AGNOSIAS
&
SEMANTIC DEFICITS

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INTRODUCTION

- The study of several neuropsychological disorders such as agnosia, optic aphasia, semantic dementia, and category specificity has provided us with a valuable insight as to the cerebral organization of meaning.

- Moreover, disorders of object perception have offered cues as to the human visual recognition abilities.

- In this lecture I am going to review a number of studies that have challenged our contemporary view on these issues.

AGNOSIA

- This is a reduced ability to identify stimuli presented in a given sensory modality as a consequence of brain damage.
- Thus depending on which modality is affected, we talk about visual, auditory or tactile agnosia.

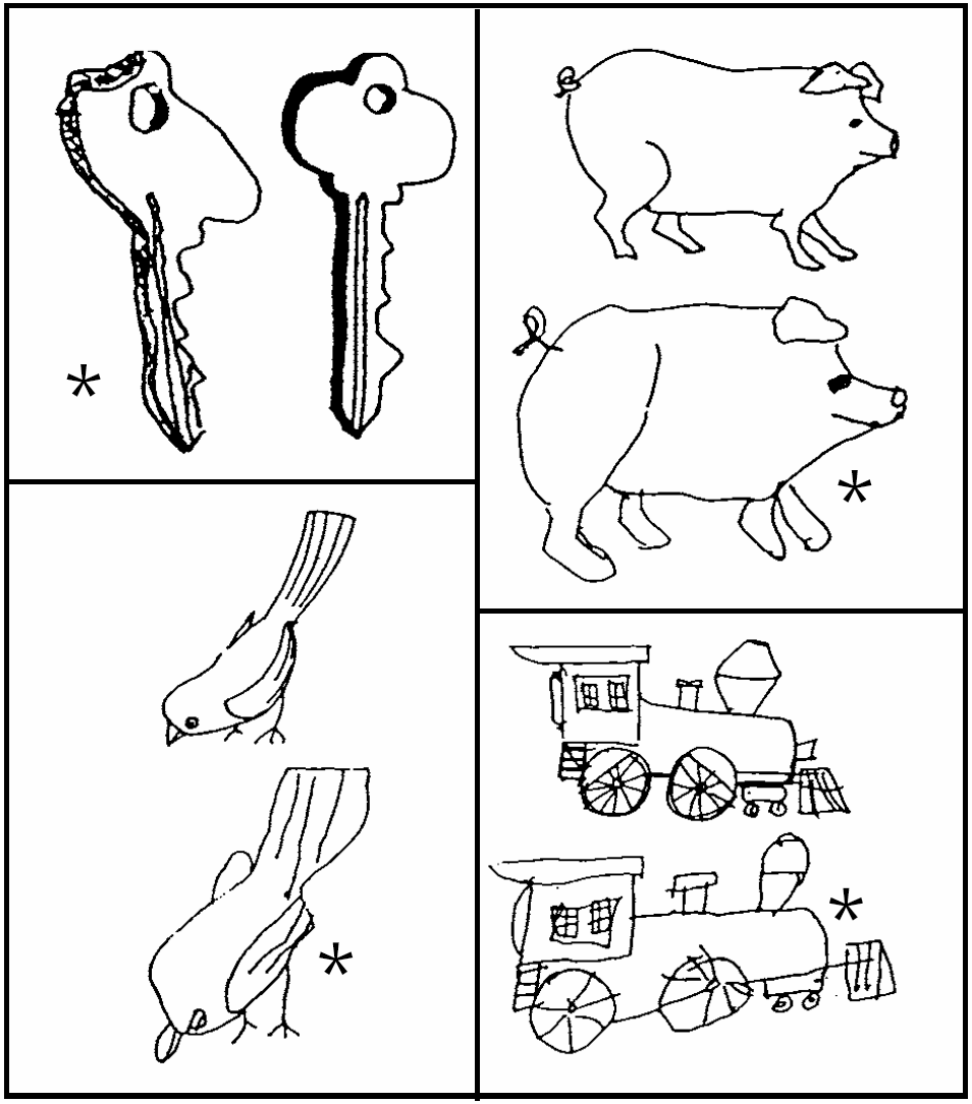
VISUAL AGNOSIA

- This is the most studied type: easier to detect.
- Stimuli misrecognized visually, can be recognized:
  - through tactile manipulation
  - from verbal description
  - based on its characteristic sound or noise.

Heinrich Lissauer (1890)

- He described the case of an 80-year-old patient, GL, who had been blown against a wooden fence by a storm, knocking his head.
- After this accident, he could still see but he could not identify common objects visually presented.
- GL had almost normal visual acuity for his age, and he could draw accurate copies of seen objects he could not recognize.
- His knowledge of objects was preserved: he would refer to them appropriately in conversation, recognize them when he could touch them or listen to their characteristic sound.
- Lissauer proposed that GL suffered from *visual associative agnosia.*
- The post-mortem analysis revealed a lesion in the left temporo-occipital junction.

COPYING LINE DRAWINGS



The patient could copy the items he could not recognize
Rubens & Benson 1971

Lissauer's Model

- He proposed a model of visual recognition that distinguishes two levels:
  - *apperceptive*: it accomplishes early perceptual processing of the stimuli;
  - *associative*: it gives meaning to the percept by linking it to previous experience.
- Depending on which of the two levels is impaired as a result of brain damage, we will observe either apperceptive or associative agnosia.

After Lissauer

- Some skeptics (Bay 1952; Bender & Feldman 1972; Farah 1990) have argued that:
  - visual agnosia does not exist
  - so-called agnosic patients have either an elementary sensory deficit or an intellectual decline.
- The original dichotomy proposed by Lissauer has been maintained but each level has been further fractionated.

Lissauer	*Warrington & co.*
	• Pseudoagnosia: sensory discrimination, shape detection and discrimination
• Apperceptive	• Apperceptive: figure-ground, incomplete drawings, perceptual categorization
• Associative	• Associative

WARRINGTON & COLLEAGUES

Pseudoagnosia

- Shape discrimination: Efron test

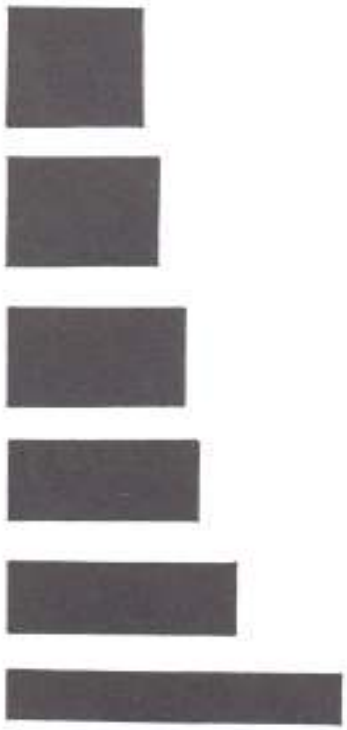


Figure 2.1 Efron Squares Test: square matched for total flux with a series of oblongs. (Adapted from Warrington, 1986.)

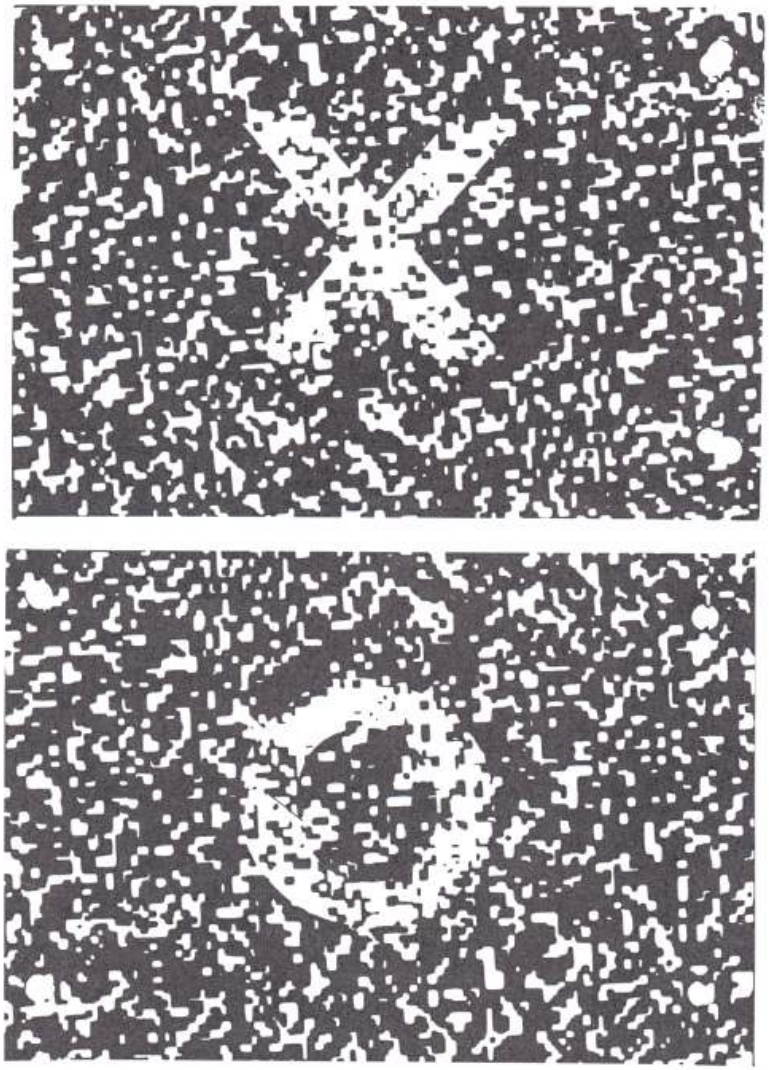


Figure 2.4 Example of stimuli for shape detection test (Warrington & Taylor, 1973).

Apperceptive Agnosia

- Incomplete silhouette drawings of objects (Street 1931, Ghent overlapping figure test, Gollin's test)

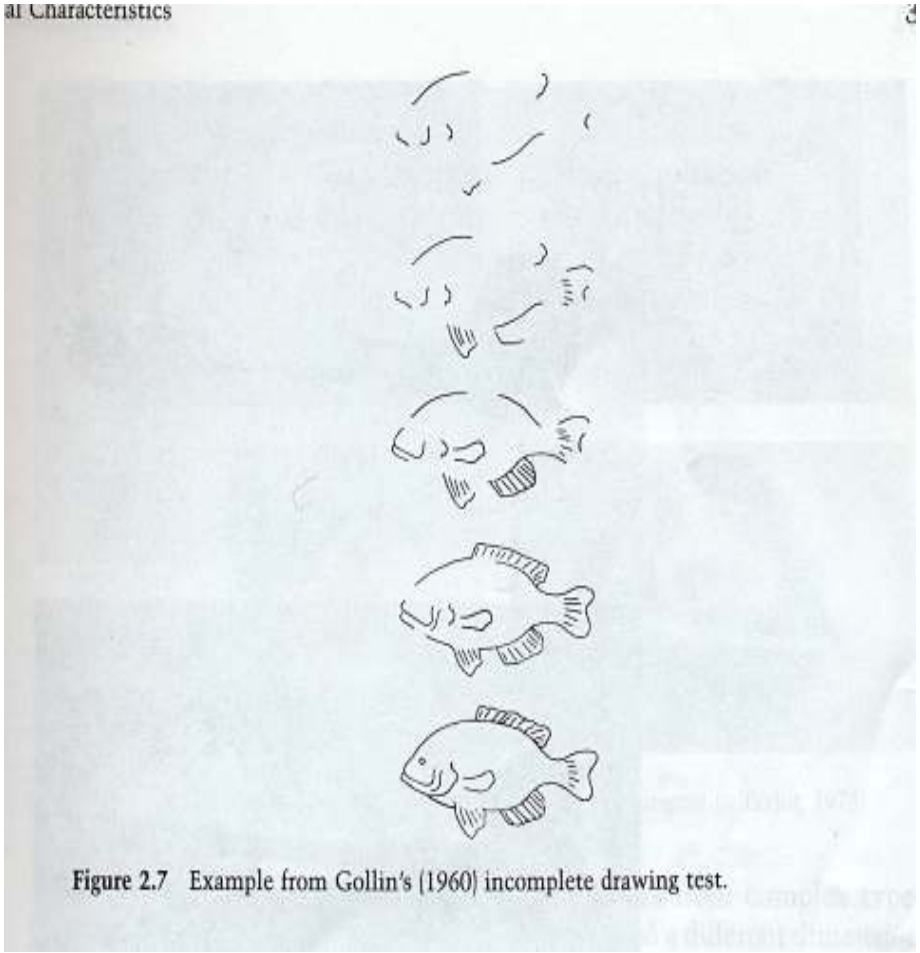


Figure 2.7 Example from Gollin's (1960) incomplete drawing test.

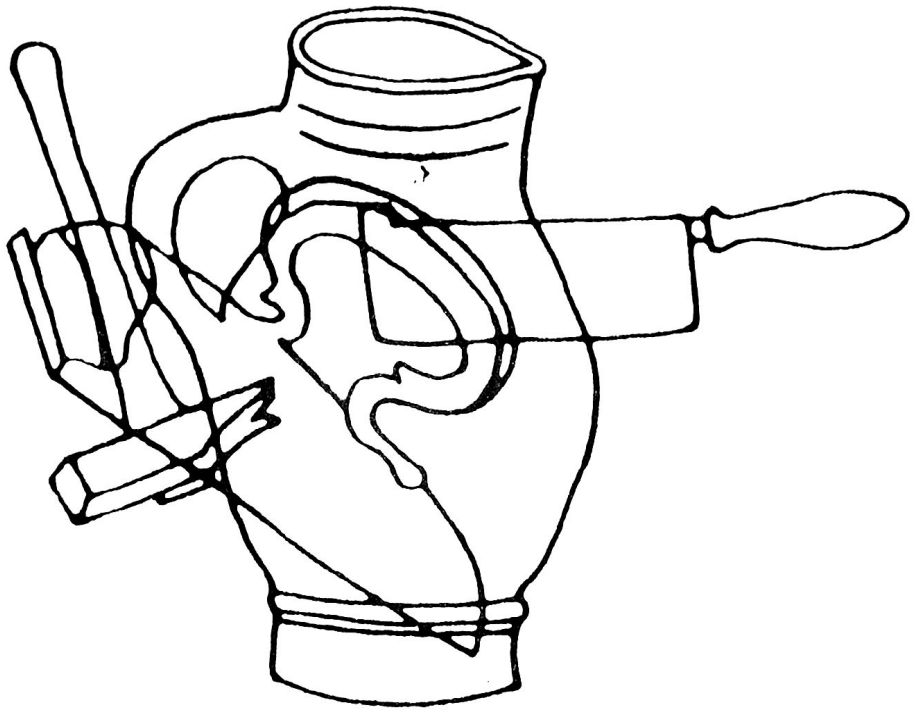
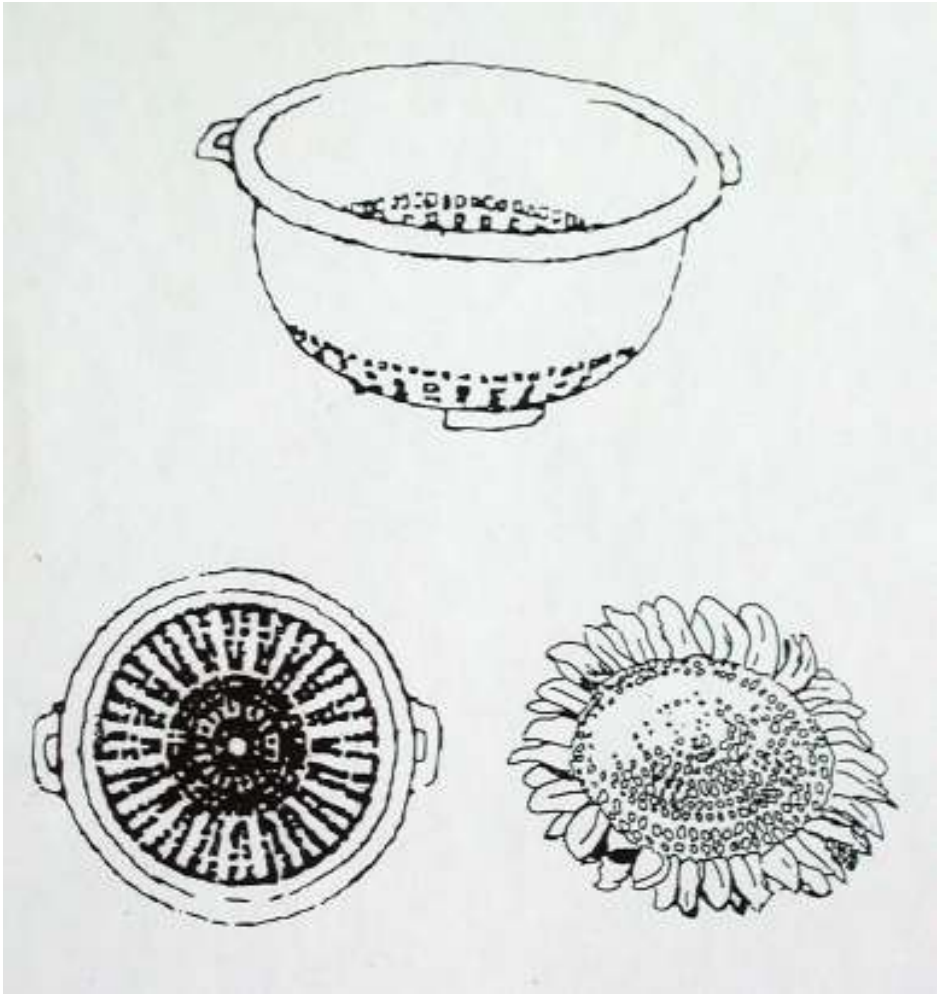


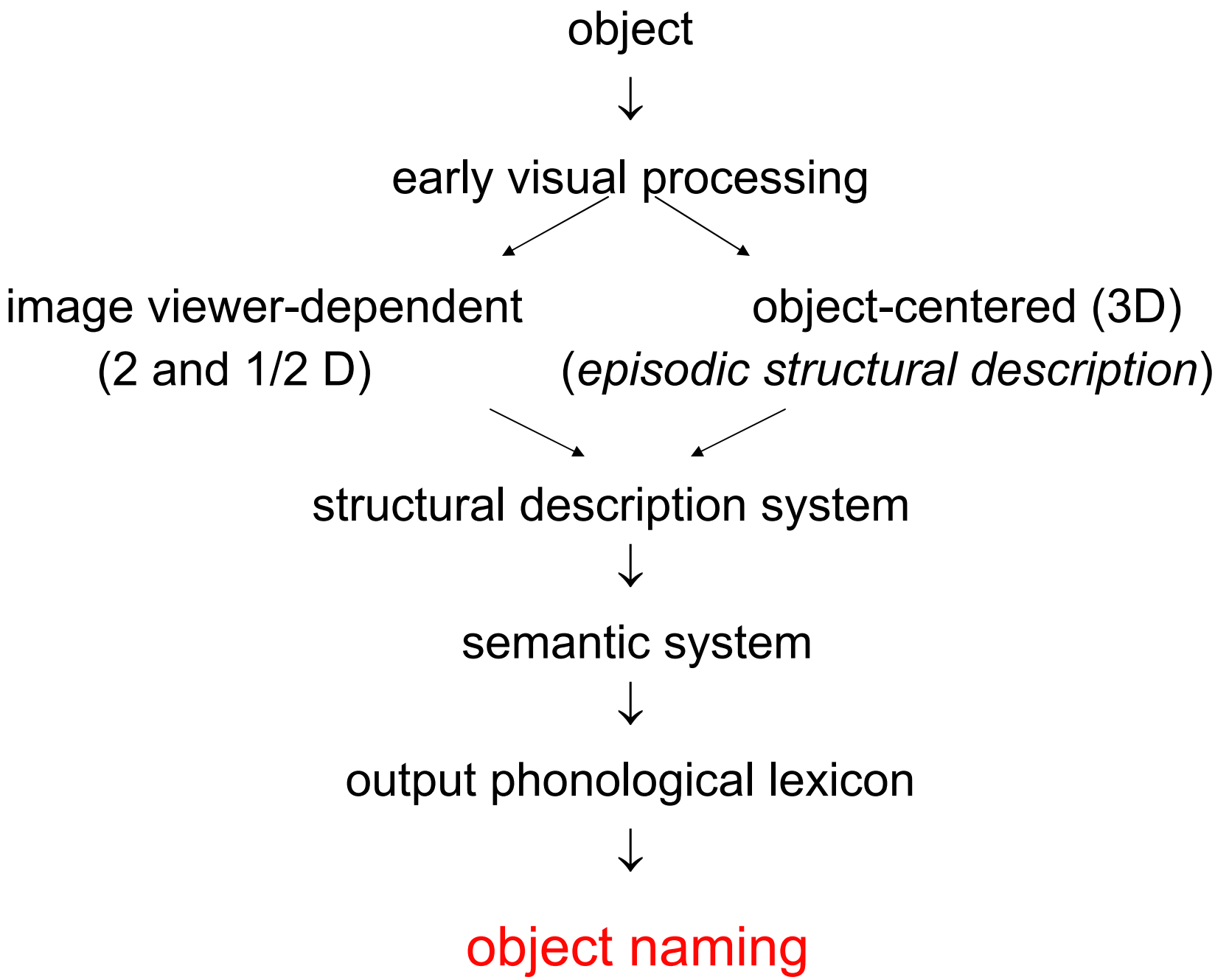
Abb. 1. Mischbild nach POPPELREUTER. Die psychischen Schädigungen durch Kopfschuß im Kriege 1914 bis 1916. I.

Perceptual Categorization:

- Patients with RBD (parietal)
  - spared shape recognition
  - impaired identification and matching of objects depicted in unusual views
  - this is particularly bad if the main axis is shortened or a critical feature is occluded.

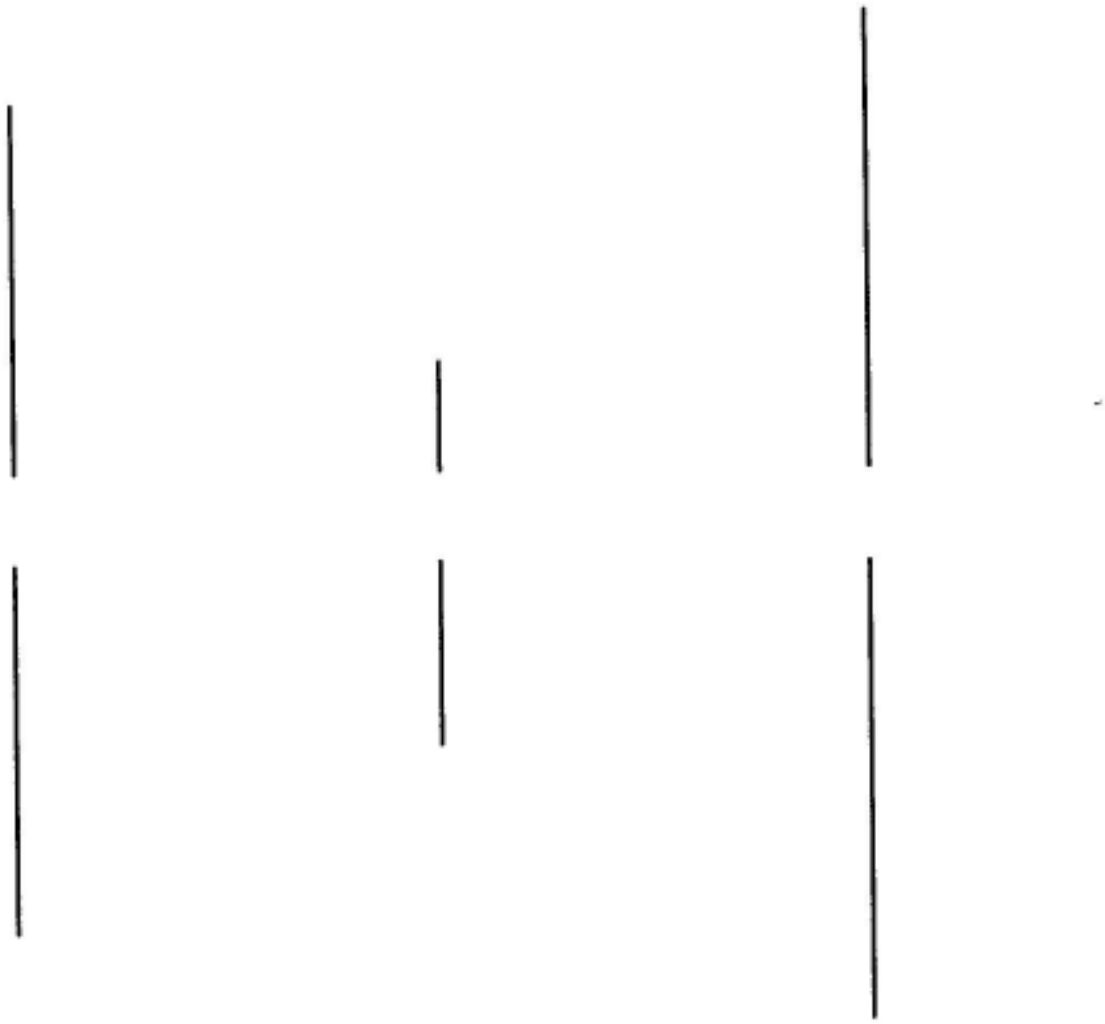
Matching unusual views



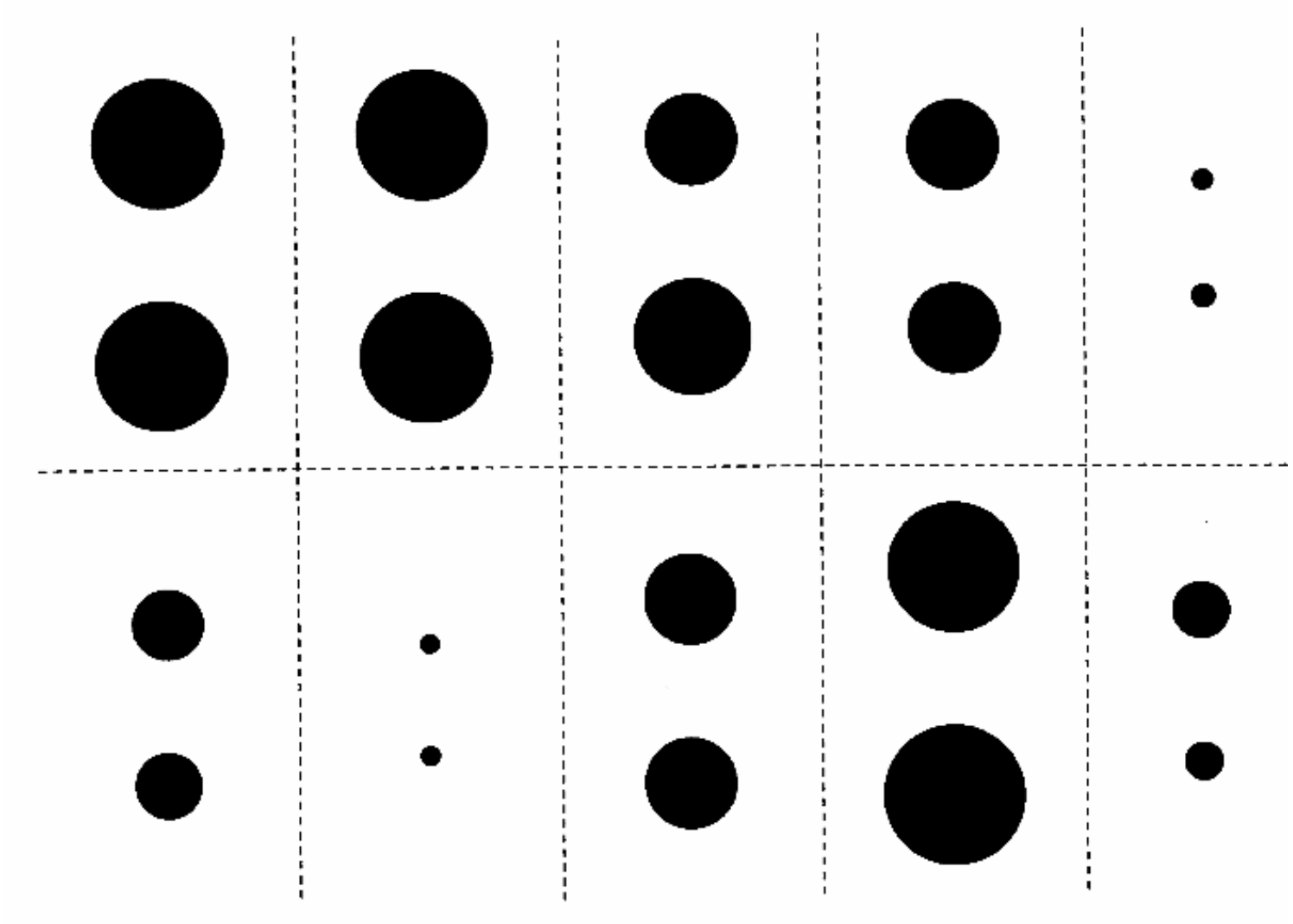

object
early visual processing
image viewer-dependent
(2 and 1/2 D)
object-centered (3D)
(*episodic structural description*)
structural description system
semantic system
output phonological lexicon
object naming

Lissauer	*Warrington & Co.*	*Humphreys & Co.*
• Apperceptive:	• Pseudoagnosia	• Appreceptive:
	• Apperceptive: figure-ground, completion, *p*erceptual categorization	• Integrative a.: shape integration
		• SDS
		• Semantic System
• Associative	• Associative	

BORB (Riddoch & *Humphreys 1993)*
Test 2: perceptual comparison (length)



BORB (Riddoch & *Humphreys 1993)*
Test 3: perceptual comparison (size)



Humphreys & Co.

Integrative Agnosia

- Very accurate copy of drawings and objects
- Good identification of elementary shapes
- Deficit in integrating single features of a stimulus in a coherent fashion
- Failure to extract a figure from the background
- Good semantic memory (see drawing from memory)

HJA, Humphreys & Riddoch, 1984

HG, Grailet et al., 1990

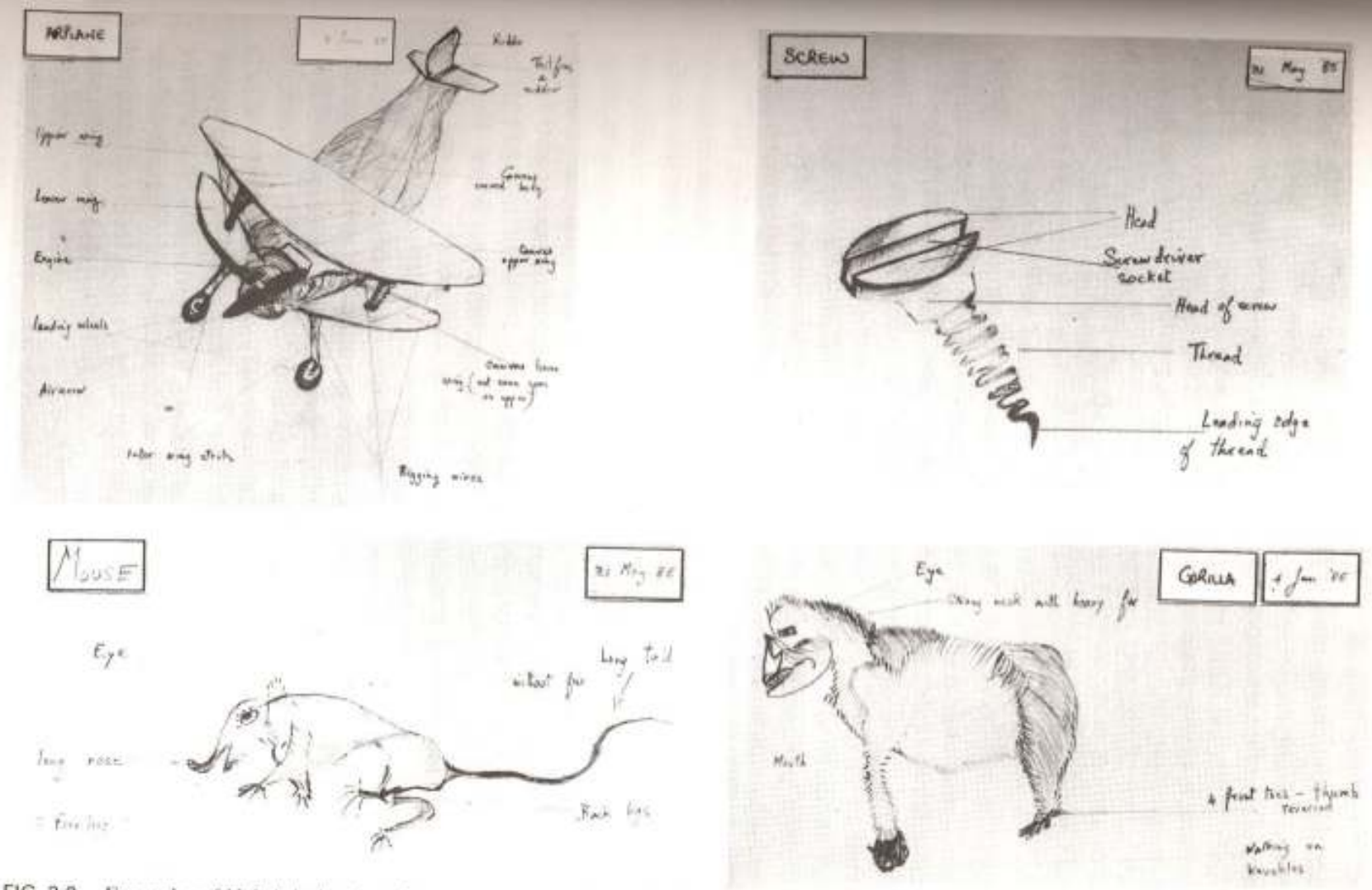


FIG. 3.2. Examples of H.J.A.'s drawings from memory, together with his notes on the salient parts of each object. (Reproduced from Humphreys & Riddoch, 1987a, with permission.)

DIFFERENT TYPES OF ASSOCIATIVE A.

- THE STRUCTURAL DESCRIPTION SYSTEM
  - contains representations which define geometrical and volumetric properties of objects
  - is for objects what the input phonological lexicon is for words.
- THE SEMANTIC SYSTEM
  - stores functional knowledge about objects, associations between them, the context in which they can be found as well as the encyclopedic knowledge about them.

How to assess the SDS

Object decision (chimeras)

- In analogy with the lexical decision task that assesses the integrity of the phonological input lexicon, the *object decision task* assesses the integrity of the SDS:
  - patients are asked to decide whether a given stimulus exists in their repertoire of visual descriptions.

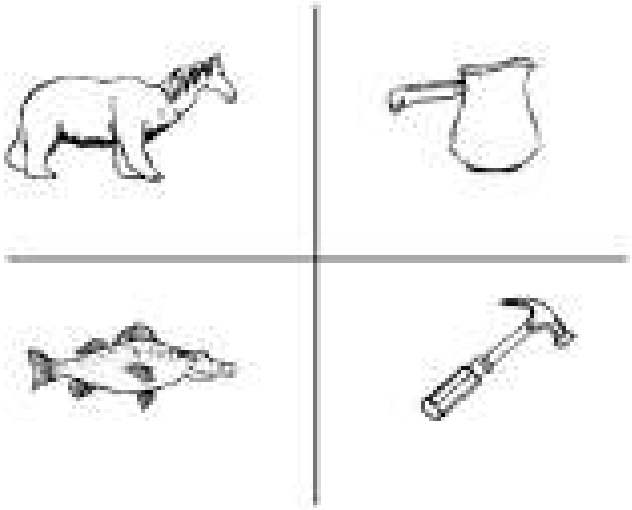
Head Test

- Matching a given "body" of an animal or object to the correct "head" is also supposed to tap the SDS.

Other Tests

- Drawing an object from memory, describing its shape, or evoking its perceptual features may not detect the SDS but it could reflect a possible imagery deficit.

(b) Stimuli from object-reality decision task



(c) Stimuli from the Heads Test