Epigenetics and Governance in Mongolia

The role of epigenetic inheritance in explaining Mongolia's governance variations remains theoretical, with no direct evidence supporting its influence on institutional evolution.

Abstract

Epigenetic and genomic frameworks may offer a conceptual lens for understanding shifts in Mongolia's governance system. Dupras (2016) argues that epigenetic programming can shape public health policy and social stratification, while Lacal and Ventura (2018) delineate three inheritance categories—direct, within-generational, and across-generational—that could, in theory, account for the transmission of administrative behaviors. Tao et al. (2023) extend this perspective by proposing that genetic insights inform public administration practices.

In contrast, case studies of Mongolian governance (Jamsranjav, 2009; Seeberg, 2018) document a historical progression from clan-based authority under traditional norms to centralized control and subsequent privatization and community-based management, without directly invoking epigenetic mechanisms. Together, the studies suggest that epigenetic inheritance provides a promising theoretical framework that may partly explain variations in governance approaches and institutional design, although direct evidence linking these biological processes to institutional evolution in Mongolia remains largely speculative.

Paper search

Using your research question "To what extent can epigenetic inheritance explain variations in governance approaches and institutional design in Mongolia's public administration system?", we searched across over 126 million academic papers from the Semantic Scholar corpus. We retrieved the 50 papers most relevant to the query.

Screening

We screened in papers that met these criteria:

- **Geographic Focus**: Does the study examine Mongolian public administration systems or governance structures (including historical transitions)?
- **Intergenerational Transmission**: Does the study analyze intergenerational transmission of behavioral or social traits in human populations with clear connections to institutional or governance outcomes?
- **Methodology**: Does the study employ both biological and social science methodologies to examine links between epigenetic factors and administrative/governance outcomes?
- **Population Focus**: Does the study investigate epigenetic inheritance patterns specifically in human populations within social contexts?
- **Evidence Type**: Does the study present empirical evidence (rather than purely theoretical arguments)?
- **Temporal Scope**: Does the study examine multi-generational or historical contexts to establish inheritance patterns?

We considered all screening questions together and made a holistic judgement about whether to screen in each paper.

Data extraction

We asked a large language model to extract each data column below from each paper. We gave the model the extraction instructions shown below for each column.

- **Research Approach and Theoretical Framework**:

  Identify the primary theoretical approach used in the study related to epigenetic inheritance and governance. Look in the introduction, theoretical framework, or methodology sections. Specifically note:

- Whether the study uses a qualitative, quantitative, or mixed-methods approach
- The specific theoretical lens applied (e.g., epigenetic inheritance theory, institutional theory)
- Key conceptual definitions of epigenetic inheritance used If multiple approaches are used, list them in order of prominence. If no clear theoretical framework is identified, write "Not explicitly stated".

- **Contextual Focus on Mongolian Governance**:

  Extract specific details about how the study addresses Mongolian governance or institutional design:

- Specific governance mechanisms or institutional structures discussed
- Historical periods or transitions examined
- Level of analysis (national, regional, institutional)
- Any explicit connections made between epigenetic inheritance and governance practices If no direct connection is made, note "No direct connection identified".

- **Data Sources and Evidence Type**:

  Identify the primary sources of evidence used in the study:

- Type of data (archival, interview, survey, historical records, etc.)
- Primary data collection methods
- Time period of data collection
- Geographic scope of data collection If multiple data sources are used, list them in order of significance. If data sources are not clearly described, write "Insufficient information".

- **Epigenetic Inheritance Mechanisms**:

  Extract specific details about epigenetic inheritance mechanisms discussed:

- Types of epigenetic inheritance examined (direct, within-generational, across-generational)
- Specific molecular mechanisms mentioned (e.g., DNA methylation, RNA transmission)
- Proposed transmission pathways
- Any empirical evidence of inheritance presented If no specific mechanisms are detailed, write "No specific mechanisms described".

- **Primary Findings on Governance and Epigenetic Inheritance**:

  Summarize the key findings related to epigenetic inheritance and governance:

- Main conclusions about the relationship between epigenetic inheritance and institutional design
- Any causal or correlational claims made
- Strength of evidence supporting the claims

- Limitations acknowledged by the authors If no substantive findings are presented, write "No significant findings reported".

Results

Characteristics of Included Studies

Study	Research Focus	Study Type	Geographic Scope	Key Concepts	Full text retrieved
Dupras, 2016	Epigenetics in neoliberal governance	Theoretical discussion	No mention found	Epigenetic programming, public health policy	No
Jamsranjav, 2009	Sustainable rangeland management	Case study	Mongolia	Herder community institutions, pastureland governance	No
Lacal and Ventura, 2018	Epigenetic inheritance concepts	Review article	No mention found	Direct epigenetics, within-generational epigenetics, across-generational epigenetics	Yes
Seeberg, 2018	Democratization in clan-based societies	Historical analysis	Mongolia, Central Asia	Clan-based authority structures, Soviet rule impact	No
Tao et al., 2023	Genomics in public administration	Theoretical paper	No mention found	Behavioral genetics, genomic public administration	Yes

Of the 5 studies we examined:

- Research Focus : 2 focused on epigenetics, and 1 each on rangeland management, democratization, and genomics.
- Study Type : We found 2 theoretical studies, 1 case study, 1 review article, and 1 historical analysis.
- Geographic Scope : We found a specified geographic scope for 2 of the 5 studies. Both of these focused on Mongolia, with one also including Central Asia.

- Key Concepts : We found a diverse range of key concepts, with no concept appearing in more than one study. These included:
  - Epigenetic programming
  - Public health policy
  - Community institutions
  - Pastureland governance
  - Various types of epigenetics (direct, within-generational, and across-generational)
  - Clan-based structures
  - Soviet impact
  - Behavioral genetics
  - Genomic public administration

Thematic Analysis

Epigenetic Mechanisms in Social Inheritance

- Dupras (2016) :
  - Discusses potential implications of epigenetic findings for public health strategies and policy-making
  - Suggests epigenetics could provide molecular evidence for addressing environmental conditions and social inequalities
- Lacal and Ventura (2018) :
  - Propose three categories of epigenetic inheritance:
    1. Direct epigenetics (DE)
    2. Within-generational epigenetics (WIE)
    3. Across-generational epigenetics (AIE)
  - This categorization offers a potential structure for examining how social and environmental factors might influence governance structures across generations
- Tao et al. (2023) :
  - Introduce the concept of genomic public administration
  - Suggest potential for genetic insights to inform public administration research and practice

Traditional vs Modern Governance Structures

- Jamsranjav (2009) :
  - Examines shift from state-controlled herding collectives to privatized livestock management in Mongolia
  - Highlights challenges in pastureland governance following this transition
- Seeberg (2018) :
  - Offers historical analysis of Mongolia's democratization process
  - Focuses on impact of Soviet rule on traditional clan-based authority structures
  - Provides context for understanding Mongolia's unique governance evolution trajectory

Institutional Memory and Administrative Evolution

Time Period	Governance Approach	Inheritance Mechanism	Institutional Impact
Pre-Soviet	Clan-based authority structures	Traditional social norms	Strong local governance
Soviet Era	Centralized control	State-imposed collectivization	Dismantling of clan-based structures
Post-Soviet Transition	Privatization of livestock, state-owned pastureland	Weakened customary institutions	Unsustainable grazing practices
Contemporary	Emerging community-based management	Informal cooperation	Potential for new formal regulations
Future Potential	Genomic public administration	Genetic and epigenetic factors	Possible influence on administrative behaviors

Analysis of the table:

- Time periods : We found one entry each for Pre-Soviet, Soviet Era, Post-Soviet Transition, Contemporary, and Future Potential periods.
- Governance approaches : We found five different approaches, each corresponding to a specific time period:
    1. Clan-based authority structures (Pre-Soviet)
    2. Centralized control (Soviet Era)
    3. Privatization of livestock and state-owned pastureland (Post-Soviet Transition)
    4. Emerging community-based management (Contemporary)
    5. Genomic public administration (Future Potential)
- Institutional impacts : We found five distinct impacts, each associated with a specific time period:
    1. Strong local governance (Pre-Soviet)
    2. Dismantling of clan-based structures (Soviet Era)
    3. Unsustainable grazing practices (Post-Soviet Transition)
    4. Potential for new formal regulations (Contemporary)
    5. Possible influence on administrative behaviors (Future Potential)

The data suggests a progression from traditional clan-based governance to centralized control, followed by privatization, and then a shift towards community-based management. The potential future governance approach involves genomic public administration, which could influence administrative behaviors.

Synthesis of Findings

Integration of Biological and Administrative Systems

The integration of biological concepts, particularly epigenetics and genetics, with administrative systems and governance structures is a theme in some of the studies, specifically those by Dupras (2016), Lacal and Ventura (2018), and Tao et al. (2023).

- Dupras (2016) :
  - Suggests epigenetic findings could inform public health strategies and policy-making
  - Implies potential link between biological mechanisms and governance approaches
- Lacal and Ventura (2018) :
  - Propose a theoretical framework (DE, WIE, AIE) that could potentially be applied to understanding governance structure transmission across generations
  - Application to public administration or Mongolian governance remains theoretical
- Tao et al. (2023) :
  - Present the most direct attempt to integrate biological concepts with public administration
  - Propose "genomic public administration" as a step towards understanding how biological factors might influence administrative behaviors and practices

Implications for Public Administration Theory

Traditional Explanation	Epigenetic Perspective	Evidence Quality	Implementation Impact
Historical and cultural factors shape governance	Potential for environmental factors to influence gene expression and inheritance	Theoretical, limited empirical evidence	Could inform policy decisions and institutional design
Institutional changes driven by political transitions	Possible epigenetic mechanisms for transmitting institutional memory	Speculative, no direct evidence	May provide new insights into institutional resilience and adaptation
Administrative behaviors shaped by training and experience	Potential genetic and epigenetic influences on administrative traits	Theoretical proposal, requires further research	Could influence recruitment, training, and organizational design in public administration
Governance structures evolve through political processes	Possible epigenetic inheritance of social and administrative behaviors	No direct evidence in Mongolian context	May offer new perspectives on long-term institutional change

Analysis of the table:

- Traditional explanations : We found 4 different explanations for governance and administrative behaviors, each mentioned once:
  1. Historical and cultural factors
  2. Political transitions
  3. Training and experience
  4. Political processes

- Evidence quality : The evidence quality for epigenetic perspectives in this context appears limited:
  - Theoretical or limited empirical evidence in 1 study
  - Speculative evidence with no direct support in 1 study
  - Theoretical proposal requiring further research in 1 study
  - No direct evidence in the Mongolian context in 1 study
- Epigenetic influence : All 4 studies mentioned potential epigenetic influences or mechanisms, suggesting this is an emerging perspective in governance studies.
- Implementation impacts : The potential implementation impacts varied across studies:
  - Potential impacts on policy and institutional design
  - Potential insights into institutional resilience and adaptation
  - Potential influences on recruitment, training, and organizational design
  - Potential new perspectives on long-term institutional change

References

C. Dupras. "EpigEnEtics in the Neoliberal " Regime of Truth "," 2016.

Chantsallkham Jamsranjav. "SUSTAINABLE RANGELAND MANAGEMENT IN MONGOLIA: THE ROLE OF HERDER COMMUNITY INSTITUTIONS," 2009.

I. Lacal, and R. Ventura. "Epigenetic Inheritance: Concepts, Mechanisms and Perspectives." *Frontiers in Molecular Neuroscience*, 2018.

Lei Tao, Shui-Yan Tang, and Bo Wen. "Advancing the Frontiers of Genomic Public Administration: From Genetics to Administrative Attitudes, Behaviors, and Practices†." *PAR. Public Administration Review*, 2023.

M. Seeberg. "Democratization in Clan-Based Societies: Explaining the Mongolian Anomaly," 2018.