Keywords: Spatial neglect; White matter damage analysis

Unilateral spatial neglect frequently occurs after right-hemisphere stroke. It represents a major problem in the domain of public health, since it prevents patients from orienting or responding to left-sided stimuli. The exact anatomical location of lesions underlying the manifestation of this syndrome is currently debated (Bartolomeo, 2012). In the present study, we used a longitudinal approach in order to identify the lesional predictors of chronic neglect in long-range white matter bundles.

We present a longitudinal study of 37 patients with right-hemisphere damage, tested at the acute/subacute phase and at more than 1 year after the stroke. 27 patients presented signs of spatial neglect in the acute/subacute phase. Each patient underwent a radiological assessment including a DTI sequence, (50 directions; bvalue of 1000 mm²/s). Voxelwise statistical analysis of the fractional anisotropy (FA) data was carried out using TBSS (Tract-Based Spatial Statistics, Smith, 2006).

The longitudinal follow-up revealed that only 10 patients (27%) recovered from neglect at restest. In acute/subacute neglect, a lower FA was found in the way of the right Superior Longitudinal fasciculus (SLF II and III) and of the corpus callosum. In the chronic phase, TBSS analysis showed the implication of the posterior portion of the corpus callosum (splenium) and of SLF II & III. The voxelwise correlation between a cancellation task (Bells test) and FA maps found a lower FA in the way of the anterior corpus callosum, local frontal and fronto-parietal white matter (SLF II and III), and in the thalamus.

Our results confirm a key role of fronto-parietal disconnection in the emergence and chronic persistence of neglect (Thiebaut de Schotten et al., 2012). Moreover, we demonstrated an implication of interhemispheric disconnection (splenium and forceps major) in chronic neglect. These findings support the hypothesis that interhemispheric disconnection may deprive the right fronto-parietal pathway of visual inputs, amputing the brain reconstruction of the left hemi-space (Tomaiuolo et al., 2010), and that chronic neglect at least in part results from the activity of an isolated left hemisphere (Bartolomeo et al., 2007).

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Effects of visuoauditive integration on motor system in speech perception: A TMS study

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Keywords: Language; Perceptual system; Motor system; TMS

Introduction.– Recent studies have shown that speech perception involves the motor system of the lips and tongue [1], integrating the idea developed by Rizzolatti et al. [2] about the existence of mirror neurons in humans. This perception can engage only auditory system or visual-auditory systems, involving various systems of integration and interaction. The aim of this study is to investigate the influence of the integration of the perceptual system on the motor system and the modulation effects of timing mismatch between the auditory and visual signals.

Materials and methods.– Seven healthy volunteers (six men, one woman, 35-64 years) were included. The motor threshold of evoked potentials (MEP) at rest has been measured by transcranial magnetic stimulation (TMS) on the motor cortex of the left and right orbicularis oris. The amplitudes of MEP after a 120% of motor threshold stimulation were measured during various states: at rest, listening a speech, lip reading of the speaker filmed in close-up, listening and watching the speaker with multiple levels of timing synchronization between the auditory and visual signal: synchronized, desynchronized of 25, 50, 100 and 300 ms, and listening and watching the same film shown reversed (“non-speech”).

Results.– It is noted that the MEP amplitude after stimulation of the left cortex varies significantly in different tasks unlike the right stimulation. Is contested a significant increase of MEP amplitude compared to the rest (165%) or the task of “non-speech” when subjects listened and watched the movie. The amplitude decreases with timing mismatch between the visual and auditory signal.

Discussion.– These results confirm the influence of the perceptual system on cortical excitability of the motor system. This influence is not only an epiphenomenon and differs with the meaning of the signal (speech versus “non-speech”) but also according to the timing congruence of visual and auditory input. These results suggest the interaction and the possible involvement of the motor system in integrating visual-auditory perception and speech.

References

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Metaphor’s and idiom’s understanding in traumatic brain injury

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Keywords: Traumatic Brain Injury; Figurative Language; Metaphor; Idiom

Introduction.– Language deficits reported in patients with traumatic brain injury (TBI) mainly concern the understanding of figurative language [1]. The aim of our study was to demonstrate the difficulties of understanding in figurative language of patients with TBI, to specify them with various figures of speech (metaphors and idioms), and to determine the origin of these deficits (working memory, inhibition, semantic and linguistic abilities).

Patients and methods.– A group of 41 TBI patients was matched for sex, age and the educational level with a group of 41 respective controls (11 women, 30 men, mean age 32 years ±13, average educational level: 11 years of study ±3). Participants filled a questionnaire composed of 48 comprehension expressions put into context: 16 verbal metaphors such as “Installed on the sunbed, Paul nibbled existence.”, 16 idioms such as ambiguous semantically transparent “Given the situation, Aline was forced to lay down their weapons.”, 16 not semantically transparent such as “Until the shipment arrives, Eloïde touched wood.” and 16 literal sentences (control items); and the verbal subtests of the WAIS-III for assessing semantic and language abilities, the Stroop test, the Hayling and Brixton tests for assessing executive functions.

Results and conclusion.– Consistent with the literature, the results showed a deficit in understanding figurative language in TBI. Correlations indicated that the understanding of the three types of figurative expressions were positively and significantly correlated with semantic and language abilities (VIC), with the working memory index (IMT) and with performances at executive functions tests. Specifically in TBI patients, VIC was the significant predictor of metaphors and nondecomposable idioms understanding, while verbal inhibition abilities measured by the Hayling test, was the significant predictor of decomposable idiom understanding.

Reference

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Bilingualism and executive functions

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Keywords: Bilingualism; Executive functions

Results and conclusion.– Given the situation, Aline was forced to lay down their weapons.”, 16 not put into context: 16 verbal metaphors such as “Installed on the sunbed, Paul nibbled existence.”, 16 idioms such as ambiguous semantically transparent “Given the situation, Aline was forced to lay down their weapons.”, 16 not semantically transparent such as “Until the shipment arrives, Eloïde touched wood.” and 16 literal sentences (control items); and the verbal subtests of the WAIS-III for assessing semantic and language abilities, the Stroop test, the Hayling and Brixton tests for assessing executive functions.

Results and conclusion.– Consistent with the literature, the results showed a deficit in understanding figurative language in TBI. Correlations indicated that the understanding of the three types of figurative expressions were positively and significantly correlated with semantic and language abilities (VIC), with the working memory index (IMT) and with performances at executive functions tests. Specifically in TBI patients, VIC was the significant predictor of metaphors and nondecomposable idioms understanding, while verbal inhibition abilities measured by the Hayling test, was the significant predictor of decomposable idiom understanding.

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