertheimer’s study of the formation of units in the perceptive field.²¹ The figure/background category had already been absorbed into phenomenological inquiry from the researches of Rubin. But on the basis of what cohesion factors do objects, already segregated by the background, aggregate themselves into units? A number of dots against a background are not simply dots; instead they form patterns. They aggregate themselves spontaneously and naturally, although with effort it is possible to see them as connected in different patterns. These latter, however, are short-lived and, as soon as our effort slackens, they yield to the rules of spontaneous aggregation. Consider this simple fact:



This is a 'row' of dots. The distance between them is now altered as follows:



This is a 'row of pairs' of dots. The space visible between one point and the next is the factor that organizes them into units (a pair is in its fashion a unit).

But distance is not the only unifying factor. This can be shown by arranging a certain number of objects at regular intervals, but so that two similar objects stand next to each other, in the following order:

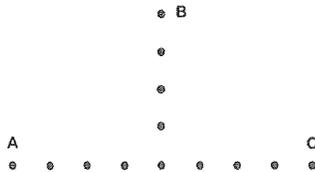


Here too we have a pattern of pairs, but this time it is one based on a relationship of similarity. The observer is able to form his or her own pattern at will when the two factors conflict with each other:

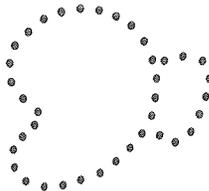


Here we can see either pairs based on proximity or pairs based on similarity. But this subjective structuring by the observer is momentary, for the objective factors are always stronger.

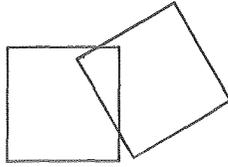
The factor of the continuity of direction prevails over that of proximity. In the following figure all the dots of segment C are more distant from the dots of segment A than those of segment B. And yet A and C form a single line while B maintains its independence.



The factor of closure is even stronger than that of continuity in certain conditions, as shown by this example:

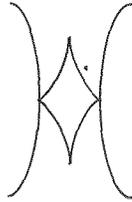


There is also a factor of 'good form'. In the following example we may, in theory, see three enclosed and somehow coordinated areas. Instead, however, we see the overlapping of two squares: two symmetrical objects rather than three irregular polygons.



Past experience may also be influential, albeit relatively rarely, in the organization of perceptive material into units.

For instance, experience of the Roman alphabet greatly helps one to see the letters M and W superimposed in the following pattern, because continuity of direction and closure are factors which prevail over the weak action of past experience:



As already mentioned, some of these factors had been identified years earlier by G. E. Müller, the teacher of Katz and Rubin. However, it was Wertheimer's achievement to realize that the factors of unitary organization (i) have differing force, (ii) can be made to conflict and give rise to weak units, (iii) can be made to act in synergy to produce strong units, and (iv) allow a conceptual distinction to be drawn between the 'natural parts' and the 'arbitrary parts' of a given whole or Gestalt.

Every object of experience can be segmented in scores of different ways. If we make a hole in a piece of black cardboard, we can view the world through it piece by piece just as it, the world, really is. This device and others like it were called 'reduction screens', and they were used to obtain true sensations without interference by the context. But objects in their entirety really possess parts, which are the elements discernable in their constitution, hierarchized in some manner and tied together by relationships which depend on the configuration of the whole. Using only the laws of 'figure/background' configuration and Wertheimer's factors it is possible to explain most of perceptive experience, or in any case to conceive of it in a problematically new manner.

Again in 1922, Freidrich Wulf applied the concept of 'good form' to memory in a series of experiments which demonstrated the mnemonic evolution of less regular patterns into more regular ones. Between 1918 and 1922 Adhamar Gold, Kurt Goldstein and Wilhelm Fuchs tested new ideas in the pathology of the vision, finding that the structural (or Gestaltic) aspects of perceptive phenomena tend to emerge with specific forms in cases of both brain damage and retinal trauma, sometimes with the effect of compensating for the functions lost.

1922 was also the year in which Kurt Lewin (1890–1947) joined the Gestalt school and published a wide-ranging study, from the point of view of the philosophy of science, on the concept of 'genesis' in physics, biology and the theory of evolution which, in certain respects, was apparently an extension of Köhler's theory of physical forms to the biological sphere. Thanks to these contributions (and to a study by Lewin of the concepts of scientific law and experimentation in psychology), Köhler and Lewin came into contact with members of the Berlin neo-positivist circle – officially constituted in 1928 but which had already been in operation for a number of years on the initiative in particular of Hans Reichenbach and Carl Gustav Hempel. They were active members of the circle until it was dissolved in 1933 when the Nazis came to power. In that year Lewin was in America, where he would remain.

Lewin had contributed studies on acoustic perception to *Psychologische Forschung* since 1922. In 1926 the journal published two essays of fundamental importance: 'Vorbemerkungen über seelischen Kräfte und die Struktur der Seele' and 'Vorsatz, Wille und Bedürfnis', two chapters of a single essay on theoretical psychology. Lewin began by developing a theme already treated by Köhler in *Die Physische Gestalten*: the proposition "every thing is connected with every other" is generally false, and it is so in the case of the mind as well. Recognition of this, however, is not prejudicial to a unitary concept of the mind itself. In reality, the mind is a set of more or less independent, and sometimes entirely independent, systems. Not in the sense that the mind comprises diverse and simultaneous psychic faculties, like memory, thought or perception – whose forms of interaction and collaboration should indeed be studied – but in the sense that it is the diverse psychic experiences, in the act in which they originate and in their simultaneity, that constitute autonomous and closely integrated blocks: complex indivisible 'Gestalten', like thinking about the solution to a problem, suddenly remembering something, noticing that it is too hot, realizing that there are books and a picture before our eyes. Two psychological events influence each other if they belong to the same system, but they will not influence each other at all, or only weakly, if they belong to different systems. Should this latter happen, however, it will generate a new system. The unity of the mind is simply the entire field of the coexistence of such systems and of the forces that dynamically regulate them. Performing a coordinated and non-chaotic activity presupposes the independence of systems and the possibility of excluding most of the other psychic tensions simulta-

neously present. In developing this theme, Lewin introduced the concept of tendency towards equilibrium, of vector (the directed thrust which often occurs in locomotion through the environment), and of “boundary among psychic systems”. These conceptual tools made it possible to devise a research programme on the psychology of affective states that was pursued in the following nine years by numerous collaborators. Above all, however, taken together they formed the theoretical basis for a new experimental social psychology which was perhaps the most enduring contribution of Gestalt psychology to the human sciences.

8

Just as the psychic factors (memories, representations, sensations, etc.) disappear in Lewin’s theory to be replaced by the plurality of the systems of experience into which the field of direct experience is segmented, so in a work by Erich von Hornbostel,²² the prejudice of the ‘five senses’ is eliminated, in this case to be replaced by the objects of experience in their complex inter-sensory integration: “movement can be seen, heard, touched”;²³ sounds can be coloured; the same adjective can be used for tactile, visual and acoustic qualities. The five senses are an abstraction; facts are sensorially multi-dimensional. Similar views were expressed in a book by Cesare Musatti.²⁴ By radicalizing some of the theses propounded by the school of Meinong – Musatti had studied with Benussi – he took the world of the objects of experience as his starting point for the conceptual elaboration of various structurings of reality: on the one hand towards the outside, i.e. towards physics and the natural sciences, and on the other towards the interior, i.e. towards phenomenology and psychology. At the basis of a system of fictions lies the ‘objectuality’ of the immediate datum.

In 1929, Köhler published a book²⁵ which imposed some sort of order on the by now broad debate on the principles of Gestalt theory. Experimental research had accumulated in *Psychologische Forschung* and in other more traditional journals, while critical reactions came mainly from American behaviourist circles (Koffka had been appointed to a professorship at Smith College in 1927). Much of European psychology was still working on associationist and Wundtian presuppositions, not without resentment at a certain arrogance that had typified the Gestaltist style from the outset. Köhler’s book is characterized by its highly systematic organization and polemical thrust. It is still the finest exposition of Gestaltism ever written. Köhler begins by showing that there is a close affinity between associationism and behaviourism: in both, the method of empirical inquiry presupposes fragmentation of the situations of experience into their presumed elementary components, which in both theories take the form of simple mechanical relationships: stimulus/sensation, stimulus/response. He then shows that the sphere of reality from which behaviourism draws its ‘facts’ – facts which in his philosophy must be

objective and non-mental, because the mind is private and whatever is private cannot be the subject-matter of science – is the same sphere as that in which phenomenal events occur. If behaviourism were consistent in its rejection of the phenomenal world, it would lose all its empirical data and all the areas in which its measurements are made. Köhler's third step is to show with examples how premature measurement distorts the structure of the facts, which should be taken in their qualitative immediacy because this generates problems – just as happened at the beginning of physics and astronomy, when the most fundamental problems of those sciences arose precisely from the qualitative analysis of phenomena.

Having eliminated the mechanistic interpretation of psychological facts, Köhler proposes a dynamic theory which no longer comprises chains of cause and effect but, instead, conditions which assume various combinations according to the complex phenomenon assumed as the object of inquiry. Experimental analysis of the conditions of the phenomenon (almost always) leads to the discovery that it can be interpreted as a field phenomenon. That is to say, a logic is used which displays close similarities with the logic that describes electromagnetic fields, the gravitational field, and so on. Accordingly, the association itself is a structure and not a simple connection. If we try to memorize a pair of semantically very different words, their mechanical repetition is less help to us than an overall image which incorporates both of them, even if it is somewhat odd (lake/sugar: a sugar cube melting in a lake; railway/elephant: an elephant walking along a railway track).

Of course, the psychophysical relationship plays an important role in the theory. But it is recast in totally new terms. Although there is a space-time of physics, it is not that of phenomenology, that is, of direct experience. We never have direct dealings with the objects of physics, which exist in their own space-time. The objects of physics include that particularly complex system that is the central nervous system. Our every dealing with something is the result of the activity of the brain; therefore the brain is extraneous to every experience. The link between the totality of our experiences and the brain is constituted by the fact that they coincide with *one part* of the brain's activity (which is a physical-chemical and electrical activity) and by the further fact that the form assumed by the laws of our phenomenological experiences is that form assumed by the logic of the concomitant cerebral processes (isomorphism). If, when experimenting on phenomena, we find that a given fact depends on three variables combined in a certain way, then there is a process within the brain – perhaps one of those that Köhler described in *Die Physische Gestalten* (1920) – whose realization depends on at least three conditions, each of which representing, at the level of nervous activity, the variable as manipulated in the ongoing experience. The 'postulate of isomorphism' assumes isomorphism between the logical form of the experiential organization and the logical form of the physical process (biochemical, electrical, etc.) taking place in the central nervous system.

The fact that there are independent systems in experience shows there are independent systems in the brain; the fact that there are functional dependencies in experience shows that there are functional dependencies in the brain. The reality of the functional dependencies that knit the subject and the environment together demonstrate the falsity of the theories derived from Hume's empiricism, for phenomenal causality exists and indeed guides our behaviour as regards the external environment. The 'insight' or immediate intuition of dependency relationships is pre-categorical because it is a given which determines behaviour even before the mind becomes aware of the structure of a situation; but it is also a logical category of explanatory thought imposed on the description of states of affairs.

Memory is based on the understanding of relationships; the problem of other minds can be dealt with by eliminating every metaphysical prejudice and analysing the field of experience in terms of expressiveness: tone of voice, facial or gestural mimicry, the environmental and cognitive context, together constitute the phenomenological conditions of the act of comprehension. Köhler argues that the universe of common sense and natural language contains not only all problems but also many of the productive and rigorous conceptual tools of psychology.

As said, Koffka moved to the United States in 1927. The headlong rush of events combined with racial persecution also forced Wertheimer to New York in 1933. After wavering between Germany and America, Lewin too emigrated to the United States in 1935, followed by Köhler, who took up an appointment at Swarthmore College after he had made his life in Germany unbearable by launching public attacks against the regime. The entire leadership of the Gestalt movement thus found itself in a cultural environment very distant from the tormented theoretical premises in Europe from which they had drawn their problems, ideas and intellectual style. One of Wertheimer and Köhler's pupils, Karl Duncker, certainly one of the most outstanding minds in the school, was unable to cope with such a radical transplant and committed suicide at the age of thirty-seven. Duncker was the author of the study *Zur Psychologie des produktiver Denkens* (1935). Much of his book is devoted to analysis of the thought processes which lead to solution of mathematical problems. Duncker's description of ongoing thought enables him to distinguish between nonsensical errors and productive errors, which are amenable to correction, and to isolate those particular cases of 'insight' which tie the consequences to the premises, both logically and factually. Duncker highlights the affinity that ties the causal relationship to the logical implication, and he identifies the conditions under which thought passes from partial understanding to 'total insight' or evidence. This is therefore analysis of the logical force that gives ineluctability to every salient step in a proof. Duncker himself stresses the continuity of his investigations with the line of thought developed by Hume, Kant, Husserl and Wertheimer.

In 1935 Koffka's great treatise *Principles of Gestalt Psychology* was pub-

lished. The 'Bible' of all the work thus far accomplished by the Gestaltists, this is a book in which Koffka's theoretical discussion and innovative ideas interweave with minute description of a myriad experiments conducted by the Gestaltists and with reinterpretations of experiments in the classical tradition. The first part of the book deals with perception, but an unusually large amount of space is devoted to analysis of the memory, of the self and of action. Central to Koffka's theory is the distinction between the geographical environment and the behavioural environment. The former is the set of properties of the external world describable using the language of physics and the natural sciences; the latter is the phenomenological universe in which the subject operates as s/he moves, reflects, remembers, recognizes, values and constructs sensate knowledge; the universe, that is, in which facts are not simply facts but elements of an overall conceptual organization which confers meaning on its substructures from above (the distinctive feature of *Principles* is its avowedly anti-positivist epistemological stance). However, rather than create a dualism, this distinction is used to sustain a physicalist monism in which the central nervous system performs a role of total mediation, on the one hand identifying itself – in strictest accordance with Köhler's postulate of isomorphism – with a subject's field of experience at a given moment, and, on the other, ensuring interpretation of the macroscopic properties of the surrounding physical world in their biologically important aspects. One of the most interesting features of Koffka's physicalism is his theory of mnesic traces, by which are meant those states of the brain which guarantee our contacts with the past. This is a theory which satisfies the requirements of a physical interpretation of the permanence of states over time simultaneously with those of compatibility with the psychological facts that emerge from studies of the evolution and transformations of memory. Despite the marked unevenness and occasional obscurity of Koffka's treatise, it can nevertheless be regarded as the most outstanding effort to systematize the psychological content of Gestalt philosophy.

Another form of physicalist monism – one perhaps even more influential in America than Koffka's *Principles* – was that developed by Egon Brunswik, an unorthodox Gestaltist who reintroduced sensations into the theory of perception. In a celebrated article written for the *Encyclopaedia of Unified Science*,²⁶ Brunswik envisaged the unification of physics and psychology and proposed a probabilistic interpretation of the laws of perception.

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However, Gestalt theory's most profound influence on American scientific culture was exerted by the work of Kurt Lewin – not so much in the field of general psychology as in the social sciences, especially in microsociology. Lewin's theories had been well known in the United States since the early 1930s. One year after Koffka's *Principles*, he published a book²⁷ in which his project of 1926 was developed into a system. Unfortunately, Lewin's reference to the topology of mathematics is highly debatable, if not downright erroneous.

One should read the book bearing in mind that what Lewin calls topology is in fact a graphic language of his own invention able to represent the experience of a given person at a given moment (or by means of more complex depictions, in several successive instants of a 'story') and articulated into specific relationships with the phenomenally external environment and specific internal states (affective, cognitive, etc.) hierarchized into systems and subsystems. Inner states and external events are represented by areas. These areas are separated by barriers of greater or lesser permeability, and they are connected by vectors which represent forces with varying degrees of intensity. Areas may carry positive or negative valencies which indicate sources of attraction or repulsion.

Koffka's 'environment of behaviour' can be thus represented in a language of its own whose terms can be written so that some sort of calculation can be made. A diagram by Lewin represents the life-space of a person P in an environment A at a given moment. Behaviour (i.e. change in the relations internal to the diagram) is a function of the structure of P and A. Since the field – the state of affairs depicted by the diagram – is always considered in a given instant, it must be conceived as a sort of absolute present, in which the past is the presence of the past in the present (e.g. memories) and the future is the set of projects and possibilities currently imagined, here and now. This principle obliges Lewin to distinguish between historical causality and systematic causality. Every behaviour is subject to systematic causality, that is, the pattern of forces present in the field at a given moment, but the structure of the field can only be explained by the factors that have led events, therefore forces, to assume that particular pattern. Dynamic psychology, especially as social psychology and the psychology of small groups, should therefore be framed as the in-depth analysis of the individual case, and not as the statistical balance-sheet of a collection of cases reduced to quantitative data. The method of psychology should therefore be Galilean, Lewin stressed in a celebrated essay, not Aristotelian and therefore classificatory.

Lewin's theory produced a large quantity of research. Mention should be made in particular of *Psychology and the Social Order* (1936) by John F. Brown, which extended Lewin's topological interpretation to macrosociological and mass phenomena. The Marxist slant of Brown's work prevented it from achieving the success that it warranted, but it contains still extremely topical analysis of power relationships in the liberal democracies, and of fascist and communist dictatorships. In 1940 Brown published another book, *The Psychodynamics of Abnormal Behavior*, in which he applied Lewin's concepts and logic to psychoanalysis, psychopathology and psychiatry with rare skill of systematization.

Of the few Gestaltists who remained in Germany mention should be made of Edwin Rausch and Wolfgang Metzger (1899–1979). Most notable of Rausch's many works is *Über Summativität und Nichtsummativität* (1937), the first mathematical treatise on the concept of Gestalt as a structure which does not result from the sum of its parts. Of Metzger's output worth citing is his book

Psychologie, published in 1941. Just as Koffka's *Principles* had been an encyclopaedia of Gestaltist experimental research prior to 1935, so *Psychologie* was the encyclopaedia of the philosophical problems connected with those researches and theories. Metzger was probably the most Kantian of the Gestaltists: the key chapters in his book are those on the appearance of 'reality' and on causality. Metzger proposed a stratification of various realities in experience, ranging from the inescapable reality of the material objects that populate our life-space to the reality of the imagination, of the void and of nothingness, each of them founded on its own conditions and capable of exerting specific effects. He analysed causality with a wealth of examples taken from everyday experience which, in a sharply anti-Humean conceptualization, he regarded as prefiguring the formal structures of epistemology. Metzger assumed the difficult task of keeping the Gestaltist tradition alive in Hitler's Germany, first at Frankfurt and then, from 1942 onwards, at Münster.

Another important book of 1940 was *Organizing and Memorizing* by George Katona (who had studied with Müller at Göttingen, where he changed from associationism to Gestaltism), in which a series of ingenious experiments showed that, as Aristotle had said, "the memories that come to depend on a principle produce themselves in a readier and more beautiful manner". According to Katona, there are in fact two memories: one for the learning of random items (syllables or telephone numbers) and one, which functions Gestaltically, based on structural understanding of the material (theorems, logical games, connections among facts) and which enables the transfer of what has been learnt to other materials.

The end of the Second World War meant that publication of three outstanding works was now possible: *Productive Thinking* by Wertheimer (posthumously), *La perception de la causalité* by Albert Michotte, and *Phénoménologie de la perception* by Maurice Merleau-Ponty.²⁸

It was Wertheimer's intention that his book should introduce a project for a new logic that took account of the real progress of thought from the problem to its solution via successive restructurings of the cognitive material, and therefore of its logical form. Wertheimer's fundamental category was 'good sense', the ability to see into (in-sight, *ein-sicht*) structures and grasp their inner architecture. It is one thing to find the sum of $1+2+3+4+5+6+7+8+9$ by adding up all the numbers (a blind and necessarily summative procedure to the structure); it is quite another to see – almost visually – that the first number plus the last number in the series makes ten, and that also the second number plus the penultimate one, the third plus the antepenultimate one, and so on, make ten, which is always the double of the central number in the series. Adding up the numbers in this case means taking the central term in the series and multiplying it by the number of terms: the result is immediate and the procedure is elegant. This happens because our eye has 'X-rayed' the logical structure of the problem and seen through to its skeleton. Wertheimer's book contains numerous examples of this kind, all of them discussed in detail.

Michotte's book showed, by means of scores of experiments, that there is a direct perception of mechanical causality and that this obeys laws. The perceptual analysis of a structure (an object A moves until it reaches an object B already present in the field, object B immediately moves in its turn, less rapidly than A but along the same trajectory: what one sees is A striking B and pushing it onwards; from this paradigmatic situation numerous variations, causal and otherwise, can be obtained) reveals that certain elementary concepts of mechanics, like those of 'force', 'impact', 'mass', are already present in perception of the physical environment.

Merleau-Ponty's book sought to achieve a philosophical synthesis between Husserl's later reflections and the theoretical and empirical matters investigated by the Gestaltists, thereby amalgamating two perspectives – after they had followed very different routes – which had shared a great deal in common at the beginning of the century.

The most important works written by Gestaltist psychologists in the 1950s were concerned less with perception than with other areas of psychology. Although a considerable amount of good quality research into visual perception was still being conducted in Germany, Italy, Japan and Sweden (Uppsala), no attempt was made at theoretical innovation and there was no enthusiasm for the daring conceptions that had characterized the decades between the wars. Truly innovative works were written by Fritz Heider on interpersonal relations,²⁹ a book long in gestation which attempted to provide a logical formalization of the sympathy and repulsion relationships between two people who share, or do not, a liking for a particular object; a book by Solomon Asch³⁰ which summarized numerous experiments in social psychology, some of them carried out by Asch himself, designed to illustrate the effects of group pressure on an individual or a minority, or to show that the prestige of the source of a message affects its interpretation; a book by Rudolf Arnheim which applied the knowledge on perception accumulated by the Gestalt psychologists during almost half a century of research to painting and the visual arts, opening new avenues for art criticism and general aesthetics.

The bulky volume by Wolfgang Metzger, *Gesetze des Sehens* (1975), was the last significant work written in the spirit of Wertheimer. Metzger's book was an encyclopaedia on visual perception running to almost seven hundred pages; its first edition of 1936 contained less than two hundred. The theoretical framework remained the same, but experimental research had proliferated during the forty years between the two dates. This state of affairs is perhaps the deep-lying cause of the declining fortunes of Gestalt theory in contemporary psychology.

Since 1979 a new German journal, *Gestalt Psychology*, has reopened debate on the fundamental themes of the Gestalt tradition, attracting the interest of a good number of scholars in Europe and America.

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NOTES

- ¹ Wertheimer 1912.
- ² Pastore 1971.
- ³ Koffka 1935.
- ⁴ Kant 1913, Part Two, II, § 77.
- ⁵ Ibid.
- ⁶ Goethe 1830, *Aphorisms*, 59, 367.
- ⁷ Goethe 1830, *Aphorisms*, 168.
- ⁸ Cf. Helmholtz 1867; 1863.
- ⁹ Husserl 1900–01, 231.
- ¹⁰ Husserl 1900–01, 232.
- ¹¹ Buchler 1956, 75.
- ¹² Buchler 1956, 74–5.
- ¹³ Buchler 1956, 75.
- ¹⁴ Katz 1911.
- ¹⁵ Köhler 1913, 80.
- ¹⁶ Popper 1935.
- ¹⁷ Köhler 1920, 157–60.
- ¹⁸ Köhler 1920, 158.
- ¹⁹ Koffka 1922.
- ²⁰ Koffka 1922, 532.
- ²¹ Wertheimer 1923.
- ²² Von Hornbostel 1925.
- ²³ Von Hornbostel 1925, 82.
- ²⁴ Musatti 1926.
- ²⁵ Kohler 1929.
- ²⁶ Brunswik 1925.
- ²⁷ Lewin 1936.
- ²⁸ Wertheimer 1959; Michotte 1954; Merleau-Ponty 1945.
- ²⁹ Heider 1950.
- ³⁰ Asch 1952.
- ³¹ Arnheim 1954.

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