

# CURRICULUM VITAE



**Name:** Angela SIRIGU  
**Birth** 29.10.1956 in Tortoli, Sardinia (Italy)  
**Marital Status** Married, 3 children  
**Citizenship:** Italian  
**Present address:** *Centre de Neurosciences Cognitives, CNRS*  
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**Language spoken and written:** Sardinian, Italian, English, French

## Positions held and education

**Current and Permanent Position:** Director of Research (DR1) and Director of the Neuropsychology group, Center for Cognitive Neuroscience, (CNC), Centre National de la Recherche Scientifique (CNRS), Lyon France.

**2008-2009** Invited Professor at the University of Torino.

**1996-** Research scientist at (1class) CNRS, French Federal Research Institution.

**1996:** "Habilitation à diriger les Recherches" (degree necessary in order to supervise graduate students in France), University Pierre et Marie Curie, Paris, France.

**1992- 96 :** Invited Scientist, Laboratoire de Médecine Expérimentale, INSERM U 289, la Salpetriere Hospital, Paris, France.

**1988-1991 :** "Visiting Fellow", Cognitive Neuroscience Section, National Institute of Neurological diseases and Stroke, National Institutes of Health, Bethesda, USA.

**1984-1987 :** Post-doctoral training in Neuropsychology, Department of Neuropsychology, C.H.U. la Timone, Marseille, France.

**1978-1983 :** PhD in Psychology, University of Rome "La Sapienza", Rome, Italy.

### *Scholarships*

**1988-1991 :** "Fogarty Fellow", National Institutes of Health

**1992-1994 :** "Poste Vert", INSERM, Paris, France.

**1994-1996 :** Fellowship "Capital Humain et Mobilité" European Community (C.E.E.)

### **Awards**

**1999-** Award of the French Academy of Science.

### **Doctoral and post-graduate teaching**

**1986-87 :** DEA of Cognitive Neuropsychology (University of Marseille).

**1989-90 :** Cognitive Neuropsychology (Department of Neurology, Naval Hospital, Bethesda, USA).

**1990-91:** Cognitive Neuropsychology (Foundation for the Advancement of Education in Sciences, Bethesda, USA).

**1998-2002 :** Neuropsychology, Claude Bernard University, Lyon 1, France.

**2001-2002 :** Course in Cognitive Neuroscience, Medical School, University of Udine, Italy.

**2003-2004:** Course in Cognitive Neuroscience, Claude Bernard University, Lyon 1&2, France.

**2005-2007** Course in Cognitive Neuroscience, University of Trieste, Italy

**2008-2009** Co-organiser with JR Duhamel of a course in Cognitive Neuroscience at the Ecole Normale Supérieure, Lyon, France.

### ***Doctoral supervision (PhD)***

**1999-2005** : Pascal Giraux, 09-2003; Gilles Lafargue, 11-2003; Nathalie Camille, 09/2004; Mateus Joffily, 27-01-2005, David Auclair, June 2005; Céline Fragne, October 2005.

**2006 to present:** Antoine Aballea, Elissar Andari, Irene Cristofori, Helene Parmentier

### ***Master***

**since 1995: I supervised 40 students.**

### **Membership**

**Since 1999** : Member of the Scientific Comity of the Doctoral program in Cognitive Science, University Lyon 2, Lyon, France.

**Since 1999:** Member of the Scientific Committee of the Doctoral program in Neuroscience, University, Claude Bernard University (UCLB), Lyon 1, France.

**Since 1995:** Member of the New York Academy of Science.

**Since 1995:** Member of the Scientific Council of Attention & Performance Society

**Since 2000** : Member of the *International Neuropsychological Symposium* (INS).

**Since 2005:** Member of the Scientific Committee 'ATIPE', CNRS.

**Since 2006:** Member of Scientific Section 27, *Comité National du CNRS* (This is the CNRS Scientific Committee in charge of (1) recruiting scientists for permanent positions and fro (2)Labs reviews and their renewal.

**Since 2007:** Member of the Scientific Committee "*Fondation pour la Recherche Médicale*".

### **Reviewer for:**

- *Journals:* Behavioural Brain Research, Brain, Brain Research, Cognition, Cognitive Neuropsychology, Cortex, Cerebral Cortex, Current Biology, Experimental Brain Research, European Journal of Neuroscience, Journal of Experimental Psychology :Human Perception and Performance, Journal of Neuroscience, Journal of Neurology, Neurosurgery and Neuropsychyaty, Journal of Neuroscience, Neuropsychologia, Neuroreport, Nature Neuroscience , Quaterly Journal of Experimental Psychology, PNAS, Progress in Neurobiology, Revue Neurologique, Science, Trends in Cognitive Science.

- *Public and private Institution:* ANR, Pierre et Marie Curie University, Cariverona Foundation, Fyssen, Fondation pour la Recherche Médicale.

### **Grants (Principal Investigator in all)**

1996-1999: GIS- Sciences de la Cognition, (120.000Euros).

1999-2001 : Cognitique, Ministry of French Research (40.000Euros)

2000-2002 : Emergence, Rhône-Alpes Department, (60.000).

2000-2003 : Ministry of Health (PHRC) (150.000Euros)

2000-2004 : -ACI, Ministry of Research (30.000Euros)

2003-2004: France Parkinson, (20.000Euros)

2002-2005 : National Science Foundation with Marc Schieber (University of Rochester, USA (940.000\$) Co-PI.

2005-2008; Human Frontier Program with Colin Camerer, Caltech Pasadena; JR Duhamel, CNRS Lyon; Rosemarie Nagel University of Pompeu Fabra, Spain (\$1.350,000)

2005-2008 European Science Foundation (ESF) (70.000€)

2006-2009 ANR (300.000€)

2007-2009 Fondation de France (85,000€)

2008-2011 : ANR (400,000€approved)

### **Large Network Grants**

2007-20012 RTRA on Composite Tissue and Transplantation, Lyon (Co-PI)

2007-20012 RTRA on Neuroscience, Lyon, (Co-PI)

### **Selected media coverage about my research:**

Newspapers: Le Monde (January 2004.), l'Humanité, Le Figaro, L'Expansion, New York Times, Herald Tribune, La Repubblica, Il Corriere della Sera, Ansa agency.

Magazines: « A life of Regret » *Nature Highlight*, 436, 11, 2005.

“Le rôle du regret dans la prise de décision “. LE MONDE, 21.05.04, by Hervé Morin..

“Nella testa di chi non conosce il rimpianto“. IL CORRIERE DELLA SERA, by Massimo Piattelli Palmarini 21.05.04.

“Vital signs: emotions; Winning, Losing and Regretting“. THE NEW YORK TIME. by John O'Neil, May 25, 2004.

“Brain Region Tied to Regret Identified“. SCIENTIFIC AMERICAN. by Sarah Graham, 8 August 2005.

“Where Regret Roosts in the Brain“. FOX NEWS. By Miranda Hitti, August 08, 2005.  
“Pinpointing regret in the brain“. NEW SCIENTIST. 13 August 2005 by Rowan Hooper.

*TV and Radio:* France Info, France 3, France 2, TLM, BBC World News, Radio24, RAI-Radio3.

### **International collaborations**

Jordan Grafman, Congitive Neuroscience Unit, NINDS, NINH, Bethesda, USA

Elena Daprati, Francesco Lacquaniti (Université de Rome).

Patrick Haggard (ICN, University College, Londres, UK),

Sarah Blakemore, (ICN, University College, Londres, UK).

James Kilner, (Fil, University College, Londres, UK).

Ray Dolan, (Fil, Londres, UK).

Marc Schieber (Université de Rochester, USA)

Colin Camerer (Caltech, Pasadena, USA)

## PUBLICATIONS

### *Ten selected publications since my career*

Sirigu, A., Duhamel, J.R., Cohen, L., Pillon, B., Dubois, B., Agid, Y. (1996) The mental representation of hand movements after parietal cortex damage. *Science*, 273, 1564-1568.

Giraux P., Sirigu A., Scheinder F. , Dubernard, JM (2001) Cortical reorganization in motor cortex after graft of both hands. *Nature Neuroscience*, 4, 691-692.

Farné A, Roy A, Giraux P, Dubernard JM, Sirigu A. (2002) Face or hand but not both: perceptual correlates of reafferentation in a former amputee. *Current Biology*, 12, 1-5.

Sirigu A. Daprati E. Ciancia S., Giraux P., Nighoghossian N., Posada A., Haggard P. (2004) Motor awareness and intention to move after focal brain damage. *Nature Neuroscience*, 7 80-4.

Camille N., Coricelli G., Sallet J. Pradat-Diehl P., Duhamel JR, Sirigu A. (2004) The involvement of the orbitofrontal cortex in the experience of regret. *Science*, 21, 1167-70.

Kilner J., Vargas C., Duval S., Blakemore SJ, Sirigu A. (2004) Motor activation prior a predicted observed movement. *Nature Neuroscience*, 7, 1299-301.

Coricelli, G., Camille, N., Pradat-Diehl, P, Duhamel, JR, Sirigu, A. (2005). Why Anticipated Regret Influences Subjects' Choice. *Science*, 308, 1260-1261.

Coricelli G, Critchley HD, Joffily M, O'doherty JP, Sirigu A, Dolan RJ. (2005) Regret and its avoidance: a neuroimaging study of choice behavior. *Nature Neuroscience*, 1255-62.

Daprati E., Sirigu A. (2006) How we interact with objects: learning from brain lesions. (2006) *Trends in Cognitive Science*, 10, 265-70.

Coricelli, G., Dolan, RJ., Sirigu A. (2007) Brain, emotion and decision-making: the paradigmatic example of regret. *Trends in Cognitive Science*, 11, 258-65.

### *Complete list of publications*

1. Habib, M., Sirigu, A. (1987) Pure Topographical Disorientation: A definition and anatomical basis. *Cortex*, 1, 73-85.

2. Sirigu, A., Grafman, J., Bressler, K., Sunderland, T. (1991) Multiple representations contribute to body knowledge processing: evidence from a case of autotopagnosia. *Brain*, 114, 629-642.

3. Sirigu, A., Duhamel, J-R. Poncet, M. (1991) The role of sensorimotor experience in object recognition: A case of multimodal agnosia. *Brain*, 114, 2555-2573.

4. Duhamel, J.-R., Goldberg, M., Sirigu, A., Fitzgibbon, E.J., Grafman, J. (1992) Saccadic dysmetria in a patient with right fronto-parietal lesion: role of corollary discharge for accurate spatial performance. *Brain*, 115, 1387-1402.
5. Grafman, J., Litvan, I., Massaquoi, S., Stewart, M., Sirigu, A., Hallet, M. (1992) Cognitive planning deficit in patients with cerebellar atrophy. *Neurology*, 42, 1493-1496.
6. Grafman, J., Sirigu, A., Spector L., Hendler, J. (1993) Damage to the prefrontal cortex leads to decomposition of structured events complex. *Journal of Head Trauma Rehabilitation*. 8,73-87.
7. Sirigu, A., Cohen, L., Duhamel, J.R., Pillon, B., Dubois, B., Agid, Y., Pierrot-Deseilligny C. (1995). Congruent unilateral impairments for real and imagined hand movements. *NeuroReport*, 6, 997-1001.
8. Sirigu, A., Cohen, L., Duhamel, J.R., Pillon, B., Dubois, B., Agid, Y. (1995) A selective impairment of hand posture for object utilization in apraxia. *Cortex*, 31, 41-56.
9. Litvan, I., Sirigu, A., Toothman, J., Grafman, J. (1995) What can preservation of autobiographical memory after muscarine blockade tell us about the scopolamine model of dementia? *Neurology* , 45, 387-389.
10. Sirigu, A., Zalla, T., Pillon, B., Dubois, B., Grafman, J., Agid, Y. (1995) Selective impairments in managerial knowledge in patients with pre-frontal cortex lesions. *Cortex* , 31, 301-316.
11. Sirigu, A., Zalla, T., Pillon, B., Dubois, B., Grafman, J., Agid, Y. (1995) Planning process after frontal lobe lesions. *Annals of New York Academy of Science* , 769, 277-288.
12. Sirigu, A., Grafman, J. (1996) Selective impairments within episodic memories. *Cortex*, 32, 83-95.
13. Sirigu, A., Zalla, T., Pillon, B., Dubois, B., Grafman, J., Agid, Y. (1996) Encoding of sequence and boundaries of script following prefrontal lesions. *Cortex* , 32, 297-310.
14. Pillon, B., Blin, J., Vihailhet, M., Deweer, B., Sirigu, A., Dubois, B., Agid, Y. (1995) The neuropsychological pattern of cortico-basal degeneration. *Neurology*, 45, 1477-1483.
15. Sirigu, A., Duhamel, J.R., Cohen, L., Pillon, B., Dubois, B., Agid, Y. (1996) The mental representation of hand movements after parietal cortex damage. *Science*, 273, 1564-1568.
16. Loarer, E., Lautrey, J., Pillon, B., Sirigu, A. (1996). Validation of a planning task in normals and patients with prefrontal cortical lesions. *European Review of Applied Psychology*, 48, 41-47.
17. Cohen, L., Brazin, B., Sirigu, A., Meininger, V., Pierrot-Desseilligny, C. (1997) Progressive upper limb monoparesis: a form of primary lateral sclerosis? Two cases with

metabolic brain imaging and transcranial magnetic stimulation. *European Journal of Neurology*, 4, 294-296.

18. Sirigu, A., Cohen, L., Zalla, T., Pradat-Diehl, P., Van Eeckhout, P., Grafman, J., Agid, Y. (1998). Distinct frontal regions for processing sentence syntax and story grammar. *Cortex*, 34, 771-778.

19. Zalla, T., Sirigu, A., Pillon, B., Dubois, B., Agid, Y., Grafman, J., (1998). Deficit in script sequence evaluation in Parkinson's disease. *Cortex*, 34, 621-628.

20. Zalla, T., Sirigu, A., Pillon, B., Dubois, B., Agid, Y., Grafman, J., (1998). Deficit in script sequence evaluation in Parkinson's disease. *Cortex*, 34, 621-628.

21. Babin-Ratté, S., Sirigu, A., Gilles, M., Wing, A. (1999). Impaired anticipatory finger grip force adjustments in a case of cerebellar degeneration. *Exp. Brain Research*, 128, 81-85.

22. Sirigu, A., Daprati, E., Pradat-Diehl, P., Frank, N., Jeannerod, M. (1999). Perception of self-generated movement following left parietal lesion. *Brain*, 122, 1867-1874.

23. Crozier S., Sirigu, A., Lehericy S., Van de Moortele P.F, Guigon E., Pillon B., Dubois B., Grafman J., LeBihan, D., Agid Y. Distinct prefrontal activations in processing sequence of actions and words: A fMRI study at 3Tesla. (1999) *Neuropsychologia*, 37, 1469-1476 .

24. Zalla, T., Sirigu, A., Pillon, B., Dubois, B., Agid, Y., Grafman, J., (2000). How patients with Parkinson's disease retrieve and manage action knowledge. *Cortex*, 36, 163-179.

25. Zalla, T., Koehlin, E., Pietrini, P., Basso, G., Aquino, P., Sirigu, A., Grafman, G. (2000) Differential amygdala responses to winning and losing in humans. *European Journal of Neuroscience* 12, 1764-1770.

26. Baron S., Gorce P., Didi N., Pradat-Diehl P., Sirigu A. (2000) Biomechanical analysis of prehension movement. *European Journal of Automation*, 34, 835-844

27. Gerardin E., Sirigu, A., Lehericy S., Poline JB, Gaymard, B., LeBihan D., Agid Y. (2000) Partially overlapping neural network for imagined and executed movement. *Cerebral Cortex*, 10, 1093-104.

28. Daprati, E., Sirigu, A., Pradat-Diehl, P., Frank, N., Jeannerod, M. (2000) Recognising the self: Denial of ownership of the contralesional hand in a case of severe neglect. *Neurocase*, 6, 477-486.

29. Sirigu, A., Duhamel, J.R. Rôle du cortex pariétal dans la représentation des mouvements manuels. *Revue Psychologie Française*, 45-4.

30. Cazalis, F., Azouvi, P., Sirigu, A., Agar., N., Burnod, Y. (2001) Script generation and reconstitution after severe traumatic brain injury. *Journal of the International Neuropsychological Society*, 7, 795-804.

31. Zalla, T., Plassiard, C., Pillon, B., Grafman J., Sirigu, A. Action planning in a virtual context after prefrontal cortex damage. *Neuropsychologia*, 39, 759-770, 2001.
32. Sirigu, A., Duhamel, J.R. (2001) Motor and visual imagery as two complementary and neurally dissociable mental processes. *Journal of Cognitive Neuroscience*, 13, 7, 910-919.
33. Giraux P., Sirigu A., Scheinder F. , Dubernard, JM (2001) Cortical reorganization in motor cortex after graft of both hands. *Nature Neuroscience*, 4, 691-692.
34. Zalla, T. Posada, A. Franck, N. Georgieff, N., Sirigu, A. (2001). A componential analysis of action planning in patients with schizophrenia: A comparison with patients with frontal lobe damage. *Cognitive Neuropsychiatry*, 6, 271-296.
35. Daprati E. Sirigu E. How well do we know our non-dominant hand? laterality effects on motor awareness (2002) *Neuropsychologia*, 40, 1379-86.
36. Angela Sirigu, Elena Daprati, Laurel J. Buxbaum<sup>2</sup>, Pascal Giraux. (2002). How the Human Brain Represents Manual Gestures: Effects of Brain Damage. A paraître dans: *Cognitive Neuroscience Perspectives on the Problem of Intentional Action*. Scott H. Johnson (Ed.), MIT Press.
37. Ruby, P., Sirigu, A. Decety, J. (2002) Long term and short term action planning with scripts: a Pet investigation. *Cortex*, 38, 321-39.
38. Lafargue G., Sirigu, A. (2002). Sensation of effort is altered in Huntington's disease. *Neuropsychologia*, 40, 1-8.
39. Farné A, Roy A, Giraux P, Dubernard JM, Sirigu A. (2002) Face or hand but not both: perceptual correlates of reafferentation in a former amputee. *Current Biology*, 12, 1-5.
40. Sirigu, A., Camille, N., Zalla, T., Pradat-Diehl, P. Planification de l'action chez l'homme. (2002) *Revue de Psychologie Française*, 47, 21-30.
41. Buxbaum, L., Sirigu, A., Schwartz, M., Klatzky, R. (2003). Cognitive representation of hand posture in ideomotor apraxia. *Neuropsychologia*, 41, 1091-113, 2003
42. G. Lafargue, J. Paillard, Y. Lamarre, A. Sirigu (2003) Production and perception of grip force without proprioception: is there a sense of effort in deafferented subjects? *European Journal of Neuroscience*, 17, 2741-9, 2003.
43. T. Zalla, P. Pradat-Diehl, A. Sirigu (2003). Perception of Action Boundaries in Patients with Frontal Lobe Damage, *Neuropsychologia*, 41, 1619-27.
44. S. Blakemore, A. Sirigu (2003) Action prediction in the cerebellum and in the parietal lobe. *Experimental Brain Research*, 153, 239-45.
45. Elena Daprati, Daniele Nico, Nicolas Franck, Angela Sirigu (2003) Being the agent: Memory for action events. *Consciousness and Cognition*, 12, 670-83.

46. Giraux P. Sirigu A. (2003) Virtual movements of the paralysed hand restore motor cortex activity. *Neuroimage*, 20, 107-11.
47. D. Nico, E. Daprati, F. Rigal, L. Parsons, A. Sirigu (2004) Hands recognition in upper limb amputees. *Brain*, 127, 120-32.
48. Sirigu A. Daprati E. Ciancia S., Giraux P., Nighoghossian N., Posada A., Haggard P. (2004) Motor awareness and intention to move after focal brain damage. *Nature Neuroscience*, 7 80-4.
49. T. Zalla, I. Verlut, N.Franck, D. Puzenat, A. Sirigu (2004). Perception of dynamic action in patients with schizophrenia. *Psychiatry Research*, 30, 39-51.
50. Neppi-Modona M., Auclair D., Sirigu A., Duhamel JR (2004) Spatial coding of the predicted impact location of a looming object. *Current Biology*, 14, 1174-80.
51. Elena Daprati, Daniele Nico, Arnaud Saimpont, Angela Sirigu. (2003). Memory for Actions: Facilitating Role of Semantic Congruence and Motor Awareness. *Neuropsychologia*, (in press).
52. Camille N., Coricelli G., Sallet J. Pradat-Diehl P., Duhamel JR, Sirigu A. (2004) The involvement of the orbitofrontal cortex in the experience of regret. *Science*, 21, 1167-70.
53. Vargas C.D., Olivier E., Craighero L, Fadiga L., Duhamel, J.R., Sirigu A. (2004) The influence of hand posture on corticospinal excitability during motor imagery: a transcranial magnetic stimulation study. *Cerebral Cortex* 14, 1200-6.
54. Tsakiris M., Sirigu A., Franck N., Haggard P.(2005) A specific role for efferent information in self-recognition. *Cognition*. 96, 215-31.
55. Sirigu A, Duhamel JR (2005) Movement, action and consciousness: toward a physiology of intentionality. A special issue in honor of Marc Jeannerod. *Neuropsychologia*., 43, 149-50.
56. Daprati E, Nico D, Saimpont A, Franck N, Sirigu A. (2005) Memory and action: an experimental study on normal subjects and schizophrenic patients. *Neuropsychologia*., 43, 281-93
57. Kilner J., Vargas C., Duval S., Blakemore SJ, Sirigu A. (2004) Motor activation prior a predicted observed movement. *Nature Neuroscience*, 7, 1299-301.
58. Coricelli, G., Camille, N., Pradat-Diehl, P, Duhamel, JR, Sirigu, A. (2005). Why Anticipated Regret Influences Subjects' Choice. *Science*, 308, 1260-1261.
59. Coricelli G, Critchley HD, Joffily M, O'doherty JP, Sirigu A, Dolan RJ. (2005) Regret and its avoidance: a neuroimaging study of choice behavior. *Nature Neuroscience*, 1255-62.

60. Lafargue G., Franck N., Sirigu A. (2006) Sense of motor effort in schizophrenia. *Cortex*;42,711-9.
61. Lafargue G., Sirigu A. Nature et substratum neurologique du sense de l'effort. *Revue Neurologique* (2006) 162, 703-712
62. Daprati E., Sirigu A. (2006) How we interact with objects: learning from brain lesions. (2006) *Trends in Cognitive Science*, 10, 265-70.
63. Petruzzo P, Badet L, Gazarian A, Lanzetta M, Parmentier H, Kanitakis J, Sirigu A, Martin X, Dubernard JM. (2006) Bilateral hand transplantation: six years after the first case. *American Journal of Transplantation* 6, 1718-24.
64. Mercier C, Reilly KT, Vargas CD, Aballea A, Sirigu A. (2006) Mapping phantom movement representations in the motor cortex of amputees. *Brain*, 129, 2202-10.
65. Reilly KT, Mercier C, Schieber MH, Sirigu A. (2006) Persistent hand motor commands in the amputees' brain. *Brain*, 2211-23.
66. Coricelli, G., Dolan, R.J., Sirigu A. (2007) Brain, emotion and decision-making: the paradigmatic example of regret. *Trends in Cognitive Science*, 11, 258-65.
67. Mercier C, Aballea A, Vargas C, Paillard J, Sirigu A. (2007) Vision without Proprioception Modulates Cortico-spinal Excitability during Hand Motor Imagery. *Cerebral Cortex*. May 20.
68. Reilly KT, Mercier C, Schieber MH, Sirigu A., (2007) Persistent hand motor commands in the amputees' brain: *a reply to Levine*. *Brain*, 130, 65.
- 69 Dubernard JM, Testelin S., Morelon E., Sirigu A, Petruzzo P.? Martin X., Devauchelle B. (2007) First face transplantation in human: fourteen months follow up. *New England Journal of Medicine* (in press)
70. Gazarian A, Abrahamyan DO, Petruzzo P, Kanitakis J, Sirigu A, Dubernard JM, Eljaafari. Hand allografts: experience from Lyon team. *Ann Chir Plast Esthet.* 52:424-435, 2007
71. Reilly K. Sirigu A. The motor cortex and its role in phantom limb phenomena (2007) *The Neuroscientist* 14:195-202.
72. Lafargue G, D'Amico A., Thobois S., Broussolle E., Sirigu A. (2008) The ability to assess muscular force in asymmetrical parkinson's disease. *Cortex*, 44, 82-9.
73. Carota F., Sirigu , A. (2008) Neural bases of sequence processing in action and language. *Journal of Language and Learning* (in press).

## Book Chapters

1. Dubois, B., Vérin, M., Teixeira-Ferreira, C., Sirigu, A., Pillon, B. (1993). How to study frontal lobe functions in humans. In *Motor and cognitive functions of the prefrontal cortex*. Thierry, A.M., Glowinski, J., Goldman-Rakic, P., Christen, Y. (Eds.), Springer-Verlag.
2. Dubois, B., Pillon, B., Sirigu, A. (1993) Fonctions intégratives et cortex préfrontal chez l'homme. *Traité de Neuropsychologie Humaine*. Seron, X., Jeannerod, M. (Eds.) Bruxelles, Mardaga.
3. Dubois, B., Pillon, Malapani, C., Deweer, B., Vérin, M., Partiot, A., Défontaines, B., Sirigu, A., Teixeira, C., Agid, Y. (1993) Subcortical dementia and Parkinson's disease: what are the cognitive functions of the basal ganglia? In: Wolters, E.Ch., Scheltens, P. (Eds.) Vrije Universiteit, Amsterdam.
4. Sirigu, A., Pradat-Diehl, P., Zalla, T. Rôle du cortex préfrontal dans la représentation et la planification de l'action. Dans "Syndrome Frontal: Evaluation et Rééducation", Actes des 11<sup>e</sup> Entretiens de l'Institut Garches, pp.49-56, 1998.
5. Daprati E., Sirigu A. (2005) Action recognition disorders following parietal damage in *Higher-Order Motor Disorders: from Neuroanatomy and Neurobiology to Clinical Neurology*, (HJ Freund, M Jeannerod, M Hallett, R Leiguarda (Eds). Oxford University Press.
6. P.Giroux, A.Sirigu, F. Schneider, J.M.Dubernard. Cortical reorganization after hand transplantation In : Composite Tissue Allografts, (Dubernard JM Ed), John Libbey Eurotext, Paris, 2001.
7. Aballéa A., Giroux P., Schieber M., Sirigu A. (2007) Human brain plasticity after bilateral hand allograft. In: Hand transplantation (Lanzetta M., Dubernard JM, Eds), Springer.
8. Schieber, MH, Lang, CE, Reilly, KT, McNulty, P, Sirigu, A. Selective activation of human finger muscles after stroke or amputation (2007) In: *Progress in Motor Control – a Multidisciplinary Perspective* (Ed. Dagmar Sternad), New York, Springer.

## People Science articles

- Sirigu A., Camille N., Coricelli G. Les Bon raison d'avoir des regrets. (2005) *Cerveau & Psycho*, 9, 37-41.
- Lafargue G., Sirigu A. (2004) La volonté d'agir est-elle libre? Neuropsychologie de l'intentionnalité. *Cerveau & Psycho*, 6, 2-7.
- Giroux P., Sirigu A. (2003). Mains perdues, mains greffées: comment le cerveau retrouve ses mains? *La Recherche*, 366, 2-8.

***Conference Abstracts (\*published):***

1. Sirigu, A., Habib, M. Spatial self-orientation disturbance with right mesial temporal lobe lesions. (Workshop in Clinical Neuropsychology, European Brain and Behavior Society, Zurich, April 11, 1985).
2. Sirigu, A., Duhamel, J.-R., Poncet, M. Identification des objets dans un cas d'encéphalite herpétique: dissociation entre "comment on s'en sert" et "à quoi ça sert". (Société de Neuropsychologie de Langue française, Paris, Décembre 1985).
3. Sirigu, A., Duhamel, J.-R., Poncet, M. Sensori-motor and cognitive processes in object recognition: case study of an agnosic patient with bilateral mesial temporal lobe lesions (4th European Workshop in Cognitive Neuropsychology, Bressanone, Italy, January 19-24, 1986)
- 4\*. Sirigu, A., Grafman, J., Bressler, K., Sunderland, T. (1989) Impaired body parts localization with preserved body reference system. *Society for Neuroscience Abstracts*, 15, Part 1, p.728.
- 5\*. Duhamel J.-R., Fitzgibbon, E.J., Sirigu, A., Grafman, J. (1990) Saccadic eye movements following parietal cortex lesions. *Society for Neuroscience Abstracts*, 15, pp.899.
6. Sirigu, A., Grafman, J. Fractioning Autobiographical memory. (NIH Research Workshop, September 1990, Bethesda, USA).
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61. \*Reilly K., Pouga L., Duffau H., Mottolese C., Sirigu A. Cortical representations of hand and arm movements in the human perirolandic region. *Society of Neuroscience* San Diego, California, November 3-7, 2007.
62. \*Mottolese C, Szathmari A, Ricci-Franchi, Ginguene C, Desmurget M, Sirigu A Stimulation électrique cérébelleuse comme outils d'optimisation de l'acte chirurgical dans les lésions de la fosse cérébrale postérieure chez l'enfant : résultats préliminaires. *Société de Neurochirurgie de langue française (SNCLF)* 25-28 November 2007, Paris.
63. \*K.T. Reilly, A. Sirigu. Motor cortex organisation and body schema in congenital amputees. 3rd International Conference on Transcranial Magnetic and Direct Current Stimulation. October 1-4, 2008, University of Göttingen, UK.
64. \*Duhamel JR, Azzi J, Sirigu A. Neural basis of rewards in social context in rhesus monkeys. Human Frontier Science Program (HFSP): Eighth Awardees Annual Meeting, Berlin, Germany, 6-9 July 2008.
65. \*Andari, E., Coricelli, G., Georgieff, N., Sirigu, A. Socio-emotional deficits in high-functioning autism. Human Frontier Science Program (HFSP): Eighth Awardees Annual Meeting, Berlin, Germany, 6-9 July 2008.

## **Invited Talks**

### **1989-2000**

1. **Un ou plusieurs schémas corporels? Analyse d'un cas d'autotopoagnosie.** 2 Novembre, INSERM U289, 1989, Paris, France.
2. **Cortex frontal et plans d'actions.** Journée d'enseignement, Faculté de Médecine, 23 Novembre, 1992. Paris, France.
3. **Le rôle de la posture manuelle dans l'organisation du geste.** 8ème Rencontre de Neuropsychologie. 1-2 September 1994, Lausanne.
4. **Disorders of manual posture in apraxia.** Neuroscience and Modelling, UPMC, Jussieu, International Workshop: Visuo-motor transformations, 9, 12.1994, Paris.

5. **Troubles de la planification de l'action chez des patients avec lésions du cortex préfrontal.** Atelier de recherche en Psychopathologie Cognitive, 3.05. 1995, Paris.

6. **Représentation des mouvements de la main chez les cérébrolésés.** Symposium: Le codage cortical de l'action. (organisers: Jeannerod M., Boussaoud D.) Lyon, 14. 05. 1995, France.

7. **Planning processes in the prefrontal cortex.** Symposium: Structure and functions of the Human Prefrontal Cortex. (organisers: Grafman J., Holyok K.) New York Academy of Science, 1-4 March, 1995, New York, USA.

8. **Representation of hand movements following lesions of the parietal cortex.** Workshop: Ideomotor Apraxia, (organiser: Pr. Rizzolatti G.) International Cognitive Neuropsychology Meeting. 22-27 Janvier, 1996, Bressanone, Italie.

9. **Trouble de la représentation de l'action après lésion du cortex frontal.** Cercle des Neurologues, (organiser: Prof. Allilaire) Fondation Ipsen, 1 Mars 1996, Fontainebleau.

10. **Mental movement representation in brain-damaged patients** Università degli studi di Roma, Rome, April, 1997.

11. **Lobe frontal et programmation de l'action.** Symposium: Syndrome frontal: évaluation et rééducation. (organisers: Prof. B. Bussel, P. Azouvi, Institut Garches, 27 Novembre, 1998).

14. **Neuropsychology of mental movements.** Symposium: Neural basis of hand dexterity. (Organisateurs: M. Wiesendanger, E. Rouiller, J. Mathis) Ascona, Monte Verità, 3-8 May, 1998.

15. **Rôle du cortex pariétal dans l'imagerie du mouvement.** (organisers: A. Holley). Bibliothèque National, Lyon, Novembre 1999.

16. **Tool use and mechanical skills.** Workshop (organisers A. Sirigu, G. Goldenberg), Seventeenth European Workshop on Cognitive Neuropsychology. 24-29 Janvier, 1999, Bressanone, Italie. Organiser and Speaker.

17. **Representation of hand movements in normals and in brain-damaged patients.** Neurokolloquiem (organiser: J. Dichangs) 3 May 2000, Tübingen, Germany.

18. Neural basis of hand movements. International Neuropsychological Symposium, (INS), (Workshop on Motor Imagery, organisers: Marlene Behrmann), June 20-24, 2000, Thun, Suisse.

19. **The mental representation of hand movements after parietal cortex damage.** Workshop on *Action and Visuospatial Attention : Neurobiological Bases and Disorders*, (organisers: GR Fink, HJ Freund, K Zilles) Königswinter, 24-25 November, 2000.

### Since 2001

20. **Reorganization corticale après greffe des deux mains: un étude a l'IRMf.** *Inserm U289*, Paris, March 2001.

21. **Neural Basis of Reward.** Symposium on "Decision making in Psychology and Economy. (organiser: Massimo Piattelli-Palmarini) 7-11, February, Tucson, USA.

22. **Neural mechanisms of reward in normal subjects and in brain damaged patients.** International Neuropsychological Symposium, (INS), Workshop, *From Motivation to the Representation of Reward* (organisers: Barry Richmond et Wolfram Schultz) Grado, Italy, June, 2001.

23. **Body representation in normals and brain damage subjects.** (organisers: P. Haggard, T. Shallice) Experimental Psychology Society Meeting, Institute for Cognitive Neuroscience, 3-4 January, 2002 London, UK.

24. **Cognitive Neuroscience of Action** (organisers: Iring Koch and Raffaella Rumiati), Max Planck Institute for Psychological Research, Février 1 – 2, 2002, Kloster Irsee, Bavaria, Germany.

25. **La représentation du mouvement chez les patients cérébrolésés.** (organisers: Jean-Michel Roy, Ecole Normale Supérieure, Lyon), 25 Avril, 2002.

26. **Conscience du mouvement après lésion pariétale** (organiser: Pierre Jacob, ENS, Paris).

27. **Les processus de décision chez les patients frontaux.** (organiser: Société de Neuropsychologie de Langue Française, Liege, 24-25 Mai, 2002.

28. **Movement and awareness of movement following parietal lesion.** (*Cognitive and neural mechanism of visuo-motor control.* (Organisers: David Milner, Michel Desmurget, Hans-Otto Karnath, Agelonde, 5-10 September, 2002, France.

29. **Représentation du mouvement et plasticité corticale.** Workshop on Neuroimagerie, Centre de Neuroimagerie, CNRS, Université d'Aix-Marseille; (Organisers: JL Velay, JL Anton, INPC, Institut de Neurosciences Physiologiques et Cognitives, CNRS, Marseille, 3 Octobre 2002).

29. **The Parietal lobe's role in maintaining a forward model for movement .** (*Hemispheric dominance for the cognitive aspects of movement.* Organiser: K. Haaland, University Albuquerque, K. Heilman, University of Florida, International Neuropsychological Society, 5-7 February, 2003, Honolulu, Hawaii, USA).

30. **Decision Making, Regret and Disappointment after Pre-frontal Lobe Lesions.** (*The Role of Affect and Emotion in Decision Making* Organisateur: M. Piattelli-Palmarini, University of Tucson, Third Tucson interdisciplinary workshop on decision making, 6-9 Février, 2003, Tucson, USA)

31. **The effects of parietal lesions on gesture and action awareness.** (Symposium on *Convergences and divergences of lesions studies and functional imaging of cognition*, Organisers: G. Fink, J. Marshall, K. Zilles, 23-25 May, 2003, Bonn, Germany).

32. Reversibility of cortical reorganization in amputees following graft. (*Symposium on Cortical Reorganization of Sensory and Motor Maps: Brain Plasticity and Brain Dynamics, Sixth IBRO World Congress of Neuroscience*, Organisers: L. Cohen, NIH, A Sirigu, CNRS, 10-15 July 2003, Prague).

33. **Motor awareness after parietal lobe lesions** (International symposium on: *Ideomotor Apraxia*. Organiser : Mark Hallett, NINDS, NIH, 20-22 September 2004, Bethesda, USA).

34. **Motor representations and motor awareness after parietal damage.** *Lecture* at the British Psychology Society (organiser Glyn Humphreys), University of Birmingham, 22 October 2004.

35. **Motor plasticity in the brain.** *Lecture* for the *French Society of Neuroscience*, Lille, France, May 2005

36. **Motor Plasticity and phantom limb in the motor cortex.** *Lecture* at the Italian Society of Neuropsychology, May 27-28, 2005.

37. **Processus de décision et émotions.** Journée Jean- Louis Signoret, (Speaker and organiser) Fondation Ipsen, October 24, 2005.

38. **Plasticité du système nerveux.** *Lecture at “Planète cerveau un monde à explorer”* Musée de l’Homme, October 26, 2005, Paris.

39. **Apraxia after parietal lobe lesions** (*International symposium on: Ideomotor Apraxia*. Organiser : Mark Hallett, NINDS, NIH, October 31-3 November 2005, Bethesda, USA).

40. **Mouvement et sensation du mouvement dans cortex cérébral.** *Lecture for:* “10 ans de l’Institut Fédératif de Neurosciences Lyonnais (IFNL)”, November 30, Lyon, 2005.

41. **Emotion, decision making and regret.** *Workshop on: The Cognitive Neuroscience of higher mental functions: the wider context* (organisers A. Sirigu, Tim Shallice), *Twenty-Fourth European Workshop on Cognitive Neuropsychology*. 22-27 January, 2006, Bressanone, Italy. Organiser and Speaker.

42. **Motor Plasticity in the brain.** Seminar at the Sensorimotor Lab, Institute of Neurology, April 27, 2006, London, UK.

43. **Décision et Emotion.** *Lecture for:* « La semaine du cerveau » (organiser: Savasta M) Semaine Internationale du Cerveau à Grenoble, Mars 2006, Grenoble

44. Sensations fantômes chez les amputées. Les syndrome de délusion. (Organiser: Y Agid. Avril 2006, Enghien Les Bains.

45. **The role of parietal cortex in predicting movements.** Workshop on “Cortical control of higher motor cognition”, (Organisers; Binkofsky F, Rizzolatti G., Freund) May 19–20, 2006, Lübeck, Germany.

46. **La rappresentazione del movimento dopo danno centrale o periferico.** Workshop on “Corpo, spazio e movimento: incontro fra neuroscienze e riabilitazione. Organiser: Université de Trieste, faculté de Médecine, 16-17 Mars, Trieste, Italie

48. **Face or hand, not both: perceptual correlates of reafferentation in a former amputee.** Workshop on “Experiencing body parts through multisensory integration” (Organiser: E. Ladavas), European Societies of Neuropsychology, October 2006, Toulouse

49. **Prefrontal cortex and decision making.** VI Congresso Nazionale della Società Italiana di Riabilitazione Neurologica, Venezia Lido, Italy, April 2006.

50. **Integation multisensorielle dans le lobe pariétal chez l’homme.** Université Ouverte de Lyon, UCBL , Lyon, Lyon.

51. **Plasticité motrice après allogreffe des mains.** « Rencontres hospitalières des HCL : pratiques innovantes et recherche hospitalière : des enjeux pour tous», (Organiser : Hospices civils de Lyon) Avril 2006, Lyon.

52. **Bases neuronales de l’image du corps.** Colloque international : « Un visage : œuvre de main », (Organisateur : B Devauchelle, P De la Porte) Janvier 2007, Université de Picardie Jules Verne, Amiens.

53. **Cartes cérébrales et afférences périphériques.** 2eme Rencontres de neurologie Comportementales, maison de la Chimie, Février 2007, Paris

54. **Regret et prise de risque.** XIXèmes Entretiens annuels comportement et lésions cérébrales, Novembre 2006, Fondation Garches, Paris

55. **Action in health and disease.** “Brain basis of social interaction: from concepts to imaging” (Organiser: Riitta Hari) Pens/Hertie Winter school, December 2006, Kitzbuhel, Austria.

56. **Parietal lobe and internal models.** University of Verona, April 2007, Verona, Italy.

57. **Homo oeconomicus. Lecture at** Società Letteraria di Verona, April 2007, Verona

58. **The role of the parietal cortex in movement representation. Lecture at** the annual meeting of Argentinean Neuroscience Society, May 2007, Buenos Aires, Argentina.

59. **Motor plasticity and motor rehabilitation after peripheral damage. Lecture at** the annual meeting of Argentinean Neuroscience Society, May 2007, Buenos Aires, Argentina.

60. **Illusion of movements after central or peripheral damage in human patients.** Workshop *Neuroscience of Illusions* (organisers: M. Goldberg, B. Vallar), International Neuropsychological Symposium (INS), June 2007 Mati, Greece.

61. **Neuroimager y and Neuroprosthesis** » Workshop « From neural code to brain/machine interface », September 27- 29, 2007, Château de Montvillargenne, Gouvieux les Chantilly.

62. **Bases neurales des processus de décision.** Workshop on « *Perspectives Cognitives sur la Décision* », ENS ULM, 22 October, 2007, Paris.

63. **Plasticité et douleurs fantômes.** 13èmes Université de Neurologie, 13-16 September, Marseille.

64. **The implication of the parietal cortex in movement representation and motor intention.** The Second A. Guiora Annual Roundtable Conference in the Cognitive Neuroscience of Language: The cognitive and neural prerequisites of time in language. Workshop organised by the Max Planck Institute for Psycholinguistics October 17-18, 2007, Nijmegen, Netherlands.

65. **Réorganisation motrice après lésion.** Workshop on “*Petite enfance et neurosciences*” organised by ANECAMPS, Journées d’étude 29 & 30 novembre 2007, Espace.

66. **How the brain thinks about movement. Lecture at The Serpentine Gallery Experiment Marathon event,** [http://www.serpentinegallery.org/2007/08/park\\_nightsserpentine\\_gallery.html](http://www.serpentinegallery.org/2007/08/park_nightsserpentine_gallery.html). organized by Julia Peyton-Jones, Hans Ulrich Obrist and Olafur Eliasson. 13-14 October 2007, *Serpentine Gallery*, Kensington Gardens, London, UK.

**Movement illusion in patients with central or peripheral lesions** European Science Foundations., Symposium Conference on THREE DIMENSIONAL SENSORY AND MOTOR SPACE: Sant Feliu de Guixols, Spain, 6 - 11 October 2007 Barcelona.

67. **The role of the Frontal lobe in sequence processing.** International Congress on Rehabilitation, April 17-19 2008, Montecatini Terme, Italy.

68. **Decision making and Emotions. Lecture** organised by the Società letteraria, University of Ancona, May 2008 Ancona, (Italy).

69: **The role of the parietal cortex in motor awareness.** Workshop in honour of Benjamin Libet, (organisers: L. Nadel, W. Armstrong) Toward a Science of Consciousness Meeting, April 8-12, 2008, Tucson, USA.

70. **What the brain thinks about ours hands. Keynote Lecture at** the 1st American Conference on Reconstructive Transplant Surgery (ACRTS): Prospects and Future of a New Era in Reconstructive Surgery”. Organised by Prof. Thomas Starzl and Dr. Stefan Schneeberger, July 18<sup>th</sup>-19<sup>th</sup>, 2008, University of Philadelphia, Philadelphia, PA.

## **Angela Sirigu: *Summary of my Research Interests***

I was trained as a psychologist at the University “La Sapienza” in Rome, Italy and I subsequently specialized in Neuropsychology both in Marseille, France and at the National Institute of Health in Bethesda, Md, USA. I therefore have extensive experience in clinical and research work with brain damaged patients. I also committed myself to pursuing my research interests by combining behavioural studies in normal subjects and in patients using NeuroimagerY and Neurophysiological techniques (autonomous function monitoring, EMG, EEG, TMS, fMRI).

Currently Director of Research at the CNRS Institute des Sciences Cognitives in Lyon, I lead a group of scientists (see details about my group below) including junior researchers, post-docs, technicians and graduate students. This group is strongly multidisciplinary in its composition and its research themes. I have strong collaborations with clinicians in neurology, psychiatry, neurosurgery and rehabilitation medicine. I coordinate a multicenter study on patients who benefited from hand allografts which is funded by a collaborative award from the American National Science Foundation (NSF). My current research interests include high-level disorders of movement execution and ideation. Behavioural and neuroimagerY (fMRI, EEG) studies are conducted in normal subjects, and in patients with brain damage or peripheral injury (amputees, brachial plexus) in order to understand the functions of different brain regions such as the parietal and motor areas in motor planning and movement prediction. Our current hypothesis is that the parietal regions are important in monitoring internal signals from sensory feedback, forward model and movement intentions (see Sirigu et al, *Science* 1996; Sirigu et al, *Nature Neuroscience*, 2004; Kilner et al. *Nature Neuroscience*, 2005). Although we emphasise the role of central mechanisms in guiding goal directed actions, the way in which afferent information (visual or proprioceptive) contributes or in some case interferes with those signals is also investigated (see Sirigu & Duhamel, *Journal of Cognitive Neuroscience*, 2002; Vargas et al., *Cerebral Cortex*, 2004). Since 2006 with Michel Desmurget (senior scientist in my group) and Karen Reilly ((senior scientist, recently recruited at CNRS) we have undertaken a series of studies where we directly stimulated different cortical and subcortical regions in awake patients undergoing brain surgery after suffering from a tumour. The aim here is to identify how motor areas are organised and how premotor and parietal regions contribute to motor awareness. These projects are currently done in collaboration with Dr. Carmine Mottolese, neurosurgeon at the Neurosurgery

Department of the Neurological Hospital in Lyon and with Dr. Hugues Duffau neurosurgeon at Montpellier University.

An important issue we address in our group concerns the plasticity of the motor system at both behavioural and neural level. With Karen Reilly and Catherine Mercier (postdoc in my group), we recently explored the hypothesis that hand movements representations are perhaps still intact in the motor cortex after amputation, thus questioning the conclusions of several studies that have reported a shrinkage of the hand area in M1 (Mercier et al, *Brain* 2007; Reilly et al, *Brain* 2007). We stimulated the amputees' motor cortex using TMS while monitoring stump muscles activity and subjective reports of TMS-evoked movement sensations. In a parallel study, the same patients were asked to produce phantom movements while EMG activity in the remaining stump muscles was being recorded. When TMS was applied to different sites in the former hand representation, the stimulation evoked distinct and reproducible phantom movements. Furthermore voluntary movements of the phantom hand were associated with specific patterns of stump muscle activity, which differed from activity recorded in the same muscle groups during movements of the proximal limb. These findings have clearly implications on how limb representation following amputation is reorganized in M1. Contrary to the current belief that neurons in the hand region disappear to the profit of those coding proximal movements, this work clearly shows that the primary motor cortex still retains the ability to generate manual motor commands, albeit addressed to new muscle groups. We recently presented a new model of M1 organisation before and after limb amputation (Reilly & Sirigu, *The Neuroscientist*, 2007).

In collaboration with the group lead by Prof Dubernard, who performed in a upper limb amputee the first world double hand allograft, we demonstrated that the patient's brain integrated the "new" hands by overthrowing the cortical reorganisation induced by the amputation (Giroux et al, *Nature Neuroscience* 2001). We also showed in amputees with phantom pain that when these patients are provided with a visual feedback of the missing limb in movement the motor cortex is reactivated and phantom limb pain disappears (Giroux & Sirigu, *Neuroimage* 2004). The same technique adapted to hemiparetic patients with cortical lesions (we trained them to visualise a correct movement of their intact hand instead of seeing moving their own affected limb) proved to be very successful. Finally, the knowledge we gained on the properties of normal functioning of the motor system has been fruitful in designing new rehabilitation techniques for patients suffering from obsessive compulsive disorder which can be considered a high level motor impairment. Another important aspect of action representation I work on since my post-doctoral stay at NIH concerns the contribution

of cognitive and emotional process to decision making and the role of the frontal areas in regulating these behaviours (see our recent papers Camille et al, *Science* 2004; Coricelli et al, *Nature Neuroscience*, 2005; Coricelli et al, *Trends in Cognitive Science*, 2007). Several projects on neuroeconomics are about to be completed and others are planned where we intend to study the mechanisms of decision making from a game theory perspective using lesion and neuroimaging methods. More particularly we focus on how strategic thinking and emotions related to reward, self-interest or fairness regulate human individual and social behaviour. We are also studying how patients affected by autism behave in a social environment (Elissar Andari). Our goal is to identify rehabilitative techniques that can modify these patients' behaviour in a social setting.

People in my group work in small teams to favour scientific exchanges and increase motivation. One single researcher can be a leader in a project but also be part of other studies sharing the same scientific question. My collaborators know that research requires time so before any project begins we always ask whether the predicted results will contribute to increase knowledge in our field. For us, doing research is not a job but a passion that once we are in is very difficult to leave.

# “*NEUROPSYCHOLOGY OF ACTION GROUP*”

## RESEARCH TOPICS

- 1: Movement Representation, Prediction and Parietal lobes
- 2: Intention and Motor Awareness
- 3: Cortical Plasticity and Motor Rehabilitation
- 3: Decision making, Emotions and frontal cortex
- 4: Social Competence and Autism

## GROUP MEMBERS:

**Angela Sirigu**, *Coordinator*

### Permanent members:

**Michel Desmurget**, senior scientist, INSERM (CR1), Specialty: motor control, brain plasticity.

**Karen Reilly**, PhD, University of Rochester, USA; Specialty: Motor control and motor plasticity in grafted patients and amputees, EMG, TMS.

**Alexandre Mayer**, Associate professor, CNRS, UCLB Lyon, Specialty: Computer science.

**Nathalie Richard**, Research Engineer, (permanent position at CNRS).

**Carmine Mottolese**, Neurosurgeon, Chief of Neurosurgery Department, Neurological Hospital, Lyon, Specialty: motor control, cortical stimulation.

**Andres Posada**: Research Engineer, Specialty: motor awareness, EEG, MEG (Under CNRS contract).

Sylvain Harquel, Research Engineer, Specialty: motor awareness, Brain direct cortical stimulation, EEG, MEG (Under CNRS contract).

### Post-docs:

**Francesca Carota**, PhD, Specialty: language and action, MEG, fMRI

**Gianluca Deiana**, MD, Specialty: Motor plasticity, cortical stimulation, EEG.

**Laura Moretti** PhD, Specialty: neuroeconomics and fMRI decoding.

Graduate students:

**Antoine Aballea**, 3rd year of PhD in Neuroscience, Specialty: Motor plasticity in amputees and allografted patients, TMS.

**Erika Rodrigues**, co-directed with Claudia Vargas, Federal University of Rio de Janeiro.

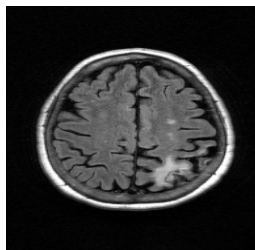
**Helene Parmentier**, 1 year of PhD in Neuroscience, Specialty: Motor recovery after peripheral injury.

**Elissar Andari**, decision making and autisme.

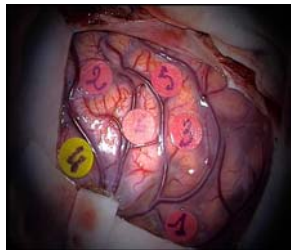
**Irene Cristofori**, 1nd year of PhD in Neuroscience, Specialty: decision making and neuroeconomics.

**Anoop Raj**, Motor awareness and parietal cortex.

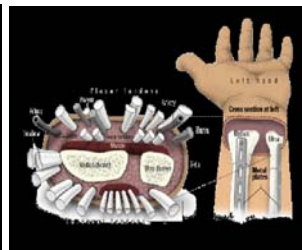
**EXPERIMENTAL MODELS AND TECHNIQUES WE USED TO EXPLORE BEHAVIOUR/BRAIN FUNCTIONS:**



**Cortical lesions**



**Direct Cortical Stimulation**



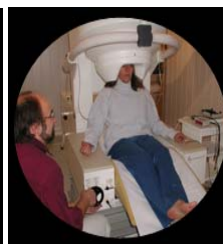
**Hand & Faces Transplant**



**fMRI**



**TMS**



**MEG**