

## **The Ageing Workforce – An Area of Sensory Problems. - Example: Binocular Vision -**

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### **Two eyes – back-up system, redundancy or different input?**

Binocularity must not be regarded as a simple link-up of two individual eyes. They rather must be seen as another organ, the autonomy of contributing eyes being abolished in the wake of a neat visual act. Additionally vision is not a fixed program or state but a behaviourally determined process. Like in a structure of bipersonal work the overall performance is regulated, fusion being the primary mechanism. Away from coping with visual tasks binocularity plays an essential role in the realization of three biological mechanisms of order: Firstly the perception of the "fixation line" within the totality of stimuli in the field of vision. The second mechanism can be called "egocentric location", equivalent to the sensation of the line of sight in relation to the centre of our body and the eye level. The third mechanism of orientation focuses the classification and fitting in of the actual visual information in order to preserve constancy of the particular looks independently of head, body and target movements. All three are preconditions of a contingent orientation of the individual in space and time. On the other side this means that the unambiguous nature of orientation immediately is upset if fusion breaks down.

### **Characteristics of binocular vision**

Numerous phenomena mark and accompany binocular vision: Dominance of an eye for certain tasks, a variety of process hierarchies with regard to visual task sequences, etc.. The primary importance of binocularity is: By simultaneous involvement of both eyes, two-dimensional impressions give way to a three-dimensional perception of space due to the congruence of the spatial values in the two visual fields. Regardless of distance and direction of gaze, the centre of identical orientation is the point on which the two foveolae are focused, thus giving a spontaneous feeling of depth, i.e. "primary stereopsis". These visual interpretations of binocular vision, i.e. fusion with normal correspondence, are physiologically so firmly established that we can even speak of "inescapable fusion". Another important remark: Visual first-class performance at work can not be expected if efficiency measures consist of a compression of functions (classical rationalization). In visual work the unrestricted play of 'looking around' and 'looking at' must be granted if we want to make use of all facets of our even in ageing persons extremely adaptive visual orienting system.

## **Binocularity and ageing**

By inadequate tasks our 'double-eye' can be driven into real crises. Even in young individuals disproportioning of binocularity can be seen due to stress and fatigue, e.g.. This worsens when we get older, similar to the incidence, intensity and duration of heterophoria and heterotropia. Fusional crises are pre-programmed when the monocular preconditions of fusion are worsening: Weakening of vision, decrease of accommodation range and adaptation, elevated sensitiveness to glare (among other things caused by dulling of lenses, retinal and other damages due to diabetes, age-related macular degeneration etc.. Even if the fusional range frequently widens with age, fusion often cannot be maintained, and height differences of the eyes have a greater impact on the fusional and vergence processes. All this is partly levelled out by binocular experience which can be seen when the vision of one eye decreases but fusion still is found.

## **Conclusions**

Even if binocular cooperation seems to function properly we always should remember that due to the age-related changes the relevant binocular performance needs more time. And even more important: In arranging work for elderly employees – and not only for them – we should always take care that the aforementioned “mechanisms of order” should not be impeded.