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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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 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
… 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)

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

<table>
<thead>
<tr>
<th>the Pair</th>
<th>Alternation</th>
</tr>
</thead>
<tbody>
<tr>
<td>set of two or four similar knapping actions, marks</td>
<td>this side/that (other) side (cf. bifacial flaking)</td>
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### 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
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’

<table>
<thead>
<tr>
<th>Cut, slice, divide, separate linearly</th>
<th>Pierce, puncture, dig out, ‘un-bound’</th>
</tr>
</thead>
<tbody>
<tr>
<td>→ groove</td>
<td>→ cupules</td>
</tr>
<tr>
<td>Pound, hammer, percuss to strike off, separate circularly</td>
<td>Bound, bind, join, link, curve to encircle, envelop</td>
</tr>
<tr>
<td>→ remove cortex</td>
<td>→ circumferential circle</td>
</tr>
<tr>
<td>pulverize top of object</td>
<td></td>
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which constitute a conceptual-space-worldview
The Palaeoartist’s art-actions may have had associated spoken Oldowan

<table>
<thead>
<tr>
<th>Oldowan Phonological-Lexical-Semantic Space</th>
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<tbody>
<tr>
<td><strong>t(p)V</strong></td>
<td>cut, slice; shear, split off, separate linearly</td>
</tr>
<tr>
<td><strong>m(n)V</strong></td>
<td>curve, turn, bend, circle; bound, contain, issue between two surfaces, join</td>
</tr>
<tr>
<td><strong>t(p)V-m(n)V</strong></td>
<td>pound, hammer, hit, strike, smash, crush, break into pieces, take pieces off, chip, chew; suffer or make suffer, thin, faint, troubled; stretch, lengthen</td>
</tr>
<tr>
<td><strong>m(n)V-t(p)V</strong></td>
<td>make a pit, pierce, puncture, dig, drill, peck, indent (cf. cupule); bore a hole, dig up, walk, pursue, seek</td>
</tr>
</tbody>
</table>
## Four Oldowan Similes
constituted by reversals of analogical relations (‘similes’)

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

Method #2
Left: skull of *Homo habilis* (OH24). Center and right: location of language areas in the brain.

Homo habilis brain expansion and reorganization areas

and areas activated by Oldowan stone tool knapping


(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