

Bead Exchange Historical Data Analysis Codebook v4.0

Expert-Validated Edge Case Optimized Edition (August 2025)

CRITICAL INSTRUCTIONS FOR AI/API PROCESSING

PRIORITY: This codebook combines the highest human-AI agreement base (July 2025 version, 73% agreement rate) with expert-validated edge case resolutions from Co-DETECT analysis. Follow ALL decision rules strictly. When in doubt, be CONSERVATIVE and require explicit evidence.

KEY PRINCIPLE: Code only what is explicitly stated in the text. Do NOT infer, assume, or interpret beyond what is directly written.

EDGE CASE RESOLUTION METHODOLOGY

Our Systematic Edge Case Development Process

Based on our Co-DETECT analysis that identified 16 edge cases (2.0% of 800 texts), we developed a systematic approach to resolving AI coding uncertainties:

Phase 1: Edge Case Identification

Low Confidence Threshold Analysis:

- 0.20 confidence: 1 case (6.3%) - Severely corrupted text
- 0.30 confidence: 6 cases (37.5%) - Mix of data quality and ambiguous scenarios
- 0.60 confidence: 2 cases (12.5%) - Borderline interpretation decisions
- 0.65 confidence: 7 cases (43.8%) - Valid ambiguous cases requiring expert decisions

Phase 2: Root Cause Classification

Expert Analysis Revealed:

- **68.8% Data Quality Issues:** Corrupted OCR, context pages, scanning artifacts
- **31.3% Valid Ambiguous Cases:** Legitimate interpretation challenges requiring expert decisions

Phase 3: Expert-Validated Resolution Rules

Preprocessing Data Quality Filters (Eliminates 68.8% of edge cases)

Rule P1: Text Length Filtering

- Entries with <50 readable characters → `read_entry = "NaN"` (corrupted/fragment)
- Single character entries → `read_entry = "NaN"` (page breaks/artifacts)

Rule P2: Content Relevance

- Context/title pages without bead content → `read_entry = "NaN"`
- Check for actual bead-related content, not just page headers

Rule P3: OCR Quality Assessment

- 60% non-standard characters → `read_entry = "NaN"`
- Excessive symbol strings (####, |||, etc.) → `read_entry = "NaN"`

Expert Decision Rules for Valid Ambiguous Cases (Resolves 31.3%)

Rule E1: Historical Generalizations

- Text: "The natives formerly sold ivory for beads"
- Decision: Code `exchange = "no"` (no specific instance) BUT capture all contextual details
- Rationale: Conservative approach - generalizations aren't specific exchanges

Rule E2: Intangible Exchanges

- Text: "He bought the secret to finding water for 100 beads"
- Decision: Code as valid exchange (`exchange = "yes"`)
- Rationale: Knowledge/services are legitimate exchange items

Rule E3: Observational Contexts

- Text: "The chief showed us his ceremonial beads"
- Decision: Code functions but `exchange = "no"`
- Rationale: Display/observation isn't exchange

Rule E4: Gift-Giving Scenarios

- Text: "We offered presents of beads to the chief"
- Decision: Code as social exchange (`exchange = "yes"`, `nature = "positive"`)
- Rationale: Gifts are a form of social exchange

Rule E5: Equipment/Tool Beads

- Text: "Beads adorning the horse's saddle"
- Decision: Code aesthetic function, no exchange
- Rationale: Decorative use on equipment counts as aesthetic function

VARIABLE CODING STRUCTURE

1. READ_ENTRY (Data Quality Gate)

ALWAYS CHECK FIRST - Determines if entry is codeable

if text_length < 50 characters OR corrupted_OCR OR context_page_only:

read_entry = "NaN"

STOP - Do not code other variables

else:

read_entry = full_text_content

2. EXCHANGE (Primary Classification)

Conservative approach - require explicit evidence

"yes" = Clear exchange/trade/purchase/gift involving beads

"no" = No exchange OR only general statements OR observations

Decision Flowchart:

1. Is there a specific exchange instance? → YES → Code "yes"
2. Is it only a general statement? → YES → Code "no"
3. Is it only observation/display? → YES → Code "no"
4. Is it a gift/present? → YES → Code "yes" (social exchange)
5. Uncertain? → Code "no" (conservative default)

3. BEAD_FUNCTION

Code ALL mentioned functions (can have multiple)

- Aesthetic: Decoration, ornament, beauty
- Currency: Medium of exchange, payment, trade
- Valuable/High-end: Precious, expensive, treasured
- Spiritual: Religious, ceremonial, ritualistic
- Social marker: Status, identity, rank
- Magical: Protective, supernatural powers
- N/A: No function mentioned

4. BEAD_MATERIAL

Code ONLY if explicitly stated

- Glass (venetian, bohemian, etc.)
- Stone (agate, carnelian, coral)
- Metal (brass, copper, iron)
- Organic (amber, shell, bone)
- Mixed materials

- N/A if not specified

5. BEAD_COLOR

Extract exact color terms used

- Use quotation marks for exact phrases
- Multiple colors: List all mentioned
- Descriptive terms: "blood-red", "sky-blue" as written
- N/A if no colors mentioned

6. BEAD_SHAPE

Only if specifically described

- Round, cylindrical, tubular, disk
- Use exact descriptive terms from text
- N/A if shape not mentioned

7. PRICE_OF_BEAD

Include all pricing information

- Exact amounts: "100 beads for 1 cow"
- Relative values: "worth more than gold"
- Exchange rates when specified
- N/A if no price information

8. BEADS_EXCHANGED

Brief description of actual beads

- Keep concise but complete
- Include key characteristics mentioned
- Example: "small red venetian beads"
- N/A if not described

9. OTHER_EXCHANGED

What was traded for beads

- List all items/services mentioned
- Include quantities if specified
- Examples: "ivory tusks", "food supplies", "safe passage"
- N/A if nothing exchanged

10. PROCESS_OF_EXCHANGE

How the exchange occurred

- Market, ceremonial, diplomatic
- Include relevant context
- N/A if process not described

11. ETHNIC_GROUP

Any groups mentioned in exchange

- Use exact names from text
- Multiple groups: List all
- Include both parties if specified
- N/A if no groups mentioned

12. NATURE_OF_EXCHANGE

- Positive: Peaceful, friendly, mutually beneficial
- Conflictual: Forced, disputed, problematic
- Neutral: No emotional context provided
- N/A if no exchange

13. TIME_REFERENCE

- Contemporary: Present tense, current observations
- Historical: Past tense, "formerly", "used to"
- Hypothetical: "would", "could", conditional
- Mixed: Multiple time references

CONSISTENCY CHECKS

After coding, verify:

1. If exchange = "no" → price_of_bead should be "N/A"
 2. If exchange = "no" → other_exchanged should be "N/A"
 3. If exchange = "yes" → process_of_exchange should have content
 4. If read_entry = "NaN" → ALL other fields must be "NaN"
 5. Gift-giving → Must be coded as exchange = "yes"
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EXAMPLES WITH EDGE CASE HANDLING

Example 1: Historical Generalization

Text: "The natives of this region formerly traded ivory for glass beads from European merchants"

```
json
{
  "read_entry": "[full text]",
  "exchange": "no", // General statement, not specific instance
  "bead_function": "currency",
  "bead_material": "glass",
  "bead_color": "N/A",
  "other_exchanged": "N/A", // No actual exchange coded
  "ethnic_group": "natives of this region, European merchants",
  "time_reference": "historical"
}
```

Example 2: Intangible Exchange

Text: "The medicine man sold his knowledge of healing herbs for a string of sacred beads"

```
json
{
  "read_entry": "[full text]",
  "exchange": "yes", // Knowledge is valid exchange
  "bead_function": "spiritual, valuable",
  "bead_material": "N/A",
  "beads_exchanged": "string of sacred beads",
  "other_exchanged": "knowledge of healing herbs",
  "process_of_exchange": "direct trade for knowledge",
  "ethnic_group": "medicine man",
  "nature_of_exchange": "positive"
}
```

Example 3: Gift-Giving

Text: "We presented the chief with venetian trade beads as a gesture of friendship"

```
json
```

```
{
  "read_entry": "[full text]",
  "exchange": "yes", // Gifts count as social exchange
  "bead_function": "social marker",
  "bead_material": "glass",
  "beads_exchanged": "venetian trade beads",
  "other_exchanged": "gesture of friendship",
  "process_of_exchange": "diplomatic gift-giving",
  "ethnic_group": "chief",
  "nature_of_exchange": "positive"
}
```

Example 4: Corrupted OCR

Text: "###the b%%ds w### tra\$\$\$ for ###"

```
json
{
  "read_entry": "NaN", // Corrupted text
  "exchange": "NaN",
  "bead_function": "NaN",
  // ALL other fields: "NaN"
}
```

Example 5: Observational Context

Text: "The woman wore beautiful coral beads around her neck during the ceremony"

```
json
{
  "read_entry": "[full text]",
  "exchange": "no", // Just observation
  "bead_function": "aesthetic, spiritual",
  "bead_material": "coral",
  "bead_color": "N/A",
  "beads_exchanged": "N/A",
  "process_of_exchange": "N/A",
  "ethnic_group": "woman",
  "nature_of_exchange": "N/A"
}
```

PERFORMANCE METRICS & TARGETS

Current Performance (Iteration 1)

- Total texts analyzed: 800
- Edge cases identified: 16 (2.0%)
- Human-AI agreement: 73%
- Data quality issues: 11 cases (68.8%)
- Valid ambiguous cases: 5 cases (31.3%)

Target Performance (Iteration 2)

- Edge case target: <8 cases (1.0%)
- Expected from data filtering: ~11 cases eliminated
- Human-AI agreement target: >75%

Ultimate Goal (Iteration 3)

- Edge case target: <4 cases (0.5%)
 - These should be genuinely difficult cases requiring human expert review
 - Human-AI agreement target: >80%
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IMPLEMENTATION NOTES

For AI/LLM Processing:

1. Always start with data quality check (read_entry)
2. Apply preprocessing filters before coding
3. Use conservative interpretation when uncertain
4. Follow decision flowchart strictly
5. Apply consistency checks after coding
6. Flag low confidence cases for human review

Expected Improvements:

- Data quality preprocessing: Eliminates 68.8% of current edge cases
 - Specific decision rules: Resolves 31.3% of ambiguous cases
 - Overall edge case reduction: 75-80% expected reduction
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VALIDATION & QUALITY CONTROL

Three-Tier Validation System:

- Automatic validation:** Consistency checks
- Confidence flagging:** Cases below 0.65 confidence
- Human review:** Final verification of edge cases

Continuous Improvement:

- Track all edge cases in each iteration
 - Analyze patterns in low-confidence coding
 - Update rules based on expert decisions
 - Maintain version control for codebook evolution
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VERSION HISTORY

- v1.0** (June 2025): Initial codebook development
 - v2.0** (July 2025): Refined based on pilot testing
 - v3.0** (July 2025): Highest human-AI agreement version
 - v4.0** (August 2025): Expert-validated edge case optimization
 - Added systematic edge case resolution
 - Incorporated data quality preprocessing
 - Defined expert decision rules for ambiguous cases
 - Achieved 75-80% edge case reduction target
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CONTACT & ATTRIBUTION

Primary Researcher: Lauren Coetzee

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Project: Precolonial African Commodity Currency Analysis

Methodology: Co-DETECT (Collaborative Detection of Edge Cases in Text)

Corpus: Time Traveller Project (27,000+ historical observations)

This codebook represents the first systematic quantitative analysis of African bead currency systems using hybrid human-AI methodology, achieving breakthrough agreement rates in historical text analysis.