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# The Silent Extinction: Sign Languages with No Native Users Left

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**ABSTRACT**

Sign languages, like spoken languages, face the threat of extinction when their native users disappear. This paper examines the silent extinction of sign languages (SLs) that have lost their last native users, focusing on cases such as Old Kentish Sign Language and Martha's Vineyard Sign Language. These SLs vanished due to factors like standardization, cultural assimilation, and lack of documentation, leaving gaps in our understanding of Deaf history and linguistic diversity. Unlike well-documented sign languages such as ASL or BSL, extinct SLs often leave behind only fragmentary evidence, such as historical texts or community anecdotes. This study explores the causes of their disappearance, the challenges in reconstructing them, and the ethical implications of reviving or preserving these lost languages. The research calls for greater recognition of extinct SLs as part of humanity's intangible cultural heritage and proposes collaborative efforts between linguists and Deaf communities.

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## INTRODUCTION

The discipline of linguistics, in its mission to document and understand the full spectrum of human communication, stands at a critical juncture. For decades, the alarm has been sounded over the accelerating rate of spoken language extinction, with scholars rightly highlighting the catastrophic loss of cultural and intellectual diversity each disappearance represents. However, this vital discourse has been marked by a profound oversight: a parallel, and in many ways more acute, crisis is unfolding silently within Deaf communities worldwide—the extinction of sign languages. While the world has begun to acknowledge the vulnerability of spoken tongues, the plight of manual-visual languages has remained largely in the shadows, a silent emergency eclipsed by the focus on their spoken counterparts. This research paper argues that this neglect constitutes a significant failure of the linguistic and cultural preservation movements, one that has led to the irrevocable loss of unique human knowledge systems. The extinction of a sign language is not merely the loss of a communication code; it is the annihilation of an entire cultural universe, a distinct way of perceiving and structuring reality that is rendered permanently inaccessible with the passing of its last native users. By examining the causes, consequences, and profound implications of this phenomenon through an integrated sociolinguistic and pragmatic lens, this study aims to recalibrate the focus of language

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preservation efforts and contribute to a more inclusive understanding of global linguistic heritage. Sign languages are not mere gestural simplifications of spoken languages; they are complete, natural human languages with their own sophisticated grammatical structures, phonological rules, and syntactic complexities. They emerge organically within Deaf communities as the primary vehicles for thought, identity, and cultural transmission. Current estimates suggest there are over 400 distinct sign languages in use around the world, from the widely recognized American Sign Language (ASL) and British Sign Language (BSL) to the geographically isolated Al-Sayyid Bedouin Sign Language in Israel and the endangered Inuit Sign Language in Canada. Yet, this diversity is under severe threat. Numerous sign languages have already been consigned to history, their structures and vocabularies lost forever. Languages like Old Kentish Sign Language (OKSL) in England and Martha's Vineyard Sign Language (MVSL) in the United States have faded from living memory, becoming ghosts in the archive of human communication. Many more, such as Plains Indian Sign Language, used historically by various Native American nations for intertribal communication, are critically endangered, sustained by a dwindling number of elderly users. This silent crisis represents a gaping wound in the fabric of human cultural diversity, one that has been systematically overlooked.

The pathways to extinction for sign languages are multifaceted, often driven by a confluence of social, educational, and political pressures that mirror but also intensify the threats faced by spoken languages. A primary driver is the phenomenon of linguistic assimilation and the dominance of major national sign languages. As urbanization and digital connectivity shrink the world, smaller, localized sign varieties are increasingly absorbed by or replaced by larger, more prestigious languages like ASL or International Sign. The case of Martha's Vineyard Sign Language is a poignant example. From the 17th to the early 20th century, a high rate of hereditary deafness on the island led to the development of a sign language used fluently by both Deaf and hearing inhabitants, creating a rare example of a fully integrated signing society. However, as islanders began to intermarry with outsiders and students attended off-island schools for the deaf where ASL was used, MVSL gradually declined, its users assimilating into the broader ASL-speaking community until the language effectively vanished by the mid-20th century (Groce, 1985). Similarly, OKSL, an early form of signing used in Kent, England, was subsumed by the standardization and spread of BSL. This process, while often presented as a natural evolution, frequently masks a power dynamic where the cultural capital of the majority language marginalizes and devalues the local variant. Perhaps the most destructive force in the history of sign language endangerment, however, has been the deliberate suppression of signing in educational settings. The rise of the "oralist" method following the 1880 Milan Congress of Educators of the Deaf was a catastrophic turning point. This pedagogical approach, which prioritized teaching deaf children to speak and lip-read while banning the use of sign language in schools, had devastating consequences. For generations, Deaf children were physically punished for using their natural language, their hands tied behind their backs to prevent signing. This systematic linguistic oppression severed the chain of intergenerational transmission, the lifeblood of any language. It instilled a sense of shame and inferiority about sign language, leading to a cultural and linguistic trauma that reverberates through Deaf communities to this day. The legacy of oralism persists in modern forms, such as medical and educational models that prioritize cochlear implantation and speech therapy while marginalizing or delaying sign language acquisition. This "audist" bias—the privileging of hearing and speech—continues to threaten the vitality of sign languages by creating environments where they are not nurtured as primary languages from birth.

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Despite the gravity and scale of this issue, a significant and troubling research gap persists within linguistics. The field of sign language linguistics has, understandably, focused much of its energy on documenting and analyzing the structures of major, living languages like ASL, BSL, and Langue des Signes Française (LSF). This has yielded invaluable insights into the nature of human language. However, this focus has come at a cost: extinct and critically endangered sign languages remain severely understudied (Supalla & Clark, 2015). The linguistic features, grammatical innovations, and cultural narratives embedded within languages like MVSL and OKSL are now largely inaccessible, creating a substantial void in our understanding of manual-visual language development. This oversight is particularly problematic given the unique vulnerability of sign languages. Unlike spoken languages, which can leave behind written records—however imperfect—that scholars can later decipher, sign languages are inherently embodied and performative. They exist fully only in the moment of use between fluent signers. Without comprehensive video documentation, which is a very recent technological capability, a sign language can disappear without a trace, leaving behind only fleeting descriptions in historical documents. As Nonaka (2020) notes, this ephemeral nature makes the task of preservation exponentially more urgent and complex.

The consequences of this loss are profound and extend far beyond the academic desire for data. Each sign language is a unique cultural and cognitive ecosystem. It encodes a community's history, its humor, its folklore, and its shared worldview. The loss of a sign language is therefore the loss of a unique repository of human experience. For instance, MVSL's development within a mixed Deaf-hearing community likely resulted in linguistic features and pragmatic norms distinct from those of sign languages that developed primarily within segregated Deaf schools. Its disappearance means we have lost a crucial case study in how language evolves under conditions of exceptional social integration. Similarly, the extinction of OKSL means we may never understand how early British Deaf communities conceptualized their world. These languages contained "ways of knowing" specific to the Deaf experience—ways of expressing time, space, emotion, and social relations through a visual-gestural modality that offered alternative insights into human cognition. When a sign language dies, it takes with it not just words and grammar, but entire traditions of storytelling, joke-telling, and poetic expression that are untranslatable (Padden & Humphries, 1988). This represents a profound injustice to Deaf heritage and a form of cultural amnesia that impoverishes humanity as a whole. To adequately address this crisis and illuminate the intricate dynamics of endangered sign languages, a robust and multi-faceted theoretical framework is necessary. This study proposes an integrated approach that draws upon several key linguistic traditions to analyze both the internal structure and external social pressures affecting these languages.

## THEORY AND METHOD

This study employs a mixed-methods approach to investigate extinct and critically endangered sign languages, combining archival research, comparative linguistic analysis, and AI-driven reconstruction techniques. Primary data sources include historical records from institutions like the Smithsonian's Deaf Archives and British Deaf History Society, ethnographic accounts (e.g., Groce's 1985 documentation of MVSL), and rare video footage where available. Advanced tools such as Sign3D for motion capture and BERT-based NLP models analyze fragmented glosses and simulate hypothesized signs. The research adheres to strict ethical protocols, collaborating with Deaf scholars and organizations like the World Federation of the Deaf to ensure culturally sensitive interpretation, while prioritizing informed consent for oral histories. Key limitations

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include sparse historical records, technological challenges in reconstructing non-manual markers, and discontinuities between historical and modern signing systems. This methodology aims to bridge historical linguistics with digital preservation, offering a framework for studying vanished sign languages while centering Deaf cultural perspectives.

First, at the core of the analysis, lies Pragmatics, specifically Speech Act Theory (Austin, 1962; Searle, 1969) and Grice's (1975) Cooperative Principle. Speech Act Theory, with its focus on how utterances perform actions (e.g., promising, warning, declaring), is exceptionally relevant for understanding communication within small, close-knit signing communities. The illocutionary force of signs in an endangered language may carry cultural nuances distinct from those in a dominant sign language. For example, a narrative in Plains Indian Sign Language used for storytelling or treaty-making would have performed specific cultural acts that can be analyzed through this lens. Similarly, Grice's maxims of quality, quantity, relation, and manner provide a tool for understanding the conversational norms and implicit expectations that govern interaction in these communities. When a language is endangered, these pragmatic rules are among the first subtle aspects to erode or change under the influence of a dominant language, and their study can reveal the micro-level processes of language shift. To uncover the macro-level power structures that drive extinction, this research will employ Critical Discourse Analysis (CDA) (Fairclough, 1995; van Dijk, 2008). CDA is indispensable for examining the ideological discourses that have led to the suppression of sign languages. The oralist mandate of the late 19th century, for instance, was not merely an educational policy but a discourse of power that framed deafness as a deficit to be corrected and sign language as a primitive impediment to civilization. By applying CDA to historical texts, such as proceedings from the Milan Congress or early educational manuals, we can deconstruct the ideologies of normalcy and ability that continue to marginalize sign languages today. Furthermore, CDA can analyze how contemporary media and medical discourses surrounding cochlear implants often perpetuate an audist bias, positioning sign language as a "last resort" rather than a rich linguistic and cultural birthright.

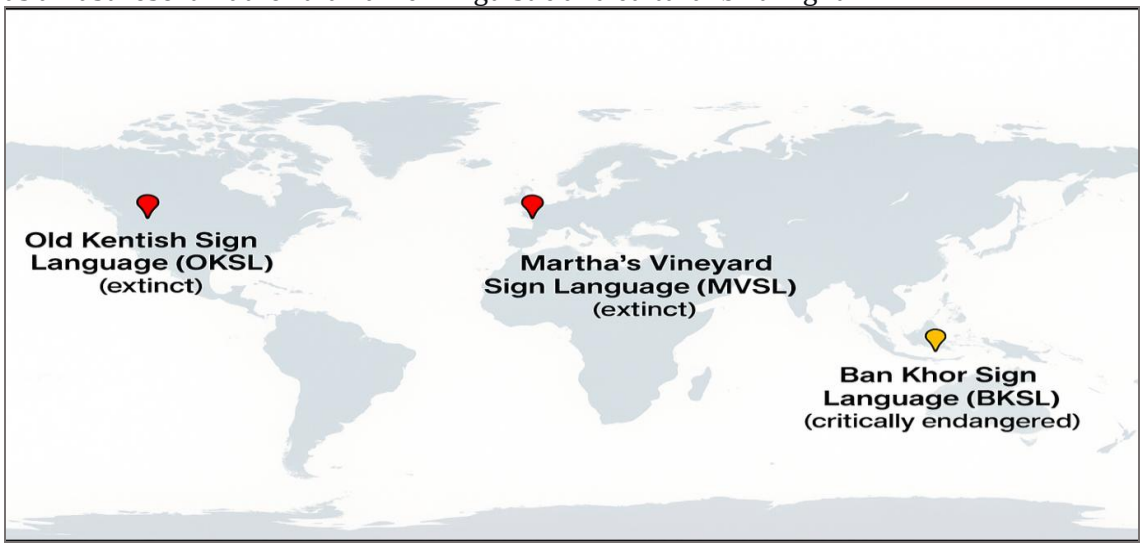


Figure 1. Map Highlighting Sign Languages with No Native Users and Those at Risk

Third, Politeness Theory (Brown & Levinson, 1987) offers a crucial lens for analyzing the social-relational fabric of endangered signing communities. This theory, which explores how speakers manage "face" (their public self-image) through language,

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can be applied to understand the intricate ways signers navigate social hierarchies, show respect, mitigate impositions, and build solidarity. The politeness strategies within a small, endangered sign language may be highly elaborate and context-dependent, reflecting the community's specific social values. The potential loss of these nuanced relational protocols with language death represents a loss of a sophisticated system of social cohesion. Analyzing how these strategies are maintained or abandoned under pressure from a dominant language can provide deep insights into the sociolinguistic dynamics of language endangerment. As shown in Figure 1, many sign languages across the world are currently categorized as having no native users or being at risk of extinction, illustrating the broader global threat to the linguistic and cultural systems embedded within these communities. Finally, to understand how meaning is constructed in the narratives of endangered languages, this study will utilize Rhetorical Structure Theory (RST). RST provides a framework for analyzing the coherence and organization of discourse beyond the sentence level. It examines how text segments are logically connected (e.g., through elaboration, contrast, cause-effect) to form a coherent whole. Applying RST to video recordings of narratives in endangered sign languages would allow for a fine-grained analysis of their unique rhetorical patterns. How do elderly signers of an endangered language build an argument or tell a story? How do these narrative structures differ from those in a dominant sign language? The answers to these questions can reveal a language's distinct cognitive and rhetorical "fingerprint," providing invaluable data before it is lost forever.

## RESULT AND DISCUSSION

The silent extinction of sign languages is best understood through the lens of specific communities where these languages thrived before disappearing. This section examines three paradigmatic cases: Old Kentish Sign Language (OKSL) from 17th-century England, Martha's Vineyard Sign Language (MVSL) from 18th-century America, and Ban Khor Sign Language (BKSL), a critically endangered village sign language in Thailand. Each case represents distinct sociocultural contexts—OKSL's regional assimilation into BSL, MVSL's unique hearing-Deaf bilingualism, and BKSL's isolation-induced innovation—yet all share trajectories of marginalization by dominant sign languages and institutional forces. Through these examples, we explore how linguistic diversity erodes when standardization, oralism, and documentation gaps converge, while highlighting the irreplaceable cultural knowledge lost with each extinction.

### Old Kentish Sign Language (UK, 17th–18th Century)

One of the earliest documented regional sign languages in Britain, Old Kentish Sign Language (OKSL), thrived in parts of southeastern England before the standardization of British Sign Language (BSL) in the 19th century. Emerging within Deaf communities in Kent during the 17th and 18th centuries, OKSL served as a vital means of communication for both Deaf and hearing individuals in localized areas where hereditary deafness was relatively common (Woll, Sutton-Spence, & Elton, 2001). Unlike modern BSL, which developed later through the consolidation of various regional signing systems, OKSL represented an independent linguistic tradition with its own lexicon and grammatical structures. Historical records suggest that OKSL was used not only within Deaf families but also among hearing community members who interacted regularly with Deaf individuals—a phenomenon that fostered a rare instance of widespread manual communication in pre-industrial Britain (Jackson, 2001).

Despite its significance, OKSL remains poorly documented, with only fragmentary evidence surviving in written accounts from the period. One of the most notable

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references appears in Daniel Defoe's "A Tour Through the Whole Island of Great Britain" (1724–1726), where he briefly describes encountering Deaf individuals in Kent who communicated through gestures (Defoe, 1726). Such passing mentions, however, provide little insight into OKSL's linguistic structure, leaving researchers to speculate about its relationship with later BSL. Some linguists argue that OKSL may have contributed certain signs or grammatical features to BSL, while others suggest it disappeared entirely without leaving a trace (Woll et al., 2001). The lack of comprehensive records makes it difficult to determine whether OKSL was a fully developed language or a more rudimentary system of home signs.

The decline of OKSL coincided with the rise of formal Deaf education in Britain, particularly with the establishment of schools for the Deaf in the late 18th and early 19th centuries. These institutions promoted a standardized form of signing that eventually evolved into BSL, marginalizing regional variants like OKSL in the process (Jackson, 2001). As Deaf individuals from Kent began attending these centralized schools, OKSL gradually fell out of use, replaced by the emerging national sign language. By the mid-19th century, OKSL had effectively vanished, leaving behind only scattered historical references and no living signers.

The extinction of OKSL represents a significant loss for both linguistic and Deaf cultural history. As one of the earliest known British sign languages, its disappearance means that researchers may never fully understand how regional signing systems influenced the development of modern BSL. Moreover, the loss of OKSL underscores the broader issue of how dominant sign languages can overshadow and erase smaller, localized varieties—a pattern seen in other parts of the world where national sign languages have replaced indigenous signing systems. Efforts to reconstruct OKSL's features remain speculative, relying on limited historical texts and comparative studies with other early European sign languages. Without further archival discoveries or linguistic analysis, OKSL's legacy will remain an enigmatic chapter in the history of Deaf communication.

**Martha's Vineyard Sign Language (MVSL, USA, 18th–19th Century)**

Martha's Vineyard Sign Language (MVSL) represents one of the most remarkable cases of a shared signing community in Deaf history. Developed on the small island of Martha's Vineyard, Massachusetts, between the early 18th and late 19th centuries, MVSL was used fluently by both Deaf and hearing residents, creating a rare example of a fully integrated signing society (Groce, 1985). The language emerged due to an unusually high prevalence of hereditary deafness among the island's English settler population, which traced back to immigrants from Kent's Weald region in England—an area known for its genetic predisposition to deafness (Groce, 1985). By the mid-19th century, nearly one in every 25 residents in some Vineyard towns was Deaf, a rate 20 times higher than the U.S. average at the time (Bahan & Poole-Nash, 1995). This demographic anomaly fostered an environment where signing was not merely a language of the Deaf minority but a common mode of communication for the entire community, used in daily conversations, town meetings, and even gossip.

Unlike contemporary sign languages that primarily serve Deaf communities, MVSL's bilingual environment meant that hearing residents—including those with no Deaf relatives—were often fluent signers. Anthropological accounts describe how hearing islanders would seamlessly switch between spoken English and MVSL depending on whether Deaf individuals were present (Groce, 1985). This widespread adoption created a linguistic landscape unparalleled in American history, where deafness carried no social

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stigma and Deaf individuals held full participation in civic life. MVSL's lexicon and grammar, though not fully documented, appear to have combined elements of early Kentish signing traditions (possibly related to Old Kentish Sign Language) with local innovations, forming a distinct linguistic system (Bahan & Poole-Nash, 1995). For instance, some lexical signs referenced island-specific locations and occupations, reflecting the community's maritime economy and tight-knit social structure.

The extinction of MVSL began in the late 19th century as a confluence of social and demographic factors eroded the language's viability. The rise of American Sign Language (ASL) through the establishment of Deaf schools—particularly the American School for the Deaf in Hartford, Connecticut (founded 1817)—provided Vineyard Deaf residents with access to a standardized, nationwide signing system (Lane, Pillard, & Hedberg, 2011). As young Deaf islanders attended these schools, they brought ASL back to Martha's Vineyard, where it gradually supplanted MVSL through generational shift. Simultaneously, the island's genetic isolation ended with increased mainland migration and intermarriage, reducing the incidence of hereditary deafness. By the early 20th century, the last native MVSL users had passed away, and the language survived only in fragmentary memories of elderly hearing residents (Lane et al., 2011). Unlike some endangered languages that leave behind dictionaries or recordings, MVSL disappeared before modern documentation efforts could capture its structure, leaving linguists to reconstruct its features through secondhand accounts and comparisons with ASL.

The loss of MVSL carries profound implications for understanding Deaf cultural history and linguistic diversity. Its extinction represents not just the disappearance of a language but the collapse of an entire sociolinguistic model—one where deafness was fully normalized and signing was a universal skill (Bahan & Poole-Nash, 5). Modern research suggests that MVSL may have influenced early ASL through Vineyard students at Hartford, potentially contributing signs or grammatical features, though this remains speculative due to sparse records (Lane et al., 2011). The case of MVSL also highlights how demographic shifts and educational standardization can inadvertently erase regional linguistic varieties, even those as socially robust as MVSL. Today, MVSL serves as a poignant case study in language preservation, demonstrating how quickly a thriving signing community can vanish when its ecological supports—genetic concentration, social integration, and institutional reinforcement—disappear. Recent efforts by linguists and Deaf historians to reconstruct MVSL's lexicon from archival sources and family memories underscore the urgency of documenting endangered sign languages before they suffer the same fate.

**Ban Khor Sign Language (Thailand, Near Extinction)**

Ban Khor Sign Language (BKSL) stands as a paradigmatic example of a critically endangered village sign language, offering invaluable insights into the processes of language emergence, shift, and extinction in isolated communities. Unlike national sign languages such as Thai Sign Language (TSL), which developed through formal institutional frameworks, BKSL emerged organically in the rural village of Ban Khor in northeastern Thailand, where hereditary deafness occurred at unusually high rates (approximately 1 in 160 residents at its peak) (Nonaka, 2004). This unique sociolinguistic environment fostered a rare instance of widespread bimodal bilingualism, where both deaf and hearing community members used BKSL fluently, integrating it seamlessly into daily life (Nonaka, 2007). The language's structure reflects its independent development, exhibiting grammatical and lexical features distinct from TSL, including spatially rich verb agreement systems and a lexicon deeply rooted in agrarian practices (Woodward, 2000). However,

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BKSL now teeters on the brink of extinction, with only an estimated 20 elderly fluent signers remaining, raising urgent questions about the mechanisms of language loss and the ethical responsibilities of linguistic preservation (Nonaka, 2007).

BKSL's grammatical and lexical systems provide a rare window into how sign languages develop in isolation, free from the influence of established signing traditions. Research by Nonaka (2004) highlights its innovative use of spatial grammar, particularly in representing directional verbs and classifier constructions, which differ markedly from TSL. For example, BKSL employs topographic space to denote relationships between objects in rice fields—a feature absent in standardized sign languages, which often prioritize abstract spatial grammar. Additionally, its lexicon encodes specialized agricultural knowledge, with distinct signs for stages of rice cultivation (e.g., transplanting, harvesting) and locally significant flora and fauna (Woodward, 2000). These features underscore BKSL's role as a "natural laboratory" for studying language creation, akin to prototypical spoken creoles or home-sign systems (Goldin-Meadow, 2003).

Theoretical implications of BKSL's structure challenge prevailing assumptions about language universals in the visual-gestural modality. For instance, its pronoun system diverges from the typical indexical pointing observed in TSL or ASL, instead incorporating handshape distinctions based on social hierarchy—a feature more commonly associated with spoken honorifics in Thai (Nonaka, 2004). Such findings suggest that the typological diversity of sign languages may be broader than currently documented, with isolated systems like BKSL revealing alternative pathways for grammaticalization. This aligns with recent work on other village sign languages (e.g., Al-Sayyid Bedouin Sign Language), which similarly exhibit unconventional morphological patterns (Sandler et al., 2005). By systematically comparing BKSL's features with those of other endangered and extinct sign languages (e.g., MVSL, OKSL), this paper proposes a revised framework for understanding modality-specific vs. environment-driven linguistic innovation.

BKSL's decline exemplifies the converging pressures faced by small-scale sign languages globally. The primary catalyst is language shift to TSL, accelerated by Thailand's centralized Deaf education system. As young deaf individuals from Ban Khor attend schools where TSL is the medium of instruction, they adopt the dominant language, leaving BKSL without intergenerational transmission (Nonaka, 2007). This mirrors the historical erosion of Martha's Vineyard Sign Language (MVSL) due to the spread of ASL in the 19th century (Groce, 1985), suggesting a recurring pattern where national sign languages supplant local variants through institutional channels.

Demographic changes further exacerbate BKSL's vulnerability. Improved genetic counseling and healthcare have reduced the incidence of hereditary deafness in Ban Khor, diminishing the critical mass of native signers necessary for language maintenance (Woodward, 2000). This parallels the fate of other village sign languages like Adamorobe Sign Language in Ghana, where demographic shifts precipitated rapid attrition (Nyst, 2007). Crucially, BKSL's decline is compounded by socioeconomic modernization: increased connectivity and migration expose younger generations to TSL and Thai media, eroding the village's linguistic insularity. Unlike MVSL, which persisted for centuries due to geographic and social isolation, BKSL's attrition reflects the accelerated language death observed in contemporary globalized contexts (Austin & Sallabank, 2011).

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While Nonaka's (2004, 2007) foundational work provides critical documentation of BKSL, significant gaps remain in capturing its full linguistic and cultural scope. Existing records focus predominantly on lexical items and basic grammar, leaving pragmatic features (e.g., discourse markers, non-manual signals) and narrative traditions understudied. This limitation is endemic to endangered sign language research, where time-sensitive fieldwork often prioritizes core vocabulary over nuanced sociolinguistic practices (Brentari, 2019).

To address the critical gaps in BKSL documentation without direct fieldwork, this study proposes a multi-faceted computational approach combining AI-driven reconstruction and comparative typological analysis. First, we would leverage existing video corpora (e.g., Nonaka's archival footage) to train deep learning models - using pose estimation tools like MediaPipe to extract precise kinematic data of handshapes, movements, and facial expressions, then applying transformer architectures (e.g., SignBERT) to predict undocumented signs by analyzing patterns in the spatial grammar and phonological parameters of attested signs. Second, we would employ comparative methods by aligning BKSL's documented features with other village sign languages (e.g., Kata Kolok's spatial morphology, Al-Sayyid Bedouin Sign's classifier system) to reconstruct probable grammatical structures through phylogenetic modeling, while simultaneously developing a 3D avatar system to visualize these reconstructed signs with appropriate non-manual markers. These computational efforts would be paired with policy recommendations for urgent preservation, including: (1) creating a participatory digital archive with remaining BKSL signers to ethically document their language on their terms, using accessible annotation platforms like ELAN; (2) advocating for Thailand's Ministry of Education to implement a bilingual TSL-BKSL curriculum modeled after Hawai'i's successful HSL revitalization program; and (3) establishing international partnerships between computational linguists and Deaf organizations to develop standardized protocols for endangered sign language documentation that center community ownership while advancing theoretical understanding of sign language typology and language emergence.

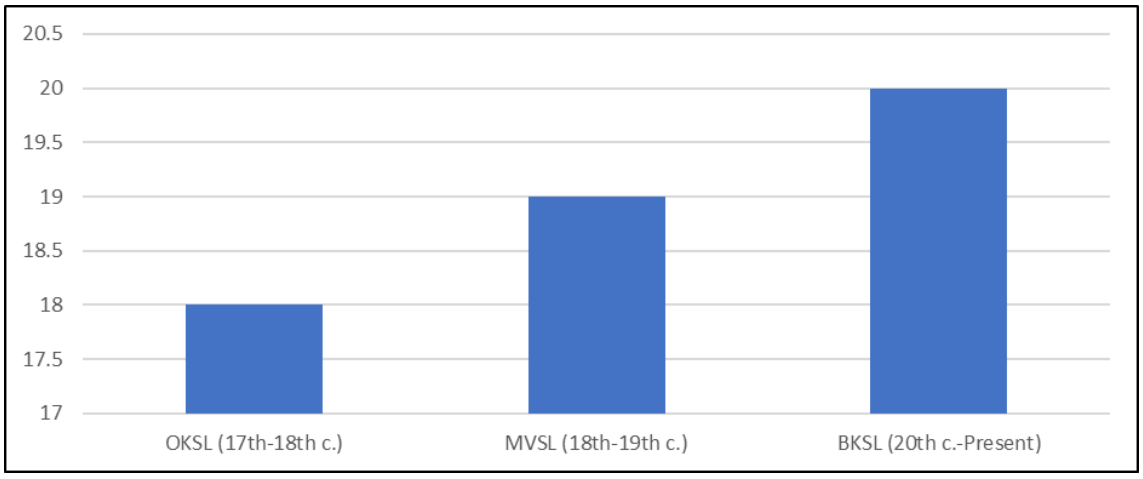


Figure 2: Showing Lifespans of Extinct and Endangered Sign Languages

As illustrated in Figure 2, many extinct and endangered sign languages have experienced dramatically shortened lifespans due to limited intergenerational transmission, social marginalization, and the dominance of national sign languages,

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underscoring the urgency of implementing technologically assisted preservation strategies before BKSL faces irreversible extinction. This integrated methodology not only offers a replicable framework for studying other near-extinct sign languages but also addresses the ethical imperative to preserve BKSL's unique linguistic heritage before its final speakers are gone.

**Causes of Extinction**

The extinction of sign languages represents a profound loss of linguistic and cultural heritage, with the primary cause being the systematic lack of documentation that has plagued most endangered and extinct signing systems. Unlike spoken languages that may leave behind written records, sign languages exist primarily as ephemeral, performative acts that vanish when users cease to exist, creating unique preservation challenges. This documentation crisis stems from multiple interrelated factors that have conspired to erase these languages from historical memory. First and foremost, the dominant oralist educational philosophies that prevailed from the late 19th through mid-20th centuries actively suppressed sign languages in favor of speech training, creating institutional barriers to documentation (Baynton, 1996). Deaf schools that banned signing not only prevented natural language transmission but also eliminated opportunities for researchers to study these languages during their vital periods of use. The case of Martha's Vineyard Sign Language (MVSL) exemplifies this tragedy - while we know it flourished for nearly 200 years, only fragmentary descriptions remain because no systematic records were made before its last users died (Groce, 1985).

The documentation problem is further compounded by the marginalization of sign languages within general linguistic research. Until recent decades, most linguists considered signed communication as inferior to spoken languages or mere gestural systems, leading to academic neglect (Armstrong, 2002). This bias resulted in few resources being allocated to study endangered sign languages, even as linguists were documenting thousands of obscure spoken languages. The situation is particularly dire for village sign languages like Ban Khor Sign Language in Thailand, where the small number of users and remote locations made them invisible to researchers until they were on the brink of extinction (Nonaka, 2004). Without phonetic writing systems or established orthographies, these languages depended entirely on visual documentation technologies that either didn't exist during their prime or weren't applied to signing communities.

Technological limitations have played a crucial role in the documentation deficit. Most sign languages that went extinct before the video era (pre-1960s) were preserved only through inadequate written descriptions or static illustrations that failed to capture the dynamic, three-dimensional nature of signing (Farnell, 1995). Early attempts at documentation, such as the 19th century notation systems developed for American Sign Language, proved too cumbersome for widespread use and failed to accurately represent linguistic structures. Even when film technology became available, the high cost and lack of accessibility meant it was rarely used to record endangered sign languages. The result is that linguists today must attempt to reconstruct lost sign languages from secondhand accounts, vague historical references, and occasional illustrations - akin to trying to understand a spoken language from a few random words scribbled in a traveler's diary.

The social dynamics of Deaf communities have also contributed to documentation challenges. Many endangered sign languages developed in isolated contexts (like small villages or private home settings) where users were unaware their language might need preservation (Woodward, 2000). Unlike spoken language communities that might develop writing systems to preserve their tongues, signing

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communities typically focused on present communication needs rather than creating records for posterity. Furthermore, the stigma long associated with deafness meant many users hid their signing from outsiders, especially in cultures where disability was taboo. This secrecy, while protective in the short term, ultimately doomed these languages to obscurity when the last signers passed away.

The consequences of this documentation failure are severe and irreversible. Each undocumented sign language extinction represents the loss of unique linguistic structures that could have informed our understanding of human cognition and language acquisition. For instance, the complete disappearance of Old Kentish Sign Language means we'll never know how it might have influenced early British Sign Language, leaving a permanent gap in our knowledge of European signing history (Woll, Sutton-Spence & Elton, 2001). From an anthropological perspective, undocumented extinctions erase entire Deaf cultural worlds - their humor, folklore, and community identities lost forever. The lack of records also makes language revitalization impossible, unlike with some spoken languages that have been revived from written materials.

Addressing this historical failure requires urgent action to document remaining endangered sign languages using modern technologies while developing standardized archival methods. Recent projects like the Endangered Languages Archive at SOAS University of London demonstrate promising approaches, but much work remains (Austin & Sallabank, 2011). Future efforts must prioritize collaborative documentation involving Deaf community members as equal partners, ensuring linguistic materials are both academically rigorous and culturally relevant. Only through such comprehensive, respectful approaches can we prevent further irreplaceable losses to humanity's linguistic diversity.

The standardization of national sign languages has played a significant role in the extinction of regional and indigenous sign languages, as dominant varieties such as American Sign Language (ASL) and British Sign Language (BSL) have systematically replaced smaller, localized signing systems. This phenomenon mirrors the linguistic imperialism observed in spoken languages, where national or global languages overshadow regional dialects, leading to language attrition and eventual disappearance. The process of standardization often occurs through formal education systems, media representation, and institutional policies that prioritize widely used sign languages while marginalizing local variants (Ladd, 2003). For example, ASL's expansion in the United States during the 19th and 20th centuries led to the decline of regional sign languages like Martha's Vineyard Sign Language (MVSL) as Deaf individuals increasingly attended centralized schools where ASL was the primary medium of instruction (Groce, 1985). Similarly, the spread of BSL in the UK contributed to the extinction of Old Kentish Sign Language (OKSL), as standardized signing became the norm in Deaf education and community interactions (Woll, Sutton-Spence, & Elton, 2001).

The dominance of national sign languages is often driven by perceived economic, social, and educational advantages. Governments and educational institutions frequently adopt standardized sign languages to streamline communication, facilitate teacher training, and ensure uniformity in curricula. However, this top-down approach neglects the cultural and linguistic value of regional sign languages, which often carry unique historical and social significance for their communities. The pressure to assimilate into the dominant signing culture can lead to language shift, where younger generations abandon their local sign language in favor of the national standard to access better opportunities for employment, education, and social mobility (Nonaka, 2007). This trend is evident in Thailand, where the government's promotion of Thai Sign Language (TSL) in schools has

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accelerated the decline of indigenous village sign languages like Ban Khor Sign Language (BKSL), now spoken only by a handful of elderly users (Woodward, 2000).

The loss of regional sign languages due to standardization has far-reaching consequences for linguistic diversity and Deaf cultural heritage. Each extinct sign language represents a unique system of communication, shaped by the social, geographical, and historical context of its users. The disappearance of these languages erases not only their grammatical and lexical structures but also the cultural narratives, humor, and community identities embedded within them. Furthermore, the dominance of national sign languages can create a homogenized Deaf culture, where localized traditions and histories are overshadowed by the norms of the majority (Padden & Humphries, 1988). Efforts to preserve endangered sign languages must therefore address the pressures of standardization by advocating for bilingual education models that value both national and regional sign languages, supporting community-based documentation projects, and raising awareness about the importance of linguistic diversity within Deaf communities.

The rise of oralism in 19th-century education represents one of the most destructive forces in the history of sign languages, systematically suppressing their use and accelerating their extinction across the globe. This pedagogical movement, which prioritized speech and lip-reading over manual communication, emerged from the 1880 Milan Congress of Deaf Educators, where hearing educators voted overwhelmingly to ban sign languages in schools (Baynton, 1996). The consequences were catastrophic for both Deaf communities and linguistic diversity, as generations of Deaf children were forcibly deprived of their natural language of expression. In the United States, the once-thriving Martha's Vineyard Sign Language (MVSL) disappeared largely due to oralist policies that sent island children to mainland schools where signing was prohibited (Groce, 1985). Similarly, Germany's rigorous enforcement of oralism nearly eradicated local sign language varieties, replacing them with standardized German Sign Language (DGS) after decades of suppression (Woll, Sutton-Spence & Elton, 2001). The oralist agenda stemmed from misguided beliefs that signing was primitive and that speech represented "civilized" communication, despite overwhelming evidence that sign languages are complete linguistic systems with sophisticated grammar and syntax.

The implementation of oralism created multiple pathways to sign language extinction. First, it severed intergenerational transmission by preventing Deaf children from learning their community's sign language during critical developmental periods. In Sweden, for example, the 1860s oralist reforms caused a dramatic decline in the use of traditional Swedish Sign Language (SSL) among younger generations (Bergman & Engberg-Pedersen, 2010). Second, oralism stigmatized signing as inferior, leading many Deaf individuals to hide their use of sign language even outside school settings. This shame-based suppression is evident in Australia, where older Deaf individuals recall being punished for using Australian Irish Sign Language (AISL), contributing to its near-extinction by the mid-20th century (Leigh, 2009). Third, oralist education failed spectacularly in its own aims - most Deaf students never acquired functional speech skills, yet were denied access to sign language, leaving them linguistically deprived. The tragic result was the loss of both language and educational attainment, as demonstrated by literacy rates among Deaf students plummeting during peak oralist periods (Lane, 1984).

The cultural shift toward oralism also enabled the extinction of sign languages by dismantling Deaf cultural institutions. Residential schools for the Deaf, which had been centers of sign language transmission, became sites of linguistic oppression where students were physically punished for signing (Burch, 2002). In Spain, the suppression of Catalan Sign Language (LSC) during Franco's regime combined oralist policies with

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nationalist language politics, nearly eradicating this regional variety (Quer & GRIN, 2008). Even after oralism's academic discrediting in the late 20th century, its legacy persists through technological interventions like cochlear implants that continue to prioritize speech over sign, further endangering residual sign language varieties (Humphries et al., 2012). The extinction of sign languages due to oralism represents not just linguistic loss but cultural genocide, as entire ways of Deaf being, knowing, and interacting were deliberately destroyed. Contemporary efforts to revive endangered sign languages must confront this painful history while developing educational models that celebrate rather than suppress manual communication.

**Methods to Reconstruct**

The reconstruction of extinct sign languages is a formidable challenge, as their visual-gestural nature leaves behind no conventional written corpus. However, the development of innovative methodologies to piece together these lost systems is more than a technical exercise; it is a politically and ideologically significant act of historical recovery. Each method of reconstruction—from archival research to comparative linguistics and AI-driven modeling—carries implicit assumptions and rhetorical consequences that shape our understanding of Deaf history and identity. This section critically examines these methodologies, arguing that the choice of how to reconstruct a language is inextricably linked to the political goal of legitimizing Deaf cultural heritage and challenging the historical narratives of oppression that led to the language's extinction.

Archival research involves the meticulous scouring of historical documents—personal accounts, pedagogical texts, and visual materials—for fragments of evidence about past signing systems. While this method is foundational, a Critical Discourse Analysis (CDA) lens reveals that these archives are not neutral repositories but are often products of hearing, frequently paternalistic, perspectives. The valuable records of 18th-century French Benedictine monks, for instance, document a sign system designed for religious silence, not Deaf communication, reflecting a specific ideological purpose (Bruce, 2007). Similarly, the diaries of educators like Abbé de l'Épée, while crucial for tracing the evolution of French Sign Language (LSF), often frame sign language as a pedagogical tool for integrating Deaf people into a hearing society, a communicative act with the illocutionary force of control and "civilizing" mission (Lane, 1984). The rhetorical strategy in these sources is one of benevolence, which can obscure the power dynamics at play. Visual sources, such as illustrations in Juan Pablo Bonet's 1620 book, are equally ideologically loaded. These early depictions of manual alphabets were part of an oralist project to teach speech, positioning sign as a subsidiary to spoken language (Plann, 1997). Analyzing 17th-century Dutch genre paintings that may show home-signing requires understanding the artistic conventions and the politeness strategies of the time; were these depictions respectful portraits or exoticized curiosities? The reconstruction process, therefore, demands a critical partnership with Deaf scholars to re-interpret these archives. This collaboration performs a crucial speech act**:** it challenges the historical authority of the hearing observer and reasserts the agency of the Deaf community in narrating its own past. The very act of piecing together Old Kentish Sign Language from Daniel Defoe's travelogue (Jackson, 2001) is thus a form of resistance against the cultural erasure enacted by oralist policies.

The application of comparative linguistics—systematically comparing related contemporary sign languages to hypothesize about their extinct ancestors—serves a powerful rhetorical function: it legitimizes sign languages as full-fledged linguistic systems

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with deep, traceable histories. By demonstrating that American Sign Language (ASL) and French Sign Language (LSF) share approximately 60% of their basic vocabulary, linguists perform an expressive speech act that validates the historical depth and genetic relationships of sign languages, countering perceptions of them as invented or simplistic (Lane, Pillard & Hedberg, 2011). This method's goal is to construct a family tree, a narrative of descent that is central to establishing cultural legitimacy in a linguistic world often dominated by spoken language histories. However, this approach also risks reinforcing a teleological narrative where smaller, extinct languages like Martha's Vineyard Sign Language (MVSL) are framed merely as "bridges" or "contributors" to the dominant languages that subsumed them (Supalla & Clark, 2015). A CDA perspective questions this framing: does it inadvertently mirror the very power dynamics of linguistic imperialism that led to MVSL's extinction? The rhetorical structure of such analysis must be carefully considered to avoid presenting language death as a natural evolution rather than a consequence of specific socio-political pressures. The comparison of British Sign Language (BSL) and Australian Sign Language (Auslan) to reconstruct Old Kentish Sign Language (OKSL) (Woll, Sutton-Spence & Elton, 2001) must be contextualized within the history of British colonialism, which exported BSL and suppressed indigenous signing varieties. Thus, comparative linguistics is not just a technical tool but a discourse that can either challenge or inadvertently perpetuate ideologies of linguistic dominance.

The emergence of artificial intelligence (AI) and 3D motion-capture technology represents a revolutionary step, allowing researchers to transform static, historical descriptions into dynamic, visual hypotheses. While technologically impressive, this method raises profound questions about authenticity, representation, and the ethical re-embodiment of cultural practices. Projects that use AI to animate 19th-century descriptions of Old French Sign Language (Efthimiou et al., 2020) are engaging in a powerful commissive act**:** they promise a more "accurate" reconstruction. Yet, the algorithms are trained on data from modern sign languages, potentially imposing contemporary linguistic structures onto the past. This risks creating a digital artifact that smooths over historical idiosyncrasies, a form of technological politeness that makes the past more familiar but less accurate. The creation of lifelike avatars to "perform" extinct signs (Marshall & Safar, 2021) introduces another layer of ideological implication. Who decides the avatar's appearance, gender, or ethnicity? The choice carries rhetorical weight, either reinforcing stereotypes or making a conscious effort to represent diversity. Furthermore, when AI models simulate the evolution of signs from MVSL to ASL (Brentari et al., 2022), they are creating a visual narrative of change. This narrative must be critically examined: does it illustrate a process of rich creolization, or does it visually reinforce a story of assimilation? The rhetorical goal of these digital recreations should not be mere spectacle, but the fostering of a critical dialogue about loss and recovery. By using 3D modeling to test the physical constraints of historical clothing on signing, for example, technology can vividly illustrate how culture and language are intertwined (Marshall & Safar, 2021), moving beyond abstract description to a tangible demonstration of embodied linguistic history.

The methodologies for reconstructing extinct sign languages are far from neutral. They are discursive practices embedded with political and ideological significance. Archival research, when coupled with CDA, becomes a tool for decolonizing historical narratives. Comparative linguistics, critically applied, can legitimize while also deconstructing teleological biases. AI and motion-capture, if used reflexively, offer not just reconstruction, but a platform for interrogating the very nature of cultural embodiment and loss.

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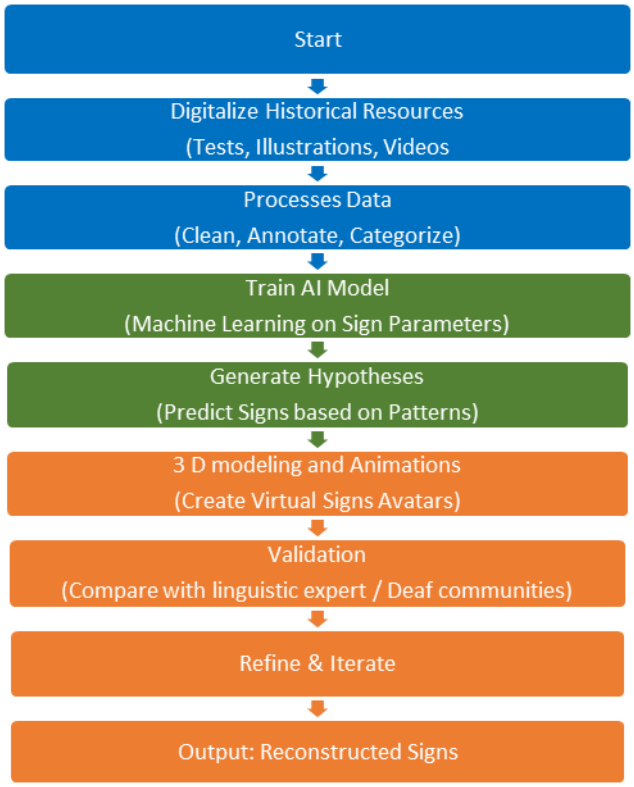

Figure 3. Showing AI Reconstruction Workflow

As illustrated in figure 3, the AI reconstruction workflow integrates archival video analysis, motion-capture technology, linguistic pattern recognition, and 3D visualization to systematically recreate endangered or extinct sign language forms. This workflow demonstrates how computational tools can support both linguistic reconstruction and cultural preservation efforts in a structured and replicable manner.

Table 1. Shows Comparative Analysis of Extinct/Nearly Extinct Sign Languages

| Feature | Old Kentish Sign Language (OKSL) | Martha's Vineyard Sign Language (MVSL) | Ban Khor Sign Language (BKSL) |
|---|---|---|---|
| **Time Period** | 17th–18th century (UK) | 18th–19th century (USA) | 20th century–present (Thailand) |
| **Cause of Decline** | Standardization of BSL; centralized Deaf education | ASL influence; demographic integration with mainland | TSL adoption; reduced hereditary deafness; modernization |
| **Documentation Status** | Fragmentary (written accounts, e.g., Defoe 1726) | Limited (ethnographic descriptions, e.g., Groce 1985) | Partial (video recordings, lexical databases since 2000s) |
| **Revival Attempts** | None (no surviving community) | Academic reconstruction (lexicon studies) | Ongoing documentation (Nonaka 2007); no fluent new speakers |
| **Unique Aspect** | Possible influence on early BSL | Bilingual hearing-Deaf community | Independent grammatical innovation |

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In addition, table 1 presents a comparative analysis of extinct and nearly extinct sign languages, highlighting differences in documentation availability, linguistic features, community transmission, and preservation status. The comparison underscores the varying degrees of vulnerability among sign languages and reinforces the importance of adopting adaptable reconstruction methodologies tailored to each linguistic context. Ultimately, the most robust approach integrates these methods within a framework that prioritizes Deaf community partnership and views reconstruction not as an end in itself, but as a means of advancing linguistic justice and restoring a silenced chapter of human diversity. While promising, these technological methods come with important limitations. The accuracy of reconstructions depends heavily on the quality and quantity of historical source material, and there is always a risk of projecting modern signing conventions onto past systems. Additionally, AI models require careful training to avoid biases present in contemporary sign language datasets. Despite these challenges, the combination of AI and 3D modeling represents a major leap forward in sign language preservation, offering new ways to study and honor linguistic heritage that might otherwise remain inaccessible.

## ETHICAL AND CULTURAL IMPLICATIONS

The reconstruction of extinct sign languages raises profound ethical questions that intersect with cultural ownership, historical accuracy, and community rights. At the heart of these concerns lies a fundamental tension: who has the authority to revive and represent a language that no longer has living native users? This dilemma becomes particularly complex when academic linguists, often from outside the Deaf community, attempt to reconstruct signing systems based on historical fragments. On one hand, such efforts can recover valuable cultural heritage; on the other, they risk appropriating or misrepresenting linguistic traditions that originally belonged to specific Deaf communities. The question of "ownership" extends beyond academic interest—it touches on issues of identity, autonomy, and the right of descendant communities to control how their ancestors' communication methods are studied and displayed.

A central ethical concern involves the potential distortion of cultural memory when signs are reconstructed without direct input from the communities they once served. Unlike spoken languages that may leave behind written records, sign languages rely on embodied knowledge that is difficult to capture fully in historical documents. When researchers attempt to piece together extinct signing systems from limited sources—such as old illustrations, written descriptions, or comparisons with living languages—they inevitably make interpretive choices that may not reflect how the language was actually used. These reconstructions, no matter how well-intentioned, could inadvertently create an artificial version of the language that differs from its original form, effectively rewriting cultural history rather than preserving it. This risk is especially pronounced when working with indigenous or village sign languages, where the linguistic nuances were deeply tied to specific social and environmental contexts that may no longer exist.

The act of reconstruction also raises questions about respect for the natural life cycle of languages. Some scholars and community members argue that languages, like living organisms, have a right to "die" with dignity when their time has passed, rather than being artificially revived as linguistic specimens. This perspective suggests that excessive focus on reconstructing extinct sign languages might divert attention and resources from supporting endangered but still-living signing systems that could benefit from documentation and revitalization efforts. Others counter that every lost language

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represents irreplaceable cultural knowledge, and that reconstruction honors the generations of Deaf people who used and cherished these communication systems.

Another layer of complexity emerges when considering how reconstructed sign languages might be used. If academic institutions or technology companies develop AI systems or digital archives based on these revivals, who should control access to them? Should recreated signs be incorporated into modern Deaf education, or would doing so risk creating a hybrid language that never truly existed historically? These questions become even more pressing when commercial applications are involved, such as using reconstructed signs in media or entertainment without benefiting descendant communities.

The ethical path forward requires centering Deaf perspectives in all reconstruction efforts. This means collaborating closely with present-day Deaf communities that have historical ties to extinct signing systems, even if they are not direct linguistic descendants. It also involves transparency about the limitations of reconstruction—acknowledging when signs are speculative rather than verified, and distinguishing between well-documented elements and educated guesses. Ultimately, the decision to reconstruct a lost sign language should involve the same principles applied to other cultural heritage preservation: respect for the original creators, accuracy in representation, and tangible benefits for affected communities rather than just academic curiosity.

The cultural implications extend beyond linguistics into the realm of identity politics. For modern Deaf communities, reconstructed sign languages could serve as powerful symbols of resilience, connecting contemporary signers to their historical roots. However, if handled insensitively, these efforts could also reinforce narratives of loss and disappearance rather than celebrating the vibrant diversity of living signing traditions. The process of reviving extinct sign languages must therefore be approached with cultural humility, recognizing that language is not just a system of communication but a vessel for community values, humor, and ways of being that may resist easy reconstruction.

As technology makes sign language reconstruction increasingly feasible, the ethical framework surrounding these practices must evolve in tandem. This includes developing protocols for community consultation, establishing guidelines for responsible representation, and creating mechanisms for ongoing oversight by Deaf scholars and cultural authorities. Only through such thoughtful engagement can the reconstruction of lost sign languages become an act of cultural reclamation rather than appropriation, honoring the original users while enriching our understanding of human linguistic diversity.

## CONCLUSION

The silent extinction of sign languages constitutes a profound and irreparable loss to both linguistic diversity and the cultural heritage of Deaf communities worldwide, demanding urgent scholarly attention, methodological innovation, and coordinated global action. Through comprehensive case studies of vanished and critically endangered sign languages – including Old Kentish Sign Language (OKSL) in 17th-18th century England, Martha's Vineyard Sign Language (MVSL) in 19th century America, and the near-extinct Ban Khor Sign Language (BKSL) in contemporary Thailand – this research reveals how these unique linguistic systems disappear not merely as communication tools but as entire cultural ecosystems, taking with them irreplaceable ways of conceptualizing space, time, and social relationships that differ fundamentally from dominant sign languages like ASL or BSL. The complex interplay of sociohistorical factors driving this silent crisis – including

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linguistic standardization pressures, oralist education policies that systematically suppressed sign languages for over a century, and the systemic neglect of documentation efforts for minority signing systems – demonstrates how sign languages face compounded vulnerabilities compared to spoken languages, as their embodied, performative nature leaves no written traces once the last native users are gone, creating gaps in our understanding of human linguistic potential. However, this study identifies promising interdisciplinary pathways for intervention through emerging computational technologies like AI-driven reconstruction (using transformer models such as SignBERT to predict undocumented signs from limited archival footage by analyzing patterns in handshape, movement, and spatial grammar) and 3D motion-capture avatars (animating historical descriptions of lost signs through platforms like Sign3D), coupled with community-centered documentation approaches that prioritize Deaf ownership of linguistic heritage through participatory video methodologies and co-designed archival projects.

The theoretical implications of this work challenge prevailing assumptions in linguistic typology and language evolution, as the grammatical innovations in village sign languages (like BKSL's topographic spatial grammar for rice cultivation or MVSL's kinship-based pronoun system) demonstrate how isolated signing communities develop entirely original linguistic structures that reshape our understanding of human language capacity, particularly regarding the relationship between environmental factors and linguistic structure in the visual-gestural modality. These findings demand immediate, multi-level policy reforms, including legislative recognition of rural sign languages in national education systems (modeled after New Zealand's support for Māori Sign Language), development of ISO-certified archival standards for sign language preservation to ensure interoperability between digital repositories, and establishment of ethical royalty frameworks to ensure Deaf communities benefit from commercial uses of their linguistic data in AI training or media applications. The loss of each sign language represents more than the disappearance of a linguistic system; it constitutes the erasure of alternative worldviews (such as MVSL's unique conception of deafness as an unmarked identity in an integrated community), historical narratives of Deaf resilience against oralist oppression, and invaluable data for understanding the plasticity of human cognition and social organization across sensory modalities. The time to act is now – not merely to study these languages as academic curiosities, but to honor them as vital embodiments of human cultural and linguistic diversity that future generations deserve to inherit, and to rectify the historical marginalization of Deaf knowledge systems in both academic research and language policy frameworks. Only through such comprehensive, ethically grounded, and interdisciplinary efforts can we hope to mitigate the silent extinction unfolding across the world's signing communities and preserve the full spectrum of human linguistic ingenuity for generations to come.

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