

VZ 210P/17

Příloha č. 3
k RD č. 26/2015

2017

Závěrečná zpráva projektu specifického výzkumu na rok 2016 – zakázka č. 110P

Název projektu: Vnímání vizuálního humoru ve vztahu k intelektové kapacitě a tvořivosti dětí raného školního věku

Specifikace řešitelského týmu

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Školitelé doktorandů: -

Další výzkumní pracovníci: -

Celková částka přidělené dotace: 99 569 Kč

Stručný popis postupu při řešení projektu (max. 2 strany)

Řešení projektu probíhalo v souladu s plánem:

- 1) Byla sjednána spolupráce se dvěma základními školami, získán souhlas s realizací výzkumu, navíc byl výzkum anoncován v časopise Radnice a byla oslovena i široká rodičovská veřejnost.
- 2) Byla vytvořena testová baterie a realizován předvýzkum (2 dospělí a 3 dětské respondenty), tato data posloužila výhradně k precizaci testové baterie a následně byla dle ujednání s dobrovolníky smazána.
- 3) Postupně byla realizována administrace metod, přičemž 7 mimořádně nadaných dětí v doprovodu rodičů bylo testováno v testovací místnosti v budově E. Po změně majitele přístroje ET byl ve spolupráci s Mgr. Petružálkem z FIM umožněn (konečně) terénní výzkum a proběhla administrace metod na spolupracující ZŠ, kde byli testováni respondenti s diagnostikovaným nadáním (administrace v gesci studentky Honzíčkové) a na spolupracující ZŠ, kde byl testován tzv. kontrolní soubor (administrace v gesci studentky Jirákové)¹. Celkem byla získána data od 41 respondentů (plánováno bylo 20).
- 4) Získaná data byla průběžně anonymizována, statisticky zpracována a vizualizována.
- 5) Výsledky byly průběžně zpracovány do podoby posteru a prezentovány před odbornou veřejností na mezinárodní konferenci. V projektové žádosti byla plánována účast na konferenci ICEEPsy nebo ekvivalentní, výsledky projektu byly prezentovány na konferenci ICERI (pro jistotu byla podána žádost o změnu a tato byla přijata).
- 6) Zmíněné výsledky byly rovněž podrobněji rozpracovány do podoby článku a publikovány jako výstup typu D. Údaje o publikačním výstupu byly zadány do OBD (viz příloha).
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¹ Pozn.: názvy škol z důvodu ochrany osobních údajů respondentů v písemné zprávě neuvádíme, budou sděleny ústně při obhajobě projektu.

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Uved'te především publikace, které vznikly na základě řešení projektu. Dále uved'te, zda byly publikace skutečně zadány do OBD s vazbou na RIV.

OBD: záznam ID 43873483.

Havigerová, J.M., Honzíčková, K., & Jiráková, A. (2017). The visual humor perception in relation to intellectual level: Eye-tracker based study. In L. Goméz Chova, A. López Martínez, & I. Candel Torres, ICERI2017 Proceedings, pp. 95-102. Valencia, IT: IATED. ISBN 978-84-697-6957-7.

Přehled realizovaných výdajů:

Čerpání proběhlo v souladu s plánem se dvěma výjimkami: byla podána žádost o změnu v čerpání a) z důvodu změny konference (žádost odsouhlasena), b) pro pořízení klávesnice s myší (žádost odsouhlasena). Drobné změny v čerpání s tolerovanými přesuny v rámci kategorií (nižší náklady na cestovné a konferenční poplatek, navýšení stipendia a materiálních nákladů) viz tabulka níže. Celkově došlo k přečerpání o 23,05 Kč, částka uhrazena ze zdrojů ÚPPE.

Kategorie	plánováno	čerpáno
Stipendium či DPP pro studentky	10 000 Kč	14 850 Kč
Odměna řešitelce vč. odvodů	4 000 Kč	3 980 Kč
Služby (test, překlad, ET)	28 460 Kč	26 260 Kč
Cestovné (letenka, ubytování, diety, pojištění, kurz. ztráty)	29 300 Kč	23 185 Kč
Konferenční poplatek, bankovní poplatek	13 500 Kč	12 763 Kč
Materiální (tonery, kanc. materiál, motivační odměny)	13 000 Kč	18 554 Kč
Navýšení dotace	1 309 Kč	-
<i>Celkem</i>	<i>99 569 Kč</i>	<i>99 592 Kč</i>

Přehled realizovaných výdajů dle jednotlivých položek viz tabulka níže.

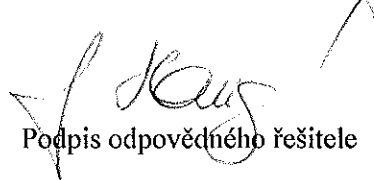
Druh výdaje (mezisoučet)	konkretizace	částka
a) osobní náklady (3980 Kč)	mzda řešitelce	2 970 Kč
	zdravotní pojištění	267 Kč
	sociální pojištění	743 Kč
b) stipendia (14850 Kč)	stipendium (2 studentky)	10 000 Kč
	stipendium (2 studentky)	4 850 Kč
c) materiálové náklady (18554 Kč)	tonery	11 652 Kč
	kanc. potřeby	2 675 Kč
	klávesnice a myš	1 846 Kč
	testový soubor	2 380 Kč
d) provozní náklady (0 Kč)	nebylo pořízeno	- Kč
e) služby (38783 Kč)	konferenční poplatek	12 523 Kč
	překlad příspěvku	5 880 Kč
	překlad anotace a posteru	5 380 Kč
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<i>Celkem (99592 Kč)</i>		<i>99 592 Kč</i>

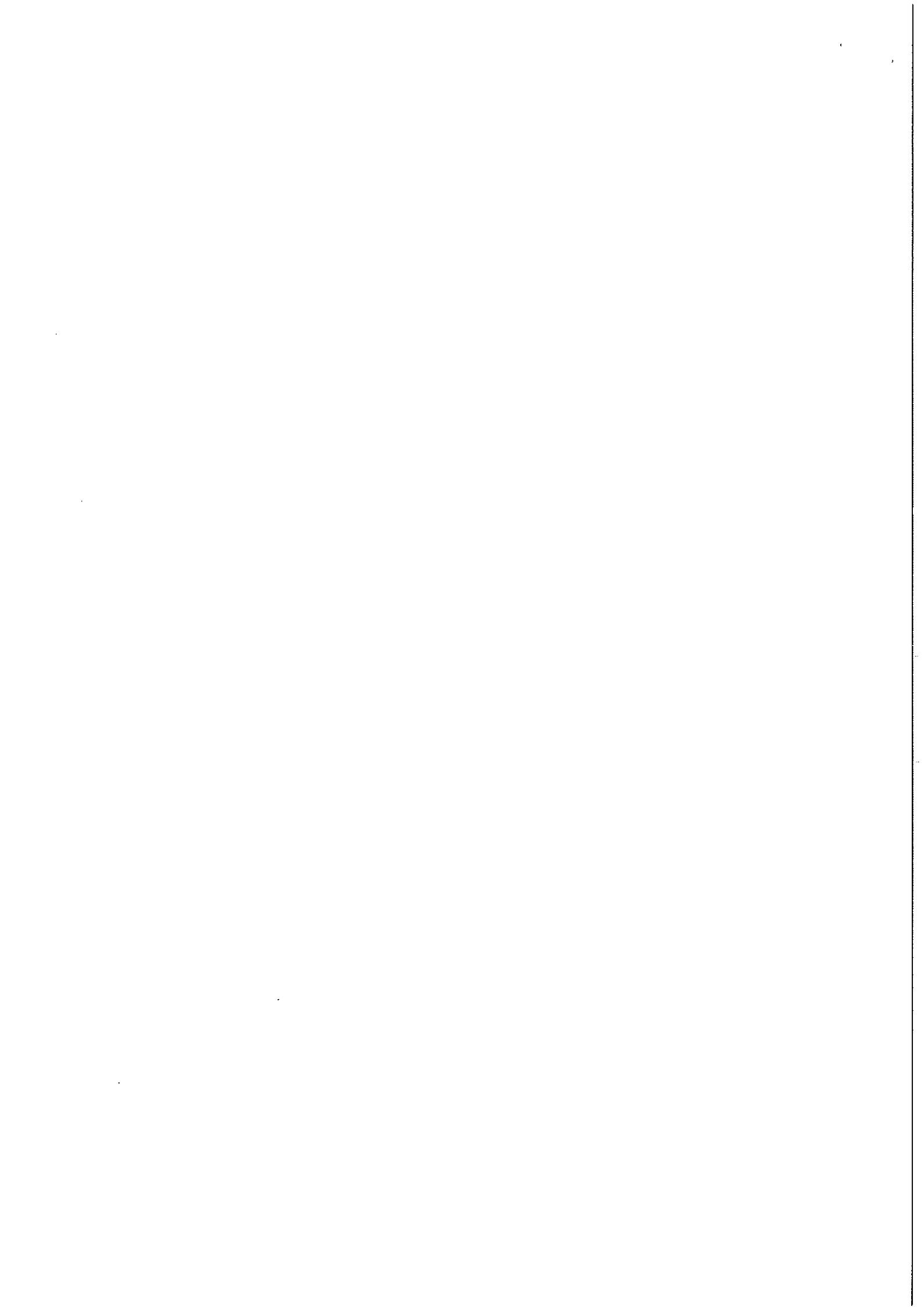
Souhrn všech realizovaných výstupů projektu v letech 2016-2017

Povinné přílohy:

- a) kopie publikačních výstupů
- b) výpis (export) z OBD – výsledky publikační činnosti podpořené projektem,
- c) vyúčtování dotace - „Výsledovka po účtech s pohyby“ z ekonomického informačního systému Magion

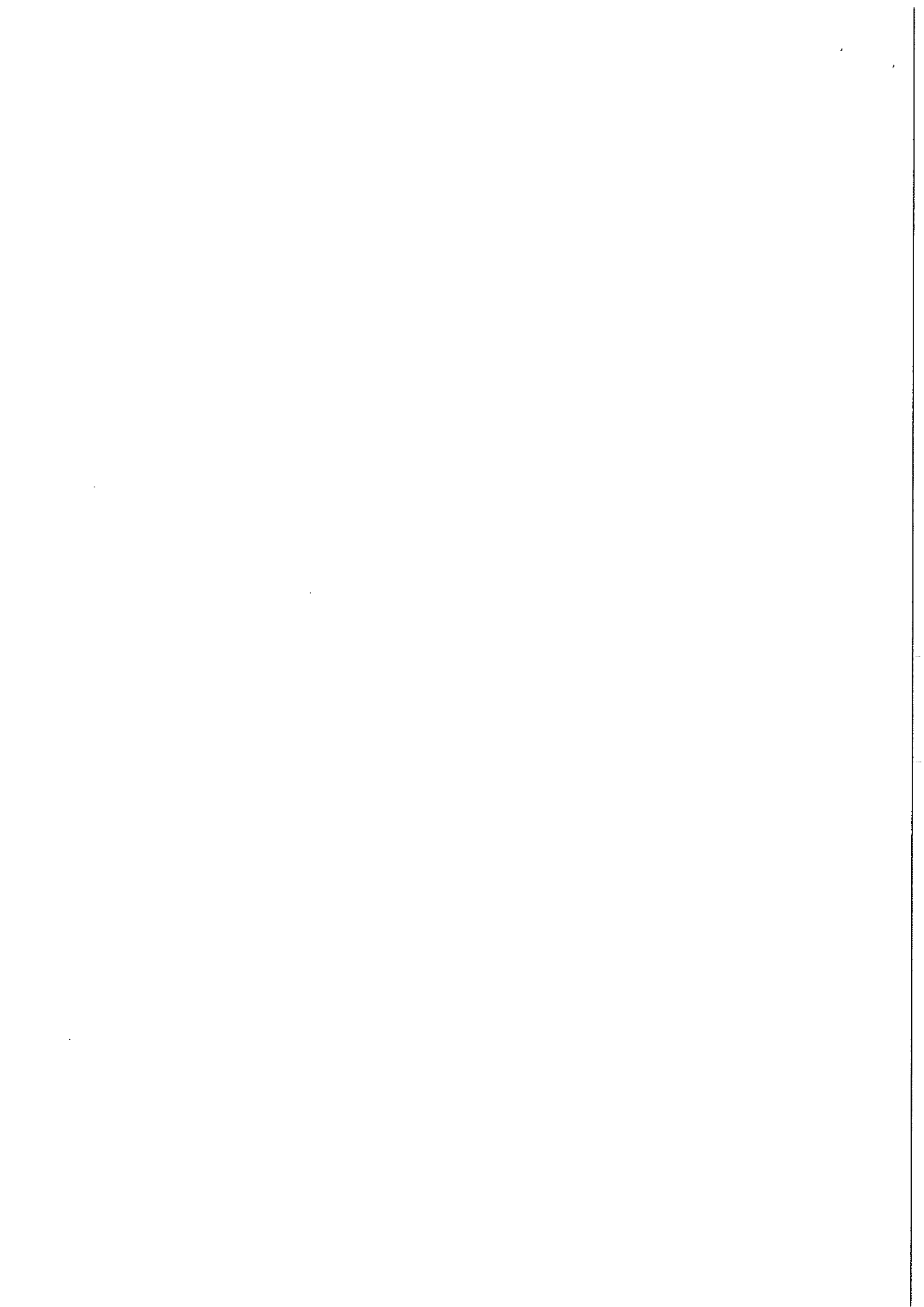
Datum: 3.1.2018


Podpis odpovědného řešitele



Export z OBD dne 03.01.2018 12:04:29

ID Publikace:	43873483	
Lit. Forma:	D_ČLÁNEK VE SBORNÍKU	
Rozšíření LiF:	D_Článek ve sborníku	
Titul:	The visual humor perception in relation to intellectual level: Eye-tracker based study	Uložený
Autoři:	Jana Marie Havigerová (Prac.: 1240); Kristýna Honzíčková (Prac.); Alena Jiráková (Prac.);	
Rok publikace:	2017	



THE VISUAL HUMOR PERCEPTION IN RELATION TO INTELLECTUAL LEVEL: EYE-TRACKER BASED STUDY

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Abstract

The pilot study aims at detailed comparison of children's reactions to cartoon jokes, depending on the general level of intelligence. The study directly follows the analysis of comparison of the subjectively perceived humour of the basic types of jokes, depending on the intellectual level, in the form of face-to-face administration. This study is eye-tracker based and it describes the results obtained from a pilot group of 19 pupils from the 1st and 2nd class. The results showed that pupils diagnosed with extraordinary intellectual giftedness needed a significantly shorter period of time and a smaller number of eye saccades both to understand the situation and qualify the degree of its humour. Furthermore, it was found out that exceptionally gifted pupils, as opposed to others, drew their attention to different details in certain situations. The increased focus on detail seems to be the reason, as well as an advanced need for realism and perfectionism, which was also documented at extraordinarily gifted pupils in other studies. Although children of different intellectual levels perceive the situation as equally humorous, research implied that the situation can be understood in a diametrically different way, whereas mentally retarded pupils generally understand the joke in its simpler level, exceptionally gifted pupils see it at a higher level or even in several levels simultaneously. The results of our study can help teachers understand the differences in humour perceptions and, indirectly, encourage teachers to make thorough use of humour.

Keywords: Visual humour, perceptive component, eye-tracker based study, junior school age.

1 INTRODUCTION

Humour is "a broad term that refers to anything that people say or do that is perceived as funny and tends to make others laugh, as well as the mental process that go into both creating and perceiving such an amusing stimulus, and also the affective response involved in the enjoyment of it" [1].

Latta [2] states: "humour (like beauty) is something that exists only in our minds and not in the real world." The human mind is a key element that allows the humour to be created or understood. The prerequisite sine qua non of humour perception is the existence of pre-existing knowledge structures known as schemas developed by Jean Piaget (1896-1980) - schemas are mental representations of environmental regularities that an individual experienced. Schemas can be thought of as scripts, recipes, maps, or concepts that help direct a person's attention, form hypotheses, develop expectations, and understand novel and incongruous events [3]. The basis of humour is the ability to keep in mind two different possible scenarios at a time: initial assumptions, created and stored over a lifetime in the temporal lobes, along with the alternative explanations that are worked out with the aid of the frontal lobes." (Koestler's Bisociation Theory of Humour [4]). The contradiction between the expected and identified scenario or script is called incongruity [3].

The cases of symptomatic (pathological) laughter led the scientists to the idea that there are some specific locations in the brain associated with laughter and humour ([5]). Contemporary neurologists point out that wit understanding and sense of humour "relies on semantic, mnemonic, inferential, and emotional contributions from multiple brain areas" ([6]). Humour processing is described as a two-phase. In the first cognitive stage (cognitive component humour) process is described as : "progression from an initially promising but misleading integration from left frontotemporal associations, to medial prefrontal ambiguity evaluation and right prefrontal reprocessing, may reflect the essential tension and resolution underlying humour" ([7]). The second emotional phase (emotional component humour) involves a positive feeling state related to mirth and/or reward rely on activity in temporo-occipito-parietal areas (TOPA comprise the posterior superior temporal sulcus – pSTS – and temporo-parietal junction – TPJ, the latter extending further ventrally into the temporo-occipital-parietal-junction – TOPJ [8]).

It is useful to distinguish between two kinds of humour: highbrow (intellectual) and lowbrow (popular, common, street, working class, folk, of the people) humour ([9], [10]). Our study works with lowbrow type of humour - humour intelligible to everyone (every child), which does not require special knowledge or experience to be understood.

1.1 Humor and Intelligence

A number of studies confirm the relationship between humour and intelligence. As early as in the 20th of the 20th century there was confirmed the close relationship between humour and intelligence (by Bird in 1925, [11]), who reported a correlation of $r = .89$ between success in humour and test and the IQ of subjects. Current research confirms this close relationship. For instance, in a study of Greengross and Miller ([12]) it was confirmed in a group of college students that general and verbal intelligence both predict humour production ability. In the current study of children respondents conducted by Hauck and Thomas ([13]) sense of humour correlated highly with both creativity ($r=.89$) and intelligence ($r=.91$). Yet the relationship between intelligence and creativity correlates usually only very little ($r=.29$), in more detail about the relationship between intelligence and creativity see [14]. Also, other studies show that intelligence predicts sense of humour ([15]).

Laing (1939, as cited in [11]) proved that the development of a sense of humour extends in parallel with the development of intelligence. The conclusion is confirmed by current studies in the field of neuropsychology. Vrticka's team ([8]) found that increasing age and IQ were linked with stronger activity to humour in brain areas implicated in the cognitive component of humour and data suggest that humour processing undergoes developmental changes and is moderated by higher IQ scores. Content, character and complexity of humour therefore vary depending on the developmental stage (cfr. [16]), which should be taken into account particularly when designing humour research during childhood and adolescence. In our studies, we focused on preschool ([17]) and primary school age ([18]).

1.2 Aim of study

Intelligence is reflected in many areas of human life. How does it reflect on the perception of cartoon humorous situations? The main research question is: How does the perception of humorous situations differ in intellectually gifted children? The purpose of the study is to describe the specifics of perceived humorous situations in intellectually gifted children using markers of the eye trail that the child leaves when watching the cartoon situation. Three sub-questions are formulated: Does the speed of understanding (latency) differ in humorous situations depending on the intellect level? Does the number of eye fixations differ in understanding of the situation? Do the optic fixation locations vary for respondents from different IQ levels? These data will be supplemented by observations from the follow-up inquiry (key event method).

2 METHODOLOGY

At this stage the project is conceived as qualitative with the aim to provide the insight into the issue. Once the research population is expanded to the number of respondents enabling usage of statistical metrics (30 respondents in each of the 6 groups surveyed - three intellectual groups G1 to G3, two age subgroups 6-8 years and 9-11 years - i.e. a total of at least 180 children), the project will be extended by a quantitative part. In order to formulate the conclusions of this study, the numerical and visual data provided by the eye-tracker are used as well as the information obtained from the follow-up inquiry with the respondents.

2.1 Data acquisition instrument

Data acquisition was realized by means of the Set of Cartoons B (SoCART-B) method. This is a set of 26 situations: 2 training, 2 proofing (neutral, no humorous elements), 11 photos and photomontages, which were perceived as humorous by children in pre-research, 11 cartoon jokes perceived by children as humorous in pre-research ([17], [18], [19]). Drawings are redrawn by a project designer, so that the perception of humor is not influenced by the graphic aspects. All stimulus scenarios were digitized and uploaded to the system in the TOBII XB device accessory, from which they were projected to the respondents on the screen.

2.2 Procedure

The children were brought into the test room by their parents. The administrator explained the purpose and course of testing. The parent was then seated in the next room and the administrator started calibrating the device (the child is watching the moving ball on the screen). Subsequently, the training tasks were projected, the child practiced the test and there was a proctor for asking questions. After that, the child started to run the test by the mouse clicking: a picture (with a joke or control situation) was projected on the screen and when the child felt that the situation in the picture is comprehensible, he or she clicked the mouse and the range of emoticons (smiles) appeared on the screen so that the child could mark the subjectively perceived humour of the situation. The semi-structured inquiry followed: the administrator asked the child about the work details, which situation was the most and the least humorous, and which situation he or she still keeps in mind. After that, the child was shown the course of his or her own eye track at the selected joke (or the jokes the child was interested in), and the child could add a comment. Finally, the child could choose a personal reward (crayons, stickers, modelling clay) from the basket and was taken to the parent waiting in the next room.

2.3 Research sample

A total of $n = 19$ children of junior school age were tested in the frame of the project. The chosen children met the criteria for inclusion in the research - informed consent of parents, age ≥ 6 years, presence at school during the testing period. Occasional selection. Children were classified according to the general intelligence level for group G1 (children diagnosed with mild mental retardation ICD F70, $n = 1$), group G2 (intact population, i.e. children without diagnosed intellectual deviation from the standard, $n = 9$) and Group G3 (children diagnosed as extremely intellectually gifted, $n = 9$).

The data was digitized and anonymized (in the database and in all the outputs the children are only introduced under the identification codes, no video material or audio recording was taken). Quantitative data were analysed statistically and qualitatively.

3 RESULTS

First, descriptive statistics (mean, median, sd) were obtained for both each group of children and each individual stimulus situation. The children's reactions were recorded on a 5-point visual "fun" scale (the children pointed at one out of five emoticons).

Overall, the average assessment of the situations (average for the whole research group) ranged from $m = 2.16$ ($sd = 1.02$, situation BW05 - proofing situation without funny content, see Figure 1) to $m = 4.20$ ($sd = 0.98$, situation BW00 - preparative situation, see Figure 2).

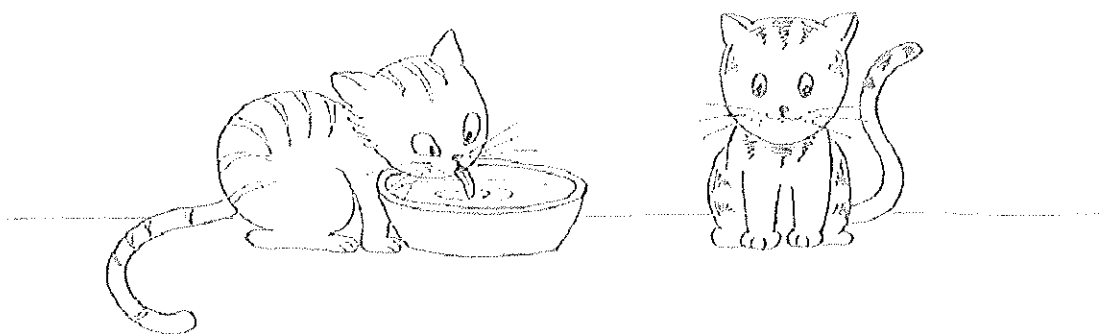


Figure 1. Test situation BW05 - proofing situation (without funny content).

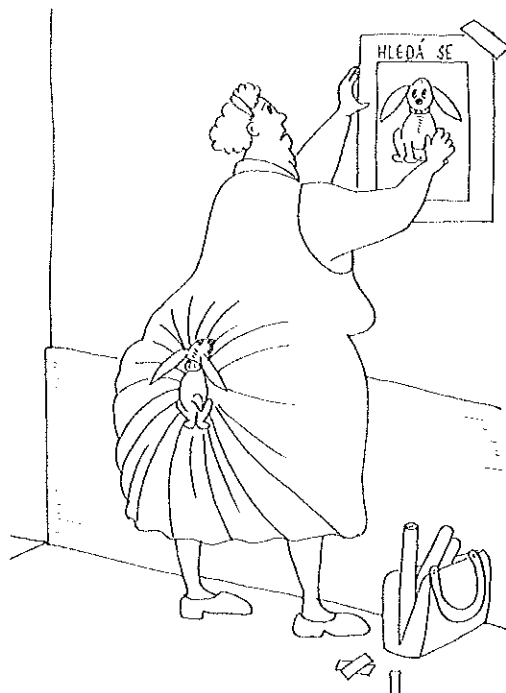


Figure 2. Stimulus situation BW00 – preparative situation.

As the least humorous of the test situations, the children in the research group perceived the situation BW03 ($m = 2.78$, $sd = 1.1$). In the picture is a cat on the right, which has a sad expression, and on the left is a mouse standing on stilts with a triumphant smile (see Figure 3). In the subsequent inquiry, the children often mentioned that they had not understood what the joke had been about. Some children spontaneously expressed concern that the mouse could easily fall out of the stilts and hurt itself. Some children confessed that they did not like the cat's look.

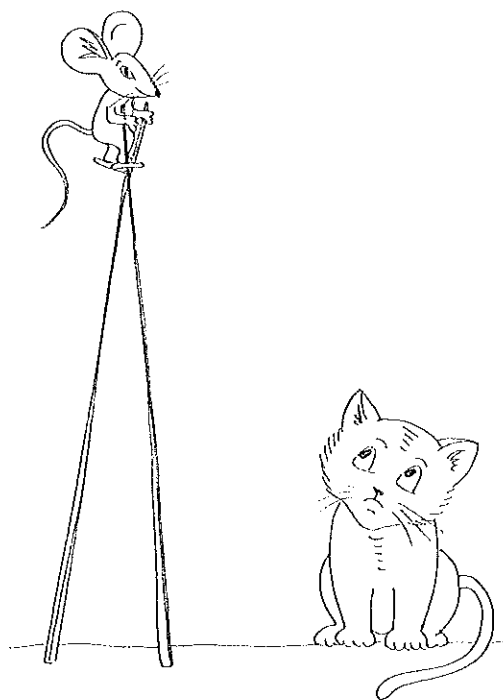


Figure 3. Situation BW3 – according to respondents the least humorous situation.

Children in the research group perceived as the most humorous of the test situations the BW07 ($m = 3.84$, $sd = 1.18$). There is a pig in a room. In the room is an electric socket, which has the same shape as the pig's snout; Pig is looking at the socket. Figure 4 shows two eye trace records, which were recorded when the children were watching the above mentioned situation - on the left (blue) is the record of the boy with mental retardation, on the right (violet) is the record of the boy with extraordinary giftedness. The course of the eye tracking demonstrates the expected results: a child with a lower intellectual capacity needed a significantly greater number of eye saccades to understand the situation than the intellectually gifted child.

Differences in the eye trace, depending on the degree of intellectual level, were observed in three variables: the length of the situation exposure (the child was expected to click when the plot in the picture was understood and he or she was able to assess the level of humour), eye saccades and so-called heatmaps (visualization of eye fixations according to the length of the eye gaze fixation).

The duration of the exposure ranged from 2.11 to 28.56 seconds; intellectually exceptionally gifted children reached a shorter exposure time in all monitored situations. The number of eye saccades (i.e., eye movements in the observed area between individual fixations) showed the same trend and proved to be redundant as it strongly correlates with the length of exposure ($r = .895$).

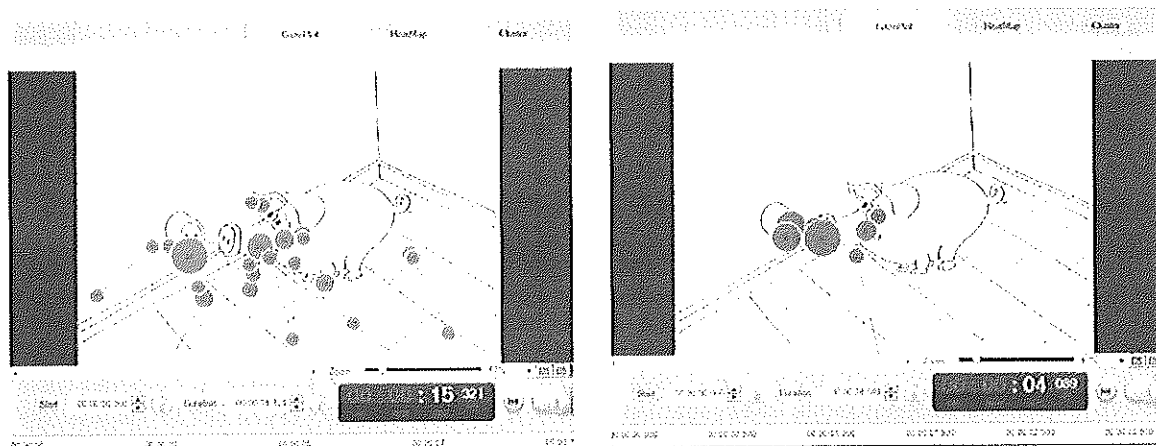


Figure 4. Test situation BW07 – the most humorous, on the left the course of saccades in the respondent with mental retardation, on the right the course of saccades in the child with diagnosed extraordinary giftedness.

Heatmaps allows to identify the places at which the respondent is looking. As seen in Figure 5, the places at which is the child with mental retardation as well as the child with extraordinary giftedness looking basically do not differ (what varies is the quantity, as already mentioned in the previous two markers). Analogically, fixation sites in other test situations were similar. At first glance, it would seem that there is no difference between differently intellectually disposed children. However, the subsequent inquiries revealed that the motivation of eye fixation is fundamentally different.

Figure 5 displays the humorous situation BW01, where the zebra is passing the zebra crossing. The joke is essentially linguistic (in Czech the pedestrian crossing is colloquially called "zebra" just like an animal). On the left is the eye track of the boy with mental retardation, on the right is the eye track of the exceptionally gifted boy. Heatmap of a gifted boy contains higher quantity of fixations than expected, and 3 different points with the greatest duration of fixation (the points with yellow and orange centre). In the boy with a mental retardation, the eye gaze was focused on the face of the zebra (which allows the identification of the animal) and on two places at the zebra crossing (it makes it possible to identify the crossing, respectively silhouettes on the road). The gifted boy's eyes were also focused on the facial part of the zebra and silhouettes on the road, however, the other two fixation points are on the opposite pavement and on the centreline heading to the centre of the crossroads. From the targeting of the eye gaze (sight), it seems that *intellectually exceptionally gifted children are watching even the phenomena of less importance to be able to understand the situation*. This is consistent with the findings related to the gifted children in general, for example, with the fact that gifted children often *tend to focus more on detail and are perfectionists* ([20], [21], [22]). The subsequent inquiry adds the value to this result. The gifted boy (as well as two other extraordinarily gifted children from this study) pointed out that the cartoon situation had shortcomings: the crossings

in the city, are always marked with the sign "Attention, pedestrian crossing" (which is missing on the right pavement in front of the standing zebra), the crossings are often equipped with a signalling device (which was not on the opposite pavement, and which would give the zebra the instruction to enter the roadway), and the centrelines should end at the crossing, they never continue to the middle of the crossroads, as shown in the picture. *None of the children apart from the group of extraordinarily gifted ones (not even the authors) thought about such details.* It is a very impressive demonstration of the thought processes of the gifted mind.

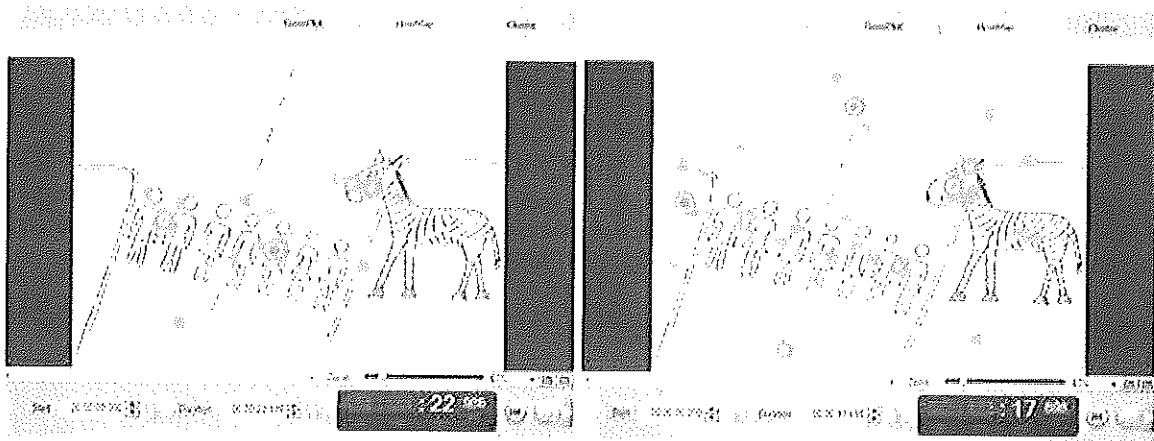


Figure 5. Test situation BW01 – on the left heatmap of the respondent with mental retardation, on the right heatmap of the child with diagnosed extraordinary talent.

The subsequent inquiry revealed further content differences in the understanding of the essence of the humour of the situation. This difference is best demonstrated again in the situation BW01 (see Figure 5). When asked what is the essence of a joke, intact children (G2 group) and gifted children without a doubt understood that it was a confusion (not a man is "crossing the zebra", but a zebra is crossing the human silhouettes symbolizing the crossing). Children with mental retardation considered funny that the zebra is walking on the street (yet zebra cannot walk alone, the zebras live in the Zoo and cannot go down the street) and one of children even asked us why the zebra is trampling on the people (the child believed that the silhouettes show people lying on the road).

4 CONCLUSIONS

Humour is a natural ingredient of family as well as school life of people ([23]). Children's ability to understand humour and humorous situations vary depending on their cognitive dispositions (general level of intellect and structure of specific intellectual abilities, such as the development of verbal intelligence, [24]). Children of all intellectual levels are unable to perceive and produce a certain level of humour ([25]). The level of cognitive abilities primarily influences the speed of understanding of the given situation - gifted children learn the situation much faster than children with average and below average intellectual capacity. Gifted children notice different details in cartoon jokes and focus more on the realism of the situation. This phenomenon has been repeatedly observed in the gifted ones, not only in perception but also in production, for example in the drawing ([26], [27], [28]).

Why to use humour in school? The school education still requires a lot of memorization. It is well known that intelligence is closely related to memory and learning ([29], [30]). However, **humour acts as a moderator** of this relationship ([13]). Humour is one of the important communication tools in the hands of teachers and it is necessary that it be used deliberately (e.g. [31], [32], [33], [34]). If we as teachers "spice up" the instruction by means of appropriate humorous stimuli, we increase the chance and ability to remember. Good teachers are able to differentiate and mediate the deliberate use of differentiated humour with children in early school age depending on their intellectual disposition. The results of our study can help teachers understand the differences in humour perceptions and, indirectly, encourage teachers to make thorough use of humour. Children, depending on their intellectual abilities, may learn different content, but a common good working atmosphere and positive attunement will certainly be benefiting for all children without distinction in intellectual abilities.

ACKNOWLEDGEMENTS

This research was supported by SV project 2017 no. 2108, entitled "The visual humour perception in relation to intellectual capacity in primary school children", run at the University of Hradec Králové.

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