

THE ART EXPERIENCE OF A BLIND PERSON

¹DUNJA PIVAC, ²TINA RUNJIĆ, ²ANTE BILIĆ PRČIĆ

¹University of Split, Arts Academy, Department for Visual Culture and Visual Arts, Split, Croatia. Contact: dpivac@inet.hr, ²University of Zagreb, Faculty of Education and Rehabilitation Sciences, Department of Visual Impairments, Zagreb, Croatia

Received: 30.5.2017.

Accepted: 6.11.2017.

Original scientific paper

UDK: 376.1-056.262 :7

Abstract: *In the art educational process, we have met a blind student. That encouraged us to try to investigate how a blind person experiences a pictorial work of art.*

The framework of the research covered an examination of experiencing a pictorial work of art (its duration, intensity and individual art expression) for a congenitally blind person by applying an educational approach that was designed to enhance her experience of art work. The subject, the only blind student in the regular third grade gymnasium curriculum of visual art, participated in the research.

The measuring tool consisted of five selected and adapted paintings of V. van Gogh, and changes in the time needed for tactile art experience were measured as well as art expression and tactile self-assessment, in which the subject determined the intensity of experiencing the selected art work during multiple experiencing.

The analysis of quantitative changes was carried out using the statistical method of individual differences.

The results of the research have shown that the application of the abovementioned approach influenced the time of experience and art expression of the experienced work of art for the subject. The significance of previous experience was confirmed, based on knowing and recognising the content of the adapted tactile picture. Therefore, after multiple experiences, the time needed for the perception and art expression of experienced content became shorter. However, at the same time, the intensity of the selected works of art remained mainly unchanged. The remarkable intrinsic motivation of the subject was noticeable, leading to positive transfer towards the art educator. That certainly had a positive impact on the experience of pictorial works of art.

Key words: *blind person, visually impaired person, art experience, tactile perception, education*

INTRODUCTION

The world of pictorial art as a product of the human spirit is perceived and experienced fully by the sense of sight. However, what about the world of pictorial art in persons blind from birth? Is it completely and permanently unattainable to them, as they do not see? How to make it attainable to them, i.e. how to adapt pictorial works of art to them and provide an aesthetic experience? Many approaches and methods of adapting paintings to blind people are known. Such approaches

are used in the world's great museums, such as the Metropolitan Museum of Art or the Museum of Modern Art in New York. People with low vision or blindness can experience some pictorial works of art in a very original manner¹ in the Modern Gallery in Zagreb. In addition, a few organisations and programmes that promote art education for the visually impaired and blind, such as the Art Education for the Blind (AEB), have been successful. They all have the same starting point, based on conversion of visual elements (elements and prin-

¹ Croatian art historian Nataša Jovičić invented an original scientific method (DiTACTA) that enables the blind not only to "see" the famous masterpieces, but also to experience colours. Eight years ago she founded the first tactile and multisensory gallery within The Modern Gallery in Zagreb, Croatia. The method that is called "1 in 5", meaning one painting in five tactile diagrams. The painting is displayed either as an original or as a replica, as a photograph, on the gallery's wall so that a partially sighted person could see it, and under it there is a stand especially designed for this purpose that holds five tactile diagrams, in 30x30 cm format, which can be touched and which a blind person can experience in a tactile manner. Also, she designed an audio guide that gives precise instructions where one should place one's hand on a tactile diagram, how to move through a painting, how many centimetres one should move to the left or how many down. Only when the blind person simultaneously listens carefully to the audio guide and touches the tactile diagram is it possible for him or her to create an image of the painting he/she is exploring (Tenžera, 2012).

ciples of art contained in a two-dimensional work of art) into tangible elements of the tactile image, so the blind person can perceive and experience it.

In the art educational process, we met a blind student, which encouraged us to try to investigate how a blind person experiences a pictorial work of art. In light of this complex challenge, several studies were consulted, mainly from the second part of the 20th century, considering the challenge from different points of view: physiological, psychological, educational and rehabilitational. De Coster and Loots (2004) have published an overview of the key facts and different disagreements on this topic. They emphasise the need to create meaningful art education for blind individuals. According to them, art education should be realised through the interaction between touch and vision, and the art educator should be an inter-sensory moderator.

Based on their considerations, we created an educational approach of adapting selected pictorial works of art to a student blind from birth. Our desire was to enable her to experience pictorial art. Our approach involved an examination of the experience of selected art works (its duration, intensity and individual art expression) in order to obtain insight into changes in the experience that might indicate its improvement or impediment.

The visual art experience and visual art expression

The pictorial experience is a kind of aesthetic experience. The phenomenon of aesthetic experience is complex and not easily defined. Both the pictorial work of art and the observer participate in the experience of the picture. It is performed through the interaction between the characteristics of the work of art and the personality of the observer, and it depends on that interaction. In this paper, we accept the definition of the aesthetic and even pictorial experience in accordance with Ingarden (1975) and Tatarkiewicz (1976), who have highlighted the multiple layers of the process of aesthetic experience. In that process the exchanges of emotional and rational components are present in the personality of the recipient-observer. Among other things (age, previous experience in communicating with visual arts, knowledge of art history, art

theory, art practice, art language), some personality traits, the current mood of the recipient as well as belonging to a particular social, cultural and historical context affect the experience.

Pictorial expression is an artistic language or reflection of the individual who is expressing him- or herself visually in some kind of visual medium. It is a way of communicating visually, expressing thoughts and feelings through creative play and activity, using art and compositional elements arranged in signs and/or meanings that transmit the message. The interpretation of signs, i.e. decoding of messages that are coded in the work of art, is an individual search for different meanings. As Kennedy (1985, 23) said: "*Expression is, in fact, something perceptual, often truly visual and yet metaphorical*".

Vision and tactile perception in the context of the pictorial experience in a congenitally blind person

Considering the multifacetedness of the pictorial work of art as a complex visual stimulus, we cannot expect that a person blind from birth can experience it fully and independently, as a sighted person can. Therefore, the most common method we use today combines tactile perception of an adapted work of art with an audio guide that complements the tactile experience. This kind of communication with the picture obtained by two compensating senses, touch and hearing, enables the blind person to experience the pictorial art to a certain extent. That level is determined by the personality of the blind person as well as by the characteristics of the pictorial work of art. Juricevic (2009) had interesting considerations about turning the original painting into a tactile image, which could then be experienced by sighted and blind people. Only in this way would their aesthetic (visual) experience be equivalent.

During the communication with the pictorial work of art, the blind person is multiply restrained in experiencing it. This has been confirmed by many previous studies. In a complex study involving people blind from birth and including visual imagery, De Beni and Cornoldi (1988) conclude that blind people, despite the use of imaginal pro-

cesses, have significant limitations in creating multiple and unusual connections in memory. Due to such limitations, their impressions are literal, poor and inflexible. The research results from Thinus-Blanc and Gaunet (1997) confirmed the exceptional importance of vision in sensing space during human development. Since the sense of sight plays an immeasurable role in understanding and experiencing space, persons blind from birth have deficiencies in space conceptions. Barraga and Erin (2001) emphasise that vision is a distance sense that provides us with a steady and comprehensive control over the environment as a whole, but also over all of its parts, and allows us to simultaneously identify and understand the cause-effect relationships in everything that surrounds us. Already nearly 40 years ago, Lowenfeld (1981) concluded that a large part of the experiences available to sighted children simply by looking, are extremely difficult for blind children to access. Holbrook and Koenig (2000) also pointed this out in their systematic overview of teaching visually impaired children and youth.

However, many contemporary studies question this conception. Hayhoe (2013, 3) expressed that empirical studies over the preceding 15 years *"have challenged the notion that visual concepts cannot be understood by blind people, even those without visual memories"*. Kennedy (1980, 1985, 2006) in his studies published in the last 30 years, has found and described that people blind from birth can tactually perceive and display a conception of space, lines to represent the edges of surfaces, a ground plane, shapes of familiar objects, role of distance, the observer's vantage point, the fundamental principle of perspective (even linear perspective), movement, and even metaphors. In their studies, Driver and Spence (2004) according to Hayhoe (2013, 4) explain that the abovementioned is possible, because *"the touch is the only perception that can provide effective information, and argue instead that perception is multi-modal"*. Carpio et al. (2017) have stressed similar conclusions in their study of an inclusive intervention programme in pictorial perception with blind and sighted students. On the contrary, I and Shiu (2010, 12) consider that congenitally blind people cannot represent all principles of space, particularly linear

perspective, in the way that Kennedy describes, because *"the tactile sense alone cannot replace the visual sense when it comes to either obtaining visual information or two-dimensional graphic representational strategies"*. Therefore, we can conclude that researchers still have doubts about the perceptual abilities of congenitally blind people.

People blind from birth, in the absence of sight, use sensory substitution (using touch and hearing) in order to learn and experience pictorial art; e.g., sighted people verbally describe the picture to the blind person. Revesz (1950), according to De Coster and Loots (2004), mentions that blind people try to create a mental image based on tactile exploration of the adapted image, and this is much easier for those persons who had previous visual experiences than for congenitally blind people. It is unclear how congenitally blind people can somehow manage to create a fairly accurate idea of the tactually perceived content. Kennedy (1983) states that this is because the same area in the brain is responsible for recognising contours perceived by vision and by tactile-kinesthetic sense. Therefore, the quality of the perceived content depends on highly trained and well-developed tactile-kinesthetic perception, which allows people blind from birth to use tactile graphics (Stančić, 1991; Dulin and Hatwell, 2006; Heller et al., 2005; Bosnar Salihagić, 2011). The ability to read tactile images properly represents the high level of tactile-kinesthetic system development; this system more recently has been called the "haptic system" to emphasise its complexity. The system involves cooperation between the two sensory modalities: kinesthetic, which provides information about the position of body parts and the body's behaviour; and tactile, which provides information about shapes and textures (Arnheim, 1990). The accuracy of object recognition is increased when blind people are verbally directed in order to provide them with information focused on better understanding during exploration (Heller, 1989, 1996, according to Bosnar Salihagić, 2011).

Since we are aware of the major constraints that congenitally blind people have in accessing and experiencing pictorial works of art, we used previous theoretical knowledge and developed an

educational approach to help them perceive selected paintings.

AIM AND HYPOTHESIS

The aim of this study was to examine the experience of pictorial work of art (its duration, intensity and individual art expression) in a person blind from birth by applying an educational approach intended to enhance her visual art experience.

Considering the aim of the study, we formulated the following hypotheses:

- H1: Time for perceiving paintings, as well as the time needed for individual art expression, will decrease as a consequence of multiple experiencing of selected paintings.
- H2: The interior motif is the most complex, so the experiencing and individual art expression of it will take the longest time.
- H3: The intensity of the experience as an aesthetic pleasure, measured on the adapted self-assessment scale, will increase as a consequence of multiple experiencing of selected paintings.

METHOD

Participants

In this study, we included one congenitally blind student. She was the only blind student who was attending the regular third grade curriculum of Visual Arts in the Language Gymnasium in Split during the school year 2014-2015. Therefore, she represented the available sample.

Outcome measures

The outcome measures used in the research were five selected works of art painted by V. van Gogh with different motifs: "Starry Night", 1889; "Vincent's Bedroom in Arles", 1889; "Wheat Field

with Cypress", 1889; "The Sower" (after Millet), 1888; and "Self Portrait", 1889. Changes in the time needed for the subject to experience a selected painting, the time needed for its visual art expression, and a self-assessment score were measured. The participant used a self-assessment scale to determine the intensity of her visual art experience over multiple experiences.

We selected the paintings from one artist, V. van Gogh, for several reasons². In order to enable the participant's perception and experience of selected works of art, we adapted them to be explored by tactile perception³. Therefore we chose the best drawings of these paintings, made especially for this study, and translated them into blind print⁴ (blind emboss).

During the implementation of this educational approach, the participant tactually perceived and experienced each of the five selected paintings during 10 sessions. While experiencing the paintings, we measured the time needed for a single event and recorded verbal and nonverbal communication of the participant with the painting and with the art educator. After that, each experience of the painting was the impetus for the expression of it through drawing in a clay plate, together with personal interpretation, which stimulated her own artistic expression. At the beginning and end of each experience, the participant filled in the adapted self-assessment scale in order to measure the intensity of the experience (i.e. aesthetic pleasure) for each painting.

The main purpose for involving the art educator in the educational approach was to provide inter-sensory moderation during multiple sessions of the participant's experiencing the painting. She tactually experienced every painting on her own, while the art educator followed her tactile exploration with occasional questions such as "What do

2 The main reason for choosing van Gogh's paintings was that his works of art are part of the visual arts curriculum in the third grade. Furthermore, his work offers typical painting motifs that we wanted the participant to get to know better, which guided our choice of the selected paintings: interior – "Vincent's Bedroom in Arles", exterior – "Wheat Field with Cypress", exterior details – "Starry Night", figures - "The Sower" and portraits – "Self Portrait". We assumed that the presence of these motifs in the works would allow us to confirm or reject existing knowledge about limitations of people blind from birth when perceiving space, proportion and detail. Another reason for our selection of van Gogh works is the painter's specific impasto painting technique, which is highly suitable for transformation and adaptation to blind print.

3 The translation was done by a graduate student who performed this research for her master's degree in visual arts education. The same student served as the inter-sensory moderator during multiple art sessions.

4 The graphic technique of blind print, unlike most other graphic techniques that have two dimensions (height and width), enables us to perceive the third dimension (depth). Therefore, it provides the ability to feel the print by touch as well as by vision.

Table 1. Basic statistics of variables related to the duration of the pictorial art experience based on 10 equidistant time points

Variable	Lowest result (minutes)	Highest result (minutes)	Arithmetic mean (minutes)	Standard deviation (minutes)	Asymmetry coefficient	Flattening coefficient
					Skewness	Kurtosis
Starry Night/Detail	10	17	14.50	2.17	-1.14	0.64
Bedroom/Interior	8	16	12.40	2.88	-0.15	-1.36
Wheat Field/Exterior	5	12	9.10	2.51	-0.40	-1.26
Sower/Figure	8	14	10.40	2.07	0.56	-0.81
Self Portrait	8	14	11.40	2.12	-0.22	-1.32

you recognise in this painting?" and "What do you think about while you are exploring this work?"

Data analysis

In order to analyse the change in the experience of the selected painting while using the created education approach, we conducted analysis of quantitative change in the experience duration, the intensity of painting experience and individual art expression in one participant through 10 equidistant time points. Data were analysed using the statistical method of individual differentiation (INDIF)⁵ (Momirović et al., 1986; Momirović et al., 1987; Nikolić, 1991; Mejovšek, 2013).

RESULTS AND DISCUSSION

Analysis of quantitative change in duration of the experience of pictorial works of art

In order to gain insight into changes in the duration of art experience under the influence of our educational approach, we conducted analysis of quantitative changes in one participant using the INDIF method. Basic statistical indicators of all manifested variables about the duration of the art experience are shown in Table 1.

Before the INDIF method of analysis, which represents the factorisation of the manifest variables, when instead of using subjects we use time points, it is necessary to calculate and identify high correlations between variables. Since the Shapiro-Wilks distribution normality test showed

that data for all manifested variables were normally distributed, we calculated the Pearson correlation coefficient between those variables and their significance.

In order to conduct INDIF analysis, we had to recalculate the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) and Bartlett's Test of Sphericity. KMO was 0.77, which is higher than 0.6, and Bartlett sphericity (0.000) was significant, as it was less than 0.005. Therefore, we concluded that the factor analysis was justified. This also meant that the INDIF method was justified. In order to conduct INDIF analysis, we calculated eigenvalues (variances of each component), and the percentage of variance as well as cumulative percentage of variance for these components. According to the Kaiser-Guttman (GK) criterion, we kept only the first main component, which represents the *component of changes*. This component has variance 4.5, which means that it explained 90.02% of the total variance in pictorial art experiences, described through five basic characteristics (variables). Hence, it can be concluded that the *component of changes* represents the overall pictorial art experience that was described through five characteristics, i.e. five selected paintings with different motifs, expressed in minutes.

Table 2 provides insight into the significance of the change for each variable and component of changes (*Component*) through 10 observations and experiences of the selected Vincent van Gogh paintings. Results of the component of changes,

⁵ The INDIF method is used for the analysis of object change described by quantitative variables. It is based on the component analysis of change in one participant described through a set of quantitative variables through time. Such analysis provides insight into the structure of the component of changes, i.e. in the relationships of registered variables and component of changes, and in the relationships between time points. Based on analysis of the first (main) component, we calculate the component of change, communalities and eigenvalues of this correlation between the manifest variables, and functions of change. This provides insight into the changes in subject conditions described through a group of quantitative variables over time.

Table 2. Significance of differences in the component of changes and on all manifested variables for pictorial art experience

Variable	Arithmetic mean (minutes)			Standard deviation (minutes)			T	Sig. (2-tailed)
	Before	After	Difference	Before	After	Difference		
Component	0.19	-0.13	0.32	0.86	0.96	0.12	7.84	0.000
Starry Night/Detail	15.00	14.44	0.56	1.58	2.30	1.13	1.47	0.179
Bedroom/Interior	12.89	12.00	0.89	2.57	2.74	0.33	8.00	0.000
Wheat Field/Exterior	9.56	8.78	0.78	2.18	2.44	0.44	5.29	0.001
Sower/Figure	10.67	10.00	0.67	2.00	1.73	0.50	4.00	0.004
Self Portrait	11.78	11.11	0.67	1.86	2.03	0.50	4.00	0.004

expressed as Z-scores, have shown a statistically significant reduction in the time required for the observation and experience of the selected painting.

The results from Table 2 show that, except for the first painting (*Starry Night/Detail* variable), the average change in duration during multiple experiences was significant.

Intensity and the direction of changes in overall and particular art experience characteristics were converted to Z-scores for the purpose of comparison (Figure 1).

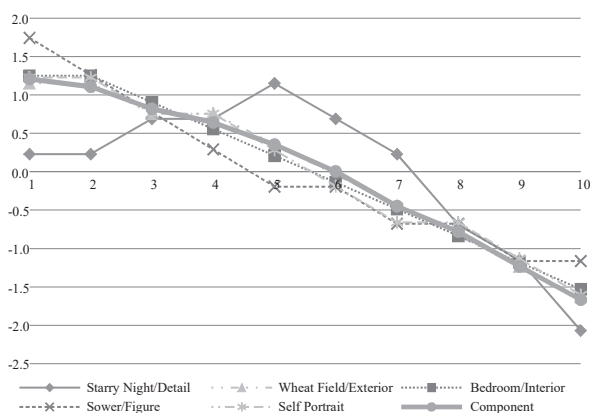


Figure 1. Changes in overall and particular characteristics of the pictorial art experience through 10 observations, expressed as Z-scores

These results lead us to the conclusion that the implementation of an educational approach including multiple experiences of five selected paintings influenced the experience of each painting in the congenitally blind participant. The value of previous experience, knowledge and recognition of tactile image content is indisputable. These factors explain the decrease in time required for the

perception and experience of pictorial art; in other words, multiple experiencing of the same art work enabled the participant to recognise and experience it faster during the subsequent tactile session.

This tendency is shown in Figure 1. Only the first painting experience, *Starry Night*, diverges from those results, where no statistically significant change occurred in exploring paintings through multiple sessions. This, with no doubt, is due to the lower structure of the image content and therefore of the tactile image content, which is a detail of a complex exterior composition that was hardly recognisable or perceptible to the participant, even after multiple sessions. The longest time for exploring an adapted painting was for the paintings *Vincent's Bedroom in Arles* (*Bedroom/Interior*) and *Starry Night (Detail)* during the first session. In addition, the participant needed more time during later sessions than during the first one in order to explore *Starry Night (Detail)*. This was expected, since these two paintings were the most complex in the set. The detail of the painting *Starry Night* was unclear to the participant in composition and in structure. Moreover, the space in the painting *Vincent's Bedroom in Arles* is shown in linear perspective and contains many objects that impede perception and slow down acquisition of the experience.

Confirmation of our conclusion was found in the participant's own statement relating to visual experience of image details in *Starry Night*: "The first time I did not even realise how the artist achieved that movement of the sky. I noticed that he piled up many small relief lines that are moving opposite to the vertical cypress. Lines on the cypress, except for the flow, are different in intensity, they are thinner and longer, in contrast to those in the sky, which are shorter and thicker."

Table 3. Basic statistics of the variable duration of individual art expression of the pictorial art experience, based on 10 equidistant time points

Variable	Lowest result (minutes)	Highest result (minutes)	Arithmetical mean (minutes)	Standard deviation (minutes)	Asymmetry coefficient	Flattening coefficient
					Skewness	Kurtosis
Starry Night/Detail	40	50	45.00	3.496	.000	-1.479
Bedroom/Interior	45	55	49.60	3.204	.201	-.842
Wheat Field/Exterior	35	50	41.50	5.255	.399	-1.270
Sower/Figure	40	53	46.00	4.082	.367	-.601
Self Portrait	41	50	45.50	3.028	.000	-1.200

These results support a point of view in which vision and visual experience have an advantage over the other senses and other ways of experiencing in order to understand and experience the complex spatial relationships and also precise details presented in art works. Many studies with blind children and adults have pointed out persistent difficulties in space understanding (Lev-Wiesel et al., 2002; I and Shiu, 2010). These results confirm one of our hypotheses concerning the duration of experiencing interior motifs. Time needed for experiencing that painting in the first session was the longest; for most of the paintings, the time needed to experience them decreased through multiple sessions. Hence, we conclude that our hypothesis about the decrease in time needed for pictorial art perception and experiencing was confirmed in four of five works of art: *Bedroom/Interior*, *Wheat Field/Exterior*, *Sower/Figure* and *Self Portrait*.

Analysis of quantitative change in the time required for individual art expression of the pictorial art experience

In order to analyse the change in the time needed for individual art expression of pictorial art experience within the framework of our educational approach, we conducted INDIF analysis of quantitative changes in one participant. The basic statistics of the manifest variables about duration of individual art expression of the pictorial art experience are shown in Table 3.

Before INDIF analysis, which represents the factorisation of the manifest variables, when instead of using subjects we use time points, it is necessary to calculate and identify high correlations between variables. Since the Shapiro-Wilks distribution normality test showed that data for all

manifested variables were normally distributed, we calculated the Pearson correlation coefficient between those variables and their significance. KMO was 0.84, which was higher than 0.6, and Bartlett sphericity (0.000) was significant, as it was less than 0.005. We could conclude that the method of factor analysis was justified, and that the INDIF analysis was justified as well. In order to be able to conduct INDIF analysis, we calculated eigenvalues (variances of each component), the percentage of variance and cumulative percentage of variance for these components. According to the GK criterion, we kept only the first (main) component, which represents the *component of changes*. The variance of this component was 4.96, which means that it explained 99.22% of the total art expression variation of the artwork experience, described over five basic characteristics (variables). It can be concluded that this component represents the overall art expression of the artwork experience described in its five characteristics.

Table 4 provides insight into the significance of the change for each variable and component of changes (*Component*) for 10 expressions of the Vincent van Gogh paintings. Results of the component of changes, expressed as Z-scores, have shown statistically significant reduction of the time required for the expression of each experienced painting.

The results from Table 4 show that, for all paintings except the last (*Self Portrait*), the decrease in time needed for expression was significant.

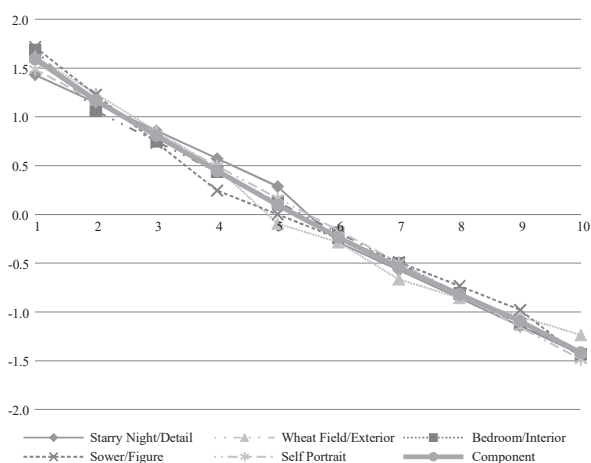
Intensity and the direction of changes in overall and particular characteristics of expression of the experienced pictorial art were converted into Z-scores (Figure 2).

Analysis of the quantitative changes in the time needed for expression of the pictorial art experi-

Table 4. Significance of differences on component of changes and on all manifested variables for expression of the pictorial art experience

Variable	Arithmetic mean (minutes)			Standard deviation (minutes)			T	Sig. (2-tailed)
	Before	After	Difference	Before	After	Difference		
Component	0.16	-0.18	0.34	0.92	0.88	0.04	21.36	0.000
Starry Night/Detail	45.56	44.44	1.12	3.21	3.21	0.33	10.00	0.000
Bedroom/Interior	50.11	49.00	1.11	2.93	2.74	0.33	10.00	0.000
Wheat Field/Exterior	42.22	40.56	1.66	5.02	4.59	0.71	7.07	0.000
Sower/Figure	46.67	45.22	1.45	3.71	3.46	0.53	8.22	0.000
Self Portrait	46.00	45.00	1.00	2.74	2.74	0.00	0.00	1.000

ence lead us to the conclusion that implementation of an educational approach consisting of multiple experiencing of five art works had an effect also on art expression of a particular art experience in a congenitally blind participant.

**Figure 2.** Differences in overall art expression of the pictorial art experience and of particular characteristics of art expression, through 10 time points, in Z-scores

In this case again, the indisputable influence of previous experience, knowledge and recognition of the painting content was confirmed. Previous experience encouraged faster and better tactile perception and its artistic interpretation as embossed relief in clay. That previous experience was the reason that the time needed for expression of the experience decreased. In other words, multiple experiencing of the same painting enabled the participant to recognise, experience and artistically interpret the visual art faster in subsequent sessions. This tendency is shown in Figure 2. Only the experience of the fifth painting (*Self Portrait*) diverged from

these results, since there was no statistical significance after multiple sessions when the participant tactilely explored painting. This is most probably due to the complexity of human face elements and the size, interrelations (proportions), and character of the person depicted. Confirmation for our conclusion came from the participant's answer to the question about the difference between the portrait and self-portrait: "The portrait does not indicate who is presented, while the self-portrait indicates that the artist is showing his own portrait. An understanding of the portrait is very important to me when I'm trying to conceive the feeling of myself, as well as the differences between myself and others. When I touch my head, I understand the characteristics of the face, like ears, eyes, nose, but not their character, i.e. the character that makes each person different, individual." We can notice from her answer that she had difficulties in understanding the difference between the visual expressions of herself in relation to someone else. She certainly recognises the individual parts of the two people's faces, their shapes, and probably some differences between them (e.g. two different noses), but she has difficulties in understanding the expression (a fine deformation, subtle discrepancies) that the artist uses to express a person's character or mood. The participant needed the longest time for expression of the painting *Vincent's Bedroom in Arles (Bedroom/Interior)*, and this is the painting she needed the longest time to experience at the first session. This difficulty is probably due to the spatial relationships among multitudes of objects presented in linear perspective within van Gogh's bedroom in Arles. This likely made her perception difficult and slowed her experience, as well as her visual art expression. These findings confirm our hypothesis about the duration of art expression

Table 5. Basic statistics on variables of the intensity of the pictorial art experience

Variable	Lowest result	Highest result	Arithmetical mean	Standard deviation	Asymmetry coefficient	Flattening coefficient
					Skewness	Kurtosis
Starry Night/Detail-beginning	9	10	9.60	0.516	-0.484	-2.277
Bedroom/Interior-beginning	8	9	8.30	0.483	1.035	-1.224
Wheat Field/Exterior-beginning	8	10	9.30	0.823	-0.687	-1.043
Sower/Figure-beginning	9	10	9.60	0.516	-0.484	-2.277
Self Portrait-beginning	8	10	8.60	0.843	1.001	-0.665
Starry Night/Detail-end	9	10	9.50	0.527	0.000	-2.571
Bedroom/Interior-end	9	10	9.50	0.527	0.000	-2.571
Wheat Field/Exterior-end	9	10	9.60	0.516	-0.484	-2.277
Sower/Figure-end	9	10	9.70	0.483	-1.035	-1.224
Self Portrait-end	9	10	9.60	0.516	-0.484	-2.277

for the motif of the interior. The expression of the interior motif was indeed the most complex and took the longest time for the congenitally blind participant.

These results again confirm previous theories about the remarkable influence of visual experience in understanding and experiencing the complexity of spatial relationships between the entire human face and its parts. Moreover, they confirm that people blind from birth have significant difficulties in comprehending characteristics of each individual (Lev-Wiesel et al. 2002). For this reason, the time for art expression did not decrease through multiple sessions experiencing the *Self Portrait*, as we expected. Considering the fact that the time decreased for art expression of four of five paintings (*Starry Night/Detail*, *Bedroom/Interior*, *Wheat Field/Exterior* and *Sower/Figure*), we can conclude that our hypothesis about a decrease in time needed for pictorial art expression is confirmed.

Analysis of the quantitative change in intensity of the pictorial art experience

In order to gain insight into changes in the intensity of the pictorial art experience at the beginning and end of each session while implementing our educational approach, we analyzed quantitative changes in one participant over 10 equidistant time points using the method of testing differences between two dependent samples. Basic statistics for all manifested variables describing intensity of the art experience at the beginning and end of each session are shown in Table 5.

Before analysis of the average differences between the beginning and end of each experiencing, we tested the normality of frequency distribution for each variable in order to choose the most suitable method for testing those results. The normality of the distribution for each variable was tested using the Kolmogorov-Smirnoff and Shapiro-Wilks tests. Since both tests showed that data were not normally distributed for any of the variables, we used the Wilcoxon test for testing differences between two dependent samples in order to test the differences between the beginning and end of each experience. Results are shown in Table 6.

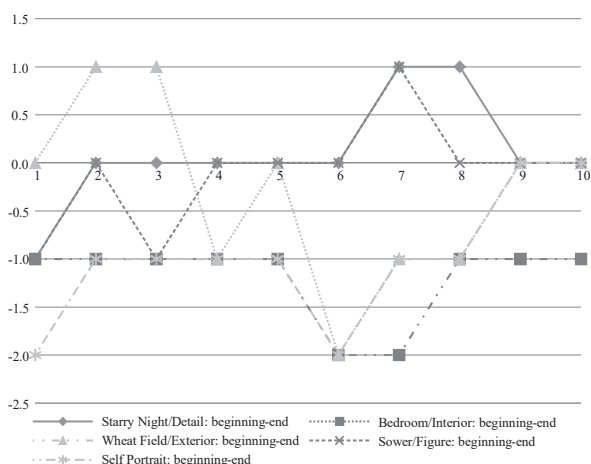
Through comparing the results of experience intensity at the beginning and end of the session exploring the painting *Vincent's Bedroom in Arles (Bedroom/Interior)*, we noticed that the difference between the medians was statistically significant. Therefore, we can conclude that experience intensity increased during observation and experiencing of the interior, as measured on the self-assessment scale. Average changes in the variable *Self Portrait* were also statistically significant: the experience intensity of the fifth painting, *Self Portrait*, increased from the beginning to the end of the session based on the self-assessment scale. All other variables of experience intensity (*Starry Night/Detail*, *Wheat Field/Exterior* and *Sower/Figure*) showed no statistically significant differences in average results.

Changes in particular characteristics of experience intensity between the beginning and end of observation and experiencing of particular pictorial art are shown in Figure 3.

Table 6. Significance of the differences between manifested variables of experience intensity at the beginning and end of each experience

Variable	Median			Middle range		Z	Asymp.Sig. (2-tailed); Significance
	Before	After	Difference Before-after	Negative	Positive		
Starry Night/Detail	10.00	9.50	-0.50	2.00	2.00	-0.577	0.564
Bedroom/Interior	8.00	9.50	1.50	0.00	5.00	-2.972	0.003
Wheat Field/Exterior	9.50	10.00	0.50	3.00	3.75	-1.000	0.317
Sower/Figure	10.00	10.00	0.00	2.00	2.00	-0.577	0.564
Self Portrait	8.00	10.00	2.00	0.00	4.50	-2.640	0.008

Based on the above results, we can conclude that as a result of the influence of multiple experiences and of our educational approach, experience intensity increased with statistical significance only for the variables *Bedroom/Interior* and *Self Portrait*. As we have already pointed out, these were the most complex paintings for observing and experiencing in terms of the perspective of the room, proportions of the face and its parts, and the multitude of details. It was intriguing for us why the detail in the painting *Starry Night (Starry Night/Detail)* was not also among the most complex for the subject.

**Figure 3.** Changes of experience intensity from the beginning to the end of each pictorial art observation, through 10 time points

We assumed that because the motif of the selected detail contained many structural lines (which were not clear to her), the detail was more unclear than complex. To the participant, *Bedroom/Interior* and *Self Portrait* were the most difficult to comprehend. As Lopes (1997, 429-430) said:

"...the variation in recognition rates from picture to picture depends on the amount of detail in each picture". Nevertheless, when the participant got to know the paintings better through multiple sessions of observation, she evaluated them with the highest result on the self-assessment scale, i.e. the highest score. Furthermore, we assume that, after multiple experiences, she perceived the most significant improvement in perception and art experience of these two images. She probably liked these two images slightly more than the other pictures. Therefore, experience intensity, as measured by the self-assessment scale, also took into account individual aesthetic pleasure. In fact, it is most likely that individual aesthetic pleasure had the greatest influence on the experience intensity score.

Experience intensity for most of the paintings (*Starry Night/Detail*, *Wheat Field/Exterior* and *Sower/Figure*) remained unchanged after multiple sessions of observing. This could indicate that deeper understanding of the visual arts is hindered, such as an understanding of why the artist used deformation, in which way he transformed objects, how he emphasized things, and generally how he used signs and meanings derived from the synergy of all visual art elements that are processed and upgraded by the observer.

Considering the limitations of the graphical technique of blind print, as well as the limitations in perception of a person blind from birth, the lack of statistically significant change in experience intensity of visual arts is understandable. Nevertheless, the participant recognised a motif and artistic handwriting in the tactile picture, and she did not supplement that with other insights. Therefore, her experience of *Starry Night/Detail*, *Wheat Field/Exterior* and the *Sower/Figure* remained almost

the same. Alternatively, to explain in simple words, her aesthetic pleasure about those pictures did not change, so neither did her experience intensity of visual arts.

Since multiple experiences for three of the five paintings (*Starry Night/Detail*, *Wheat Field/Exterior* and *Sower/Figure*) did not encourage the experience intensity expressed as stimulated aesthetic pleasure, we can conclude that our hypothesis about the increase of experience intensity through multiple sessions was not confirmed.

It is interesting to note that the participant self-evaluated her overall visual art experience with very high scores, from 8 to 10 (on a scale from 0 to 10). This is the reflection of her high motivation and satisfaction with all new knowledge and insights she had through such a study, which was based on visual arts adapted to her needs. It can be understood as a ceiling effect due to the high intrinsic motivation and the subject's satisfaction to have the opportunity to perceive and experience any work of art adapted to her. We quote two of her statements, confirming the abovementioned: *"When I touched these paintings for the first time, I needed a lot of time to understand what is presented. I recognised most of the forms (table, chairs, window); nevertheless, the structural lines prevented their complete description. Now, when I touch them again, they are much clearer and even interesting. ... Here we are, [I] learned new things, so I've decided to give the maximum score."*

"I am so motivated and excited, because until now, I didn't even have the chance to meet and approach visual art adapted in the way I need."

CONCLUSION

In this study, we present the results of our educational approach that consisted of adaptation of five selected van Gogh paintings to a student blind from birth. The approach included examination of the experience of selected pictorial art works (duration, intensity and individual art expression) in order to gain insight into changes in the experience, which could indicate its improvement or impediment.

The results of our study have confirmed two of the three hypotheses. Implementation of the

educational approach resulted in a decrease in the time needed for the experience of pictorial art and for art expression of the experienced painting by a person blind from birth. The importance of previous experience, knowledge, and recognition of tactile image content was confirmed: these three factors reduced the time needed to perceive and express the art experience after multiple sessions. Intensity of the pictorial art experience remained mostly the same after multiple experiences, which implies that deeper understanding of visual art is hindered. On the other hand, to put it simply, the participant's aesthetic pleasure about those pictures did not change after multiple experiences, so the experience intensity of visual arts did not change either. We also noticed very high intrinsic motivation in the participant and her positive transfer towards the art educator. That, most certainly, had a positive influence on the pictorial art experience. Despite the expected limitations in perception, especially in perception of space, proportions of the human body and face as well as different details in selected paintings, the education approach presented here helped the participant to enhance her experience of adapted paintings through multiple observations. This was observed not only in the quantitative results of the study but also in the participant's art expressions in clay plate (based on painting experience) and her verbal statements during sessions and communication with the art educator. During each new pictorial art experience session, the participant revealed something new, something she had not perceived before. That was obvious from the comparison of her drawings in clay plate. Unfortunately, the scope of this study does not allow detailed analysis or discussion of the qualitative part of the research.

We have to emphasise that the results of our study come from a highly motivated participant. She is an excellent student who gained a lot of knowledge from her regular gymnasium curriculum and from art. That, with no doubt, influenced her improvement in pictorial art experience, since the level of education (Lev-Wiesel et al. 2002) influences the quality of a blind person's drawing.

Considering the tendency for the inclusion of students with low vision and blindness in regular schools in Croatia, we know it is necessary to

devise an effective and cost-effective educational approach within the art curriculum they are attending. In the near future, it will probably become possible to transform pictorial art into tactile art using complex electronic systems. Those systems will include manual tracking and guidance, motion sensors and 3D reconstruction in order to bring the world of visual arts closer to low vision and blind people (Buonamici et al., 2016). However, such complex systems of conversion and support are going to be available only in certain museums and institutions. The value and advantage of the

presented educational approach in experiencing adapted pictorial art derives from its effectiveness, profitability, accessibility and applicability in a comprehensive educational system.

ACKNOWLEDGEMENT

We would like to thank the subject who participated in this study and anonymous reviewers for valuable comments on an earlier version of this article.

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LIKOVNI UMJETNIČKI DOŽIVLJAJ SLIJEPE OSOBE

Sažetak: U nastavi likovne umjetnosti susreli smo se sa slijepom učenicom. To nas je potaklo da pokušamo istražiti kako slijepa osoba doživljava slikarsko djelo.

Okosnica istraživanja obuhvaćala je ispitivanje doživljaja slikarskog djela (njegovo trajanje, intenzitet i osobnu likovnu ekspresiju) kod osobe slijepa od rođenja primjenom osmišljenog edukativnog pristupa koji joj je trebao pomoći da unaprijedi svoj doživljaj likovnog djela. U istraživanju je sudjelovala jedna ispitanica, učenica koja je jedina bila uključena u redovni nastavni program likovne umjetnosti u trećem razredu gimnazije.

Mjerni instrument sastojao se od pet odabranih i prilagođenih slika Vincenta van Gogha, mjerenja promjena u vremenu potrebnom za taktilni doživljaj likovnog djela kao i njegovu likovnu ekspresiju te taktilne samoprocjene kojom je ispitanica određivala intenzitet doživljaja pojedinog likovnog djela pri višestrukome doživljavanju.

Analiza kvantitativnih promjena provedena je primjenom statističke metode **Individualne Diferencije (INDIF)**.

Rezultati istraživanja potvrdili su da je primjena navedenog pristupa utjecala na vrijeme doživljavanja i likovno izražavanja doživljenog likovnog djela kod ispitanice. Potvrđen je značaj prethodnog iskustva, utemeljenog na poznavanju i prepoznavanju sadržaja prilagođene taktilne slike. Zbog toga se vrijeme potrebno za percipiranje i likovno izražavanje doživljenog smanjilo, nakon višestrukog doživljavanja. Pri tome je intenzitet doživljaja odabranih likovnih djela uglavnom ostao nepromijenjen. Zamjetna je i velika intrinzična motivacija ispitanice te pozitivan transfer prema likovnom edukatoru, što je zasigurno imalo pozitivan utjecaj na doživljavanje slikarskih djela.

Ključne riječi: slijepa osoba, slabovidna osoba, doživljaj likovnog djela, taktilna percepcija, odgoj i obrazovanje