

# Modality Specific Assessment and Management for Individuals with Visual Agnosia: A Case Report

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## Abstract

*Differential diagnosis amongst the neurocommunication disorders is essential for successful management. Agnosias are modality specific disorders and they have an effect on communication. Visual agnosia is a deficit in object as well as word recognition and processing confined to the visual modality, with intact auditory and tactile modality. This case report highlights the utility of a modality specific test in the diagnosis and management of visual agnosia. The importance of accurate diagnosis of visual agnosia in planning structured therapeutic sessions is also discussed.*

**Keywords:** Visual agnosia, Modality specific test, Differential diagnosis.

Agnosia is a modality specific impairment. It is defined as a disturbance of recognition or identification of sensory stimuli. Wepman and colleagues (1960 as cited in Halpern, 1986, pp 420). It is an input modality – bound impairment in which the person has difficulty only with the affected modality, and can perform well through an alternate modality. Visual agnosia is a deficit in object as well as word recognition and processing confined to the visual modality, with intact auditory and tactile modality. Further, visual agnosia is thought to be present when the client has difficulty in visual recognition of objects which is not attributable either to defects of visual acuity or to generalized intellectual impairment (Brain, 1961, as cited in Halpern, 1986, pp 421).

The most common cause of agnosia is cerebrovascular accident. Other causes include, trauma-induced by a head injury, brain infection, dementia or other neurological disorders. Some forms of agnosias have been found to be genetic. Visual agnosia is caused due to infarction in the posterior cerebral artery involving the occipital lobe or the temporo - occipital lobe (Davis, 1983, as cited in Halpern, 1986, pp 420). Shelton, Bowers, Duara, and Heilman, (1994) reported a case with an infarction of the inferior temporal and occipital association cortex bilaterally, spared primary visual cortex. They observed that the client had impaired visual recognition of objects, faces, colors, words, and gestures. A number of forms of visual agnosia have been delineated. These include visual agnosia for objects, simultanagnosia or failure to appreciate the meaning of a picture though its individual elements are correctly identified, visual agnosia for colours, visual agnosia for space,

prosopagnosia or difficulty in recognizing familiar faces and loss of visual imagery for objects, where the client has difficulty with objects forms and colours from memory but no difficulty with them upon presentation (Brain, 1961, as cited in Halpern, 1986, pp 421).

Brown (1972, as cited in Halpern, 1986, pp 421) has described apperceptive visual agnosia and associative visual agnosia. An apperceptive disorder occurs when the client fails to identify, describe or copy the simplest objects or line drawings in visual presentation, and has impaired performance on matching tests. In associative agnosia, there is an interruption at a later phase in perception. In this instance, the client can probably perform the tasks described under the apperceptive disorder but has great difficulty in distinguishing items which are visually similar.

Visual agnosia affects the individual's language functioning in his day to day life as the visual modality plays an important role in language functions. However, there is a paucity of assessment tools for assessing clients with agnosias in general and visual agnosias in particular. Often the clinician has to rely on combinations of various subtests of different assessment tools for visual perception. Assessing client's visual acuity, visual recognition by naming objects, colors and pictures and picture description, graphical recognition and comprehension by assessing reading and writing skills, visual discrimination test, visual matching test, visuo - spatial orientation by Frostig's line drawing test and visual figure ground perception test encompass assessment areas for visual agnosia.

Visual agnosia needs to be differentially

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diagnosed from aphasia and this may be done by assessing the client using a modality specific test. One such a test is 'Appraisal of Language Disturbances' (ALD), devised by Emerick (1971, as cited in Kertesz, 1979, pp 26 - 27). ALD is systematized according to the modalities of stimulation as well as responses and incorporates various items in each sub-test. For example the oral to oral sub-tests in ALD include automatic speech, repetition, supplying opposites to words, sentence completion, definitions, and disparities (word finding) tasks. The oral to visual sub-tests include pointing to objects, pictures and words, comprehension and reading. The oral to gesture sub-tests are partly the tests of praxis, such as shaking head, coughing, whistling, humming, pointing to body parts, and demonstrating actions. The oral to graphic sub-test is writing on auditory stimuli; the sub-test similar to the oral to oral tests, except that the client responds by writing (graphically). The gestures to visual sub-tests assess comprehension of gestures, with multiple choice objects, pictures and words. The visual to gesture sub-tests assesses praxis with actual objects. The visual to oral sub-tests contain reading and naming tasks. The visual to graphic sub-tests include copying, writing the names of objects, and writing about the picture.

A test similar to the ALD described by Emerick (1971) was developed in Hindi by Jani (2007). The test consisted of eight modality combinations including aural-oral modality, aural-visual modality, aural-gestural modality, aural-graphical modality, visual-gestural modality, visual-visual modality, visual-oral modality and visual-graphical modality. The details of the modality combinations are given in Appendix-1. Test plates were prepared using pictures taken from various sources including story books. Items for the gestural and graphical modalities were selected according to the demands of day-to-day communication needs and were included in the test. Following a pilot study on 20 typical Hindi speaking adults, the test was administered on 120 normal Hindi speaking adults ranging from 30-70 years of age. Participants were divided according to age group (30-50 years & 50-70 years) as well as educational level (<XIIth std and graduates). Statistical analysis revealed that the

reliability measure, that is, internal consistency was very high. Also, the test-retest and inter-tester reliability measure was found to be very high for all the sub-tests. The constructed test was also administered on a small sample of adults who had the complaints of communication disorder. The aim was to ascertain the utility of the test in assessing the intact modality in the modality specific disorders like agnosia and the relatively spared modality in aphasia. It was observed that the modality specific test could identify the intact and relatively intact modality in clients with neurogenic communication disorders.

There is a paucity of literature on the management of individuals with visual agnosia associated with language disorders. Treatment of clients with visual agnosia includes the use of the intact modality to de-block the affected modality. Combining the auditory and tactile modality with the visual modality helps in better visual perception and comprehension. (Beukelman & associates, 1980, as cited in Darley, 1982, pp 213) compared the performance of 19 severely aphasic clients in response to input presented in three ways: verbally, by pantomime and combination of both. The combined pantomime and verbal mode gave the best performance followed by pantomime alone. The least progress resulted from verbal stimulation.

This paper presents a case report describing modality specific assessment and management of visual agnosia. The case report highlights the importance of understanding the characteristics of an individual with visual agnosia in order to differentially diagnose from an individual with aphasia and carry out appropriate rehabilitative strategies. The main objectives of this paper are to highlight the utility of a modality specific test in the Indian context to 1) assess the presence / absence of visual agnosia, 2) differentially diagnose visual agnosia from aphasia and 3) in the management of visual agnosia.

### Case Report

A 56-year-old right handed male reported to the institute with the complaint of inability to see clearly since two weeks. The client also complained of weakness on the right side and an inability to move his upper and lower limbs

adequately. The client was educated till the 12th grade and was a fluent Hindi and Marathi speaker. Medical evaluation revealed a history of

fluency (10/10), comprehension (7.65/10), repetition (10/10),

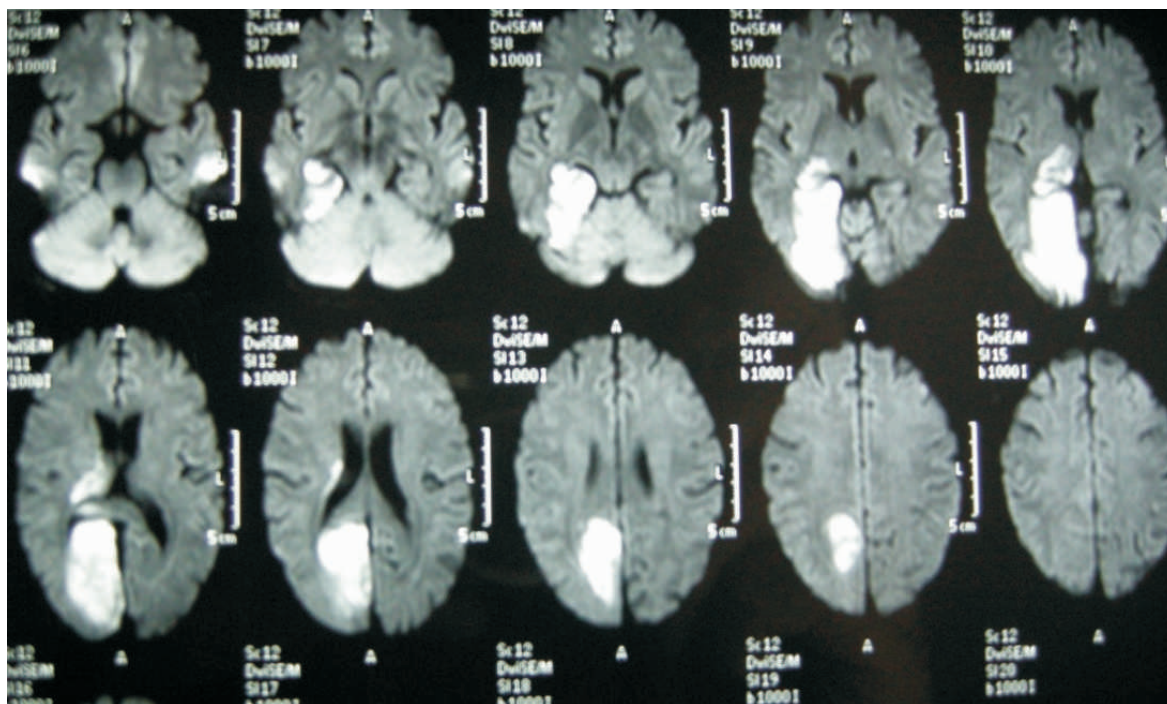


Fig. 1. Magnetic Resonance Imaging (MRI) of the client

cerebro-vascular accident with right sided hemiparesis and hemianopsia. The MRI scan revealed left posterior cerebral artery infarction with left temporo-occipital lobe involvement. Figure 1 shows the MRI scan results of the client.

### Speech and Language Evaluation

Informal assessment revealed that the mode of communication was verbal. Auditory comprehension for three-step commands was found to be adequate. The client expressed himself using compound and complex sentences. Repetition for 10 word sentence was adequate. Client experienced difficulty in naming objects shown visually. However, the client performed well on auditory completion subtest. Reading and writing were found to be severely affected.

Western Aphasia Battery (Kertesz, 1982) which was informally translated to the regional language Marathi was used for language evaluation. The scores on different sections of the WAB namely,

naming (5.6/10), and reading and writing (0/10) sections revealed a diagnosis of anomia.

Client exhibited deficits in visual confrontation naming with adequate naming and comprehension by auditory modalities. Therefore, the client was evaluated using the modality specific test. The raw scores and percent scores for client in each modality combination are shown in Table-1. The range of percent scores obtained by a group of 30 neurologically normal adults in the age group of 50 to 70 years is also presented in Table-1. Data from the neurologically normal adults is taken from the results of the study conducted by Jani (2007). As evidenced from the table, the client demonstrated poor performance in the aural-visual modality combinations and was unable to perform in the modality combinations of aural-graphical, visual-visual, visual-gestural, visual-oral and visual-graphical.

Table 1. *Performance of the client across the various modality combinations before Intervention*

| Modality Combinations | Maximum scores | Performance of client before intervention |                   | Performance of neurologically normal adults |
|-----------------------|----------------|---|-------------------|---|
|                       |                | Raw Scores                                | Percentage Scores | Range of percentage scores                  |
| Aural - Oral          | 77             | 68  | 88%               | 88% - 100%                                  |
| Aural - Visual        | 36             | 19  | 53%               | 92% - 100%                                  |
| Aural - Gestural      | 50             | 45  | 89%               | 82% - 100%                                  |
| Aural - Graphical     | 115            | 0   | 0%                | 77% - 90%                                   |
| Visual - Visual       | 20             | 0   | 0%                | 95% - 100%                                  |
| Visual - Gestural     | 20             | 0.5                                       | 1%                | 100%  |
| Visual - Oral         | 80             | 0   | 0%                | 94% - 99%                                   |
| Visual - Graphical    | 102            | 0   | 0%                | 82% - 98%                                   |

*Note: The data from neurologically normal adults is drawn from Jani (2007). The 30 adults ranged in age from 50-70 years and had completed education till the 12th grade*

In addition to the modality specific tests, different tests aimed at assessment of visual perception were performed to assess the functioning of the visual modality. Visual confrontational naming and visual comprehension test resulted in poor performance. The client's visual matching and discrimination was also impaired. Client's visuo-spatial orientation was assessed using Frostig's line drawing test (Appendix-2) where the client was expected to draw certain geometrical forms by joining dots. The results of the Frostig's line drawing test indicated poor visuo spatial orientation. The client was unable to comprehend the figures in the Figure ground perception test (Appendix 3). In the figure ground perception test, the client was expected to identify the shapes embedded within a background. Client also performed poorly on visual completion test where the client was

required to complete the missing portion in the picture. For example, the client was shown pictures of a fish without eye, a house without a window, a face without a nose and a lock without the key hole. The client was expected to complete the pictures. These tests do not have a scoring system. The results of visual perception tests described above along with the results of the modality specific test were indicative of visual agnosia. This diagnosis was confirmed by the neurologist based on the reports of magnetic resonance imaging (MRI).

Examination of the oral peripheral mechanism revealed normal structure and functioning. Diadochokinetic rate for speech was within normal limits. Speech intelligibility was rated as level 0 on a scale of 0 to 6 suggesting normal speech and ruling out the presence of any dysarthria. Client was able to perform all gestures

on command, without any repetitions, indicating the absence of apraxia. Client reported no complaints regarding swallowing. Voice parameters in terms of loudness, pitch and quality were perceptually rated as normal by two clinicians. Hearing sensitivity was found to be within normal limits on pure tone audiometry.

### Therapeutic Intervention

The client was enrolled for intervention with the long term goal being achievement of functional visual skills within the limits of the client's impairment. The goals of the intervention included 1) To improve visual confrontation naming using tactile modality and auditory cues and prompts like describing functions of objects and pictures; 2) To improve visual matching by using tactile modality and real objects; 3) To improve letter recognition by use of sand paper and tracing; 4) To facilitate writing by tracing and joining dots, drawing lines and curves. These goals reflect the use of de-blocking and

stereognosis during the intervention.

De-blocking is a technique where the impaired modality is not made available to the client and the intact or relatively intact modality is used to give intensive stimulation. The tactile and auditory cues were faded off gradually. The clinician also used the stereognosis method where the client's visual modality was completely blocked (by asking the client to close his eyes) and clinician traced alphabets and shapes over client's hands. Client was assessed after three months of intensive intervention. Client showed an overall improvement in performance via the visual modality. Client could perform visual matching, visual discrimination, visual completion, tracing on line drawing test and visual figure ground perception test adequately. On the modality specific test, the client showed improvement in all sub-tests involving the visual modality (Table 2). Figure 2 depicts the percentage scores across various modality combinations obtained by the client before and after intervention.

Table 2. Performance of the client across various modality combinations after intervention for three months

| Modality Combinations | Maximum scores | Performance of client after intervention |                   |
|-----------------------|----------------|--|-------------------|
|                       |                | Raw Scores                               | Percentage scores |
| Aural - Oral          | 77             | 69                                       | 90%               |
| Aural- Visual         | 36             | 32                                       | 88%               |
| Aural- Gestural       | 50             | 45                                       | 90%               |
| Aural- Graphical      | 115            | 57.5                                     | 50%               |
| Visual- Visual        | 20             | 14                                       | 70%               |
| Visual- Gestural      | 20             | 12                                       | 60%               |
| Visual - Oral         | 80             | 48                                       | 60%               |
| Visual- Graphical     | 102            | 31                                       | 30%               |

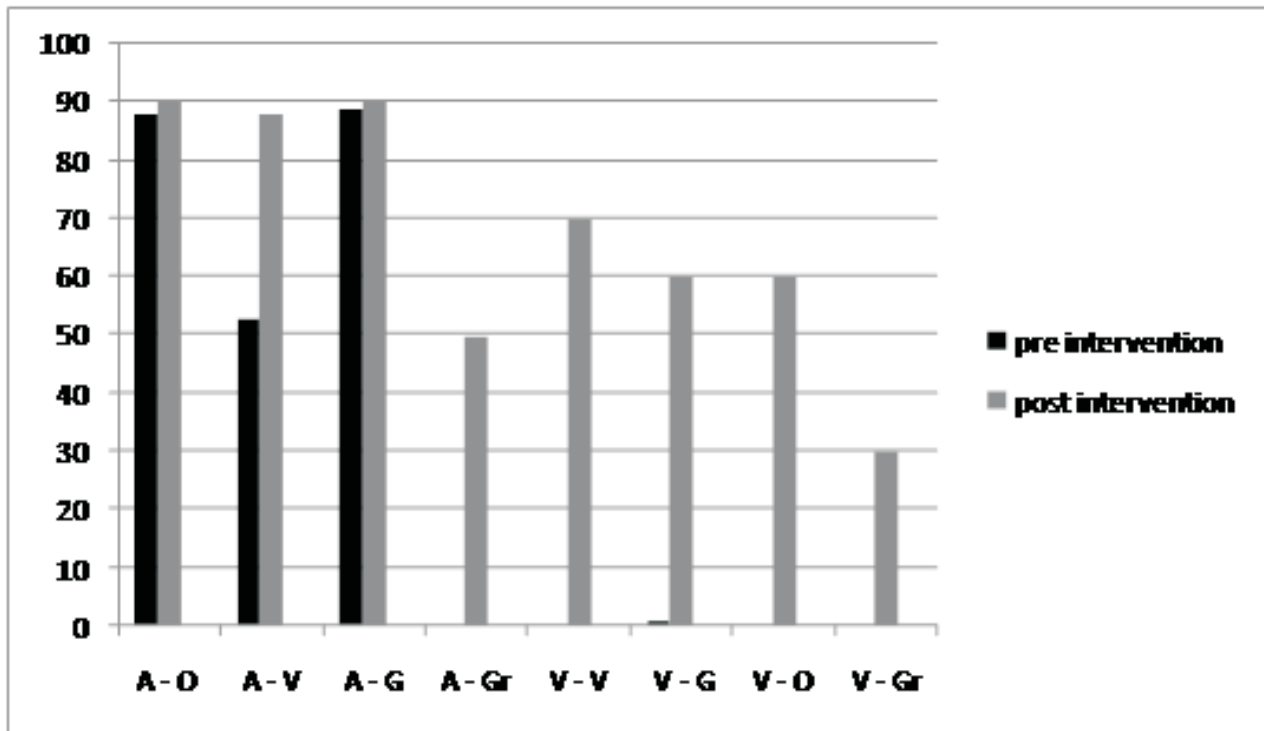


Fig. 2. Percent scores of performance of the client before and after intervention across various modality combinations (A-O: Aural-Oral; A-V: Aural-Visual; A-G: Aural-Gestural; A-Gr: Aural-Graphical; V-V: Visual- Visual; V-G: Visual-Gestural; V-O: Visual-Oral; V-Gr: Visual-Graphical).

### Discussion

Visual agnosia usually occurs after unilateral or bilateral damage in the occipito-temporal boundary (Halpern, 1986, pp: 420). The MRI scan findings of the client reported in the case study are in accordance with those reported by Halpern (1986).

The present case study highlights the importance of modality specific assessment in diagnosis of visual agnosia. Evaluation using the Western Aphasia Battery resulted in the diagnosis of anomia, even though the client showed adequate performance on the auditory naming and auditory completion test. The client was assessed using the modality test constructed by Jani (2007) to ascertain performance across different modality combinations. The client's performance revealed impaired modality combination involving visual stimuli i.e visual-visual, visual-oral, visual- gestural, visual-graphical and aural-visual. Impaired aural-

graphical modality maybe be due to impaired writing skills. The findings of the current study once again endorsed Emerick's view that modality specific tests are sensitive in detecting modality specific impairment. The result suggest that probably a modality specific test facilitated the diagnosis of modality specific impairments in an efficient manner. In the absence of such as modality test, there is every possibility that an experienced clinician will be able to diagnose such a condition only after a few sessions of observation or during intervention. Additionally, it can be observed that use of only traditional language batteries such as the western aphasia battery can be misleading while working with clients with concomitant agnosias.

Appropriate assessment procedures are crucial in the success of any management program. In this client, the clinician used the intact auditory and tactile modality to de-block the impaired visual modality. In de-blocking, rehabilitation begins with the client having to

produce the correct response in the modality that is not too severely damaged and that is not blocked. Immediately after de-blocking, through repetition the target response can be accessed in the inaccessible modality. The basic theoretical premise is the assumption that language is not lost but cannot be accessed through all modalities. Linebaugh and Lehner (1977, as cited in Kearns, 2005, pp 133) taught self-generated cues to five clients with Broca's aphasia in an attempt to facilitate word retrieval with cuing hierarchical treatment program. Significant improvement occurred in client's ability to name treatment stimuli and generalization of improved naming abilities was also reported for untrained word lists. Halpern (1986) reported the use of tracing and copying of objects and forms, letter recognition and a multimodality approach with a client with visual agnosia. However, no studies have been reported to support the efficacy and effectiveness of these techniques.

After three months of intensive intervention, the client described in the current study demonstrated overall improvement in the visual modality. His visual naming, comprehension and recognition improved significantly. Based on a review of several studies on the use of different modalities in the management of individuals with Aphasia Darley (1982) concluded as follows: "We can expect aphasic patients to experience problems with all modalities, such being the nature of aphasia, but examination may reveal that in a given patient one input or output channel is relatively more intact, we should exploit its intactness. Combination of two input-channels, auditory plus visual, olfactory plus visual or auditory, auditory plus gestural may facilitate comprehension and performance by some patients. It is worth our while to investigate an individual patient's responses to determine whether multi-modality stimulation may be useful" (pp 214).

The same reasoning may be applicable to the present client for his recovery in the visual modality. The concept of the de-blocking technique has gained a lot of importance to explain the recovery process in individuals with cortical damage. Jenkins, Jimenez-Pabon, Shaw and Sefer (1975) have explained the use of proprioceptive information to aid defective visual

recognition and recall.

Several authors have opined that early treatment is more effective than late treatment (Butfield & Zangwill, 1946; Basso et al, 1975; Dabul & Hanson, 1975; Vignolo, 1964; Wepmann, 1951, as cited in Shewan, 1986, pp 38). The client described in the case study reported for assessment one month after the episode of cerebrovascular accident. The considerable recovery observed in the client may be attributed to early intervention.

### Conclusion

Diagnosis and management of visual agnosia is a challenging task due to the paucity of modality specific tests. Identifying the intact and weak modalities helps the speech language therapist to use the intact modalities to de-block the impaired modalities. The use of the intact modalities in intervention helped in the overall improvement of visual skills in the client described in the current case study. Improvement was possible because of the timely assessments were performed using appropriate tests. The use of modality specific test helped the clinician to identify the intact modalities and use them for rehabilitation. A Speech Language Pathologist plays a key role in the successful rehabilitation of visual agnosia. Clinicians should use modality specific tests along with the standard language assessments for every client who reports with a neuro-communication disorder. This may aid in the dual goals of differential diagnosis and planning appropriate therapy.

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Appendix-1

Subtests of the modality specific test

|   | <i>Modalities</i>         | <i>Stimulus presentation</i>     | <i>Response elicited</i> |
|---|---------------------------|----------------------------------|--------------------------|
| 1 | Aural – oral modality     | Aurally                          | Verbally                 |
| 2 | Aural – visual modality   | Aurally                          | Pointing                 |
| 3 | Aural – gesture modality  | Aurally                          | Gesturally               |
| 4 | Aural – graphic modality  | Aurally                          | Writing                  |
| 5 | Visual – visual modality  | Gesture                          | Pointing                 |
| 6 | Visual – gesture modality | Visually (pictorial, Graphical)  | Gesturally               |
| 7 | Visual – oral modality    | Visually (pictorial, Graphical)  | Verbally                 |
| 8 | Visual – graphic modality | Visually (pictorial, Graphical). | Writing                  |

Appendix-2

Frostig's line drawing test



Appendix-3

Visual figure ground perception test

