with groups and group behavior (drawing upon group dynamics, sociometry, and industrial sociology), and the characteristics and identification of leadership. With these materials as background, the balance of the volume takes up institutions, management and union tactics, the accommodation process, the strike, cooperation, and industrial peace. A wealth of research is reported, but precisely in these areas the individual psychology principles either do not enlighten very much or seem to require undue straining of the facts. For example, in the treatment of management "tactics," it seems to stretch the point to analyze such procedures as job simplification, new machinery, time and motion study, employee testing, and so forth, as devices to afford management "ego gains," surely an incidental benefit if it occurs at all.

Although Stagner does not offer any prescriptions for its attainment, he seems to be, on the whole, optimistic about the possibilities for management-union cooperation and accommodation and industrial peace, which "is not an Utopian dream." All thinking men must agree with him that it can be achieved, however, only if the leadership is intelligent, informed, and mature. Whether these are virtues needed only or primarily by management leaders, as the author seems to imply, or perhaps by leaders on both sides of the table, and in government, is not yet clearly demonstrated. Furthermore, it sometimes seems that the leader and his perceptions may not so much shape the situation as the situation will permit a rise to leadership of the individual whose attitudes and perceptions fit the requirements of the situation.

I believe that Stagner's book is an interesting addition to the literature and worth the reader's time.

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Fire Research, 1955. H. M. Stationery Office, London, 1956 (order from British Information Services, 20 Rockefeller Plaza, New York 20). 57 pp. Illus. $0.72.

Since 1947, research on fire fighting and fire prevention in the United Kingdom has been carried on jointly by the Department of Scientific and Industrial Research and a committee formed by the insurance societies. The annual reports of the Joint Fire Research Organization provide a detailed and continuing record of the progress of this research. The most recent annual report, that for 1955, includes sections dealing with statistics of outbreaks of fires; fundamental studies of the initiation and growth of fire; results of tests on various fire-extinguishing agents; effect of fire on properties of concrete; structural aspects of fires in buildings; special fire hazards—for example, flammability of fabrics; and tests of fire-fighting equipment. A new committee to advise on research into industrial fires and explosions was set up during the year under review.

The National Academy of Sciences–National Research Council, acting on behalf of the Federal Civil Defense Administration, set up early in 1956 a Committee on Fire Research and a Fire Research Conference. Close liaison is being maintained between the British and the American organizations, and a paper on British fire research is to be read at the forthcoming Research Correlation Conference, organized by the academy.

Behavior Theory and Conditioning. Kenneth W. Spence. Yale University Press, New Haven, Conn., Geoffrey Cumberlege, Oxford University Press, London, 1956. vii + 262 pp. Illus. $4.50.

Spence represents psychology for the first time in the Silliman lectures. For this reason he begins with an essay on historical and modern conceptions of psychology. He traces psychology's struggle to become objective and defends the need for pure science research, even though it requires artificial and nonlife-like conditions of experimentation.

The remaining lectures represent a sample of psychology as science, the subject matter being that of laboratory learning and the method that of quantitative ordering of data in the context of theory. The background comes from the conditioning experiment made familiar by Pavlov and the kind of theoretical construction associated with the name of Clark L. Hull. Although Hull left his mark on a great many psychologists and other behavioral scientists who passed through Yale before his death in 1952, learning theorists look especially to Spence as the man to carry on where Hull left off. Those who were close to Hull and Spence know of their extensive correspondence about theory, and Hull in the prefaces to his major books referred to Spence's influence on his own theorizing.

In these lectures Spence has struck out on his own, acknowledging his indebtedness to Hull, but calling attention, too, to their differences. He has here brought to a head a number of suggestions that have appeared in his work during the past 20 years and has included much new analysis. The main differences in outlook between him and Hull are that Spence does not follow Hull's postulate system and the formal hypothetico-deductive method, he does not see the need for specifying a neurophysiological basis for intervening variables, and he does not commit himself on the mechanism of reinforcement.

Although in all the lectures there is a closely related interaction between data and theory, those already familiar with Hull's system will probably find Spence's treatment of motivation, especially the K factor, both the most novel and the most fertile in suggesting new lines of data gathering. The K factor refers to incentive motivation—how what happens in the goal-box affects what goes on in the next trial on the way to the goal. In rat learning, both the amount of the goal and the time spent in eating affect this subsequent behavior. According to Spence, the action is by way of motivation (K being added to D, the drive factor) rather than by way of an increase in habit strength (H), or by way of a separate process entering into multiplicative relationship with other factors. There are a number of implications systematically followed out by Spence, tested by data from his laboratory.

This is a major contribution, both to theory construction in psychology generally, and to learning theory specifically. It should help scientists from other fields to understand what psychologists are trying to do, and it should help psychologists to move forward toward the solution of their problems.

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The Chemistry of the Coordination Compounds. John C. Bailar, Jr., Ed. Reinhold, New York; Chapman & Hall, London, 1956. 834 pp. Illus. $18.50.

This is a worthy addition to the long and distinguished Monograph Series of the American Chemical Society. Although its editors disclaim an attempt to cover the entire chemistry of coordination compounds in a single volume, a remarkably broad and excellent survey of this huge subject has, nevertheless, been accomplished. When we reflect that most of the elements in the periodic table, barring only the rare gases and some of the alkali metals, are known to enter into complex compounds, the vastness of the undertaking will be appreciated.

The first of the book's 23 chapters (there are 25 contributing authors) outlines the scope of coordination chemistry according to the donor properties of some of the more important ligand atoms: halogens, oxygen, sulfur, nitrogen, phosphorus, arsenic, and carbon. Especially

welcome is the tabulation of the nomenclature rules that have been adopted by the International Union of Pure and Applied Chemistry.

In succeeding chapters the power and brilliance of Werner's theory are developed. Once so controversial, it is now accepted in all important respects. Within its framework the inorganic (or is he organic?) chemist unravels the three-dimensional complexities of molecular structure with confidence. Deservedly, many of the monograph's chapters are concerned with the details of the architecture of coordination compounds: isomerism in its many forms, chelation and heterocyclic rings, bridge structures, and coordination numbers. There is another approach than the structural one—fully as important—which takes the attention of chemists, however. It is a concern for a deeper understanding of the nature of the forces that bind atoms together. The attempts to describe these interactions on electrostatic models are well presented, and good qualitative descriptions of the atomic orbital and molecular orbital theories of binding are given. A more detailed mathematical treatment of these approximations of quantum mechanics would have been welcome.

For the most part, the emphasis has been laid on the conclusions that have been drawn from measurements, although one chapter is devoted to physical methods: spectroscopic, electrometric, magnetic, x-ray and electron diffraction, isotopic tracer, and transport studies. The over-all integration is excellent, especially in view of the numerous contributors; such overlap as does exist is commendable. The book fairly bristles with literature references, and the indexing appears to be thorough.

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Agricultural Ecology. Girolama Azzi. Constable, London, 1956 (order from Essential Books, Fair Lawn, N.J.). 424 pp. Illus. $7.20.

The relatively new science of agricultural ecology attempts to correlate the physical features of environment, soil, and climate, with the quantitative, qualitative, and generative (characters of seed) development of agricultural plants. By this approach to a study of bio-environmental relationships, the action of each factor on the plant is carefully studied, and then the effect of each is measured as a function of all the other factors. Therefore, it may be possible to obtain the same yield with quite distinct groupings of factors, because it is possible for the factors to combine in many different ways, with the most unexpected compensating effect as the result. The methods could also contribute to studies in other fields such as forestry and animal husbandry.

Part I with 12 chapters deals with the concept of meteorologic equivalents and agricultural climatology (bio-atmospheric units) in relation to the growth and yield of crop and certain woody plants. An evaluation of the atmospheric environment is attained by determining the meteorologic equivalents for each plant, which make it possible to represent and summarize climate by the frequencies of normal and abnormal situations that result from an excess or deficiency of rainfall and temperature. Consideration is also given to certain factors such as diseases and photoperiodism. Isophane charts are given for sowing and harvesting of wheat throughout the world. The equivalents are determined for each of the subperiods of vegetative development, which in the case of chestnut are (i) leafing, (ii) flowering, (iii) fruit formation, (iv) maturity, and (v) dormancy. Equivalents are given for a number of crop and woody plants. An integration of the equivalents with an evaluation of losses through excess or deficiency will yield a "climatic formula" that summarizes positive and negative atmospheric values in the various zones for each single crop.

Part II with two chapters presents the method used for determining the relationship between the positive and negative values of soils in relation to growth of various crop plants. The study of soils is characterized by (i) the determination of soil-units, (ii) the conception of the repeated series of soils, and (iii) climate-soil units or the synthesis of the physical environment. Some of the soil characteristics used in the evaluation of the effects of soil on yields are chemical capacity, water balance, and workability. The climate-soil units offer a measured representation of the physical environment that is indispensable to the agronomist, economist, and geneticist.

Part III with nine chapters is largely a discussion of the quantitative, qualitative, and generative yield of cultivated plants. Of particular interest is the system of velocity-mass-structure. Small velocity with great expansion of mass is related to productivity, while great velocity with small mass is correlated with hardiness. With rust, for example, a higher degree of resistance may even be encountered with a small velocity of development.

Part IV with four chapters deals with a general discussion on factorial combinations, geographic trials with corn, and analysis of the components of yield.

This well-organized book includes numerous tables, figures, and charts as well as a glossary and an extensive bibliography. *Agricultural Ecology* should interest all teachers and scientists in agriculture, forestry, and animal husbandry.

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New Books

The Image of the Heart. And the principle of synergy in the human mind. Daniel E. Schneider. International Universities Press, New York, 1956. 267 pp. $6.

A Space Traveler's Guide to Mars. I. M. Levitt. Holt, New York, 1956. 175 pp. $3.95.

They've Got Your Number. Robert Wernick. Norton, New York, 1956. 124 pp. $2.95.

Handbuch der Physik. Band XXI, *Gas Discharges 1.* S. Flugge, Ed. Springer, Berlin, 1956. 683 pp. DM. 105.50.

Photoconductivity Conference. Held at Atlantic City, 4–6 Nov. 1954. Sponsored by the University of Pennsylvania, Radio Corporation of America, and Office of Naval Research. R. G. Breckenridge, Chairman, Editorial Committee. Wiley, New York; Chapman & Hall, London, 1956. 653 pp. $13.50.

Topics in Number Theory. vols. 1 and 2. William J. LeVeque. Addison-Wesley, Reading, Mass., 1956. vol. 1, 198 pp., $5.50; vol. 2, 270 pp., $6.50.

Arctic Frontiers. United States explorations in the far North. John E. Caswell. University of Oklahoma Press, Norman, 1956. 232 pp. $3.75.

Fundamental Concepts of Higher Algebra. A. Adrian Albert. University of Chicago Press, Chicago, 1956. 165 pp. $6.50.

Geology of the Delaware Valley. Horace G. Richards. Mineralogical Society of Pennsylvania, Philadelphia, 1956. 106 pp. $2.50.

Education in the U.S.A. A comparative study. W. Kenneth Richmond. Philosophical Library, New York, 1956. 227 pp. $4.50.

Astronomical Optics and Related Subjects, Proceedings of a Symposium. Zdenek Kopal. North-Holland, Amsterdam; Interscience, New York, 1956. 428 pp. $12.50.

Applied Metallurgy for Engineers. Malcolm S. Burton. McGraw-Hill, New York, 1956. 407 pp. $7.50.

Challenge of the Andes. The conquest of Mount Huantsan. C. G. Egeler and T. De Booy. Translated by W. E. James. McKay, New York, 1956. 203 pp. $4.50.

Diseases of Field Crops. James G. Dickson. McGraw-Hill, New York, ed. 2, 1956. 517 pp. $8.50.

The Intellectual Life of Colonial New England. Samuel Eliot Morison. New York University Press, New York, 1956. 288 pp. $4.95.

On Freedom and Free Enterprise. Essays in honor of Ludwig von Mises. Presented on the occasion of the fiftieth anniversary of his doctorate, 20 February 1956. Mary Sennholz, Ed. Van Nostrand, Princeton, N.J., 1956. 333 pp. $3.50.