

<b>Institution:</b> University of Warwick
<b>Unit of Assessment:</b> A4 Psychology
<p><b>1. Unit context and structure, research and impact strategy</b></p> <p><b>Research structure</b>  The Unit consists of 28.9FTE in the Department of Psychology. The Department has a broad interdisciplinary collaboration network within and beyond the University. It is divided into three research groups: Behavioural Science, Life-span Health &amp; Wellbeing, and Language &amp; Learning. The group structure facilitates vibrant and sustainable research, spanning from basic science to applied research with far-reaching, real-world impact.</p> <p><b>Research objectives set in REF2014</b>  During the REF2014 period, Warwick Psychology set the following objectives:</p> <p><b>Objective 1:</b> to develop each of our (newly formed) three Research Groups so that they are well established and internationally renowned in their respective areas, while continuing to improve upon our established reputation for high quality, theoretically motivated research;  <b>Objective 2:</b> to explore and develop real-world applications and impact of our basic research;  <b>Objective 3:</b> to develop the interdisciplinary links of each group, both within the University and beyond.</p> <p>Below we describe how each Group has met the three objectives, by creating research synergy within the Group and across the University and beyond, and by engaging with non-academic stakeholders.</p> <p>(1) The <b>Behavioural Science Group</b> carries out basic research on behavioural science (e.g., judgement and decision making) and applies basic research to human welfare, risk-related decisions, consumer psychology, legal contexts, and health related behaviours. This group is led by <b>Brown</b> and consists of 9.1 FTE (Professors <b>Brown</b>, <b>Hills</b>, <b>Sanborn</b>, <b>Ludvig</b> and <b>Watson</b>; Reader <b>Wade</b>; Associate Professors <b>Kunar</b>, <b>Walasek</b>; Assistant Professors <b>Konstantinidis</b>; Independent Research Fellow, <b>Mason</b>).</p> <p><i>Objective 1 (Internationally leading theoretically motivated research).</i>  The Group conducts synergistic activities to create a dynamic research culture. Those who work on judgement and decision making (<b>Brown</b>, <b>Sanborn</b>, <b>Ludvig</b>, <b>Konstantinidis</b> and <b>Walasek</b>), for example, hold weekly joint lab meetings that have fostered novel collaborations among labs (e.g., <b>Walasek</b> and <b>Brown</b> collaborate on people's expectation of future wellbeing). The Group has conducted influential basic research, and their research is funded by major grants. For example, <b>Brown</b> was awarded an ERC Advanced Grant on well-being and an ESRC Large Grant (co-I) on decision making. <b>Sanborn</b> was awarded an ERC Consolidator grant on inferences on probability.</p> <p><i>Objective 2 (Facilitating societal impact)</i>  The Group has developed numerous cross-departmental initiatives with significant impact. Most notably, the Group has developed strong connections with Warwick Manufacturing Group, which is an applied engineering department with well-established collaborative ties to the public and private sectors. <b>Walasek</b> is part of a major consortium grant on mental health in the workplace from Midlands Engine ("Mental Health and Productivity Pilot"), which involves West</p>

Midlands Combined Authority, mental health charity Mind, and Public Health England. **Watson** held an EPSRC grant with Warwick's Department of Computer Science and Jaguar Land Rover to study how people perceive autonomous vehicles. See Section 4 for further information.

### *Objective 3 (Interdisciplinary research)*

The Group leads a number of cross-departmental and cross-institutional research networks. Along with Warwick Business School and Economics, this Group leads a cross-departmental seminar series, DR@W ("Decision Research @ Warwick") and one of the University's strategic research foci, Behaviour, Brain, & Society Global Research Priority (REF5a 2.9.1). It also organised a reading group on morality, jointly with Warwick Business School (e.g., **Melis**, who is now at UCL) and the philosophy department. This enabled an ESRC research grant on cooperation in humans and chimpanzee (**Ludvig**, as the co-I, and **Melis**, as the PI). It also led to an ESRC research grant on macroeconomics (**Sanborn**, co-I) with Warwick Business School. The Group also played a key role in establishing the University-wide Centre for Operational Police Research (**Wade** as co-director). This Centre links 30 Warwick researchers spanning nine academic departments. In one interdisciplinary project, Wade and collaborators in Law and the Business School evaluated the role of forensic property marking in burglary prevention and public confidence in policing (funded by the ESRC Impact Acceleration Account).

The Group obtained major funding to create infrastructure for interdisciplinary research. First, **Hills** as the PI obtained funding for the Leverhulme Bridges Doctoral Programme. PhD students in this Programme have one supervisor in social sciences (including Psychology) and the other in the mathematical sciences (e.g., Statistics, Mathematics). Second, **Brown** (as a co-I) obtained a Large Grant from ESRC for the Network for Interdisciplinary Behavioural Science with collaborators in Nottingham and East Anglia. This network links economics, business, computer science, mathematics, and psychology, and it developed and tested models of behavioural change. Third, **Walasek** investigated technology-assisted interventions for reducing exposure to indoor pollution in collaboration with chemists, geographers, and biomedical scientists in a project on how to protect vulnerable individuals from air pollution (NERC funded). This was based on his expertise on behavioural change and nudging.

(2) The **Lifespan Health & Wellbeing Group** investigates physical and mental health, and developmental adaptations across the lifespan. The Group is an international leader in research on longitudinal cohort studies of long-term impact of bullying and premature birth, cognitive ageing, sleep, chronic pain, psychological impact of natural/human-made disasters, and psychology of religion. **Wolke** leads this group which consists of 12.1 FTE: Professors **Goodwin**, **Maylor**, **Realo**, **Tresilian** and **Wolke**; Readers **Tang**, **MacCallum**, and **Schlaghecken**; Associate Professors **Gummerum**, **Preston**, **Lemola**, and von **Mühlenen**; Assistant Professor **Lee**.

### *Objective 1 (Internationally leading theoretically motivated research)*

The Group has been highly successful in conducting influential research, funded by major grants. For example, **Wolke** (as a PI) obtained a major Horizon 2020 consortium grant that oversees a comprehensive programme of European longitudinal cohort studies on pre-term and low-birth weight babies.

### *Objective 2 (Facilitating societal impact)*

Much of the Group's research has an applied orientation, and collaboration within the Group has facilitated dissemination and impact. One outcome of this research networking mechanism is a project exploring "Student Mental Health and Resilience in Transition", in which five academic staff (**Lemola**, **Wolke**, **Tang**, **Realo**, **von Muhlenen**) and three PhD students

collaborated. This study longitudinally monitored lifestyle and wellbeing of 600 students in Warwick during their first year and received the University's award for "Outstanding Team" (University Awards, 2018). Section 4 describes further engagement with non-academic partners outside of the University.

#### *Objective 3 (Interdisciplinary research)*

Due to its applied orientation, much of this Group's research is highly interdisciplinary. The Group helps lead the University's Mental Health theme of the Health Global Research Priority (REF5a 2.9.1) in collaboration with the Medical School.

There are many examples of interdisciplinary collaboration. **Wolke's** Horizon 2020 grant on longitudinal cohort studies of pre-term and low birth-weight babies includes paediatricians, statisticians, neurologists, and neuroscientists. **Tang's** research on chronic pain and sleep includes a large collaborative network in pain medicine, sleep medicine, rheumatology, neurology, general practice, dentistry, neuroscience, psychiatry, nursing, statistics, and engineering. **Von Mühlenen** collaborated with computer scientists to investigate new ways to stop caller ID spoofing (EPSRC funded). This work is based on his expertise in user experience research and experimental methods. **Realo** investigated the genetics of personality traits, as well as the complex relationships among personality, health, and subjective wellbeing. This involves researchers from neurology, environmental health, genetic and psychiatric epidemiology, and molecular human genetics.

(3) The **Language & Learning Group** studies language and communication in adults, children, and animals. The Group conducts cutting-edge research on language and gesture development in children, adult language learning, speech-accompanying gestures, visual word recognition, and animal communication. This Group is led by **Kita** and consists of 7.7 FTE (Professors **Kita** and **Hills**; Associate Professors **Adelman**, **Messenger**, **Féher**, and **Townsend**; Assistant Professors **McGillion**, **Aussems**, and **Lemeira**).

#### *Objective 1 (Internationally leading theoretically motivated research)*

The Group's research was supported by a broad range of external grants. **Messenger** was PI on an ESRC grant, and two Leverhulme Research Grants on grammatical processing in children. **Adelman** was PI on a Leverhulme Research Grant to develop a computational model of word processing. **Kita's** research on infant pointing gesture was supported by a Leverhulme Research Fellowship. **Townsend** holds a large research fellowship (Swiss National Foundation Research Professorship) to investigate animal communication.

#### *Objective 2 (Facilitating societal impact)*

The Group conducted research with substantial impact and public engagement. For example, the Group's research on animal communication has been covered by mainstream media (e.g., **Lameira** featured in BBC, New York Times, National Geographic). **McGillion** (UKRI funded) and **Aussems** are conducting two separate projects on how Covid-19 related home-schooling and social distancing influence child development. See Section 4 for more information about engagement with non-academic partners.

#### *Objective 3 (Interdisciplinary research)*

The Group regularly hosted interdisciplinary research events, including a bi-weekly seminar and an annual research away-day on language and communication. These events were attended by researchers from Philosophy, Warwick Business School, and Applied Linguistics, and led to significant interdisciplinary collaboration. For example, The Group hosted a prestigious grant that straddles philosophy and psychology (UKRI Future Leader Fellowship with

Moore (PI) in the Department of Philosophy). **Messenger** holds a research grant from the Leverhulme Trust on motivation in second language learning as the PI, with a Co-I in the Centre for Applied Linguistics.

**Townsend** and **Lameira** collaborated closely with biologists in their field-work research on animal communication. Townsend conducts comparative studies of vocal communication in humans, birds and chimpanzees (funded by Swiss National Foundation, British Academy).

**Lameira** was recently awarded a UKRI Future Leader Fellowship (commencing 2021) to investigate evolutionary origins of speech, based on orangutan vocalisation.

### Future Plans for the next REF period

The Department aims to further develop its vibrant and sustainable research environment that delivers world-leading research. In 2017, the University approved the Department's strategic plan up to 2025. In this plan, we will further develop the three research groups with the following priorities: 1) To strengthen the Department's internationally recognised expertise in the fields of cognitive psychology and health across the lifespan by providing the facilities required for high-quality experimental, longitudinal and data science research. 2) To develop collaborative, interdisciplinary research projects across departments and universities (e.g., in areas such as mental health, artificial intelligence and data science). 3) To work closely with a wider group of stakeholders in government, industry, and the third sector to provide impactful interventions and knowledge transfer, and to disseminate research findings to the general public.

The following activities have laid the groundwork for achieving these objectives.

#### 1) Internationally leading research on cognitive psychology and health across the lifespan

We encouraged junior academics to apply for large long-term funding to create sustainable excellence in these areas. As mentioned above, **Lameira** has been awarded a UKRI Future Leader Fellowship to start in 2021.

The Department established a link with a new international centre of excellence launched in 2020. **Townsend** is part of a Swiss research consortium with major long-term (seven years in the first instance) Swiss government funding ("National Centre for Competence in Research") on language development and evolution. Townsend holds posts at both Warwick and the University of Zurich (one of three Swiss universities to host the National Centre), and he will continue to bridge the research on language evolution and development at Warwick (**Lameria, Aussems, Feher, Kita, McGillion, Messenger**) with Swiss researchers to create research synergy.

#### 2) Interdisciplinary research with societal impact

The Department has collaborations in multiple disciplines to build research with societal impact. As noted above, **Wade** co-directs the cross-faculty network, the Centre for Operational Police Research. The collaboration in this Centre led to an ESRC Centre Grant application, "Centre for Next Generation Policing" (**Wade**, co-I), which united Psychology, Law, Politics & International Studies, Computer Science, Warwick Manufacturing Group, and the Centre for Interdisciplinary Methodology. It also involved numerous non-academic stakeholders: West Midlands Police HQ, Ada Lovelace Institute, College of Policing, and JUSTICE (human rights organisation for legal professionals). This project aimed to find the best way for the police to use the latest information technology such as AI in a responsible and fair way.

As mentioned above, the Behavioural Science group led one of the University's strategic research foci, Behaviour, Brain, & Society Global Research Priority (REF5a 2.9.1). In 2019, this Research Priority was restructured to include members from a broader set of departments: Statistics, Politics & International Studies, History, in addition to Psychology, Business School and Economics. This expansion was motivated by the interdisciplinary Leverhulme Bridges Doctoral Programme (see above).

**Enabling impact**

The Department has several strategies to foster a culture of developing impact. The Department recognises four stages of impact development and uses appropriate interventions at each stage. In addition, the Department was agile in freeing up academics' time whenever opportunities or urgent need for impact activities arose.

*Stage 1) Raising awareness & sharing good practice*

Our strategy is to create regular opportunities to remind all academic staff of impact, and to inspire them with impact success stories.

- Our impact agenda was presented regularly at all-staff meetings.
- The University's Impact Team was physically present in the Department one day per week to raise awareness, respond to queries, facilitate impact events, and assist with the recording and evaluating of impact activities.
- The annual Departmental Research Away Day included presentations of impact success stories to inspire all academic staff to engage in impact and to share good practice.

*Stage 2) Networking with non-academic partners*

Our strategy is to foster sustained two-way engagement between academics and diverse groups of end-users.

- The Department hosted "impact seminars" once a term and welcomed speakers from charitable organisations, industry, and the military (e.g., Kidscape (challenging bullying), Royal Military Academy Sandhurst, Google DeepMind, and ASSIST Trauma Care (working with those bereaved by homicide)).
- The Department supported academics in organising networking events. Various University funds were used for different purposes. **Kita** and **Aussems** held a workshop on "Gesture and Technology", which was attended by Jaguar Land Rover. This event explored how gestural communication can be applied in engineering contexts (funded by Warwick's Institute for Advanced Study, REF5a 2.9.2). **Sanborn** held a dissemination event for representatives from the European Commission, which covered decision making science for behaviour change interventions (funded by ESRC Impact Acceleration Account funds).
- For more targeted one-to-one dissemination with commercial potential, Warwick Ventures, the commercialisation arm of the University (REF5a 2.8) was involved. Using this mechanism, **Watson** and **Kunar** promoted their road-safety training demonstration to police departments across the UK.

*Stage 3) Collaboration with non-academic partners*

When academics identified potential non-academic partners, the Department facilitated collaboration through different means.

- To capture arising opportunities, the Department provided departmental "quick-access" Impact funds. Academics took advantage of opportunities for which University-level funds would have been too slow. For instance, using this fund, **Wade** travelled to London to meet international arbitration professionals as part of the groundwork for her Impact Case Study.
- To enable more extensive engagement, Warwick Impact Fund (funded by various RC Impact Acceleration Accounts) was frequently used. Using this fund, for instance, **Wade** co-produced research and a new policy report with the International Chamber of Commerce (see her Impact Case Study) on improving the reliability of fact witness evidence in international business



disputes. Wade gave a keynote presentation at an ICC Commission meeting in Rome to 1000 international arbitration experts from across the world and attended four ICC meetings in Paris during her 5-year term as a scientific advisor to the ICC International Court of Arbitration.

- The Department also used external funds to extensively engage with non-academic users.

**Stewart** (now at Warwick Business School) used an ESRC research grant and an ESRC Large Grant to conduct crucial activities for his Impact Case Study. He investigated credit card payment patterns using real transaction data provided by UK Finance (the UK credit card industry body) and Argus (a data aggregation company). Based on the results, he shaped the Financial Conduct Authority's policy on credit cards.

#### *Stage 4) Documenting the expanding impact horizon*

Once a solid case for impact was realised, the Department monitored and documented how the impact grew.

- **Wolke** developed a parental questionnaire for cognitive screening for two-year olds, the PARCA-R. This is now used in broad clinical settings in multiple countries (see Wolke's Impact Case Study). Due to Covid-19, more countries are adopting PARCA-R. The Swiss organisation for monitoring infant development (Neonatal Network) just switched from a face-to-face assessment (e.g., Bayley) to PARCA-R. **Wolke** recently obtained ESRC Impact Acceleration Account funding to determine which countries have adapted PARCA-R due to Covid-19.

#### *Impact strategy management*

**Wade** (Impact Director) managed the strategy to maximise impact, in collaboration with the University's Impact Team. She encouraged members of the Department to think about the impact of their research, and guided them to develop impact through the above-mentioned stages. She headed the Impact Committee, which reported to the Research Committee.

#### **Open and ethical research**

##### *Open research:*

- The funds administered by the University Library support open access publishing and supplement Department members' open access publications where this is not automatically covered (e.g., via UKRI).
- The Department complies with the Concordat on Open Research Data.
- Staff individually provide great examples of open science, which created the culture of valuing open science practice. For example, **von Mühlenen**, **Ludvig** and **Wade** each participated in separate multi-lab pre-registered replication studies.
- The Department organised a workshop on open science practice by Prof. Steve Lindsay (Univ. of Victoria). Prof. Lindsay was the Editor-in-Chief for *Psychological Science* and a key promotor of open science practices. The workshop was available to all members of University of Warwick and also the Midlands Graduate School ESRC Doctoral Training Partnership, and attracted 32 researchers from social sciences departments in Warwick, Birmingham, and Loughborough.
- The Department encouraged those who took part in the Open Science workshops/training to report back key points to the department in internal seminars (e.g., by a postdoc, Siposova, in 2020). Additionally, a PhD-student (Kang) led a reading group on Open Science practice.

##### *Ethical research:*

The University mandates research integrity, ethics, and GDPR training for all staff.

The University's Research and Impact Services supported legal ethical requirements and cost implications. Members of the Department played a key role in the Humanities and Social

Sciences Ethics Committee. **MacCallum** and **Schlaghecken** have chaired the Committee. Also, Psychology PhD students (e.g., Barker) served as members.

## 2. People

### Staffing and recruitment strategy and staff development

The Department has the following strategies to sustainably meet the three research objectives listed in Section 1.

**1) Sustainability of excellence:** We maintain a good balance of seniority to ensure sustainable growth into the future. All academic staff have a long-term contract: assistant professors, associate professors, readers, and full professors have a permanent contract (assistant professors' contracts are subject to successful completion of an up to five-year probation period).

**2) Synergy effects for vibrant research:** We strengthen the research themes of the three Research Groups by clustering researchers who work on related research questions with complementary approaches. This maximises the vibrancy of research. When recruiting new academic staff, one key criterion is that the candidate would complement and strengthen the existing research in one of the Research Groups.

**3) Balancing basic research and societal impact potential:** We maintain a good balance between basic and applied research within the Department.

**4) Equality and Diversity:** We promote equality and diversity in the Department. See below for more details.

### New hires during the REF period

The Department recruited 14 new REF-eligible researchers, a large majority of which were offered long-term contracts (1 Professor, 3 Associate Professors, 10 Assistant Professors and 1 Early Career Researcher on a three-year fellowship; 50% male, 50% female). They were hired evenly over the REF period. We appointed four staff in the Behavioural Science Group, six in the Lifespan Health & Wellbeing Group, and four in the Language & Learning Group. As a result, each Group has a spread of ranks from assistant professor to full professor, ensuring that our Research Groups develop in a sustainable way. The new hires complemented key strategic strengths of the Research Groups: for example, decision making (**Walasek, Konstantinidis, Mason**) in the Behavioural Science Group, mental health (**Goodwin, Lemola, Lee**) in the Lifespan Health & Wellbeing Group, language development (**Aussems, McGillion**) and comparative psychology (**Townsend, Féher, Lameria**) in the Language & Learning Group.

### Staff development

#### PDRAs:

The Department supported PDRAs to develop their career-relevant skills and to create a network beyond the labs they work in.

- The Department provided each PDRA with a senior academic mentor.
- The Department held career development workshops (e.g., job talk training by recently hired Assistant Professors).
- Warwick's Institute for Advanced Study (REF5a 2.9.2) provides PDRAs with support for application to independent fellowships and also with interdisciplinary network opportunities.
- The Department offered opportunities to gain teaching experience (e.g., thesis supervision, running workshops).

- The Department convened an "Ask the Editor" workshop with Prof. Steve Lindsay, who was the current Editor-in-Chief of *Psychological Science*. The seminar provided participants with advice on publishing and reviewing in psychology journals.
- The Department convened a support group for BAME early career researchers (see "Equality and diversity" below).
- Postdoc achievements were celebrated by Science Faculty's postdoctoral publication prize (Psychology winners in 2018, 2019).
- The success of our initiatives can also be illustrated by the success by our independent research fellow (**Mason**) in securing further funding (ESRC New Investigator Grant).

#### Academic Staff:

The Department supported junior academics to establish their labs and become a PI in major grants, and supported all academic staff to find substantial time for research and to find opportunity for developing various skills useful for research.

- For Assistant Professors, the leader of each Research Group served as the mentor. The Head of the Department held a probation meeting with junior academic staff once a year to guide their development. The Director of Research met junior academic staff twice a year to guide them through funding applications and establishment of their labs.
- The success of our support for junior academics is illustrated by the fact that our assistant professors have obtained major funding: **Lameria** with UKRI Future Leader Fellowship (to start in 2021), **Messenger** (now an associate professor) with an ESRC research grant and two Leverhulme Trust research grants.
- A detailed workload model ensured staff research time is protected. The workload model included allocations for funded hours for grants, pursuing impact, and supervising PhD students. Assistant Professors on probation received reduced hours for teaching and admin (about 57% of senior academics). The workload model typically correlated closely (> .90) with staff self-reports via Time Analysis Survey returns.
- All staff were entitled to apply for one term of research leave for every 6 terms of service (**Adleman, Brown, Goodwin, Hills, Kita, Ludvig, Messenger, Schlaghecken, Sanborn, Wade, and Wolke** were given leave during the REF period).
- The University's Organisational Development team held training events, including grant-writing workshops, networking events, career development sessions, and leadership and management sessions.
- The success of these initiatives can be illustrated by the fact that a number of staff hired during the REF period received internal promotions (**Realo** to Professor; **Lemola** to Reader; **Féher** and **Townsend** to Associate Professor).

#### Research students:

The Department substantially increased the PGR community to create a more vibrant research environment. To support our research strategy, the majority of Departmental PhD studentships were assigned to new staff (who themselves were recruited in areas of our strategic focus); the remaining studentships were put into a department-wide competition.

The Department has made 44.95 REF-eligible PhD awards since REF2014. An increase of more than 164% from 17 completions during the REF2014 period.

The Department attracted 27 non-departmental studentships. As a member of the ESRC DTP Midlands Graduate School (through the REF period), 12 studentships were awarded to the Department. The Department leads the Leverhulme Bridges Doctoral Training Programme (**Hills**), which awarded 5 studentships to the Department. The remaining sources of non-



departmental studentships were the Leverhulme Trust (3), EPSRC-Jaguar Land Rover (1), Government sponsorship (4), and EU (1).

The Department supported PGR students to develop career-relevant skills and a professional network, with equality and diversity in mind.

- PGR students met with their supervisors at least once a month, typically 1-2 times per week.
- PGR students were allocated a mentor who provided general guidance and advice.
- The Research Student Skills Programme equipped all Warwick PGR students with the skills, knowledge and attributes to enable them to thrive as an independent researcher. All PGR students engaged with at least ten days professional development per year.
- The Department convened the "Ask the Editor" workshop with Prof. Steve Lindsay (see above).
- We organised annual postgraduate research conferences, in which PhD students can obtain feedback from a broad expert audience and broaden their network.
- The Department operated a maternity-leave scheme for its own funded PGR students (similar to that for UKRI students), a policy later adopted by the University.
- The Department convened a support group for BAME early career researchers (see "Equality and diversity" below).
- To support PGR students after thesis submission, the Department encouraged students to apply for Early Career Fellowships from the Warwick's Institute for Advanced Study (REF5a 2.9.2), which provides up to 9 months of training and funding. 12 Psychology students were awarded these competitive fellowships.
- The Faculty of Science, Engineering & Medicine ran the best thesis prize to celebrate excellent work (Psychology winners in 2017, 2019).

### **Equality and diversity**

The Department developed a culture where actions related to equality and diversity issues are valued. Out of 28.9 FTE of the submitted staff, 51% are female and 49% are male. 9% are BAME. The Department's research is led by a diverse leadership team: Director of Research (a BAME male), Deputy Director of Research (a white male), and the chair of the Impact Committee (a white female). Equality and diversity training was mandatory for staff seeking research ethics approval at the University level. When inviting external speakers for the Departmental seminar, staff were reminded that diversity of gender and race/ethnicity was important.

#### *REF submission*

We selected outputs through a process that took equality and diversity seriously. Each eligible staff member self-nominated candidate publications. Each article was rated by the departmental REF Reading Group, consisting of three female and three male senior academics, including one BAME member. The ratings from the REF Reading Group and the external reviewers (one male, one female) were averaged to obtain the score for each candidate article.

Once we had a provisional list of outputs to be submitted, we re-evaluated borderline papers for submission with equality and diversity in mind. For the female and BAME staff who had only one output in the provisional list, we went through all of their self-nominated papers to check if they had any promising unselected papers. These promising papers and white males' outputs just above the cut-off point were re-evaluated by three members of the REF Reading Group (two

females and one male, including one BAME). This process increased female representation in the final selection. We believe that it also raised the overall quality of selected outputs.

#### *Gender equality*

Following the successful renewal of its Athena Swan Bronze Award in 2016, the Department made a number of commitments to enhance gender equality, including cover for maternity leave and research fellowships for those who return from maternity leave (see below on "Warwick Academic Returner Fellowship").

The Department formed a new Athena Swan committee in 2019. The committee organized a networking event with speakers from both within (Prof. Seers from Warwick Medical School, which has a Silver award) and outside the University (Prof. McCormack from Queen's University Belfast, which has a Gold award) to develop its strategies for improving gender equality. The Department will apply for the Silver Award in 2021.

The Department successfully negotiated so that the University provided maternity leave for University-funded PhD students in Psychology, in line with research council provision. This initiative by the Department led to the University-wide policy change to allow maternity leave for University-funded PhD students.

Those taking maternity or parental leave were supported in applying for the Warwick Academic Returners Fellowship that released staff from teaching and administrative duties for a period of time equal to the amount of maternity or alternative parental leave taken. **Tang** and **Kunar** took advantage of this scheme. This Fellowship enabled Tang's successful MRC research grant application.

#### *Race equality*

The Director of Research (BAME, as noted earlier) convened a support group for BAME early career researchers (MSc and PhD students, postdocs) twice a term. The meeting topics included career development strategies (e.g., job application tips, how to choose a journal to publish), and discussions with role models (BAME academics).

#### *Departmental committees*

To embed equality and diversity within departmental culture, we always included equality and diversity as a standing item on agendas of key meetings (e.g., Management Committee, Departmental Council).

Welfare and Communications Committee reported key Equality and Diversity statistics (e.g., staff survey outcomes) to the Department. The committee reviewed our workload model in the light of gender/race-ethnicity and re-designated roles where necessary to try to ensure gender/race-ethnicity equality in workload.

The membership of the three key committees (Management Committee, Research Committee, and Undergraduate Committee) always included male and female representation, and BAME representation. Key departmental and faculty positions were held by a BAME staff member (Director of Research and Leader of Language & Learning Group, Director of Postgraduate Research Programmes) and a female staff member (Deputy Head of Department, Director of Postgraduate Research Programmes, Chair of Humanities and Social Sciences Research Ethics Committee, Director of Impact, and Deputy Faculty Chair).

The Departmental Search Committee identified potential female and BAME candidates for senior role recruitment. Following a review from our Welfare and Communications Committee, we adopted a new protocol to ensure all job advertisements were consistent with best practice in encouraging diversity in our applications. We ensured mixed gender shortlisting and panel membership for all academic posts. We included a BAME member in shortlisting and panel membership most of the time. We aimed to ensure equality principles in PGR student selection by having mixed gender interview panels for studentships.

#### *Promotion and development*

Senior male and female promotion champions provide confidential feedback on the promotion process to candidates interested in applying. The Research Group leaders actively encouraged applications from all members of their group. PGR students also had mixed gender review boards for their Annual Reviews.

#### *Workload adjustment*

The Department offered support with care arrangements via compassionate leave and workload adjustments or cover. Staff returning from ill health met with HR and the Head of Department, with further support from Occupational Health, and developed a phased return to work. Disability was recognised through flexible working arrangements and alterations in probationary period. Flexible working was supported by family-friendly scheduling of departmental meetings during school hours (9am–3pm).

### **3. Income, infrastructure and facilities**

#### **Research income**

The Department's research income per FTE per annum increased by 65% from the REF2014 period, from £17.6K/FTE/year in REF2014 (when FTE is calculated in the same way as REF2021) to £29.1K/FTE/year in REF2021. The Department obtained funding from a wide range of funders (the number of awards in parentheses).

**- UK funders:** ESRC (11), MRC(3), EPSRC (3), AHRC (1), Leverhulme Trust (6), Royal Society (1), British Academy (2), Experimental Psychology Society (5), Alan Turing Institute (3), NIHR (2), NHS (3), MoD (1)

**- Regional funder:**

Midlands Engine (2)

**- European funders:**

ERC (2), Horizon 2020 (1), German Ministry (3), and Swiss National Science Foundation (1)

**- Industry:**

Jaguar Land Rover, joint funding with EPSRC (1), BAE (1) Which? (magazine) (1)

Notable major awards include an *ERC Consolidator Grant* (**Sanborn**, £1.5M), an *ERC Advanced Grant* (**Brown**, £1.5M), and a *Leverhulme Doctoral Training Centre* grant (**Hills**, £1.1M).

This strong increase in research income since REF2014 was made possible by a number of departmental initiatives.

#### *1) Stimulating and supporting applications for large grants*

The Department actively encouraged applications for large grants. For example, information about successful ERC grant applications from other UK psychology departments was shared in departmental staff meetings and annual research away days. Furthermore, the

Department organised a peer support group, "Large Grant Club", in which those who were interested in applying for a large grant discussed each other's proposal ideas. These measures were highly effective. While the Department had made no ERC grant applications in the REF2014 period, it made 12 ERC grant applications in the current REF period: two successful (Advanced by **Brown**, Consolidator by **Sanborn**) and one Advanced (**Wolke**) under review in the second stage of evaluation. The Large Grant Club supported four UKRI Future Leader Fellowship applications: one successful (**Lameira**, £1.1M, to start in 2021).

## 2) *Forging strong interdisciplinary research networks in the University*

The Department established interdisciplinary research networks within the University (see Objective 3 in Section 1). One of the University's strategic research foci, Behaviour, Brain, & Society Global Research Priority (REF5a 2.9.1) has forged a strong link between Psychology and Warwick Business School, which was crucial in Hill's Leverhulme Doctoral Training Programme, **Brown's** ESRC Large Grant and **Ludvig's** ESRC Research Grant. The Language and Learning Group organised events (seminars and one-day conferences) that brought together language science researchers across campus. This was crucial in obtaining collaborative funding with the Centre for Applied Linguistics (**Messenger**, Leverhulme research grant) and with Philosophy (**Kita** is a collaborator for the UKRI Future Leader Fellowship to Moore in Philosophy). Moore was working in a different University when he applied to UKRI FLF; however, he specifically chose Warwick as the host because he was attracted by the close research links between Philosophy and Psychology.

## 3) *Strategic hiring in areas of strength*

Following our strategic plan approved by the University in 2017 (see "Future Plan" in Section 1), we hired Assistant Professors in animal communication (**Lameira**) and behavioural science (**Walasek**) in 2019, two areas in which the Department has research strengths. Taking advantage of the excellent intellectual environment, the two quickly secured funding (**Lameira**, UKRI Future Leader Fellowship; **Walasek**, two grants from Midlands Engine).

## 4) *Strategic investment in facilities*

As detailed in the "Facilities" section below, the investment in the Behavioural Science Lab, the Sleep Lab, the Baby and Child Lab, and the Driving Simulator enabled a number of successful grants.

## 5) *General grant application support*

The Department used numerous approaches to facilitate grant applications. First, a member of the University's Research and Impact Services was physically present in the department one day per week. Second, the Department designated "Grant Writing Days" (2 days x 4 times/year), during which emails and meetings unrelated to grants were discouraged to provide larger chunks of time for proposal development. Third, academic staff who were preparing grant proposals were assigned a "buddy" who provided feedback on drafts. Fourth, the Department took advantage of various University pump-priming funds. For example, the Research Development Fund enabled **Kita** to create a participant database for infant studies, which led to his Leverhulme Research Fellowship, and enabled **Messenger's** ESRC grant and a ESRC postdoctoral fellowship hosted by **Hills**. Pilot grants from the University's Global Research Priority (REF5a 2.9.1) led to **Hill's** hosting of the ESRC Postdoctoral Fellowship and **Messenger's** ESRC grant and a Leverhulme Trust Research grant.

**Infrastructure and facilities**

The Department is located in a single building. Staff offices are clustered along a single corridor, the three Groups intermixed to encourage interactions.

The Department has 5 main research lab areas: Behavioural Science Lab, the Sleep Lab, Baby & Child Lab, Virtual Reality Lab, and the Driving Simulator. Furthermore, the Department has a substantial number of PC-equipped single cubicle testing labs, some with soundproofing. The Department opened the Sleep Lab, Baby & Child Lab and Behavioural Science Lab in early 2014 with £500K investment since September 2013. Subsequently, as a result of collaborations with Warwick Manufacturing Group, the Department obtained a Driving Simulator (2015) for £85K, and new Virtual Reality equipment (2018) for £12K.

One IT officer and IT manager (both 1.0FTE with permanent contracts) support the research infrastructure. They provide general IT support and data security, as well as ensuring GDPR and health and safety compliance.

**The Behavioural Science Lab** (directors **Ludvig** and **Sanborn**) contains 24 PCs for group testing. These PCs are networked and can be used to run experiments in which the participants interact with each other. This is useful for research on group decision making and game theory, as well as efficient simultaneous data collection with multiple participants.

This Lab enabled a wide range of projects in judgement and decision making (funded by an ERC Consolidator Grant, an ERC Advanced Grant, ESRC Research Grants, and a Leverhulme Doctoral Training Programme grant).

**The Virtual Reality Lab** (director **Watson**) consists of a dedicated lab area containing a high-performance PC driving an HTC Vive VR-headset. The system is interfaced with a dedicated Biopac physiology measurement device for the synchronised recording of bio-signals. The lab also has standalone Oculus Go VR systems providing greater flexibility in application, and Leap Motion sensors to allow visualisation of participants' hands and fingers within VR. Research is conducted using Unity with Autodesk 3DSmax modelling software.

This facility, established in 2018, has enabled research on virtual presence and real-world simulation and performance, memory, deception detection and the perception of autonomous vehicles.

**The Baby & Child Lab** (directors **Kita** and **Messenger**) consists of various testing facilities: a family reception room, an eye tracking room with an EyeLink 1000 eye tracker, an infant testing room for looking time experiments such as head-turn preference procedures, and a multi-modal interaction lab. The research in the Lab was coordinated by the Wa.R.Ks ("Warwick Research with Kids") group, a consortium of labs led by **Messenger**, **Kita**, **Aussems**, and Moore in Philosophy. The group coordinated testing to maximise efficiency (e.g., a family participates in studies from multiple labs in a single visit). PIs and other lab members met every second week to coordinate their efforts. The Wa.R.Ks group recruits child participants in various child-related events and through advertisement, and jointly manages the participant database. The database has approximately 3000 families.

The lab enabled research on infant pointing gestures (funded by Leverhulme Research Fellowships), children's syntactic processing (funded by ESRC and Leverhulme Research Grants) and theory of mind (UKRI Future Leader Fellowship).

**The Sleep Lab** (director **Tang**) comprises a testing bedroom with en-suite bathroom and adjacent control room. The bedroom is sound attenuated with temperature and lighting control. It is equipped with an Embla S4500 polysomnography system and an infrared video-monitoring system for overnight sleep studies. For ambulatory sleep/activity monitoring, we use actiwatchers



from CamNTEch and Physical Activity Monitoring System from BioSensics. Quantitative sensory testing uses a refrigerated circulating water bath and a digital algometer supplied by Medoc.

The Sleep Lab enabled research on a novel hybrid intervention for pain-related insomnia in primary care (NIHR funded), and research that develops and evaluates a programme to support people living with chronic pain to improve their everyday functioning and reduce their opioid use (NIHR funded).

**The Driving Simulator** (director **Watson**) is for the department's exclusive use. The simulator consists of a fixed-base system comprising the cabin of a Jaguar XJ vehicle and a set of networked PCs running the Oktal SCANeR driving simulator package. The facility has three forward projection screens and three rearward screens to provide immersive views in the vehicle's interior and exterior mirrors. Sound is provided via a 5.1 channel system and vibrotactile feedback via a force-feedback steering wheel and under seat shaker. The driver uses the original cabin controls to interact with the vehicle and both the dashboard and centre consoles consist of customisable LCD panels. Miniature cameras record driver behaviour. The simulation software generates custom terrains/environments/road layouts, and a dedicated scripting language creates dynamic events with various parameters (e.g., the behaviour of other vehicles, time of day, weather conditions, etc). The system is interfaced with a Biopac physiological recording apparatus to record the driver's electrodermal activity, heart rate, respiration rate, skin temperature and facial EMG. The Driving Simulator enabled research on driver behaviour and road safety: for example, the perception of autonomous vehicle behaviour (funded by EPSRC/Jaguar Land Rover).

**RECAP Preterm Data Platform** (director **Wolke**) allows researchers anywhere in the world to analyse data from participating very preterm and very low birth weight cohort studies, using novel tools available on the project webpage. The data node at the University of Warwick holds harmonised data of eight longitudinal studies of preterm children into adulthood. With Datashield technology, harmonised microdata (data on individual subjects) across cohorts can be securely analysed without physically sharing it with research users (thus complying with GDPR).

#### 4. Collaboration and contribution to the research base, economy and society

##### Collaboration

The Department developed a number of research networks and partnerships.

##### Grants

The Department held numerous research grants with investigators in other institutions. Three examples are especially notable. **Wolke** was a PI on a Horizon 2020 grant that coordinated 20 partner institutions in Europe to create a European-wide cohort study database. **Brown** co-led the Network for Interdisciplinary Behavioural Science, funded by a Large Grant from the ESRC, with researchers from the University of East Anglia and the University of Nottingham. **Walasek** was part of a consortium grant, Midlands Engine Mental Health and Productivity Pilot, which involves six universities in the Midlands, Public Health England, West Midlands Combined Authority, and mental health charity Mind.

##### Research partnership

**Wade** investigated the relationship between trauma history and the reliability of memory for emotional events, working with clinical psychology experts in Monash University. This three-year project was supported by the University's Monash-Warwick strategic collaboration funds

(see section 1.12, item 4, in the institutional statement). **Ludvig** was a Visiting Associate Professor at Technion in Israel and a Visiting Research Collaborator at Princeton.

### *Outputs*

The authorship of submitted outputs illustrate extensive collaboration networks of the Department. 76% of the outputs submitted had non-Warwick co-authors (60% with an overseas co-author, and 16% without an overseas co-author but with a non-Warwick UK co-author).

### **Contribution to the Research Base**

Department members contributed to the peer review process for a number of journals and funding bodies.

### *Research database*

**RECAP Preterm Data Platform** (director **Wolke**) allows researchers anywhere in the world to analyse data from eight longitudinal studies of preterm children into adulthood in a secure GDPR-compliant way.

### *Chief Editor and Associate Editor of a journal*

*Gesture* (Chief Editor, **Kita**), *Quarterly Journal of Experimental Psychology* (Associate Editor, **Schlaghecken**), *Journal of Experimental Psychology: Learning, Memory, and Cognition* (Associate Editor, **Sanborn**), *Legal and Criminological Psychology* (Associate Editor, **Wade**).

### *Consulting Editor and Editorial/Advisory Board Member of a journal*

*Cognitive Research: Principles & Implications* (**Kunar**), *Journal of the Experimental Analysis of Behavior* (**Ludvig**), *Comparative Cognition & Behavior Reviews* (**Ludvig**), *Journal of Experimental Psychology: Human Perception and Performance* (**Watson**), *Behavioral Research Methods* (**Adelman**), *Journal of Pragmatics* (**Kita**), *Language and Cognition* (**Kita**), *Psychology and Aging* (**Maylor**), *Journal of Gerontology* (**Maylor**), *Psychological Science* (**Maylor**), *European Journal of Personality* (**Realo**), *Journal of Cross-cultural Psychology* (**Realo**), *International Perspectives in Psychology: Research, Practice, Consultation* (**Realo**), *Journal of Cognitive Psychology* (**von Mühlenen**), *Journal of Sleep Research* (**Tang**).

### *Grant bodies*

ESRC, BBSRC, British Academy, Leverhulme Trust, Arthritis Research UK, German Science Foundation, Japan Society for Promotion of Science, National Science Foundation (USA), Swiss National Science Foundation, Russian Mega-grant scheme, Human Frontiers Science Program, Israel Science Foundation, Leverhulme Trust, Social Sciences and Humanities Research Council of Canada, Estonian Research Council, Netherlands Organisation for Scientific Research.

The Department organised conferences and took leadership roles in learned societies and other academic organisations.

### *Conference organisation*

- **Sanborn**, **Adelman**, and **Brown** organised the 2017 *MathPsych/ICCM conference* at Warwick.
- **Brown** organised the 2016 Workshop on the Nature of Preferences, *The Network for Integrated Behavioural Sciences mini Conference*, in Berlin.
- **Ludvig** co-organised the 2016 *Foundations of Utility and Risk Conference* (FUR-2016) at Warwick and the 2015 and 2016 *Barbados Workshops on Reinforcement Learning*. He was also

the Tutorial Chair for the *Reinforcement Learning & Decision Making (RLDM)* conference in Montreal, Canada.

- **Watson** and **Kunar** organised the 2016 *Collaborative Academic and Driving Safety Forum*.
- **Kita** and **Messenger** co-organised the 2015 *Child Language Symposium* at Warwick.
- **Kita** and **Aussems** organised the *Gesture and Language Development workshop* in 2015 (funded by the Experimental Psychology Society), and the *Role of Gesture in Cognitive and Linguistics Processes postgraduate workshop* in 2017 (funded by the Experimental Psychology Society), both at Warwick.
- **MacCallum** organised the 2015 *Changing Understandings of Body Image workshop* at Warwick.
- **Realo** and **Goodwin** organised the 4<sup>th</sup> *Mini-conference on Culture and Psychology* in 2018 at Warwick.

#### *Discussion forum*

A postdoc (Hardy) and a PhD student (Coumel) in the Department convened a statistics discussion forum for women, "R-Ladies Coventry", with participants from Warwick and other UK and European universities.

#### *Learned societies and other academic organisations*

- **Brown** was a member of the 2014 *Hong Kong UGC REF panel*.
- **Wade** was Executive Director of the *Society for Applied Research in Memory & Cognition* (International).
- **Realo** was a Member of the Executive Committee and President of the *European Association for Personality Psychology* (EAPP), and a Member of the Scientific Advisory Board of the *European Social Survey ERIC*.
- **Kita** was the President of the *International Society for Gesture Studies*, and also served as a member of its executive committee.
- **Wolke** was a Member of *European Society for Child and Adolescent Psychiatry* (ESCAP) International Scientific Advisory Board (Geneva, Switzerland), a Member of *SPRING – Pre-Term Birth Collaborators Steering Committee*, a Member of the Scientific Advisory board to the German Government - Working party on Psychology, the Chair of the *Follow-up & Continuing Care Topic Expert Group* of the Standards of Care for Newborn Health Project in EFCNI (*European Foundation for the Care of Newborn Infants*), a Member of the Scientific Advisory Board of EFCNI, a Member of the Chair Committee of the newly established *Global Alliance for Newborn Care* (GANCE - worldwide), and a Member of the working group in the *International Consortium for Healthcare Outcomes Measurement*.

#### **Indicators of wider influence**

The Department's academic influence can be evidenced by awards and distinctions during the REF period.

- **Realo**: Member of the Estonian Academy of Sciences
- **Realo**: The Order of the White Star (IV Class)—the highest state distinction—awarded by the President of Estonia.
- **Wolke**: Highly Cited Researcher (top 1%) by Clarivate Analytics in 2018, 2019, 2020.
- **Wolke**: the BPS Developmental Psychology Distinguished Contribution Award.
- **Wolke**: an Honorary Doctorate in Natural Sciences from Ruhr-University Bochum.
- **Wade** and **Wolke**: Fellows of the Association for Psychological Science.
- **Sanborn** and **Hills**: Fellows of the Alan Turing Institute.
- **Preston**: the Margaret Gorman Early Career Award from APA Division 36.

- **Ludvig**: the Clifford T. Morgan award for best paper in *Learning & Behavior*.
- **Hills**: Best Paper award in *Society of Risk Analysis*.

### Interactions with key research users and wider contributions to economy and society

The three research groups were highly active in research user engagement.

#### Behavioural Science Group

**Brown** was an Academic Advisor for the Fairbanking Foundation (2016-2017) due to his expertise in judgment and decision making research.

**Stewart** (now at Warwick Business School) collaborated with the UK's credit card industry body to uncover novel patterns in how credit card users pay off their debts, based on the data of millions of actual transactions. This led to collaboration with the Financial Conduct Authority, in which they tested interventions to reduce the interest that card users often unnecessarily pay. This resulted in recommendations to the Financial Conduct Authority on credit card use (one of our Impact Case Studies).

**Wade** collaborated with the International Court of Arbitration (part of the International Chamber of Commerce) which resolves high-stakes commercial disputes across the world. Wade was a member of the taskforce in the International Chamber of Commerce which developed new policy on collecting and evaluating witness evidence in the arbitration process. Wade's long-standing research on witness memory shaped the task force's policy recommendations (one of our Impact Case Studies).

**Watson** held a Co-I EPSRC grant with Jaguar Land Rover to investigate how people interpret and judge the behaviour of autonomous vehicles.

Collaboration within the Group led to impact generating projects. **Kunar** and **Watson** built on their expertise on visual attention to collaboratively develop driving skills training programmes, which raised awareness of how human attention can lapse and fail to detect prominent objects or large changes in the visual field. Their training programmes are being used by Dorset and Gloucestershire Police as well as by Leeds and Dudley Councils, to promote safe driving.

**Wallasek** and **Ludvig** carried out a collaborative project on how the gambling industry communicates with customers about their products, and how to optimise communication in a way that is fair to customers.

#### Lifespan Health & Wellbeing Group

**Wolke**'s longitudinal research on the long-term outcome of pre-maturely born infants influenced standards of care for pre-term infants, through participation in the European Foundation for the Care of Newborn Infants (EFNCI) and the International Consortium for Health Outcomes Measurement (ICHOM). Wolke developed the PARCA-R (Parent Report of Children's Abilities-Revised) questionnaire for screening the cognitive and language ability of two-year-olds in a highly efficient way (see Wolke's Impact Case Studies). The screening tool is recommended in NICE guidance (2017) in the UK, and it is used in over 46 countries. It has been normed for the representative sample of full-term and preterm children in the UK. It has been used as a screening tool in clinics to triage care, and it has also been used as the main outcome measure in randomised controlled trials of neonatal interventions.

**Wolke** was a Member of the Action Medical Research Scientific Advisory Panel, a Member of the National Steering Group – Childhood Feeding Disorders (NSG-CFD), and provided advice to companies such as Philips Avent and Mead Johnson.

**Goodwin** was a consultant for the International Atomic Energy Authority on the communication of nuclear risk and led their survey team on measures for nuclear waste reduction (2016). Goodwin, in collaboration with Department of Politics and International

Studies, ran interdisciplinary workshops on psychological/political aspects of security in Brussels, Venice and at the Alan Turing Institute. These events disseminated Goodwin's research around the theme of "security and risk" in moments of crisis. Those attending events included senior representatives from the European Commission, FCO, MOD, DfID, Cabinet Office, and Sandhurst Military Academy. Goodwin was also a commentator on the new WHO Framework for Managing Mental Health and Psycho-Social (MHPS) Support in Radiological and Nuclear Emergencies, providing feedback on the new framework documentation. He also helped organise a Joint Workshop for end-user feedback and scoping out the practical tools for MHPS (BfS-NEA-WHO) (2020), which included WHO and OECD.

**Lemola** worked with the Swiss Midwives Association, to evaluate and revise the "Guidelines on Screening and Counselling for the prevention of cigarette smoking and alcohol consumption before, during, and after pregnancy" (revised and updated version released in 2017), based on his research on pre-term babies. He has also worked with the Canton Basel-Stadt Ministry of Education (Switzerland) regarding secondary schools' starting time in the morning, based on his research on sleep and cognitive functions.

The Sleep and Pain Lab (led by **Tang**) investigated the relationship between chronic pain and sleep, and used their research findings to inform treatment development. The research also evaluated the efficacy and feasibility of providing recommended interventions in health services, in collaboration with University Hospitals Coventry and Warwickshire and local Clinical Commissioning Groups in Coventry, Rugby and Warwickshire (funded by MRC, NIHR, Arthritis Research UK). Empirical research and meta-analyses by the Sleep and Pain Lab informed the European Guidelines for the Diagnosis and Treatment of Insomnia and the current draft of NICE guidelines for chronic pain published for consultation. The group is collaborating with the local IAPT service to provide training for high intensity therapists to roll out the hybrid CBT programme developed for patients with pain and insomnia. The Sleep and Pain Lab also conducted research on opioid tapering for chronic pain patients (funded by NIHR), multidisciplinary management programme for patients with dystonia (funded by Dystonia Society), the impact of Covid-19 on students' mental health (funded by the University), and sleep, emotion regulation and mental health in the workplace (funded by Midland Engine).

**Realo** was a member of the Advisory Board to the Estonian Minister of Health and Labour on issues concerning equal opportunities.

### Language and Learning Group

**Kita**, **Messenger**, and **Aussems** disseminated their latest findings to hundreds of parents with young children every year, via various family-oriented events such as the BabyShow, the British Science Festivals, and events in art/science museums and libraries.

**Aussems** and **McGillion** conducted research (in two separate projects, one funded by UKRI) on how lockdown due to Covid-19 impacted language development in children, in collaboration with UK and overseas universities.

**Hills** obtained funding from Innovate UK, with help from Warwick Venture (Warwick's commercialisation branch), to visit and meet potential customers/investors for commercialisation of his research tool, Macroscopic, and the underlying machine learning mechanism. Macroscopic can find how the meaning of words changed over historical time, by text-mining historical texts. **Towsend** and **Lameria**'s research on animal communication is widely disseminated to the public through BBC, New York Times, and National Geographic.