

Grouping in Pitch Perception: Evidence for Sequential Constraints

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Motivation/Aim

- Test whether pitch perception is subject to sequential auditory grouping mechanisms
- Secondary aim – are such cues more effective when combined with differences in lateral position

Experiment 1

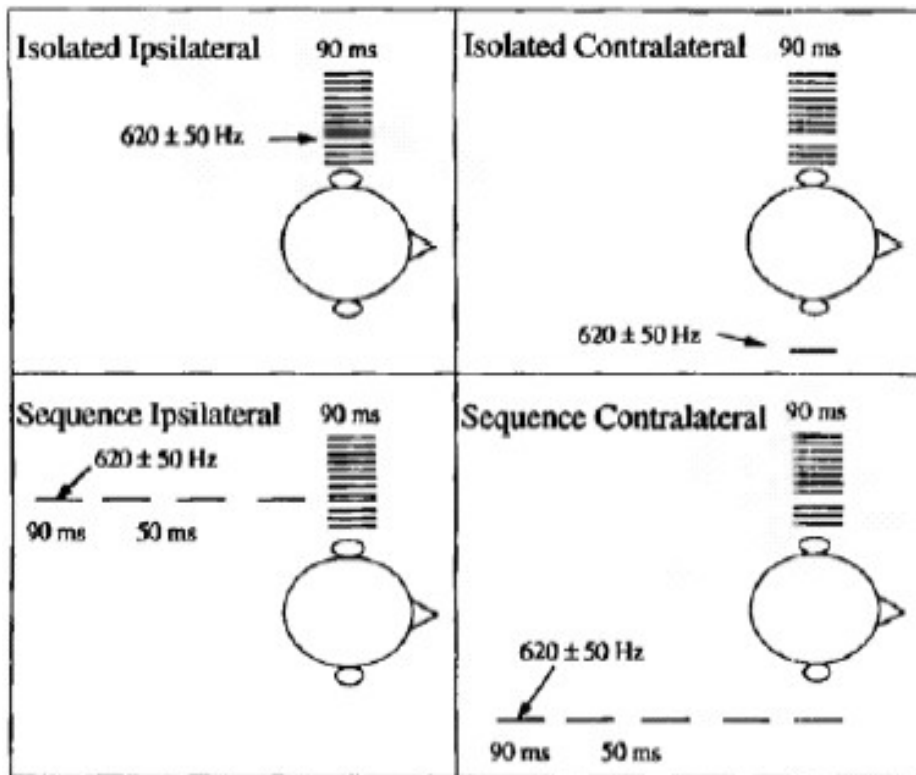
- Paradigm

- To perceptually remove a single frequency component from a complex, embed the complex in a short sequence of tones at the same frequency.

- Hypothesis

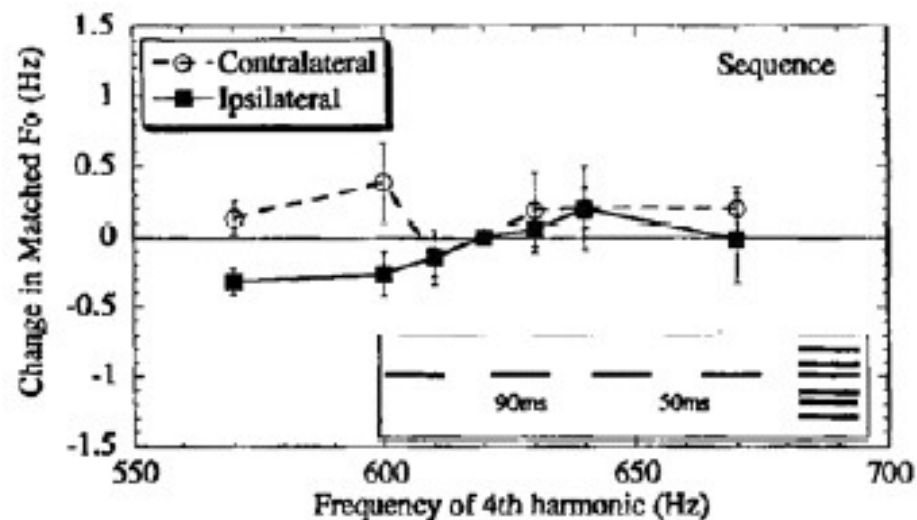
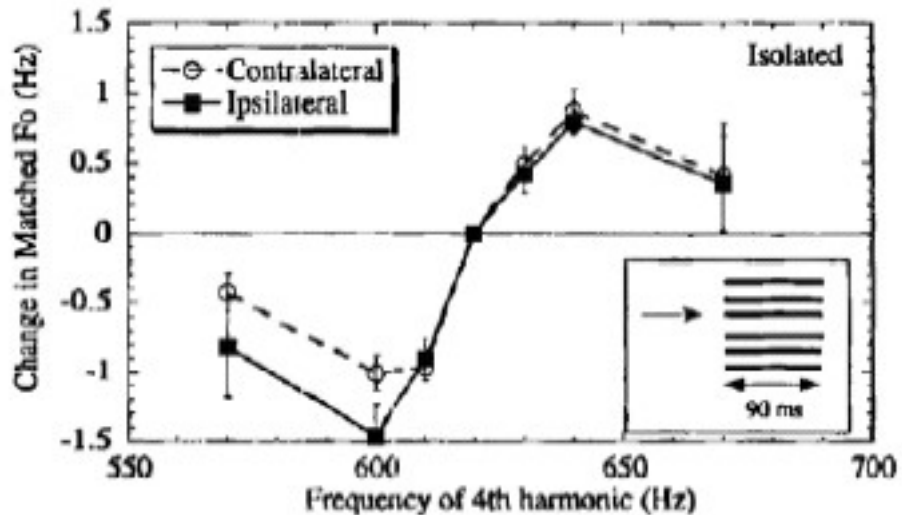
- Changes in pitch of the complex produced by the mistuned component will be reduced by preceding the complex with a tone sequence at the frequency of the mistuned component.

Experiment 1



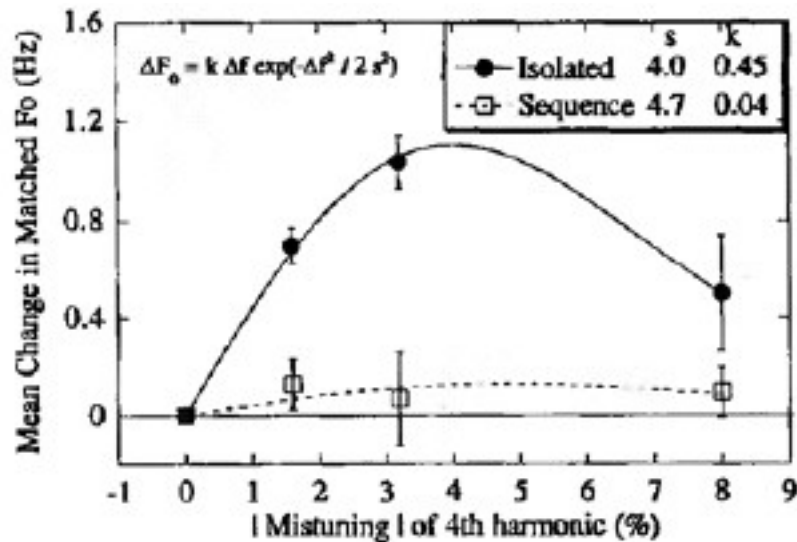
- Methods
- *Isolated or sequence* condition
- Ipsilateral or contralateral
- Target – harmonics 1-3 and 5-12 of a 155 Hz fundamental with a possibly mistuned 4th harmonic
- Mistunings of $\pm 1.6\%$, $\pm 3.2\%$ and $\pm 8\%$

Experiment 1



- Results
- Pitch shifts in sequence condition smaller
- No significant influence of the side of presentation of the mistuned component on the size of the pitch shifts

Experiment 1



- Results
- Fit the mean data with a Gaussian derivative function
- Width of the harmonic sieve (SD) unaffected by presence of tone sequence
- Contribution of the mistuned harmonic to the pitch (scaling factor) reduced in the presence of tone sequence

Experiment 1

- Discussion

- Sequential context *does* influence the extent to which a particular component contributes to the pitch of a complex tone
- Alternative explanation – the neural representation for the mistuned component reduced by peripheral adaptation

Experiment 2

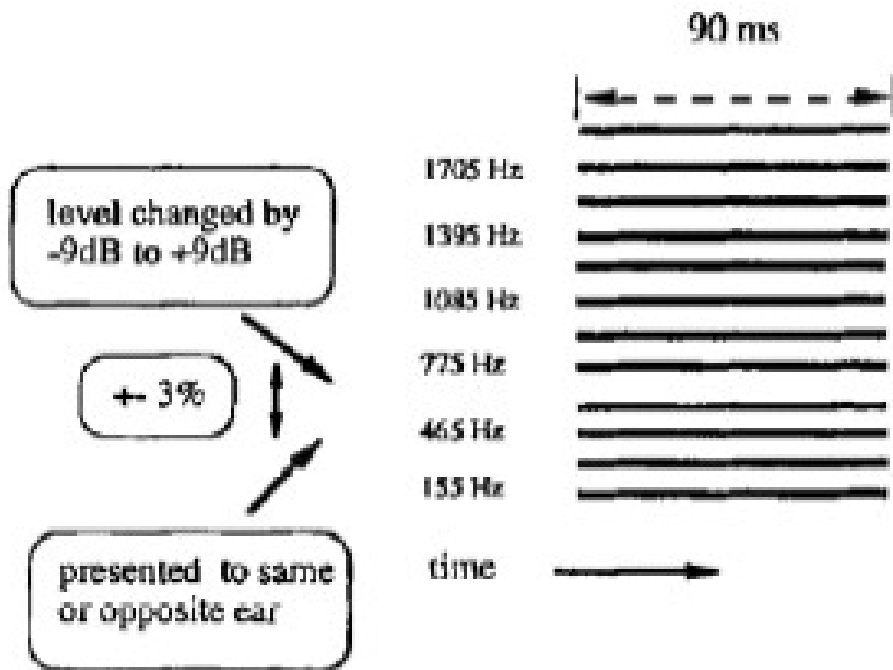
- Paradigm

- Measure the contribution to pitch of varying the level of a mistuned harmonic

- Hypothesis

- Explanation in terms of adaptation less likely if a reduction in level of a mistuned component were to have substantially less effect with contralateral than with ipsilateral presentation

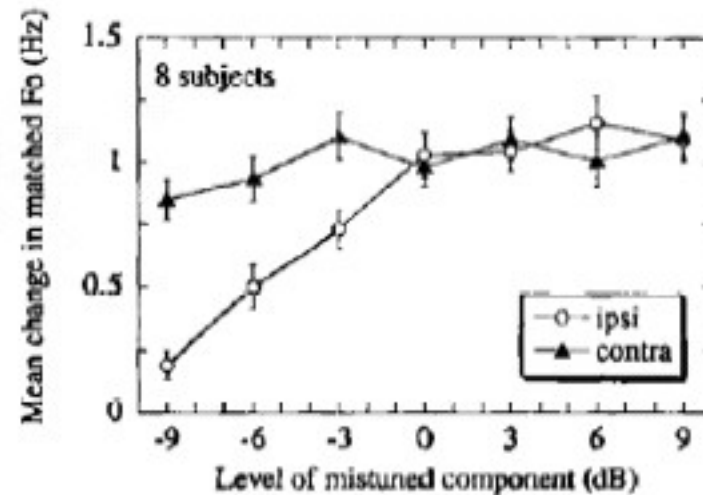
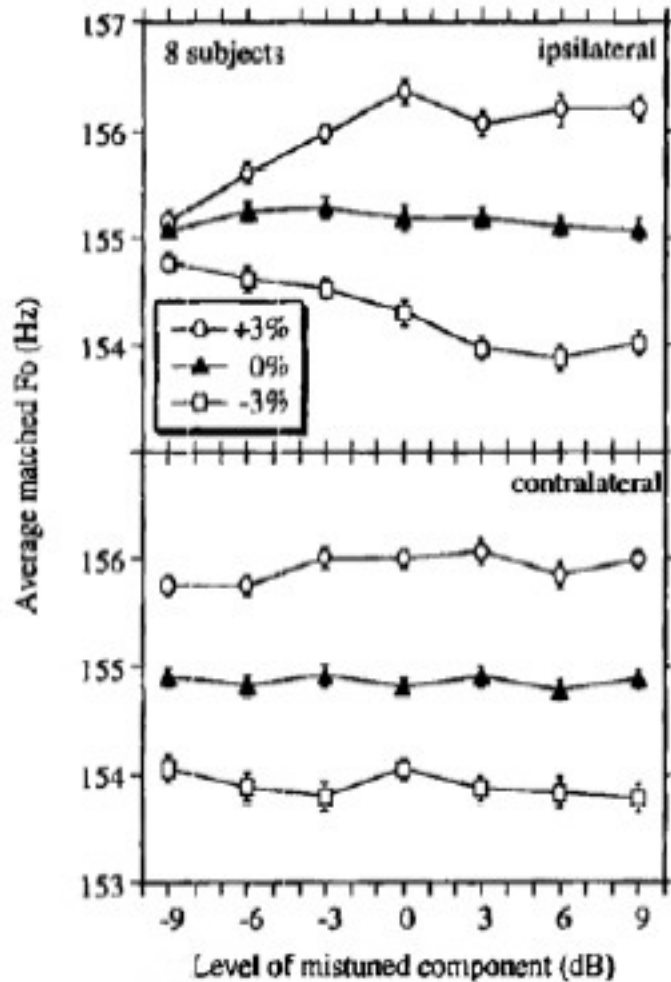
Experiment 2



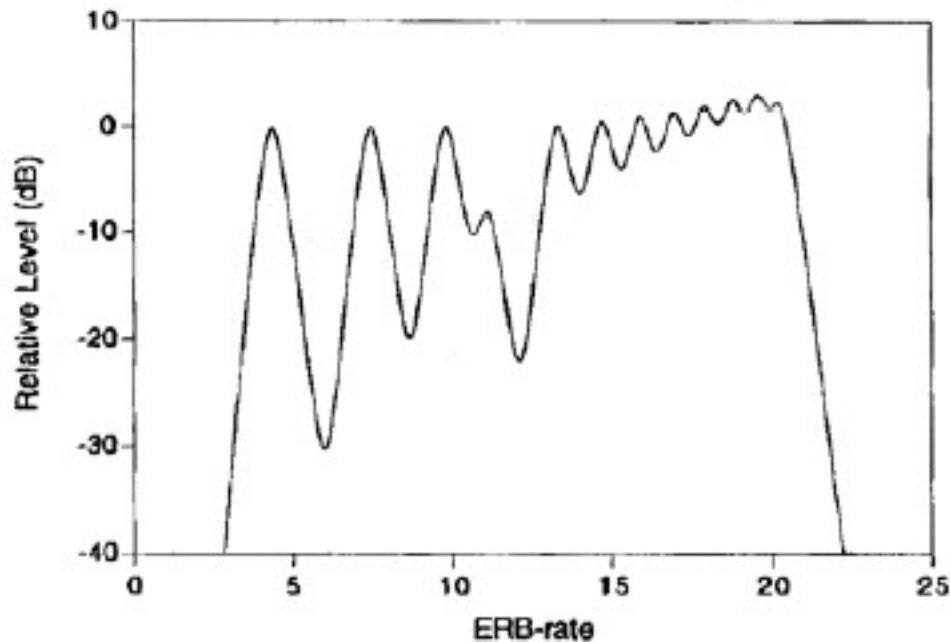
- Methods
- Isolated condition
- Level of the 4th harmonic varied between -9 and +9 dB
- Ipsilateral or contralateral
- Mistunings of $\pm 3.2\%$

Experiment 2

- Results
- Reducing the level reduces the size of pitch change only if the component is presented ipsilaterally



Experiment 2



- Discussion
- Ipsilateral masking by neighboring components on the mistuned one
- Argues against models which weight resolved frequency components independently of the degree to which a harmonic is resolved
- Argues against the effects found in experiment 1 being due to adaptation

The End

Any questions or comments?