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Original Article

Education Section

If 'Express' is to 'Say', then 'Believe' is to What? Development of an Aristotelian Styled Analogical Reasoning Task for Indian Adolescents

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ABSTRACT

Introduction: Analogical reasoning skills are a cognitive linguistic mechanism that develops with age. This development is manifested in the language abilities exhibited by children and adolescents. There are only a handful of standardised language tasks available to assess analogical skills in typically developing adolescents in India.

Aim: The present research attempts to develop an analogical reasoning task to assess language in Indian adolescents.

Materials and Methods: The research followed a two-stage cluster random sampling design with a total of 432 participants between 10-16 years of age allocated based on age and standard. The participants were recruited from English-medium schools based on a selection criterion. The development of the task followed three stages: Stage I comprised of construction of the task along with pilot studies; Stage II included the administration of the developed task; Stage III focused on establishing test validity and reliability measures. The mean and SD of the scores of the task of the adolescents (typical and language disordered) were calculated. The test-retest reliability of the items was measured using Kappa statistics. Intra-class correlation coefficient was done to determine the agreement between the total scores of the task. Mann Whitney Test was done for the items and total scores of each age group. ROC analysis was performed to determine the sensitivity and specificity.

Results: Significant results were obtained when the typically developing and age matched adolescents with language disorders were compared using Mann-Whitney test. ROC analysis revealed a moderate-high sensitivity and low-moderate specificity.

Conclusion: The developed task is a criterion and norm-referenced test which can be used to determine language disordered adolescents.

Keywords: Analogies, Auditory, Developing, Tool, Visual

INTRODUCTION

Analogical reasoning being a higher-order thinking skill allows effective performance on fresh problems, transference of knowledge or information to different situations, and learning by taking in a range of information from various contexts [1]. It requires the manipulation, maintenance, and inhibition of mental representations in order to identify and draw inferences regarding higher-order similarity relationships which are essential for cognitive development and learning [2]. Analogies have been used for better recall of medical concepts (and images), allowing the learners to appreciate the real situation better [3] and also to learn and teach procedures [4], to transfer representations across contexts [5], abstract concepts [6], and fresh mathematics [7].

The comparison between the target and source of an analogical problem play an important role in children's acquisition of word meaning [8]. This comparison conveys the relational information that is necessary for verb learning and other relational devices [9]. Analogical skills are core to children's reasoning and is crucial to educational advancement [10]. The performance in analogical reasoning tasks does require knowledge of the vocabulary items included in it, as well as the ability to comprehend the relationships between the two pairs of terms [11]. Analogical reasoning has shown a steady improvement throughout the elementary, middle and high school years. These reasoning skills are dependent on the intellectual capacity and academic achievement [12] of the children, exhibiting greater use of systematic problem-solving abilities [13]. With the convergence of cognition and language, which is essential for analogical reasoning skills, a competency in both of these areas help resolve analogical problems. Children are able to more skillfully defend and explain analogical solutions leading to a growth in their metalinguistic skills [14].

Studies have reported a steady improvement in the analogical reasoning abilities in typically developing adolescents [13,15]. Deficits in reasoning skills have been noted in children with learning disabilities [16,17], intellectual disability [18], traumatic brain injury [19], deaf and hard of hearing [20], and specific language impairment [21,22]. Though the importance of early detection of language disorders and delays in younger children are well known, the detection of the same in older children are deeply neglected and therefore less explored. Such individuals are frequently under pressure facing challenging problems in a society that is determined to excel in literacy. With the difficulty to find appropriate tasks to assess language disorders in adolescents [23], either under or over identification is a common scenario. One common method to assess reasoning abilities in school-aged adolescents has been the Aristotelian way, i.e. the presentation of incomplete analogies of the form 'X is to Y as A is to ___?' Here the student is required to generate the appropriate B item or choose it from many alternatives. These symbols X, Y, A and B are filled by words (e.g., hand:write:: legs:___?).

In a study done by Kumar S et al., [24], the authors studied the degree of satisfaction of Indian speech language pathologists with the use of the available standardised language measures, and expressed their concern of the lack of availability of the test materials, substantial cost of western language tests, and multi-linguistic and cultural issues while using existing western language tests. Researchers emphasised on the need to develop

and upgrade formal language tests based on linguistic variations (dialects), socio economic status and age. Therefore, culturally and linguistic sensitive language assessment measures are the present need of the hour. Since, there are only a few standardised linguistic tasks are available to evaluate the linguistic growth in adolescents, identifying language disorders in this population have always been a challenge. Hence, the present research is an attempt to develop an analogical reasoning task to assess language abilities in Indian adolescents.

MATERIALS AND METHODS

The present study was approved by Institutional Ethical Committee of Kasturba Medical College, Manipal Academy of Higher Education, Mangaluru, Karnataka, India. Participants included adolescents with a lower age limit of 10 years and an upper age limit of 15.11 years. According to the Registrar General and Census Commissioner of the Government of India, one-fifth of India's population is in the adolescent age group of 10-19 years of age. Though the adolescent age group can extend up to 19 years of age, the upper limit of 15.11 years was considered for this study. This was attributed because children attend secondary high school which is till Xth standard, and also since high school is often the minimum level of education that is received in most social communities, with only 27% of students getting into class XI [25].

The participants were recruited from English medium schools following the state board syllabus. Prior to the conduction of research, school authorities were explained about the purpose of the research and a written permission was obtained from them. The school teachers and parents were provided with a checklist adopted for the research to recruit children based on selection criteria. The inclusion criteria consisted of children who fitted into the age and standard criteria. The exclusion criteria consisted of children with a history/complaint of any speech and/or language deficits, reading and/or writing problems, acquired hearing loss, cognitive deficits; and those with a history of any transfer from more than one school, shift in medium of instruction, and/or any academic failures. An informed consent was obtained from all the participants involved in the research prior to their inclusion in the study.

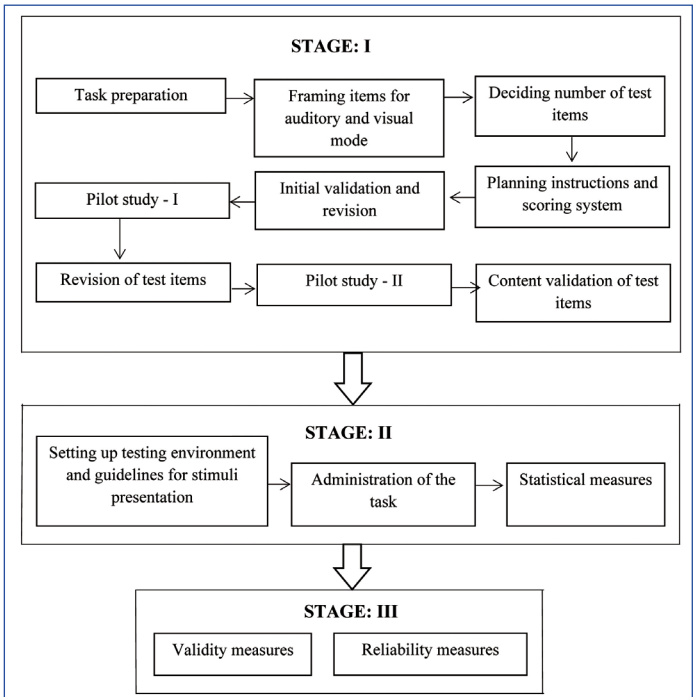
The present study adopted a two-stage cluster random sampling design (using a random number table) for the inclusion for the pilot studies and final data collection. The sample size was calculated using the formula,

$$n=N/1+N(e)^2$$

{n=sample size, N=population size, e=level of precision at 0.05}. The sample size was estimated based on the population of adolescents between 10-19 years in India (Census of India, 2001). The distribution of participants based on their age and standard for the pilot studies, final data collection and content validity estimation are depicted in [Table/Fig-1]. The inclusion criteria for adolescents with language disorders are mentioned in Stage III of the procedure.

Groups	Standard	Age range (years)	Number of typically developing adolescents			Number of adolescents with language disorder
			First pilot study	Second pilot study	Final data collection	For content validity
I	5th	>10-≤10.11	15	10	72	10
II	6th	>11-≤11.11	15	10	72	10
III	7th	>12-≤12.11	15	10	72	10
IV	8th	>13-≤13.11	15	10	72	10
V	9th	>14-≤14.11	15	10	72	10
VI	10th	>15-≤15.11	15	10	72	10
Total			90	60	432	60

[Table/Fig-1]: Distribution of participants across age and standard for the first, second, final data collection, and content validity estimation.



[Table/Fig-2]: The process involved in the development of the analogical reasoning task.

Procedure

The development of the analogical reasoning task followed three stages. Stage I comprised of designing of the task along with pilot study; Stage II included the administration of the developed task; and Stage III focused on establishing test reliability and validity measures. The following figure [Table/Fig-2] illustrates the stages involved in the development of the analogical reasoning task.

Stage I: This stage began with the construction of the items for the task. The test items were prepared using suitable vocabulary from the core curriculum (4th standard-10th standard). The vocabulary included content and functional words. The test items were prepared in a clear, precise, and grammatically correct manner. The items were designed to be age specific, fitting within the curriculum prescribed. Care was taken to avoid inter-related and inter-locked items.

The method of presentation of the task was decided so as to elicit a single word response. The items were assigned under two modalities of presentation (auditory and visual). Caution was taken so as to avoid repetitions in vocabulary across the modalities. This was followed by planning the number of test items under each modality. Separate sets of test items were prepared for each of the six groups (Group I-VI). For the first pilot study, a total of 62 items were developed for the auditory modality, and 60 items for the visual modality. The participants of a particular age group received three sets of items-easy (level below the target age group), medium (level of the same target age group), and difficult levels. The items which attained less than 30% scores or more than 80% scores were eliminated from the stimuli set in order to prevent a floor and ceiling effect of the chosen stimulus. This resulted in the elimination of 23 items in the auditory modality, and 17 items in the visual modality for the second pilot study. In order to maintain uniformity across the separate sets for the final data collection, a total of 5 items were retained under each set for each group, specific to each modality (5 items × 6 groups × 2 modalities). Appropriate instructions were

framed with the test items having a constructed response format resulting in an objective scoring system. The scheme of scoring followed a standard biserial scoring system (0 and 1).

The developed task was validated before the pilot study commenced. Two judges (experts in the field of speech language pathology) were involved to examine the validity of the task and the items. The task was also scrutinised by the respective English teachers of the six standards. After the retrieval of the scrutinised language tool from the subject experts and teachers, necessary modifications were incorporated, and the tool was used for the pilot study. The first pilot study included n=90 students (n=15 per group), who were recruited based on the subject selection criteria. The participants of each standard received three levels of stimuli-easy (below target standard), medium (same target standard), and difficult (above target standard) levels. Items having a low difficulty value may indicate the item to have been mis-represented, too challenging, ambiguous, or the item may have only one correct answer. Considering the item difficulty range of 15-85% adopted for the Test of Adolescent and Adult Language-4 [26], stringent criteria of 30%-80% was considered for the second pilot study. A total of n=60 students (n=10 per group) participated in the second pilot study. Caution was taken to exclude the participants who were involved in the first pilot study. Following the data acquisition, the items of the task of every group were subjected to validity and reliability related measures, in order to select the good items. For the final data collection, a more stringent item difficulty index range of 40%-70% was considered in order to maintain an intermediate level of difficulty. The items used for the final data collection were validated using a discriminating power of 0.3 as per the guidelines prescribed by Hammill D et al., [26]. With a high coefficient alpha value indicating a high degree of internal consistency, researchers recommended alpha values ranging between 0.70 and 0.95 to be considered as acceptable [27]. The current study adopted a Cronbach's alpha value of >0.70. Therefore, items receiving a discrimination power of <0.3, and a difficulty index of <40% and >70%, and a Cronbach's alpha value of <0.70 were eliminated.

Stage II: This stage of the study began with the identification of participants who were not included in the pilot studies. A total of n=432 participants (n=72 per group) were recruited for the final data collection. For the visual modality, the examinee was given a booklet containing the instructions [Annexure-1] and the target items. While, for the auditory modality the examiner verbally presented the items with its instructions [Annexure-1]. The administration of the analogical reasoning task [Annexure-1] included the presentation of a single stimuli set targeting its age equivalent group. The verbal responses generated by the examinee for both modalities were noted by the examiner on a response sheet. The study was conducted between November 2014-February 2015. Kolmogorov-Smirnov and Shapiro-Wilk Test was performed to ascertain the normality distribution and was found to be significant. A total of 30 items were present in the task (per modality), with every group having been assigned five items each. Therefore, the maximum score that can be attained by an individual was 5 (score 1 for each item) for each modality. Descriptive statistics was performed to measure the mean and SD scores of the typically developing adolescents and the age matched adolescents with language disorders under the task for every age group across both modalities.

Stage III: The content validity of the task and its items were evaluated during the task construction stage itself. In order to attain good construct validity, the typically developing adolescents were compared with 60 age matched adolescents with language disorders (10 adolescents with language disorder × 6 groups) using Z test (to compare their responses to items) and Mann Whitney Test (to compare the total scores in the task). These adolescents with language disorders were identified by the teachers using the inclusion/exclusion checklist, and further who demonstrated a relatively poor linguistic competence in the Linguistic Profile Test (LPT) [28]. The language profile of the adolescents with language disorders were manifested by deficits exhibited in the components of phonology, semantics, syntax and discourse in LPT. All the identified adolescents with language disorders had a 1 to 2-year delay in most of the language components. None of the adolescents with language disorders had any associated cognitive deficit or any other confounding disorders such as autism spectrum disorders or learning difficulties. Receiver Operating Characteristic (ROC) analysis was performed to attain the cut-off scores, sensitivity, specificity, and area under the curve. To establish good test-retest reliability, the task was re-administered on 10% of the total sample size (7 participants from each group), after 2 weeks of the initial administration. Kappa statistics (agreement between each item in the task) and intra-class correlation coefficient (agreement between total scores of the task) was done to determine the coefficient of reliability.

RESULTS

The current research focused on the development of an analogical reasoning task (auditory and visual) for adolescents >10-≤15.11 years. The below mentioned results are of the test items used for the final data collection. The mean and SD of the scores of the task of the typically developing adolescents and age matched adolescents with language disorders under each group were calculated. [Table/Fig-3] shows the mean and SD of the scores of the analogical reasoning task of the typically developing (n=432) and age matched adolescents with language disorders (n=60).

The test-retest reliability of the items which was measured using Kappa statistics revealed that all items of the task of each group

Group	Auditory modality				Visual modality			
	Typically developing Adolescents		Age matched adolescents with language disorders		Typically developing Adolescents		Age matched adolescents with language disorders	
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
Group I	3.58	1.21	2.40	1.07	3.16	1.52	2.80	1.23
Group II	3.78	1.30	2.40	1.07	3.25	1.16	1.20	1.03
Group III	3.18	1.42	2.90	0.74	3.25	1.11	1.20	0.42
Group IV	3.29	1.23	1.20	0.42	3.33	1.27	1.60	1.07
Group V	3.04	1.29	1.80	0.79	3.04	1.26	1.80	0.79
Group VI	2.57	1.23	1.40	1.26	3.12	1.22	1.50	0.53

[Table/Fig-3]: The mean and SD of the scores of the analogical reasoning task (auditory and visual) of the typically developing adolescents and the age matched adolescents with language disorders.

attained a Kappa value of 1.0 with a level of significance at p<0.001. The results of the intra-class correlation coefficient reveals >0.88 at p<0.05 for auditory and visual modalities for all groups. ROC analysis was performed to determine the sensitivity and specificity of the task (auditory and visual). [Table/Fig-4] shows the details about the cut-off score, sensitivity, specificity, area under the curve and the level of significance at p<0.05 of the task.

Mann-Whitney test was done for the items of the task (auditory and visual) of each group, in order to compare the responses of the typically developing and age matched adolescents with language disorder. [Table/Fig-5] shows the Z values and the level of significance at p<0.05 of the items of the task (auditory and visual) of each group.

Group	Cut-off score	Sensitivity (%)	Specificity (%)	Area under the curve	p-value
Group I-A	≥ 3	82	60	0.76	0.006
Group I-V	≥ 3	68	60	0.58	0.033
Group II-A	≥ 3	84	60	0.79	0.003
Group II-V	≥ 2	88	80	0.89	<0.001
Group III-A	≥ 3	71	30	0.61	0.024
Group III-V	≥ 2	92	80	0.93	<0.001
Group IV-A	≥ 2	92	80	0.93	<0.001
Group IV-V	≥ 2	89	40	0.84	<0.001
Group V-A	≥ 2	86	40	0.78	0.003
Group V-V	≥ 2	90	40	0.78	0.003
Group VI-A	≥ 1	97	40	0.72	0.025
Group VI-V	≥ 2	89	50	0.87	<0.001

[Table/Fig-4]: The ROC values of the Analogical Reasoning Task (Auditory and Visual).
Note. A indicates an Auditory item, and V indicates a Visual item.
The level of significance is maintained at p<0.05 level

Further, Mann-Whitney Test was done to compare the total scores of the typically developing and age matched adolescents with language disorders on the task (auditory and visual) of each group. Group I attained a Z-value of 2.816 (p<0.05) and 0.928 (p=0.35); Group II attained 3.118 (p<0.05) and 4.148 (p<0.001); Group III attained 1.086 (p=0.06) and 4.614 (p<0.001); Group IV attained 4.588 (p<0.001) and 3.593 (p<0.001); Group V attained 3.029 (p<0.05) and 3.040 (p<0.05); and Group VI attained 2.351 (p<0.05) and 3.922 (p<0.001) for the auditory and visual modalities respectively.

DISCUSSION

The high reliability and good validity attained by the analogical reasoning task, does imply that the task is a strong measure to evaluate the reasoning abilities of an adolescent with language disorders. The test items (auditory and visual) of this task were prepared using an Aristotelian styled format, as per Levinson PJ and Carpenter RL [29] guidelines. A recent study done by Glady Y et al., used a similar A:B::C:D format to examine the analogical reasoning abilities in typically developing children [30]. The items that were selected for this task comprised of concrete and abstract analogies which were of six different types as suggested by Goldstein G [31]. They were analogical relations based on characteristic property {rock:hard :: water:_____(wet,blue,clear)}, part-whole {hand:finger :: leg:____(toe,nail,hair)}, functional {Smile:mouth :: wink:____ (nose,tongue,eye)}, superordinate-subordinate {minute:hour :: paise:____(money, rupee, note)}, causal {food:hunger :: water: ____ (drink, thirst, liquid)}, and sequential {future:tomorrow :: past:_____ (before, yesterday, time)}. The six mentioned analogical types have been suggested by Goldstein G [31]. Analogical reasoning skills

Group	Auditory modality			Visual modality		
	Item no.	Z value	p-value	Item no.	Z value	p-value
Group I	1 A	1.195	0.043	1 V	2.889	0.007
	2 A	2.001	0.020	2 V	2.773	0.038
	3 A	2.613	0.004	3 V	2.284	0.028
	4 A	2.196	0.014	4 V	3.399	0.031
	5 A	2.649	0.004	5 V	1.976	*0.054
Group II	6 A	1.825	0.034	6 V	3.287	0.001
	7 A	2.598	0.045	7 V	5.37	<0.001
	8 A	3.198	0.022	8 V	2.983	0.001
	9 A	3.501	0.000	9 V	1.773	0.038
	10 A	2.228	0.013	10 V	3.283	0.049
Group III	11 A	2.456	0.024	11 V	3.782	<0.001
	12 A	2.043	0.021	12 V	2.567	0.047
	13 A	1.573	*0.053	13 V	2.313	0.010
	14 A	2.007	0.022	14 V	4.865	<0.001
	15 A	2.424	0.036	15 V	3.208	0.001
Group IV	16 A	4.768	0.000	16 V	4.626	<0.001
	17 A	2.665	0.004	17 V	2.365	0.009
	18 A	3.272	0.002	18 V	2.861	0.035
	19 A	2.671	0.004	19 V	2.558	0.048
	20 A	2.250	0.012	20 V	3.324	<0.001
Group V	21 A	1.140	0.027	21 V	2.128	0.013
	22 A	1.748	0.028	22 V	2.651	0.004
	23 A	2.254	*0.400	23 V	1.214	*0.112
	24 A	2.043	0.021	24 V	3.151	0.044
	25 A	3.789	0.000	25 V	5.123	<0.001
Group VI	26 A	1.796	0.013	26 V	2.375	0.009
	27 A	2.108	0.018	27 V	2.817	0.002
	28 A	2.563	0.005	28 V	2.365	0.009
	29 A	2.347	0.044	29 V	3.044	0.001
	30 A	2.171	0.015	30 V	2.525	0.006

[Table/Fig-5]: The Z-values and its Level of Significance of the Items of the Analogical Reasoning Task (Auditory and Visual).
Note. A indicates an Auditory item, and V indicates a Visual item.
*p>0.05

assessed in the present study tapped upon the higher-semantic abilities in typically developing adolescents. On similar lines, recent studies have assessed other higher-linguistic tasks in adolescents as well which are closely related to analogical reasoning [15,32].

The words in the analogies were age specific which increased in complexity with age. The younger groups in the present study were subjected to a larger number of concrete analogical items {Fish:egg :: plant:_____(seed, leaf, root)}, {Shirt:cotton :: shoes:_____(nylon,leather,plastic)} compared to the older groups which received abstract analogies {Correction:error :: cure:_____ (heal, disease, treatment)}, {Commercial:advertise :: comedy:_____ (inspire,motivate,entertain)}]. Younger children were found to have an age related improvement in solving concrete analogies when compared to abstract analogies [33]. Recent research has revealed the improvement exhibited across middle childhood and early adolescents on analogical measures which is largely driven in their ability to selectively retrieve task-relevant semantic relationships [34]. The developed task comprised of analogical types (auditory and visual), increasing in complexity of occurrence, and were presented to all groups. Part-whole and sequential based analogies, predominantly occurred in the earlier groups (Group I and II). Analogies based on the characteristic property and superordinate-subordinate relationship occurred in the subsequent two groups (Group III and IV). The last two groups (Group V and VI) had items that were causal and functional based analogies.

The task (auditory and visual) received a good validity based on the Mann-Whitney test, with all the items of the auditory and visual modalities receiving a validity at p<0.05, except for the four items (13A, 23A, 5V and 23V) which received a validity at p>0.05. Except for the total scores of 2 groups {(Group I (visual) and Group III (auditory)}, which were found to be non-significant, the remaining groups of both modalities received a good validity at p<0.05. This validity attained by this task (auditory and visual) implied that it can be considered as a measure to identify adolescents with language disorder.

The ROC analysis done for the task (auditory and visual) revealed all groups to have attained a sensitivity of 80% and above, except for Group I-V and Group III-A which attained sensitivity between 60-80%. The specificity of the task revealed Group II-V, Group III-V, and Group-IV-A to have attained a specificity of 80% and above, except for Group I-A, Group I-V, Group II-A which attained a specificity between 60-80%. Group IV-V, Group V-A, Group V-V, Group VI-A, and Group VI-V attained a specificity between 40-60%; whereas Group III-A attained a specificity below 40%. This task which followed a selected response format received cut-off scores within the range of ≥1- ≥3, with a maximum score of 5 for each group.

The erroneous words generated in this task (auditory and visual) does indicate the limited vocabulary use of adolescents with language disorders, as well as their poor reasoning abilities. Similar to the present task, typically developing children have been found to perform better than children with communication deficits in analogy based completion tasks [11,18-20,35]. Deficits in analogical reasoning skills can indicate the poor performance exhibited by adolescents in academic settings [36].

CONCLUSION

The developed task in the present study is aimed to identify adolescents exhibiting reasoning deficits. This task is a criterion referenced and norm-referenced task which can be used by speech language pathologists in clinical settings.

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ANNEXURE 1

Instructions for Auditory Stimuli

I am going to ask you to finish a sentence that has a word missing at the end of the sentence. Tell me a word that would end that sentence correctly. You will be given three choices. You can select the correct choice and tell me. If you don't know the answer, just say, I don't know."

Instructions for Visual Stimuli

"I am going to show you two pairs of words. The second pair has a missing relation. You have to find the correct word to complete the pair. You will be given three choices. You can circle the correct choice. If you don't know the answer, you can leave it and go to the next one."

	Auditory Task				Visual Task		
	Item no	Test item	Correct response		Item no	Test item	Correct response
Group I	1	Hand:finger :: leg:____ (toe, nail, hair)	toe	Group I	1	Goldfish:aquarium :: horse:____ (barn, room, shelter)	barn
	2	Future:tomorrow :: past:___ (before, yesterday, time)	yesterday		2	Lunch:afternoon :: breakfast:____ (day, morning, early)	morning
	3	Books:read :: toys: ____ (games, play, tools)	play		3	Smile:mouth :: wink:____ (nose, tongue, eye)	eye
	4	Nose:smell :: fingers:____ (hear,touch,see)	touch		4	Go:green :: stop: ____ (red, orange, black)	red
	5	Broom:clean :: stove:_____ (burn, eat, cook)	cook		5	Cook:kitchen :: study:_____ (home,shop,classroom)	classroom
Group II	6	Rain:water :: storm:____ (sun,wind,fire)	wind	Group II	6	Poor:money :: sad:_____ (age,feelings,happiness)	happiness
	7	Pen:write :: ruler:_____ (hit,feel, measure)	measure		7	Day:week :: month:_____ (year, November, hour)	year
	8	Fish:egg :: plant:_____ (seed, leaf, root)	seed		8	Minute:hour :: paise:____ (money, rupee, note)	rupee
	9	Mammal:lion :: reptile:_____ (whale, snake, spider)	snake		9	Students:group :: thieves:_____ (crowd, team, gang)	gang
	10	Radio:music :: bulb:____ (bright, round, light)	light		10	Shirt:cotton :: shoes:_____ (nylon, leather, plastic)	leather
Group III	11	Desk:classroom :: sink:_____ (kitchen, attic, bedroom)	kitchen	Group III	11	Circle:circumference :: rectangle:_____ (radius, perimeter, diameter)	perimeter
	12	Professor:respectable :: minister: ____ (advisable, admirable, honorable)	honorable		12	Comb:tooth :: book:_____ (library, page, knowledge)	page
	13	Teacher:educate :: doctor:_____ (pray, heal, teach)	heal		13	Fisherman:net :: doctor:_____ (medicine, mask, stethoscope)	stethoscope
	14	Bad:worst :: good:____ (great, goodest, best)	best		14	Poor:money :: tired:____ (energy, food, clothing)	energy
	15	Boy:son :: man:____ (father, adult, person)	father		15	Food:hunger :: water:____ (drink, thirst, liquid)	thirst
Group IV	16	Assassination:murder :: relay:_____ (race, event, game)	race	Group IV	16	Bow:arrow :: gun:____ (weapon, danger, bullet)	bullet
	17	Immobile:move :: illiterate:____ (talk, read, feel)	read		17	Selfish:compassion :: childish:___ (responsibility, maturity, ability)	maturity
	18	Rock:hard :: water:_____ (wet, blue, clear)	wet		18	Orphan:parents :: prisoner:_____ (freedom, belief, resolution)	freedom
	19	Coal:fuel :: passport:_____ (ticket, receipt, document)	document		19	Wheat:bread :: milk:____ (white, curds, cow)	curds
	20	Message:information :: hug:____ (perfection, affection, fulfillment)	affection		20	Urban:city :: rural:_____ (village, state, district)	village
Group V	21	Dentist:physical :: psychologist:_____ (mental, clinical, internal)	mental	Group V	21	Weak:strength :: lost:_____ (direction, courage, found)	found
	22	Generator:electricity :: college:____ (professors, teachers, graduates)	graduates		22	Expert:skilled :: athletic:_____ (thin, fast, fit)	fit
	23	Desire:fulfill :: goal:_____ (satisfy, accomplish, organize)	accomplish		23	Actor:dialogue :: Priest:_____ (confess, preach, counsel)	preach
	24	Mask:disguise :: perfume:_____ (liquid, spray, scent)	scent		24	Texture:feel :: aroma:____ (smell, odor, stink)	smell
	25	Water : contaminate :: society : _____ (corrupt, illegal, immoral)	corrupt		25	Humans:violent :: animals:_____ (aggressive, powerful, ferocious)	ferocious
Group VI	26	Society:vaccine :: Farm:_____ (agriculture, biogas, pesticide)	pesticide	Group VI	26	Commercial:advertise :: comedy:_____ (inspire, motivate, entertain)	entertain
	27	Quit:resign :: substitute:____ (alternative, different, option)	alternative		27	Liar:honesty :: fool:_____ (power, mercy, wisdom)	wisdom
	28	Correction:error :: cure:_____ (heal, disease, treatment)	disease		28	Fall:gravitation :: collapse:_____ (pressure, balloon, destruction)	pressure
	29	Money:withdraw :: metal:_____ (excavate, extract, expand)	extract		29	Express:say :: believe:_____ (ask, wonder, think)	think
	30	Gasoline:flammable :: radiation: ____ (ecological, organic, hazardous)	hazardous		30	Veins:circulate :: ornaments:_____ (enhance, decorate, improve)	decorate