



# Prosopagnosia & Hemifield Loss of Contrast Perception following Traumatic Brain Injury (TBI)



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## Patient's Symptoms

A 36 year-old white female presented with a primary complaint of problems with face recognition (prosopagnosia) following TBI (high speed impact to the left pinna). She described people as "looking like relatives of themselves." Short-term symptoms of vertigo and past-pointing (reaching for objects several inches left of target) resolved inside three months; right hemifield neglect and severe loss of working memory were still present 8 months post-TBI.

## Findings, Diagnosis

Neuropsychological testing at 1 month post-TBI indicated visual processing deficits in tasks involving part/whole relationships, visualization, and working memory.

Probing of subjective perception of faces with controlled central fixation revealed an awareness of softened facial details confined to the right side of the face. Visually Evoked Potential (VEP) stimulus was modified to stimulate one hemifield

with central fixation under binocular viewing at 1m for 20' arc (64x64 check size) at 85% contrast. Initial measures (8 months post-TBI) confirmed asymmetric contrast perception with a 25% (3  $\mu$ V) relative amplitude deficit for the right hemifield (9.2  $\mu$ V) compared to the left (12.2  $\mu$ V). See adjacent poster: "Novel use of VEP to Document Asymmetries between Hemifields following TBI."

## Neuropsychological Testing Measures of Visual Function

Post-injury, visual processing was impacted, particularly tasks involving part-to-whole relationships. Subjective perception of prosopagnosia resolved coincident with return of visual processing to levels which were normal for this patient.

Test	Sub-test	Skills	@ 1 mo	@ 18 mos
WAIS-IV	Picture Completion	Visual scanning, attention to detail, part-to-whole relationships	16%ile	63%ile
<i>Task: Visually scan a picture and identify the "important thing that is missing."</i>				
WAIS-III	Object Assembly	Part-to-whole relationships, constructional ability, abstract reasoning, visual closure	63%ile	98%ile
<i>Task: Put together a puzzle of a familiar but unknown object without a visual guide.</i>				
WAIS-III	Picture Arrangement	Visual scanning, visual sequencing, Reasoning, part-to-whole relationships	63%ile	84%ile
<i>Task: Put together a sequence of pictures to make a coherent story.</i>				

\*WAIS: Wechsler Adult Intelligence Scale

Language-based tasks were affected, particularly those where visualization skills are used to support task performance, and where working memory is involved.

Test	Sub-test	Skills	@ 1 mo	@ 18 mos
Verbal Fluency	Animals	Supported by organizational strategies of visualization & grouping	47%ile	77%ile
<i>Task: Name as many animals as possible (timed for 60 seconds).</i>				
Spreeen (1 mo)/ WRAML-2 (18 mos)	Sentence Repetition Test	Working memory, visualization of action and/or words	65%ile	99%ile
<i>Task: Repeat sentences verbatim.</i>				
WMS-IV (1 mo)/ WRAML-2 (18 mos)	Logical Memory I (Immediate Recall)	Sustained attention, working memory, sequential memory, visualization	37%ile	75%ile
	Logical Memory II (Delayed Recall)	Above, plus short-term memory.	50%ile	84%ile
<i>Task: Recall a narrative story with as many components and details as possible, immediately (I); or after 20 min with intervening activities (II).</i>				

\*WRAML: Wide Range Assessment of Memory and Learning; WMS: Wechsler Memory Scale

## Treatments

Patient was enrolled in an office-based optometric vision therapy and rehabilitation program (OVT). Procedures to enhance sensitivity to motion and space in the right hemifield included integrative techniques of the binocular, oculo-motor, gross and fine motor, visual, and vestibular processing systems. Visual spatial memory activities were conducted in the presence of non-related verbal and cognitive demands to reduce dependence on auditory memory cues.

## Outcomes

- After 9 months OVT, the patient's observation of prosopagnosia and contrast asymmetry became much less noticeable.
- Working memory skills were restored gradually.
- Reassessment of neuropsychological tests at 18 months post-TBI revealed a significant improvement in measures related to visual processing (scaled score increases of  $3.6 \pm 1.4$ ).
- More recent VEP measures show reduced amplitude asymmetry between hemifields (2.1  $\mu$ V @ 11 mos; 0.0  $\mu$ V @ 17 mos).
- OVT may play a role in the time course and outcome of rehabilitation of visual symptoms following TBI.

## Visual Processing in Language

Patient reports that she routinely utilizes visualization skills to support her working memory, assigning pieces of data to different areas in her mind-space. After the injury, patient reports a limited number of "available memory slots," gradually increasing over time.



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