

**Symbolic Behavior (Palaeoart)  
at Two Million Years Ago:  
The Olduvai Gorge FLK North Pecked Cobble**

**The Earliest Artwork in Human Evolution**

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Session: Archaeology and the science of rock art

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# A New Paradigm

- Wave I: Dispersal of *Homo rudolfensis/habilis*, with classic Oldowan pebble-core tool tradition, out-of-Africa, ~2.0 Ma to 1.7 Ma

- Wave II: Dispersal of *Homo erectus*, with Middle Acheulian or Developed Oldowan-like tool tradition, out-of-Africa, ~1.0 Ma to 800 ka

- Wave III: Dispersal of *Homo sapiens* out-of-Africa or SW Asia with Mid-Middle Paleolithic technology, ~150 to 60 ka

- Wave IV: Upper Paleolithic → 60 ka Global Rock Art Heritage

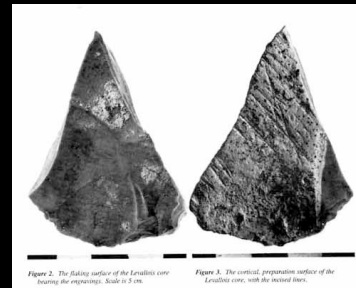
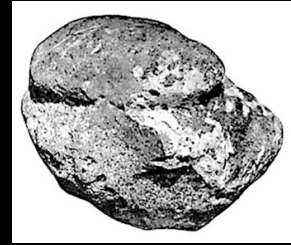


Figure 2. The flaking surface of the Levallois core showing the enlèvement. Scale is 3 cm.

Figure 3. The vertical, preparation surface of the Levallois core, with the lateral faces.



**... there literally is art in every artifact, and vice versa, in every work of art there lies the shadow of an artifact or tool.**

George Kubler, *The Shape of Time* (1962)

Pasztory, Esther. 2005. *Thinking with Things: Toward a New Vision of Art* (Austin: University of Texas Press): dedication

# The Oldowan grooved and pecked cobble

*How do we approach this artifact?*

1. Science must approach art with questions of science
2. The art historian or prehistorian approaches with a second set of questions
3. This artifact has forced me to ask a third set of questions

## The Oldowan grooved and pecked cobble

This artifact constitutes a major challenge to the fields of palaeoart and the evolution of cognitive and symbolic behavior.

About 2 mya we are around 3-4 feet high, covered with hair, and decided to make art.

While there are lots of research studies and hypotheses about this moment in our evolution THIS DECISION – THE CHOICE TO CREATE, TO MAKE AN ARTWORK, has as far as I know never been thematized.

So this raises QUESTION 1. WHAT IS THE PURPOSE OF MAKING ART?

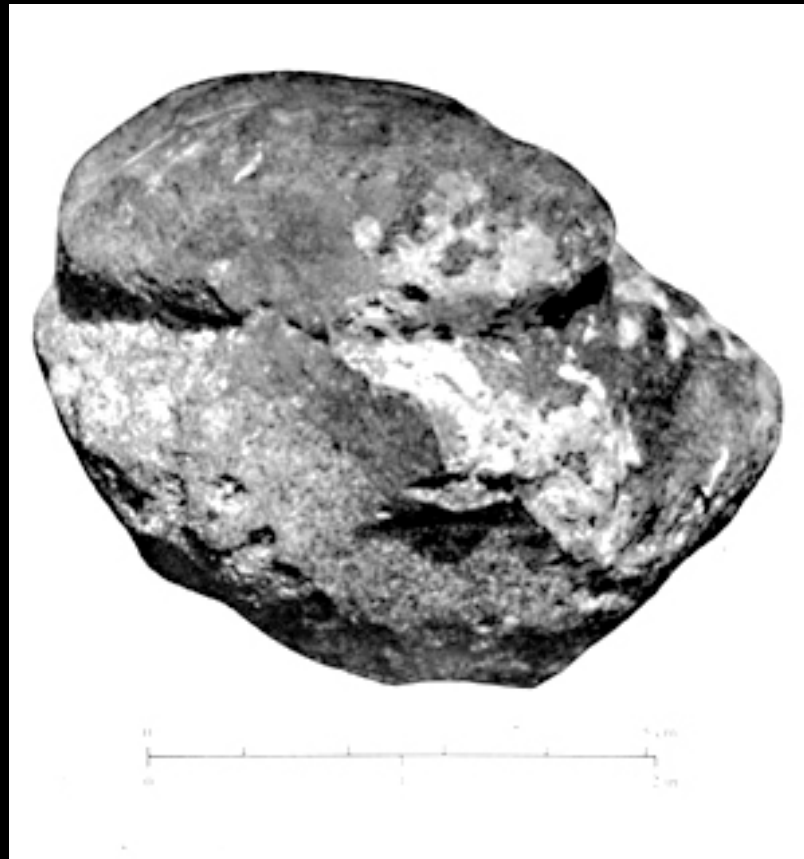
The artifact raises QUESTION 2: the EXISTENTIAL question of the artist – WHY AM I AN ARTIST?

Another not yet thematized symbolic behavior and 3rd QUESTION: the MAKING OF A MEDIUM on or in which to make marks. How did this arise?

Another as yet unthematized aspect of symbolic or marking behavior – the space in which the artwork is made, the ART SPACE – this is a 4th QUESTION. How are we to understand this as arising at a certain moment in our evolution?

## **Four Not Yet Thematized Aspects of Palaeoart Marking Behavior**

1. The decision to make art
2. The existential question of the artist
3. The making of a medium
4. The making of the art space



## Oldowan, grooved and pecked cobble

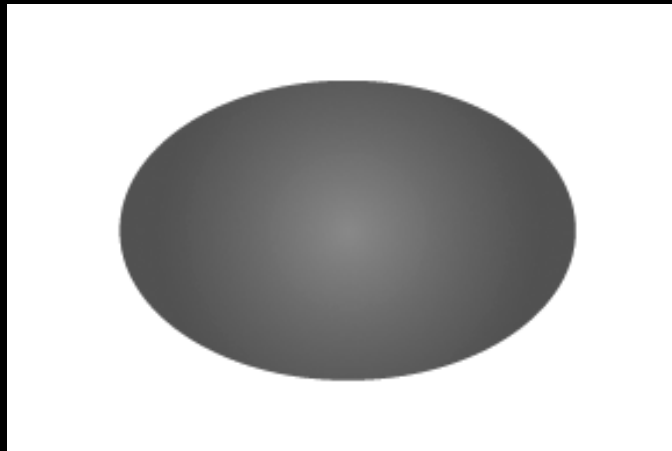
Olduvai Gorge, FLK North, Upper Bed I, 1.75 to 1.76 Ma

~8x5x5cm, artificially grooved and pecked phonolite cobble, cortex fully removed, pecked with four pits in row, 3-4mm deep + 2 pits 0.5mm deep on lower side and linear groove, varying 9 to 18 mm deep, encircling the cobble, sufficient for suspending by thong; overall shape 'unlikely a tool, resembles a primate / baboon-head' (*LM1971: 84, 269; LM1976; 'apparent cupules on either side' (BR2003)*). Photo Mary Leakey (1971: pl. 18)



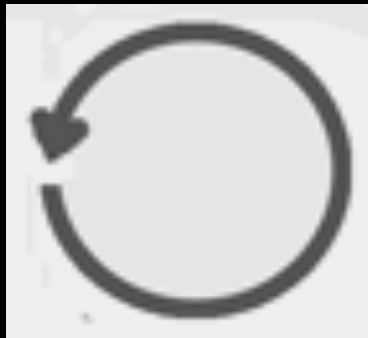
# Initial Visual Analysis

1. **'8 x 5 x 5 cm phonolite cobble, oblong shape, almost the entire original smooth cortex surface has been removed by pecking and battering.'** (Leakey M. 1971: 84)



Note: phonolite, a volcanic rock, name from Greek *phono* = sound, thus 'sounding stone' because of the metallic sound it produces if an unfractured plate is hit; hence the English name clinkstone.

# The Oldowan artist uses syntactic sequencing rule to incise two complementary reversal transformations



A line extended makes a circle



A circular dot extended makes a line

### **Nearbyness**

*contiguity, contact, overlap, proximity  
(cf. trimming)*

### **Separation**

*apartness, standing apart  
usually by means of boundary*

### **the Pair**

*set of two or four  
similar knapping actions, marks*

### **Alternation**

*this side/that (other) side  
(cf. bifacial flaking)*

### **Syntactic Sequencing and Reversal**

*concatenation of elements joined in ordered series  
= nearbyness + separation + repetition + constant direction  
Finite State Grammar (FSG) ABABAB and Sequence Reversal, e.g. ABCD → DCBA*

### **Hierarchical Rule Use in Sequencing**

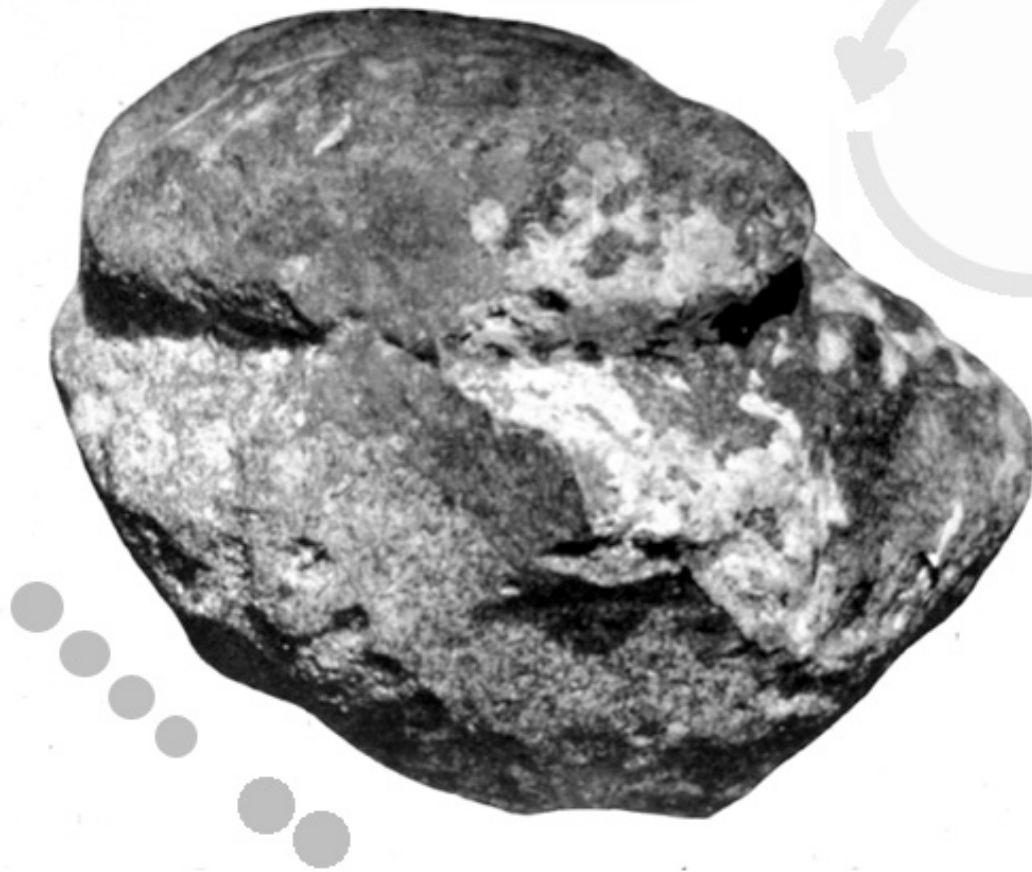
*actions, geometric shapes; hierarchical (embedded) dependency;  
visuospatial goal-subgoals action outcome prediction*

## **Oldowan Visuospatial Features**

Top 2 rows: Wynn, T. (1979, 1981, 1985); Gowlett (1984), Toth (1987). Wynn (1979:17) suggests sequence reversal does not appear until Acheulian bilateral symmetry. I suggest it is intentionally applied to the Oldowan pitted and grooved cobble. 3<sup>rd</sup> and 4<sup>th</sup> row: evident in object and supported by Oldowan toolmaking brain imaging neural substrates (Stout, Toth, Schick & Chaminade 2008).

**Olduvai Gorge, FLK North, grooved and pecked cobble  
topological sequential order reversal**

Grooved line turns into circle



Pecked cupules turn into line

# The Palaeoartist applied 4 'body techniques' 'elementary actions on matter'

<p>Cut, slice, divide, separate linearly → <i>groove</i></p>	<p>Pierce, puncture, dig out, 'un-bound' → <i>cupules</i></p>
<p>Pound, hammer, percuss to strike off, separate circularly → <i>remove cortex</i> <i>pulverize top of object</i></p>	<p>Bound, bind, join, link, curve to encircle, envelop → <i>circumferential circle</i></p>

**which constitute a conceptual-space-worldview**

# The Palaeoartist's art-actions may have had associated spoken Oldowan

## Oldowan Phonological-Lexical-Semantic Space

<b>*t(p)V</b>	cut, slice; shear, split off, separate linearly
<b>*m(n)V</b>	curve, turn, bend, circle; bound, contain, issue between two surfaces, join
<b>*t(p)V-m(n)V</b>	pound, hammer, hit, strike, smash, crush, break into pieces, take pieces off, chip, chew; suffer or make suffer, thin, faint, troubled; stretch, lengthen
<b>*m(n)V-t(p)V</b>	make a pit, pierce, puncture, dig, drill, peck, indent (cf. cupule); bore a hole, dig up, walk, pursue, seek

# Four Oldowan Similes

constituted by reversals of analogical relations ('similes')

<p><b>Surface / Core</b> <i>flakes from core;</i> <i>reverse:</i> <i>nutmeat from shell ('core essence')</i></p>	<p><b>Matrix / Pit</b> <i>exterior matrix with pit dug into it;</i> <i>reverse:</i> <i>pit with interior-matrix (cupule)</i></p>
<p><b>Division / Sharing</b> <i>slice, carve, divide up, distribute;</i> <i>reverse:</i> <i>Share together in common, in community or communal group, equally ('festal share')</i></p>	<p><b>Concatenation / Container</b> <i>series of joined units (thread, knot);</i> <i>reverse:</i> <i>circling round to hold, protect, transport a unit (nest, thong, plaiting)</i></p>

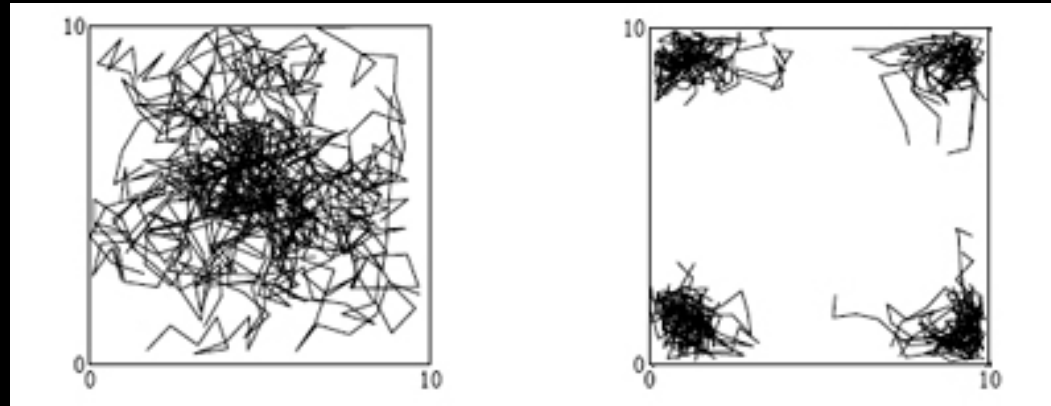
**An Oldowan Conceptual-Poetic-Spiritual Worldview**

**If these quaternion structures  
(fourfoldnesses)  
are present in an Oldowan art space, conceptual  
space and phonological-lexical space, what  
explains their emergence?**



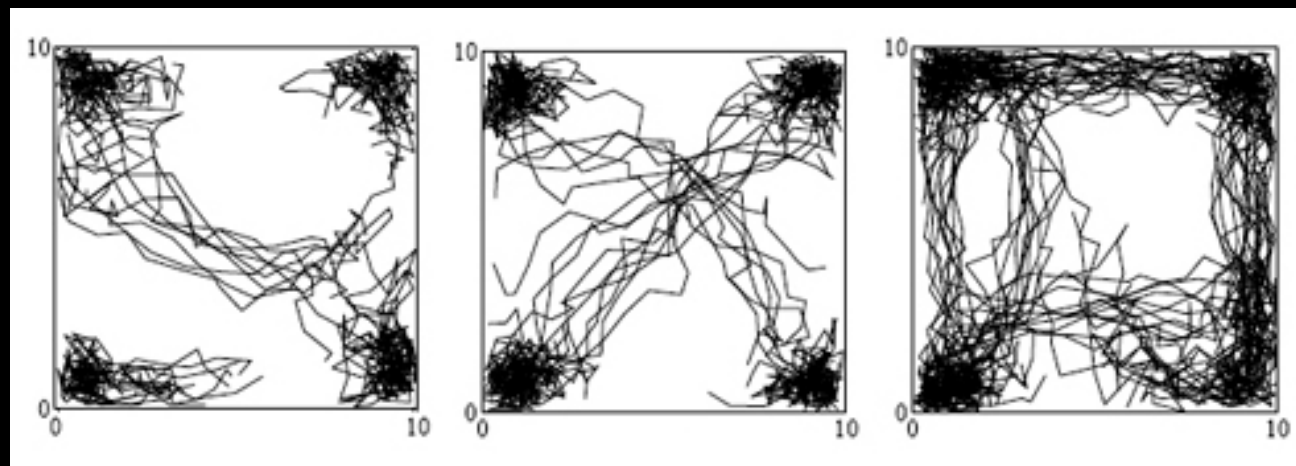
# Self-Organizing Combinatorial Systems in Acoustic Phonological Space

(simulation imitation language game with 10 agents interacting to 60,000 generations)



randomly initialized state

4 trajectories, after 60,000 generations



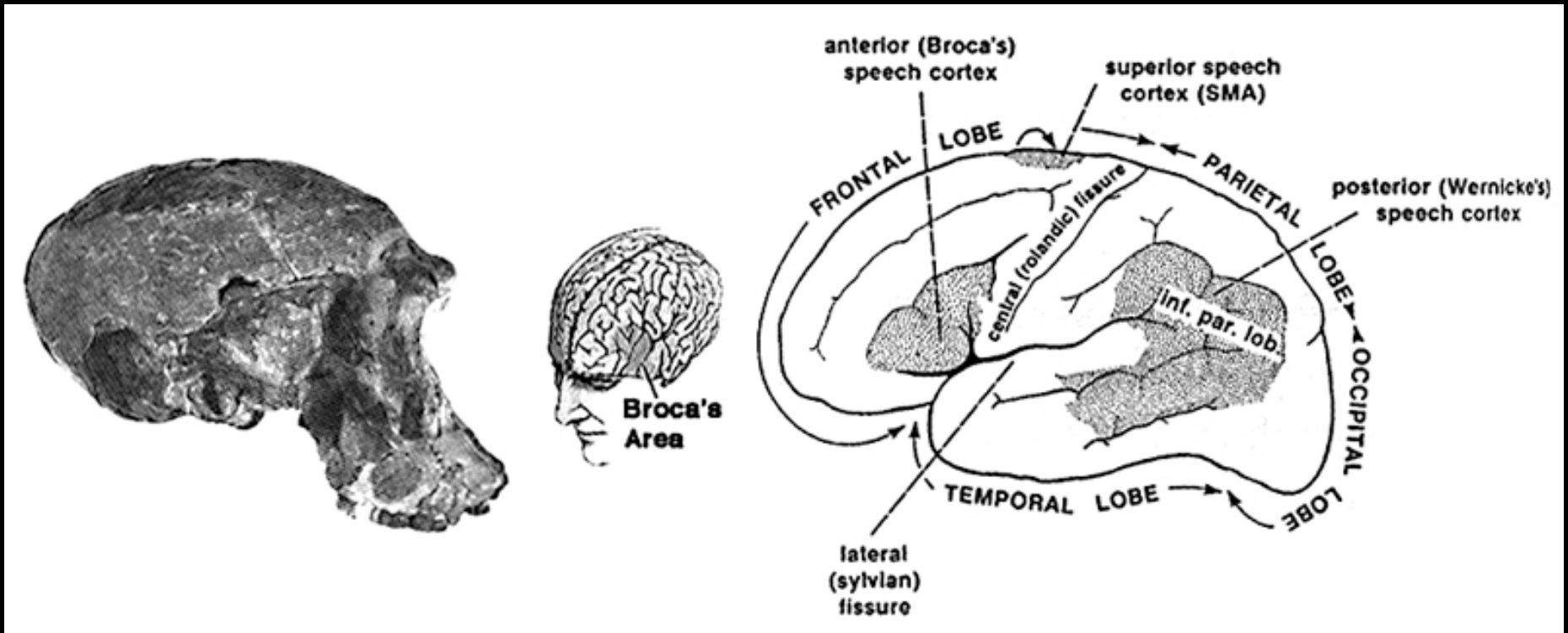
5 trajectories

6 trajectories

10 trajectories

De Boer B and Zuidema W. 2010. Multi-agent simulations of the evolution of combinatorial phonology. *Adaptive Behavior* 18(2): 141-154; figs 3, 5 and 6 (modified, rearranged as one figure)

Method #2



Left: skull of *Homo habilis* (OH24). Center and right: location of language areas in the brain.

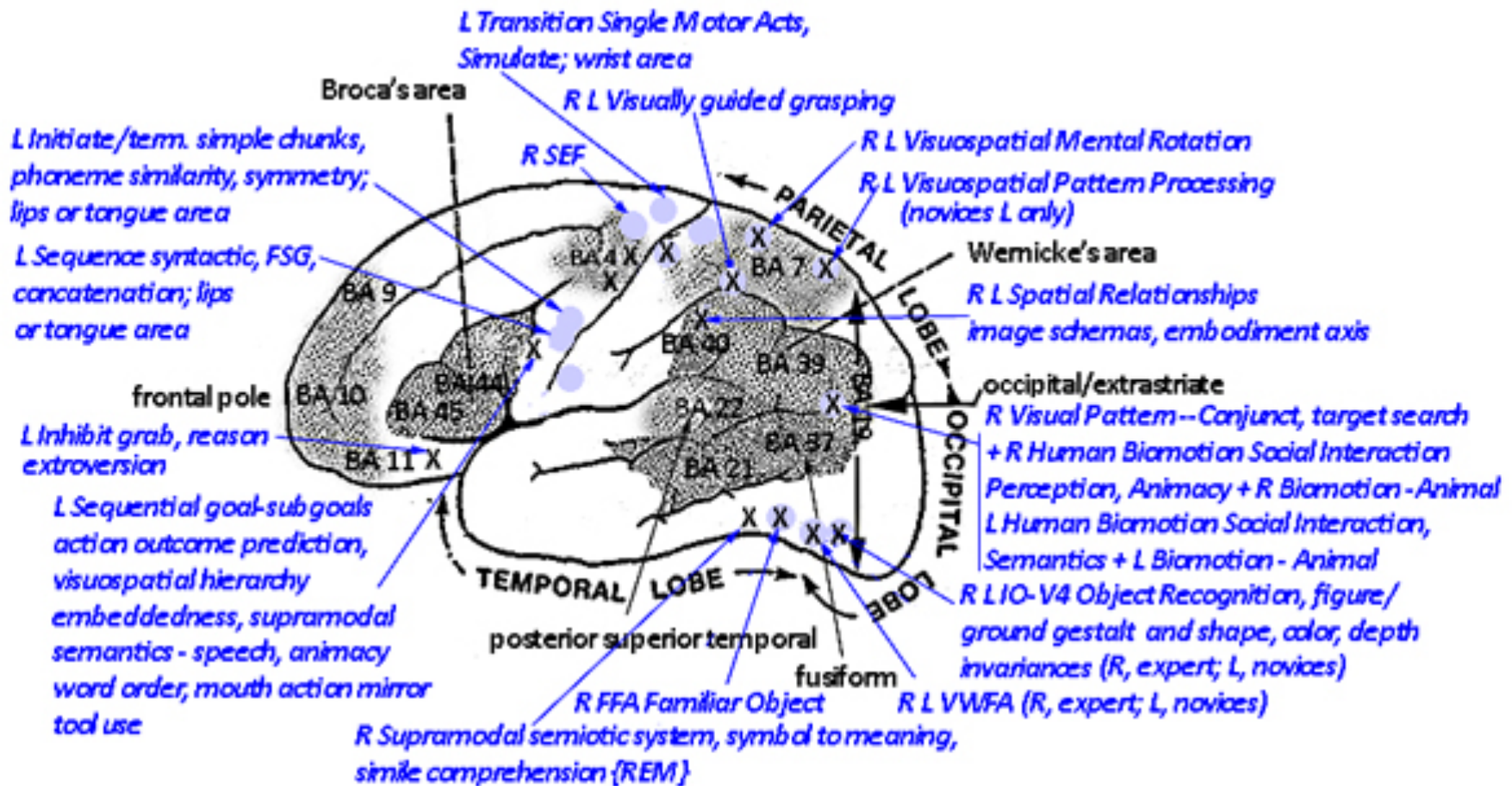
Source: Figure 1. Tobias, Phillip V. 2005. Tools and brains: which came first?

In: Francesco d'Errico and Lucinda Backwell (eds.) *From Tools to Symbols: From Early Hominids to Modern Humans*: 82-102. Johannesburg, South Africa: Wits University Press.

# Homo habilis brain expansion and reorganization areas

(Homo sapiens sapiens brain outline illustrated)

## and areas activated by Oldowan stone tool knapping



X Expert    ● Novice

(Source: Tobias 1987; Falk 1983; Holloway and Post 1982; Holloway 1981; Holloway 1978, Bruner and Holloway 2010)

(Source: Stout, Toth, Schick and Chaminade 2008; Stout and Chaminade 2007; Stout, Toth and Schick 2000)

# 19 Design Principles

14 Design Principles used in  
Oldowan toolmaking and the  
Olduvai grooved and pecked cobble