

Annotation

for the thesis "Age dynamics and individual psychological characteristics of categorical color perception".

The main purpose of this research is studying the manifestations of the categorical effects of color perception throughout age-related development under the influence of various factors, including speech development disorders, the manifestation of categorical effects in different parts of the visual field, the exhibition of categorical effects on hardly distinguishable (borderline) and clearly visible (focal) colors. The main research hypothesis is that between-category color discrimination, i.e. the distinction of colors that have a clear verbal designation in the language will proceed faster than the within-category (shades that are not well-defined represented in the language). It is also assumed that the characteristics of categorical effects manifestation of color perception will change with age. The paper presents its own theoretical model describing the obtained age-related patterns of manifestation of categorical effects. The theoretical model includes a description of three successively replacing stages: fragmented (preschool age), supercategorical (primary school age), functional (senior school age and adult age). It is assumed that the color category has a complex hierarchical structure, which is formed with age development due to the evolvement of speech and intensification of verbalization processes as the individual is socialized. The qualitative features of the categorical effects manifestation at different stages of age development have been revealed. It is suggested that the formation of the structure of the perception color category, is due to the influence of a variety factors. First, there is a close connection between the development of color perception, speech development and the formation of attention processes. All these processes have a long-term dynamics of formation and are socially conditioned. Second, it is assumed that the process of forming a color category can be influenced by various external factors, for example, the conditions for the perception of color stimuli (stimuli perception in different parts of the visual field, as well as different spacing of perceived stimuli from the center of the color category).

The study ontogenetic aspect is represented by a wide coverage of the subjects sample. The research involved subjects from four to forty-five years old. The total sample size of the presented studies is 550 people. Four color ranges were used (blue-cyan, green-blue, yellow-green, red-orange). The reaction time of subjects to the appearance of a color stimulus on the monitor screen is a measured parameter that allows one to judge the presence of categorical effects. To collect of the empirical material was used a special research computer program based on the visual search method. In all tests, 12 squares arranged in a circle were presented against a light gray background. 11 squares were background stimuli, the 12th square was the target stimulus, its color changed depending on the performance of the within- or between-category task. The position of the target stimulus was changed in a random order. This scheme was almost identical in all studies.

Studies 1 and 2 examined the age-related dynamics of the color perception categorical effects manifestation in children with speech disorders and children with normal speech development. All children were divided into two experimental groups. Three age ranges have been identified: 1) preschool age; 2) junior school age; 3) middle school age; 4) senior school age. The age coverage of the subjects was from 4 to 18 years old. The first experimental group included subjects with various disorders of speech development of varying severity. It was found that in children with general speech underdevelopment, the categorical effects were less pronounced than in healthy children in preschool (fragmented stage) and primary school (supercategorical stage) ages. By the senior school age (functional stage), the manifestation of categorical effects in both groups of children decreases, and the speed of recognition of color stimuli increases, reaching its maximum. Despite the fact that the general dynamics of the categorical effects manifestation in children with normal speech development and children with speech disorders has obvious similarities, the time frames for the color category structure formation in children with disorders of speech development are significantly shifted.

Study 3 is investigated the manifestations of categorical effects on borderline and focal colors at different stages of age development. It was also studied the age-related

dynamics of changes in categorical effects in different parts of the visual field at different stages of the formation of the color category. In total, the survey involved respondents aged 8 to 45 years, who were divided into three age groups: 1) junior schoolchildren; 2) older students; 3) adult subjects. It was shown that the categorical effects of color perception are manifested when the stimulus is fixed in the area of clear vision (5°). However with a deviation of 15° , the categorical effects disappear. It is analyzed the nature of the color perception categorical effects manifestation in different parts of the visual field in the process of age development. It has been established, in particular, that at the supercategorical stage (primary school age), categorical effects can be observed in the area of clear vision; on the visual periphery, they are of a contradictory probabilistic nature. At the functional stage (senior school and adult ages), categorical effects are expressed only in the area of clear vision. Categorical effects are manifested mainly on border colors. The pattern of manifestation of categorical effects on borderline and focal colors changes with age. In early school age (supercategorical stage), categorical effects are observed, both on borderline and focal colors. In adolescence and adulthood (functional stage), categorical effects manifested themselves only at borderline shades. It is assumed that in the process of development, color perception categorical effects manifestations acquire a highly specialized character both in relation to the area of color boundaries and in the area of the perceived visual field: with age development (at the functional stage), categorical effects manifest themselves in the area of subtle color shades when processed by central vision. When it perceived with peripheral vision, the categorical effect is absent on both borderline and focal colors.

Based on the results of the research conducted, we come to the conclusion the color categories formation occurs due to the person individual experience assimilation, as well as depending on the individual psychological characteristics of the individual development and the properties of the perception stimulus conditions. These factors have the greatest impact on categorical color perception in preschool and primary school ages. The color category is undergoing long-term development, thanks to the formation of higher forms of cognitive processes through social and cultural influence,

as well as the voluntary attention mechanisms alignment, which makes it possible to successfully group and classify the perceived information about color.

The results of all our age studies are confirmed by the developed theoretical model. It is assumed that there are general age-related patterns in the color category structure formation, which comes to its completion by the senior school age. The severity of categorical effects, both for borderline and focal colors, gradually decreases towards older adolescence, forming a functional stage of color category development, regardless of various external factors (different color characteristics, visual angle of perception, proximity of colors to the categorical center) and individually – psychological conditions (speech development disorders).

The following conclusions are formulated as the main results of this study:

1) In all the studies carried out, there was a categorical effect. The effect was manifested in subjects of different ages and on different color ranges, regardless of individual psychological characteristics, as well as various experimental psychological conditions of the study. Children performed the task of between-category color discrimination faster and easier compared to the within-category one, despite the equal spectral distance of perceived color stimuli.

2) The process of developing the color perception categorical structure goes through a number of key stages that unfold as the individual grows up: fragmentary, supercategorical and functional stages. The nature of the categorical effects manifestation on borderline and focal colors changes with development. At the fragmentary stage, the structure of the color category is little differentiated and in this period, only the best samples (focal colors) which are the central members of the category are represented. With the transition to the supercategorical stage, color identification becomes more efficient, due to which the speed and accuracy of the reaction to the emerging color stimuli increases, and stable categorical effects are manifested both on borderline and focal colors. At the functional stage, the final color category structure formation takes place. The categorical effects of color perception are less pronounced. The effect of categoricity is more pronounced for borderline colors, intensifying spectral differences near the borders of transition from one to another color

category. For focal colors, overall discernibility at the physical level comes to the fore, and categorical effects do not significantly affect it. At the transition to the functional stage of color category development the formation of the color category is completed. The described categorical effects are reflected in a three-stage theoretical model.

2) The categorical effects of color perception undergo significant changes in age development. The greatest differences in between- and within-categorical discrimination are observed at the supercategorical stage (primary school age), and then it gradually decrease at the functional stage (senior school age).

3) The influence of speech disorders on categorical color perception depends on the age of the children. In children with general speech underdevelopment, the differences in between- and within-category color discrimination are much less pronounced than in children with normal speech development in the preschool (fragmented stage) and primary school (supercategorical stage) ages. In older school age (functional stage), there are no differences in the color perception categorical effects manifestation in children with normal speech development and in children with speech pathology.

4) Categorical effects appear depending on the localization of perceived color stimuli in various parts of the visual field. The effects of categorization are manifested in the central visual field and disappear on the visual periphery, which is associated with identification processes that require a clear visual fixation of the stimulus in the area of clear vision at 5° . With a visual angle of 15° to 25° , no categorical effect is observed. As the perceived color boundary stimulus approaches the visual periphery, the response rate of the subjects decreases. The opposite time reaction effects is true for focal shades.

5) The properties of the color perception categorical effects manifestation in different parts of the visual field changes in the process of age development. At the supercategorical stage (at primary school age), categorical effects are characterized by heterogeneity of manifestations. Categorical effects can be observed in the area of clear vision; on the visual periphery, they have a contradictory probabilistic nature. At the functional stage (in older adolescence and adulthood), categorical effects are expressed only in the area of clear vision.

6) In the process of development, the color perception categorical effects manifestations acquire a highly specialized character both in relation to the color boundaries area and in the area of the perceived visual field: with age categorical effects are manifested in the area of subtle color shades when processed by central vision. At the functional stage (starting from senior school age), the effect of categoricity can be observed only when subjects perceive borderline color stimuli in the area of clear vision (5 °).

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