Fig. 1. Response-latency in naming objects versus $\log_{10}$ frequency of occurrence of the name in English. ●, Picture set 1; □, picture set 2

extending over a ratio of three to one; (2) that there is a closely followed linear relation between latency and logarithm of word-frequency. The bearing of this particular relationship is not clear, though it may be noted that it would be generally consistent with the kind of word-commonness frequency distribution found empirically by Zipf³. It might be thought that one reason why objects with rare names take longer to name than those with the more common is that there is, as is well known, a marked tendency for rarer words to be longer than common ones. It might be suggested, therefore, that the greater latency is due to greater time being required to organize the motor patterns of speech. So far as our results are concerned, however, this factor plays no significant part. The correlation $r_{xy,z}$ between x (log frequency) and y (latency) keeping z (number of syllables) constant is $r_{xy,z} = 0.618$, $P < 0.001$, while $r_{xy,z}$ (latency versus syllables, log frequency constant) = $+0.200$, $P < 0.4$.

Rough experimental tests we have carried out on the effect of practice on the naming-latencies show that for the same set of objects re-presented (in different random orders) on two subsequent occasions, the latencies progressively diminish by a fairly large amount (35 per cent) for the least common names and by a small amount (16 per cent) for the most common. This presumably reflects the effects of increasing familiarity with the ensembles of stimuli, there being less scope for improvement in the shorter reaction-times.

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³ Zipf, G. K., *The Psycho-Biology of Language* (Houghton Mifflin Co., Boston, 1935).

Natural History of Aggression

In the report of the recent symposium of the Institute of Biology on the "Natural History of Aggression"¹ it is surprising that no consideration appears to have been given to field sports among possible substitutes for war (Dr. A. Storr's paper).

Modern man, as opposed to primitive man, does not stand in a natural predator/prey relationship to what he kills, so exclusion of modern human predation from

interspecific aggression (Mr. J. Fisher's paper) need not here apply. If this is accepted, field sports, with elaborate rules in direct ratio to efficiency of technique and inverse ratio to utilitarian value, seem explicable in terms of a slight extension of Storr's thesis that aggression is a deep-seated drive in mankind which needs to be satisfied. Such rules as reflect the desire to preserve as well as destroy might perhaps be analogous to his postulated vital 'assumption of similarity' in the intraspecific context.

In view of Dr. Freeman's suggestion of man's inheritance of a carnivorous psychology from remote ancestors, it is not surprising that the predatory instinct has survived the comparatively few generations since domestication removed much of its utilitarian value, and it seems unrealistic to ignore it. In present-day England, however, views on field sports are usually subjective and tend to be focused on the prey species. The importance of understanding human aggression and possible outlets for it, alternative to war, brought out by the symposium, would seem to warrant serious objective investigation of the psychology of the subject.

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ARCHAEOLOGY

Thermoluminescent Dating of Ancient Ceramics

Most clays contain a few parts per million of uranium and thorium and a few per cent of potassium, so that the body of an ancient pot receives a radiation dose of the order of 1 r./g./yr., mainly from α -particles. Some of this energy is stored in the constituent minerals of the clay either by the creation of new lattice defects or by the filling of existing impurity traps. On heating, some of this energy is emitted as visible light. In the majority of cases the pot will have been fired to about 800° C in antiquity when it was made, so that accumulation of stored energy begins anew from that time, and there is the possibility, first suggested by Daniels *et al.*¹, that the thermoluminescent glow observed from ancient pottery could be used as a measure of its age. Thermoluminescent study, in the dating of lava flows² and limestones³, for example, is fairly well known as a geological tool, but little has been heard of its archaeological exploitation since an announcement by Kennedy and Knopff⁴ in 1960 and a description of technique by Houtermans, Grögler and Stauffer⁵ in 1960. The present communication reports the results obtained on potsherds ranging back to 8,000 years in age and widely spread in provenance.

The thermoluminescence was detected with a photomultiplier (E.M.I. 6255S/A) having maximum spectral response at 3500 Å, using a blue filter to reduce black-body radiation. The sample, in the form of 15 mg of potsherd ground-up to less than 150μ diameter, was spread over a 0.8 cm² area in the central region of a 1-mm thick graphite plate. The temperature of this plate was raised at about 25° C/sec by passing a current of several hundred amps directly through it. Curve N of Fig. 1 shows a typical glow curve. Curve B represents the black-body radiation, obtained from a second heating of the sample. The natural thermoluminescent glow is the difference between these two curves. The glow curves are taken in an atmosphere of nitrogen, since it was found that in air there was appreciable glow from a recently fired pot—or a re-fired ancient potsherd—and it is clearly important that zero glow should be obtained for zero age,