Introduction

It has been suggested that patients with schizophrenia (SZs) show impairment in multisensory integration [1, 2]. A work in our group examined the audio-visual temporal integration with sound-induced flash illusion and found a lengthened temporal binding window for the bisensory information in SZs [3]. The present study investigated the audio-visual spatial integration in schizophrenia by using the ventrilloquist illusion paradigm [4].

Methods

Participants

- 22 Schizophrenia patients (SZs) from rehabilitation centers and 22 Healthy Control (HCs)
- SZ group had an interview to evaluate symptoms by using Scale for Assessment of Negative Symptoms (SANS) & Scale for Assessment of Positive Symptoms (SAPS).
- HC group filled in self-report questionaires, Schizotypal Personality Questionaire (SPQ).

Auditory localization task

- Green LED light for visual stimuli
- 1000Hz beep for auditory stimuli
- Both stimuli were presented for 15ms

Conditions

1) A only condition: only an auditory stimulus presented
2) AV congruent condition: audio-visual stimuli presented simultaneously on a same location
3) AV incongruent condition: audio-visual stimuli presented simultaneously different locations (spatial disparity between stimuli: 14 or 28°)
- 26 combinations × 15 trials = 630 trials

Procedures

- Participants fixated center-red LED point during the experiment.
- Participants responded by indicating their perceived sound location using a rotating handle bar.

Results

A only condition

- Both groups showed good sound localization ability in A only condition (SZ: r = .997 and HC: r = .989).
- The main effect of group was not significant statistically (F(1, 7) = 2.314, p = .172).

AV conditions

- There was no significant difference in eccentricity (central vs. peripheral) in both groups (SZ: t(21) = .724, p = .477, HC: t(21) = 1.692, p = .105).
- Therefore, data across all the location were collapsed.

- Only the main effect of location (-28, -14, +14 and +28°) was significant F(1.155, 48.494) = 48.860, p < .000).
- Both groups showed biases as a function of spatial disparity which indicates audiovisual spatial integration in the ventrilloquist paradigm.

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- In SZs, both multisensory integration indices were correlated with severity of symptoms of schizophrenia.
- Ventriloquist effect had negative correlation with Visual hallucinations (r = -.457, p = .032), and marginal negative correlation with Global ratings of hallucinations (r = -.368, p = .058).
- Congruency effect had negative correlation with Auditory hallucinations and Visual hallucinations (r = -.424, p = .049, and r = -.491, p = .020, respectively).
- No correlation between either index and schizotypal features was found.

- Auditory localization ability was calculated by slope from perceived responses in 8-speaker locations in A only condition.
- No correlation was found between hallucinations and auditory localization ability (r = -.229, p = .306).

Regression Analysis

- To investigate audiovisual spatial integration, 2 indices were used:
  1) Ventriloquist effect (VE, %) = \text{Visual bandwidth} \times 100 - the relative proportion of perceived bias toward visual stimulus.
  2) Congruency effect (CE, %) = \text{Auditory bandwidth} \times 100 - a lower variability in congruent multisensory stimulus implies multisensory enhancement.

- Both groups showed ventriloquist effect, but not Congruent effect.

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- No group difference of both effects (t(42) = -.836, p = .408, (t(42) = 1.093, p = .280, respectively).

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References


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