

51. Dunlap [1914 p.36]. Watson [1914 p.18n] borrows this argument, with acknowledgement to Dunlap, to explain why people might come to believe in "the fiction of visual imagery".

52. Dunlap, 1914 p.36.

53. Watson, 1919 chap.IX; 1930 chaps.X-XI.

Notes to §I.B.4.

1. Watson, 1930 p.5.

2. See e.g. chapter three of Wolfgang Köhler's **Gestalt Psychology** [1929], which is entitled "A Criticism of Introspection".

3. Petermann, 1932 introduction (original German 1929); Danziger, 1980 p.256.

4. Petermann, 1932 p.5.

5. See e.g. Koffka, 1935 p.684. Carnap's attempt, around 1928, to incorporate Gestaltist ideas into his positivist system would seem to rest on a thorough misunderstanding of Gestalt Theory - as he seems later to have realised [see Carnap, 1967 §67 and p.vii].

6. Schultz, 1981 p.285.

7. In a letter to R.M. Ogden - quoted by Henle [1984 p.10]. The substance behind this extravagant claim would seem to be that, together with Einstein (who was a good friend of Wertheimer's [Wertheimer, 1959 p.213; Michael Wertheimer, 1970 p.122; Luchins & Luchins, 1979]), were finding themselves to be leading representatives of the 'Romantic' or 'dynamical' approach to science. This is the tradition of Boscovich, Faraday, Maxwell etc., the tradition which tends to take force rather than matter as the primary reality, as opposed to the more dominant 'mechanical' tradition [see Hendry, 1986 chaps.1 & 2]. The Gestaltists, especially Köhler, were quite explicit about preferring "dynamic" as opposed to "mechanical" explanation, not only in psychology but in science in general [e.g. Köhler, 1940, 1929 chap.4]. Faraday's notion of field became absolutely central to Gestalt theory, as we shall see.

8. Henle, 1984.

9. Koffka, 1922.

10. Köhler, 1929.

11. Shipley, 1961 pp.1126, 1195.

12. Shipley, 1961 pp.1088, 1126. Wertheimer and Koffka were both Jewish. Köhler was not, but after he had spoken and written against the new government and the dismissals of Jewish academics, and had suffered various forms of harassment for his pains, he found it prudent to give up his prestigious Berlin chair and leave the country. Kurt Lewin, another influential Gestaltist, also fled to America in 1933 [Henle, 1978, 1984].

13. It is no accident that Gestalt Psychology or Gestalt psychologists are frequently approvingly cited or even mentioned as important influences by anti-positivist philosophers of science during the middle years of this century. Examples are Kuhn [1970], Hanson [1958] and Polanyi [1958]. However, with the possible exception of Polanyi, only a very shallow understanding of Gestaltist principles is displayed in these authors' writings [see Mandelbaum, 1977] (Mandelbaum is in a position to know, having been a colleague and disciple of Köhler's at Swarthmore College [Mandelbaum, 1964 p.246]). The relativistic conclusions which can be found in, or readily drawn from, the works of Kuhn and Hanson are really quite at odds with Gestalt Theory and with the opinions of the leading Gestalt Psychologists [Luchins & Luchins, 1978; Köhler, 1938 chap.1; Koffka, 1935 p.347; Newman, 1944 pp.433-4]. The fact of the matter may be that "Gestalt" had acquired a sort of symbolic anti-positivist significance by this time, even amongst those relatively innocent of the actual theory. (Polanyi was emphatically not a relativist, and his work contains many direct allusions to Gestalt Psychology, which he repeatedly cited as a major, even the major influence on his philosophic thinking [e.g. 1958 p.vii; 1959 p.102; 1963 p.3]. One of his earliest papers on philosophy of science [Polanyi, 1941] contains noticeable echoes of Köhler's Gestalt Psychology [Köhler, 1929].)

14. 1980.

15. See Mayer, 1981 p.6.

16. See Schultz, 1981 p.381.

17. Hamlyn, 1957 p.3.

18. E.g. Koffka, 1928 pp.252, 258-9 (first German edition 1921); Köhler, 1929 p.150; Wulf in Ellis, 1938 p.138 (original German 1922).

19. In Ellis, 1958 p.1 (original German 1925).

20. See Köhler, 1940 chap.2 §1.

21. See Danziger, 1980 p.256. And c.f. Shipley [1961 p.1032] on the "novel" use of language in Wertheimer's pioneering Gestalt paper.

22. As told by Michael Wertheimer [1970 p.122n].

who is, I believe, the son of Max. Newman [1944 p.431] also recounts the story in his obituary for Wertheimer.

23. A fuller account of Wertheimer's education is given by Newman [1944 pp.429-30].

24. Kolers, 1972 p.8. My emphasis.

25. This does not mean the rapidly flashing light to which this name is now most usually applied, but a device which "produces the illusion of motion by a series of pictures viewed through the openings of a revolving disc" [O.E.D.].

26. Michael Wertheimer, 1970 p.123; Shipley, 1961 pp.1127,1195. Koffka had also briefly worked as Külpe's assistant at Würzburg [Shipley, 1961; Henle, 1984 p.10]. Harrower [1983 pp.253-4] gives a fuller account of Koffka's education.

27. Wertheimer in Shipley [1961 p.1042] (original German 1912).

28. *Experimentelle Studien über das Sehen von Bewegung*. I have used the (abridged) English translation in Shipley [1961 pp.1032-1088] - original German 1912.

29. See e.g. Koffka, 1935 p.280; Köhler, 1929 pp.72,73; Köhler, 1971 p.108f (original publication 1967); Petermann, 1932 p.7 (original German 1929); Henle, 1980 p.178.

30. 1970 Postscript.

31. Wertheimer in Shipley [1961 p.1032] (original German 1912).

32. See Kolers, 1972 chap.1.

33. There is some dispute over exactly what Wertheimer intended " ϕ " to refer to. O'Neil & Landauer [1966 p.335] designate it simply as "the phenomenon of apparent motion"; Kolers [1972 p.9] restricts it to "'figureless' or 'objectless' apparent motion", where movement is seen, but not what moves; and Seaman [1984 pp.3-4] argues that it means any impression of motion, whether illusory or veridical. My suspicion is that Seaman is the most reliable here. (Kolers may be giving the modern usage rather than Wertheimer's.)

34. Wertheimer in Shipley [1961 pp.1071-3] - original German 1912.

35. Wertheimer in Shipley [1961 pp.1077-8] - original German 1912.

36. The 1915 date is given by Köhler [1971 p.110 (original publication 1967)] (and, following him, by Seaman

[1984]), and refers to the paper translated in Ellis [1938] under the title "Reply to V. Benussi". Petermann [1932 p.9 (original German 1929)] cites an earlier, 1914, paper of Koffka's as where "a reorientation of principles first comes to clear expression". What Koffka wrote at this time seems to have derived fairly directly from what Wertheimer was saying in lectures and in conversation, but was reluctant to set down in print [Newman, 1944 p.433; Köhler, 1971 p.110]. Wertheimer seems to have suffered all his life from a lack of confidence in committing his thoughts to paper [Köhler, 1944 p.146; Newman, 1944 p.434] with the result that, although the originator and prime intellectual force of Gestalt Psychology he remains less well known than his more prolific followers.

37. Köhler, 1971 p.110 - originally 1967.

38. Koffka in Ellis [1938 pp.377-8 (original German 1915)]. Seaman [1984 p.5] adds another "methodological" principle from an earlier paper of Koffka's.

39. See Kolers [1972 pp.14-15]. Direct experimental refutations of the physiological theory were carried out by Lashley, Chow & Semmes [1951] and Sperry, Miner & Meyers [1955] (see below). Köhler, however, continued to dispute these findings to the end of his life [Köhler, 1958; Köhler, 1971 chap.14 (original 1967)], and 'second generation' gestaltist Mary Henle still seems to think it is defensible [Henle, 1980 pp.183-4]. (Köhler died in 1967. Koffka and Wertheimer had died in 1941 and 1943 respectively.) Kolers [1972 p.15] calls the theory, as Köhler developed it, "bizarre", but it probably did not seem so in 1912. In fact Wertheimer's original version shows a noticeable resemblance to the neurophysiological theory proposed by Pavlov, only a few years before, to explain his famous experiments on conditioning [Kolers, 1972 p.14n; and see Fancher, 1979 pp.308-13] - and Pavlov was a Nobel Laureate physiologist. Pavlov had a very low opinion of Gestalt Psychology, but his quarrel was not with its physiological aspect [see Pavlov, 1957 pp.592-605 (from conversations held in 1935)].

40. See Köhler in Ellis [1938 chap.3 (original German 1920)]; Köhler [1940]; Köhler [1969 pp.103f]; and see previous note. It is worth noting, also, that in 1939 Koffka gave a series of lectures in Oxford on "Gestalt Psychology and Neurology", and was working them up into a book when he died in 1941 [Harrower, 1983 p.258].

41. In Ellis, 1938 chap.32.

42. According to the recent writings in the philosophy of science from Nancy Cartwright [1983] and Ian Hacking [1983], this may always be the case. Scientific theories (putting it crudely) are all strictly false, but may nevertheless be pragmatically useful and lead us to true facts. I have considerable sympathy with these views.

43. Wertheimer in Shipley [1961 pp.1084-5] - original German 1912.
44. Köhler, 1940 pp.54-5.
45. Henle, 1980 p.183.
46. Koffka, 1935 p.53.
47. Koffka, 1935 pp.53,56 (my emphasis).
48. Köhler in Ellis [1938 p.18] (original German 1920).
49. See e.g. Koffka, 1935 p.54.
50. Koffka, 1935 p.56. C.f. Wertheimer in Ellis [1938 p.15] (original German 1922).
51. Koffka in Shipley [1961 p.1153] (original 1922).
52. Wertheimer in Shipley [1961 p.1085 (original German 1912)]. (Emphasis in original.)
53. Köhler, 1927 (first German edition 1921).
54. Wertheimer in Ellis [1938 pp.71-88] (original German 1923).
55. Die Physischen Gestalten in Ruhe und im Stationären Zustand, Eine Naturphilosophische Untersuchung. Erlangen, 1920. A much abridged translation can be found in Ellis [1938 pp.17-54].
56. Köhler, 1940. A very similar account is given in Köhler, 1938 chap.VI §III.
57. Köhler, 1940 p.76.
58. Köhler, 1940 p.77.
59. See Köhler in Ellis [1938 p.22] (original German 1920).
60. Köhler, 1940 p.80.
61. Köhler, 1940 pp.79-80.
62. 1977 p.9
63. 1974 pp.7-8
64. Köhler & Held, 1949 p.419. Henle [1980], responding to Gregory and to Kaufman, has recently denied that the brain fields are intended to be pictorial in this sense. Admittedly, as she points out, Köhler qualifies his conception of isomorphism, saying that the structure of the

cortical field need not be a geometric projection of the visual field, but only need be functionally isomorphic [Köhler, 1938 p.220; 1971 chap.12 (originally 1930)]. Wertheimer had, indeed, made a similar point in 1912 about his theory of the ϕ -phenomenon [in Shipley, 1961 p.1085n]. Kaufman [1974 pp.7-8] seems quite aware of these points, but, like myself, he seems to find it hard to see how any spatial arrangement of the cortical field which is not at least a topologically accurate, one-for-one projection could be reconciled with the account of the brain as an electrolytic volume conductor which is central to Köhler's theory. In any case, the point is irrelevant to my argument. I could quite happily accept that the cortical field is a functional rather than a geometrically accurate image [c.f. Rey, 1981]. The important point, the way it is supposed to play its rôle in cognition, will not be affected.

65. Köhler, 1938 p.197.

66. Köhler, 1929 p.98. (My emphasis.)

67. Köhler, 1938 p.218 (emphasis in original).

68. 1935 p.61.

69. Koffka, 1935 p.67.

70. This is not explicit in Aristotle, although it is perhaps implicit in *Poetics* 1455a [Bywater, 1909 p.49] (and see also Else [1957 pp.496,499]). It does become explicit in later antiquity [Rees, 1971].

71. E.g. Arnheim, 1949, 1970.

72. E.g. Wertheimer, 1959.

73. E.g. Köhler, 1927 (first German edition 1921).

74. See Köhler, 1929 chap.X; Koffka, 1935 pp.382f. These works were written in English, but it may be worth noting that the term as it was first introduced was the German "einsicht", which Koffka [1928 p.197 (first German edition 1921)] claims is being used "without theoretical preconceptions, in the common sense in which everyone takes it". English speaking readers, however, may find the term "insight" rather obscure; certainly it seems to have led to misunderstanding [see Köhler, 1929 p.200].

75. See Köhler, 1929 chap.X; Koffka, 1935 pp.382f.

76. See Köhler, 1929 pp.202-3.

77. Köhler, 1927 (first German edition 1921).

78. Köhler, 1927 chap.VII (original German 1921).

79. See Wertheimer, 1959.

80. There are many stories to this effect [see Koestler, 1969]. However, Perkins [1981 chap.2] has recently expressed doubts about taking these anecdotes too seriously.

81. Köhler, 1969 pp.163-4.

82. It has not always been seen this way, especially by those who ignore its physiological basis (which it is all too easy to do). Both anti-scientific romantics and positivists, including the Behaviorists who then dominated American psychology, had reason to misunderstand, or misrepresent, Gestaltism as being somehow non-scientific (see Pavlov's [1957 pp.592-605] vitriolic comments). Luchins & Luchins recall the following incident from one of Wertheimer's early seminars in America:

A student asked why it was that in most psychology courses and textbooks one got the impression that Gestalt psychology was a kind of mysticism reflecting the philosophical views of Kant, Plato, Aristotle, German Idealism and Romanticism; yet from what he had heard in class they were even more scientific and empirical-minded than many of the people who criticised them. Was he giving us a newer version of Gestalt psychology? Wertheimer said that there had been continued misunderstanding.

[Luchins & Luchins, 1970 p.9].

83. 1938.

84. 1935.

85. Henle, 1961.

86. Lashley, Chow & Semmes, 1951.

87. Sperry & Miner, 1955.

88. Sperry, Miner & Meyers, 1955.

89. We should note, again, Köhler's [e.g.1958, 1971 pp.280-3] and Henle's [1980 pp.183-4] continued questioning of these results.

90. Kolers, 1972 p.15.

91. Hochberg, 1974 pp.188-92.

92. Koffka, 1935 p.67 et passim.

93. See Dennett [1982, 1978c] on the implausibility of this view.

94. Koffka, 1935 p.65.

95. Köhler, 1971 chap.3 (first published 1960).
96. 1971 pp.80-81. C.f. Kaufman, 1974 p.8.
97. Köhler, 1971 p.71. Köhler does not consider 'epiphenomenalism' (the view that the brain can affect the mind, but not vice versa) which might appear even more in conformity with the theory of isomorphism than is parallelism. However, such a doctrine would clearly also imply the rejected 'emergence', and perhaps run into other difficulties besides.
98. Köhler, 1971 p.81.
99. 1978c p.249.
100. 1949.

Notes to §I.C.1.

1. Solso, 1979 p.5.
2. Shannon, 1948.
3. Neisser, 1967 pp.7-8.
4. On Bartlett and imagery see Kessel [1972].
5. See Richardson, 1976 p.ix.
6. Holt, 1964 (an earlier version was read to division 12 of the American Psychological Association in 1962).
7. Cohen, 1979 - and of course see Skinner, 1948, 1972.
8. Holt, 1964 p.257.
9. Holt, 1964 p.261.
10. Holt, 1964 p.257.
11. Bexton, Heron & Scott, 1954 p.70.
12. Bexton, Heron & Scott, 1954 p.73.
13. See e.g. Penfield, 1958.
14. The use of "revolution" here seems to owe nothing to Kuhn but is rather based on an explicit analogy with the political American Revolution of 1776. Hebb, we should note, is Canadian. Neisser's [1972b] 'post-revolutionary' title "A Paradigm Shift in Psychology" presumably is indebted to Kuhn. It is notable that Neisser