technopolis group

May 2025

Evaluation of the Research Part of the University of Luxembourg: Evaluation Report

Department of Behavioural and Cognitive Sciences (DBCS)

May 2025

Evaluation of the Research Part of the University of Luxembourg: Evaluation Report

Department of Behavioural and Cognitive Sciences (DBCS)

Prof. Grégoire Borst (chair), Prof. Gergely Csibra, Prof. Tina Kretschmer

Executive Summary

The Department of Behavioural and Cognitive Sciences (DBCS) is part of the Faculty of Humanities, Education, and Social Sciences (FHSE) and focuses on research in psychology, cognitive sciences, and economics. It is organised in three research institutes (Cognitive Science and Assessment [COSA], Health and Behaviour [HEBE] and Lifespan Development, Family and Culture [LDFC]). The COSA and HEBE institutes are subdivided into research groups (11 in total), while LDFC works on transversal topics (e.g., Lifespan Development and Ageing, Cultural Psychology and Motivation in Learning and Instruction) without separate research groups. The research topics covered by the different institutes are grouped into three transversal research areas (mental health; digital, behavioural and cognitive assessment; and cognitive and socio-emotional development across the lifespan).

The department has a clear and cohesive scientific strategy at the research group level. There is tangible evidence that the department is conducting excellent research: The department published in internationally recognised peer-reviewed journals (more than 800 articles) and obtained a large amount of funding (53 grants totalling €11.3m) during the evaluation period. The department has international visibility, in part owing to some unique research topics such as video gaming and learning and ageing in a multilingual and multicultural environment. The societal impact of the department is outstanding and exceeds expectations with numerous collaborations with the public sector and in particular with government through the Luxembourg ministries of health, education, and gender equity. The EPSYLON lab cluster stands out as a high-quality and outstanding infrastructure, which can compete with top universities worldwide. However, the organisation of the department, whether in terms of institutes or research areas, appears ill-suited for defining a coherent and effective mid-to-long term research strategy. The human resource strategy is also not sufficiently defined, partly due to the inefficiency of the faculty hiring process at the university level. While increasing competition for FNR funding at the national level has been identified as a potential threat, there is no clear strategy or process to support faculty in submitting grants at the European level. Finally, there is a need for infrastructure at the university, faculty or department level to ensure swift ethics approval for research and compliance with data protection requirements.

The main recommendations of the Panel are fourfold. First, the department should develop a long-term vision and strategy to improve the visibility of some of its research topics and research staff. To do so, the department should first define its internal organisational structure more clearly, especially considering what structure will best enable the development of a long-term scientific strategy. Second, the Panel encourages the department to implement a strategy to diversify funding sources, particularly at the European level (European Research Council, Horizon 2030), and to strengthen collaborations with the private sector. Third, the university should allocate some of its resources to increase the efficiency of ethics approvals and data protection processes. Fourth, the recruitment processes for faculty need to be improved both in terms of speed and agency.

Table of Contents

1 Introduction and background

1.1 Introduction to the evaluation

The Ministry of Research and Higher Education (MESR) of Luxembourg mandated Technopolis Group with the evaluation of the research part of the University of Luxembourg. This evaluation was conducted from May 2024 to June 2025. According to Art. 50/2 of the modified law on the organisation of the University of Luxembourg of June 27th, 2018, based on the original law of 2003, the University is subject to external evaluation every four years. The present evaluation assesses both the research and institutional aspects of the University.[1] The main time period to be covered by this exercise is 2018-2023. Next to a retrospective assessment of achievements, the evaluations' prospective elements include the evaluation of the strategies and plans of the University as well as the evaluators and the panel assessment of challenges and opportunities ahead.

The University's mission, as defined by law, is threefold: to offer higher education courses leading to degrees, diplomas and certificates; to conduct research; and to contribute to the social, cultural and economic development of Luxembourg.

This report is part of the assessment of the research performance of the Universities' 13 research departments and three interdisciplinary centres and covers the Department of Behavioural and Cognitive Sciences. The evaluation is based on international external peer review and covers the performance of the research department, taking into account various aspects such as inputs (e.g., finances, human resources, infrastructure, strategy) and outputs/impacts (e.g., research outcomes, innovation activities, services). A separate report covers the assessment of organisation, management, and governance matters.

The observations and recommendations presented in this report are based on a peer review by the following experts working in the research entities' research fields: Prof. Grégoire Borst (chair, Université Paris Cité), Prof. Gergely Csibra (Central European University), Prof. Tina Kretschmer (University of Groningen).

The assessment is based on a self-evaluation report submitted by the Department of Behavioural and Cognitive Sciences, background information on the Luxembourg research system information provided by Technopolis Group, and an on-site visit of the entity in January 2025. The hearing, which was organised and moderated by Technopolis, consisted of a self-presentation by the research unit and its research groups, as well as group interviews with external partners and clients.

The panel applied the following evaluation criteria and organised the present report accordingly: quality of the research, impact of the research (third mission), and future potential of the research in the department.

The evaluation team would like to thank all those who helped us prepare the evaluation, those who provided information and those who were interviewed during the consultation.

[1] The external evaluation of the University covers teaching and research activities, central administration and internal organisation. The focus alternates between research and education. All evaluation reports are published by the Ministry. https://mesr.gouvernement.lu/fr/dossiers/dossiers/rapports-d-evaluations.html

1.2 The Department

The Department of Behavioural and Cognitive Sciences (DBCS) is part of the Faculty of Humanities, Education, and Social Sciences (FHSE) and focuses on research in psychology, cognitive sciences, and economics, organised in three research institutes (Cognitive Science and Assessment [COSA], Health and Behaviour [HEBE] and Lifespan Development, Family and Culture [LDFC]). The COSA and HEBE institutes further consist of research groups, while LDFC works on transversal topics (e.g. Lifespan Development and Ageing, Cultural Psychology and Motivation in Learning and Instruction) and is not organised into research groups. The COSA research groups are Computational Cognitive Science and Modelling; Cognitive Neuroscience; Experimental Cognitive Interaction Technologies; Computer-Based Assessment; and Human-Computer-Interaction, while the HEBE research groups are Self-Regulation and Health; Behavioural Health Technology Interventions; Brain-Body Interaction; Economic and Social Well-being; Health Promotion and Aggression Prevention; and Stress, Pain, and Gene-Environment Interplay.

DBCS is mainly funded by the state endowment (covering all types of expenditure including salaries and for educational activities), with 33% of funding coming from external sources. Competitive funding is mainly from the National Research Fund (FNR, 70%) reaching €1.3m in 2023 and international funding close to €390k.

As of December 2023, the academic staff of DBCS consisted of 7 full professors, 4 associate professors, 3 assistant professors, 13 postdocs and 13 research scientists.

Between 2018 and 2023, the number of PhD students increased from 51 to 60, with around 8 PhD graduates on average per year. Research output is mainly in terms of peer reviewed publications. Between 2018 and 2023, the department published 855 journal articles, 166 book chapters, 35 books, and 161 conference proceedings.

2 Research strategy and organisation

There is a clear, cohesive strategy at the research group level with tangible evidence that the research groups can attract funding (24 FNR grants, 7 from the European Union, 7 from the university, 1 from EIT Health, 1 COST action, 9 from ministries and 4 from other bodies for a total of €11.3m), excellent PhD students and postdocs which support the excellence of the research conducted. The organisation of the department in three institutes does not seem to provide any added value in terms of organisation and long-term strategy in the opinion of the panel. The difference in the size of the institutes could be a threat in the future creating unnecessary competition and hindering the ability of the research groups to collaborate with each other favourably. Similarly, while the panel recognises that the transversal, joint research areas (mental health; digital, behavioural and cognitive assessment; and cognitive and socio-emotional development across the lifespan) serve to present the different research topics covered by the different institutes and research groups and in showing how these research topics fit with the strategic focus of the University, they appear ill-suited to allow the department to define a coherent and effective research strategy. The lack of long-term research strategy and the organisation in institutes directly impacts the human resource strategy of the department which is not sufficiently defined.

The Department has been highly successful in obtaining grants at the national level and in terms of its financial resource planning has clearly identified a potential threat emerging from the increased competition for national grants and is well aware of the need to diversify the type of resources it can have access to. That said, a long-term strategy is still lacking and there

is no clear process by which the department can identify and support junior and senior researchers to obtain ERC funding.

The department is clearly committed to research integrity and open science as evidenced by the training of PhD students, yearly workshop on data sharing for DBCS staff, training of research facilitators and the development and tools for the research community to help support open science. The department faces challenges with funding open access publications, ethical approval procedures and data sharing in light of GDPR.

The Department has assessed the opportunities and the challenges relevant to its research topics but still lacks a clear strategy for the future, especially to mitigate the risks posed by researchers potentially moving to other universities (three have moved in the last 5 years in addition to two researchers retiring) which constitutes a threat for some of the research topics. The issue is amplified by the slow hiring process that does not allow the department to plan well in advance for the replacement of staff who are retiring or potentially moving to other universities.

The department is well-positioned in the national landscape as evidenced by the 24 FNR grants obtained, collaborations with the three Luxembourg research institutes (LISER, LIH, LIST) and research commissioned by several Luxembourg Ministries (Ministry of Education, Family Ministry, Ministry for Gender Equality and Ministry of Health). The department is also well-connected to the international research landscape with multiple collaborations with other universities (e.g., Trier University, KU Leuven, University of Lorraine, TU Graz).

Recommendations

- The department should define a long-term strategy with succession planning and a set of processes that would allow researchers to be successful in obtaining ERC grants at different stages of their career
- The department should also decide on the optimal organisational structure to implement this long-term strategy even if it means disregarding the historical organisational structures such as institutes and/or research areas
- The university needs to address the issue of delays in obtaining ethical approval for human studies and support the creation of data stewards in the department to comply with data management and regulatory requirements
- The Department should build on its position at the national and international level to strategically enhance its unique selling points in order to improve its international visibility and attractiveness

3 Quality of Research

Research Area 1 – Mental Health

This research area comprises of members from the Health and Behaviour and Life-span Development, Family, and Culture institutes (the former being represented with nearly all of its groups) and situates itself within the UL Strategic Development Area of Personalised Healthcare/Medicine and Health. The aim of the research area is to understand the interplay between socioeconomic, psychological and biological factors in the aetiology and prevention, early detection and treatment of mental health problems. This research area is contributing to advancing the state of the art of mental health, both nationally and internationally. The projects listed in the self-evaluation report and discussed during the site visit

are international, interdisciplinary, of high quality and represent important contributions to mental health research. Notable examples are StressGen, a genetically-informed study on stress and ImmunoTwin, carried out within the context of an international collaboration. The researchers have strong publication records and awards. They collaborate widely with academic and non-academic partners, not only nationally but also internationally, building on the international networks of staff hired from abroad. Interdisciplinary collaborations are of very high quality and convincingly designed such that the meeting between two disciplines leads to something truly novel. Researchers in this research area seem to both initiate and participate in international and interdisciplinary collaborations, which is testament to their visibility in the field as well as proactive approach. Overall, this research area produces innovative, high-quality, internationally recognised research and can be a role model in terms of interdisciplinary collaboration.

Key objectives for the future as discussed during the site visit include establishing an out-patient clinic and creating a panel for stress and health monitoring, alongside contributing to development of behaviour change and real-time interventions. These objectives appear to be comparably applied and directed to societal impact. While societal impact is important, the researchers should not lose sight of the strong and cutting-edge scientific contributions that could be made to mental health research through this research area.

Research Area 2 – Digital Behavioural and Cognitive Assessment

This research area spans all three institutes within the Department and aligns with the university's strategic focus on Digital Transformation. Research groups in this research area leverage advanced technologies to develop cutting-edge programmes and practical applications aimed at addressing societal challenges in Luxembourg. Although the topics explored do not encompass all areas of cognitive psychology and assessment, the department consistently delivers high-quality, internationally competitive research. This is evidenced by the volume of publications and the prestige of the journals in which they appear. Professors in this domain actively engage in numerous collaborations, including a remarkable number of partnerships with educational, governmental, and industrial stakeholders. Many of these collaborations are inherently interdisciplinary, involving educators, software developers, security experts, and others. Researchers in this area effectively utilise the resources of the EPSYLON laboratories to advance their work.

One of the key strengths of this research area during the assessment period was the work (studies and applications) aimed at enhancing user-side cybersecurity. With the departure of the lead researcher in this field, it is crucial to recruit an equally skilled expert to maintain and build upon existing expertise. This is especially important given the strong interest from both academic and non-academic partners in continuing their collaborations with the department in this field. A similarly promising, unique and novel research topic is the development of video games for academic, research and educational purposes.

Research Area 3 – Cognitive and Socio-Emotional Development Across the Lifespan

This research area brings together researchers from all three institutes of the Department and in particular the Lifespan Development, Family and Culture institute. This research area is positioned within the UL Strategic Development Area of sustainable and societal development. It aims to provide a better understanding of human development across the lifespan in different contexts and environments as well as the influence of intergenerational relationships. The research area focuses on four main topics: Lifespan Development and Ageing; Neurotypical and neurodiverse development; Development in the context of school, the family, and culture/migration; Multilingualism and Development. The research on autism and

more generally on neurodevelopment disorders and how multilingualism affects lifespan development attracts some visibility at the international level. As for the other research areas, researchers consistently engage with the different stakeholders and with the government. For instance, they develop questionnaires and trainings for neurodiverse populations and provide teacher training and materials for multilingual education. Finally, the research groups collect some unique longitudinal datasets on ageing in Luxembourg and actively engage in multi-country research projects.

While the research area has definitely strengths, its overall contribution to the wider field is not as clear as in the two other research areas. This research area needs to be better defined in terms of topics. Currently, this research area overlaps greatly with the other research areas which alters the visibility of some of the research topics that are truly specific to this research area. For instance, studies on ageing in a multilingual environment could gain even more international visibility if it was the main focus of the research area and education was part of research area 2.

Recommendations

The panel recommends the department to think about what scientific insights they want to be known for in 5 or 10 years' time and translate the results of this process into strategies for research, recruitment, international collaborations, and funding acquisition. The planned outpatient clinic directly targets societal impact, but it is necessary to also consider impact on fundamental research and theory-building, and ensure that these are guided by an overarching departmental research vision and strategy.

It is important to decide the appropriate level (department, institute or research area) at which the research strategy should be defined so that it contributes to the excellence and the visibility of the department's research at the international level. The panel also advises that the strategy development should not be led by topics and structures that have existed in the past but rather by thinking about topics that will be the hallmark of the department in the future.

- Additionally, the panel recommends further investment in research and development related to video games—a distinctive area where the department has the potential to become a global leader.
- Strengthening engagement with educational institutions across Luxembourg is also essential to facilitate access to school-age populations for future research initiatives.

4 Resources

4.1 Financial resources and infrastructure

The primary source of external research income for the department is the Luxembourg National Research Fund (FNR – Fonds National de la Recherche). Although the amount of funding from FNR has fluctuated during the assessment period, and the application success rate has decreased recently, it remains a continuous source of research income. However, the department's limited engagement with international funding opportunities is surprising. Despite its strong infrastructure, personnel, and high-quality research output, there have been very few applications for international grants. Notably, only one ERC application was submitted during the assessment period, and only 14% of external research funds have come from international sources, primarily through the European Commission.

The physical infrastructure available to the researchers is exceptional and enviable. The EPSYLON lab cluster stands out as a remarkable facility: in terms of its size, the number of laboratories, and the high-quality equipment available, it comes across as a high-quality and outstanding infrastructure, which can compete with top universities worldwide. The university provides annual funding, separate from the departmental budget, to maintain and update lab equipment, ensuring the lab facilities remain operational and state-of-the-art.

The department benefits from a generous allocation of research personnel, with nearly as many research scientists employed as there are appointed professors. These scientists contribute to the work of various research groups, conduct independent studies, and often generate additional income and publications for the department. The availability of research facilitators and technicians is another invaluable resource that that the researchers utilise well. The administrative team, consisting of eight members, seems adequate for the department's size. However, neither they nor the university's central administration are well-prepared to assist with large-scale European funding applications.

The department has built extensive internal databases and has access to some national datasets in education and mental health services, supporting subject recruitment and outcome monitoring. However, researchers lack adequate access to local schools, at least to the extent required to fully capitalise on research strengths and achieve societal impact. Additionally, the university's ethical approval process is inefficient, often delaying research projects—a particularly significant issue for PhD students.

Recommendations

- Continue providing financial support to the EPSYLON infrastructure to sustain it and maintain a competitive edge on an international level.
- Diversify funding sources by proactively seeking EU and other international funding opportunities through fostering collaborations beyond Luxembourg's immediate region.
- Support EU (especially ERC) applications by
  - hiring dedicated, trained personnel at the university, faculty or department level to assist with grant applications
  - offering administrative and research support staff training in preparing applications
  - reducing teaching loads for professors preparing applications
  - providing incentives for successful applications
- Collaborate further with educational authorities and key stakeholders to facilitate greater research access to local schools.
- Hire a dedicated data steward to manage the security and accessibility of the department's large datasets, assist with data analysis, and facilitate data sharing.

4.2 Human resources, careers, and related policies

As of December 2023, the department's faculty composition was somewhat top-heavy, consisting of 7 Full Professors, 4 Associate Professors, and 3 Assistant Professors. The faculty is both gender-balanced and internationally diverse. However, staff turnover has been higher than ideal, with key professors leaving recently and half of the faculty being replaced over the past six years.

The university's hiring policies present challenges for effective succession planning. Replacing retired professors can take several years, as recruitment processes cannot be initiated until the

retiree has officially vacated their position. Despite these limitations, the department actively supports career development for academic staff at all stages.

Recommendations

- University hiring policies for academic staff should be updated to enable more effective human resource planning and streamlined recruitment processes.
- Create structured career progression opportunities for staff in research support roles such as research facilitators.

5 Contribution to teaching

DBCS staff teach in the Bachelor's programme in Psychology and the Master's programmes in Psychological Intervention, Psychotherapy, and Gerontology (three programmes). They are also involved in study programmes coordinated by other units. The teaching load for research staff seems comparable to that in neighbouring countries though it is remarkable that PhD students and postdocs as well as Research Scientists do not have significant regular teaching involvement as would be the case in, for instance, the Netherlands or Germany. This means that junior research staff can focus on their research without teaching obligations taking up too much of their time. Senior members of the department seem content with their teaching load, perhaps also a result of the comparably smaller cohorts of students. The panel was impressed by how well research is integrated in teaching - students are immersed in research at all levels and throughout their studies, which contributes to smooth combination of both core tasks for staff members. The panel did not have the impression that staff teaching and training workload hinder the realisation of DBCS' tasks and objectives, instead, integrating students into their research might support research objectives. Clearly, students are not only trained substantively but also very well in research which likely supports the quality of their own research products and career development, especially if they aspire to stay in academic or non-academic research settings. This also applies to training and mentoring of PhD candidates and postdocs, who all reported to be taken very seriously within the research groups, encouraged in their research and networking nationally and internationally, and as such well trained for future research careers.

Legal circumstances (the "5 year rule" for contract workers), however, seems to put a brake on early career development within Luxembourg – if early career researchers have to leave the institution after 5 years, they also have to leave the country if they seek to stay in academia. It is unclear how this impacts their employability in Luxembourg in the long-term though their roles abroad certainly benefit from the training they receive at DBCS. That said, the department does not currently keep track of future employment of their students or early career staff, which makes it difficult to objectively evaluate subsequent careers.

Nonetheless, in summary, the integration of research into teaching and training of early career researchers is commendable and can serve as a role model to departments of similar size and with comparable student numbers.

Recommendations

- The panel recommends the Department to keep in touch with alumni, for instance via alumni networks or regular mailings. Contact with previous PhD students and postdocs can be facilitated by academic staff to gain insights into available opportunities and potential areas for further improvement of the training.

- With respect to teaching at the Bachelor's and Master's levels, the panel recommends DBCS to continue the great work.

6 Contribution to the third mission

The panel was impressed with the extent to which the department is engaged in knowledge transfer and the impact of DBCS' work on society and policymaking. Across the department and the research groups, members interact intensively with non-academic partners and disseminate their insights in forms that are immediately useful to stakeholders outside the university. Strong and mutually beneficial collaborations lead to true co-creation of knowledge and students benefit from contributions to teaching by partners outside the department such as GERO Kompetenzzenter fir den Alter, the Centre Hospitalier Neuro-Psychiatrique and the Ministry of Health. The listed user-oriented publications and products strongly contribute to DBCS' societal impact and the stakeholders the panel met at the site visit all confirmed the pleasure and benefit they get in working with DBCS.

At this point, the department has not been overly active in terms of financial valorisation of research insights, which is probably also due to the content of the work that is not always immediately "sellable". Staff mentioned the university incubator as a potential partner in identifying avenues for financial valorisation, but it should be noted that this is a relatively new service that needs to demonstrate its value and grow in size to serve the entire university.

Recommendations

- Although the panel agrees that DBCS' research might not lend itself immediately to commercialisation, we encourage the department to explore opportunities in this direction, potentially in collaboration with partners in industry. The strong research and lab environment might, for instance, support the development of learning apps that could be marketed. Future recruitment efforts could also take into account applicants' ideas for marketable research.
- Dissemination to and impact on society and policymaking seems to be fairly organic at the moment. As these activities continue to increase in importance for funders of research, it might be useful to develop collaborations and co-creation of knowledge with society and policy stakeholders in a more strategic manner. In other words, we recommend that collaborations with stakeholders and third mission strategies are formalised to some extent to ensure their consistency beyond involvement of specific individuals.

7 Overall assessment and recommendations

Across the whole department, there is tangible enthusiasm for research. It produces innovative work, with some unique research topics e.g. video games and the effect of multilingualism and multicultural environments on learning and ageing. The department has demonstrated a solid ability to attract funding (€11.3m in the last five years) and an impressive track record of publication- including 855 articles in excellent international peer-reviewed journals. The excellence of the research is further evidenced by the quality of the PhD students and postdocs that the department is able to attract. Societal impact from the research is tangible and exceeding expectations with a number of research projects commissioned by national (e.g. Ministry of Education, Ministry of Health, the Family Ministry and the Ministry for Gender Equality) as well as international organisations (OECD, Landesinstitut für präventives Handeln [LPH,

Germany]). Currently, the economic impact of the research conducted appears to be limited, likely because the topics investigated do not lend themselves to direct valorisation. While the research is of a very high standard, it is at risk of being negatively impacted by the lack of the necessary organisational support structures, especially those concerning ethics in human research, data protection in the era of open science and recruitment processes, particularly succession planning for retiring staff. Moreover, a strategy to maintain the department's research quality in the future is not completely in place, essentially because the department has not fully defined an organisational structure to organise the research, human resources and funding strategies at the appropriate level.

Overall recommendations

1. The Panel encourages the department to engage in developing a long-term vision and strategy to improve the visibility of some of its unique selling points in terms of research topics (video games, multilingualism) and research staff. The department should first define the best internal organisational structure that would allow it to develop a scientific strategy. In particular, the department needs to decide whether it wants to maintain the research areas and/or institutes as part of its organisational structure – they seem to be ill suited at the moment to support the emergence of a long-term strategy.
2. The Panel encourages the department to implement a strategy to diversify funding sources in light of the increasing competition for FNR funding. The department should in particular consider implementing processes to support researchers in submitting international funding applications to the ERC or Horizon 2030. The department should also find ways to strengthen collaborations with the private sector and valorisation of research.
3. The university and/or the faculty should allocate some resources to improve the research support infrastructure (structures, personnel and processes) to support an increase in the efficiency of ethics approvals and GDPR compliance. This is a critical issue particularly for a department strongly engaged in conducting research with people and open science.
4. Finally, the Panel urges the university to improve recruitment processes for faculty, both in terms of speed and agency, which will contribute to ensuring that the department can implement a long term scientific strategy.

technopolis group

www.technopolis-group.com