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# Physiopathologie de la vision et de la motricité binoculaire

Rapport Hcéres

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agence d'évaluation de la recherche  
et de l'enseignement supérieur

Department for the evaluation of  
research units

AERES report on unit:

Physiopathology of Binocular Control and Vision

IRIS-team

Under the supervision of  
the following institutions  
and research bodies:

Université Paris Descartes



December 2012



agence d'évaluation de la recherche  
et de l'enseignement supérieur

Research Units Department

President of AERES

**Didier Houssin**

Research Units Department

*Department Head*

**Pierre Glaudes**



# Grading

Once the visits for the 2012-2013 evaluation campaign had been completed, the chairpersons of the expert committees, who met per disciplinary group, proceeded to attribute a score to the research units in their group (and, when necessary, for these units' in-house teams).

This score (A+, A, B, C) concerned each of the six criteria defined by the AERES.

NN (not-scored) attached to a criteria indicate that this one was not applicable to the particular case of this research unit or this team.

**Criterion 1 - C1** : Scientific outputs and quality ;

**Criterion 2 - C2** : Academic reputation and appeal ;

**Criterion 3 - C3** : Interactions with the social, economic and cultural environment ;

**Criterion 4 - C4** : Organisation and life of the institution (or of the team) ;

**Criterion 5 - C5** : Involvement in training through research ;

**Criterion 6 - C6** : Strategy and five-year plan.

With respect to this score, the research unit concerned by this report received the following grades:

- Grading table of the unit: **Physiopathology of binocular control and vision**

| C1 | C2 | C3 | C4 | C5 | C6 |
|----|----|----|----|----|----|
| A  | A  | A  | A  | A  | A  |



## Evaluation report

|  |   |
|--|---|
| Unit name:                             | Physiopathology of binocular control and vision |
| Unit acronym:                          | IRIS  |
| Label requested:                       | University E.A. with CNRS label                 |
| Present no.:                           | UMR 8194-CESeM                                  |
| Name of Director<br>(2012-2013):       | Mr Pierre-Paul VIDAL                            |
| Name of Project Leader<br>(2014-2018): | Ms Zoi KAPOULA                                  |

## Expert committee members

|          |  |
|----------|--|
| Chair:   | Ms Christine ASSAIANTE, Université de Provence, CNRS                             |
| Experts: | Mr Frédéric CHIAMBARETTA, Université d'Auvergne                                  |
|          | Mr Pierre DENISE, Université de Caen, INSERM                                     |
|          | Ms Chéryl FRENCK-MESTRE, Université de Provence, CNRS,<br>(Representative CoNRS) |
|          | Mr Andreas SPRENGER, University Luebeck, Germany                                 |

### Scientific delegate representing the AERES:

Ms Sylvette TOURMENTE

### Representative(s) of the unit's supervising institutions and bodies:

Mr Bernard POULAIN, CNRS-INSB

Mr Stefano MARULLO, Université Paris 5 Descartes



## 1 • Introduction

### History and geographical location of the unit:

In 2007 the team was part of a large CNRS unity at Collège de France. The team headed by Ms Zoi KAPOULA became autonomous for the period 2008-2010. Since 2011 the team is part of a CNRS unit (CESeM, UMR 8194) directed by Mr Philippe VIDAL.

The label requested is: university team with a CNRS label, attached to the Fédération de Recherche en Neurosciences des Saints Pères (Director Mr Philippe DJIAN).

### Management team:

The team is composed by one full time researcher, the director, and 4 persons mainly involved in clinical responsibilities at various different places.

### AERES nomenclature:

SVE1-LS5

### Unit workforce:

| Unit workforce   | Number as at 30/06/2012 | Number as at 01/01/2014 | 2014-2018 Number of project producers |
|--|-------------------------|-------------------------|---------------------------------------|
| <b>N1:</b> Permanent professors and similar positions  | 2 (0.3)                 | 1 (0.25)                | 1                                     |
| <b>N2:</b> Permanent researchers from Institutions and similar positions   | 2                       | 1                       | 1                                     |
| <b>N3:</b> Other permanent staff (without research duties)   | 0                       | 0                       | 0                                     |
| <b>N4:</b> Other professors (Emeritus Professor, on-contract Professor, etc.)                                      | 0                       | 0                       | 0                                     |
| <b>N5:</b> Other researchers from Institutions (Emeritus Research Director, Postdoctoral students, visitors, etc.) | 5 (2.5)                 | 3 (1.4)                 | 3                                     |
| <b>N6:</b> Other contractual staff (without research duties)   | 5 (1.9)                 | 4 (0.9)                 | 4                                     |
| <b>TOTAL N1 to N6</b>  | 14 (6.7)                | 9(3.55)                 | 9                                     |
| Percentage of producers  | <b>100 %</b>            |                         |                                       |



| <b>Unit workforce</b>  | <b>Number as at<br/>30/06/2012</b> | <b>Number as at<br/>01/01/2014</b> |
|--|------------------------------------|------------------------------------|
| Doctoral students  | 5                                  |                                    |
| Theses defended  | 4                                  |                                    |
| Postdoctoral students having spent at least 12 months in the unit* | 0                                  |                                    |
| Number of Research Supervisor Qualifications (HDR) taken           | 0                                  |                                    |
| Qualified research supervisors (with an HDR) or similar positions  | 2                                  | 2                                  |



## 2 • Assessment of the unit

### Strengths and opportunities:

The unique combination of fundamental and clinical research is a major positive aspect. The team shows clear strengths as concerns its research and funding as well as its capacity to train doctoral students and attract post-doctoral research scientists. The team has shown its capacity to both participate in and lead research projects at the national and international level. Moreover, the recent addition of a clinical leader who is able to direct doctoral students is clearly beneficial to its growth. Lastly, the development of tools for diagnosis and rehabilitation as well as the neurophysiology of artwork gives an excellent impression.

### Weaknesses and threats:

Because of the clinical assignment of most of the members of the team, except the leader, the team is very isolated. Because of its insertion directly in various hospitals, conceptual and technical interactions with local neuroscience researchers were minimal, as well as access to the mutualized platforms and technical support. Moreover, up to now, only one HDR was present in the group, that constitutes a limitation to train young research workers.

### Recommendations:

An important point for the credibility of the new team should be also a strategy of co-publication between the researcher leader and the clinician leader. Indeed, the team recently incorporated a new PUPH, who will actively direct work on developmental ocular-motor disorders and the interaction with vestibular dysfunction. This will help remediate the current limitation of having had only one HDR in the team in the past. In the same vein, the more senior members of the team should be actively encouraged to pursue their research careers (obtaining their HDR) to open further avenues. Future directions should include increasing the present ties with the St Pères' Neuroscience Research Federation (previously IFR 95), to become a fully integrated team within this Federation. The development of new collaborations, on conceptual as well as on methodological aspects, is largely encouraged inside this Federation.



### 3 • Detailed assessments

#### Assessment of scientific quality and outputs:

The scientific work of Ms Zoi KAPOULA's group is well known in the community of her research field. The team is clearly visible at the national and international level. Concerning the team's international presence at scientific meetings, numerous presentations have been given at international conferences and workshops. In the French scientific landscape, the research conducted is unique. At the present time, the team is centered on one full time researcher and one other person mainly involved in clinical responsibilities. Nevertheless, up to now the scientific production is particularly important. The team has a mean publication rate of 12.25 per year during the last four years. The publication strategy changed over the last years. In 2008 and 2009 scientific articles were published in highly accepted but more specialized journals (e.g. Graefe's archive for clinical and experimental ophthalmology, Experimental Brain Research, IOVS, Vision Research) with moderate Impact Factors (IF) mostly. In spite of these moderate IFs these journals publish high quality scientific work only; publications in these journals therefore can be seen as an award for high quality of the scientific work. In recent years articles were published in journals with a broader readership, (e.g. PLoS One, Frontiers journals) and an higher IF. The quality of the work didn't change but now the scientific work is spread more widely. At the present time, the team proposes a balance between specialized journals on vision and oculomotricity and journals with a broader readership.

The scientific work of the team shows a potential for future publications in high-ranking journals. A publication in a high level journal depends on the effects that can be derived from a study or a set of studies. A combination of these various strands can be used to successfully submit a paper to a high level journal. This strategy of publication takes more time, and the publication rate may decrease. Nevertheless, the returns are obvious. Lastly, an important point for the credibility of the new team should be also a strategy of co-publication between the researcher leader and the clinician leader.

#### Assessment of the unit's academic reputation and appeal:

The team has shown its capacity to both participate in and lead research projects at the national and international levels. The team is currently involved in two PHRC (clinical research grants awarded to hospital teams) with teams at Hôpital La Pitié Salpêtrière and Hôpital Robert Debré respectively. The first PHRC aims to discriminate between neuro-degenerative diseases in the elderly (Lewy-Body Dementia vs. Alzheimer's) using ocular motor behaviour as a means. The second, involving young children (age 6 to 11) with vertigo but without definable clinical vestibular disorders, also uses ocular-motor behaviour coupled with postural control to determine the cause of their vertigo symptoms. These projects have provided both fundamental results and methods to improve clinical rehabilitation. At the international level, the team is involved in a project (PICS) with a team at Shanghai (China), dealing with neurodegenerative disorders, eye movements and stability. The team also obtained financial support from the Belgian Dyslexia foundation to investigate the neural network of dyslexia and creativity. This work is incorporated in a larger network involving research scientists at Oxford University. The team recruited an international post doctoral researcher who contributed to the development of the team's work on healthy ageing and on Alzheimer's disease. Currently, another post-doctoral researcher is collaborating in the PHRC on neurodegenerative diseases using mathematical models (fractal analysis of ocular motor behaviour) to distinguish between etiologies. Lastly, the team is partner of the ANR Equipex Matrice, the team leader is responsible for eye movement technology and emotional impact of historical representations at the Memorial of Caen.

The unique combination of fundamental and clinical research is a major positive aspect. The team shows clear strengths as concerns its research and funding as well as its capacity to train doctoral students and attract post-doctoral research scientists. Nevertheless, we recommend more interactions with local neuroscience researchers, that could be improved by a double insertion at the hospitals and at the Federation of Neurosciences Research of St Pères.

#### Assessment of the unit's interaction with the social, economic and cultural environment:

The team holds two patents which is quite rare for units working on basic neuroscience. These patents are mainly involved in the development of diagnostic tools and rehabilitation. The unique combination of scientific and clinical competences that are present in the team helps to bring insights into neurophysiological mechanisms to research on patient's problems and needs. This wide range of vision disorders present a general interest for a large range of people, and the team communicates with media about their scientific results.



The team recently produced a volume on the Visual Aspects of Dyslexia (Oxford University Press), which has received wide support from the academic community intended for the general public on dyslexia. Moreover, the group developed a new approach: neurophysiology of artwork. The team leader is responsible of the GDR ESARS (national network of researchers from various disciplines working on aesthetics and art in connection with artists). The team is promoting pluri and transdisciplinary research.

The development of tools for diagnosis and rehabilitation as well as the neurophysiology of artwork give an excellent impression. These innovative research programmes deserve to be encouraged.

#### Assessment of the unit's organisation and life:

The strength of the team clearly lies in the unique combination of competences, combining scientific, clinical and methodological expertise in physiopathology of binocular control and vision, during life span (including childhood, adolescent and aging). This excellent collaboration between neurosciences and clinical approaches is based on several eye movement laboratories, directly located in various hospitals. The team is composed by one full time researcher and 4 persons mainly involved in clinical responsibilities in various different places, such as an ophthalmology PU-PH in University Jules Verne Picardie, an ophthalmology PH in European Hospital Georges Pompidou, a contractual hospital doctor (Ear, Nose and Throat service) in European Hospital Georges Pompidou and a Physical Therapist in University of Bourgogne and Paris VII. The team has a number of international collaborations with leading groups in the field all around Europe, US and China and collaborates in national and international funding schemes.

Because of the clinical assignment of most of the members of the team, except the leader, the team is very isolated. It is necessary to connect this team with other research workers and students. The Federation of Research in Neurosciences of St Pères provides an excellent intellectual environment for this team. The development of new collaborations, on conceptual as well as on methodological aspects, are largely encouraged inside this Federation. Lastly, we would express that it would be a high mark up of the team to bring out researchers from PhD to HDR and at least to Professorship within the same or a different institute.

#### Assessment of the unit's involvement in training through research:

Several doctoral students and post-docs have been working in the unit in recent years. Obviously the good working structure and conditions of the unit attract French and foreign students and researchers. It has to be noted that the team is attractive to both neuroscientist and clinical students.

Although equipment and experimental setups existing in hospitals are adequate and sufficient for carrying the on going studies and the projects, access to the mutualized sensorimotor platform of St Pères would improve training on the basis of future collaborations with local teams.

#### Assessment of the five-year plan and strategy:

Most of the projects proposed for the next five years are in direct line with the previous successful studies. The three main axes are: 1. developmental disorders of binocular control in children and adolescent; 2. Neurophysiological mechanisms of saccade vergence synergy: interaction with posture and vestibular function; 3. Eye movements and neurodegenerative diseases. In addition, translational research on artwork and transfer of technology are still in progress. This ambitious project presents many advantages because most of the objectives are clearly identified and the methodology already successfully developed.

The unique combination of fundamental and clinical research is a major positive aspect. The recent addition of a new member who is able to direct doctoral students is clearly beneficial to its growth. Indeed, the team recently incorporated a new PUPH, who will actively direct work on developmental ocular-motor disorders and the interaction with vestibular dysfunction. This will help remediate the current limitation of having had only one HDR in the team in the past. In the same vein, the more senior members of the team should be actively encouraged to pursue their research careers (obtaining their HDR) to open further avenues. Future directions should include increasing the present ties with the St Pères' Neuroscience Research Federation (previously the IFR 95), to become a fully integrated team within this Federation.



## 4 • Conduct of the visit

The visit had been carefully prepared and members of the committee liked the scientific quality of the oral presentation. During the visit, the committee members were able to discover the information essential to the understanding of the life of the unit. The relative contributions of the director and of the other members of the team to the oral presentation and to the answers to the questions of the committee were carefully and appropriately planned.

### Visit date:

Start: 2012-12-18 at 8H30

End: 2012-12-18 at 17H00

Visit site(s): Centre Biomédical des Saints Pères

Institution: Paris Descartes

Address: Rue des Saints Pères, 75006 Paris

### Conduct or programme of visit:

8h30 -9h00 : Welcome (closed-door) Visiting committee with the AERES Scientific advisor

9h00 -9h15: AERES representative: the role and procedures of AERES

9h15-10h15 : Director of the Unit : Presentation of the past activities and project

10h15-11H : Results-projects : 3 talks

*11H-11H30: Coffee break*

11h 30-12h15: Parallel meetings with personnel:

Discussions with engineers, technicians, administrative

Discussions with staff scientists

Discussions with students and post-docs

12h 15-13H00 : Discussion with the representatives of the managing bodies

*13h-14h : Lunch*

14h-17h Private meeting of the visiting committee

17:00 End of the visit



## 5 • Statistics by field: SVE at 10/06/2013

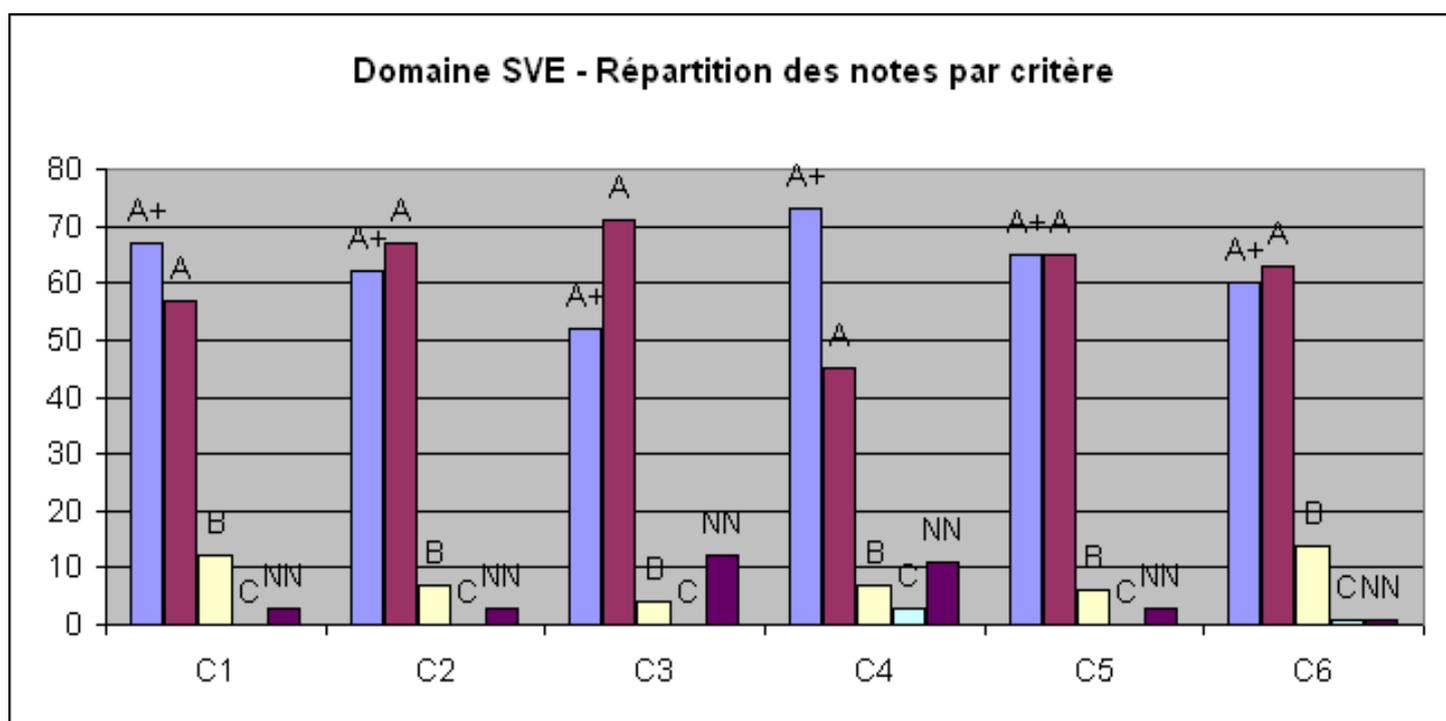
### Grades

| Critères | C1 Qualité scientifique et production | C2 Rayonnement et attractivité académiques | C3 Relations avec l'environnement social, économique et culturel | C4 Organisation et vie de l'entité | C5 Implication dans la formation par la recherche | C6 Stratégie et projet à cinq ans |
|----------|---------------------------------------|--|--|------------------------------------|---|-----------------------------------|
| A+       | 67                                    | 62   | 52   | 73                                 | 65  | 60                                |
| A        | 57                                    | 67   | 71   | 45                                 | 65  | 63                                |
| B        | 12                                    | 7  | 4  | 7                                  | 6   | 14                                |
| C        | 0                                     | 0  | 0  | 3                                  | 0   | 1                                 |
| Non Noté | 3                                     | 3  | 12   | 11                                 | 3   | 1                                 |

### Percentages

| Critères | C1 Qualité scientifique et production | C2 Rayonnement et attractivité académiques | C3 Relations avec l'environnement social, économique et culturel | C4 Organisation et vie de l'entité | C5 Implication dans la formation par la recherche | C6 Stratégie et projet à cinq ans |
|----------|---------------------------------------|--|--|------------------------------------|---|-----------------------------------|
| A+       | 48%                                   | 45%  | 37%  | 53%                                | 47%   | 43%                               |
| A        | 41%                                   | 48%  | 51%  | 32%                                | 47%   | 45%                               |
| B        | 9%                                    | 5%   | 3%   | 5%                                 | 4%  | 10%                               |
| C        | 0%                                    | 0%   | 0%   | 2%                                 | 0%  | 1%                                |
| Non Noté | 2%                                    | 2%   | 9%   | 8%                                 | 2%  | 1%                                |

### Histogram





## 6 • Supervising bodies' general comments

Vice Président du Conseil Scientifique

Paris le 09.04.2013

Vos ref : S2PUR140006246 –  
Physiopathologie de la vision et de la  
motricité binoculaire - 0751721N

Monsieur Pierre GLAUDES  
Directeur de la section des unités de recherche  
Agence d'Évaluation de la Recherche et de  
l'Enseignement Supérieur  
20, rue Vivienne  
75002 PARIS

Monsieur le Directeur

Je vous adresse mes remerciements pour la qualité du rapport d'évaluation fourni à l'issue de la visite du comité d'expertise concernant l'unité « Physiopathologie de la vision et de la motricité binoculaire »

De même que le Directeur de l'unité, Zoi KAPOULA, le Président et moi-même n'avons aucune remarque particulière à apporter.

Je vous prie d'agréer, Monsieur le Directeur, l'expression de ma considération distinguée.

Le Vice Président du Conseil Scientifique



Stefano Marullo, DM, DesSci