Gestalt Psychology and Kurt Lewin.[1]

Once in a conversation, the late Karl Lashley, one of the most important psychologists of the time, told me quietly, "Mr. Köhler, the work done by the Gestalt psychologists is surely most interesting. But sometimes I cannot help feeling that you have religion up your sleeves."

Gestalt psychology took its first step...to the opponents this meant, of course, that from now on they were supposed to regard practically every thing in perception as a mystery.

Motivation (which was Kurt Lewin's main interest) I will not discuss because we do not yet know how Lewin's important work is related to Gestalt psychology, the theme of my lectures.

Questions Considered in This Section

1. **Why has Gestalt Psychology been so hard to understand?**
2. **How is Gestalt Psychology closely tied to physics?**
3. **What did the physicist Friedrich Schumann contribute?**
4. **Was Wertheimer attacking a straw man, beating a dead horse?**
5. **What *are* Gestalten?**
6. **What are the criteria for demonstrating Gestalten?**
7. **Why is apparent movement (phi) considered so important?**
8. **How many kinds of apparent movement are there?**
9. **What are "W Phenomena," or movement Gestalten?**

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[1] K|hler, W. (1969). The task of Gestalt Psychology. Princeton, NJ: Princeton University Press, p. 48, 9.

Gestalt psychology began in late 19th-century Germany in opposition to what was perceived as pervasive elementarism in psychology. The original Gestaltists were impressed with physics, not biology, and were perhaps inspired by the writings of the Scottish physicist James Clerk Maxwell.[2] Many writers suggest that Gestalt views were actually absorbed into psychology and that the Gestaltist influence lies in whatever changes this caused in mainstream psychology.[3] I believe this to be absolutely untrue and that Wolfgang Köhler, were he living, would not see much Gestalt influence in current journals. The reader may decide whether this is true after finishing the pages below.

Kurt Lewin is often treated as a Gestaltist, though it is clear that he was no such thing. Gestalt psychologists were basic researchers earnestly attempting to understand the "physics of the mind." Lewin was an energetic applier and a student of topics that are often expressed in newspaper headlines - racial discrimination, industrial productivity, worker morale, and the like. It was he who was responsible for half of the concepts that were used by social psychologists during the second half of the 20th century. He was an interesting and influential character who was not a Gestaltist, but whose work is better placed in a chapter with the Gestaltists than anywhere else.

Gestalt Psychology[4]

> Mach, for instance, asked this question: When a physical system approaches a state of equilibrium or a steady state, why is this change so often characterized by growing regularity, symmetry, and simplicity in the distribution of the material and the forces within the system?
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> For now the Gestalt psychologists discovered that this procedure made them neighbors of the most advanced natural scientists, the physicists. [5]

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[2] See Chapter 9 for a discussion of the contribution of this remarkable scientist to color vision research.

[3] As only one of many examples, Bower & Hilgard, 1981, take this view.

[4] T. G. R. Bower (1982). Development in infancy (2nd ed.). San Francisco: W. H. Freeman, pp. 114-115. Bower is at Edinburgh.

> It thus seems that the Gestalt rules are not all innate; at least one of them, proximity, develops very slowly, while common fate has been shown to be effective at very early ages. [6]

> There were always several features to their writings: an experimental or demonstrational part...then a polemical, almost philosophical part in which the ancient elementarism...was flogged to death; and finally, some relatively incomprehensible field theory...would be advanced.

The last quotation above comes from Gordon Bower,[7] one of the most influential experimental psychologists of the late twentieth century. Clearly, he failed to appreciate Gestalt psychology. But he is not alone - almost no one understands the Gestaltists.[8] Yet, Gestalt psychology seems ever popular. Wolfgang Köhler, last of the original Gestaltists, died in 1967, but the theory is still presented in a variety of textbooks and research papers. Theirs was not only a psychological theory, but a world view and a philosophy of science.[9] Was their message relevant only in the early decades of the twentieth century and has it been absorbed into mainstream psychology?

It has definitely not been absorbed - rather, it has been translated into a form that seems a minor modification of the point of view that they so vigorously combated. They had a real point to make, whether right or wrong, and they failed to

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[5] Köhler, W. (1969). The task of Gestalt Psychology. Princeton, NJ: Princeton University Press, p. 48, 9.

[6] T. G. R. Bower (1982). Development in infancy (2nd ed.). San Francisco: W. H. Freeman, pp. 114-115. Bower is at Edinburgh.

[7] G. H. Bower & E. Hilgard (1981). Theories of learning. Englewood Cliffs, NJ: Prentice Hall, p. 324.

[8] That may include Mary Henle, judging from her chapter in Koch & Leary. She had the exceedingly poor judgment to attempt to show how Gestalt psychology was compatible with the symbolic information processing "cognitive revolution" trend of the 1980s. The rapid demise of information processing lends particular irony and pathos to her chapter. (1985). Points of view in the modern history of psychology. New York: Academic Press.

[9] see Mitchell G. Ash (1985). Gestalt psychology: Origins in Germany and reception in the United States. In Koch & Leary (Eds.) Points of view in the modern history of psychology. New York: Academic Press, pp. 295-344.

make it convincingly, partly because they were wrong on what now seem unessential details and partly because of the tremendous inertia of accepted ways of thinking. As an apparent irony,[10] "Gestalt theory" is now applied to a form of psychotherapy largely devised by behaviorists.[11]

Difficulty in understanding Gestalt theory arises in part from misclassifying it. It seems to be a cognitive theory, but it is not - at least, it is not similar to the cognitive theories of the late twentieth century that are based on machine analogies.[12] It can appear to be a biological theory, since it posits brain fields that organize experience, but it is not. What it is will be discussed below, but there can be no assurance that it will be sufficiently insightful. As prophylactic, I will use many excerpts from the original writings of the group.

Beginnings of Gestalt Psychology

All three founders of Gestalt psychology were introduced to scientific research by Carl Stumpf. Interestingly, when Stumpf was first offered a professorship of philosophy at Berlin, the Prussian government included a laboratory as large as Wundt's, and a higher budget with more modern equipment. This was in 1893 and Stumpf turned it down! He did not favor psychology as a separate discipline involved in "big science." What he agreed to was a "Psychological Seminar," with lectures, exercises, and demonstrations. He believed that:[13]

> has objective difficulties...(Stumpf) could not follow the example of Wundt and the Americans in this direction...In such a young research tendency (not "science" or "discipline") with so little developed methodology, so many sources of error, such great difficulties in the exact setting up and carrying out of experiments, it could not be the main goal to produce as many dissertations as possible. Instead, the leading aims must

[10] This is less ironic than might be supposed, since behaviorism and Gestalt psychology are similar in important ways.

[11] that is, Gestalt therapy, which Frederick (Fritz) Perls touted as derived from Gestalt theory. Ralph Hefferline, a Columbia University Skinnerian behaviorist, was actually closer to being the source.

[12] whether the serial processor of the symbolic information processing theories or the neural networks of the subsequent connectionist theories.

[13] Ash, 1985, p. 297.

> be these two: the support of lectures by demonstrations and exercises; second, provision for the necessary aids for the experimental work of the director, the assistants and a few especially advanced workers.

These advanced workers included Max Wertheimer, Kurt Koffka, Wolfgang Köhler, Kurt Lewin, and others. Instruction in experimentation was given in Berlin by Hans Rupp and Friedrich Schumann, both of whom had been trained by G. E. Müller.[14] Stumpf taught his students to be guided by the loftiest ideals, reflected in a tribute from Wertheimer on Stumpf's 70th birthday in 1918:[15]

> As much as you love and support work in specialized science, you have nonetheless taught us to keep our gaze directed to larger questions of principle, to work toward the fruitful cooperation of psychology and the theory of knowledge, with the highest problems of philosophy in view. None of us wishes to be locked up in the workroom of specialized science.

- *Friedrich Schumann's Contributions*

Schumann, with a doctorate in physics, was an ingenious designer of apparatus from the year that he became G. E. Müller's assistant, 1881, to 1910, when he built the apparatus that Max Wertheimer used to demonstrate apparent movement.[16] He ran the laboratory at Frankfurt at the time that Wertheimer joined the faculty. Schumann was hardly a Gestaltist, but his research at Berlin from 1900-1904 seem in keeping with Gestalt views.[17]

Schumann published four studies of visual perception that emphasized what could be called "configural principles." He examined the emergence of "perceptual wholes" or "structures" over fractions of seconds. That is, a spatial configuration could be perceived when its separate parts were presented in quick succession at

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[14] see Chapter 11
[15] Ash (1985), p. 298.
[16] See Chapter 11
[17] Or maybe not. Müller shared some of these ideas, yet was an outspoken critic of the Gestaltists, who he claimed were poor experimentalists and who lacked originality. Blumenthal, 1985, p. 60.

intensities just below sensory threshold. He extended the same method to word recognition.

Unlike Müller, he viewed selective attention as determinant of configural perception and around the turn of the century he was considering things later treated by the Gestaltists. He showed that incomplete figures tend to be seen as complete, that ambiguous figures appear as unambiguous, and visual items tend to be grouped according to proximity in space.

- *The Beginnings: Wertheimer Attacks - the Wrong Enemy?*[18]

> I remember Wertheimer at some of our New School seminars - a man of passionate convictions, who was extremely intolerant of all differences and who would shout at anyone who took issue with him.

The original outline of Gestalt Psychology that spawned countless summaries of Gestaltism in countless textbooks and that was referred to in countless articles and technical books was published by Max Wertheimer in 1922 as "Investigation of the Gestalt Doctrine."[19] In it he criticized the prevailing psychology of his time, at least as he saw it. Ironically, Wundt was often the target of attacks by Wertheimer and his allies, who disliked what they perceived as atomism and associationism.[20] The Gestalt position rose in objection to the orthodox view, characterized by Wertheimer as resting on two hypotheses:

> I. The mosaic or "bundle" hypothesis. - Every "complex" consists of a sum of elementary contents or pieces (e.g. sensations)... We are dealing essentially with a summative multiplicity of variously constituted components (a "bundle") and all else is erected somehow upon this and-

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[18] Marrow, A. (1969). The practical theorist. New York: Basic Books, p. 106.

[19] (1922). Untersuchungen zur Lehre von der Gestalt. Psychologische Forschungen, I, 47-58. This journal, "Psychological Research," was the organ of the Gestalt psychologists. The article is reproduced in its entirety in Ellis, W. D. (Ed.) (1938/1967). A source book of Gestalt psychology. New York: Humanities Press, pp. 12-16.

[20] Those of their targets influential at that time could have included G. E. Müller and his students, left over Herbartians, followers of Helmholtz' perceptual theories, and virtually any American psychologist. Wundt did not fit the bill, but the Gestaltists clearly did not realize that.

> summation. Thus to sensations are added "residues" of earlier perceptions, feelings, attention, comprehension, will. Also memory attaches itself to the sum of contents.
>
> II. The association hypothesis. - If a certain content A has frequently occurred with B ("in spatio-temporal contiguity"), then there is a tendency for A to call up B....This is the ground plan of associationism. The principle here is one of merely existential connection, a union only as regards the appearance of these or those contents, a concatenation essentially extrinsic in character...

Wertheimer went on to characterize both hypotheses as instances of "and-summation, i.e. a construction from pieces...which, as primarily given fundaments, underlie all else."[21] From these there is no limit on the higher structures that may be erected but, whatever they are, they depend on no intrinsic factors - organismic factors play no part in the construction of experience. In all, Wertheimer gave an adequate account of even the sophisticated associationism of Helmholtz and John Stuart Mill.

- *A Straw Man?*

Were there such associationist ("and-summists") as Wertheimer described in 1922? Or was he flailing the corpse of Herbart, who had been gone for half a century? Wundt was not an and-summist, nor was G. E. Müller, who appeared to appreciate configurations at least as much as did some proto-Gestaltists, such as von Ehrenfels. In America, Titchener was still strong and he was an analyst, all right, but in a half decade he would be dead and his influence dispersed and diluted. Who was the object of criticism in 1922 and, similarly, who could be identified as the villains in the second half of the twentieth century?

The target was and is no straw man, that's certain, but it is also no individual or small group to whom we may easily point. Wertheimer was absolutely correct when he acknowledged this and pointed to the culprit:[22]

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[21] the German word for "construction" is "Gebilde," one of the names frequently used by Wundt (see Chapter 11) and translated by Titchener and by Judd as "compound." Wertheimer never knew how Wundtian he was as he mistakenly attacked Wundtian psychology. Müller, one-time teacher of both Katz and Rubin, was a more appropriate target.

> would today defend such a position? But we are not examining "general doctrines;" the aim is to inquire what actually is done, what the positive content underlying the terminology of experimental reports really is, how a concrete problem is attacked and how the stages in a piece of strict research really follow one another...We are dealing here not with opinions but with practical questions.. there can be no doubt that these hypotheses do prevail in a great deal of concrete psychological work.

No one in 1922 openly urged the strict associationist position that Wertheimer critiqued and few did so during the following decades of the twentieth century. But it nonetheless existed as tacit basis for much of the theory and research of the century.

This is illustrated in so-called "adaptations" of Gestalt notions by researchers who are in fact unshakably associationist, though they present themselves in apparently different guises.[23] No one proclaims oneself to be such an object of loathing, and no one privately views oneself in such a light. In 1981, Gordon Bower, a prominent experimental psychologist, wrote a chapter purporting to explain Gestalt psychology.[24]

It would be a naive reader indeed who believed that Bower provided an accurate portrayal of Gestalt theory. Each aspect of Gestalt theory was presented as a vague approximation of a concept that can be far better expressed in associationist terms. For example, the principle of grouping by similarity is illustrated by the fact that it is difficult to read tExT WHiCh iS pRIntED like this, since we inappropriately group the upper and lower case letters. Anditisdifficulttoreadprosewithnospacesbetween the words, since we group by proximity and so treat the series of letters as one long word.

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[22] 1922, p. 51, reproduced in Ellis, p. 13.

[23] T. H. Leahey (1992) A history of psychology, Englewood Cliffs, NJ: Prentice-Hall shows convincingly that the associationists have merely changed hats during the century. The mediational associationist "faux behaviorist" verbal learning memory researchers of the middle of the century were as "and-sum" as one can be. This group included Underwood, Melton, Pollio, and the like. When the so-called "cognitive revolution" occurred, Leahey argues that no real change in practice occurred and that the same people merely began calling themselves information processors and "revolutionaries." This appellation became "cognitive scientist" just before the entire enterprise collapsed.

[24] Bower, G. & Hilgard, E. (1981). Theories of learning. (5th ed.). Englewood Cliffs, NJ: Prentice Hall.

But that is not a fair illustration of Gestalt psychology. There is no Einsicht in Bower's treatment.

- *The Place For Associationism*

Wertheimer proposed, much as Wundt had decades earlier,[25] that association - "purely summative relationships" - occurs rarely. This may be when we are extremely fatigued, stymied in thinking, or participating in an experiment in which conditions are such that we are forced. Normally, even what appears as a chaos is not a case of and-summation.

- *What Are Gestalten, For Heaven's Sake?*

That is a very good question and Wertheimer answered it in a more or less satisfying way:[26]

> The given is itself in varying degrees "structured" (gestaltet"), it consists of more or less definitely structured wholes and whole-processes with their whole-properties and laws, characteristic whole-tendencies and whole-determinations of parts…Empirical inquiry discloses...gradations of given-ness "in broad strokes" (relative to more inclusive whole-properties), and varying articulation. The upper limit is complete internal organization of the entire given...The role played here by the parts is one of "parts" genuinely "participating" - not of extraneous, independent and-units.

Von Ehrenfels was promoting the doctrine of "form-qualities"[27] during this period and that view, like Mach's, makes a lot of sense. They emphasized form/structure/organization as an indispensable feature of percepts, perhaps more important than the elements themselves. The musician von Ehrenfels was constantly pointing to the melody that survives drastic transposition -

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[25] see Chapter 11

[26] The unsatisfying common answer to that question is to point to examples - witness the textbooks crammed with Gestalt illustrations. "Explanation by pointing" is not enough. Wertheimer's explanation comes from his 1922 paper, pp. 53-57, reproduced in Ellis, pp. 14-16.

[27] "Gestaltqualitäten"

changes in scale and key - so of course form qualities were important. But Wertheimer would have none of that:[28]

> Nor are "Gestalten" the sums of aggregated contents erected subjectively upon primarily given pieces...not simply blind, additional, "Qualitäten", essentially as piecelike and intractable as "elements"...nor are they ...merely "formal".

Wertheimer went on to predict that the study of perception "will not be grounded in a 'purely summative' point of view."[29]

> Instead, perception must be treated from the point of view of stimulus constellations on the one side and actually given mental Gestalt phenomena on the other. And this leads in physiological theory to the assumption of whole processes. The cells of an organism are parts of the whole and excitations occurring in them are thus to be viewed as part-processes functionally related to whole-processes of the entire organism.

Physiology and stimulus constellations are what is important, so where does that leave psychology? In fact, Wertheimer wrote that this hypothesis permits "Psychological penetration of this problem" for the first time.

This psychology seems definitely "top-down" stuff[30] and its operation is apparent in "the completion of an incomplete experience, as occurs when we fill in the continuity in the movie's series of stills or unconsciously add the missing letter to the worn message on the sign we see by the highway. In memory we find the influence of "whole-properties and structural unity of the thing remembered."[31] There, as in all thought, there are no contextless units that are added and subtracted, stored and re-

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[28] Ibid, 1922, pp. 53-54; Ellis, p. 15
[29] Ibid
[30] though top-down is certainly the wrong expression - there is no "mind structuring chaotic input, or executive ghost supervising a hierarchy of subordinates," as "top-down" seems to suggest. Input comes structured and "whole-to-part" probably better fits.
[31] 1922, p. 55; reproduced in Ellis, p. 16

trieved.[32] Problem solving is not a serial process, as it would seem to be in the 1970s; it involves "the process of discovering what a problem is, in seeing the point...(Analogies may be seen also in the processes of perception, feeling, and will.)"[33]

Gestalten are meaningful wholes and "meaningful" is, as ever, difficult to define. It appears as "inner coherence," "an inner necessity," and in general, "a whole is meaningful when concrete mutual dependency obtains among its parts." Others would try to clarify Wertheimer's characterization of Gestalt theory,[34] And are there Gestalten? Wertheimer concluded, "Whether there is such a thing as meaningfulness or not is simply a matter of fact."[35]

Fundamentals: Psychology as Physics

The words "Gestalt" and "Gestalt Psychology" have taken on an aura very unlike that meant by the founders of this viewpoint. Many psychologists and nonpsychologists take Gestalt theory to be a humanistic sentimentalism that deals with "the whole person," and takes "holistic viewpoints." Such stuff, whatever merits it might have, has no connection whatever with Gestalt Psychology.

Max Wertheimer grew up as a student of the violin and always appreciated music and auditory perception. He knew Albert Einstein later in life and understood physics well enough to understand Einstein's reconstruction of his thinking while devising relativity theory. Wolfgang Köhler had similar interests in audition and viewed mental life (and all life) as only an aspect of physics. The laws that govern the physical world govern the world of conscious experience as well. There was no "getting in touch with one's feelings" for these individuals. And we will see that

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[32] This was Wundt's view as well, though Wertheimer almost surely did not realize it. Wundt's pupils, such as Titchener, were atomists and there were probably lots of Herbartians around - they always seem to be plentiful, though going by different names.

[33] Ibid

[34] Which, if it ever came, was not enough for the best writers in psychology, for example, Bower & Hilgard (1981) and Leahey (1992). These authors of influential texts confessed their bafflement concerning what the gestaltists were trying to say.

[35] 1922, 57; Ellis, p. 16

Gestalt work in what could be called emotional well-being was far from therapeutic.[36]

Psychology is a branch of physics, but twentieth-century physics is not Newton's; it is not the machinery of the Enlightenment and organisms are not robots:[37]

> There is an altogether fundamental difference between the organism and (so far as I can tell) all manmade machines...The firm arrangements in these machines consist of given materials, just as a rock, or any piece of iron, contains the same solid material day after day, more probably year after year... But, to repeat, hardly any part of the organism, hardly any of its anatomical structures, is a solid object in this sense. When closely examined, almost all these structures prove to be processes, so-called steady states, the materials of which are gradually and slowly being eliminated and, at the same time, replaced by metabolic activities. It is only the structures, the forms of these tissues, and the general kinds of material which they contain that do not vary.

- *The Phi Phenomenon and Related Phenomena*

Wertheimer first presented Gestalt theory in 1912, but not in his classic paper on apparent motion - the phi phenomenon, as is commonly thought. That paper was preceded by one on number concepts among primitive peoples.[38] Unlike what is supposed to be true of Western arithmetic, primitive peoples count units differently. One horse plus one horse is two horses and one person plus one person is two persons. But one horse plus one person is a rider.

That same year the phi paper was published, officially launching Gestalt psychology.[39] The phenomenon of apparent movement was known and had been studied for almost a century, since Plateau in the 1820s, so it was not a "discovery"

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[36] See the description of Tamara Dembo's experiment below.

[37] W. K|hler (1969). The task of gestalt psychology. Princeton, NJ: Princeton University Press, pp. 81-82.

[38] Wertheimer, M. (1912a). Uber das Denken der Naturv|lker, I. Zahlen und Zahlgebilde. Zeitschrift für Psychologie, 60, 321-378.

[39] Wertheimer, M. (1912b). Experimentelle Studien über das Sehen von Bewegungen. Zeitschrift für Psychologie, 61, 161-265.

that launched the movement. Ash pointed out that there existed a number of theories proposing to explain apparent motion as "motion sensations," "fused afterimages," and "illusions of judgment," by Mach, Marbe, and Schumann, respectively. The psychophysicist Sigmund Exner had found that apparent motion can produce negative afterimages just as does real motion and he proposed that some physiological process was involved, rather than a judgment process.[40] Wertheimer's experiments, using Koffka and Köhler as subjects and a tachistoscope[41] built by Schumann, refuted those theories, while supporting Exner's physiological theory. When a vertical line is briefly presented, immediately followed by the presentation of a horizontal line, the perceived movement is not movement of anything, it is "pure phi," and it corresponds to the "cortical streak" brain process that underlies it. It is an example of a pure, dynamic phenomenon - motion in and of itself, not the motion of some thing and not the sum of a series of isolated events.

Koffka was "enthralled" and wrote in 1931[42]

> To have proved that movement as experience is different from the experience of successive intervening phases meant a good deal at that time. But...Wertheimer did very much more: he joined the movement experience, the movement phi, to the psychology of pure simultaneity and of pure succession, the first corresponding to form or shape, the second to rhythm, melody, etc. This was the decisive step.

The varieties of apparent motion were described by Kenkel in 1913, a student of Koffka's who named alpha, beta, and gamma movement in 1913 and by Korte, also

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[40] 1985, p. 309.

[41] a device for producing brief presentations of visual stimuli for precisely-controlled durations. A few decades earlier Helmholtz was forced to use the spark generated by a Leyden jar to produce brief visual stimuli.

[42] Koffka papers at the Archives of the History of American Psychology, Akron, Ohio, excerpted in Ash, 1985, p. 310.

a Koffka student, who added delta movement in 1915. The main categories of apparent movement are as follows:[43]

phi mov't	pure movement from pairs of flashing lights
beta mov't	object moves from one to another position
alpha mov't	size change w/successive presentation - Kenkel was working with the central line of the Müller/Lyer illusion as its two forms alternated successively.
gamma mov't	expansion/contraction w/illumination change
delta mov't	reversed mov't when second stimulus is much brighter - then the movement is in the direction opposite the order of presentation.

In 1915 Korte also worked out the laws of optimal movement, showing how it depends on the distance between the stimuli, the time between them, and their intensity. If the time-interval is constant, the optimal distance for apparent movement varies directly with intensity. If the distance separating them is increased, intensity must be increased. The perception of phi depends also on expectations and attitude, so that an analytical attitude discourages it and a passive attitude promotes it. It is also easier to perceive movement of a meaningful unit, like an arm attached to a shoulder, than a line attached to another line.

It is also clear that eye movements are unnecessary. Recall that this was the explanation endorsed by Wundt, though he did not originate it. When we see the apparent movement of the successively-lit dots of light or of the vertical line that is succeeded quickly by a horizontal line, the apparent movement is no more than the movement of our eyes. This is decidedly not the case, as is clear in the case of gamma movement, since the change is expansion and contraction[44] and it is unclear how the eyes could move to produce such an effect. Also, illusions of movement include the

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[43] These are most of the varieties listed by Boring, 1942, Sensation and perception in the history of experimental psychology, pp. 596-597. Richard Gregory, in the OCTTM, incorrectly calls these "Korte's Laws."

[44] produced by changes in illumination

familiar spiral illusion of Plateau, introduced in 1850. Depending on direction of rotation, a spiral drawn on a disk appears to expand or to contract, an experience certainly not produced by eye movements. And phi may be seen when a vertical line is succeeded by horizontals on each side, requiring movements of the two eyes in opposite directions. Finally, Boring noted that "Guilford and Helson (1929), by photographing eye-movements, proved (if proof were still needed) that eye-movements are not determinants of apparent movement."[45]

Köhler and Koffka were impressed indeed with Wertheimer's findings. Fifty-four years later, in his final series of lectures, given at Princeton, Köhler began with a recounting of the 1912 phi experiment, complete with illustrations.[46] Koffka, on the other hand, performed his own experiments and described them in 1930.[47]

- *Three-Dimensional Motion Gestalten*

Koffka described simple conditions that produce gestalt phenomena in three dimensions.[48] In the simplest case, the phi phenomenon is produced by successively exposing two parallel lines, so that movement is seen from left to right, for example. If a third parallel line is introduced between the two original lines and if the new line remains constantly visible, the movement appears behind the new permanent line. The observer describes the movement to appear to be passing through a tunnel. Koffka proposed that "...the permanent line excludes the phi process from its own area without being capable of breaking it up. Thus the process is forced into the third dimension."[49] Koffka described Fuchs' discussion of common spatial Gestalten, illustrated by observing a vertical black rod in front of a white wall as background.[50] Standing at some distance from the wall, say 15 feet or so, the rod appears as a figure

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[45] 1942, p. 599. J. P. Guilford & H. Helson (1929). Eye movements and the phi-phenomenon. American Journal of Psychology, 41, 595-606.

[46] The Task of Gestalt Psychology, pp. 35-40.

[47] S. J. Handel, of the University of Tennessee at Knoxville, is sympathetic to the gestaltists' thesis, but cautions that phi phenomena are not really as striking as they are often described to be.

[48] Koffka, K. (1930). Some problems of space perception. In C. Murchison (Ed.) Psychologies of 1930. Worchester, MA: pp. 161-187.

[49] 1930, p. 169

superimposed on a ground, such that the wall hidden by the rod still is "seen," a feeling hard to describe but certainly common enough. But if the rod and wall are viewed monocularly, through one eye, some depth is lost and rod seems to lie in the plane of the background, which is now three parts: white wall, black line, and white wall. The change from two- to three-dimensional movement also happens in other cases of phi. Benussi showed that if two dots, ten cm apart, are exposed in succession, we see at first the dot moving back and forth. However, after a while the "moving dot" appears to be moving in a circle in a horizontal plane, thus giving the appearance of depth. Koffka suggested that movement in a circular track cannot be in the vertical plane, since there are "no vectors upwards or downwards."

In yet another case, successive presentations of a V and an inverted V positioned above it result in movement as motion around the axis of symmetry. This resembles a spinning top - why does that appear, rather than an perception of movement from inverted V - to V - to inverted V and so on? Koffka explained that this would require strong distortions in form - a V cannot flip back and forth vertically without change in appearance. The simpler organization, if movement is to be seen, is a spinning top.

- *Illusions and Laws of Grouping*

Since we live in an organized world, it is necessary to show how that organization occurs and this is the function of the laws of Prägnanz. These laws describe the manner in which we tend to structure the world toward "good Gestalten," and many a Gestalt-sympathizing psychologist has difficulty in defining a "good Gestalt." One can say only that it is that toward which organization tends and, since the Gestalt is the basic unit of experience, it is impossible to be more precise. We see a row of dots: **.....** and call it a line, showing the effects of proximity. We see the same number of dots arranged differently **... . ..** and call it three groups of dots, again because of proximity.

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[50]Fuchs, W. (1923). Untersuchungen über das simultane Hintereinandersehen und derselben Sehrichtung. Zeitschrift für Psychologie, 91, 145-235.

We tend to see objects as symmetrical, even when they are not; this follows the principle of symmetry. We see a circle with a small gap in it as closed, which follows the law of closure. We see the world as objects on backgrounds, which Edgar Rubin proposed as the principle of figure/ground.[51] There are many more laws of organization, totaling well over one hundred.[52] The Gestaltists saw associationists overstressing the importance of contiguity in space and time, as well as similarity. These represent only two of the many laws of organization - proximity and similarity. And the law of effect reflects further misplaced emphasis, this time on the law of closure. When rewards act as such, it is because they provide closure by ending a preceding sequence of behavior, thus making a "unit" of that behavior. But closure is no more important than contiguity/proximity, similarity, or other laws of organization. These laws are simply aspects of the behavior of physical forces.

Psychology is Physics

> For now the Gestalt psychologists discovered that this procedure made them neighbors of the most advanced natural scientists, the physicists.

The quotation above comes from Köhler's *The Task of Gestalt Psychology*[53] where, after a discussion of Wertheimer's principles of grouping according to proximity, similarity, and simplicity, Köhler drew the parallel with the physics of the turn of the century. This is not the mechanical physics of Newton, where particles in space and time individually act on one another - it is the physics of Pierre Curie, James Clerk Maxwell, Max Planck, and Ernst Mach. Here is the rationale behind Gestalt theory:[54]

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[51] see Chapter 11. Rubin was a student of G. E. Müller and not really a Gestaltist.

[52] Helson, H. (1925-1926). The psychology of Gestalt. American Journal of Psychology, 36, 342-370, 494-526; 37, 25-62, 189-223.
This was Helson's Harvard dissertation.

[53] p. 59. His original writing on this subject was published in 1920 and in a second edition in 1924 as Die physischen Gestalten in Ruhe und im stationären Zustand: Eine naturphilosophische Untersuchung. Erlangen: Verlag der Philosophische Academie.

[54] Ibid, pp. 58-59. K|hler was referring to Mach's 1897 Die Mechanik in ihrer Entwicklung, 3rd ed., pp. 389-390.

> Mach, for instance, asked this question: When a physical system approaches a state of equilibrium or a steady state, why is this change so often characterized by growing regularity, symmetry, and simplicity in the distribution of the material and the forces within the system?...When such regular distributions are being established, more and more components of the acting forces are likely to balance each other...the equilibrium or a steady state is quickly or gradually approached. But in a closed system the action of forces does operate in the direction of equilibrium or a steady state. It is therefore not surprising that during this operation the distributions within the system become more regular, symmetrical and simple.

Köhler also studied the writings of Clerk Maxwell, "the greatest figure in the development of field physics," and Max Planck, who introduced quantum physics. Maxwell described Faraday's earlier work, which made possible the electrical generator, as beginning with "wholes" and arriving at the parts by analysis, rather than the reverse, beginning with parts. He quoted Maxwell along these lines in a treatise published in 1873, noting that this was 40 years before the Gestalt psychologists began:[55]

> We are accustomed to consider the universe as made up of parts, and mathematicians usually begin by considering a single particle, and then conceiving its relation to another particle, and so on. This has generally been supposed the most natural method. To conceive of a particle, however, requires a process of abstraction, since all our perceptions are related to extended bodies, so that the idea of the <u>all</u> that is in our consciousness at a given instant is perhaps as primitive an idea as that of any individual thing.

Köhler's intention was to show by reference to the greats of physics that the Gestaltists were not preposterous - they were not "proceeding in a fantastic fashion." Far from it, in fact, since they were in agreement with the most natural of the natural

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[55]Ibid, pp. 60-61.

sciences. Forget the touchy-feely "holism" of sentimental humanism and consider Max Planck:[56]

> In physics, it is our habit to try to approach the explanation of a physical process by splitting this process into elements. We regard all complicated processes as combinations of simple elementary processes...that is, we think of the wholes before us as the sum of their parts. But this procedure presupposes that the splitting of a whole does not affect the character of this whole...Now, when we deal with irreversible processes in this fashion, the irreversibility is simply lost. One cannot understand such processes on the assumption that all properties of a whole may be approached by a study of its parts...It seems to me that the same difficulty arises when we consider most problems of mental life.

Another great physicist, Arthur Eddington, held the same view - he wrote in 1929 that a survey of the individual particles, the "minute compartments of space," would miss "any world features which are not located in minute compartments."[57] The physical analogy to which the Gestaltists turned was field theory, not Newton's mechanics or Descartes' geometry. To qualify as instances of Gestalt phenomena, physical processes had to meet what Köhler called "Ehrenfels' criteria." They had to be "suprasummative," so that qualities and effects were not derivable solely from properties of their parts and they had to be transposable - so that their organization survived changes in the absolute values of their parts.

He pointed to electrostatics as an example. In an ellipsoidal conductor the density of charge is greatest at the points of greatest curvature and least where the curvature is least. It is the shape of the conductor, not its material or the quantity of charge. If charged particles are fed into one part of the conductor, the charge immediately redistributes itself to maintain the curvature/charge relationship.

Since the brain is a chemical/electrical entity, electrical fields there must correspond to perceptual Gestalten. Köhler wrote in the final lectures:

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[56] Ibid, P. 61. K|hler quoted from a book of lectures Planck delivered in New York in 1909.

[57] Ibid, p. 62.

> In 1920, the Gestalt psychologists transformed this assumption into the following general hypothesis. Psychological facts and the underlying events in the brain resemble each other in all their structural characteristics. Today, we call this the hypothesis of Psychophysical Isomorphism.

To be isomorphic, brain processes need not mirror perceptions, they need only functionally correspond. It is easy to imagine how phenomena such as figure-ground and reversible figures,[58] or even the Müller-Lyer illusion, could be produced by electrical fields and differences in charges on or in the cerebral cortex.

Köhler referred to Mach's findings in fluid dynamics as evidence that physical systems tend toward end states that are as simple and regular as possible. The tendency toward simplicity and regularity was called Prägnanz by Köhler. These principles apply to problem-solving behavior, as well as to perception, as Köhler tried to show in 1917.

Köhler and Insight?[59][60]

> I know that several psychologists will not easily believe that my description of intelligent behavior in apes is correct...Therefore I have made moving pictures of some experiments of this type. They are much more convincing than all words and arguments which I might add in order to corroborate my statements; but we have no technique to give this strongest argument to the readers of a scientific journal.

> At the close (of the fourth and final lecture) he showed the famous film of the chimpanzees on Tenerife which he had taken more than half a century earlier, and he laughed with his audience at the antics of the apes that had given him his first insight into *Einsicht*.

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[58] such as the Necker cube and the reversing staircase

[59] W. K|hler (1926). Intelligence in apes. In C. Murchison (ed.) Psychologies of 1925. Worchester, MA: Clark University Press, pp. 145-161. This was his closing comment.

[60] Carroll Pratt in the preface to The task of Gestalt Psychology, K|hler's last work.

Wolfgang Köhler, the longest-lived and most influential of the Gestaltists, spent the years from 1913 to 1920 as director of the anthropoid research station of the Prussian Academy of Sciences on the island of Tenerife, in the Canary Islands off the west coast of Africa. He was 26, seemingly young for a position of such responsibility, and he had no experience with apes or with any other animals. His doctoral dissertation at the Friedrich-Wilhelm University in Berlin in 1909 concerned hearing and he continued his auditory research as assistant and instructor at the University of Frankfurt. Later he served as Wertheimer's subject in the famous phi experiments of 1912, when he became devoted to the Gestalt movement.

Why a young auditory researcher with no animal experience would be sent to a German research station on a Spanish island in the middle of the British shipping lanes just prior to WWII has become a subject for speculation.[61] The British quickly took control of the region when war broke out and they saw no threat from German researchers studying apes on Tenerife. But they might have wondered why the Germans had brought apes to the island - there were none there before 1913 and they were removed in 1920.

Inexperienced and perhaps distracted, Köhler nevertheless carried out a series of experiments on chimpanzees, chickens, and even children, published in translation as *The Mentality of Apes* in 1925.[62] One line of research demonstrated transposition learning in chickens. He found that the birds could learn the concept of "degree of," so that after training to peck the lighter of two gray papers, they would choose the lighter of other presented pairs. They were responding to a relationship, not to the absolute values of the stimuli. Even clearer results were obtained with apes and colors. Karl Lashley had found earlier that rats could learn to choose the larger of two circles[63] Over the next several decades Lashley would side with the gestaltists, stressing the importance of responding to relationships. This position was attacked

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[61] Ron Ley ( ). A whisper of espionage.
[62] (E. Wister, Trans.). New York: Harcourt, Brace & World.
[63] K. S. Lashley (1912). Visual discrimination of size and form in the albino rat. Journal of Animal Behavior, 2, 310-331.

more or less successfully by Clark Hull and his associates, who viewed Gestalt relationships as a "doctrine of despair."[64] Köhler was impressed with what seemed to be insightful problem solving by animals and he saw this as damaging to psychological theories of the day, including Thorndike's connectionism.

In considering Köhler's findings, it is important to realize that he had little knowledge of the theories of the time, including Thorndike's.[65] He interpreted Thorndike's trial and error learning as no more than random and blind fumbling, with S-R connections mechanically stamped in by consequences. We have seen that this is not a fair representation of Thorndike's views, but Köhler was not alone in believing that it was.

Like other Gestaltists, Köhler believed that problem solving, perception, learning, and thinking involve the organism's regarding the relevant parts of its environment in a particular way. They stressed *Einsicht*, or "insight," which they saw as opposed to trial and error, as basis for learning. Köhler defined insight in 1925 as "the appearance of a complete solution with reference to the whole layout of the field." Let us examine Köhler's findings and assess just exactly what he found.

A typical problem for an ape required that two sticks be joined together to achieve the length necessary to retrieve a banana placed outside the bars of its cage. In another situation, an obstructing box had to be moved before the ape could reach the banana. A typical chimpanzee exhibited plenty of behaviors that Köhler described as "crude stupidities," but the moment of "Einsicht," or "insight" eventually came. Overall, the chimpanzees showed astonishing *stupidity*, not insight. In one case, Köhler wrote that "it did not dawn on Tschego for hours to push the obstructing box out of the way." Köhler judged errors as "good," when they were caused by "lack of comprehension of the conditions of the task." "Bad errors" were manifestations of "the crude stupidities arising from habit." These errors were extremely annoying to the experimenter; "It almost makes one angry," he wrote.

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[64] since it emphasizes relativity and dynamics, rather than stable structures made out of simple pieces. To Hull and others this makes Gestalt theory hopelessly imprecise.

[65] quotation from personal acquaintance in Let book.

But, just as Watson's work with children was compressed into the story of Albert B., so Köhler's investigation of "Ape Mentality" was pretty much the story of *one* ape, Sultan. Only he could solve the most difficult problems without demonstration or assistance. When a banana was hung from the ceiling of a room and a wooden box was nearby on the floor, only he could move the box to use as a platform to reach the fruit. None of the others could do so without the assistance of demonstration. Chimpanzees are not adept at stacking boxes and when they did manage to successfully stack them, it was often without regard for the location of the banana. Even Sultan failed here, so the "insight" shown was not striking.

The interest generated by Köhler's work owed largely to our belief that we commonly experience seemingly sudden solutions to problems, the familiar "aha" feeling. Is that because of a sudden reorganization of brain fields, a new apprehension of relevant aspects of our environment? Can we really ignore our experiences preceding the act of insight? Two alternative interpretations are worth considering and both emphasize relevant past experience. But they do not view that experience as simple trial-and-error rote learning, as Köhler did.

Two Interpretations of Insight

- *Harlow and Learning Set*

In 1972 Harry Harlow and his colleagues[66] reported an interesting historical note concerning the history of the discovery of the phenomenon of *learning set*, or "learning to learn" to efficiently solve different problems of the same general class. In 1940 Harlow spent a year as a student at Columbia University and attended a seminar held by the great neurologist, Kurt Goldstein.[67] Goldstein distinguished between two kinds of thought, concrete and abstract, and held that only humans with intact frontal lobes were capable of abstract thought.

To demonstrate that one is capable of abstract thought, one must be able to verbalize space, set a clock, perform two tasks at once, and other things. But the most

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[66] Harlow, H. F., Gluck, J. P. & Suomi, S. J. (1972). Generalization of behavioral data between human and nonhuman animals. American Psychologist, 27, 709-716.

[67] Goldstein also coined the term "self actualization."

basic test for abstract thought was a conditional discrimination problem called the Weigl problem. For example, a subject may be shown two cubes and a sphere, with the sphere and one cube black and the remaining cube white. The subject is asked to indicate which two items are similar, which could be answered in terms of shape or brightness. Once the response is made, the subjects were to specify another way of grouping them. Goldstein found that soldiers suffering battlefield wounds to the fronts of their heads were not capable of solving this problem and had thus lost the capacity for abstract thought.

It goes without saying that animals were incapable of abstract thought, at least as far as Goldstein was concerned, and Harlow saw a challenge. With difficulty, he managed to train rhesus monkeys and chimpanzees to solve the Weigl problem. After posing problem after problem in a stepwise fashion, they did demonstrate "abstract thought," at least as defined by Goldstein. Harlow wrote that he was shocked and surprised to find that most psychologists did not care. "At least Goldstein cared," he concluded.

Learning set, or learning to learn "transforms the creature from a creature that adapts to a changing environment by trial and error to one that adapts by seeming hypothesis and insight."[68] This is the way that insight is learned.[69] In a typical demonstration, monkeys were presented with two stimulus objects placed over food wells. The stimuli could differ in shape, size, color, brightness, or other ways, and the correct stimulus could appear on the right or on the left. A problem including star-shape versus circle-shape stimuli might be presented 50 times, by which time the animal would invariably choose the correct item on each trial. But it would have made a lot of errors before reaching that stage.

Then the stimuli would be changed, say to triangle versus square, would be presented 50 times, followed by a third problem and a fourth and a fifth and a hundredth, and a three-hundredth. As new problems were presented, the likelihood that no more than one error would be made increased. The animal learned the con-

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[68] Harlow, H. F. (1949). The formation of learning sets. Psychological Review, 56, 51-65.
[69] W. K|hler (1959). Gestalt psychology today. American psychologist, 14, 727-734.

cept, "this is a two-choice problem where right/left position is irrelevant and some visual characteristic of the stimuli signals which is correct." On the first trial of a problem, there is no telling which stimulus is correct, so if you choose the wrong one on that trial, switch to the other and stick with it.

- *A Simulation of Insight*

Epstein and his colleagues[70] proposed that the insight shown by Köhler's chimpanzees, evidenced in the use of a box to retrieve a suspended banana, for example, was possible only because of specific learning experiences. Köhler's animals had to learn to push objects toward targets and to climb on objects to reach other objects. His chimps were adults and thus had plenty of time to acquire such learning. Given comparable experience, even *pigeons* could show insight!

Two learned skills are required - pushing a box to various locations and climbing onto the box to grasp a banana hanging out of reach from the ceiling. The pigeons were first trained to push a small cardboard box toward a green spot located at various positions over a period of from one to eight weeks. They were then trained to climb onto a box under a suspended facsimile of a banana. Finally, they were tested with the banana suspended out of reach and the box positioned away from it.

The birds initially looked "confused," just as Köhler described his chimps. They looked back and forth from box to banana and then "suddenly" they pushed the box to a position under the banana, "sighting" the banana as they did so. They placed the box properly, stepped onto it, and pecked the banana. Is that insight, as conventionally defined? It looks like it, partly because of the "suddenness" of the solution, but the specific training they received made their insight possible. Birds that were trained to peck the banana but not to climb, or to climb and peck but not to push, or to climb and peck and push randomly showed no insight when tested.

It is no help to point to the need for attention to "structural properties" of the situation, rather than "blind trial and error," as Köhler did in 1925. In the box-and-banana problem, insight depends on having learned to push objects toward targets and

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[70] Epstein, R., Kirshnit, C. E., Lanza, R. P., & Rubin, L. C. (1984). "Insight" in the pigeon: antecedents and determinents of an intelligent performance. Nature, 308, 61-62.

to climb on objects to reach other objects. Needless to say, other cases of insight require other previously-learned skills.

The Gestalt "School" and Kurt Koffka's Novel Contributions

In 1922 Köhler succeeded Stumpf as director of the Psychological Institute and professor of philosophy at Berlin. Two years earlier the institute had been moved to posh quarters in a wing of what was once the Imperial Palace. Wertheimer had come to Berlin in 1916 to do research on sonar for the submarine service. He joined the faculty in 1919 and was named associate professor in 1924. It was in 1923 that the "Gestalt laws" were published, though Wertheimer had formulated them by 1913.

Koffka became associate professor at Giessen in 1918 and director of the laboratory there. A student, Friedrich Wulf, tried to show that the law of *Prägnanz* applied to memory as well as to perception, by showing that when subjects reproduce drawings from memory, ambiguous drawings are changed toward better Gestalten. G. E. Müller had held the view that such effects are due to learned "standard" reactions and later commentators, such as Woodworth,[71] tended to agree. That is, the so-called change in memory forms produced by Gestalt laws of organization were more likely due to a tendency to revert to learned forms. Ash[72] noted that some leaders in 20th century cognitive psychology, such as Jerome Bruner and Ulrich Neisser, were attracted to psychology in part because of Koffka's work. However, he also pointed out that the "cognitive science" of the 1960s and 1970s was "based on thinking quite different from Gestalt theory." Rather, it was more influenced by the psychology of Helmholtz and of the Graz school, which was precisely what the gestaltists opposed.

The gestalt psychology of the Berlin group appealed to some academics, charmed by Köhler's suggestion that Gestalt theory offered a philosophy in which the world is like "a Beethoven symphony, and we would have the possibility of grasping from a part of the whole something of the structural principles of that whole."[73] This was taken as an antidote to the atomistic/mechanistic thinking of the 1920s industrial

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[71] R. S. Woodworth (1938). Experimental Psychology. New York, Macmillan.

[72] 1985, p. 334.

[73] Ash, p. 322.

world. The Gestaltists could offer natural science without such characteristics by pointing to the physics of the day. But Wundt's successor at Leipzig, Felix Kreuger, offered a different nonatomistic psychology - "Ganzheitpsychologie" - emphasizing the importance of feeling and will in structuring experience.[74]

Kreuger ultimately supported the Nazi policies that ended ordinary academic life in Germany in the 1930s. Wertheimer was a Jew and a proponent of Marxist and socialist views, as well as a friend of Albert Einstein. The two were among the first professors dismissed in April, 1933, when the "Law for the Reconstitution of the Civil Service" was enacted. Wertheimer left for the New School for Social Research in New York City in that year, before his firing was official.[75] K|hler publicly protested the Nazi policies, one of the few German professors to dare do so, and somehow was not dismissed himself, though his assistants, Karl Duncker, Otto von Lauenstein, and Hedwig von Restorff were not so lucky.[76] After two years fruitlessly opposing the "new order," Köhler left to take a job at Swarthmore College in the fall of 1935.

Koffka had left Giessen in 1927, after two visits to America, to accept an attractive offer from Smith College, though he was also offered a position at the University of Wisconsin, where he had spent the year 1926-1927. He was attracted to the prospect of life in a small New England college town and the new laboratory built to his specifications, five years free of teaching, two assistants of his choice, a laboratory budget, and a salary that made him one of the highest paid professors in America. He was attractive to some American psychologists because of his attack on behaviorism. Interestingly, his critique was aimed at the same behaviorisms that Skinner would attack and his view was more similar to Skinner's than anyone at the time conceived.

- *Koffka: A Behaviorist of Sorts*

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[74] See Chapter 11.
[75] Ash, 1985, p. 324.
[76] Pratt described the fate of von Lauenstein in the preface of K|hler's The task of gestalt psychology, p. 16. He went to England in 1937 and planned to take a position at Rutgers University in 1939. But he returned to Germany during the summer and was not able to cross the border when war broke out in September. He was seriously wounded while serving in the German Army and sent back to the front during the last days of the war. He was not heard from again.

Neither the Gestaltists nor the radical behaviorists of the twentieth century would admit to much in the way of common views, but they do exist. Ash[77] presented an excerpt from Koffka that is more behaviorist than the views of many so-called behaviorists:

> First, Koffka maintained, it makes no practical scientific sense to constrict a science of psychology without consciousness, which he called "inner behavior." This could only lead to the reduction of psychology to comparative or animal studies, and eventually to a mere "reactology" of the muscles and glands. Second, it is not only methodologically but also theoretically legitimate to retain consciousness in psychology, for inner and outer behavior are "essentially alike and materially related." According to Koffka (1921/1925, pp. 7ff.), the goal of psychology should be to determine the nature of this relation, not arbitrarily to exclude one side of it.

"Analysis is necessary in science," Ash noted, "but it is important to select appropriate, natural units from which to begin." It may be that this obsession with "natural units" is the sole key to Gestalt theory. It is the sole key to radical behaviorism and B. F. Skinner would make precisely the same argument for natural units in only a few years.

- *Koffka and Behavior Over Time*

Kurt Koffka concluded a lecture titled "Mental Development"[78] with a reference to the organization of behavior in time, the key conception in B. F. Skinner's analysis of behavior that was first published in 1931.[79] In essence, Skinner pointed to the importance of behavior occurring over time and its influence by environmental variables acting over time. Many of Skinner's followers never grasped the significance of temporal organization, but Koffka seemed to have the same idea in 1925:

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[77] 1985, p. 327.

[78] published with that title in Murchison, C. (1926), Psychologies of 1925. Worchester, Mass: Clark University Press, pp. 129-143. The conclusion referred to is on pp. 142-143.

[79] The concept of the reflex in the description of behavior. Journal of General Psychology, 5, 427-458.

> The behavior of an organism shapes configuration also in time. Not only the simultaneous but the successive is also structured. The larger these wholes and the greater their unity, articulation and meaning, the more perfect is their gestalt, the more personality will they express.

In Chapter 17 we will compare the Gestalt position with the Skinnerian position, perhaps revealing a close similarity heretofore unsuspected.[80]

- *Perception of Depth: Was Berkeley Mistaken?*[81]

> Not only is tridimensional vision, as a result of organization, possible without binocular parallax and experience, but inasmuch as less articulate organization seems prior to more articulate organization, tridimensional vision must be the earlier form, in which bidimensional, plane surfaces arise only with progressive capacity of the organic systems for organization.

Three-dimensional vision may be more basic and primitive than is two-dimensional vision, according to Koffka.[82] But how can that be, since depth perception has been *explained* and, as Koffka noted, the explanation is so widely accepted that no one bothers to do research on depth perception any longer? Not surprisingly, the Gestaltists did not accept the traditional account for depth perception, the theory proposed by Berkeley in 1709 and accepted as fact in the twentieth century.[83] That view begins with the fact that we have two eyes and specific retinal points that are disparately stimulated. Disparate images act as a cue for an inference of "outness" - therefore we see depth, actually a compromise between seeing two objects and seeing one. It was Helmholtz who demonstrated conclusively that distance is the

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[80] surely unsuspected by the Gestaltists and Skinnerians themselves, who view one another as key exemplars of despised views.

[81] Kurt Koffka, 1930, p. 177.

[82] 1930, Some Problems of Space Perception. In C. Murchison (Ed.), Psychologies of 1930. Worchester, MA: Clark University Press. Koffka cited Madison Bentley's Field of Psychology (NY: Appleton, 1924), p. 216 in support. Bentley wrote that mathematical simplicity, as it applies to plane versus solid, does not imply a simpler organismic function or a more ancient ability.

[83] Koffka cited R. S. Woodworth's 1929 edition of Experimental psychology (New York: Holt), who lists the many cues that transform our two-dimensional retinal images into three dimentional objects and space.

product of such "unconscious inferences."[84]Does that mean that our perception is really the sum of those stimulated points - the complex of sensations that result? That illustrates the complaint made first by Wertheimer and echoed by Köhler and then Koffka that psychology cannot be a matter of construction of wholes from pieces. After all, *physical science* no longer follows such a model, so why should psychology?

Koffka's argument was simple, though the evidence is difficult to summarize. First, he said that, according to Helmholtz's theory, we do not normally see double images because we interpret them as depth. It is only with effort that we can detect double images at all, as when we focus on a near object while attending to distant ones. But Helmholtz knew well, Koffka contended, that double images may themselves be localized in space, an impossibility if they were the cue for space.

More convincingly, Koffka argued that depth perception occurs frequently in the absence of disparate retinal images. The depth perceived in the apparent movement demonstrations described above occur with monocular viewing. The Necker cube appears three dimensional viewed with one eye, as do many other patterns that possess the structural properties required.

> ...when simple symmetry is achievable in two dimensions, we shall see a plane figure; if it requires three dimensions, then we shall see a solid. But always the organization of the field resulting from retinal stimulation will show the greatest possible symmetry. In other words, we have explained the appearances of the Necker cube not by experience but on the ground of principles of organization.

The most elementary case of space perception, the figure/ground relationship described by Edgar Rubin,[85] since what is perceived as "figure" is perceived as in front of a "ground." But this is true whether or not it really is closer than the background.

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[84] See Chapter 9 for a summary of what is still the theory of perception.

[85] a student of G. E. Müller, see Chapter 11.

Katz[86] performed an interesting experiment bearing on this and showing the interaction between perceived depth and color.[87] A subject looks through a 1 cm hole in a vertical cardboard screen at a black wall a meter and a half away (see figure). A yellow disk is mounted on the wall. Between the viewer's peephole and the wall is a color wheel[88] that has only one sector filled and that with a blue segment of the same diameter as the yellow disk. The remaining sectors are empty, so that the viewer sees either

-----Insert Figure Here-----

yellow or blue, depending on the position of the wheel.

If the wheel is rotated rapidly, the view through the hole is a yellow - blue mixture and the size of the blue segment may be adjusted until the mixture appears as gray.[89] That, of course, means that the colors are seen as being in the same plane, at the same distance - no wonder, under such conditions. What happens when the screen is removed and the viewer need no longer look through a small opening? Now, "at once you will see the dark background with a yellow disk through a transparent blue circular disk, though the retinal stimulation has remained unaltered within the area that corresponded to the hole in the screen."[90] Depth and color are linked here and the effect occurs whether one or two eyes are used. Koffka regarded this as perhaps the best experiment proving "strikingly the inadequacy of the Berkeleyan axioms."[91]

Even color brightness influences depth perception, since brighter colors seem more "surfacy"[92] and are "thinner" than are dark, less bright colors which look "thicker," and show depth. "Brightness here does not mean simply the intensity of

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[86] David Katz was a student of G. E. Müller - see Chapter 11.

[87] Published in German, of course, and described by Koffka, 1930, p. 171.

[88] a device for rotating a disk, like a fan.

[89] Recall that Karl Marbe had invented a mechanism to allow the adjusting of the size of sectors even while such a wheel was spinning - see Chapter 11.

[90] Koffka, 1930, p. 171.

[91] Koffka's reasoning here is odd. Berkeley and similar thinkers explained the perception of depth as a function of context and the Katz finding would actually support such a view. Titchener had earlier used pinhole perspectives to eliminate context and so prevent the "stimulus error." Depth perception, at least monocularly, could be viewed as a case of such an error.

[92] That term was Koffka's 1930, p. 174.

reflected light, but a quality that Koffka could only call "insistence." Titchener called it "self assertiveness," or "aggressiveness."[93] Koffka suggested that when we look at a scale of shades of gray from white to black, there is more than an intensity difference. Compared with white, a dark gray is less aggressive, assertive, and "insistent." And it is thick and deep, compared with the white, which is "surfacy and thin."

Finally, Koffka argued that stereoscopic depth perception is possible monocularly - with one eye - as demonstrated in the 1920s by E. Lau[94] and by Koffka himself. Lau projected two lines on corresponding retinal lines,[95] but each line was distorted by a different illusion pattern, for example, the Z|llner illusion. A stereoscopic effect was produced as a line seen in three-dimensional space. The lines were on the corresponding retinal lines, so there was no "real" retinal disparity. Hence the distorting effect that is the illusion had to be due to "organization" in the eye and optic tract prior to the meeting of the two tracts. It is "...only when organized in their respective fields will these lines be shaped in such a way that their union results in depth."[96]

-----Insert Zöllner illusion-----

A second demonstration was performed by Koffka and supports the same conclusion; the perception of depth, of three dimensions, does not require more than one eye. Two transparent mica slides were presented, each bearing a vertical line drawn in ink. Paired with each line was a dotted line, drawn so that if they were superimposed, the dashes of one fell into the spaces of the other, forming a broken line with smaller spaces between dashes than the originals. The slides were placed before the subject, who fixated on the solid lines so that they were seen as one, which also caused the dashed lines to be superimposed.

When the right dashed line was moved a bit to the right, the combined dashed ine receded behind the plane of the fixated solid line. If that dashed line was moved to

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[93] This was in Titchener's 1910 Textbook.

[94] in German, in (1922). Versuche über das stereoskopische Sehen. Psychologische Forschungen, 2, 1-4.

[95] that is, the lines were "par," rather than disparate.

[96] Koffka, 1930, p. 183.

the left, the combined line was seen as protruding forward of the plane. Why do that occur? Koffka explained:[97]

> Now no dot of either line has a counterpart dot of the other line in the same cross-section with which it could form a disparate pair.There are no cross disparate pairs of points. But the lines as wholes are cross disparate and therefore show the depth effect, and this organization must be an organization in the monocular processes.

-----Insert Figure Here-----

Gestalt Psychology and Gestalt Therapy

It is common to assume that gestalt therapy is somehow derived from Gestalt psychology, perhaps as a simplified popular derivative, as phrenology was the popularized biology of its day. Nothing could be further from the truth, as several commentators of the late 20th century pointed out.[98]

Probably the clearest, most unequivocal, and most authoritative assessment of the relation of Gestalt theory and Gestalt therapy is the excerpt below, taken from Michael Wertheimer.[99] As the son of Max Wertheimer and a distinguished Gestaltist himself, his opinion carries special weight.

> One other theory that must be mentioned is the psychotherapeutic approach of Fritz Perls and his colleagues, called Gestalt therapy. A neo-Freudian approach that emphasizes the client's existence in the here and now, this therapy has amassed a large following not only among clinical psychologists but among the lay public as well. While it is true that Perls heard a lecture by Wertheimer once at the University of Berlin and was inspired by it, there is conceptually no relationship whatever between Perls's gestalt

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97 1930, p. 184. What we call "dashes" he calls "dots."

98 Mary Henle (1978). Gestalt psychology and gestalt therapy. Journal of the History of the Behavioral Sciences, 14, 23-32; (1986). 1879 and all that. New York: Columbia University Press; Terry J. Knapp (1986). Ralph Franklin Hefferline: The Gestalt therapist among the Skinnerians or the Skinnerian among the Gestalt therapists? Journal of the History of the Behavioral Sciences, 22, 49-60.

99 1978 chapter in Gazda & Corsini

> psychotherapy and classical Gestalt theory, as documented by Henle (1978), for example. It is a historical accident that Perls's approach was called gestalt therapy, and his practices are in no way related to traditional Gestalt theory: Evaluations, criticisms, successes, or failures of Gestalt theory have no bearing on the validity of gestalt therapy, nor do evaluations, criticisms, successes, or failures of gestalt therapy have any bearing on the validity of Gestalt theory.

Another authoritative opinion comes from Mary Henle and seems to vie with Wertheimer in emphasizing just how utterly and absolutely unrelated are Gestalt psychology and gestalt therapy:

> What Perls has done has been to take a few terms from Gestalt psychology, stretch their meaning beyond recognition, mix them with notions - often unclear and incompatible - from the depth psychologies, existentialism, and common sense, and he has called the whole mixture gestalt therapy. His work has no substantive relation to scientific Gestalt psychology. To use his own language, Fritz Perls has done "his thing," whatever it is, it is not Gestalt psychology.

The fact is that gestalt therapy was in large part the product of Ralph Hefferline, a Skinnerian behaviorist at Columbia University who is remembered for his demonstration of the operant conditioning of minute muscle contractions without the awareness of the subject. He coauthored Gestalt Therapy[100] and realized that the book was misleadingly titled and reported that K|hler denied that gestalt therapy was in any way connected with Gestalt psychology.[101]

Criticism of Gestalt Psychology

Some of the soundest criticism of Gestalt theory has come from Julian Hochberg, a respected researcher in sensation and perception who was for years

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[100] Perls, F., Hefferline, R. F., & Goodman, P. (1951). Gestalt therapy. New York: Dell. It is likely that Hefferline would not be concerned about the relation of this therapy to Gestalt psychology.

[101] Knapp, 1986.

genuinely sympathetic to Gestalt Psychology. His criticisms[102] may be summarized as follows:

The Gestalt theory of brain function is wrong

There is little doubt that the Gestalt conception of isomorphic electrical fields on the surface of the cortex is mistaken. This view, born in the "cortical streak" of apparent movement in 1912, shares with Pavlov's theory the assumption of DC fields that determine perception. Since a neuron with a myelin sheath is an insulated conductor, current traveling through it would generate an electrical field. Billions of such fields could act as suggested by the Gestaltists and by Pavlov. Research examining this possibility began with Lashley, Chow, and Semmes[103] and was replicated and extended by Nobel laureate Roger Sperry and by noted neurosurgeon-theorist Karl Pribram. Pribram summarized their findings.[104]

The gist of the matter is that many experiments have been conducted to attempt to influence cortical electrical fields, with no effect. Animals have been trained to some criterion of performance on a brightness discrimination, for example, and then surgery performed in which gold foil or pins was placed all over the cortex or in which insulating mica strips were inserted in the cortex (by Lashley, et al and Sperry, respectively). Pribram even smeared conducting aluminum cream over the surface of the brain. After the animals recovered, little deficit in the learning of discriminations was found - the surgical interventions had no real effect. If the DC fields in the brain played any significant role, some deficits would have appeared.

According to Pribram,[105] K|hler had never accepted the findings of Lashley or of Sperry. But when he saw Pribram's demonstration of the lack of effect of

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[102] 1978 chapter on S&P in Hearst's first century

[103] Lashley, K. S., Chow, K., & Semmes, J. (1951). An examination of the electrical field theory of cerebral integration. Psychological Review, 58, 123-136.

[104] Pribram, K. (1973). Languages of the brain: Experimental paradoxes and principles in neuropsychology. Englewood Cliffs, NJ: Prentice-Hall.

[105] 1973, p.

aluminum cream, he had to admit that his theory was wrong. He said, "Ach, you have destroyed not only the Gestalt theory but all other theories of perception as well."[106]

Simplicity/Good Gestalten Exceptions

The Gestalt laws of organization specify what we will perceive when presented with different displays. This is most easily illustrated in visual displays that may be seen as either two or three dimensional. In panel a of the figure below the form appears two dimensional, since the law of good continuation means that the figure is more easily seen as two, rather than three dimensional. Note that it can be seen as a three-dimensional cube, but only with difficulty; the interior lines appear more readily as three lines intersecting at their midpoints. In panel b, good continuation means that the corners are prominent and thus the figure is difficult to see as other than the familiar three-dimensional Necker cube. As a two-dimensional figure, it is composed of 15 line segments, a less "simple" figure. Figures such as this exemplify the Gestalt position.

FIGURE

While these figures well exemplify the Gestalt maxim that we organize toward simplicity, other examples are less supportive of Gestalt theory. Hochberg pointed out that many Escher drawings and "impossible" figures violate Gestalt laws. Consider the figure below. It is obviously not "simpler" to see it as three dimensional, yet that is how it appears. Why not just see it as lying on a two-dimensional plane and see it at once as impossible? Organization toward simplicity would preclude its being seen as three dimensional.

FIGURE

Hochberg concluded:

> In fact, I believe that the Gestalt phenomena are themselves most plausibly subsumed by the Helmholtzian explanation of the illusions - that we fit our expectations about objects and their edges to the abnormal or unusual

[106] Check this quote. Pribram told me in 1992, I think, that the cream produced no effect of learning and retaining visual discriminations, but that it did affect perception. I didn't think to ask him to elaborate later.

> stimulus situation of viewing lines on paper...laws of organization describe the class of good cues as to what is likely to belong to what.

A similar conclusion was reached a half century earlier by many writers, including Woodworth in his influential series of editions of Experimental Psychology.[107]

Later Gestaltists

Wolfgang Köhler lived until 1967 and remained active and influential throughout his life. Wertheimer and Koffka died in the 1940s, however, and did not leave dedicated followers in sufficient numbers to assist K|hler in pressing the Gestalt point of view. Koffka was influential on Edward Tolman,[108] and the two corresponded since at least 1913. But Tolman was hardly a Gestaltist.[109] And koffka exerted a powerful influence on one of the leading theorists in perception during the twentieth century, J. J. Gibson.[110] Wertheimer conducted famous seminars at the New School, but even those students closest to him, such as Solomon Asch and Abraham Luchins, received doctorates elsewhere.[111] Köhler had a longer time to exert influence and among his postdoctoral fellows and younger colleagues at Swarthmore were Robert MacLeod, Hans Wallach, David Krech, Richard Crutchfield, Richard Held, Ulrich Neisser, Edwin Newman, Soloman Asch, and Mary Henle, only a couple of which could be called Gestaltists. Even the powerful personalities of the founding trio could not promote their unusual viewpoint during the twentieth century, when a succession of fads characterized mainstream psychology.

Early Infancy and the Gestalt Laws

The gestaltists constantly criticized empirical theories of space perception. These theories followed Berkeley and assumed that depth and the form and position of objects in visual space is the product of experience. Hence, the receptors on my retina

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[107] the first was 1929, I think.
[108] Ash, 1985, p. 329
[109] see Malone's (1990) Theories of learning: A historical approach. Belmont, CA: Wadsworth.

[110] Gibson's autobiography - Gibson was a young assistant professor at Smith College, where Koffka was a very strong presence.
[111] Ash, p. 331.

code only spots in Lotze's "imagined space" and through experience they are "projected" outward.[112] This view, called by Boring the "telegraph theory,"[113] has been discussed earlier.[114] The infant's world is James' "blooming, buzzing confusion" until experience creates a stable three-dimensional world. This is the embodiment of Wertheimer's "and-sum" target.

The Gestaltists would have none of this and constantly questioned the necessity of experience in the apprehension of space. Once sensory equipment is operating, so that objects may be focussed upon and accommodation is possible,[115] the world should appear as effects of the laws of Prägnanz, such as common fate, proximity, and good continuation. It appears that they were at least partly mistaken.

T. G. R. Bower of Edinburgh University is the acknowledged master of early childhood development, whose work was already discussed in Chapter 9. Here we turn to his findings for evidence of Gestalt organization in the earliest experiences of infancy.

Bower reported[116] that infants do see objects in the way described as common fate. That is when a three-week old infant is shown a display of four dots arranged as a square moving through space, it is visibly surprised when the dots of the display break up. However, if the form of the four dots is changed from a square to a rotating circle, little surprise is shown. This is presumably because the four dots remain related as if parts of a single moving object and the principle of common fate is illustrated. This occurred in three-week olds.

Another important gestalt principle of organization is grouping by proximity and it seems of fundamental importance. Indeed, it is difficult to imagine how an infant could experience much resembling the adult world unless grouping by proximity occurred. But here the Gestaltists were clearly shown to be wrong. Again

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[112] see space perception

[113] 1950, p. 95. The theory was later called the labeled-line theory and was lambasted by Carl Pfaffman in the 1960s. It was first clearly proposed in Helmholtz' Tonempfindungen.

[114] for example, see Helmholtz in Chapter 9.

[115] see Chapter 9 for developmental changes in perception.

[116] (1982). Development in infancy, 2nd ed., pp. 112-116.

using expressions of surprise[117] as indicative of perceived change in visual displays, Bower found no effect of proximity until infants were nearly a year old! And this occurred "To the experimenter's own surprise." The displays involved a three-dot set, with specific spatial relations among the dots, as shown in the figure, part A. The changes either maintained the proximity relations of the original (as does B) or did not (as does C). Display C should have been surprising, but it was not, until twelve-month infants were examined.[118] On the other hand, the gestalt principle of good continuation seemed to be operating in the perceptions of six-week old infants. They were shown a wire-frame triangle with a bar covering part of it, as shown in part A of the figure. That display was established as a CS and several other displays (B: 1, 2, 3, 4) were presented. The strongest response occurred to the intact triangle (#1), indicating that the infants viewed the original display as a unitary pattern. As we do, the infants "completed" the occluded parts of the sides of the original display.

Further data relevant to the Gestaltist position concerns reactions to displays as patterns/wholes or as individual parts. This brings us to another, and final, phenomenon to be put to bed - the assertion that an infant younger than several months old "smiles at human faces." We have all experienced the apparent smile directed at us by the infant a few weeks old, and who is to say that it isn't smiling at us? Why shouldn't the human face or a facsimile of it be a releasing stimulus eliciting smiling? Perhaps dogs and cats smile at us too - again, who is to say?

Well, if the cat smiles at paper plates and dustmops, as well as at us, we may guess that it is not "my face" that is the cause. In the case of infants, we find that the effective stimulus is simpler than we thought. Bower[119] found that infants respond to displays with dots and lines arranged so as to represent a human face.[120] However, they also respond equally strongly and reliably to each of the individual parts comprising the "face" until the age of about sixteen weeks. Hence, response to

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[117] actually, cessation of sucking.

[118] Bear in mind that T. G. R. Bower is the chief exemplar of careful experimentation in this, a notoriously sloppy research area. His results are to be trusted above all others.

[119] 1982, p. 140.

[120] see Chapter 9 for more on the perception of human faces by infants.

patterns versus to pieces is not evident until four months of age, old enough for experience to work its wonders as Helmholtz, Stratton, and other functionalists would have it. Indeed, Bower himself seems to prefer functionalist interpretations, such as those of Egon Brunswik.[121] When we ask whether the infant smiles at a face or at a display of lines and dots that caricatures a face, we must be careful to not overestimate the infant's accomplishment:[122]

> However, such explanations become increasingly untenable when one considers the data on early smiling. For example, it has been found that a card with six dots on it is more effective in eliciting smiles than a card with two dots on it and is even more effective than a whole human face...we must accept that the infant will smile at any high-contrast pair of stimulus objects...

Bower concluded that "faceness" is really "contrastiness" for very young infants. Further evidence on such matters appears in Chapter 9.

Beyond Classic Gestalt Theory

Gunnar Johansson is familiar to students of developmental psychology because of his findings on the perception of "biological motion." In brief, Johansson showed that when a dozen or so lights are attached to a person's feet, knees, waist, elbows, wrists, and shoulders, observers instantly recognize "biological motion" when the configuration of lights is seen moving in the dark.[123] Further, observers can distinguish male versus female models with fair accuracy and even fairly young infants can distinguish biological from artificial motion. But this later and more popular work derived from a broader basis in 1950, when Johansson extended Gestalt psychology beyond Wertheimer's laws of organization to include event perception.[124]

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[121] p. 116
[122] T. G. R. Bower, 1982, pp. 262-263.
[123] For example, Gunnar Johansson (1975). Visual motion perception. Scientific American, 232, 76-89.
[124] Gunnar Johansson (1950). Configurations in event perception. Uppsala: Almquist & Wiksells.

Johansson believed that, in a world of "unceasing change," we segment temporal wholes as "events," which have a "compelling character not due to former experience." Most of the phenomena he studied were visual, involving moving spots, usually of 3mm diameter each. Consider an example described on pp. 77-78. Four spots lay in a row and moved back and forth at the same frequency and with the same period in the directions shown.

. . . . . 0 0 0 0

. . . . . .

The outer two spots traced a path vertically up and down, while the outer spots traced an oblique, roughly 45 deg path. But this is not what an observer saw, viewing the pattern on a bright screen in a dimly-lit room. What was seen was vertical, up and down motion of the whole pattern, with horizontal, left-right oscillations on the ends. The same result appeared when the outer spots described circular paths - vertical motion was common to the whole pattern and horizontal motion applied to the left and right parts of the pattern.

Patterns of motions resolvable to horizontal and vertical components were described by Pierre Lissajous,[125] a French physicist who reflected light from mirrors mounted on tuning forks held at right angles and created a variety of visual patterns, as may be more easily done with an oscilloscope. Ernst Mach, German physicist already familiar to us,[126] first considered such effects in psychology. Consider a simple example to see how resolution to vectors seems to explain phenomena.

The two spots below move fairly slowly, at a rate of .7cm/s, though frequency may be varied widely. Subjects may comprise a large audience, which looks at the two spots moving toward one another, fusing briefly, and moving apart. In fact, the two spots move vertically and horizontally, respectively, as shown in the left panel. What all subjects see is the pattern on the right,

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[125] 1822-1880

[126] see Chapter 9

0 0 . .

. . . . .0 0

whether they are shown what is "real" or not. The two spots move toward one another, meet in the middle of the oblique "path," and retreat, sometimes appearing to collide and bounce away from one another. A vertical and horizontal motion becomes a vector resultant perceived motion.

Many more complex cases are possible and some are described by Johansson. Effects occur even when motion is absent, as when brightnesses of several lights are varied in such a way as to produce apparent motion. Imagine one light rhythmically changing intensity, as if "pumping," and you will see how it might seem to be approaching and retreating. These effects are "W-Phenomena," or "wandering" phenomena, and Johansson was careful to show that they are not a subclass of gamma effects or stroboscopically produced apparent movement effects.[127] Wertheimer's apparent movement effects disappeared if stimuli were separated by 200ms - simple succession was seen, rather than movement. W-effects occur within ranges of stimulus separation of 175 to 4500ms, hence are a different order of event. These "motion Gestalts"[128] are demonstrable with color changes, as "sound phantoms," and as "phantom air currents,"[129] but discussion of them is beyond the scope of this chapter.

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[127] see Chapter 14

[128] We drop the awkward German plural - Gestalten -.

Kurt Lewin: Gestaltist?[129][130][131][132][133]

Motivation (which was Kurt Lewin's main interest) I will not discuss because we do not yet know how Lewin's important work is related to Gestalt psychology, the theme of my lectures.

There is nothing as practical as a good theory

Can be, but I sink absolute ozzer.

Kurt Lewin[134] was not clearly a Gestalt psychologist, as the Köhler remark testifies, partly because he was not really a basic researcher, as Gestalt psychologists were and still are. He is particularly interesting and inspirational for those who see psychology as strictly applied, devoted to studying matters that are of popular interest, such as "insight" and the behavior of groups working under different kinds of leadership conditions. In a real sense, Lewin was the model for the headline-grabbing forms of social psychology that show how subservient to authority people are and how a mock-jail setting can turn normal students into sadistic "guards" and cringing

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[129] Johansson's 1950 Chapters 7, 8, and 9, respectively.

[130] Wolfgang K|hler, The task of Gestalt psychology, p. 120

[131] Kurt Lewin, in Marrow, A.J. (1969). The practical theorist: The life and work of Kurt Lewin. New York: Basic Books, viii. This volume includes some interesting and rare photos of Lewin and others of the period.

[132] Kurt Lewin's wife, Gertrud, quoted in Marrow, p. 17.

[133] When challenged, Lewin often responded thus, according to students interviewed by Marrow, 1969, p. 66.

[134] 1890-1947. Lewin died suddenly of a heart attack on February 11.

"prisoners."[135] But many students and colleagues remember him as an inspirational figure who first awakened their interest in psychology.[136]

Lewin[137] was born in Prussia on a date he often said was easy to remember - the ninth nine of ninety, referring to September 9, 1890.[138] The family ran a store, over which the family lived. Kurt had an older sister, Hertha, and two younger brothers, Egon and Fritz. Even in childhood Kurt was an observer of social behavior. His brother Fritz was "tall, athletic, and high-spirited and excelled at sports,"[139] and often came home late at night. But, however late he came, his mother, Recha, was waiting with motherly concern. Later Kurt's wife, Gertrud, believed that he gauged the depth of a woman's love or the affection of a friend by their willingness to wait for him, since he was always late for appointments and classes.

The Prussia of the turn of the 20th century was strongly anti-semitic and the aristocrats and army officers who were the cream of society would do business with Jews, but would not have any social contact with them. Yet, oddly, Prussian law required religious education in elementary school, so Kurt and other Jewish children attended Jewish religious classes and underwent the Hebrew Bar Mitzvah ritual. The Lewin family still celebrated Christmas, however, and exchanged gifts as did other Prussians.

Berlin Education and Philosophical Interests

As an elementary school child, Kurt was sent to board with a family[140] that lived in Posen and later Berlin, since educational opportunities were much better away from Mogilno, their tiny home village. Kurt had not been a standout pupil thus far

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[135] See any introductory text for that and similar fare, courtesy of Milgram, Zimbardo, and others sharing Lewin's propensity for studying contemporary culture.

[136] Those influenced by Lewin include Tamara Dembo, Roger Barker, John Thibaut, Harold Kelley, Kurt Back, Morton Deutsch, Edward Jones, Philip Zimbardo, Jerome Singer, Stanley Schachter, Leon Festinger, John Darley, Eliot Aronson, and others forming a "who's who" in social psychology. (Perlman, , D. (1984) Recent developments in personality and social psychology: A citation analysis. Personality and Social Psychology Bulletin, 10, 493-501.

[137] "Leh-VEEN" is proper German pronunciation, but he changed it to "LEW-in" when his children were embarrassed by the German version.

[138] Marrow, p. 3.

[139] Marrow, p. 4.

[140] This was his adoptive family, not his birth family, as some writers, such as Hothersall, suggest.

and was known for temper tantrums that led to the family nickname the "Furious Herring."[141] He was not suspected to be of any great intelligence until his last two years of high school.[142] Marrow noted a significant event that occurred when he was 17 - one that is of utmost importance and to which we should devote all of our attention:[143]

> In 1907 he was introduced to Greek philosophy and fell in love with it. It was a love that lasted all his life. During this same period his scholastic record improved remarkably.

The fact is that a favorite paper contrasted Aristotle's doctrine of essences and natural law with Galileo's Enlightenment notions.[144] He argued for the status of opposites as extremes of continua, rather than as isolated "contrasts," and passionately argued against group-averaged data and for the intensive study of single cases. It may come as a surprise to those who know only Lewin's applied work, but he was always the philosopher. As his wife Gertrud said,[145]

> He never abandoned philosophy. In Berlin he lectured one year in psychology and had a seminar in philosophy; the next year he had a lecture in philosophy and a seminar in psychology.

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[141] Marrow, p. 5. This no doubt translates to a better German form - or one might expect. My Langenscheidt species wütend and Hering, yielding the translation, "Wütendhering," which seems no better than English.

[142] Gymnasium, that is.

[143] Marrow, p. 5. This is particularly true if our name is Leonard Handler!

[144] Lewin, K. (1931). The conflict between Aristotelian and Galileian modes of thought in contemporary psychology. Journal of Genetic Psychology, 5, 141-177. Lewin only published a lifetime total of 101 items, including abstracts and pieces in church bulletins and clearly minor periodicals. So he probably would not be considered top-rate at many modern universities, where status is defined as length of publication list - period.

[145] Marrow, p. 17

An earlier philosophical/theoretical paper appeared in 1922 as an analysis of the concept of "identity" in the sciences.[146] He believed that psychology had reached a turning point (Wendepunkt) comparable to that reached in physics in Galileo's time. He contrasted the ways in which physics and biology determine "genidentity," or the ways in which objects maintain identity over time and thus are treated as the "same" object.[147] In physics, objects extend over time and we can speak of the "same" star shining on the Roman Empire and on the Wrigley Building. And we can say that the material composing the star is essentially the same over the centuries.

But in biology, we don't do that - the egg and the year-old chicken are structurally very different, yet we treat them as different stages of the same biological matter. The forty- and twenty-year old are treated as "the same person," though few molecules may have survived the decades.[148] Lewin concluded that physics and biology are therefore essentially different in their descriptive units and the two sciences are thus incommensurable - there is no translating one to the other.

As sciences mature, they purify and segregate themselves increasingly from other sciences. There may be some unity of the sciences, as Descartes hoped to establish, but that may be wishful thinking. Whether "physiological psychology" progresses or not, psychology is best served in segregating itself and developing an autonomous set of concepts, thus purifying itself as do all sciences that advance.

Lewin in Graduate School and as Soldier of Kaiser Wilhelm II

He graduated from the Kaiserin Augusta Gymnasium[149] in Berlin in 1909 and studied medicine and biology at Freiburg and Munich, one semester each, until 1910.

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[146] Lewin, K. (1922). Der Begriff der Genese in Physik, Biologie und Entwicklungsgeschichte. Berlin: Julius Springer. It translates as "The Concept of Genesis (or origin) in Physics, Biology and Evolutionary History."

[147] As we have seen, this question was addressed by Hume, Kant, and many others.

[148] This brings to mind Thomas Brown's father, no longer the same person, once sunk in the "imbecility of idiocy," and Sir John Cutler's worsted stockings, that changed to silk after many mendings. They illustrate too the oddities of identity.

[149] one of the oldest style, humanistic, stressing Latin and Greek classics, with some mathematics, but virtually no science.

He then spent three years at Berlin[150] experimenting with nonsense syllables and reaction times, but he apparently discovered nothing doing that research and so turned from academics to applied psychology, the field in which he remained the rest of his life. Interestingly, his beginning in psychology actually came from a course in philosophy in which Lewin wrote a paper on the nature of concepts in the sciences. His instructor suggested that he apply this thinking to psychology and it was that push that began Lewin's work at the Berlin Psychological Institute under Stumpf.

As a graduate student at Berlin he organized courses for the city's workers, whose powerlessness stemmed largely from their ignorance, and this enterprise was evidently successful. In 1914 World War I broke out and, though he was about to finish his doctorate, he volunteered to serve in the German Army, where he spent four years in combat and won the Iron Cross before being wounded in 1918. He volunteered as a private and left a lieutenant who had acquired the useful skill of being able to sleep while standing up and when walking or marching.[151] Lewin was wounded and hospitalized near the end of the war and his youngest brother Fritz was killed in action.

His degree had been conferred in 1916, despite his absence, and he recalled later that his advisor, Carl Stumpf, had never discussed his doctoral research with him. In fact, Stumpf was known for the freedom that he allowed his students, but inattention has been suggested as a more apt description. When Lewin proposed his thesis, he waited outside while an assistant presented it to Stumpf. The assistant relayed word that it was acceptable and Lewin next discussed it with Stumpf four years later, on the day of his final examination. Despite this lack of nurturance and the contempt that Stumpf and G. E. Müller held for applied psychology, which was to be his life's work, Lewin considered them the two greatest German psychologists of the time.[152]

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[150] in the laboratory supervised by G. E. Müller - see Chapter 11.

[151] Marrow, p. 10. Lewin claimed that he used this skill later in life.

[152] According to Marrow, Müller was Lewin's "Geheimrat," or secret advisor.

Lewin's first, and perhaps most interesting, psychological work was published in 1917[153] and titled "War Landscape." He described how the "life space" of a soldier differed from that of a civilian, such that an lovely open field or a quiet spot beneath a cliff appears as inviting to the latter, but dangerous to the soldier. More specifically, the landscape changes for the soldier as he approaches the front lines. When still a great distance from the front the landscape seems to stretch endlessly in all directions. But as the front is approached, the landscape takes on boundaries, so that it has direction and a front and a back. This structuring of the space is viewed as objective features of the landscape, though it is a function of "soldier needs" that influence perception.[154] A soldier needs physical protection, food, a favorable position with respect to the enemy, and other things that structure his space. Even objects change character, from "peace things" to "war things," so that things become defined solely by their possible military application. Lewin used the terms boundary, direction, zone, and topological theory in that paper and referred to the evil of the "dehumanizing of the enemy" as deplorable.[155] In 1918 Lewin returned to Berlin, where he found the research of Wertheimer, K|hler, and Koffka to be interesting, but unappealing because of its lack of practical application.[156] He published two 1919 papers on workers in industry and in agriculture, pointing out the great differences in what is called "hard work."[157] He referred to the then-popular time and motion studies of industrial engineer F. W. Taylor, who promoted a stopwatch and clipboard approach to factory

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[153]Lewin, K. (1917). Kriegslandschaft. Zeitschrift für angewandte Psychologie, 12, 440-447. The journal title translates as "Journal of Applied Psychology," precisely the kind of psychology that Wundt was arguing against - see Chapter 11.

[154] We have seen that John Stuart Mill and Helmholtz stressed the effects of motivation (needs) on perception - Chapters 7 and 9(?). William James repeated the message in 1890 when he emphasized "preperception" and the "New Look" psychologists of 1950, including Floyd Allport and Jerome Bruner, rediscovered motivational influences on perception.

[155] A commentary on that article was written by Heider, F. (1959). On Lewin's methods and theory. Journal of Social Issues, No. 13.

[156]It is always more difficult to find the virtue in work that has no immediate application, but such basic research ultimately provides the most important applications, as Helmholtz and virtually all the great scientists of history agree - see Chapter 11.

[157] The agricultural worker must do many different things daily and according to season, where the industrial worker does more repetitive things and is therefore receives less satisfaction.

work. His advocacy of piece-work pay[158] efficiency through the elimination of inefficient motions earned him the nickname "Speedy" among workers. Lewin criticized Taylor, arguing for the "life value" of work over the exclusive emphasis on maximum efficiency.[159]

Lewin joined the faculty at Berlin in 1921 and formed a group that met at the Swedish Cafe across the street from the Berlin Psychological Institute. There he noticed that waiters remembered their customers' bills only until they were paid, an observation that led to the later research of Bluma Zeigarnik.

Lewin's Theoretical Psychology

His work was so strongly focussed on applied features of current culture that it is easy to forget that he did propose a field theory, about which he felt very strongly. He was influenced by the field physics that had grown in Germany during the early decades of the 20th century, as were Wertheimer, K|hler, and Koffka, his companions at Berlin. He thought of people as systems of tensions that could be best seen as energy fields, constantly changing as they move in the life space, or psychological field.

The formula B = f(P,E) proposed that Behavior is a function of a Person operating in an Environment, all represented in ellipses called Jordan curves. This spatial representation came from topology, a geometry that represents things arranged in their relative positions, without precise, point-for-point duplication. These representations appeared all over Lewin's papers and became known as "Lewin's eggs" at the University of Berlin.[160] The figure below illustrates the topology of the "life situation"[161] of a single person.[162] the interaction of person and environment occurs in space M, the motor/perceptual area. The inner egg bounds the numerous

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[158] a fixed-ratio schedule, in which pay directly depends upon number of units produced. Both humans and animals work very hard on such a schedule, but it has aversive aspects.

[159] Lewin, K. (1920). The socialization of the Taylor system. Berlin-Fichtenau: Verlag Gesellschaft und Erziehung.

[160] The students at Iowa would later call the diagrams "Lewin's potatoes," probably reflecting the greater familiarity with potatoes in Iowa.

[161] later, life space

[162] from Marrow, p. 78-79.

divisions of the self - the I, or inner personal area, the P areas, or peripheral parts of I, and C, the central part of the I. Outside it all is E, the environment.

When at ease, P is easily accessed from the environment (E) and the I influences the motor/perceptual system freely, as shown in the leftmost of the three little eggs. The middle egg represents the results of stress and the imposition of self control. P becomes less accessible and the I more constricted, as P and C are more closely connected. The line separating I and M becomes less permeable. When stress is high, the divisions of the self blur and the rightmost egg depicts the process of primitivation, or "regression," or "unification."

Always there are spaces and forces and vectors and valences - it was almost psychoanalysis without concern for the history of the individual. Lewin's psychology was a psychology of the present, with no concern for the history that brought a person to the current situation. The book did not do well and, as it received little notice, Lewin occupied himself with the founding of a psychological institute at Hebrew University in Jerusalem

Lewin became known in America in 1929 when a student published a description of the experiments with Zeigarnik and portrayed Lewin as a Gestaltist dealing with psychic energies just as physicists had dealt with physical energies only a few decades before.[163] Lewin himself presented his ideas in the same year at the Ninth International Congress of Psychology at Yale. He presented his talk in German, but it didn't matter, since he showed films and communicated his enthusiasm to an audience which could not understand the language he spoke![164] The film showed behavior of children that exemplified his views, such as the appearance of insight shown when an 18 month old infant tries to sit on a spot on a stone. She managed to keep her eyes on the stone by looking down between her legs while backing over the stone - thus insuring that she would sit on target. Gordon Allport, the Harvard social

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[163] Brown, J. F. (1929). The methods of Kurt Lewin in the psychology of action and affection. Psychological Review, 36, 200-221.

[164] Edwin G. Boring of Harvard was there and he understood. Later, when asked to recommend someone for a six-month term at Stanford, Boring suggested Lewin. Marrow, p.

psychologist,[165] was there and believed that a number of Americans were impressed with the film.[166]

Real People, Not Statistical Myths

In 1931 Lewin contributed a piece in Murchison's Handbook of Child Psychology titled "Environmental Forces in Child Behavior and Development," translated by Donald K. Adams.[167] In that chapter, which introduced Lewin to a wide audience, he argued for the study of the behavior of individual children. He proposed that it is imperative to understand well the life space of a single child, rather than to collect data averaged over groups. The "average child," who exemplifies such research, has no existence in fact, only as a "statistical myth," to use Lewin's expression.[168] It is Lewin's views, not those of the traditional Gestaltists, that leads psychologists to believe that the Gestaltists were advocating the study of "the whole person." That was pure Lewin, who did urge that the whole Gestalt of the child's life space be examined. You can rest assured that the result will not match the "statistical - average child."

Over the course of development, the child's life space changes from small and undifferentiated to large and differentiated - note that this is a view wholly in keeping with William James' views[169] and with the tenets of the functionalism that had swept America in the first decades of the 20th century. As Lewin cast it, the infant's concerns extend barely beyond the limits of its body and a favorite toy may be removed from a

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[165] See Malone, J. C. (1990), Theories of learning. Belmont, CA: Wadsworth, pp. 168-170.

[166] once again, Hothersall, p. 243.

[167] Murchison, C. (Ed.) (1931). Handbook of child psychology. Worcester, MA: Clark University Press. Don Adams later taught a course in animal behavior and, 39 years after the Lewin translation, I was the last psychology graduate student to take that course under him at Duke University. The other students were all in zoology.

[168] Lewin's argument for the study of individual subjects jibes with the views of Freud, of course, and the views of very different people, such as Pavlov and Skinner. Astonishingly, however, researchers in child psychology continue to collect data averaged over groups. This state of affairs frustrates some, such as my colleague Richard Saudargas, who has developed a system for scoring the behaviors of individual children in classrooms (SECOS). While the system appears useful and valid, Saudargas has not yet published an account of the scoring categories and years of data validating it.

[169] See Chapter 13.

few feet away with no protest. But a two-year old will react differently, as we all know.

In the 1931 chapter he also illustrated his method of representing fields and gradients of forces in the life space. He described detour problems, in which the child must move away from a highly-valenced[170] goal object in order to eventually reach it. His methods and interpretations were identical to those of K|hler, whose subjects had been the apes brought to Tenerife. Lewin also described conflict in terms of conflicting forces. A child may experience conflict between two attractive choices - an approach-approach conflict - or between other choices constituting approach-avoidance or avoidance-avoidance conflicts. Perhaps interestingly, he noted that once the choice is made in an approach-approach conflict, the rejected alternative looks mighty attractive.[171]

Perhaps the conception of psychological field that Lewin promoted is best illustrated in a strange case published as a very long monograph by one of his students at Berlin, a woman named Tamara Dembo.

A Gestalt Demonstration of Induced Insanity

Tamara Dembo was a student of Kurt Lewin who reported[172] a fascinating demonstration of induced anger, interpreted as a Gestalt phenomenon. Her aim was to create a "field of forces" that will "transform a person's life space" in such a way as to produce strong emotion. In fact, the subjects were put into a situation where frustration produces anger, along with general disorganization of behavior. Dozens of subjects participated.

Each subject was seated in a chair within a rectangle marked on the floor and was asked to get a flower from a vase that was just out of reach, while keeping both feet within the rectangle. In that situation, the subject quickly finds a solution by

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[170] "Valence" was the term coined by Donald Adams to refer to the attractive or repulsive power of objects. "Incentive" is a more commonly-used term for such properties.

[171] In the 1950s, long after Lewin's death, Leon Festinger would point to this as a source of cognitive dissonance and Jack Brehm would show that that dissonance is reduced by subsequently overvaluing the chosen alternative.

[172] 1931/1976, originally in the journal Psychologische Studien, as an article of some 200 pages - in German. Her work is briefly described in deRivera (date) and at greater length in Koffka'a (1935) Principles of Gestalt Psychology, New York: Harcourt-Brace (pages).

leaning on the chair and thus reaching far enough to grasp the flower. Then the subject is asked to discover a second solution and confronts a "barrier," since there is no second solution and attempts to find one are frustrated.

The subject did not become aggressive at this point, but merely informed the experimenters that there is no second solution. Attention to the task is diverted away and readiness to leave is expressed. But Dembo then created an "outer barrier" by insisting that there is indeed a second solution and that she is sure that the subject can discover it. To escape the field, the subject must repeatedly attempt to reach the impossible goal. Subjects frequently spent over an hour in this extremely unpleasant situation, before they fled it. Interesting things happened along the way.

Dembo's subjects reacted to the initial tension of the situation by "Moving up to a level of fantasy where barriers do not exist and wishes can come true."[173] This cannot be maintained and the subject returns to the impossible task, where tension accumulates. The tension acts to dissolve the various boundaries within the field, such as the real goal and an easy but unacceptable substitute - a flower within easy reach. That flower is rejected by the experimenters and tension mounts. The boundary between reality and fantasy breaks down, along with the boundary separating public and private!

With a little effort, this progression toward insanity is easy to imagine - just picture yourself in a hopeless position, where you must act, but where there is no chance of success. As tension accumulates, your "objectivity" suffers, in a manner of speaking, as occurred with Dembo's subjects. At that point, her subjects engaged in "minor irrationalities - finding themselves holding the nearby flower, thinking that perhaps they really can do an impossible feat (such as hypnotizing the flower), telling the experimenter something that is really too personal to share, and so forth."[174] As the tension continues to mount, the boundaries of the field fade so completely that even the boundary defining the self versus the environment cannot be preserved. At

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[173] From deRivera, p. 372, since I haven't Koffka's book with me.

[174] deRivera, p. 372

this point the subject explodes in anger or, in many cases described by Koffka, the subject bolts from the room and is later found huddled in a corner, crying.

Including that experiment, 64 experiments were done between 1925 and 1928 with a total of 27 subjects, each spending from one to two hours. The situations were designed to create tensions and generate anger, as was the case in "fetch the flower." Other tasks were assigned that were also described as achievable, though they were not. For example, subjects were asked to throw rings over the necks of bottles fifteen feet away - until ten consecutive successes occurred. This was effectively impossible, but it seemed possible.[175]

Dembo saw the effect of these experiments as a transformation of a person's life space, such that the situation becomes filled with tension, transforming the person. Emotion arises from a restructuring of the field and the intensity of the emotion corresponds to the degree of transformation of the life-space. Kurt Koffka endorsed the essentials of this view, but preferred to interpret the dynamic organizations as states of tension within the ego. De Rivera rightly preferred Dembo's interpretation to that of Koffka - any good Gestaltist would do the same.

Other Work at Berlin[176]

Bluma Zeigarnik's dissertation work, a staple item in countless textbooks since it was published, showed the greater recall for uncompleted tasks.[177] This was the first corroboration of Lewin's notion of tension systems, with 164 subjects, child and adult, performing from 18 to 22 tasks. These were simple, such as listing cities, solving riddles, counting backward, and stringing beads - half were completed and half interrupted. When subjects were later asked to recall the tasks, those interrupted

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[175] These and other details of Dembo's experiments appears in Marrow, A. J. (1969). The practical theorist: The life and work of Kurt Lewin. New York, Basic Books, pp. 253-255. Other students were doing similar work at the time at Berlin and their work is described as well.

[176] This section derives from the longer treatment provided in Marrow, Appendix B, pp. 244-259.

[177] Zeigarnik, Bluma (1927).]ber Behalten von erledigten und unerledigten Handlungen. Psychologische Forschung, 9, 1-85.

were recalled twice as often; the ratio of recall of uncompleted to completed was 1.9 to 1. The first task recalled was three times as likely to be an uncompleted one.

Zeigarnik proposed that motivation for a "satisfying performance" arose from three sources: tension arising from a need to achieve completion as a goal in itself, personal ambition, and the "obligation" to follow the directions of the experimenter. The strength of these quasi-needs was manifest when, as often happened, the subject resisted the interruption. Subsequent experiments showed that it was not just the emotion aroused by interruption that was producing the effect. Subjects who were interrupted on one third of the tasks and subsequently allowed to finish them were no more likely to recall those tasks than the tasks that were uninterrupted. But the third of the tasks that were interrupted and never finished were once again memorable.

Another Russian woman, Maria Ovsiankina, extended Zeigarnik's findings, with 125 subjects who were usually "accidentally" interrupted, rather than deliberately, and who were given a "free period" of eight to ten minutes immediately after the interruption. During that period, 100% of the "accidentally" interrupted tasks were spontaneously resumed, and 82% of the deliberately interrupted tasks were resumed.

A second and novel extension was carried out by Vera Mahler during 1930-1931 and evaluated the effectiveness of substitute actions on reducing the tension that was the putative cause of the Zeigarnik effect. Subjects were 155 adults - mostly students at the Berlin Psychological Institute - and a group of children ranging from 5 to 10 years old. Tasks were interrupted and substitutes offered as means of finishing the original task in a different way. Subjects could think about completing the task, talk about it, or do it in a different way as a "real," or physical act.

For example, if the task were punching holes in paper so as to form words, the physical substitute could consist of writing the word or speaking it. The alternatives would lie in thinking or talking about the act of punching holes. After a substitute physical act, resumption of interrupted tasks dropped 86%, but when the substitute was talking about the task, resumption dropped only 33%. In other cases, talking was more effective - or less ineffective. So, if the task was counting squares, a verbal

substitute counting "assumed a higher reality" than did action as a substitute activity. It appears that tasks that are essentially speaking, as in counting, are substituted for by speaking and that tasks involving action, in the sense of movement, are substitutable for other actions.

It also mattered whether the substitute activity allowed the attainment of the goal, at least in principle. Stringing beads for a necklace "to put around my neck" by children could not be substituted for by talking about or imagining the necklace. But adults, striving for a "pleasing pattern" of beads, were satisfied when it was partially completed and never resumed the task. If the tasks were numerical calculation, talking sufficed to substitute for written work. But in "realization" tasks, where a visible physical product was the goal, only physical production could suffice as substitute. Lewin concluded that "Substitute satisfaction occurs only when this inner goal is in sufficient degree attained by the substitute activity."[178] Mahler's work was published in 1933,[179] the year marking the end of the Berlin period. Hitler became Chancellor in January and Lewin left Germany for good in August.[180] During the few years preceding, research other than the Zeigarnik effect had been published. Topics were level of aspiration, psychical satiation, the relation between valence and distance, and backsliding after changing habits.

Ferdinand Hoppe used darts, ring tossing, puzzles, and arithmetic problems in a 1930 study of aspiration level. Subjects performed tasks of varying difficulty, including insoluble problems, and shifted their stated goals as a result of their experiences of success and failure. In 1928 Anitra Karsten studied psychical satiation, a term coined by Lewin to refer to a "decrease in tension level" due to repetition, but not to muscular fatigue. Her subjects repeatedly drew pencil patterns, read poems, or made pencil strokes until they wished to stop - "had no desire to continue." Tasks judged to be agreeable or disagreeable "sated" faster than did neutral tasks and Lewin applied the results to the phenomenon of more frequent change in women's fashions

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[178] Marrow, p. 248.

[179] Mahler, V. (1933). Ersatzhandlungen verscheidenen Realitatsgrades. Psychologische Forschung, 18, 26-89.

[180] He said that he was unwilling to remain at a university where his son could not be admitted.

than in men's.[181] Sara Fajans examined the relation between valence and distance in 1933, using 140 children ranging in age from 6 months to 6 and a half years. She found it easy to devise measures to distinguish degrees of reactions to near and far objects - for example, is the infant reaching or pointing? And she found that valence changes with distance, the degree of change depending on the age of the child. Lewin commented that psychological space need not conform at all closely to physical space and that an air of friendliness of hostility can effectively change psychological distance. Many other factors contribute to the "distances" of objects as the life space differentiates with age.

Finally, Georg Schwarz examined backsliding,[182] or reversion to old habits after learning a new one. This was found to be more likely when the new habit is only one part of a configuration of performances and less likely when the subject took the task requiring the new habit as a principal goal.

It is noteworthy that in all of these experiments, which in many ways were the prototypes for the social psychology of the second half of the 20th century, the actual behavior of many subjects was examined - no questionnaires were administered and no inferential statistics were used. You can rest assured that Lewin was later criticized for such practices and he agreed that more subjects never hurt and that exact measurement is desirable in some cases. But quantitative nicety was clearly of minor importance to him:[183]

> To prove or disprove the theory of tension systems, it seems much more important to find
> a variety of derivations from this theory which should be as different as possible from one another, and to test as many as possible of these derivations, even if this test should be rather crude quantitatively at the beginning.

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[181] The jist of htis explanation is that clothing is more "central" to women and they find fashions to be agreeable or disagreeable. Hence, they sate faster than men, for whom clothing is peripheral and most fashions neutral.

[182] Rückfälligkeit

[183] Marrow, Appendix B, p. 259.

Topological Psychology and Psychoanalysis

In a talk given at the Menninger Clinic in 1936, Lewin spoke on the relation between his views and Freud's.[184] Both share terms, such as "need," "regression," and "tension," and both emphasize emotion, meanings of actions and objects, and causal relationships. But, said Lewin, psychoanalysis lacks rigor and objectivity - it "prefers richness of content to logical strictness of theory."[185] The recovery of patients is really no evidence for the theory.

The depth of psychoanalysis can be a liability, as historical answers are constantly sought and the current life space, or psychological environment, is given short shrift. Like the old associationist theory, psychoanalysis points to the past to explain current phenomena. And psychoanalysis refers too often to "intervening concepts," such as "cathexes" and "drives," which are not measurable. On the other hand, Lewin felt that the vectors and valences of topological theory can be measured.[186]

The purported causes for current pathology are uncovered through free association, dreams, and other means that all depend on the state of the current person. Whether the reports given by patients are historical truth needs independent confirmation.[187] Psychoanalysis always seeks causes in the patient's past and often these causes lie in the remote past, so that it may take a long time to discover them. It seems an odd way to put it, but Lewin's topological psychology was almost identical

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[184] He was accompanied by the philosopher Herbert Feigl, evidently an admirer of Lewin. Marrow, p. 132-136.

[185] Marrow, p. 133.

[186] Ironically, it was a follower of associationist/mechanist psychologist Clark Hull, who actually attempted to measure vectors - Neal Miller did so in the 1940s and published a summary in 1944 and in 1959. Miller, N.E. (1959). Liberalization of basic S-R concepts: Extensions to conflict behavior, motivation, and social learning. In S. Koch (Ed.), Psychology: A study of a science. Vol. 2. New York: McGraw-Hill.

[187] This was naive of Lewin, though many others shared the view that the veracity of verbal reports from patients undergoing psychoanalytic treatment was a problem. Late 20th-century writers recognize that "historical truth" is often difficult to determine and, in any event, it doesn't really matter. A falsely remembered trauma may currently be troubling, whether it actually occurred or not. See Nash, M.R. (1994). Memory distortion and sexual trauma: The problem of false negatives and false positives. International Journal of Clinical and Experimental Hypnosis, XLII, 346-362.

to psychoanalytic theory if the historical aspect of psychoanalysis is eliminated. Of course, what is left would be only a cursory diagnosis, a description of current life space, with its objects and barriers and valences and vectors - it would not be psychoanalysis. Psychoanalysts regarded it as superficial and they did so with justification.

Lewin's Later Work: Heart of 20th Century Social Psychology?

Lewin was never offered a position at a prestigious university and, as Marrow pointed out,[188] most of his work was done in "odd" settings, like the Cornell School of Home Economics and the Iowa Child Welfare Research Station. The American Psychological Association paid him little attention and, all in all, he resembled Titchener as an outsider supported by a circle of enthusiastic supporters. Of course, Titchener would never have approved of the applied research done by Lewin - evidently, neither did Wolfgang, Köhler since it was he who was consulted by Wertheimer when Lewin was considered for a position at the New School for Social Research. Köhler said no.[189]

Lewin's "Action Research at Iowa[190]

> The student explained this (his thesis topic) to Lewin and Lewin replied, 'Ach, nonsense! Just nonsense!'. To a student struggling with a thesis based on a new idea such as this, it's not very encouraging to hear your ideas called nonsense. Well, it turned out to be nonsense.

Lewin spent nine years at Iowa, from 1935-1944, as Research Professor of Child Psychology - he was able to bring Tamara Dembo, along with Roger Barker, who had just finished a doctorate at Stanford. It was there that Lewin began his "group dynamics action research," best known for its finding that groups of boys work more efficiently and harmoniously when organized democratically, then when control is authoritarian or is largely absent - "laissez faire." But that famous research was awfully crudely done, as the illustration shows; also, Lewin's antipathy toward the

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188 Marrow, p. 227.
189 Marrow, p.

Nazi authoritarian regime in Germany made it impossible for any other findings to emerge.

Other work was more substantial - for example, the "group decision" study done with anthropologist Margaret Mead to encourage the wartime eating of what were called "variety meats." Iowa wives claimed that their husbands specified what meats were to be served, but it was found that it was the wives who did the choosing and the husbands were stuck with that choice. A variety of other research had been published by 1940 and Lewin was becoming famous. And he was aware of the "publish or perish" policy that was conspicuous in America.

Work on level of aspiration that was begun in Berlin by a student named Hoppe was continued and is still recognizable in the studies of the kinds of goals that subjects high and low in need for achievement select.[191] The Zeigarnik Effect, whereby subjects recall and resume interrupted tasks better than completed ones, and the frustration/dedifferentiation studies were widely known. The latter was a continuation of Dembo's "emotion" experiment described above, but done with children, aged two to six.

In this study, done by Barker, Dembo, and Lewin, children were allowed to play with ordinary toys for half an hour, at which time they were allowed access to a second room that had previously been blocked off with heavy wire mesh. The second room featured more attractive toys and, after a period of access to them, the children were expelled from the room and access was prevented by the heavy wire screen and a conspicuous padlock. Blocking of goal-oriented behavior was designed to produce frustration and it apparently did.

Subsequent play appeared regressive, so that a four and a half year old became a babyish, thumbsucking three year old. Play seem less intellectual, unhappiness and restlessness were evident, and some aggression occurred. In a subsequent experiment by Wright, in which pairs of children served, there were actually attacks on the

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[190] Roger Barker, quoted in Marrow, p. 94.

[191] They select goals that are intermediate in difficulty, allowing perhaps a 50/50 chance of success. Those low in achievement need or high in fear of failure choose very easy or very difficult tasks.

experimenter. The procedure thus appeared to produce regression, dedifferentiation of the life space so as to become more primitive.[192]

Beginnings of Industrial Psychology: The Harwood Project

Prior to the 1930s the work of psychologists in industry amounted largely to time and motion studies, "Taylorism," introduced by Frederick Winslow Taylor and aimed at reducing unnecessary effort by workers. Its concern was "objective," treating the worker almost as a piece of machinery that can be well or inefficiently used and cost/benefit ratios were paramount. Lewin had become interested in industrial psychology as a young man and published a critique of the Taylor system in 1920.[193] He argued that efficiency experts were not enough and that psychologists were needed to ensure job satisfaction, an essential ingredient if high outputs are to be achieved at low cost. It is not the hours worked, but the "inner value" of the work that is important.[194] In 1939 the Harwood Manufacturing Corporation established an operation in the mountains of rural Virginia, employing 300 local women. After 12 weeks of training and the use of every known method of incentive and pressure, their output was half that of the company's plants in the Northeast and Lewin was asked to intervene.[195]

Lewin saw that the employees saw the production quotas as unattainable, so they had no "social reality" and the employees' failure to attain them was not accompanied by feelings of failure. The quotas were not really goals, as far as the workers were concerned. The first job, therefore, was to stop pressing individuals to improve and to convince them that the quotas could be met. Workers met in small groups, since Lewin always believed that if group standards are set and group attitudes exist, individuals will do everything possible to conform to those standards and attitudes.

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[192] Lewin always distinguished between regression and retrogression. The latter refers to reversion to an earlier state, but it need not be a more primitive state, as is the case with regression. For example, a retrogression from a state of age-induced senility would constitute a retrogression to a better state.

[193] Lewin, Kurt (1920). Die Socialisierung des Taylorsystems. Praktischer Socialismus, No. 4.

[194] Marrow, p. 17.

[195] Alfred Marrow, Lewin's biographer, was an officer of the company.

The company also brought in 60 skilled workers from the North, who immediately met and maintained production quotas. This had no effect for the first two weeks, but then production of all workers increased. Alex Bakelas was brought in to run things for Lewin and he began regular meetings with productive supervisors. A group of workers was formed that was allowed to decide how to change to increase production and to vote when and by how much to raise production quotas. Having a hand in the production process raised quotas and production from 75 units a day to 87 and then to 90, a level that was maintained for five months and that was matched by no other group. In Lewin's words, "Deciding links motivation to action,"[196] and discussion groups - or other kinds of groups - were not enough.

Bakelas and J. R. P. French experimented further on methods of increasing and maintaining production quotas without increasing "tension" in the participants' life spaces. Workers were allowed to plan their days - when and how hard to work - as long as quotas were met. Leadership training groups, later to be called T-Groups, involved role playing and sensitivity training and were conducted by French in the early 1940s. French also persuaded the supervisors, all women, to accept the hiring of older workers. There was initial resistance, since the supervisors were sure that older workers - women over thirty - could not physically do the work, could not learn to do it, and would soon quit.

The war had brought on shortages of labor and older workers were themselves in short supply, so Harwood had to hire those that it could find. But how to convince the supervisors to accept them and give them a chance? French asked the supervisors themselves to form a group and look into the question, producing what data could be found to support their contentions. They found, of course, that older workers in fact performed better, learned faster, and stayed on the job longer than did younger workers and, "these findings being their own, they trusted them."[197]

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[196] Marrow, p. 144.

[197] Marrow, p. 149. When Lewin heard of this finding - that participation in the discovery of facts about their beliefs greatly affects the attitudes of group members - he insisted that French write it up and publish it. In fact, he locked French in Marrow's New York office until the paper was dictated. It appeared as French, J.R.P. Jr. & Marrow, A.J. (1945). Changing a stereotype in industry. Journal of Social Issues, 1, 33-37.

Group Dynamics at MIT

Lewin was a citizen by 1940, working part-time for the OSS, the precursor of the CIA, and so was commuting between Iowa City and Washington. What he and his colleagues worked on is not specifically known, because of the veil of secrecy that shields wartime projects. But they involved problems of boosting morale at home and lowering that of the enemy, choosing leaders, training them, increasing war production, and convincing civilians to change their diet to conform to wartime shortages. Concerning the last category, Leon Festinger found that a newly-introduced beverage was more readily accepted when the container in which it was distributed was also new.[198] In 1944 Lewin was promised a million dollars' support from the American Jewish council to research racial and religious discrimination and to discover remedies for it. He also was promised support from the Field foundation and Iowa was pressing him to decide whether he would continue research and teaching there or go off on these new projects, since it was clear that no one could do both.

He contacted friends at Berkeley and at MIT, hoping that one could offer him a home - he preferred that it be Berkeley, because of the climate. As it happened, the MIT offer came first and he moved to Newtonville, Massachusetts in August of 1944. A year later an article was published that included the expression, "Nothing is as practical as a good theory" and described the goal of the new MIT center.[199] The key assumption of the center came from Lewin's experience at Harwood. It seemed clear that the first thing to do was to set group norms and attitudes - individual members will then go to great lengths and through much suffering to conform to those norms. Hence, it is easier to change the group rather than the individuals comprising it! The center aimed to discover the forces that lead to group cohesiveness, the attractive and repellent forces that define groups. Homogeneity of individual members is not a

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[198] Marrow, p. 155-156.

[199] Lewin, K. (1945). The research center for group dynamics at Massachusetts Institue of Technology. Sociometry, 2 126-136.

factor, since members need not be similar and the "whole is different from the sum of its parts," as K|hler would say.

Even at what was to be this late stage of his career, immersed in applied projects, his teaching was still philosophical and theoretical. Harold Kelley recalled the "exotic, specialized" subjects that Lewin covered - topological and vector analyses, as well as "Aristotelian versus Galilean modes of thought."[200] John Thibaut, Lewin's assistant, was formerly a graduate student in philosophy at the University of North Carolina at Chapel Hill. Along with theory and philosophy was Lewin's old habit of drawing diagrams in the snow, just as he had done decades earlier in Berlin.

Because of its generous funding,[201] The American Jewish Council's Commission of Community Relations (CCI) in New York City demanded much of Lewin's time. The goal of the CCI was to better understand, and thus combat, prejudice. This was to be accomplished through long-term research on ways to train community leaders, to change environments, and to make minority groups feel that they belonged.

But the AJC pressed for "fire fighting" responses to isolated acts of prejudice, the first occurring in 1946. Italian Catholic youths had disturbed Yom Kippur services at Coney Island - what could Lewin do about it? He had only two assistants at the time and his chief assistant, Charles Hendry, had just quit because Lewin continually started new projects before old ones were complete. In many cases, the new projects interfered with or required abandoning of ongoing work. Who wouldn't quit under such conditions?

Lewin met with local groups of Jews, Catholics, Protestants, and "Negroes" and immediately had the charges against the youths dropped - they were turned over to their priest and to the Catholic Big Brothers. It appeared that the miscreants were not really anti-Jewish, but were generally hostile. After all manner of counseling they became substantially less aggressive, though their "attitudes" remained the same.[202] It

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[200] Marrow, p. 188

[201] much of which was only promised, not delivered.

[202] It is now universally recognized that what people say are their opinions frequently do not jibe with their actions - attitudes and actions need not correlate. See Chapter 16.

was Lewin's view that "you can't legislate good will," and that objectionable behavior is best changed by withdrawing support from the local social group. As was true at Harwood, group norms work wonders.

In related work, Lewin and his assistants found that attitudes toward Negro sales clerks, as assessed by questionnaires, did not correspond with actions. People said that they would not shop at stores with black clerks - but observation showed that they did shop at such stores. Lewin planned to assess methods of integrating housing projects and it was after his death that results clearly showed that mixing races and religious groups was superior to integration by separate building or area.

The Founding of T-Groups

In the summer of 1946 the state of Connecticut asked for help in training leaders to combat religious and racial prejudice and Lewin's group held a two-week session at Teachers' College in New Britain. This was an important project for both Lewin, whose CCI was underfunded and understaffed, and for the Connecticut Interracial Commission, whose lack of success to date had called its competence to question. Frank Simpson, head of that commission called Lewin.

Forty-one volunteers, mostly educators and social workers, half blacks and Jews, met daily in group discussions in which the staff and members of the group were treated as peers. The sessions were taped and reviewed in the evening by staff and then by "students." They spent time role playing and appraising their own behavior - this self appraisal constituted about a fifth of their time.[203] Most participants, interviewed six months later, reported that they felt more competent working with groups and more sensitivity to the feelings of others.

The Office of Naval Research awarded a grant to Lewin to establish the National Training Laboratories in Bethel, Maine, but he died before the first meeting. The NTL was meant to deal with bigotry and raising the self esteem of blacks and their children. Simple role-playing instances of bigotry were enacted and different responses tested. The most effective response to a bigot appeared to be a calm one,

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[203] According to Marrow, it was 18% of their time - 90 minutes every evening. p. 213.

rather than a violent response or no response, at least this was the judgment of some 500 subjects who participated.

In Britain, the Tavistock Institute was founded by Eric Trist and A. T. M. Wilson, who had previously worked in the rehabilitation of returning British prisoners of war. Lewin published two papers in the first issue of Human Relations, a journal founded by Trist and Wilson and published jointly by Tavistock and Lewin's MIT group. He described his view of group dynamics as quasi stationary equilibria, with forces promoting and resisting change and promoting and resisting discrimination. Change comes through methods that add to or diminish tension - in his view, decreases in tension are preferable.

On Tuesday, February 11, 1947, Kurt Lewin had a busy day and fell ill late in the evening. His family doctor determined that he had suffered a heart attack and should be hospitalized the next day. The fatal seizure came later that evening. He had seemed exhausted and almost frantic for some time - no longer playful and optimistic. In 1947 Donald Adams asked him when he would get back to "vergleichenden Wissenschaftslehre," the comparative study of the sciences, as represented decades earlier in his Aristotle - Galileo paper and in lectures since. Adams remembered his answer:[204]

> I must do that. These things we are finding out will be discovered in five or ten years anyway, but this other might be fifty years away.

Adams felt that the philosophy of "comparative sciences" was Lewin's real business in life. Maybe Lewin thought so too.

Timeline

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[204] Marrow, p. 235.