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Left parietal activation during the production of pointing in several modalities: prosodic focus, syntactic extraction, digital- and ocular- pointing

Hélène Loevenbruck^a, Coriandre Vilain^a, Francesca Carota^b, Monica Baciu^c, Christian Abry^d, Laurent Lamalle^e, Cédric Pichat^c and Christoph Segebarth^f

^aSpeech and Cognition Department, GIPSA-lab, 46 avenue Félix Viallet, 38031 Grenoble, France

^bCentre de Neurosciences Cognitive, 67, Boulevard Pinel, 69675 Bron, France

^cLaboratoire de Psychologie et NeuroCognition, UFR Sciences de l'Homme et de la Société, BP47, 38040 Grenoble, France

^dCentre de Recherche sur l'Imaginaire (CRI), Université Stendhal, Grenoble 3, BP 25, 38040 Grenoble cedex 9, France

^ePlateforme régionale IRM 3Tesla, IFR n° 1, RMN Biomédicale : de la cellule à l'homme, CHU de Grenoble, BP 217, 38043 Grenoble Cedex 9, France

^fGrenoble Institut de Neurosciences, CHU de Grenoble - B.P. 217, 38043 Grenoble, France

Deixis, or pointing, is the ability to draw the viewer/listener's attention to an object, a person, a direction or an event. Pointing is gradually acquired by children, first with the eyes, then with the finger, then with intonation and finally with syntax. The crucial role of digital pointing in language acquisition suggests that all modalities of pointing may share a common cerebral network. An fMRI study of the production of multimodal pointing was carried out on 15 subjects. Subjects were scanned during the execution of index finger pointing gestures, eye pointing gestures, prosodic pointing (focus) and syntactic pointing (extraction). The results of a random effect group analysis show that the left superior parietal lobule (BA 7) was activated in all three digital, ocular and prosodic pointing but not in syntactic pointing. These results indicate that pointing in different modalities may recruit the left superior parietal lobule, with ocular pointing more anterior than prosodic pointing, itself more anterior than digital pointing. A grammaticalisation process is suggested to explain the lack of parietal activation in syntactic pointing.