

Original article**Effect of arts based therapy on functionality of children with intellectual disability**

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Abstract

Background: To explore the effect of arts based therapy on basic skill level and behavior parameters as measured by Behavior Assessment Scale for Indian Children with Mental Retardation (BASIC-MR) and performance on Arts-Based Therapy (ABT) rating scale in children with intellectual disability (ID).

Method: Six children (4 males) aged 5 to 13 years with mild-moderate intellectual disability underwent individualized ABT modules with music, rhythm, drama and visual arts in a child friendly academic environment for 9 months. BASIC-MR and ABT rating scale were administered quarterly till the end of study.

Results: Median (range) BASIC-MR scores for basic skill level, BASIC-MR behavior score and ABT rating scale score at 3, 6 and 9 months were 725(349-1208), 855(389-1262) and 936(432-1291); 14(0-22), 6(0-14) and 3(0-16) and 16(12-23), 20(13-26) and 23(15-29) respectively ($p < 0.05$ by Friedman test for all) indicating steady improvement in the skill scores as measured by BASIC-MR & ABT rating scale at 3,6 and 9 months. Posthoc analysis showed that these improvements were steady across the quarters.

Conclusion: ABT results in a medium-term improvement in skill, behavior and ABT parameters in children with ID. This study suggests the need for restructuring remedial education to include performing and visual arts.

Keywords: Arts Based Therapy, Intellectual Disability, Children with special needs.

Introduction

Globally, intellectual disability (ID) is prevalent in 1 % of the population. The prevalence is said to be almost twice more in low and middle-income countries with highest incidence in child and adolescent population [1]. The quality of education received by persons with ID is very important [2]. The definition of ID has globally moved away from that of a medical model to that of an educational model, which is functional and support based and emphasizes the rights of the individual [3].

Studies have indicated that constructivist methods of teaching have great potential for special education students [4] and that holistic arts-based approaches reach children with different learning styles that are not targeted by the teaching methods, which are already in place [5]. Expressive therapies, musical training, rhythmic entrainment intervention (REI), drama therapies and visual art therapies have recently gained additional interest in education as neuroscientific research increasingly demonstrates their positive effects on neurodevelopment [6,7,8,9]. Studies also emphasize the efficacy of expressive therapies, drama therapies, REI, visual art therapy and music therapy in enhancing processing speed of auditory, motor and visual content [10,11].

When creating art, a child builds a wide variety of skills – both motor and cognitive. The various sensory experiences involved in art production are positive and pleasurable sensations. The creative process in art also provides opportunities for expressing ideas and emotions, which are

otherwise difficult for children with disabilities [12,13]. Arts-Based Therapy (ABT) is an evidence-based use of art forms to accomplish individualized goals within a therapeutic relationship. The basis of ABT lies in Indian psychology and ethics, studies of human development and cognitive neurosciences [14]. ABT uses methods from three artistic media - music, drama and visual art.

In the present study, individualized comprehensive remedial ABT modules focusing on five therapeutic goals (impulse control, auditory speech discrimination, quantification, symbol recognition and memory for instruction) were implemented in children with ID. The objective of the study was to assess the effect of individualized ABT modules on the domains of skills and behavior problems and the most commonly occurring goal (MCOG).

Method

The study design was of single group quasi-experimental pre-post design conducted at a special school in New Delhi from 01 July 2015 to 30 April 2016.

Subjects

The selection criteria of the subjects were as follows:

Inclusion Criteria: Children (both boys and girls) with an IQ ranging between mild-moderate intellectual deficiency and age range between 5 - 13 years; Exclusion criteria: (a) Children diagnosed with severe autistic spectrum disorder or severe movement disorders (b) Children with parents planned for relocation

Measures: The tools used for the present study were:

Behavior Assessment Scale for Indian Children with Mental Retardation-BASIC-MR: The BASIC-MR has been designed to elicit systematic information on the current level of behaviors

in school going children with ID. The scale can be used for children between the ages of 3-16 years. The scale is developed in 2 parts. Part A helps assess current level of skill behavior in the child. It consists of 280 items grouped under 7 domains. High scores indicate skill improvement; Part B helps assess the current level of problem behaviors in the child. It consists of 75 items grouped under 10 domains. Low score indicates fewer behavioral problems. Inter-rater reliability for part A was reported to be 0.83 (satisfactory) while construct validity for part A was 0.804 post-test. Reliability for part B was 0.68 (test-retest), construct validity was 0.75 while face validity obtained was found to be high and significant [15].

ABT rating scale for children with special needs: ABT rating scale developed by the WCCL Foundation Pune identifies the skill level of the child with special needs in the domain areas of body, attention, group interaction, cognition, narrative capability and expressive capability. The scale also helps identify the most commonly occurring goals (MCOG) in the group as well as for each individual [14].

Therapeutic Goal Checklist: Based on the MCOG of the ABT rating scale, a simple 5-point Likert rating scale checklist was prepared by the researchers. The rating scale was used to assess the skill level ranging from 1- dependent, 2- physical prompting, 3- verbal prompting, 4- cueing, 5- independent. The checklist aimed at breaking down each MCOG into simple skill-based activities for the child as well as the group.

Procedure: After the sample selection, baseline scores were calculated on BASIC-MR and ABT rating scale. MCOG as assessed by ABT rating scale were identified for the study group.

Individualized ABT modules consisting of 3 sessions per week were created for all children included in the study as below. Simulated game activities were planned based on the therapeutic goal checklist to facilitate the sessions, along with the functional academic need of the child as

assessed by BASIC-MR. The module followed for the functional academics was based on the teaching manual of the National Institute of Empowerment of Persons with Intellectual Disabilities (NIEPID) [16]. For example, for stimulation in auditory discrimination, the baseline criterion to assess auditory localization would be: Is the child able to attend and respond to sounds around him? Is he able to locate the area the sound is coming from? Based on the skill level of the child, game-based circle activities were planned where each child would take turn to identify a recorded sound or a sound made by the teacher on the basis of ‘what’ it was and ‘where’ it came from (Table-1).

Table-1: Example of simulated activities for therapeutic goals used as ABT Module

	Therapeutic Goals			
Simulated Activities for Therapeutic Goals	Auditory Discrimination	Memory for Instructions	Quantification	Symbol Recognition
	Sound localization (treasure hunting sound). Discrimination of sound. Awareness of Phonemes. Auditory memory	Simple commands (Simon says). Body parts game. ‘Which’ ‘Why’ First-Middle-Last	Recognizing Numbers (drum beat counting). Matching with original. Counting Understanding quantity-more, less	Recognition-sounds, signs, shapes, objects, pictures. (Role-playing). Safety signs. Traffic signs. Action pictures

Each ABT session was divided into 3 sections: 1) Pre-session which involved getting together the material and space, seating preparation required for the session; 2) Actual session which consisted of 3 parts namely, communion (starting rituals, warm up exercises), creation (focused activities based on the planned therapeutic goal for that session) and closure (disengaging, putting away things, summarizing), and; 3) Post session which involved completing the session record sheet (SRS), writing the group as well as individual observations, making note of the

difficulties faced, making changes required for the next session and noting down ideas for the next session.

Children were evaluated every 3 months using the BASIC-MR and ABT rating scale to monitor progress. The therapeutic goal checklist was used again at this stage to modify the ABT modules.

Statistical Analysis:

Statistical analysis was done using statistical package for social sciences (SPSS) version 20. Quantitative analysis included median and range scores of the demographic background of the participants. Friedman test was used to evaluate the statistical significance of the change in scores of each test at different times. Wilcoxon signed-ranked test was used to compare performances between the baseline and 1st, 1st and 2nd as well as 2nd and 3rd quarters.

Results

A total of 12 children with ID were identified. Two children suffered from severe autism spectrum disorder, one child suffered from severe diplegia and the parents of 3 children were planned for relocation. These 6 children were excluded from the study leaving 6 children who participated in the study. All the participants for the study had been attending the school for at least 6 months. Table 2 shows the demographic details and the baseline median and range scores of the participants.

Table-2: Baseline characteristics of the subjects (n= 6)

Gender- girls: boys	2: 4	
Father's Occupation		
Govt employee	5	
Businessman	1	
Mother's Occupation		
Homemaker	6	
Characteristic	Median	Range
Age (Median)	10.06	5-12
Developmental Quotient (DQ)	64.50	42-70

Social Quotient (SQ)	70.50	50-78
Associated Clinical Features		
Mild Autism Spectrum Disorder	1	
Hearing Impairment	1	
Down's Syndrome	1	
Cerebral Palsy	2	
Seizure Disorder	1	
Intelligence Quotient (IQ)		
Mild	5	
Moderate	1	
BASIC-MR Skill Score (Median)	693	563-969
BASIC-MR Behavior score	16.5	6.75-22
Arts Based Therapy Checklist	14.4	5-22

Table-3 indicates quantitative analysis of MCOG as assessed by ABT rating scale. Results indicated, $\chi^2 (2) = 17.7$, $p = 0.05$ and Median (IQR) at 0-3, 3-6 & 6-9 months as 2.3 (1.5-3), 3 (2-4) and 3 (2-4), respectively for auditory discrimination. Post hoc analysis of auditory discrimination with Wilcoxon signed-rank tests also indicated significant improvement between 0-3 months ($Z = -2.02$, $p = 0.04$), 3-6 months ($Z = -2.201$, $p = 0.02$) & 6-9 months ($Z = -2.20$, $p = 0.02$). For memory for instructions, $\chi^2 (2) = 18$, $p = 0.05$ and median (IQR) at 0-3, 3-6 & 6-9 months as 3 (2-3), 3 (3-4) and 4(3-5) respectively. Post hoc analysis with Wilcoxon signed-rank tests also indicated significant improvement between 0-3 months ($Z = -2.20$, $p = 0.02$), 3-6 months ($Z = -2.201$, $p = 0.02$) & 6-9 months ($Z = -2.20$, $p = 0.02$). For quantification, $\chi^2 (2) = 17.74$, $p = 0.05$ and Median (IQR) at 0-3, 3-6 & 6-9 months as 3 (2-5), 3 (2-5) and 4(3-5), respectively. Post hoc analysis with Wilcoxon signed-rank tests also indicated significant improvement between 0-3 months ($Z = -2.21$, $p = 0.02$), 3-6 months ($Z = -2.201$, $p = 0.02$) & 6-9 months ($Z = -2.02$, $p = 0.04$). For symbol recognition, $\chi^2 (2) = 17.74$, $p = 0.05$ and Median (IQR) at 0-3, 3-6 & 6-9 months as 2.3 (2-4), 3 (2.3-4) and 3(3-5), respectively. Post hoc analysis with Wilcoxon signed-rank tests also indicated significant improvement between 0-3 months ($Z = -2.02$, $p = 0.04$), 3-6 months ($Z = -2.20$, $p = 0.02$) & 6-9 months ($Z = -2.20$, $p = 0.02$).

Table-3: Quantitative analysis of MCOG assessed by ABT rating scale

	Total Median Score				Friedman		Wilcoxon signed rank					
	Baseline	3 Months	6 Months	9 Months	Chi	Sig	0-3 Z	0-3 Sig	3-6 Z	3-6 Sig	6-9 Z	6-9 Sig
Auditory Discrimination	2 (1.3-2.4)	2.3 (1.5-3)	3 (2-4)	3 (2-4)	17.74	.00	2.02	.04	2.20	.02	2.20	.02
Memory for instructions	2 (1-3)	3 (2-3)	3 (3-4)	4 (3-5)	18.00	.00	2.20	.02	2.20	.02	2.20	.02
Quantification	2 (1-4)	3 (2-5)	3 (2-5)	4 (3-5)	17.74	.00	2.21	.02	2.20	.02	2.02	.04
Symbol Recognition	2 (1.4-3)	2.3 (2-4)	3 (2.3-4)	3(3-5)	17.74	.00	2.02	.04	2.20	.02	2.20	.02

Table-4: Quantitative analysis of BASIC-MR form A & Band overall scores of ABT rating scale

	Total Median Score				Friedman		Wilcoxon signed rank					
	Baseline	3 months	6 months	9 months	Chi	Sig	0-3 Z	0-3 Sig	3-6 Z	3-6 Sig	6-9 Z	6-9 Sig
BASIC-MR (Form A)	693 (563-969)	725 (622 - 1052)	855 (719 - 1164)	935 (788 - 1272)	18	.00	-2.201	.028	-2.207	.027	-2.201	.028
BASIC-MR (Form B)	16.5 (6.75-22)	13.50 (6-21.2)	6 (0.75-11)	3 (0.00-7.75)	17.21	.001	-1.82	.068	-2.02	.043	-1.46	.144
ABT Rating scale	15.62 (13.01-20.38)	16.45 (13.91-23.05)	20.24 (17.79-24.76)	23.32 (19.27-26.61)	12	.002	-2.201	.028	-2.201	.028	-2.201	.028

Table-4 shows the scores from baseline to 3rd quarter with Friedman chi and Wilcoxon Z scores on BASIC-MR forms A and B as well as ABT rating scale. MCOG identified were auditory speech discrimination, memory for instructions, quantification and symbol recognition. Results

showed statistically significant improvement in the overall scores of BASIC-MR (form A) and ABT rating scales.

Median (IQR) scores of BASIC-MR (form A) at 3, 6 & 9 months were 725 (622-1052), 855 (719-1164) and 935(788-1272) respectively showing a significant increase $\chi^2 = 18$, $p < 0.01$. Post hoc analysis with Wilcoxon signed-rank tests also indicated significant improvement between 0-3 months ($Z = -2.201$, $p = 0.02$), 3-6 months ($Z = -2.207$, $p = 0.027$) & 6-9 months ($Z = -2.201$, $p = 0.028$).

Median (IQR) BASIC-MR (form B) scores at 0-3, 3-6 & 6-9 months were 13.50 (6-21.2), 6 (0.75-11) and 3 (0.00- 7.75), respectively, $\chi^2 = 17.21$, $p = 0.01$. Post hoc analysis with Wilcoxon signed-rank tests showed a significant decrease in behavior problems between 3-6 months ($Z = -2.02$, $p = 0.043$) but not between 0-3 months ($Z = -1.82$, $p = 0.068$) & 6-9 months ($Z = -1.46$, $p = 0.144$).

Median (IQR) ABT rating scale scores at 3, 6 & 9 months were 16.45 (13.91 - 23.05), 20.24 (17.79- 24.76) and 23.32 (19.27-26.61) respectively. $\chi^2 = 12$, $p = 0.05$. Post hoc analysis with Wilcoxon signed-rank tests also indicated significant improvement between 0-3 months ($Z = -2.201$, $p = 0.028$), 3-6 months ($Z = -2.201$, $p = 0.028$) & 6-9 months ($Z = -2.201$, $p = 0.028$).

Table 5 shows the quantitative analysis of the subscales of BASIC-MR (form A&B). Statistically significant improvement in all the subscales of BASIC-MR (form A) skill scores from baseline to 3rd quarter was observed. Statistically significant decrease in the number of behavior problems in the areas of violent-destructive behaviors, hyperactivity and rebellious behaviors were observed in BASIC-MR (form B). Post hoc analysis with Wilcoxon signed-rank tests showed inconsistent decrease through the quarters. No statistically significant decrease in behavior

problems was observed in the subscales of temper tantrums, misbehavior with others, self-injurious behaviors, repetitive behaviors, odd behaviors, antisocial behavior and fears.

Table-5: Quantitative analysis of subscales of BASIC-MR form A & B

	Total Median Score				Friedman		Wilcoxon signed rank					
	Baseline	3 months	6 months	9 months	Chi	sig	0-3 Z	0-3 Sig	3-6 Z	3-6 Sig	6-9 Z	6-9 Sig
Form A												
Motor	164 (130-181)	170 (136-184)	178 (147 - 190)	183 (157 - 194)	15	.002	2.023	.043	2.032	.042	2.032	.042
Activities of Daily Living	135 (107-158)	140 (115-166)	160 (129 - 182)	173 (143-196)	15	.002	2.032	.04	2.032	.04	2.041	.04
Language	120 (89-138)	132 (100-145)	154 (126-162)	171 (135-177)	18	.00	2.22	.026	2.20	.027	2.20	.028
Reading-Writing	85 (61-126)	90 (71-136)	109 (86-151)	120 (96-162)	17.74	.00	2.023	.04	2.20	.02	2.20	.02
Number-Time	56 (40-114)	58 (49-140)	74 (56-168)	89 (60-183)	15	.002	2.03	.042	2.3	.042	2.03	.042
Domestic-Social	92 (58-125)	95 (66-130)	114 (88-144)	128 (97-158)	18	.00	2.20	.027	2.20	.028	2.20	.028
Pre vocational – Money	60 (48-126)	64 (53-136)	82 (63-156)	95 (67-172)	17.74	.00	2.02	.043	2.20	.028	2.20	.027
Form B												
Violent & Destructive Behavior	1 (0-7)	1 (0-7)	0 (0-7)	0 (0-2.5)	8.30	.04	.00	1.0	1.64	.10	.44	.65
Hyperactivity	3 (0-5)	3 (0-4.5)	1 (0-3)	0 (0-1.7)	9.8	.02	1.00	.317	1.34	.180	1.63	.102
Rebellious behavior	3.5 (2.7-7.7)	3.5 (1.5-6.7)	1.5 (0-4.2)	0 (0-3.2)	13.04	.005	1.633	.10	1.85	.06	1.63	.10

Table-6 indicates the quantitative analysis of the subscales of ABT rating scale. Statistically significant improvement in all the subscales from baseline to 3rd quarter was observed. However,

post-hoc analysis with Wilcoxon signed-rank test did not show consistent improvement through the quarters.

Table-6: Quantitative analysis of subscales of ABT rating scale

	Total Median Score				Friedman		Wilcoxon signed rank					
	Baseline	3 months	6 months	9 months	Chi	Sig	0-3 Z	0-3 Sig	3-6 Z	3-6 Sig	6-9 Z	6-9 Sig
Body	3 (2.5-4)	3.6 (2.7-4.5)	4.4 (3.3-4.5)	4.5 (3.6-5)	16.5	.001	1.6	.10	1.6	.10	2.3	.02
Attention	3 (2-4.2)	3 (2.8-4.3)	4 (3.5-5)	4.5 (4-5)	12.9	.005	1.0	.31	2.0	.04	1.4	.15
Group Interaction	3 (2.8-4)	3 (2.8-5)	4 (3.2-5)	4 (3.5-5)	14.23	.003	1.6	.10	1.8	.06	2.03	.04
Narrative Capability	2(2-3)	2.4 (2-3)	3 (2.3-4)	4 (3-4)	14.60	.002	1.6	.10	2.04	.04	2.07	.03
Expressive Capability	1.5 (1-2)	2 (1-3)	2.5 (1.8-3.2)	3 (2.7-4)	14.60	.002	1.73	.08	1.73	.08	2.0	.04
Cognition	2 (2-3.3)	2 (2-4)	3 (2.4-4.4)	3 (2.5-4)	16.6	.001	2.02	.04	2.20	.02	1.48	.13

Discussion

In this study, a cohort of 6 children was administered ABT modules tailored to their MCOG and effects of this intervention were assessed using the BASIC- MR and ABT rating scales. The efficacy of the ABT modules was proven by improvement in the MCOG as assessed by the ABT rating scale. There was a significant improvement in the domains of skill and behavior problems as assessed by BASIC-MR.

Benefits of expressive therapies have been proven in the past [5,6,10,11]. However, there are few studies using simulated art based activities focusing on specific intervention goals [14]. ABT

modules have been proven to be very effective in educating children with ID with focused goals especially in a resource-constraint scenario. Working on 31 children with moderate to severe to moderate intellectual disability, WCCL foundation [14] stated that arts therapy showed 80% improvement for moderate group and 75% improvement for severe group and maximum improvement were observed in the cognitive domain. However, this study did not assess for improvement using a standard instrument such as BASIC-MR. The present study was able to demonstrate this improvement.

Simulated activities/games were used in the present study to achieve the therapeutic goals. The activities /games were planned keeping in mind the multimodal (occupational therapy, speech therapy, physiotherapy and behavior therapy) remedial requirement of the child. Combining the structured quality of the ABT session with the simulated activities, made each ABT session target oriented while not diluting the main essence of 'having fun', which was motivating for both the facilitators and the child. These results are supported by WCCL's (14) opinion that "most special schools in India use the arts as fillers or as activities to showcase them as products or performances of the children be it visual art, music, drama, singing or dance. The focus now needs to include and integrate the arts as part of the repertoire of modes used to enhance the abilities of children with special needs".

Statistically significant improvements in the skill levels were observed in domains other than the MCOG, i.e. domains covered by BASIC-MR form 'A' and few subscales of ABT rating scale. Skills like narrative expression, body control & meta-cognition though were not actively focused during the study showed performance improvement. Similar evidence was reported in other studies where it was stated that there are specific brain networks for different art forms and the interest and training in the arts leads to improved general cognition [14]. Music, visual art and

drama work at a much higher metacognitive level where they stimulate more than one faculty of the brain [9,12,13,17,18].

Inconsistent improvement was observed through the quarters in some behavioral subscales indicating different learning curves for those skills based on the developmental level of the child. Similar observations were made in a study by WCCL [14] who stated that since the group is heterogeneous comprising of children having cognitive and developmental challenges due to birth defects, genetic disorders like Down Syndrome, Epilepsy, Cerebral Palsy, the level of progress is not uniform in the group. Each child has a different threshold of learning, retaining and practicing. Therefore, even in special education, needs are typically addressed through Individualized Education Program (IEP) to meet their specific requirements. Thus, it is possible that though improvement in skill and behavior would occur, the speed at which it occurs would have inter as well as intra-personal differences.

The present study could not demonstrate a statistically significant improvement in the problem behaviors of temper-tantrums, hyperactive behavior, misbehavior with others and antisocial behaviors. This can be due to the small sample size. This could also be due to other factors such as clinical condition (children vulnerable to falling ill due to changing weather condition) or post-vacation performance slide indicating a need for longer exposure to therapy. Further, research conducted with a similar heterogeneous group noted that ‘gaps in intervention often lead to a slide back in performance’ and that non-uniformity in the group needs was also likely to result in non-uniform progress [14,19].

Introducing unconventional modules in a conventional setup had their unique challenges. There were difficulties right from getting the permission to convincing the teachers and finally winning the trust of the children. Initial sessions required more cajoling for the teachers to participate in

the sessions as they were set in their teaching roles and running around, playing games, singing songs, making silly expressions and sounds were different from conventional training. The success of the teacher participation was seen at times when they would take the initiative to start the sessions on their own in the absence of the ABT practitioner. Convincing and cajoling was not only limited to the administration and teachers, but also the students initially looked skeptical about the sudden shift in activity and probably because they had never seen a teacher in that role. But, over time, when they saw the facilitator enter the session room, they would get ready for the session by beginning to sing the warm-up song. However, the biggest challenge was in the group activity of drum circle and sound orientation with one child having hearing impairment. Session goals and improvisation in the form of giving cues to the child and responding to vibrations had to be introduced. Heartening experience during the study was, that even children with severe problems would look forward for the sessions and watch if not participate in the sessions and be a part of the activity.

The present study has several strengths. Firstly, the ABT modules were planned in a setup where there were financial constraints. Based on the results of the present study, ABT modules can be suggested as an effective intervention where financial restrictions are a concern, overruling the obstacles of culture and language while having a better outreach. To some extent, the common problem of shortage of trained professionals such as occupational therapists and speech and language pathologists can also be overcome in this paradigm of education. Secondly, the results of the ABT module were measured on a mainstream standardized tool like BASIC-MR. Hence, despite the small sample size, statistically significant results were obtained and this supports the use of ABT for the education of children with ID. Thirdly, the use of the therapeutic goal checklist helped the facilitator logically breakdown the task at hand and focus on the skill

improvement of the MCOG. Fourth, the modules combined ABT with the conventional NIEPID functional academics. This not only made the education comprehensive but also eliminated the need for additional time for the ABT modules. Finally, the MCOG in each session were specific to each child but at the same time did not miss out on the importance of ‘group activity time’, a core feature of remedial education. This makes the ABT modules very comprehensive and goal oriented to use in remedial management.

However, these results need to be interpreted with caution and replicated in a larger study. The limitations of the study are small sample size and timeline. The design of the simulated activities was intuitive and could be subject to inter-operator variability. However, this concern was offset to some extent by the use of ABT rating scale and further amplification by the quantitative analysis of MCOG to measure of the quality of the therapy itself. Thus, the use of ABT rating scale and quantitative analysis of MCOG can be used to balance the inter-operator variability in design of the intervention.

To conclude, we report the salutary effect of an individualized ABT module on the domains of skills and behavior problems as assessed by the BASIC-MR scale in a cohort of 6 children with ID, an important proof-of concept in the domain of education of individuals with ID.

Conflict of interest: None declared.

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