JULIEN LAGARDE PhD

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Education

- *PhD 2001* : B THON, University Paul Sabatier Toulouse, France
  Sensorimotor learning, verbal instructions, language- sensorimotor interactions

- *Post-Doctorat 2002-2005* : JAS KELSO, Center for Complex Systems and Brain Sciences, Boca Raton USA
  Coordination dynamics, phase transitions, EEG, multimodal dynamics, social coordination

- *Post-Doctorat 2005-2008* : B BARDY, Enactive and Skills IP European projects
  Skills, virtual reality, juggling pattern, transfer of skills, postural coordination dynamics

- *Habilitation 2012* : La dynamique des patrons de coordination. Mécanismes impliqués dans l'intégration multisensorielle et les interactions interpersonnelles

Research

I investigate pattern formation/ coordination dynamics in cognition, human movement and perception. Specific topics include: Multimodal coordination dynamics, Social neuroscience, and Biological signal processing.

Publications

1- Fezzani, K., Thon, B., Lagarde, J. (2000). Can different levels of S-R practice influence sequence learning? An investigation into the context of a perceptual-motor sequence learning task. *Perceptual Motor Skills, 91*, 463-75.

2- Lagarde, J., Li, L., Thon, B., Magill, R.A., & Erbani, E. (2002). Interactions between human explicit and implicit perceptual motor learning shown by kinematic variables. *Neuroscience Letters, 327*, 66-70.

3- Lagarde, J., Peham, C., Licka, T., Kelso, J.A.S. (2005). The coordination dynamics of the horse-rider system. *Journal of Motor Behavior, 37*, 418-424.

4- Lagarde, J., Kelso, J.A.S. (2006). The binding of movement, sound and touch: Multimodal coordination dynamics. *Experimental Brain Research, 173*, 673-688.

5- Oullier, O., Lagarde, J., Jantzen, K.J., Kelso, J.A.S. (2006). Coordination dynamics: (in)stability and metastability in the behavioural and neural systems. *Société de Biologie, 200*, 145-167.

6- Tognoli, E., Lagarde J., DeGuzman, G.C., Kelso, J.A.S. (2007). The phi complex as a neuromarker of human social coordination. *Proc. Natl. Acad. Sci. U S A, 104*, 8190–8195. (*Featured in Scientific American Mind*).

7- Bonnet, V., Lagarde, J., Fraisse, P., Ramdani, N., Ramdani, S., Poignet, P., Bardy, B. (2007). Modelling human postural coordination to improve the control of balance in humanoids. *Proceedings 7th IEEE-RAS International Conference on Humanoid Robots*, 2007.

8- Nusseck, M., Fleming, R., Lagarde, J., Bardy, B. G., Buelthoff, H. (2007). Perception and prediction of simple object interactions. Proceedings of APGV07, Applied perception in graphics and visualization, July 25–27, 2007. Tübingen, Germany.

9- Lagarde J., Bardy B. (2007). Dynamique de coordination, variables collectives, et construits sociaux. Réponse à Grégory Ninot & Marina Fortes (2007). Science et Motricité, 60, 75-80.

10- Lagarde J., Mottet D., Bardy B. (2007). Coordination and human perceptuo-motor skills. First review of the IP SKILLS, December 2007. Sant'Anna Scool for Advanced Studies, Pisa, Italy.

11- Marin, L., Lagarde, J. (2007). The perception-action interaction comes first. Open peer commentary in *Behavioral Brain Sciences, 30*, 215-216.

12- Bardy, B.G., Oullier, O., Lagarde, J., Stoffregen, T.A. (2007). On perturbation and pattern co-existence in postural coordination dynamics. *Journal of Motor Behavior, 39*, 326-334.

13- Bonnet, V., Lagarde, J., Fraisse, P., Ramdani, N., Ramdani, S., Poignet, P., Bardy, B. (2007). Modelling human postural coordination to improve the control of balance in humanoids. Humanoids'07, Pittsburg PA, USA, 29 November-1st December 2007. *Proceedings 7th IEEE-RAS International Conference on Humanoid Robots*.

14- Oullier, O., Deguzman, G., Jantzen, K.J., Lagarde, J., Kelso, J.A.S. (2008). Social coordination dynamics: visual information exchange mediates spontaneous phase synchrony between people. *Social Neuroscience, 3*, 178-192.

15- Ramdani, S., Bouchara, F., Lagarde, J. (2009). Influence of noise on the sample entropy algorithm. *Chaos, 19*, 013123.

16- Ramdani, S., Seigle, B., Lagarde, J., Bouchara, F., Bernard, P.L. (2009). On the use of sample entropy to analyze human postural sway data. *Medical Engineering and Physics, 31*, 1023-1031.

17- Bonnet, V., Fraisse, P., Ramdani, N., Lagarde, J., Ramdani, S., Bardy, B. G. Modeling postural coordination dynamics using a closed-loop controller (2009). *Proceedings of the IEEE-RAS 8th International Conference on Humanoid Robots*.

18- Bonnet, V., Fraisse, P., Ramdani, N., Lagarde, J., Ramdani, S., Bardy, B. (2009). A closed loop musculoskeletal model of postural coordination dynamics. *48th IEEE Conference on Decision and Control*, Shanghai.

19- Filippeschi, A., Ruffaldi, E., Frisoli, A., Avizzano, C.A., Varlet, M., Marin, L., Lagarde, J., Bardy, B., Bergamasco, M. (2009). Dynamic models of team rowing for a virtual environment rowing training system. *The International Journal of Virtual Reality, 8*, 19-26.

20- Lagarde, J., Zelic, G., Avizzano, C.A. , Lippi, V. Ruffaldi, E., Zalmanov,H., Erev-Yehene, V., Gillian, N., O'Modrain, S., Mottet, D., Gopher, D. (2009). The Light Weight Juggling training system for juggling. SKILLS09, International Conference on Skills, Bilbao, Spain, 15-16 December.

21- Varoqui, D., Bardy, B., Lagarde, J., Froger, J., Pélissier, J-Y. (2010). Changes in spontaneous postural patterns following stroke. *Gait and Posture*, 32, 34-38

22- Bardy, B., Delignières, D., Lagarde, J., Mottet, D., Zelic, G. (2010). An enactive approach to perception-action and skill acquisition in virtual reality environments. 3rd International Conference on Applied Human Factors and Ergonomics, Miami FL, USA, 17- 20 July 2010.

23- Varlet, M., Marin, L., Lagarde, J., Bardy, B.G. (2011). Social postural coordination. *Journal of Experimental Psychology: Human Perception and Performance, 37,* 473-483.

24- Bonnet, V., Ramdani, S., Fraisse, P., Ramdani, N., Lagarde, J., & Bardy, B. G. (2011). A structurally optimal control model for predicting and analyzing human postural coordination. *Journal of biomechanics, 44*, 2123-2128.

25- J. Lagarde et al. (2011). Evaluation of the light weight Juggling system. B.G. Bardy, J. Lagarde and D. Mottet (Eds.), The International Conference SKILLS 2011. BIO Web of Conferences Vol. 1. (download free from publisher)

26- V. Lippi, E. Ruffaldi, G. Zelic, J. Lagarde, P. Tripicchio, C. A. Avizzano (2011). Uncontrolled manifold and Juggling: Retrieving a set of Controlled. B.G. Bardy, J. Lagarde and D. Mottet (Eds.), The International Conference SKILLS 2011. BIO Web of Conferences Vol. 1. (download free from publisher)

27- G. Zelic, D. Mottet and J. Lagarde (2011). Multisensory integration impacts coordination. B.G. Bardy, J. Lagarde and D. Mottet (Eds.), The International Conference SKILLS 2011. BIO Web of Conferences Vol. 1. (download free from publisher)

28- G. Zelic, D. Mottet and J. Lagarde (2011). Audio-tactile events can improve the interlimb coordination in Juggling. B.G. Bardy, J. Lagarde and D. Mottet (Eds.), The International Conference SKILLS 2011. BIO Web of Conferences Vol. 1. (download free from publisher)

29- Lagarde J., Zelic G., Mottet D. (2012, Online First). Segregated audio- tactile events destabilize the bimanual coordination of distinct rhythms. *Experimental Brain Research, 219,* 409-419.

30- Zelic G., Mottet D., Lagarde J. (2012). Behavioral Impact of Unisensory and Multisensory Audio-Tactile Events: Pros and Cons for Interlimb Coordination in Juggling. *Plos One 7(2)* e32308. doi:10.1371/journal.pone.0032308

31- Lagarde J. (2013). Challenges for the understanding of social coordination. *Frontiers in Neurobotics*, 7, 1-9.

32- Ramdani S., Bonnet V., Tallon G., Lagarde J., Bernard P.L., Blain H. (2015). Parameters selection for bivariate multiscale entropy analysis of postural fluctuations in fallers and non-fallers older adults. *IEEE Transactions on neural systems and rehabilitation engineering*, *24*, 859 – 871.

33- Zelic G., Mottet D., Lagarde J. (2016). Perceptuo-motor compatibility governs multisensory integration in bimanual coordination dynamics. *Experimental Brain Research*, *234*, 463-474.

34- Roy C., Dalla Bella S. Lagarde J. (2016). To bridge or not to bridge the multisensory time gap: Bimanual coordination to sound and touch with temporal lags. *Experimental Brain Research, in press.*

35- Ramdani S., Bouchara F., Lagarde J., Lesnes A. (2016). Recurrence plots of discrete-time Gaussian stochastic processes. *Physica D, 330,* 17-31.

36- Lagarde J., Lippi V., Ruffaldi E., Mottet D., Avizzano C.A., Bergamasco M., Zelic G. (in preparation, 2017). Transfer of skills, a fundamental approach. *ArXiv.org*

37- Lagarde J. (2017). How to do things with words (only): An introduction to the role of noise in coordination dynamics without equations. *Arxiv.org*

38- Roy C., Dotov D., Lagarde J., Dalla Bella S. (*in revision*). Walking to a Multisensory Beat. Brain and Cognition.

39- Roy C., Dalla Bella S. Lagarde J. (*in preparation,* 2017). The bright side of poor performance: departing from an endogenous rhythm boosts multisensory integration

40- - Lagarde J. (2017). How to do things with words (only): An introduction to the role of noise in coordination dynamics without equations. arXiv:1702.02492, Neurons and Cognition (q-bio.NC). https://arxiv.org/ftp/arxiv/papers/1702/1702.02492.pdf

Invited Conferences

- J Lagarde (2016) A cross-cultural study of Plasticity- Synchronization (Euromov seminar)
- J Lagarde (2014) Multimodal coordination dynamics: A couple of years back. *Center for Complex Systems and Brain Sciences, Florida Atlantic University, **Boca Raton Fl USA***
- J Lagarde (2014) Pattern formation far for equilibrium in brain and behaviour: The coordination dynamics theory. *Faculty of Physics, **University La Havana, Cuba***
- J Lagarde (2014) Social coordination: Oscillations in two interacting brains. ***University of Siena, Italy***
- J Lagarde (2012). Pattern formation processes between individuals: Social coordination dynamics. *ROMAN' 12. Workshop on Developmental and bio-inspired approaches for social cognitive robotics September 9th 2012, **Ecole des Arts et Métiers, Paris***
- J Lagarde (2011). Coordination Dynamics of Multisensory Integration. Workshop on Mathematical Models of Cognitive Architectures, December 5-9, 2011. Chairs : G Deco, V Jirsa. ***Centre International de Rencontres Mathématiques (CIRM) Luminy, Marseille***
- J Lagarde (2011) Invariant coordination patterns. A way to select functional units to train skills. *Summer School Skill Learning and Virtual Environments, July 25-30th 2011, **Castle of Gargonza (Arezzo, Italy)***
- J Lagarde (2009). The human laws of attraction: How social interaction can spontaneously take over postural dynamics. *Brain, Behavior, and Beyond: A seminar on Coordination Dynamics, 24 Avril, **Chaire d'Excellence Pierre de Fermat de la Région Midi-Pyrénées Toulouse***

Diffusion of Scientific knowledge

- J Lagarde (2017). Universaux des signes avant-coureurs de crise : résultats en neurosciences du mouvement humain (***Montpellier Université du temps libre***)
- J Lagarde (2017). De l'eau qui bout au trot qui devient galop, comment des signes universaux permettent d'anticiper des changements abrupts ? (***Les jeudis de l'UM***, Université de Montpellier).
- A presentation of the SKILLS IP project of the EU for the French TV show ***E = M6*** « Incroyables talents » with a juggling expert.

GRANTS: European Union Grants

SKILLS IP (FP6) (FP6-2005-IST5-IP35005) (2009- 2011; 10 million Euros):
Workpackage leader, member of the scientific committee, for the Université Montpellier 1
http://www.skills-ip.eu/

Consortium composition: Scuola Superiore Sant'Anna – Laboratorio PERCRO (IT). Fraunhofer Institut für Graphische Datenverarbeitung (DE). Commissariat à l'Energie Atomique (CEA)- Laboratoire d'Intégration des Systèmes et des Technologies (FR). **UM1– University Montpellier-1 (FR)**. DLR – Institute of Robotics and Mechatronics (DE). LABEIN (ES). CEIT (ES). Technion – Israel Institute of Technology (IL). University of Tampere (FI). QUB – Queen's University Belfast (UK). Aalborg University (DK). HAPTION (FR). KUKA Roboter GmbH (DE). OMG plc, (UK). Simonazzi S.p.A. (IT).