higher and a gradual return to normal was observed during the next 10-15 minutes.

In a third group of 33 experiments 7.5%-15.8% O_2 was inhaled for 8-30 minutes. Here again it was found that during the period of O_2-lack a decrease in hearing occurred. The recovery period, after readmission of air, depended greatly upon the degree of O_2-lack produced during the experimental period. If 10% or less O_2 was inhaled for 15-30 minutes a decrease in hearing persisted for considerable periods of time, in some cases for several hours. During this time no other symptoms were present. The administration of high O_2 mixtures (50-60% O_2) for 5-10 minutes does not seem to influence the course of the recovery period. These observations seem to indicate that a diminished O_2-supply for relatively short periods of time produces changes in the nervous mechanism involved in hearing which are only slowly reversible. Furthermore, they indicate that O_2-lack, CO_2-excess, and CO_2-lack influences hearing in the same fashion, although the effect of O_2-lack is most severe. Another interesting phenomenon was observed in all 3 groups of experiments. The readmission of air leads in some cases to a considerable temporary improvement in hearing. Our observations agree with those of Schubert,[2] who found that after O_2-lack upon readmission of air an improved visual discrimination is observed, as well as motor hyperexcitability. But in our experiments it is shown that such a temporary supernormal phase is not a specific reaction to O_2-lack but also occurs after CO_2-inhalation and voluntary hyperpnea.

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Influence of Variations of O_2 and CO_2 Tension in Inspired Air Upon After-Images.

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It was our objective to study the influence of variations of O_2 and CO_2 tension upon a simple and quantitatively measurable visual process in man. We chose the latent period of a negative after-image. The experimental subject fixated with both eyes the center of a yellow square on a grey background at a distance of 60 cm. The eyes were closed for one minute prior to each experiment.

[2] Schubert, G., *Pflüger's Arch.*, 1933, **231**, 1.

After a fixation time of 10 seconds the eyes were closed and a stop watch started. When the negative after-image appeared the watch was stopped. Control experiments showed that after a period of training the latent periods were very constant if the intervals between the individual experiments were at least 10 minutes. Fifty-five experiments were performed with 5 subjects. In the first group the influence of O_2 lack was studied by allowing the experimental subject to breathe various air-nitrogen mixtures from 7 to 30 minutes. The O_2 concentration varied between 9.2% and 16.0%. Whereas a reduction of the O_2 concentration to 13% was without influence on the latent period of negative after-images, very considerable changes occurred after breathing 9-11% O_2 for various times (7-27 minutes). The latent period was either considerably lengthened or became infinite since the after-image disappeared. In those experiments in which a negative after-image appeared, the subject noticed a decrease in its intensity. In some cases the latent period of the after-image remained lengthened even 10 minutes after the end of the breathing period. The subsequent experiments showed approximately the same latent periods as before the O_2-lack experiment.

Similar experiments were carried out in order to study the influence of CO_2. They showed that CO_2 is without effect upon the latent period of negative after-images when breathed in concentrations of 2-2.5% for as long as 26 minutes. The threshold concentration seems to be about 3-3.5%. A distinct increase in the latent period is observed in experiments with 4-7% CO_2 which was breathed for a period of 4-20 minutes. The effects were reversible.

A final series of experiments was carried out in order to study the influence of a reduction in the CO_2 tension upon sensory function. The subjects breathed with the rhythm of a metronome (between 64 and 90 per minute) for periods of 3-6 minutes. Immediately afterwards the after-images were investigated and showed regularly an increase in latent period.

The observations show conclusively that O_2 lack, CO_2 excess, and CO_2 lack have the same end effect on the sensory mechanism involved in the production of after-images. An interpretation of our experimental data in regard to the site of action will be postponed until more material on other sensory functions is available but it may be said that the effects are not due to circulatory disturbances. The blood pressure was either unchanged or varied only a few millimeters, whereas much greater alterations in blood pressure induced by physical exercise were without influence upon the latent period of after-images.