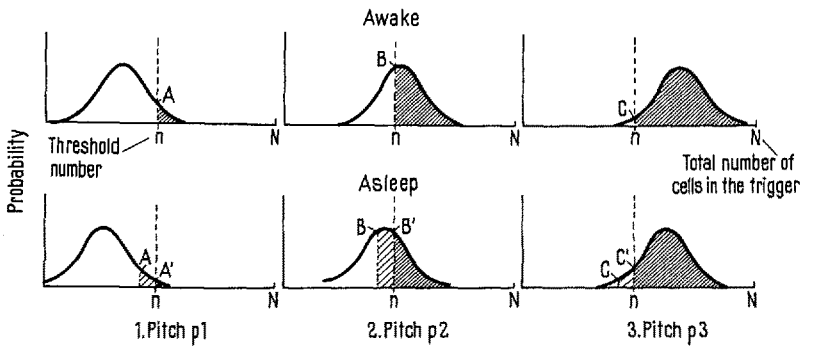

Fig. 2. Hypothetical situation. On abscissae, number of trigger cells responding to a presentation of a given pitch. N is the total number of cells in the trigger mechanism; n is the threshold number of cells (i.e. on a given presentation, the response will occur whenever any n or more trigger cells respond). On ordinates, respective probabilities. Upper row, curves awake; lower row, curves asleep. Left, center and right columns correspond to pitches p1, p2 and p3 respectively. See text.

divided into three differently effective categories according to where the curve is intersected by the n line (at A, B and C respectively): pitches like *p3* for which most of the area under the curve is to the right of n and that are, therefore, very effective; pitches like *p2* for which the area is divided into similar parts and that are moderately effective; pitches like *p3* for which most of the area is to the left of n and are the least effective.

If the sleep process exerts a relatively uniform influence upon the mechanism that mediates the response, this may be reflected by a uniform shift of all probability curves to the left, without a major change in their shapes. The situation in the sleeping cat is shown in the lower row of Figure 2. Curves now intersect line n at A', B' and C', to the right of A, B and C, respectively. As can be inferred from comparison of the upper and lower rows the probability that a given tone will mobilize n or more T units and evoke the response is reduced, on passing from wakefulness to HVS, by a value represented by the lightly shaded areas between A and A', B and B' and C and C', respectively. On the basis of obvious geometrical features, it is apparent that the decrease in probability will be greater for *p2* (whose density curve mode crossed the n line when the animal fell asleep) than for *p1* (whose density curve left tail crossed the n line) and *p3* (whose density curve right tail crossed the n line). The hypothetical situation just described is summarized in Figure 1B. The *'probability of a response for a tone of a given frequency'* is plotted as a function of *'pitch'*, for the cat awake (open circles) and asleep (black circles); the vertical bars indicate the 95% probability intervals for the proportion of successes in 250 presentations[3]. The change in reactivity which occurs when the animal passes from wakefulness to sleep in the hypothetical case (Figure 1B) exhibits the same basic features as in the real experimental situation (Figure 1A). Namely: (i) the small decrease in the efficiency of the very effective 'positive' tone (*p3*); (ii) the small decrease in the efficiency of the least effective 'negative' tone (*p1*); (iii) the marked decrease in the efficiency of the intermediately effective 'negative' tone (*p2*); and (iv), as a consequence of (i), (ii) and (iii), the increase in the differentiation gradient that goes from the 'positive' to the 'negative' pitches. Note that a similar effect could be produced if, instead of the curve having shifted as a consequence of HVS, the threshold value n had increased. In summary, the hypothesis presented here, based upon assumptions and subject to constraints that are not altogether unreasonable, appears to explain a somewhat surprising experimental finding[4].

Résumé. Une hypothèse est présentée pour expliquer la discrimination tonale précise du chat endormi. Postulats: (A) Un mécanisme de déclenchement détermine si la réponse aura lieu ou non[2]; et il faut qu'une quantité minime de neurones de déclenchement soit activée. (B) Le nombre de cellules activées par chaque ton est une variable aléatoire avec une distribution qui possède certaines caractéristiques.

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