Rereassessing the Role of Sonority in Syllable Structure: 
Evidence from a Visual Gestural Language

David P. Corina
The Salk Institute and University of California, San Diego

1.0 Introduction
Phonological theories' renewed interest in the syllable has led naturally to a re-
evaluation of the interaction of sonority with syllable structure. However, like the syllable
itself, the proper characterization of sonority remains controversial in both phonological
theory (see for example Selkirk 1982, Sterelze 1982, Clements 1988) and phonetics (for
presents that a better understanding of sonority may follow from a more complete
picture of its manifestations across possible human languages. This paper addresses this
issue through a comparison of principles of sonority in aural/oral languages and a
visual/gestural language American Sign Language. The comparison provides evidence that
the widely held sonority sequencing principle (Sievers 1981, Jespersen 1904) may be a
modality-conditioned effect of aural/oral languages, while sonority's role in determining
what elements will serve as the nucleus of a syllable and insuring some minimum degree
of perceptual distance between contrastive elements, appears to hold across languages,
both spoken and signed. These findings have important implications for a proper
treatment of sonority in a theory of language.

Given the lack of an objective definition of sonority, we are left to describe sonority
phenomenologically. In this paper we will focus on three aspects of sonority which factor in
our understanding of this concept: the sonority hierarchy, dispersion, and the sonority
sequencing principle. Having reviewed these three characteristics of sonority, we can then
ask to what extent a visual language shares these properties.

1.1 The Sonority Hierarchy

The observation that speech sounds can be ranked in terms of relative structure or
sonority dates back to at least the 1800's. The identification of sonority hierarchies has
enabled linguists to capture important generalizations concerning the recurring patterns
of speech sounds within a syllable. These generalizations have in turn been applied both
implicitly and explicitly in derivational approaches of syllabification. In accounts of
syllabification, relative sonority is typically used to elect those segments which will serve as
the syllable nucleus. For example given the sonority hierarchy in 1a, we would predict that
given two segments, a liquid and a vowel, that it will be the vowel which will serve as the
syllable nucleus as shown in 1b.

(1a) Spoken Language Sonority Hierarchy

Obstruent < Nasal < Liquid < Glide < Vowel

(1b) Sonorities Role in Syllabification

\[
\begin{array}{c}
\sigma_x \\
\mu_x \\
\lambda_x \\
\end{array} \\
\begin{array}{c}
\sigma_y \\
\mu_y \\
\lambda_y \\
\end{array}
\]

1.2 Dispersion

The term dispersion is used here to refer to the observation that across some
domains there appears to be a requirement for segments to have some degree of minimal
perceptual salience or contrast. Dispersion is used as a metric for determining this
perceptual constraint. The scope of this domain varies from theory to theory, some
suggesting it should be stated for adjacent segments (Harris 1983, Steriade 1986) others
suggesting the demisyllable (Clements 1988), while other state the generalization holding
over the syllable or word (Jespersen 1904). In this paper a dispersion constraint whose
domain holds for adjacent segments co-extensive with a syllable peak appears to be the
most amenable for ASL. An illustration of a dispersion requirement for Spanish is found
in Harris (1983). Harris observes that in Spanish, initial clusters of the form obstruent,
nasal, and nasal, liquid are systematically excluded, while clusters of the form obstruent,
liquid are allowed. If one assumes the sonority scale shown in 1a for Spanish, then we may
say that Spanish requires adjacent consonants in the same syllable to observe a distance of
2 on the sonority scale. In other words there must be some minimal degree of dispersion
across adjacent segments in Spanish.
1.3 Sonority Sequencing Principle
The sonority sequencing principle, describes the general tendency for segments to
increase in sonority from onset position, to nucleus, and then decrease from nucleus to
coda position. Numerous versions of the principle have been proposed, in 1c is the version
found in Clements (1988).

(1c) Sonority Sequencing Principle:
Between any member of a syllable and the syllable peak, only sounds of
higher sonority rank are permitted.

The effect of this principle is to permit sequence like: tra, sme, eva, which show a gradual
rise in sonority, and exclude syllables like: rua, miss, anda, which show an uneven sonority
profile. This principle accounts for languages preference for syllables with gradual sonority
profiles and avoidance of uneven sonority profiles.

In spoken languages these three attributes of sonority: the sonority hierarchy,
dispersion and the sonority sequencing principle, may be seen to conspire resulting in our
intuitive notion of sonority, the rise and fall of dimunition across syllables. In this view the
sonority hierarchy and dispersion may seen as contributing to the context of the
sonority, while the sonority sequencing principle serves to structure the shape of the
syllable.
2.0 Sonority in American Sign Language
We turn now to the question of whether there is evidence for sonority in American
Sign Language. We being with a brief review of some fundamentals of ASL phonology
(see Wilbur 1987 for a summary). ASL has been argued to be a syllable based language
(Wilbur 1982, Coulter 1982) which has mora based internal structure (Perlmuter 1989).
Hierarchical syllable constituent structure is proposed in Wilbur (1982), in which segments
marked as [+dynaminc] are considered constituents of a syllabic nucleus. The view of ASL
syllable constituency which I adopt differs from Wilbur's in many respects. Following
Trabetsky (1939), I consider the existence of a syllable nucleus is a necessary and
sufficient condition for the existence of the syllable. Further it is the placement of
segmental content within a syllable that determines whether a segment is syllabic or not;
syllabicity is not an inherent characteristic of segment. However as we will see, just as in
spoken languages, sonority determines, in part, which segments are likely candidates for
syllable nuclei.

ASL has four major phonological parameters, movement(mov), handshape(hs),
orientation(orn), and location(loc) (Battison 1978). These parameters are formally
analogous to the analyses of speech sounds along parameters of place, manner, and so forth.
Each parameter encompasses many possible specifications just as for place there are
bilabial, labiodental, dental, alveolar etc. For the purposes of this paper I will refer rather
generally to the major phonological parameters rather than the features of those
parameters. I assume that once a well articulated theory of ASL phonological features is
developed (as is currently emerging
and Johnson 1985, Corina 1990, this paper will map onto specific formal examples of this in our discussion of
2.1 Sonority Hierarchy for ASL
Turning to the question of consider the data in 2a which lists
one parameter which changes as static or non-changing parameters
here represented with a delta co to illustrate that all four major phis as shown schematically in 2b. In ti
parameters is arbitrary, and not in becomes, "Are these four param
rasking among them?" In other
demonstrate that their is a ran
position?.

Parameters
\[ \Lambda \ mov \\
loc \hs \\
orn \]

Glosses
COLLEGE
T

(2b) Partial Syllabi

\[ \text{hs} \ \text{orn} \ \text{mov} \hs \]

APPOINTMENT
T

The signs in 3a provide the
we have two dynamic components, F1 and handshape change. Interest
is only one dynamic component which contains solely handshape
and that of the handshape change (case that is, a from which surfaces change. A table of the patterning of the left all contain two changing ph only one changing parameter.
ments (Harris 1983, Steriade 1986) otherwise the generalization holding in this paper a dispersion constraint whose with a syllable peak appears to be the requirement for Spanish is found in initial clusters of the form obstruent, while clusters of the form obstruent, as shown in b for Spanish, then we may be same syllable to observe a distance of some minimal degree of dispersion.

The general tendency for segments to us, and then decrease from nucleus to have been proposed, in c is the version.

Principle:

The syllable peak, only sounds of tra, sma, dva, which show a gradual vda, which show an uneven sonority 10 for syllables with gradual sonority of sonority, the sonority hierarchy, be seen to conspire resulting in the distribution across syllables. In this view the contributing to the content of the serves to structure the shape of the evidence for sonority in American sign language, and in American Sign Language, the nucleus is in many respects. Following the syllable nucleus is a necessary and e. Further it is the placement of either a segment is syllable or not. However as we will see, just as in segments are likely candidates for movement (mov), handshape (hs), These parameters are formally unique in the case of ASL, and so sections just as for place there are of this paper I will refer rather than the features of these of ASL phonological features is developed (as is currently emerging from the work of Brentari 1990, Sandler 1989, Liddell and Johnson 1985, Corina 1990, Corina and Sager 1989) that the facts discussed in this paper will map onto specific features or feature constellations. We will encounter an example of this in our discussion of dispersion as it relates to handshape features.

21 Sonority Hierarchy for ASL

Tuning to the question of whether a sonority hierarchy exists in sign language, consider the data in 2a which lists a typology of monosyllabic signs. In these signs, we find one parameter which changes during the course of articulation against a backdrop of static or non-changing parameters. Under the assumption that the most dynamic element (here represented with a delta) constitutes the nucleus of the sign syllable, this table serves to illustrate that all four major phonological parameters may serve as the syllable nucleus as shown schematically in 2b. In these representations left to right ordering of non-nuclear parameters is arbitrary, and not meant to imply onset or coda positions. The question now becomes, "Are these four parameters all equally good syllable nuclei, or is there some ranking among them?" In other words, can we find internal evidence which will demonstrate that their is a ranking among the elements which occupy the nucleus position?

(2a) Typology of Monosyllabic Signs

<table>
<thead>
<tr>
<th>Parameters</th>
<th>COLLEGE</th>
<th>THINK</th>
<th>UNDERSTAND</th>
<th>ONE-DOLLAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>mov loc</td>
<td>mov loc</td>
<td>mov loc</td>
<td>mov loc</td>
<td></td>
</tr>
<tr>
<td>Δ movΔ loc</td>
<td>Δ hs Δ mov</td>
<td>Δ hs Δ mov</td>
<td>Δ hs Δ mov</td>
<td></td>
</tr>
<tr>
<td>Gloses</td>
<td>COLLEGE</td>
<td>THINK</td>
<td>UNDERSTAND</td>
<td>ONE-DOLLAR</td>
</tr>
</tbody>
</table>

(2b) Partial Syllabic Representations of Monosyllabic Signs

![Diagram]

The signs in 3a provide the relevant data. These are all signs which on the surface have two dynamic components. For example in the sign ASK we find both location change and handshape change. Interestingly, each of these signs also has a lexical alternate which has only one dynamic component. The sign ASK, for example, has a lexical alternate which contains solely handshape change. Importantly in these alternations, it is not arbitrary which dynamic component is maintained. While it is quite common for a sign with the handshape change and location change to have a lexical alternate composed solely of the handshape change (as we have seen in ASK), we do not find the opposite case; that is, a from which surfaces only with location change while suppressing handshape change. A table of the patterning of these lexical alternates is found in 3b. The forms on the left contain two changing parameters, while the alternate forms on the right contain only one changing parameter.
(3a) Signs with Two Dynamic Components

\[
\begin{array}{c}
\Delta \text{mov} \\
\Delta \text{loc} \\
\Delta \text{hs} \\
\Delta \text{orn}
\end{array}
\begin{array}{c}
\Delta \text{mov} \\
\Delta \text{loc} \\
\Delta \text{hs} \\
\Delta \text{orn}
\end{array}
\begin{array}{c}
\Delta \text{mov} \\
\Delta \text{loc} \\
\Delta \text{hs} \\
\Delta \text{orn}
\end{array}
\text{APPOINTMENT} \\
\text{ASK} \\
\text{DIE}
\end{array}
\]

(3b) Sign Forms with Lexical Alternates

Form 1

\[
\begin{array}{c}
\Delta \text{mov} \\
\Delta \text{hs} \\
\Delta \text{loc} \\
\Delta \text{orn}
\end{array}
\text{APPOINTMENT} \\
\text{ASK} \\
\text{DIE}
\end{array}
\]

Form 2

\[
\begin{array}{c}
\Delta \text{mov} \\
\Delta \text{hs} \\
\Delta \text{loc} \\
\Delta \text{orn}
\end{array}
\text{APPOINTMENT} \\
\text{ASK} \\
\text{DIE}
\end{array}
\]

How are we to account for these facts? I suggest the data are easily explained if one assumes a sonority hierarchy for the parameters which serve as the nucleus of the ASL syllable. The proposed sonority hierarchy which accounts for these data is shown in 4. The hierarchy states that movement is the most sonorous parameter in ASL followed by handsshape and orientation, which in turn is followed by location. That handsshape and orientation are ranked equally in this hierarchy points to a special relationship holding between features for handsshape and those of orientation, a full account of this relationship is however beyond the scope of this paper. From this preliminary hierarchy, we are able to predict that given a sign whose surface contains two dynamic components, which one will serve as the syllable nucleus, and hence which component will be likely to be maintained in the lexical alternate.1

(4) Sonority Hierarchy for American Sign Language

Location < Handshape = Orientation < Movement

To understand how the sonority hierarchy serves to insure which parameters will be maintained in those signs with lexical alternates, consider the partial derivations shown in 5a, b, and c. At an underlying level (ULF) the two components are shown here represented as parameters labeled with the discrete delta.2 For ease of exposition, the static parameters are not shown. According to our hierarchy, during syllabification (Sylb.), movement will constitute the nucleus in the sign APPOINTMENT, handsshape will constitute the nucleus in the sign ASK, and orientation change in the sign DIE. Following the representational conventions proposed in Hayes (1989) syllable nuclei are dominated by a mora, while non-weight bearing elements are attached directly to the syllable node. In the surface forms, we have find mora insertion following Perlmutter (1989) and the spelling out of the two halves of the respective dynamic components.

\[
\begin{array}{c}
\Delta \text{mov} \\
\Delta \text{hs} \\
\Delta \text{loc} \\
\Delta \text{orn}
\end{array}
\text{APPOINTMENT} \\
\text{ASL} \\
\text{DIE}
\end{array}
\]

(5a')

Given these derivations which easy to derive the lexical alternates, the non-nuclear dynamic specific spelled out as illustrated in 5a', i.e., asymmetries in the data. Recall components, the lexical alternates's. That is, it is non-arbitrary which dynamic alternative maintains the assumption that a well-formed syllable prosodic phonology, the maintaining of one of each component which are f' without affecting syllable integrity. Sonorities of these parameters and identify the syllable node makes a sign will surface and which will not l

22 Dispersion Constraints in ASL

We turn now to dispersion, that the ASL syllable requires some 6a list sign which have not been discussed, our hierarchy predicts the syllable nucleus in these signs. Contrary to our hierarchy which is comprised of these 6a, these constraints on but these signs do not have the same change, how are we to account for a constraint for the ASL syllable. Unalternates as these forms would vo
Given these derivations which are dependent on the sonority hierarchy shown in 4, it is easy to derive the lexical alternates. The lexical alternates are forms in which one half of the non-nuclear dynamic specification is deleted as shown in 5a' and 5b' or fails to be spelled out as illustrated in 5c'. Furthermore, this analysis correctly predicts the asymmetries in the data. Recall that in surface forms which have two dynamic components, the lexical alternates systematically maintain only one of these components. That is, it is non-arbitrary which dynamic sign element will be maintained. Here we see the lexical alternate maintains the nucleus of the syllable. This is compatible with the assumption that a well-formed syllable necessarily must have a nucleus. Cast in light of prosodic phonology, the maintenance of the nucleus serves to maintain prosodic well-formedness. Elements which are not moraic (non-nuclear elements here) may delete without effecting syllable integrity. Crucially, an analysis which fails to rank the relative sonorities of these parameters and hence provides no systematic mechanism by which to identify the syllable nucleus makes no prediction whatsoever as to what components of the sign will surface and which will not in these lexical alternates.

2.2 Dispersion Constraints in ASL

We turn now to dispersion, the question being addressed is whether we find evidence that the ASL syllable requires some minimal degree of perceptual salience or contrast. In 6a are listed signs which have both handshape change and location change. As just discussed, our hierarchy predicts that it is the handshape sequence which is serving as the syllable nucleus in these signs. Consistent with this analysis, we find each of these signs has a lexical alternate which is comprised solely of a handshape change. But now consider the signs in 6b. These signs are also forms with both handshape change and location change, but these signs do not have the familiar lexical alternates comprised solely of handshape change, how are we to account for gap? This gap can be explained by positing a dispersion constraint for the ASL syllable. Under this hypothesis the signs in 6b do not permit lexical alternates as these forms would violate a dispersion constraint of ASL. Evidence for this...
claim rests on an understanding of the featural composition of handshape sequences found in these two classes of signs.

(6a) Permissible Lexical Alternates

<table>
<thead>
<tr>
<th>Form 1</th>
<th>Form 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASK Δ loc Δ hs</td>
<td>ASK Δ hs</td>
</tr>
<tr>
<td>SEND Δ loc Δ hs</td>
<td>SEND Δ hs</td>
</tr>
<tr>
<td>BEAT Δ loc Δ hs</td>
<td>BEAT Δ hs</td>
</tr>
</tbody>
</table>

(6b) Impermissible Lexical Alternates

<table>
<thead>
<tr>
<th>Form 1</th>
<th>Form 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERCEIVE Δ loc Δ hs</td>
<td>*PERCEIVE Δ hs</td>
</tr>
<tr>
<td>LISTEN Δ loc Δ hs</td>
<td>*LISTEN Δ hs</td>
</tr>
<tr>
<td>HOPE Δ loc Δ hs</td>
<td>*HOPE Δ hs</td>
</tr>
</tbody>
</table>

Examination of the handshape transitions in 6a versus 6b reveals a systematic difference. In 6a the handshape changes are what have been termed “full” handshape changes (Corina 1990, Corina and Sager 1989). Each of these handshape changes sequence from a fully open handshape to a fully closed handshape or vice versa. In contrast, the handshapes in 6b are all partial handshape changes. These handshape changes from a fully open handshape to a partially closed handshape, either a “hooked” or a “flat bent” hand configuration (see figure 7). These differences in handshape configuration are captured by the distinctive feature system proposed in Corina (1990) and Corina and Sager (1989). In this feature system, two binary distinctive features code for four major handshape configurations found in ASL (see figure 8). The feature [+/- hook] makes reference to the knuckles of the hand which are non-adjacent to the palm. This feature encodes whether these knuckles are uabent [- hook] or bent [+ hook]. The feature [+/- bent] makes reference to the remaining knuckle, that is the knuckle which abuts the palm. The feature [+ bent] indicates a finger configuration in which this knuckle is bent, and conversely [- bent] refers to the non-bent knuckle configuration. The coding system allows us to capture four principle finger shapes --- open, closed, hooked (or curved) and flat-bent as shown in figure 7. This system distinguishes fully closed handshapes [+ bent, + hook] and open handshapes [- bent, - hook] from the intermediate forms flatbent [+ bent, - hook], and hooked [- bent, + hook].

Notice how the differences captured in this distinctive feature from a fully open to a closed hand: (e.g. [- bent, - hook] --> [+ bent] require a change in only one hand transition from an open to a flat bent). (e.g. [- bent, + hook] --> the quantity of features transitional constraint: we can establish a dirad adjacent handshape sequences would require that the features must differ by at least one dispersion constraint accounts for the number of signs which have full handshape). These lexical alternates are ruled in by a feature of transition in a single constraint: makes an even a strong sign which on the surface consist change. This stronger claim appears number of signs which have full a SEND, ILLUMINATE etc.). This is the hypothesis that ASL obeys a dit sign forms with a single articulatory accidental gap in the ASL lexicon.

One question which is raised is the quantity of features transitioning in scale. Other than the obvious phylogenetic that a partial handshape of two feature transition is more sonorant from the form lexical sign which is a partial handshape change is found not a single articulation (dispension constraint) but a rapid reasonable to assume that this surface syllable structure and in fact serve argued that in certain morpbro-
(7) Major Handshape Configurations in ASL

- open  closed  hooked  flat-bent

(8) Distinctive Feature Representation for ASL Handshapes

<table>
<thead>
<tr>
<th>+ hook</th>
<th>- hook</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ bent:</td>
<td>closed</td>
</tr>
<tr>
<td>- bent:</td>
<td>hooked</td>
</tr>
</tbody>
</table>

Notice how the differences between full versus partial handshape changes are captured in this distinctive feature system. Full handshape changes, those which transition from a fully open to a closed handshape or visa versa, will constitute a two feature change, e.g. [-beat, -hook] --> [+ bent, + hook]). In contrast partial handshape sequences require a change in only one handshape feature. For example, in a handshape which transitions from an open to a hooked handshape, only the value of the feature hook is affected, e.g. [- bent, - hook] --> - bent, + hook]. If we assume that the differences in the quantity of features transitioning in these handshape sequences maps directly onto a sonority scale, we can establish a dispersion constraint for ASL. The constraint would hold for adjacent handshape sequences which constitute the nucleus of the ASL syllable. Such a constraint would require that permissible syllabic nuclei composed solely of handshape features must differ by at least two of these handshape configuration features. This dispersion constraint accounts for the lack of lexical alternates otherwise predicted in 6b. These lexical alternates are ruled out by the dispersion constraint as they all would be forms which transition in a single handshape feature. Furthermore this dispersion constraint makes an even a stronger claim. It predicts that the ASL lexicon should lack signs which on the surface consist solely of a single articulation of a partial handshape change. This stronger claim appears to be correct. This stands in contrast to the a large number of signs which have full handshape transitions (e.g. UNDERSTAND, SPEAK, SEND, ILLUMINATE etc.). This asymmetry receives systematic explanation under the the hypothesis that ASL obeys a dispersion constraint. Without this constraint, the lack of sign forms with a single articulation of a partial handshape sequence must be treated as an accidental gap in the ASL lexicon.

One question which is raised by this dispersion constraint concerns the claim that the quantity of features transitioning in handshape sequences map onto a sonority or salience scale. Other than the obvious physical evidence that a full handshape change is more extreme than a partial handshape change, what evidence do we have for the claim that a two feature transition is more sonorant than a single feature transition? Evidence can be garnered from the form lexical signs take when they consist of a dynamic component which is a partial handshape change. In these cases, as exemplified in the sign BUG, what is found is not a single articulation of a partial handshape change (this would violate the dispersion constraint) but a rapid re-articulation of the partial handshape change. It is reasonable to assume that this rapid re-articulation is required of this otherwise illicit syllable structure and in fact serves to increase perceptual salience. In earlier work, I argued that in certain morpho-phonological environments the rapid re-articulation of
partial handshape change comprises a form of perceptually driven compensatory lengthening (Corina 1989a). This analysis also serves to illustrate perceptual status of partial handshape re-articulation, and its interaction with syllable structure. Taken together these facts indicate that ASL does have a requirement for some minimal degree of perceptual change across a sequence comprising the syllable peak. Furthermore, differences in the quantity of features effected in these handshape sequences appear to serve as a useful metric in determining this dispersion constraint.

2.3 Sonority Sequencing Principle in ASL?

Last let us consider the sonority sequencing principle. Recall one function the sonority sequencing principle purportedly serves is to sequence segments in increasing sonority from onset to nucleus. Where might we look for this principle in ASL? The component. Consider those forms in 3a. To the extent that the sonority hierarchy in 4, the articulation of the handshape change (the less sonorant element) occurs prior to the find, instead each dynamic component is in fact executed simultaneously. Likewise in ASL we might expect the location change to occur prior to the handshape change if a sonority sequencing principle holds for ASL, but once again what we find is near simultaneous articulation of each dynamic component. Likewise in DIF, once again we find simultaneous articulations of the location and orientation change despite the sonority sequencing principle. Thus it appears that ASL at least on the surface does not obey the sonority sequencing principle.

2.4 Summary

To summarize thus far, we have identified three attributes of sonority: the sonority hierarchy, dispersion and the sonority sequencing principle. We have examined linguistic and perceptual evidence from ASL which provided support for a sonority hierarchy in ASL and an operative constraint of dispersion. However little evidence was found to support the sonority sequencing principle. These facts are summarized in 3.

9) Summary of Sonority facts in Signed and Spoken Languages

<table>
<thead>
<tr>
<th>Sonority Hierarchy</th>
<th>Dispersion</th>
<th>Sonority Sequencing Principle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sig Language</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Spoken Language</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

3.0 Implications for Theories of Language

The data presented thus far supports the existence of sonority in a signed language. This finding suggests that sonority is an important organizing principle for languages in both oral/aural and visual/gestural modalities. It was argued that ASL shows evidence for a sonority hierarchy and a dispersion constraint. These two attributes may be viewed as contributing to the content of a syllable, with the sonority hierarchy selecting elements which will serve as syllabic nuclei and dispersion constraints limiting certain co-occurrences of elements within a syllable. As discussed, the sonority hierarchy and dispersion constraints appear to play a similar role in spoken languages. However, questions were raised to the extent to which a ASL shows evidence for a sonority sequencing principle. The ASL syllable does not seem to honor a principle which sequences elements within a syllable in terms of sonority, a principle which by some accounts holds for spoken languages. How are we to account for these differences? We will entertain two possible accounts. First, assuming that a sonority sequencing principle is in fact operative in the phonology imposed by a aural/oral modal principle answer, second, draw consider the possibility that son spoken or signed languages, articulatory dynamics.

First, the differences in the signed languages may reflect the signed and spoken languages are rectify both simultaneous/parallel effective for temporal contrasts (conjecture for a moment that the information, then spoken lat sequentia/temporal contrasts organizing principle at some and comparison, a sign language with temporal contrasts may require c difference may be reflected in the

A second possibility is to be determining syllable shape in the position taken by O'Hara and Ka evaluation of sonority in signed l while sonority do serves to l sonority plays no role in determining for by articulation factors and articulations. Viewed in this light, which the differences in articula shapes.

3.1 Conclusion

In conclusion, we have exam evidence for a sonority ranking o shows dispersion requirement sequencing principle. Two implic sign language were examined wh theories of language. It is hoped in considering languages outside those principles which are basic those which are simply reflective language develops.

* This research was supported #DC0042, #DC00201, and #BNS86-09085. I wish to thank Karen Van Hoesch and the PDNP versions of this paper.

1) An account of these data orpenness will not be entertained.
2) The use of the "delta" is rather than a feature. It is still a features which will ultimately tr those which do not. With respect forth, Corina (1989b) proposes transitioning handshapes from
perceptually driven compensatory system to illustrate perceptual status of a particular segment with syllable structure. This requirement is for some minimal degree of the syllable peak. Furthermore, these handshape sequences appear to be constrained.

A principle. Recall one function that the sequencing of segments in increasing order for this principle in ASL? The first: signs with more than one dynamic component, namely that the sonority hierarchy is a display of a sonority profile such that the most important element appears first. To put it simply, this is not what we see simultaneously. Likewise in ASL, the handshape change in a sonority, what we find is near simultaneous in DIE, once again, we find sonority change despite the sonority meters. These facts, which indicate executed simultaneously run counter to ASL, at least on the surface does not attribute the sonority principle. We have examined linguistic support for a sonority hierarchy in ever little evidence was found to be summarized in 9.

4. Spoken Languages

In spoken languages, in this case, evidence for a sonority ranking of elements which serve as the nucleus of the syllable and show dispersion requirements; however, no evidence was found for a sonority sequencing principle. Two implications of the lack of a sonority sequencing principle in a sign language were examined which have ramifications for proper treatment of sonority in theories of language. It is hoped that this paper serves as an illustration of the importance of considering languages outside the oral/aural modality in forging an understanding of those principles which are basic to all human languages, and distinguishing them from those which are simply reflections of constraints imposed by the modality in which a language develops.

3. Conclusion

In conclusion, we have examined evidence from ASL which indicates that ASL shows evidence for a sonority ranking of elements which serve as the nucleus of the sign syllable and shows dispersion requirements; however, no evidence was found for a sonority sequencing principle. Two implications of the lack of a sonority sequencing principle in a sign language were examined which have ramifications for proper treatment of sonority in theories of language. It is hoped that this paper serves as an illustration of the importance of considering languages outside the oral/aural modality in forging an understanding of those principles which are basic to all human languages, and distinguishing them from those which are simply reflections of constraints imposed by the modality in which a language develops.

Footnotes

1) This research was supported in part by the National Institutes of Health grants #DC00146, #DC0201, and #HD13249, as well as National Science Foundation grant #BNS86-09085. I wish to thank Diane Brentari, David Perlmutter, Karen Emmorey, Karen Van Hooft and the PDPNLP group at U.C.S.D. for helpful comments on earlier versions of this paper.

2) As an account of these data in which the second surface component is derived by oponentesis will not be entertained here.

3) The use of the "delta" in these representations is meant to serve as a diacritic rather than a feature. It is still an open question how one should differentiate (if at all) features which will ultimately transition (and hence be eligible for syllable nuclei) from those which do not. With respect to handshape, two concrete proposals have been put forth. Corina (1989b) proposed a contour feature which serves to differentiate transitioning handshapes from their static counterparts. Brentari (1990) utilizes an
interpretive convention of autosegmental licensing, which establishes differential constraints on the number of handshape features which may be present at various levels of a derivation. The derivation of a handshape change is thus treated as an extrapolation across these constraints.

3) The sign APPOINTMENT is a bi-syllabic sign; this is a representation of the initial non-final syllable, and hence more insertion does not apply.


5) In earlier work I argue that in signs with handshape change and location changes one does often find subtle differences in the execution of the handshape change relative to the path movement. For example in the sign ASK when inflected for the multiple, the handshape transitions prior to the arc path movement. In contrast in a nearly identical sign, HATE it is more natural to execute the path movement prior to the handshape change. I argued these differences are accounted for in a theory which posits unspecified handshape features in contour handshapes (Corina 1989b). These facts do not contradict the premise that ASL does not obey a sonority sequencing principle. In fact they serve to further illustrate that ASL does not have strong predilections for sequencing less sonorant elements prior to more sonorant elements as discussed above, either order is attested.

6) It has been argued that the sonority sequencing principle holds at core levels of syllabification in spoken languages but may be subsequently violated (see Clements 1988 for a discussion).

7) O'Hala and Kawasaki (1984) do not characterize their finding in terms of sonority per se, arguing that a unidimensional scale for assessing what has been termed sonority does not capture its inherently multidimensional properties. This point only serves to emphasize the need to evaluate sonority in all of its manifestations.

Bibliography


Corina, D. 1989b. To Branch or not to Branch: Underspecification in ASL Handshape Contours. Paper presented at the Summer Meeting of the Linguistic Society of America, Tucson, AZ.


