



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

Department for the evaluation  
of research units

AERES report on unit:

Laboratoire Psychologie de la Perception

LPP

Under the supervision of  
the following institutions  
and research bodies:

Université Paris Descartes

CNRS



November 2012



# Evaluation report

Unit name:	Laboratoire Psychologie de la Perception
Unit acronym:	LPP
Label requested:	UMR
Present no.:	8158
Name of Director (2012-2013):	M. Kevin O'REGAN
Name of Project Leader (2014-2018):	M. Andrei GOREA

## Expert committee members

Chair: M. Pierre BARRROUILLET Genève, Suisse

Experts:

- M. Paul AVAN Clermont-Ferrand
- M. Pascal BARONE Toulouse (Representative CNRS)
- M. Karl GEGENFURTNER Giessen, Allemagne
- M. Bernard LETE Lyon (Representative CNU)
- M. Jose Junca de MORAIS Bruxelles, Belgique

Scientific delegate representing the AERES:

Ms Annie VINTER

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

M. Frédéric DARDEL (President of Université René Descartes)

Ms Nathalie LERESCHE (chargée de mission CNRS)



## 1 • Introduction

### History and geographical location of the unit

The Laboratoire Psychologie de la Perception (LPP) has been created in 2006 by members of two research units from the Institut de Psychologie at Boulogne, the Laboratoire de Psychologie Experimentale (LPE) and the Laboratoire Cognition et Développement. The LPP became UMR CNRS 8158 in January 2007. It is located at the Centre Universitaire des Saints Pères and, for the audition team, at the ENS rue d'Ulm.

### Management team

The director for the period 2007-2012 was M. Kevin O'REGAN, researcher at the CNRS. M. Andrei GOREA, researcher at the CNRS too, has been in charge of drafting the project as the future director of the unit.

### AERES nomenclature

**SHS4\_2** : Psychology

### Unit workforce

Unit workforce	Number as at 30/06/2012 <sup>1</sup>	Number as at 01/01/2014 <sup>2</sup>	2014-2018 Number of project producers <sup>3</sup>
<b>N1:</b> Permanent professors and similar positions	8	6	6
<b>N2:</b> Permanent researchers from Institutions and similar positions	15	11	11
<b>N3:</b> Other permanent staff (without research duties)	12	8	
<b>N4:</b> Other professors (Emeritus Professor, on-contract Professor, etc.)	0	1	1
<b>N5:</b> Other researchers from Institutions (Emeritus Research Director, Postdoctoral students, visitors, etc.)	22	2	2
<b>N6:</b> Other contractual staff (without research duties)	1	2	
<b>TOTAL N1 to N6</b>	<b>58</b>	<b>30</b>	<b>20</b>
Percentage of producers	<i>100,00 %</i>		



Unit workforce	Number as at 30/06/2012	Number as at 01/01/2014
Doctoral students	33	
Theses defended	43	
Postdoctoral students having spent at least 12 months in the unit*	20	
Number of Research Supervisor Qualifications (HDR) taken	5	
Qualified research supervisors (with an HDR) or similar positions	19	12



## 2 • Assessment of the unit

### Strengths and opportunities

The main strength of the unit is undoubtedly its outstanding scientific level. Each of its teams is at the forefront of the European research and even worldwide. To take just two examples, the Vision team is the most important and creative group in this field in Europe with a huge impact, remarkable creativity and innovative projects, making of Paris a leader place for the research on vision. The audition group is unique at the theoretical and applied levels with an impressive variety of methodologies used. The two other teams (Perception Action Development and Speech Perception Development) produce high-level research with important advances in the domains of early development and infant's capacities. This scientific excellence is testified by an impressive record of publications in high-ranking journals. The LPP is therefore a jewel of French psychology and a worldwide leader in the study of perception. In this regard, the work of the Director during these years should be emphasized for having conceived the project of a research group specialized on perception and for having been able to unite around him many talented researchers and to promote very good research.

The LPP is also remarkable for its ability to attract many researchers and post-doctoral students from abroad, with a dozen of internationally renowned scholars invited. This results in very good international collaborations that increase the impact of the lab.

The capacity to obtain financial support with 5 ERC grants and currently 9 national grants including 6 ANR is something probably unique in our country. It should be noted that among the ERC grants, three of them are starting grants, testifying for the outstanding quality of the young researchers of the group.

Another strength is the very good and stimulating doctoral training, something confirmed by the doctoral and post-doctoral students themselves.

Finally, but importantly, the research unit enjoys the full support of the University and the CNRS.

### Weaknesses and threats

Seven out of the 19 researchers involved in the project will be aged 62 or more at the beginning of the next five-year period. Thus, several leader researchers will leave the unit in a next future.

### Recommendations

Particular attention should be paid to recruitments. Many retirements that will occur in the coming years could weaken the laboratory. Maintaining this level of excellence requires not only the recruitment of talented young researchers but also of senior researchers able to take in charge the leadership of research groups. A special effort of the University and the CNRS will probably be necessary if one wants to maintain the exceptional scientific level of the LPP. Both institutions have up to now invested many resources in this research unit and this investment might be extended.

In relation to recruitment problems, the laboratory should not be isolated from the psychology curricula of the University and from the source of recruitment of lecturers and professors these curricula constitute. Particular attention should be paid to this question within a competitive environment with several laboratories of psychology necessarily competing for a limited amount of human resources. In this respect, it could be damaging to exclusively focus on the Cogmaster, which is excellent but no longer associated with the Institut de Psychologie.

Because the next director will reach retirement age at the end of the forthcoming five-year period, a reflection should be initiated to identify potential candidates for laboratory management.



### 3 • Detailed assessments

#### Assessment of scientific quality and outputs

The scientific quality of the research carried out by the LPP is simply excellent. This lab is a national and international reference for the study of perception, with frequent and regular publications in world top-leading journals in the domain.

Considering the 8 permanent professors (4 ETP equivalent full time) and 15 permanent researchers (15 ETP) who have contributed to the scientific productions between 2007 and mid-2012, the unit has published 336 articles in journals appearing in the Aeres-psychology list, that is more than 14 articles per member during the 5 last years, or 3,5 articles per year and per ETP. But the main point is that most of this production has appeared in the best international journals, with high impact (*Nature Neuroscience, PNAS, Current Biology, TICS, Neuroscience and Biobehavioral Reviews, Psychological Bulletin, Neuron, Psychological Science, Developmental Science...*). The production of the unit also includes 8 books, 59 chapters and numerous communications to conferences. One member of the committee has qualified this production as "stellar", a comment that needs no further development.

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

As we have seen above, this is one of the main strengths of the unit. The number of post-doctoral students has increased from 9 in 2008 to 32 today, with a large majority coming from foreign universities. Several top foreign scientists have been recruited as Enseignants-chercheurs or chercheurs. The academic reputation of the unit can also be appreciated through the number of international grants obtained, with 5 ERC grants. Some of the members of the unit are regularly invited to give keynote lectures in important international conferences. Networking of the unit is also very active at the national level with the management of three GDR (Groupement De Recherche, the GDR Vision, the GDR GRAEC on experimental and clinical audiology, and the GDR Cognitive Neuroscience of Development) and with an involvement in two Réseaux Thématiques de Recherches Avancées (RTRA). At the local level, the lab is strongly implicated in the creation of the Institut des Neurosciences et de la Cognition and in the Fédération de Recherche that brings together all the neuroscience labs at the Centre des Saints Pères.

To conclude, the unit enjoys a visibility, academic reputation and appeal that can be considered as unique in French psychology.

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

The unit entertains close links with the industry, with two CIFRE grants with Technicolor and Orange Labs and a research grant with Thalès. The members of the teams specialized in developmental psychology regularly act as experts on educational and health issues (World bank, UNESCO, INSERM) and have designed tools for linguistic evaluations (Early Grade Reading Acquisition, EVALEC). Members of the Perception-Action team run a unit at the Paris Fondation Ophtalmologique to diagnose and treat visual problems, while the Vision and Perception-Action teams are contributing to renovating of exhibits at the Palais de la Découverte and the Musée de la Villette. The Audition team organizes a Journée Nationale de l'Audition that brings together industrials, clinicians and scientists interested in hearing prostheses. The entire lab regularly contributes to the Nuit des Chercheurs organized by the city of Paris, or to the Fête de la Science. Overall, the members of the lab make an effort to play a role in their socio-economic and cultural environment.

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

The director of the lab is assisted by two assistant directors. Each of the four research teams of the laboratory has a head who is responsible for his or her team and is a member of the Conseil de Laboratoire, which meets every two months. Also sitting on this Conseil are representatives from the doctoral and post-doctoral students, from the technical staff, the university teachers and the CNRS researchers. The Conseil de Laboratoire discusses issues related with recruitments, the involvement of the lab in different institutions, as well as the organization of scientific events. This Conseil discusses also the distribution of financial resources. Scientific policy is generally determined within each team, but general scientific policy or reorganization of the lab is discussed by the Conseil de laboratoire, and sometimes the Assemblée Générale is consulted. During the visit, the committee noted a positive and warm atmosphere indicating a good governance of the lab. This was confirmed by the meeting with the doctoral students. It should be noted that the transfer of direction took place without any difficulty or conflict.



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

The involvement of the unit in training through research is excellent, with 43 doctoral theses defended and 32 PhD students currently working in the lab in June 2012. The unit belongs to the Doctoral School "Cerveau-Cognition-Comportement" of the University of Paris Descartes (ED 261). Training is very active, with a weekly journal club and PhD students organizing seminar to review papers or prepare conference presentations. They are also invited to present their work during the annual whole-day 'lab marathon' during which all the members of the lab and students make a short presentation of their scientific activity and projects. They receive strong incentives to publish their work. There is no doubt that PhD and post-doctoral students at the LPP benefit from a very good scientific environment and constitute a pool of young researchers who are likely to be recruited in the future.

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

The LPP faced a challenge with the Auditory team and a small branch of the Vision team leaving the laboratory to the Ecole Normale Supérieure due to administrative changes in the organization of the Parisian universities. This results in the loss of an important part of the initial lab that could have led to its weakening. This is not at all the case, and the laboratory proved especially reactive and innovative in these circumstances. The project presents a LPP reorganized in a new structure integrating a new research topic and reinforcing the collaborations between teams. Along with the Vision and Speech perception groups that already existed is created a new Action, Volition & Consciousness team specialized in the study of human action control, the role of feedback and cognitive load in perceptual plasticity, as well as consciousness and attention in experimental and clinical settings. Moreover, the team "Perception Action Development" is now entitled "Perception, Action, and Cognitive Development" with a wider range of developmental phenomena addressed covering topics as diverse as perception, action, concepts formation, and social cognition in infants, children, but also adults from typical and atypical populations. This results in a lab tackling a wider range of psychological functions and processes that go beyond perception. Despite this greater diversity, the possibility of cooperations between groups is preserved and even reinforced. As an example, the present director, who was member of the vision team will be integrated in the Perception, Action, and Cognitive Development team. Overall, the project is a perfect balance between novelty and innovative research topics on the one hand and the pursuit of research programs that have made the renown of the LPP on the other.



## 4 • Team-by-team analysis

**Team 1 :** Vision team

**Name of team leader:** Mr Pascal MAMASSIAN (change of leader for the project: Mr Mark WEXLER)

**Workforce**

Team workforce	Number as at 30/06/2012 <sup>1</sup>	Number as at 01/01/2014 <sup>2</sup>	2014-2018 Number of project producers <sup>3</sup>
<b>N1:</b> Permanent professors and similar positions	2	2	2
<b>N2:</b> Permanent EPST or EPIC researchers and similar positions	5	2	2
<b>N3:</b> Other permanent staff (without research duties)	3	2	
<b>N4:</b> Other professors (PREM, ECC, etc.)			
<b>N5:</b> Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.)	6		
<b>N6:</b> Other contractual staff (without research duties)			
<b>TOTAL N1 to N6</b>	<b>16</b>	<b>6</b>	<b>4</b>

Team workforce	Number as at 30/06/2012	Number as at 01/01/2014
Doctoral students	11	
Theses defended	15	
Postdoctoral students having spent at least 12 months in the unit	6	
Number of Research Supervisor Qualifications (HDR) taken	1	
Qualified research supervisors (with an HDR) or similar positions	5	2



## • Detailed assessments

### Assessment of scientific quality and outputs

LPP's vision team can be considered such as the best visual psychophysics group of Europe over the last 5 years. This was achieved not by a big mass of routine publications, but rather by a large number of high quality projects that have had significant and lasting impact on the field. Instead of covering all aspects of vision equally, the Vision team has concentrated on three core aspects of visual perception. In particular, they chose (i) to study the interaction of vision with action, (ii) to understand how visual processing can lead to visual awareness, and (iii) to investigate how vision interacts with the other senses. In each one of these areas, they achieved major breakthroughs.

One of the most puzzling problems in vision science is how the brain achieves a stable percept of the world, despite constantly changing retinal images. A senior member of the team, together with his postdoc and researchers from Germany, has investigated the functional correlates of the predictive remapping of receptive fields accompanying eye movements. They found that, briefly before the eyes start moving, attention drawn to the targets of upcoming saccades also shifted to those retinal locations that the targets would cover once the eyes had moved, facilitating future movements. This predictive remapping of attention provides an efficient mechanism for keeping track of relevant parts of the scene when frequent rapid eye movements provoke retinal smear and temporal masking.

Another big topic of debate is how sensory signals are combined from different modalities. The major question is whether multimodal signals are individually weighted, or whether there exist special processing modules sensitive to their interactions. Another member of the team and his postdoc showed that evidence is accumulated for each signal separately and that consequent decisions are flexibly coupled by logical operations. A whole bulk of previous findings has to be reinterpreted in the light of their results.

The impact of these researchers is tremendously high. One of them might be the most cited vision researcher of our day with more than ten thousand citations on Google Scholar. The director is one of the most successful researchers world-wide on visual consciousness. The other members of the group are also well cited, according to their career stages. The leader of the team is performing extremely innovative work right now, combining psychophysics with Bayesian modeling and neuroimaging. Work along these lines will have great future impact.

These researchers have both strong national and international collaborations. They are well-connected and have made Paris into the center of research on visual psychophysics. Publications of the team have regularly appeared in the leading high impact journals (Nature Neuroscience, Current Biology, PNAS). The researchers are also on the editorial boards of the leading specialized journals in the field.

The researchers are part of a number of national and international grants. Astonishingly, four of the seven vision team members now hold ERC grants. Two of them were just awarded ERC Advanced Grants, one member is a co-investigator on an Advanced Grant, and another one holds a Starting Grant. This is unheard of for any other group of this size! In addition to this, the leader of the team was coordinator of an EU-Marie-Curie training network, which is now in its 3<sup>rd</sup> generation. The high quality of research has made the lab a highly attractive place for good students and talented foreign PostDocs.

A big effort is made to invite renowned scientists to regular colloquia. Even more important, the group organizes workshops in Paris ("Fests") where whole labs are invited. These events have become an important outlet for important questions in European vision science.

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

Given the great successes of the last 5 years, it is rather unfortunate that the vision team will undergo large changes, with only 4 of the 7 members remaining. However, even at this reduced capacity, the team will undoubtedly keep being highly successful during the coming 5 years.

They have thoughtfully chosen to address three important problems in visual science during that period. Motion, space and time are "classic" topics of interest in visual perception. Visual Stability is currently a topic hotly debated, on which the group has already made groundbreaking contributions. Here, they are building on their previous work and extending it to crossmodal stability. The third key area is about eye movements and decision making, which is an upcoming topic of great interest. There is a lot of interaction between these different themes and the individual projects are only loosely assigned to themes. This will foster collaboration and produce synergy effects. The project has the potential to maintain the extremely high level quality of research the group is known for.



## Conclusion

- Strengths and opportunities:

During the past 5 years, the LPP has become the most important European center for visual psychophysics. This has led to important collaborations and scientific breakthroughs. It is reflected in the great attractiveness of LPP for PostDocs world-wide. There is an opportunity to build on that strength!

- Weaknesses and threats:

The biggest threat is that the current vision group has split. One member has retired, one is leaving to setup a competing group at ENS, one has setup his own team at LPP, and two other members will retire within the next 5 years.

- Recommendations:

In 5 years, only two of the four current members will be remaining. It is of utmost importance to hire some good basic vision researchers right away to join the group and lead them into the future.



**Team 2 :** Audition team

**Name of team leader:** Mr Daniel PRESSNITZER

**Workforce**

<b>Team workforce</b>	<b>Number as at 30/06/2012<sup>1</sup></b>	<b>Number as at 01/01/2014<sup>2</sup></b>	<b>2014-2018 Number of project producers<sup>3</sup></b>
<b>N1:</b> Permanent professors and similar positions	2	2	2
<b>N2:</b> Permanent EPST or EPIC researchers and similar positions	2	1	1
<b>N3:</b> Other permanent staff (without research duties)	2	2	
<b>N4:</b> Other professors (PREM, ECC, etc.)	0		
<b>N5:</b> Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.)	7		
<b>N6:</b> Other contractual staff (without research duties)	1		
<b>TOTAL N1 to N6</b>	<b>14</b>	<b>5</b>	<b>3</b>

<b>Team workforce</b>	<b>Number as at 30/06/2012</b>	<b>Number as at 01/01/2014</b>
Doctoral students	5	
Theses defended	7	
Postdoctoral students having spent at least 12 months in the unit	7	
Number of Research Supervisor Qualifications (HDR) taken	2	
Qualified research supervisors (with an HDR) or similar positions	4	1



## • Detailed assessments

The audition team was created two years before the period under study, starting with 3 permanent researchers, two from CNRS and one PR, plus one engineer. Between 2007 and 2012, it has been reinforced by one scientist coming from the field of computer science. Through the use of complementary techniques from psychophysics, physiology of auditory pathways, signal processing and computational neuroscience, the choice of a common center of interest (timing in auditory processing) and the personal output of each of its participants in excellent journals, the Audition team has acquired a broad, international standing and a clear identity.

### Assessment of scientific quality and outputs

The reputation of the audition team comes from their publications on three levels of investigations, grounded in psychophysics and addressed with the help of a broad range of methods (from psychophysics itself to electrophysiology to signal processing). The first theme investigated the part played by temporal features of complex sounds (envelope vs. temporal fine structure) in their perception, both in normal and hearing-impaired subjects. The second theme addressed mid-level processes involved in the analysis of auditory scenes and examined how auditory memory contributes to sound analysis. The last theme pertained to computational models and tools for signal processing. All three themes revolve around a common core: the psychoacoustics of temporal characteristics of complex sounds.

Among the major results of the team, one can single out the groundbreaking report (making the cover of the *Neuron* issue where it came out) that auditory memory can build up in an unsupervised manner for meaningless sequences of noise. Another intriguing series of results showing how the perception of temporal cues can be disrupted in patients with sensorineural hearing loss, even in audiometrically spared regions, raises exciting questions, the answers to which will be important for the large community of hearing-impaired people. Last, novel tools designed using cutting-edge signal processing techniques have an obviously strong clinical potential.

One of the originality in the scientific approach was to confront some mechanisms of visual processing to auditory perception. This has been successfully achieved using a paradigm of visual or auditory multistable perception revealing shared principles of perceptual organization. In addition to a publication in *Current Biology*, this gave rise to a special issue in *Philosophical Transactions of the Royal Society B: Biological Sciences*, co-edited by one member of the audition team.

Accordingly, the impact of the published work has been highly satisfactory, with several papers published in top generalist journals, *Nature Neuroscience* and *Neuron*; excellent broadband journals such as *Journal of Neuroscience*; and the best specialty journals in the field of hearing, e.g., *JASA* and *JARO*. The H-indexes of the audition team researchers testify to their impact, that is, from 32 for the most senior team member to between 14 and 20 for the younger ones. That the number of Pubmed-referenced publications has been 117 over the last 5.5 years, thus corresponding to 4.25 per researcher and per year, is to be commended.

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

The Audition team is involved in numerous national and international networks. First, a member of the group was the founder of the CNRS GDR GRAEC which succeeded in putting together a large range of scientists, clinicians and private companies working on clinical audiology. Second, one member of the audition team is also at the head of the Labex IEC (Institut d'Étude de la Cognition) which conveys an exciting dynamic of the Cognition at the École Normale Supérieure (ENS). The strong implication of the team in the Cogmaster at ENS, and their ability to secure national and international grants (ANR, ERC) allowed them to attract many excellent PhD students with already an appropriate background, and who had their share of the high output of the team in international journals.

Some members of the group belong to the editorial boards of high-quality journals in diverse topics from computational neuroscience (*Frontiers in Neuroinformatics*) to review journal (*Trends in Cognitive Sciences*). One member received the IUF Junior that distinguishes each year a small number of university professors for their research excellence. The Audition group organized or co-organized 17 international meetings with the participation of high-level scientists in audition.

The ability for this team to attract large grants is impressive, both from ERC and ANR. It allowed them to attract, for at least five years, an expert professor from the USA, which already considerably reinforces their experimental strength and opens promising themes. The team is also founding member of a Labex structure.



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

The audition team is firmly embedded in clinical research through a series of studies aimed on auditory processing in hearing impaired subjects or cochlear implanted deaf patients.

In the past five years, user-friendly diagnostic methods have been developed and disseminated in the framework of multicentric research projects involving several departments of French University hospitals. The goal of these methods is to categorize patients and identify those in whom hearing aid fitting may be particularly difficult, so as to suggest more accurate guidelines for clinically-grounded choices of the parameters of sound-processing algorithms in hearing aids.

The team has established long-lasting applied-research programs with hearing aid companies, who employ former PhD students funded by CIFRE programs. The expertise of the audition group in acoustic research is highly recognized as some members of the team are involved in consulting for private companies in audio-technology.

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

The audition team will not participate to the project of the LPP but will join a new lab, the LSP (Laboratoire des Systèmes Perceptifs), which has made the object of a separate AERES visit with regard to its creation as a new UMR CNRS unit.

The "second team" of the LPP in the project will be a new and very promising team, the Action, Volition & Consciousness team. The leader of this new team is a young scientist who has received the CNRS Bronze medal in 2011, and who has obtained an ERC starting grant in 2011. This team is specialized in the study of human action control, the role of feedback and cognitive load in perceptual plasticity, as well as consciousness and attention in experimental and clinical settings. No doubt that this team will attract young PhD students and post-docs, considering the high potential impact of its research program.

### Conclusion

- Strengths and opportunities:

High attractivity, high ability to get large grants and support from companies. Strong multidisciplinary approach, both at the scale level (from single neurons to psychophysics) and at the methodological level from animals studies to human psychophysics, from neuronal computation to technological development. As a result, innovative research with both fundamental and applied consequences.

- Weaknesses and threats:

No risk or threat at present, thanks to a wise strategy allowing the team to keep a reasonable size and remain coherent while extending its know-how.

- Recommendations:

The team is highly aware of the potential offered by interactions with other teams of their former LPP unit, interested in the psychophysics of other sensory modalities. It is thus almost needless to encourage the team members to go further in this direction in which they have already invested in a promising manner, as it will likely be unaffected by the split between the present LPP and the future LPS.



**Team 3 :** Perception-Action Development

**Name of team leader:** Ms Jacqueline FAGARD (change of leader for the project: Ms Sylvie CHOKRON)

**Workforce**

Team workforce	Number as at 30/06/2012 <sup>1</sup>	Number as at 01/01/2014 <sup>2</sup>	2014-2018 Number of project producers <sup>3</sup>
<b>N1:</b> Permanent professors and similar positions	2	1	1
<b>N2:</b> Permanent EPST or EPIC researchers and similar positions	4	4	4
<b>N3:</b> Other permanent staff (without research duties)	4	2	
<b>N4:</b> Other professors (PREM, ECC, etc.)		1	1
<b>N5:</b> Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.)	4	2	2
<b>N6:</b> Other contractual staff (without research duties)			
<b>TOTAL N1 to N6</b>	<b>14</b>	<b>10</b>	<b>8</b>

Team workforce	Number as at 30/06/2012	Number as at 01/01/2014
Doctoral students	9	
Theses defended	9	
Postdoctoral students having spent at least 12 months in the unit	3	
Number of Research Supervisor Qualifications (HDR) taken	1	
Qualified research supervisors (with an HDR) or similar positions	5	7



## • Detailed assessments

### Assessment of scientific quality and outputs

The Perception-Action Development team investigates visual, proprioceptive, haptic perception and cognitive capacities as well as perception-action coupling in children from birth to childhood with some studies devoted to adults. The goal is to understand how cognitive, perceptive and motor primitives present at birth allow the newborn infant to interact with, and show some understanding of, his physical and social environment. These studies are conducted in infants and children with typical or atypical development, through intercultural and even interspecies comparisons. The team conducts outstanding research with a series of cutting-edge results of major significance such as the discovery of abstract numerical representations at the start of post-natal experience, the fact that movements of the mouth observed in the talking face enhance face recognition at birth, or that the newborn's locomotor pattern previously thought of as "walking reflex" can be elicited solely by exposure to a visual flow. Studies have also clinical implications with the discovery of a strong dissociation between physiological/biological responses and emotional/behavioral reactions to pain in autistic children. The rate of publication is high with about 2 articles per researcher per year, in journals of low, medium, and high impact (e.g., *PNAS*, *Child Development*).

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

The Perception-Action Development team is renowned for its work on infant's capacities. In the last years, it proved appealing, attracting 3 post-doctoral students and training 18 PhD students. Most importantly, the team was joined during the quadriennial by two young researchers, one of them being awarded an ERC starting grant. The team should be reinforced in the next years by another CNRS recruitment. Thus, this research group has been especially reactive to the last AERES evaluation that stressed the need for recruitment and it will constitute the largest team in the next structure with 7 researchers.

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

The team has strong interactions with several hospitals. Moreover, it organizes a GDR (GDR Neurosciences Cognitives du Développement) and its members are involved in several committees and coorganize cultural events (permanent exhibitions at the Musée des Sciences de la Villette).

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

As we noted above, the five-year plan is especially innovative, with a more integrated research program in the field of development covering a variety of topics from perception to concept formation and social cognition. Apart from a continuing outstanding work in the domain of newborn capacities, projects about typical development using comparative and cross-cultural approaches are especially interesting, as well as the study of behavioural and cerebral plasticity, with direct clinical applications in the domain of psychological disorders and perceptual impairments.

### Conclusion

#### •Strengths and opportunities:

- The quality of the scientific output with the discovery of findings of major significance.
- The extension of the topics of research covering a wider range of developmental phenomena from the lowest to the highest cognitive functions.
- The capacity to attract top-level new researchers.

#### •Weaknesses and threats:

- There is no identifiable weakness or threat in the team.



- Recommendations:

- This team will be one of the more affected by retirements during the next five-year period. This means that the effort of recruitment must be continued.

- The extended range of questions addressed by the team could lead to some scattering, but the members are sufficiently skilled to pay attention to this problem.



**Team 4 :** Speech Perception

Name of team leader : Mr. Thierry NAZZI

Workforce

Team workforce	Number as at 30/06/2012 <sup>1</sup>	Number as at 01/01/2014 <sup>2</sup>	2014-2018 Number of project producers <sup>3</sup>
<b>N1:</b> Permanent professors and similar positions	2	1	1
<b>N2:</b> Permanent EPST or EPIC researchers and similar positions	4	4	4
<b>N3:</b> Other permanent staff (without research duties)	3	2	
<b>N4:</b> Other professors (PREM, ECC, etc.)			
<b>N5:</b> Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.)	5		
<b>N6:</b> Other contractual staff (without research duties)			
<b>TOTAL N1 to N6</b>	<b>14</b>	<b>7</b>	<b>5</b>

Team workforce	Number as at 30/06/2012	Number as at 01/01/2014
Doctoral students	8	
Theses defended	12	
Postdoctoral students having spent at least 12 months in the unit	4	
Number of Research Supervisor Qualifications (HDR) taken	1	
Qualified research supervisors (with an HDR) or similar positions	3	2



## • Detailed assessments

### Assessment of scientific quality and outputs

Scientific production is regular and of very high quality, with a great majority of publications in refereed international journals, such as *Cognition*, *Developmental Science*, *Journal of Experimental Child Psychology*, *Journal of Speech, Language and Hearing Research*, *Journal of the Acoustical Society of America*, etc.

During this period, the team made several important scientific contributions, among which the demonstration of the extraction of structural regularities from the speech input by the newborns, the more important lexical role of consonants compared to vowels during the whole course of life, and the positive effect of bilingualism in the early perception of speech. The studies concern not only the earliest levels of speech perception (auditory and phonetic) and the phonological level, but also lexical, morphosyntactic and semantic processing of the oral language. The approach is mainly developmental. In this context, both the typical and the pathological (auditory deficit, autism, dyslexia, etc.) development were examined. The team attempted to show the amplitude of plasticity phenomena and to identify the cerebral correlates of deficits such as dyslexia. Their research is thus important from a fundamental as well as an applied perspective.

The research on the development of phonological skills with age and experience is inspired by quite original hypotheses, especially those that concern the origin of the invariance of consonantal features in different vocalic contexts. The demonstration of a décalage in the establishment of the processing of the envelope (since 6 months) and of the fine temporal structure of sounds (reaching the adult pattern by 5 years of age) is a very important contribution. One may say the same for the outcomes of the study of developmental changes in lexical prosody in hearing children and in phonological processing in children with cochlear implants.

In another line of research, it is worth to emphasize the novelty of the demonstration of the baby's capacity to encode both the adjacent and the non-adjacent repetition of syllables as well as their position in the sequence, and the fact that, according to the infra-red spectroscopy data, the Broca area, known for its sensibility to linguistic regularities in the adult, is already activated in the baby. Later, the sensitivity to grammatical forms appears since 18 months of age and the comprehension of the noun-verb agreement is reached by 30 months. Other studies, employing the functional properties of the N400 electrophysiological component and the priming technique, showed that the semantic (taxonomic) component of knowledge develops between 18 and 24 months.

### Assessment of the teams's academic reputation and appeal

All the members of this team intervene regularly in teaching activities, especially in the Cogmaster (ENS/EHESS/U. Paris Descartes) and University of Poitiers. Since 2007, 19 PhD students and more than 50 from Master were supervised. The researchers are also active in counselling parents associations and diffusing the scientific knowledge to which they contribute in the large public through TV and magazines.

Research collaboration with other national and foreign teams is significant and productive. All the team members are involved in international collaborations. Two of them belong to boards of international scientific journals. The team is part of Labex EFL and obtained 3 ANR grants (1 Young researcher, 1 DFG et 1 ESRC).

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

The research conducted by the team is relevant for education and health (evaluation of reading level and of non-pharmacological therapies of autism). Hence, it allows them to establish links with these sectors. Several team members acted as experts or consultants.

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

The team will consist of slightly the same number of researchers and professors and will present more or less the same distribution between the two categories (professors/researchers) as in the present period. The number of PhD students is sufficient to run the planned studies. The major change, with implications for the themes, results from the very recent retirement of two members involved in the study of written language and of the retirement of 2 other very productive members that will occur by the end of the next period.



One may therefore understand quite well the changes proposed for the titles of the 3 new themes: 1. Acoustic perception and acquisition of phonology; 2. Lexico-semantic development; 3. Morphosyntactic acquisition.

In the next period, the theme will focus on spoken language and two of the themes will concern explicitly high-level linguistic components. At the same time, the research effort will be put mainly on the development of language capacities, including the study of the influence of bilingualism, which benefits from several partnerships with foreign laboratories (in UK, Finland, Spain, USA and even in Asia).

### Conclusion

- Strengths and opportunities:

- The team has a long experience of studying speech perception and related themes, and is internationally recognized for its publications.

- The team has just recruited two young researchers who are productive and involved in original lines of research.

- The leader, in spite of his youth, presents already an important scientific record and has the leadership qualities for making the group work together in a coherent way.

- Weaknesses and threats:

The recent departure of two experienced and productive members and the expected departure, at the end of the next period, of two other similarly qualified researchers may potentially create some difficulties. However, this risk may be surmounted, given that the team has already provided the proof of its capacity to attract young researchers.

- Recommendations:

- In the course of the next period, the consequences of the expected retirement of two productive researchers (in the areas of the early stages of speech perception and the effects of bilingualism) should be anticipated, and the nature of the themes for the subsequent period should be discussed so that the potential recruitment of young researchers would take such plans into account.

- Given that the work on written language and its troubles has stopped, the relationships with the sector of education risk to be greatly reduced. For this reason, it is recommended to increase the actions of counseling and diffusion of scientific knowledge in the domains of bilingual education and deafness remediation.



## 5 • Appendix : Conduct of the visit

### Visit dates:

Start: Wednesday 21 Novembre 2012 at 9:00  
End: Wednesday 21 Novembre 2012 at 17:00

### Visit site(s):

Institution: Laboratoire Psychologie de la perception  
Address: 45 rue des Saints Pères Paris

Specific premises visited: visit of the experimental booths for studies on vision, audition, speech and infant studies.

### Conduct or programme of visit:

The visit began with a meeting of the committee for a first exchange of views. The director of the unit then presented the report and the new director presented the project. Each team leader then presented the report of his or her group and the project. These presentations were followed by a visit to the experimental booths and demonstrations. At lunch time, committee members met with representatives of the University and the CNRS and then met with doctoral students of the unit. A second meeting was held with university officials who had not been encountered during the meal. Finally, the committee met for synthesis and defining the outline of the report.