The relation between linguistic and spatial working memory capacity and sign language processing
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Introduction
- Linguistic working memory (WM), but not spatial WM, is strongly predictive of spoken language comprehension (e.g., Caplan & Waters, 1999; King & Just, 1991)
- Sign languages utilize visual-spatial contrasts at all linguistic levels, but it is unknown whether either linguistic or spatial WM correlates with language comprehension

Research questions
- Do linguistic and spatial spans rely on common resources?
- Do linguistic and/or spatial WM span predict language comprehension for deaf signers?

Participants

<table>
<thead>
<tr>
<th></th>
<th>Deaf ASL signers (n=33, 28 for narrative task)</th>
<th>Hearing English speakers (n=43, 27 for narrative task)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>33.7 (11.1)</td>
<td>23.2 (6.2)</td>
</tr>
<tr>
<td>Age of exposure</td>
<td>28 native or early (&lt; 7 yrs), 5 late</td>
<td>n.a.</td>
</tr>
<tr>
<td>Gender</td>
<td>18 female, 15 male</td>
<td>35 female, 8 male</td>
</tr>
<tr>
<td>Years of education</td>
<td>16.5 (2.9)</td>
<td>15.1 (1.4)</td>
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</tbody>
</table>

Tasks
- Corsi block span
  Recalling sequences of spatially distributed blocks in forwards or backwards order
- Spatial WM span (based on Shah & Miyake, 1996)
  Deciding whether rotated letters on the screen are mirrored or not while remembering the direction in which the top of the letters are pointing
- Letter span
  Recalling sequences of spoken/signed letters in forwards or backward order
- Linguistic WM span (based on Daneman & Carpenter, 1980)
  Making plausibility judgments on signed/spoken sentences while remembering the last sign/word of each of each sentence

Language comprehension
- Narrative comprehension
  (data available from 28 signers and 27 speakers)
  Answering fact and location questions after viewing signed/spoken topographic narratives (e.g. the layout of an apartment)

Do linguistic and/or spatial WM span correlate with language comprehension for deaf signers?
- Linguistic WM span correlated with spatial WM span (r=.556, p=.001) and the Corsi block span (forward: r=.504, p=.003; backward: r=.487, p=.004) for deaf signers, but not for hearing speakers

Do linguistic and spatial spans rely on common resources?
- Linguistic WM span correlated strongly with narrative comprehension for hearing speakers (r=.592, p=.001), but only weakly for deaf signers (r=.352, p=.08)
- Spatial WM span correlated with location questions for deaf signers (r=.440, p=.019), but not for hearing speakers (r=.274, p=.167)

Discussion
- Linguistic WM may draw on non-linguistic spatial resources for signers, but not for speakers
  - Linguistic WM correlated with spatial WM and with Corsi spans only for deaf signers
  - Signers may rely less on serial order information during language comprehension
  - Linguistic WM weakly predicted language comprehension, in contrast to hearing speakers
  - Signers, but not speakers, draw on non-linguistic visuospatial WM processes when comprehending spatial narratives
  - Spatial WM predicted memory for location information only for deaf signers

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References