

Designing a Data Model for a Diachronic Sign Language Database: A Case Study of Nineteenth-Century Bohemian Sources

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Abstract

Diachronic research on sign languages is limited by the fragmentary and heterogeneous nature of historical documentation. Eighteenth- and nineteenth-century printed texts and manuscripts contain valuable lexical data, but their descriptions vary in precision, terminology, and representational conventions. This paper proposes a structured data model for a diachronic sign language database designed to systematise such archival materials. The proposed model adopts a multi-layered architecture that separates primary evidence from analytical interpretation, distinguishes attested from inferred sign parameters, applies graded confidence levels, and encodes structural, iconic, and metaphorical properties in parallel layers. Detailed source metadata ensures traceability and explicit representation of uncertainty. The model is illustrated through sign attestations drawn from nineteenth century Bohemian sources. The case study demonstrates that even fragmentary records, most commonly documented in dictionaries and pedagogical materials through written descriptions or illustrations, can be systematically represented within a unified data model suitable for structured comparison and diachronic analysis. The proposed model may also provide a methodological basis for comparable work on other European sign languages.

Keywords: archival sign language sources, diachronic sign language database, historical sign lexicon, sign language data modelling, lexical comparison

1. Diachronic Research and the Need for an Archival Database

Research in diachronic sign language linguistics has expanded in recent decades, yet it remains comparatively limited in scope and unevenly distributed across languages. Surveys of the field emphasise that historical and comparative studies still constitute only a small proportion of sign linguistic research, largely because of the scarcity of historical materials, the fragmentary nature of pre-video documentation, and the difficulty of identifying historical relationships among sign languages (Reagan, 2021; Power, 2022; Power, Quinto-Pozos and Law, 2025). Much of the existing work has focused on American Sign Language and, by extension, on French Sign Language, which is associated with the richest body of early sources (Frishberg, 1975, 1979; Woodward, 1976, 1978; Bonnal-Vergès, 2005; Delaporte, 2007). These studies have primarily examined pathways of morphophonological change and mechanisms of diachronic variation within individual sign languages, often drawing on nineteenth-century dictionaries and pedagogical sources for French Sign Language. In parallel, cross-linguistic work has pursued the quantitative classification of sign languages through lexicostatistical and phylogenetic approaches, most frequently extrapolating genealogical relations from synchronic or twentieth-century data rather than from systematic diachronic corpora (cf. Woodward, 2011; Reagan, 2021; Power, 2022; Power, Quinto-Pozos and Law, 2025). At the same time, scholars have highlighted persistent methodological problems, including the role of iconicity in producing false

cognates, the lack of consensus on criteria for cognacy, and the incompleteness of nineteenth-century descriptions, which often privilege motivation over form (Power, 2022; Okrouhliková, 2025a). Recent reviews, therefore, converge on the need for more systematic diachronic research grounded in archival sources, combining philological analysis with structured lexical databases and what has been termed a sign language archaeology approach, in order to reassess historical relatedness and the formation of sign language families beyond exclusively synchronic evidence (Power, Quinto-Pozos and Law, 2025).

The present study focuses on the periods and types of evidence that enable systematic linguistic analysis and database construction. The kinds of sources that allow systematic structural analysis and the construction of comparative databases emerge primarily from the period of institutionalised deaf education from the late eighteenth century onwards, when European sign languages took shape in forms broadly comparable to those used today. If monastic sign systems are set aside (cf. SIGNA database; Těšínská Lomičková and Těšínský, 2009), whose relationship to later sign languages remains contested (Vilwock, 2012), it is this period that provides the first sustained bodies of evidence suitable for diachronic investigation and corpus-based resource creation.

As a language articulated in space and motion and lacking a conventional written form, sign language is accessible in historical periods almost exclusively through paper-based sources. Such materials can never capture the language's full

complexity and typically restrict analysis to individual lexical items, most often those recorded in dictionaries, glossaries, and pedagogical manuals. Diachronic research is therefore necessarily grounded in fragmentary representations of signs rather than in continuous discourse, a limitation that fundamentally shapes both the scope of historical inquiry and the design of any comparative database built on archival materials. While considerable scholarly attention has been devoted to French Sign Language dictionaries (cf. Arnaud, 2019), their descriptive practices, and their modern re-editions, we argue that comparable historical sources exist for a range of other European sign languages but have so far been only sparsely documented and synthesised (e.g. Fischer, 2010a, 2010b; Linde-Usiekiewicz and Łozińska, 2023; Nyst and Schüller, 2024; Okrouhliková, 2025b).

Cross-linguistic comparisons of historical signs remain rare (Regen, 2010; Okrouhliková, 2025a), despite their importance for evaluating degrees of similarity across European sign languages and for reassessing long-assumed family groupings, especially those linked to old French Sign Language. In addition to the limited availability of materials, such work is complicated by the fact that surviving records disproportionately document highly iconic signs, while written descriptions often focus on motivation rather than form or provide only partial accounts of a sign's structure. Visual representations pose an additional challenge, as historical illustrations employ highly heterogeneous graphic conventions for depicting handshape, orientation, and movement, often without explicit legends or consistent systems of notation. These constraints underscore the need for systematically organised archival databases that make historical lexical data comparable across languages and regions.

2. Designing the Diachronic Sign Database

2.1 Relevant Models and Precedents

In designing a diachronic database for sign languages, methodological inspiration can be drawn from spoken-language resources and digital humanities projects, though no direct equivalent exists. *EvoSem* (François et al., n.d.; cf. Dehouck et al., 2023) offers a model for structuring diachronic lexical relations and semantic connections across historically related forms through the concept of dialexification, while *CLICS* (cf. Rzymiski et al., 2019) provides a framework for the interactive representation of cross-linguistic colexification patterns. *Ticha* (Lillehaugen et al., 2016; cf. Broadwell et al., 2020) demonstrates how archival language materials can be presented through linked layers of source images, transcription, translation, linguistic analysis and metadata.

Historical sign language sources, however, require a distinct modelling strategy, because they lack a conventional written form and survive only in fragmentary visual and written representations. In addition, relationships among sign languages are often shaped less by descent from a single proto-language than by lateral transmission and institutional contact (cf. Reagan, 2021).

A relevant precedent is the *Historical Sign Language Database* (cf. Supalla 2001) for American Sign Language, which integrates early twentieth-century NAD films, printed ASL dictionaries from the same period, and three historical French Sign Language dictionaries (Brouland, 1855; Pélissier, 1856; Lambert, 1865). In its current interface, the database organises entries by fields such as source (author and year), entry ID (number), a photo or picture of the sign if available, Reference Gloss, Author's Gloss, and provides a description and page reference for each dictionary entry.

Another relevant point of reference is Bonnal-Vergès's (2005) work on the etymological and historical dictionary of French Sign Language. Her model organises historically related forms into iconic families and matrices and relates them through the notion of the *iconon*, understood as the core conceptual image underlying formally and historically connected variants. This approach is particularly relevant to the present proposal because it combines strict traceability to primary archival sources with a distinct interpretative layer of motivational analysis and with an explicitly diachronic account of formal change. In this sense, it offers a useful analogue for sign language data to the structuring of diachronic lexical relations found in *EvoSem*, while remaining sensitive to the specific role of iconicity and conventionalisation in sign language history.

2.2 Proposed Database Structure

We propose a diachronic lexical database that would bring together representations of signs from eighteenth- and nineteenth-century European sources, including printed dictionaries, pedagogical manuals and unpublished manuscripts. Rather than presupposing stable cross-linguistic equivalence, the proposed database is designed to accommodate uncertainty, variation and partial documentation. Historical records differ substantially in their aims, levels of detail and terminological conventions, and it is often unclear whether two sources describe formally identical signs, semantically related items or independent, iconically motivated sign forms. In many cases, authors describe signs in written language without specifying phonological parameters in sufficient detail, while others foreground motivation or cultural interpretation rather than form (cf. Okrouhliková,

2025a, 29–45). Each historical attestation would therefore be treated as a source-specific record linked to language, place, year, institutional context and degree of descriptive precision, allowing competing hypotheses about equivalence and relatedness to be represented explicitly rather than resolved prematurely. This design is intended to enable comparative work across languages and regions while remaining faithful to the fragmentary and heterogeneous nature of archival evidence.

Each record in the proposed database would be anchored by a stable identifier and glossing layers. Because the database would bring together sources written in different languages, each record would be assigned an English reference gloss intended to represent, as closely as possible, the meaning the original author attributed to the sign. This gloss would facilitate search, comparison and provisional semantic grouping across records, but it would not be treated as evidence of formal identity between signs or as a claim of full lexical equivalence across languages. At the same time, the database would preserve the label used in the original source and, where relevant, include additional glosses in other languages. All such glossing decisions would be explicitly documented, accompanied by notes on terminological choices, and remain open to revision as the database develops. Furthermore, the model would distinguish between internal variants attested within a single source and parallels identified across different sources, allowing historical variation to be represented in a structured way without forcing premature lemmatisation. The proposed database would also explicitly encode compound signs and allow their segmentation into constituent elements. Where components correspond to independently attested signs, they would be linked to separate records, enabling navigation between compounds and their component units.

Detailed source metadata would document authorship, including links to biographical records, publication or manuscript context, archival provenance, repository holdings, institutional affiliations, and bibliographic references, together with persistent links to digitised facsimiles stored in institutional or project-based repositories, precise page or folio locations, and information about whether a sign is represented pictorially, through a lexicographic written description, or written description in continuous prose, via notational systems, or through a combination of these representational forms.

Written descriptions would be preserved through several parallel transcription layers, including diplomatic renderings that maintain original orthography and abbreviations, normalised versions for computational use, English translations, and editorial commentary on

damaged or ambiguous passages. For manuscript sources, palaeographic observations and graded assessments of legibility would be included in order to make the limits of the evidence transparent. Where written descriptions contain information relevant to the sign form, this would also be recorded as part of the evidential basis for subsequent phonological annotation. Visual material would be treated with equal care: the database would store full-page scans and cropped sign images, plate numbers and figure identifiers, documentation of editorial image processing, information about viewpoint and depicted body orientation, graphic style, medium, and quality ratings indicating how securely phonological parameters can be extracted from an illustration.

Where possible, each sign would be annotated for phonological structure, beginning with sign type and, where applicable, with separate parameter values for each hand. These would include handshape, palm orientation, finger orientation, location, movement, non-manual components, dominance relations, symmetry patterns, and parameter-specific confidence ratings. Because written descriptions usually do not permit all parameters to be identified with complete certainty, the database would distinguish explicitly between attested and inferred parameters. For textual sources, handshape annotation would therefore also allow broader descriptive categories, including Stokoe-style groupings derived from the manual alphabet, for example, B-type labels for flat hand configurations, in cases where the author's wording does not support secure assignment to a single fully specified handshape. To support consistency, the database would also include source-specific inventories of the descriptive terminology used by individual authors, especially for recurrent expressions referring to handshape and movement. Where visual documentation is available and sufficiently detailed, parameter values could additionally be encoded in HamNoSys, chosen here as a widely used notation system that facilitates interoperability and comparison across sign language datasets and has also been applied in the creation of cross-linguistic comparative databases (cf. Power et al., 2022). Editorial interpretations of form would remain explicitly separated from primary documentation.

Semantic, iconic, metaphorical, and motivational properties would be encoded in a parallel layer, including fields for motivation, iconic and metaphorical mapping type, iconic and metaphorical coding, degree of transparency, and risk of cross-linguistic universality. The Motivation field would distinguish between motivations explicitly stated by historical authors and later analytical inferences. Where available, illustrative material and excerpts from historical sources

would be included to document and clarify these assessments.

Because historical lexicons were often shaped by surrounding spoken languages, manual alphabet traditions, and pedagogical practices in sign language use, the proposed database would include a dedicated layer for classifying lexical origin and contact influence. Some relationships, especially those involving borrowing, semantic extension, or calquing from spoken language expressions, as well as formations incorporating elements of the manual alphabet through fingerspelling, initialisation, or mixed forms, may be identifiable already at an early stage of data entry, with explicit reference to contemporary manual alphabet tables where relevant. By contrast, possible contact relations between sign languages would be expected to emerge more gradually, as the database expands and broader comparative patterns become visible. The model would therefore allow such classifications to remain provisional and to be refined over time. Records could also be linked to estimated borrowing periods, institutional contexts that may have favoured particular formations, and graded uncertainty assessments.

All records in the proposed database would be embedded in a relational environment designed to allow users to navigate between primary sources, source-specific attestations, and analytical layers. Search and retrieval would operate along two complementary axes, semantic and formal. Semantic retrieval would rely on English reference glosses and provisional semantic groupings, allowing researchers to explore related concepts across different regions, languages, periods, and source types. This would also make it possible to record cases in which similar forms are associated with different meanings, or in which attested parallels show slight semantic differences across sources. Formal retrieval, by contrast, would allow searches based on sign type and on selected phonological parameters, such as handshape, location, movement, or orientation. By combining such criteria, the database would support the structured comparison of variants and parallels across heterogeneous materials without requiring premature claims about cognacy or lexical equivalence. In addition, records could be linked through an interpretative layer capturing shared motivational or iconic patterns, making it possible to group potentially related signs into provisional families while keeping such relationships explicitly distinct from source attestation and formal equivalence.

¹ This process must be accompanied by parallel historical research into the relevant educational, institutional and sociolinguistic contexts in order to interpret the sources accurately and situate the

Chronological metadata would enable tracing documented trajectories of use and identifying periods of stability, change, or apparent discontinuity. Geographic, institutional, and sociolinguistic layers would support the analysis of circulation, pedagogical transmission, and local patterns of variation. In a future implementation, this structured format could also facilitate alignment with selected contemporary sign language resources, making it easier to compare historical attestations with modern forms. Taken together, these features would provide a structured framework for comparative diachronic research on European sign languages while preserving the uncertainty and heterogeneity inherent in archival documentation.

3. Identifying Sources and Compiling Historical Sign Data

Before the proposed database can be implemented, relevant historical sources must first be identified and the signs they contain systematically collected. This preparatory phase involves surveying printed dictionaries and pedagogical manuals, locating manuscript materials in archives and libraries, and assessing the types of linguistic evidence they provide, including pictorial representations, written descriptions and other notational systems.¹ To illustrate this process, we focus on the historical sign language documented in the territory of Bohemia, as a pilot case.

3.1 Applying the Database Model to Bohemian Sources

In this section, we therefore outline the corpus of Czech historical sources assembled for this study and describe the procedures used to extract and catalogue individual sign attestations in a form informed by the conceptual database model proposed above.

The materials documenting the sign language used in Bohemia constitute a coherent yet internally diverse body of eighteenth- and nineteenth-century printed and manuscript sources, produced primarily within institutional settings but not exclusively, and provide an instructive example of how local archival traditions can be integrated into a broader comparative framework.

Sign language used in the Czech lands was shaped primarily within the Prague Institute for the Deaf and Dumb, founded in 1786, in the broader context of the Habsburg Monarchy, and in particular close connection with the Viennese institute, with which it shared the language of

recorded signs within their broader cultural and pedagogical frameworks.

instruction, German (Okrouhlíková, 2025b). A separate Czech section was established only in 1836. This institutional history directly affects the nature of the sources considered here. Until 1839, the relevant texts were written exclusively in German; thereafter, they were also written in Czech. This also has practical consequences for data extraction, since many documents are written in Kurrent script or printed in Schwabach, which makes transcription and careful philological processing necessary prerequisites for linguistic analysis and database compilation (Okrouhlíková, 2025b). Over more than a decade of research, the conditions for working with these materials have changed significantly within a broader digital humanities context, from consulting physical copies to large-scale digitisation, the use of transcription tools, and, more recently, the cautious application of AI-assisted processing, while maintaining rigorous human supervision and philological scrutiny at all stages of analysis.

To demonstrate the applicability of the proposed model, we apply its multi-layered architecture² to a corpus of eighteenth- and nineteenth-century Bohemian sources. These materials present the specific types of descriptive inconsistency and fragmentary documentation that the database is designed to manage. As a test case, we draw primarily on three of the most substantial documented sources (Mücke 1834; Czech 1836; Jarisch 1851), supplemented by several shorter or less systematic records in continuous prose, and examine the sign MIRROR, which is attested across these different types of materials.

3.1.1 Mücke (1834)

The first dictionary in the Bohemian context is the glossary appended to Mücke's work (1834), written during his tenure as director of the Prague Institute. It comprises 243 entries, describing a total of 269 signs when compound components are segmented separately. Rather than just a list of signs, its aim was to demonstrate the principles of sign formation by providing examples of signs already in use at the Prague institute. The lexicography written descriptions vary from relatively detailed phonological specifications to mere references to semantic or iconic motivation (for details see Okrouhlíková, 2025b). In our dataset, these variations are captured through parameter-specific confidence ratings and a dedicated iconic mapping layer, ensuring that editorial interpretation of form remains separate from Mücke's original motivational descriptions.

² Owing to space constraints, this paper does not reproduce full bibliographic descriptions or detailed information on individual exemplars and their holdings.

Example

Record ID: MU-1834-102-01-156 **Reference gloss (EN):** MIRROR **Source label:** Spiegel **Gloss (DE):** Spiegel **Gloss (CZ):** Zrcadlo **Author:** Mücke Johann (1770–1840), director of Prague Institute (1820–1840) **Year:** 1834 **Publisher:** Gottlieb Haase Söhne **Place of publication:** Prague **Source:** *Anleitung zum Unterrichte der Taubstummen in der Lautsprache nebst einigen Bemerkungen über die Geberdenzeichen der Taubstummen* **Source type:** Printed book **Page:** 102 **Section:** *Einige Haus- und Tischgeräthe* **Language:** German **Script:** Schwabach **Record type:** Lexicographic written description **Evidence type:** textual **Political entity:** Austrian Empire **Region:** Bohemia **Institutional context:** Prague Institute for the Deaf and Dumb **Digital facsimile:** [Google Books](#)

Primary Evidence Layer

Spiegel. Man hält die linke flache Hand wie einen Spiegel vor das Gesicht, ahmt mit einiger Bewegung des Kopfes das Hineinschauen nach und richtet sich dabei etwas an seiner Kleidung.

Figure 1: Mücke (1834, p. 102), sign *Spiegel*

Diplomatic Transcription (Latin script)

SPIEGEL. Man hält die linke flache Hand wie einen Spiegel vor das Gesicht, ahmt mit einiger Bewegung des Kopfes das Hineinschauen nach und richtet sich dabei etwas an seiner Kleidung.

English Translation

MIRROR. One holds the left flat hand in front of the face like a mirror, imitates, with some movement of the head, the act of looking into it, and at the same time adjusts oneself somewhat at one's clothing.

Structural Annotation

Sign type: 2H-asym (inferred); **Dominance:** H1R (inferred)

H1R (dominant, active): HS = 0; ORI = 0; LOC = torso (inferred); MV = small adjusting movement (attested)

H2L (non-dominant, passive): HS = flat (attested) (B-type, subtype undetermined); LOC = face-front (attested); ORI = 0; MV = static (inferred)

NM: several head movements (attested).

Phonological specification: low

Iconicity and Motivation

Motivation: holding a flat hand as a mirror, imitating looking into it and adjusting one's clothing (attested)

Iconic mapping type: object representation + pantomimic enactment

References are limited to publicly accessible copies of the respective works, with complete bibliographic information provided in the reference list.

Iconic encoding:

- H1R performing a grooming movement, hand-as-hand; pantomimic enactment (attested)
- H2L flat hand representing the mirror surface, hand-as-object (attested)
- NM head movement representing the act of looking (attested)

Transparency: high

Cross-linguistic universality risk: high (everyday embodied action)

Lexical origin classification

Lexical origin: native iconic formation

Contact: not attested; possible

3.1.2 Czech (1836)

This book on deaf education, authored by a Bohemian native who served as catechist at the Vienna Institute for the Deaf and Dumb, represents another important source of signs used in the Austrian context. The pictorial appendices contain approximately 140 signs, though largely without explicit glosses or equivalents. Most can nevertheless be identified through cross-references in the main text, which discusses the pedagogical principles of sign formation. Because movement is not graphically indicated in the illustrations but sometimes can be inferred from the accompanying textual explanations, these records utilise the interpretative reconstruction layer. This allows us to explicitly distinguish between attested static forms and inferred motion.

Example

Record ID: CZ-1836-02-07-07 **Reference gloss (EN):** MIRROR **Source label:** Spiegel **Gloss (DE):** SPIEGEL **Gloss (CZ):** ZRCADLO **Author:** Czech Franz Hermann (1788–1847), catechist and teacher at the Vienna Institute (1818–1841) **Year:** 1836 **Publisher:** Commission der Mechitaristen-Congregations-Buchhandlung **Place of publication:** Wien **Source:** *Versinnlichte Denk- und Sprachlehre mit Anwendung auf die Religions- und Sittenlehre und auf das Leben* **Source type:** Printed book **Page** 60, Table 2 **Section:** *Mittheilung durch Geberden* **Language:** German **Script:** Schwabach **Record type:** pictorial representation - copperplate engraving + written equivalent **Figure framing:** full body **Viewpoint:** left profile **Political entity:** Austrian Empire **Region:** Lower Austria **Institutional context:** Vienna Institute for the Deaf and Dumb **Digital facsimile:** [Münchener Digitalisierungs Zentrum](#)

Primary Evidence Layer



Er lege dem Taubstummen Abbildungen einiger im Zimmer vorhandenen Gegenstände zur Anschauung vor, als: Stuhl, Tisch, Fenster, Thür, Schuh, Hut, Brille, Bohrer, Schere, Spiegel, Bürste u. a. m. Tab. 1; weist zuerst selbst mit

Figure 2: Czech (1836, Tab. 2, p. 50), sign *Spiegel*

Diplomatic Transcription (Latin script)

Er lege dem Taubstummen Abbildungen einiger im Zimmer vorhandenen Gegenstände zur Anschauung vor, als: Stuhl, Tisch, Fenster, Thüre, Schuh, Hut, Brille, Bohrer, Scheere, Spiegel, Bürste u. a. m. Tab. 1;

English Translation

Let him present to the deaf and dumb pictures of some objects present in the room for observation, such as: chair, table, window, door, shoe, hat, spectacles, drill, scissors, mirror, brush, etc. Plate 1.

Structural Annotation

Sign type: 2H-asym; **Dominance:** undetermined **H1R:** HS = flat (B-type, subtype undetermined; image unclear); ORI = palm toward body; fingers upward; LOC = face-front; MV = 0 (unspecified) **H2L:** HS = pinch (probable, image unclear) (O-type, subtype flat O); LOC = chest-centre; ORI = palm downward and toward body; fingers toward body; MV = chest contact (unspecified). **NM:** eye gaze toward palm (attested) **Phonological specification:** moderate

Iconicity and Motivation

Motivation: holding a flat hand as a mirror in front of the face, tie-adjusting (inferred)

Iconic mapping type: object representation + pantomimic enactment

Iconic encoding:

– H1R flat hand representing the mirror surface, hand-as-object

– H2L hand-as-hand pinch the tie (attested)

Transparency: high

Cross-linguistic universality risk: high (everyday embodied action)

Lexical origin classification

Lexical origin: native iconic formation

Contact: not attested; possible.

3.1.3 Jarisch (1851)

Although private teacher Jarisch does not specify a geographic use, his training at the Prague Institute suggests a localised Bohemian influence. The book contains a dictionary consisting of 224 written descriptions and 11 pictorial tables with 173 illustrations. Signs are depicted through various methods: drawings in neutral space with movement indicated by arrows, varying perspectives from either the signer's or the addressee's viewpoint, and handshape changes during articulation (for details see Okrouhliková, 2025b). These visual attributes are documented in the visual metadata layer to maintain transparency in phonological extraction.

Example

Record ID: JA-1851-03-13-73 **Reference gloss (EN):** MIRROR **Source label:** Spiegel **Gloss (DE):** SPIEGEL **Gloss (CZ):** ZRCADLO **Author:** Jarisch Johann Anton (1818–1890), private teacher of the deaf (1847–1852) **Year:** 1851 **Publisher:** Verlag von G. Joseph Manz **Place of publication:** Regensburg **Source:** *Methode für den Unterricht der Taub=stummen in der Laut=sprache im rechnen und in der Religion* **Source type:** Printed book **Page:** Tafel III. – Fig. 13, Erklärung der Figuren der Tafel III. **Section:** appendix **Language:** German **Script:** Kurent **Record type:** pictorial representation + handwritten equivalent **Figure framing:** head and hand **Viewpoint:** left profile **Political entity:** Austrian Empire **Region:** Bohemia, Lower Austria **Institutional context:** 0 **Digital facsimile:** [Google Books](#)

Primary Evidence Layer



Fig. 13. = *der Spiegel*.

Figure 3: Jarisch (1851, Tab. III.), sign *Spiegel*

Diplomatic Transcription (Latin script)

der Spiegel

English Translation

the mirror

Structural Annotation

Sign type: 1H; **Dominance:** H1R

H1R: HS = flat (B-type, subtype: B₀ thumb slightly adducted); ORI = palm upward and toward body; fingers upward and away from body; LOC =

face/upper chest-front (image unclear); MV = 0 (unspecified)

NM: eye gaze toward palm, head slightly tilted toward palm (attested)

Phonological specification: moderate

Iconicity and Motivation

Motivation: holding a flat hand as a mirror in front of the face

Iconic mapping type: object representation

Iconic encoding:

– H1R flat hand representing the mirror surface, hand-as-object

Transparency: high

Cross-linguistic universality risk: high (everyday embodied action)

Lexical origin classification

Lexical origin: native iconic formation

Contact: not attested; possible.

3.1.4 Fragmentary Sources

Our dataset also includes several printed texts and one manuscript, in which examples of signs occur within continuous prose, most often in chapters devoted to sign language (e.g. Gross, 1790; Staněk 1846; Beran Novopacký 1878; Kmoch 1886; Škornička 1890; Huleš 1891; Malý 1875, 1897; O posunové řeči, undated). These provide brief references to form or motivation rather than comprehensive descriptions. Such records are integrated via the fragmentary record status and linked to more robust entries through the linking system, providing sociolinguistic context while remaining faithful to the limited nature of the primary evidence.

Example

Record ID: MA-1897-26-47-54 **Reference gloss (EN):** MIRROR **Source label:** zrcadlo **Gloss (DE):** SPIEGEL **Gloss (CZ):** ZRCADLO **Author:** Malý Karel (1846–1916), teacher in Prague Institute (1867–1916) **Year:** 1897 **Publisher:** I. L. Kober **Place of publication:** Prague **Source:** *Děti hluchoněmé, nedoslýchavé, jakož i poruchami řeči stížené ve škole obecné* **Source type:** Printed book **Page:** 26 **Section:** A. *Posunování* **Language:** Czech **Script:** Latin **Record type:** Written description **Evidence type:** textual **Political entity:** Austria Hungary **Region:** Bohemia **Institutional context:** Prague Institute for the Deaf and Dumb **Digital facsimile:** NA

Primary Evidence Layer

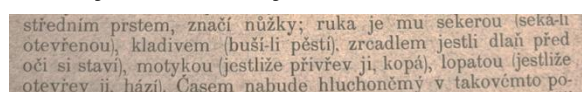


Figure 4: Malý (1897, p. 26), sign *Zrcadlo*

Diplomatic Transcription (Latin script)

Ruka je mu ... zrcadlem jestli dlaň před oči stavi

English Translation

His hand is to him ... a mirror if he sets the palm before his eyes.

Structural Annotation

Sign type: 1H; **Dominance:** undetermined

H1: HS = open (inferred); ORI = palm toward eyes; LOC eyes-front; MV bring hand in front of eyes

NM: 0

Phonological specification: low

Iconicity and Motivation

Motivation: holding a flat hand as a mirror in front of eyes

Iconic mapping type: object representation

Iconic encoding:

– H1 open hand representing the mirror surface, hand-as-object (attested)

Transparency: high

Cross-linguistic universality risk: high (everyday embodied action)

Lexical origin classification

Lexical origin: native iconic formation

Contact: not attested; possible.

3.2 Diachronic Patterns and Interpretation

As an illustration of the analytical potential of the proposed database, we briefly demonstrate what can be reconstructed about the sign MIRROR across historical sources. The sign is highly iconic and appears to be based on direct iconic mapping, linking linguistic form to embodied experience and sensorimotor routines. This mode of forming concrete signs used by deaf signers, as well as their striking similarity, was also noted by nineteenth-century authors. We therefore extend our comparison to include lexicographic records of the sign MIRROR from French, German, Polish, and Russian lexicographic sources.³

The 1834 attestation corresponds closely to Mücke's (1834) description of sign formation, according to which the initial stage of a sign is rather pantomimic and only gradually, through conventionalisation and reduction, acquires the contours of a stabilised lexical sign. In the 1834 depiction, the dominant right hand, together with head movement, faithfully represents the embodied behaviour of grooming oneself in front

of a mirror, while the non-dominant left hand already schematises the mental representation of the mirror as a flat surface. The Czech (1836) sign is very similar; however, it does not record movement. The mirror is represented by the right hand, while the left hand is used for grooming.

A very similar description of the sign from the German area is found in Jäger and Riecke (1832, p. 31): “*The flat hand is held in front of the face as a mirror, and the gestures of the person looking at himself in the mirror are imitated*”, although the dominance of the hands is not specified. Reich (1834, p. 56) likewise does not specify which hand performs which action; however, his description includes a slight trembling movement of the flat hand representing the mirror: “*One holds the flat hand with a slight trembling movement in front of the eyes and acts as if one were looking into it and arranging something on one's clothing.*”

By contrast, Flery (1835, p. 221) from the St Petersburg Institute classifies the sign as one-handed and describes slight repeated movements of the right hand representing the mirror: “*The right hand, open and held obliquely upright, moves several times gently in front of the eyes, as a mirror.*” He thus presents the Russian sign as corresponding to, yet differing from, the French sign recorded by Dégerando (1827, p. 14): “*One appears to look at oneself in one hand.*”

In Jarisch (1851), the sign is also reduced to a one-handed form, indicating further formal simplification and the representation of a single mental concept. A similar representation can be observed in the dictionary of French author Pélissier (1855, planche 5). However, none of the authors depicts or describe the movement, similar to Malý (1897, p. 26) and the Polish Hollak and Jagodziński (1879, p. 102), who describe only the position of the hand in front of the eyes.⁴



Figure 5: Pélissier (1856, Pl. 5), sign Miroir

By linking these historical attestations to modern Czech Sign Language, we can observe that the

³ For these regions, historical links between institutions can be documented. The French manual method of deaf education was adopted at the Vienna Institute and was subsequently transmitted to the institutes in Prague, Warsaw, and St Petersburg. Although German schools followed different pedagogical methods, they

were geographically and linguistically close to the Austrian schools and influenced them as well.

⁴ The sign without hand movement is also recorded in [Suppalla's database](#) in dictionaries of American Sign Language from 1923.

sign for MIRROR is documented in printed dictionaries (Gabrielová et al., 1988; Potměšil, 2005) and online resources such as [Spread the Sign](#) and [Dictio](#) in an identical one-handed sign. The dominant flat hand, palm oriented to the left, performs a twisting movement at the wrist on the right cheek. However, if we broaden the comparison to the European signs currently available in Spread the Sign, their forms appear to be practically identical.

Given the high degree of iconicity, these similarities cannot be treated as reliable evidence of cross-linguistic relatedness, since similar forms may arise independently through iconic motivation. At the same time, the attestations suggest a broader developmental tendency, although clearly not a uniform or linear one. Across the sources, the sign appears to develop from more pantomimic enactments of looking at oneself and adjusting one's clothing in a mirror, often involving both hands, towards simpler forms in which the mirror is represented as an object by a single moving hand, while the imitation of actual bodily actions gradually disappears. In present-day forms, the sign is not articulated directly in front of the face, but rather near the right cheek. This overall development corresponds to the historical changes in sign form already documented by Frishberg (1975). Taken together, these attestations are compatible with a tendency towards more schematic object-based representations of MIRROR, but the surviving records are too sparse and uneven to justify a strictly linear reconstruction of formal change.

4. Conclusion

This paper has argued that diachronic research on sign languages requires not only the identification of archival sources but also a systematic framework for structuring them. Historical sources provide valuable lexical attestations, yet their documentation practices are heterogeneous, often incomplete, and theoretically inconsistent. Sign descriptions vary in precision, in the representation of individual formational parameters, in terminology, and in the authors' underlying assumptions. Without a shared formal model, cross source and diachronic comparison remains methodologically fragile.

The proposed database model addresses these challenges through a multi layered architecture that clearly separates primary documentation from editorial interpretation. It distinguishes between attested and inferred parameters, applies graded confidence levels, and records structural, iconic, and metaphorical aspects of sign formation in parallel analytical layers. Detailed source metadata enables tracing the origin of each record and explicitly representing the limits of the available evidence. The aim is not to eliminate historical uncertainty, but to encode it

in a structured and transparent way, while allowing formally distinct but potentially related attestations to be compared without presupposing a single, clearly reconstructable trajectory of change or a fixed type of relationship between signs.

The pilot application to nineteenth century Bohemian sources demonstrates that even fragmentary historical data can be represented within a unified formal framework that supports structured search, comparison, and further analysis. It also shows that historically related sign types, including iconically and metaphorically motivated forms, may be analysed together while preserving uncertainty about the precise nature of their relationship. In this way, the model is designed not to resolve historical ambiguity prematurely, but to make it explicit and analytically tractable. The framework is intended to support broader comparative and diachronic research across European Sign Languages.

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Appendix A. Architecture of the Proposed Diachronic Sign Database

