Auditory object formation occurs when pieces of information within and across ears are bound together to perceive one coherent object.

Hearing sensitivity to binaural cues can help with localizing the direction of a single coherent object.

Auditory object formation occurs when pieces of information within and across ears are bound together to perceive one coherent object.

Bilateral cochlear implant (BiCI) listeners
- Binaural sensitivity is limited in clinical processors from poor representation of the ITD in the signal. However, listeners demonstrate ITD sensitivity when listening with research processors.
- Sound processors operate independently and may encode the same signal differently between the two ears.
- It is unknown whether poor ITD sensitivity with sound processors is due to poor AOF.

Hypothesis: If stimulation rate is a major component of lateralization and auditory object formation:
1. Asymmetric across-ear rates will weaken object formation and yield poor lateralization.
2. Symmetric across-ear rates will strengthen object formation and yield good lateralization.

RESULTS I: How many sounds were reported as a single auditory object?
- NH listeners show AOF for a narrow range of asymmetric rates across the ears.
- NH listeners never report hearing one sound when rates differ by more than ±15% and ±25%.
- BiCl listeners show AOF for a broader range of asymmetric rates across the ears.

NH listeners appear to show some, yet weaker lateralization when rates are symmetric even in the presence of AOF.
- However, NH listeners poorly lateralize when rates are completely asymmetric and AOF is lacking.

RESULTS II: How many responses were correctly lateralized (NH Listeners)?
- Figure 4: Proportion of correctly lateralized responses per target ITD presented, averaged across the group of NH listeners. Predicted results shown in inset. Error bars represent standard error.

RESULTS III: How many responses were correctly lateralized (BiCI Listeners)?
- If we assume that good AOF and good lateralization is characterized by a peak in the responses only when the rates are symmetric across the ears, then we observe that...
- BiCl listeners actually show inconsistent lateralization and AOF when rates are interaurally asymmetric.

DISCUSSION
- As expected, BiCl and NH listeners have a high degree of AOF when information across the ears is the same. However, when information is different across the ears, range of AOF differs between BiCl and NH listeners suggesting that detection of rate differences with simultaneous presentation across the ears is more difficult with electrical stimulation (Fig. 3).
- As expected, when AOF is poor ITD lateralization is also poor. However, a high degree of AOF did not guarantee good ITD lateralization in both NH and BiCl listeners (Fig. 3 & 4).
- Overall, our results suggest that having AOF even when information is different across the ears is insufficient for good lateralization for both populations of listeners.

REFERENCES

Table 1: BiCl demographic data

<table>
<thead>
<tr>
<th>Listener ID</th>
<th>Age</th>
<th>Years of CI experience (bilaterally)</th>
<th>Etiology</th>
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<td>Heredity</td>
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<td>8</td>
<td>Gradual hearing loss; Heredity</td>
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