**INTRODUCTION**

“Face inversion effect”: inversion impairs face recognition to a greater extent than object recognition (Hochberg & Galper, 1967).

A “same/different” face identification task: pairs of faces

- temporal inversion (e.g., backwards speech);
- frequency inversion centred around 4000 Hz;
- inversion centred around 2500 Hz.

**METHODS**

Stimuli: • Voice stimuli: the American vowels “A” and “I” in a /hVd/ syllable, recordings of Hillenbrand et al. (1995)
• Instrument stimuli: Exp.3: two 3-notes melodies (C-D-G and C-F-G)
• Exp. 4: 2 notes (D and F) (MIDI synthesizer of the PC sound card)

4 conditions of presentation: - no inversion;
- temporal inversion (e.g., backwards speech);
- frequency inversion centred around 4000 Hz;
- frequency inversion centred around 2500 Hz.

**EXPERIMENT 1: GENDER IDENTIFICATION**

Subjects: 20 healthy subjects, native Canadian-French speakers (10 women) (21-23 years old).

Task: A gender identification task on syllables

• Speaker discrimination: normal condition: no difference (F=3.3, p=0.063) normal condition: no difference (F=3.3, p=0.063) 4000 Hz condition: no difference (F=0.011)

**EXPERIMENT 2: SPEAKER DISCRIMINATION**

Subjects: 20 different healthy subjects, native Canadian-French speakers (10 women) (20-50 years old.)

Task: A “same/different” speaker discrimination task.

Results: Significant effect of inversion condition on performance (p<0.005).

Performance was better in the normal condition (78.6%) than in the:
- temporal inversion condition (74.1%) (p=0.005)
- frequency inversion condition (66.5%) (p=0.001)

Performance degraded by inversion.

Performance above chance, even in identifying children’s gender.

**EXPERIMENT 3: INSTRUMENT DISCRIMINATION**

Subjects: The same 20 subjects than in Exp. 2.

Tasks: A “same/different” instrument discrimination task (similar of Exp. 2). Pairs of melodies: 8 strings, 8 wind.

Results: Significant effect of inversion condition on performance (p<0.001).

Better performance in the normal condition (94.1%) than in the:
- temporal inversion condition (90.9%) (p=0.05)
- frequency inversion around 4000 Hz condition (87%) (p=0.001)
- frequency inversion around 2500 Hz condition (89.7%) (p=0.001).

⇒ Better performance in the instrument discrimination task than in discrimination task (Exp. 2).

⇒ BUT, much easier task than Exp. 2 (even in the normal condition), so difficult to compare.

**EXPERIMENT 4: TIMBER (VOICE+INSTRUMENT) DISCRIMINATION**

Stimuli: the American vowels “A” and “I” in a /hVd/ syllable, recordings of Hillenbrand et al. (1995)

Task: A “same/different” timber discrimination task: pairs of syllables: 8 male, 8 female speakers, pairs of notes: 8 strings, 8 wind

Results: 1) A significant effect of inversion condition on performance (F=44.007, p<0.001)

Normal condition (73.83%) = temporal inversion condition (73.16%) (p=0.576).

These performances better than in the:
- frequency inversion around 4000 Hz condition (59.18%) (p<0.001)
- frequency inversion around 2500 Hz condition (65.51%) (p<0.001).

2) Interaction Inversion condition * Stimuli type

Comparison Voices/Instruments: repeated measure ANOVA: F=39.67, p<0.001).

These performances better than in the:
- frequency inversion around 4000 Hz condition (59.18%) (p<0.001)
- frequency inversion around 2500 Hz condition (65.51%) (p<0.001).

⇒ Same manipulation (sound inversion): Speaker discrimination was more impaired than instrument discrimination.

**DISCUSSION AND CONCLUSION**

Significant effect of sound inversion on performance.

Stronger effect for frequency inversion than for temporal inversion.

Performance was always above chance level (50%), even in the most disrupting frequency-inversion conditions.

Exp. 4 suggests a “voice inversion effect”: a stronger effect of inversion on the voice discrimination performance than on the instrument discrimination performance.

**REFERENCES**


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