

Effectiveness of music therapy on reading skills of pupils with intellectual disability

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Suggested Citation:

Jacob, U. S. & Pillay, J. (2021) Effectiveness of music therapy on reading skills of pupils with intellectual disability. *Cypriot Journal of Educational Science*. 16(1), 251-265. <https://doi.org/10.18844/cjes.v16i1.5526>

Received from 24 August, 2020; revised from 15 September, 2020; accepted from 1 October, 2020.

Selection and peer review under responsibility of Prof. Dr. Huseyin Uzunboylu, Higher Education Planning, Supervision, Accreditation and Coordination Board, Cyprus.

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Abstract

Objective: Reading is an indispensable skill. The study investigated the effects of music therapy on the reading skills of pupils with intellectual disability. **Methods:** An experimental research design was used. The sample was purposively selected from two special schools for pupils with intellectual disability in Ibadan, Nigeria. Seventeen pupils were randomly assigned to two groups (music therapy and control groups). Eighteen sessions of music therapy were conducted with the experimental group only. The Reading Skills Test was used before and after the intervention to collect data. Analysis of Covariance (ANCOVA) was used for data analysis. **Results:** The data indicated that there was a significant statistical difference between pre-test and post-test results. The interaction effect of treatment and parents' socio-economic status was not significant for the participants' reading. **Conclusion:** Music therapy enhanced the reading skills of pupils with intellectual disability and should be adopted in teaching pupils with intellectual disability.

Keywords: Music therapy; parents' socio-economic status; pupils with intellectual disability; reading skills

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1. Introduction

Reading skills are key to the lifelong effective learning required for active participation in the classroom and in life for pupils with or without intellectual disability. This makes the development of reading skills a primary objective for teachers (Bell, 2010; Register, Darrow, Standley, & Swedberg, 2007). Early identification of pupils with poor reading skills can encourage teachers to find alternative ways to help them develop the skills needed for effective reading. These skills, also referred to as emergent literacy, include, and are not limited to, decoding and vocabulary, phonemic and phonological awareness, language and reading skills (Miller & Stahl, 1989). Pupils need reading skills to successfully accomplish educational goals and expectations. The process of extracting information from visual (printed, graphic or other) or aural/auditory representations, rationalising the meaning, and transferring the information to other contexts, is known as comprehension (Azan, 2010; D'Agrossa, 2008; Kirmizi, 2010).

Pupils with intellectual disability usually struggle to develop appropriate reading skills because they are not given a quality foundation in early literacy skills compared to their peers (Azan, 2010; Bell, 2010; Darrow 2008; Register, et al., 2007). This lack, in addition to their disability, often results in difficulty developing the higher-level skills needed for comprehending texts. Moreover, at the end of first grade, poor reading skills, if not improved, are likely to continue into fourth grade (Bell, 2010). Pupils may face challenges in different academic subjects, mainly because of poor reading skills. Findings reveal that pupils who are unable to read by the 4th grade are more likely to drop out of school before graduation (Azan, 2010). Educational policies should be directed at identifying early indicators of poor reading skills so that early intervention can be adopted to lower the risk associated with reading difficulties (Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004). Pupils who have trouble reading face challenges both with decoding the printed information correctly and comprehending what they are reading. It is stressful for pupils with intellectual disability trying to learn to read due to limited cognitive ability.

2. Literature review

2.1 Benefits of music

Pupils with poor reading skills usually exhibit anxiety when requested to read a given text in front of their peers and sometimes adopt different strategies to hide their inadequacies, instead of focusing on what they are reading. Creating an atmosphere that is stimulating has been reported to help pupils acquire appropriate reading skills (Rashidi & Faham, 2011). Literacy, as a means of expressing concepts by using symbols, could be complemented by other mediums to convey information. One such medium is music (D'Agrossa, 2008). Educators can reach more learners when teaching is done using multimodal approaches, including music. Music therapy has been proposed as an alternative method to developing reading skills of children with reading difficulty because of the significant relationship that has been observed between music therapy and helping learners with dyslexia (Aldridge, Gustorff, & Neugebauer, 2002; Linden & Ostermann, 2010; Nicolson, Fawcett, & Clarke, 2003; Overy, 2000; Overy, 2003; Overy, Patel, 2012). The use of music to enhance teaching of foreign languages has been the focus of much research. Research findings have revealed that music is effective in enhancing the development of language skills, which in turn will result in improved academic achievement (Rashidi & Faham, 2011; Saarikallio & Erkkilä, 2007).

Music may enhance the acquisition of linguistic skills, including reading, writing, listening and speaking (Jalongo & Bromley, 1984; Martin, 1983; McCarthey, 1985), but no known researcher has

investigated using music therapy to enhance reading skills of pupils with educable intellectual disabilities in Nigeria. According to Stansell (2005), the effect of music on language accent, memory, and grammar, as well as on mood, pleasure and motivation, is significant and positive. It can therefore be inferred that music may have a beneficial impact on both the cognitive and the emotional characteristics of humans. In addition, Merrell (2004) avers that anxiety levels and inhibition in learners can be reduced using music therapy. This leads to the conclusion that music can be helpful in minimising levels of tension and stress. Different kinds of music are used by music therapists to alleviate various forms of psychological and physical stress (Stansell, 2005).

Music has been adopted as an intervention to treat medical and psychological issues (Fritz, Hardikar, Demoucron, Niessen, Demey, Giot, et al., 2013; Ghetti, 2013). Music therapy can be used to monitor mental health challenges and reduce the level of pain by releasing endorphins (Boso, Politi, Barale, & Enzo, 2006; Vollert, Stork, Rose, & Mocke, 2003). Music therapy is an effective intervention in the treatment of pupils with special needs. Music also plays an important role in the life of an individual both biologically and aesthetically (Jensen, 2000). Music probably has a direct effect on the human brain, body, energy levels, emotions and ideas. The effect on different individuals can be exciting or soothing (Harvey, 2004). Evidence is compelling to support the argument that proper implementation of music therapy can result in significant and lasting benefits for learners. Such benefits can be grouped into both direct and indirect results of music (Jensen, 2000).

Several studies have examined the effect of music on the development of reading skills of pupils. Not all music has the desired effect. Three quarters of students who participated in a study conducted by Anderson & Fuller (2010) showed a significant decline in reading comprehension as a result of listening to lyrical music, compared to the control group that read in a quiet environment. The implication is that lyrical music may not be the appropriate type of music to use for the development of pupils' reading skills. This study used traditional folk songs, instruments were included, and pupils actively participated by singing the songs. Researchers submit that the right type of music can cause students to become less anxious, more confident and therefore, more productive (Tze & Chou, 2010). Music can also improve the function of the brain in coping with stress, and can increase self-satisfaction and self-confidence (McKinney, Tims, Kumar, & Kumar, 1997). According to Sze & Yu (2004) the integration of music provides students with realistic, hands-on interactions that are crucial to the development of each learner's ability to reason, reflect, resolve conflicts, make judgments and enhance creativity. However, if the music is not properly implemented it can serve as a distraction (Purnell-Webb & Speelman, 2008).

2.2 Factors that mitigate against reading skills

The most common mental disorders which are treated with music therapy include pain, heartbreak, anxiety, and relationship problems. (Nightingale, Rodriguez, & Carnaby, 2013; Sili, Fida, Proietti, Vellone, & Alvaro, 2013). However, there are factors that could mitigate against the effectiveness of the intervention in enhancing reading skills of pupils. Socio-economic factors represent a strong explanatory variable in many of the differences found in educational performance, specifically in reading comprehension (Cáceres-Serrano & Alvarado-Izquierdo, 2011). The foetus in the womb can listen to the mother's language and speech patterns (Adamek, Coddling, Darrow, Gervin, Gfeller, Gorsuch, et al, 2000; Scott, 2004; Standley, 2003). According to Crosnoe, Johnson and Elder (2005), social economic variables, such as education and income are important factors that may predict academic performance of pupils. For example, Arnold and Doctoroff (2003), Lawson and Farah

(2017), Ngorosho (2010), and Reardon (2011) identified three critical factors as major determinants of the home climate that affects academic performance.

Such variables include the father and mother's education, access to electricity, household and educational resources such as books in the home. Ewijk & Slegers (2011) observed that parents with higher socio-economic status are generally able to show interest in their children's academic performance, whereas low socio-economic parents are not likely to show interest in their children's education (Arnold & Doctoroff, 2003; Lawson & Farah, 2017; Reardon, 2011; Turney & Kao, 2009). This may be because low socio-economic households are engaged in low-paying occupations and struggling to take care of more basic needs such as the family's food and shelter (Aikens & Barbarin, 2008; Kieffer, 2012; Ratcliff & Hunt, 2009; Ren & Xin, 2013; Wössmann, 2005). However, the conclusions have been inconsistent (Bradley & Corwyn, 2002; Lareau, 2011). Harris (2006) posits that for proper social and emotional development, students require a strong and reliable primary caregiver who provides unconditional love, guidance and general support. They also require a safe, predictable, and stable environment. Children with intellectual disability from poor socio-economic households are less likely to have these vital needs met than their counterparts from high socio-economic households.

Zhang (2012) found that children from low-income households exhibit poorer social skills, poorer cognitive linguistic abilities, lower phonological comprehension, and lower achievement academically than their peers from high-and middle-income households. The reading skills of children from high-income families were more advanced than those of children from low income households (Chow Ho, Wong, Waye, & Zheng, 2017; Pan Kong, Song, McBride, Liu, & Shu 2017; Wen, Chang & Hau, 2016). Bradley and Corwyn (2002) and Reardon (2011) observed that conventional research has shown that parents who are highly educated, and specifically mothers, are more efficient in providing their children with cognitive and linguistic skills that result in improved academic achievement at school. The level of parents' educational qualifications is crucial to academic performance (Dixon, Keltner, Worrell, & Mello, 2017; Kraus, Piff, Mendoza-Denton, Rheinschmidt & Keltner, 2012; Mallan, 2009).

3. Methodology

3.1 Hypotheses

The following null hypotheses were tested at 0.05 level of significance.

1. There is no significant main effect of music therapy on reading skills of participants
2. There is no significant main effect of parents' socio-economic status on reading skills of participants
3. There is no interaction effect of treatment and socio-economic status on reading skills of participants.

3.2 Participants

Seventeen (17) pupils with intellectual disability were selected for the study. They were purposively selected from two (2) special schools to reflect geographical coverage of the Ibadan metropolis, Oyo state. Participants were randomly assigned to treatment groups tagged as M and C, representing the treatment they were exposed to. Participants in school M were exposed to music therapy, while participants in School C were exposed to conventional methods of teaching, thereby

serving as the control group. Total enumeration was used based on the number of pupils with mild intellectual disability in the two (2) schools.

3.3 Material and methods

The study was based on a quasi-experimental research design of the pre-test control group using a 2 x 3 factorial matrix. Two (2) levels of treatment (Music therapy and Control) were considered, while parents' socio-economic status (high, average and low) of the participants was considered at three (3) levels. The design is represented thus:

Experimental Group 1: (E1) $O_1 X_1 O_2$

Control Group 2: (E2) $O_3 O_4$

Where:

O_1 , and O_3 represent experimental and control group pre-test scores, respectively

O_2 and O_4 represent experimental and control group post-test scores, respectively

X_1 represents the treatment for experimental group (the teaching mode of music therapy)

3.4. Research instruments

The Slosson Intelligence Test (SIT) was constructed and validated by Slosson in 1961 and was developed and designed for analysing general intelligence. The test was adapted to and validated for an African community because SIT originated in the USA. The test is based on content and structure. Some words and items were adjusted to the culture of participants without compromising the validity of the scale. Slosson used the 1960 revision of the Stanford Binet (SB) Intelligence Test to construct the scale and determine its validity. The validity coefficients for each age group were independently determined. They ranged from 0.90 to 0.98. It was concluded by Slosson that just as SB correlates with itself, the SIT also correlated with its criterion. Adediran (2011) reported that using a test retest, the content validity of 0.86 was recorded, which is high. Thus, SIT validity and utility appear to be well established.

3.5 Reading Skills Test

The researcher developed a reading skills test for the purpose of collecting data related to reading skills of learners with mild intellectual disability. The pupils' English language syllabus and English textbooks were also used as references. The test was subdivided into five sections. Demographic characteristics of participants were collected in the first section. The second section requested the attitude of participants to reading, while the third assessed participants' skills on matching words with pictures. For example, 'Girl': the word should match the picture, and nothing else. The task required a description of various pictures and was evaluated in section four. The pupils observed the picture before each sentence and selected the appropriate word in brackets to complete the sentence.

The objective of the reading test was to measure the ability of pupils in matching words with images representing them. Participants were awarded two marks each for any correct response to Section C and D, while zero (0) was awarded for an incorrect response. Section E consisted of ten simple sentences, which measured pupils' ability to read aloud. Two points were awarded to pupils who could read each sentence correctly with few or no errors. One point was recorded for pupils who

managed to read some of the sentences, and zero (0) was awarded to students who could not identify any words in the sentences.

3.6 Music therapy

Traditional folk songs were used for the music therapy. Each session was held using drum sets, piano and recorder. The music therapy treatment consisted of twenty-four sessions of 45 minutes each for the treatment group. Participants were encouraged to sing along and dance to the songs. For the control group, no intervention was used, and they were not asked to attend to any music therapy sessions.

3.7 Parental socio-economic scale

This scale classified participants' parents' socio-economic as high, middle, and low. The scale was adopted for the study from the one designed by Salami (2000) to determine the socio-economic status of parents through their occupation, level of education, residence and types of appliances in the house. Composite scales are usually used for measuring SES, which has a combination of variables such as social and economic, and this scale has 12 items. Items 1 to 4 dealt with the pupils' bio-data. Items 5 to 12 were based on parents' occupation, educational qualification, residence and types of electrical appliances in the home.

The scoring pattern for the scale was:

Parent occupation:	1-10 points
Educational level:	1-14 points
Parent's residence:	1-6 points
Type of house:	1-3 points
Equipment in the house:	1-17 points

The maximum score was 60 and this gave an indication based on three socio-economic status levels. These were:

0-15 points:	Low socio-economic status
16-40 points:	Middle socio-economic status
41-60 points:	High socio-economic status

This scale was validated by Salami (2004), while the reliability of the scale was determined using test-retest, which yielded 0.73. Moreover, revalidation of the instrument yielded a coefficient of 0.75. It was also revalidated by the researcher and found to be 0.70, which implies that the instrument is reliable and appropriate for the study.

3.8 Procedure

Approval to conduct the study was given by the Local Education Authority after I informed them of the purpose of the study. An official letter of introduction was submitted to the head of the selected school. Two research assistants served as resource teachers. They were trained for five hours for three days on how to provide the intervention to participants. Based on the training regarding the way the intervention was to be deployed, the research assistants helped to screen participants using

the Slosson Intelligence Test. After that, the Reading and parents' socio-economic status were administered to participants. The data collected was the pretest score. The intervention lasted for eight (8) weeks, with forty-five (45) minute sessions. Placebo treatment was given to the control group (Conventional Method). The instrument used during the pretest was also used to evaluate the treatment and control group as the post-test after the eight weeks of providing intervention.

3.9 Data analysis

The data generated were analysed using Analysis of Covariance (ANCOVA) to test the null hypotheses at 0.05 level of significance difference. Moreover, the estimated marginal means and Bonferroni Post-Hoc were determined.

4. Results

H₀₁: There is no significant main effect of treatment on reading skills of participants

Table 1: Analysis of Covariance (ANCOVA) of Post- Reading Performance of Learners with Intellectual Disability by Treatment and Socio-economic Status

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2691.118 ^a	6	448.520	48.001	.000	.938
Intercept	1.238	1	1.238	.132	.720	.007
Pretest	204.789	1	204.789	21.917	.000	.536
Treatment	542.545	1	542.545	58.064	.000	.753
Socio-Economic Status	311.423	2	155.711	16.664	.000	.637
Treatment * Socio-Economic Status	34.797	2	17.398	1.862	.183	.164
Error	177.536	19	9.344			
Total	27669.000	26				
Corrected Total	2868.654	25				

Table 1 reveals that the main effect of treatment on reading skills of pupils with intellectual disability was significant ($F_{(1, 19)} = 58.064$; $p = .000 < .05$; partial $\eta^2 = .753$). The effect size was 75.3%. This implies that 75.3% variance in the post- reading performance of learners with intellectual disability was accounted for by treatment. Hence, there was a significant difference in the learners' post-reading performance. The null hypothesis 1 was therefore not accepted. In evaluating the extent of the significant main effect across treatment groups, estimated marginal means of the treatment groups was performed and the finding is shown in Table 2.

Table 2: Estimated Marginal Means of Post-reading Performance by Treatment

Treatment	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Music Therapy	33.896 ^a	.715	32.399	35.394
Conventional Group	21.137 ^a	1.497	18.003	24.271

a. Covariates appearing in the model are evaluated at the following values: Pretest = 19.0385.

Table 2 shows that the learners with intellectual disability taught using Music Therapy had a higher post-reading performance (33.896) than their counterparts taught using a conventional strategy (21.137). This implies that Music Therapy is more effective in improving the reading performance of learners with intellectual disability than the conventional mode of teaching. Table 3 below shows the significance difference between the mean scores of the two groups.

Table 3: Bonferroni Post-Hoc Analysis of Post-reading Performance by Treatment

(I) Treatment	(J) Treatment	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	Lower Bound	Upper Bound
Music Therapy	Conventional Group	12.760*	1.675	.000	9.255	16.264	
Conventional Group	Music Therapy	-12.760*	1.675	.000	-16.264	-9.255	

Table 3 shows that there was a significant difference between the post-reading mean scores of learners taught using Music Therapy and the conventional strategy (Mean Difference =12.760; $p=.000<.05$).

H₀2: There is no significant main effect of socio-economic status on reading skills of participants

Table 1 indicates that the main effect of socio-economic status on reading skills of pupils with intellectual disability was significant ($F(2; 19) = 16.664$; $p=.000<.05$; partial $\eta^2 = .637$). The effect size is 63.7%. This implies that 63.7% variance in the post-reading performance of learners with intellectual disability was accounted for by their socio-economic status. Hence, there was a significant difference in the learners' post-reading performance. The null hypothesis 2 was therefore not accepted. To assess the extent of the significant main effect across the three levels of socio-economic status, the estimated marginal means were used for analysis. The result is shown in Table 4.

Table 4: Estimated Marginal Means of Post-reading performance by Socio-Economic Status

Socio-Economic Status	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
High	33.789 ^a	1.783	30.057	37.521
Average	27.392 ^a	1.329	24.610	30.174
Low	21.369 ^a	1.063	19.144	23.593

Table 4 shows that learners with high socio-economic status had the highest post-reading performance (33.789), followed by the learners with average socio-economic status (27.392) while the learners with low socio-economic status had the lowest post-reading performance (21.369). Table 5 below shows the significance difference that exists among the mean scores of the three levels of socio-economic status.

Table 5: Bonferroni Post-Hoc Analysis of Post-reading Performance by Socio-economic Status

(I) Socio-economic Status	(J) Socio-economic status	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
High	Average	6.397*	2.066	.018	.974	11.819
	Low	12.420*	2.173	.000	6.715	18.125
Average	High	-6.397*	2.066	.018	-11.819	-.974
	Low	6.024*	1.775	.009	1.364	10.684
Low	High	-12.420*	2.173	.000	-18.125	-6.715
	Average	-6.024*	1.775	.009	-10.684	-1.364

Table 5 shows that the post-reading performance of learners with high socio-economic status was significantly different from that of their counterparts with average socio-economic status (Mean Difference = 6.397; $p=.018<.05$) and low socio-economic status (Mean Difference = 12.420; $p=.000<.05$). The table also indicates that the post-reading performance of learners with average socio-economic status was significantly different from that of their counterparts with low socio-economic status (Mean Difference = 6.024; $p=.009<.05$).

H₀₃: There is no significant interaction effect of treatment and socio-economic status on reading skills of pupils with intellectual disability.

Table 1 indicated that the interaction effect of treatment and socio-economic status on reading performance of pupils with intellectual disability was not significant ($F(2; 19) = 1.862$; $p=.183>.05$; partial $\eta^2 = .164$). This indicates that the difference in the post-reading skills of pupils with

intellectual disability was not substantial, based on interaction of treatment and socio-economic status. However, based on the partial eta squared of .164, treatment and socio-economic status, interaction had a 16.4% effect size on the reading skills of pupils with intellectual disability.

5. Discussion of findings

Based on hypothesis one, the findings revealed that the reading skills of pupils with intellectual disability in the experimental group taught with music therapy were better than the control group. This is inconsistent with the submission of Anderson and Fuller (2010), who reported a significant decline in reading comprehension after pupils listened to lyrical music, compared to the control group that read in a quiet environment. However, the present finding aligns with the conclusion of Sze and Yu (2004) who suggested that integration of music into learning provided students with realistic, hands-on interactions that are crucial to the development of each learner's ability to reason, reflect and resolve conflicts. The result of the present research is also in agreement with the assertion of Fritz, Hardikar, Demoucron, Niessen, Demey, and Giot, et al. (2013) and Ghetti, (2013) that music is an effective intervention to treat medical and psychological issues due to the positive effect of music on managing psychological issues.

Furthermore, hypothesis two indicated that parents' socio-economic status had a significant main effect on reading skills of pupils with intellectual disability. This is consistent with Zhang (2012), who noted that children from low-income households exhibit poor cognitive linguistic abilities, poorer social skills and lower phonological comprehension, in addition to lower achievement academically than their peers from high- and middle-income households. The findings also showed that the reading skills of children from high socio-economic status households significantly improved compared to pupils from middle and low socio-economic households among participants with intellectual disability. This may be due to higher socio-economic status parents taking a stronger interest in their children's academic performance than lower socio-economic parents, who have other priorities and cannot take as much interest in the education of their children (Ewijk & Slegers, 2011; Turney & Kao, 2009).

The findings showed that the interaction effect of treatment and parents' socio-economic status on reading skills of pupils with intellectual disabilities was not significant. This does not align with the conclusion of Crosnoe, Johnson and Elder (2005) that social and economic variables, such as education and income are important variables that predict academic performance of pupils. Sze and Yu (2004) averred that integration of music provided students with realistic, hands-on interactions that are crucial to the development of many abilities. These include each learner's ability to reason, reflect, resolve conflicts, and improve enhance creativity. The finding that the interaction effect of treatment and verbal ability did not significantly influence the reading skills of pupils with intellectual disability is also not consistent with the report of McKinney, Tims, Kumar and Kumar (1997) that music can also improve the function of the brain in coping with stress and increases self-satisfaction and self-confidence.

6. Conclusion and recommendations

This study concludes that the music therapy using traditional folk songs was effective in enhancing the reading skills of pupils with intellectual disability in contrast with participants in the control group. This may be due to the active participation of learners singing the songs used for teaching, and in that way the interest of the learners was better sustained. It created an opportunity for the learners to interact with one another while learning. Music therapy is a learner-centred instructional strategy that enhances active participation for learners in the reading class.

Moreover, parents' socio-economic status was also significant in enhancing the reading skills of pupils with intellectual disability. Based on the findings, teachers of pupils with intellectual disability should be encouraged to use this teaching strategy of integrating music with reading lessons because it ensures the active participation of pupils with intellectual disability in developing their reading skills. In that way, learning is made concrete, auditory and visual. Teachers should also consider the socio-economic background of pupils with intellectual disability because it has a significant effect on the reading skills of participants. There is a need for stakeholders such as teachers, caregivers and teachers of pupils with intellectual disability to be trained on how music can be adopted to teach learners reading effectively.

Funding

This work was supported by the South African Research Chairs Initiative of the Department of Science and Innovation and National Research Foundation of South Africa. South African Research Chair: Education and Care in Childhood: Faculty of Education: University of Johannesburg South Africa [grant number: 87300, 2017].

Acknowledgments

The authors acknowledge the students who responded to their instruments and the authors whose materials they consulted.

Conflict of interest

The authors confirm that there is no conflict of interest with respect to the data presented in this paper.

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