Gordon’s Amazonian Piraha Study
Study of Numerical Cognition Without Words

Introduction
- Whorfian Strong & Weak Hypothesis
  - Strong or Weak Linguistic Determinism
- Relationship of hypothesis to Numerosities
  - Strong Whorfian means that the lack of words for numbers would signal an inability to comprehend those numbers.
- Questions arising through Amazonian Piraha System
  - The Piraha are a group of adults with no words to represent exact numbers over 2

Test in Year 1
- Gordon expected that the language’s ability to express numerologies would prove to be truly limited to a one-two-many system.
- These tests are used to discover whether the language has a recursive number system, there were taboos in counting certain types of objects or if there was a use of fingers to supplement words.

Important Questions
- Is the counting system recursive? What would this mean?
- Are the linguistic words supplemented by finger counting? What would this mean?
- Are there taboos in counting certain types of objects? What would this mean?
Findings

- Hoi (falling tone) = 1
- Hoi (rising tone) = 2
- Baagi or Aibai = many
- The number system isn’t recursive, isn’t supplemented by finger counting, and no objects are counted past 2.

<table>
<thead>
<tr>
<th>No. of objects</th>
<th>Number word used</th>
<th>No. of fingers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>hoi (-1)</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>hoi (-2)</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>aibai (= many)</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>hoi (-2)</td>
<td>5 → 3</td>
</tr>
<tr>
<td>5</td>
<td>aibai (= many)</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>aibai (= many)</td>
<td>6 → 7</td>
</tr>
<tr>
<td>7</td>
<td>hoi (-1)</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>aibai (= many)</td>
<td>5 → 8 → 10</td>
</tr>
<tr>
<td>9</td>
<td>aibai (= many)</td>
<td>5 → 10</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

*This use of “one” might have been a reference to adding one rather than to the whole set of objects.

Test in Year 2

- Gordon expected that the Piraha would have a limited ability to grasp or comprehend numbers greater than two.

- These tests are used to discover whether the language’s “one-two-many” system limited number comprehension.

Important Questions

- How do Piraha perform with numbers larger than their language has (higher than 2)?

- What is the Piraha comprehension of large numerosities?
1-1 Line Match
- The participants are given batteries and asked “to make the same” as above the line.
- This test the counting ability of Piraha in visually similar test.

Cluster Line Match
- The participants are given batteries and asked “to make the same” as above the line.
- This test the counting ability of Piraha in visually uneven test.

Orthogonal Line Match
- The participants are given batteries and asked “to make the same” as above the line.
- This test the counting ability of Piraha in visually uneven test.

Uneven Line Match
- The participants are given batteries and asked “to make the same” as above the line.
- This test the counting ability of Piraha in visually uneven test.
Participants are given the unfamiliar task of copying what is drawn on paper.

This test the ability of the relatively inexperienced drawing tribesman to copy what was drawn.

The participant is only shown what is above the line for a second and asked to “make the same.”

This task is to see if the Piraha can hold a specific numerosity larger than 2 accurately in their memory.

The researcher 1 by 1 puts nuts in the can and withdraws them 1 by 1, asking each time whether there are still nuts or the can is empty.

This test the memory of the tribesman.

The researcher places candy inside a box with the number or fish drawn on the lid, and this box is hidden and brought back out with a box containing one more or one less.

This test also test the Pirahas’ abilities to remember numerousities or compare numerousities.
Test 2 Result

Summation

- How did the Piraha Tribe’s members perform?
  - The performance wasn’t very successful in the memory or recognition of numbers.

- What does the level of comprehension of numbers seem to be?
  - It seems to be very limited, very close to the limit of 2.

Meaning of Results

- How do results correspond to what Gordon expected?
  - His beliefs proved true

- What do these results mean?
  - The lack of number words limited the ability to conceive and remember higher numbers.

- How do these results correspond to Whorf’s hypothesis?
  - These results go towards the Whorfian Hypothesis of language as a toolkit.

Summation

- Is calculation possible without language?
  - According to Piraha study, no.

- Are numerosities essential or a necessity to humans?
  - According to Piraha study, no.

- What is the overall importance of the study?
  - Important Whorfian implications

- Personal Notes