

missive dog presents his jugular vein to the dominant animal. I have observed aggressive behavior in dogs for over 20 years and have seen a great variety of adjustments between dominant and subordinate dogs, but I have yet to see a behavior pattern that could be interpreted as presenting the jugular vein.

There are two defects in the classical instinctual analysis of behavior as presented by Lorenz. One is that it provides a theoretically complete explanation for behavior and so offers no new leads for research. The second defect arises out of the first. Because it is limited by theory, the analysis provides only limited practical solutions. If destructive aggressive behavior is caused by a spontaneous outburst of internal energy, then sublimation is the only practical answer to the problem. While it has some application, sublimation by itself is a very weak reed upon which to rest our attempts to control aggression. Lorenz is on the side of the angels, but his theory limits him to using only one of the many tools available. This is essentially the same as William James's idea of the Peace Army, which has become a modern reality as the Peace Corps. As we know, this will not by itself eliminate aggression.

Actually, there is no evidence that there is any physiological mechanism in any mammal which produces stimulation to fight in the absence of external stimulation. Rather, there is much evidence indicating that mechanisms exist which are easily excited by external stimulation and which function to prolong and magnify the effects of this stimulation. Aggressive behavior can be greatly enhanced or completely suppressed by training; the capacity to develop such behavior can be greatly magnified or almost completely eliminated by genetic selection. Furthermore, Lorenz has entirely missed one of the most important newer findings arising from the study of animal behavior, namely, that a major cause of destructive fighting in animal societies is social disorganization.

As a student of the evolution of bird behavior, Lorenz has presented a bird's-eye view of mammalian and human aggression. It is fascinating, but it is only 50 percent science.

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A Tribute to Littlewood

A special volume of the **Proceedings of the London Mathematical Society** [vol. 14A (1965). J. D. Wesson, Ed. Oxford University Press, New York, 1966. 320 pp., illus. \$12.80] was presented to J. E. Littlewood, professor emeritus at Cambridge University, on the occasion of his eightieth birthday, 9 June 1965. Here was a felicitous occasion: Littlewood is one of the greatest living mathematicians, the London Mathematical Society (with which he has been closely identified for decades) was to celebrate its centenary the following month, and the papers in the volume (written by prominent mathematicians) are almost all in fields to which he has greatly contributed.

Littlewood's name is frequently mentioned in the form Hardy-Littlewood, signaling his notable collaboration of 35 years with G. H. Hardy. (An atrocious example, which nonetheless illustrates the point: the wife of a number theorist, herself no mathematician, on learning that Littlewood was traveling to the local university and was then 77, exclaimed, "My, but he's a hardy Littlewood!") A good half of Littlewood's output is in joint papers with Hardy. The collaboration, conducted almost entirely by correspondence, was governed by two inflexible rules: (i) either one, on acquiring any idea, however rough or tentative, had to write it down in a letter that was then sent to the other; and (ii) the recipient didn't have to read the letter. Perhaps the most famous fruit of the collaboration is the "Hardy-Littlewood method," also known as the "circle method." If the authors had done only this, they would still be permanently enshrined in the mathematical hall of fame. The method was successfully applied in the twenties to the fundamental problems of additive number theory; for example, in how many ways can a positive integer be written as a sum of squares, of primes, of k th powers, and so on. It survives and will continue to survive as a fundamental tool in analytic number theory and has been used recently, to give only one example, to obtain powerful new results in the theory of diophantine equations (Davenport, Birch, Lewis).

Many of the papers in the volume under review are closely connected with Littlewood's own work. A good example is A. E. Ingham's article, "On

Tauberian theorems." Consider a series $\sum a_n$; if it converges, then the power series $\sum a_n x^n$ converges in $|x| < 1$, and it is relatively easy to show that $\sum a_n x^n \rightarrow A = \sum a_n$ as $x \rightarrow 1$ (with $x < 1$). But the converse is false: with $a_n = (-1)^n$, $\sum a_n x^n = 1/(1+x) \rightarrow 1/2$ but $\sum a_n$ is not convergent. However, if we impose the condition $na_n \rightarrow 0$ as $n \rightarrow \infty$, the converse theorem becomes true, as was proved by A. Tauber. In 1910 Littlewood made the outstanding improvement of assuming only that na_n is bounded as $n \rightarrow \infty$ and proving the convergence of $\sum a_n$. For this purpose Littlewood used a "peak function" $u^N e^{-su}$, which as a function of u has a peak at $u = N/s$, and the peak becomes sharper as N increases. In 1930 Karamata greatly simplified Littlewood's proof. At first sight Karamata's method seems to have nothing to do with Littlewood's, but Ingham points out that there is a peak function concealed in Karamata's argument. He then generalizes the whole situation, eventually obtaining theorems which include not only the original Littlewood method but some of a more numerical nature that are of more recent discovery.

This volume will take its place of honor in the long list of distinguished volumes commemorating the lives and work of outstanding mathematicians.

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Festschrift for Weisskopf

It is a custom, more in Europe than in this country, to honor outstanding men of science by publishing books or special issues of journals containing articles by their colleagues and former students. What other purpose, if any, can such *Festschriften* serve? An answer to this question must be given in order to give a fair appraisal of **Preludes in Theoretical Physics, In Honor of V. F. Weisskopf** [A. de-Shalit, H. Feshbach, and L. Van Hove, Eds., North-Holland, Amsterdam; Interscience (Wiley), New York, 1966. 361 pp., illus. \$12.75].

The disadvantages of the practice of publishing *Festschriften*, especially in the case of the special issues of scientific journals, have recently been put forward eloquently by S. A.