Max Planck Institute for Human Development

Max-Planck-Institut für Bildungsforschung
Max Planck Institute for Human Development

Max Planck Institute for Human Development

The Max Planck Institute for Human Development, which was founded in 1963, is dedicated to the study of human development and educational processes across the lifespan and historical time. Beyond learning in schools and other institutional settings, the Institute's researchers explore how human development is influenced by physical and cognitive factors, the social setting, the environment, and the zeitgeist.

Research teams investigate questions such as "How can we keep mentally fit as we grow older?", "What effects does the environment have on our brains, behavior, and mental health?", "How do children learn?", "How have human emotions been shaped by history and how do they continue to shape history?", "How can we make good decisions in an increasingly complex world?", and "What challenges does digitalization pose for society and how can we best respond to those challenges?"

Researchers from diverse disciplines—including psychology, sociology, history, computer and information science, medicine, mathematics, and economics—work together on interdisciplinary projects.

The institute's four research centers, a Lise Meitner Group, and three Max Planck Research Groups (MPRG) are also involved in numerous national and international collaborative research efforts with universities and non-university research institutions.

In addition, International Max Planck Research Schools have been set up to advance the careers of young scientists at the institute and beyond. These graduate schools offer especially talented young researchers the opportunity to participate in a structured doctoral program providing excellent research conditions and an intensive, interdisciplinary learning experience.

The institute is one of over 80 research institutions operated by the Max Planck Society for the Advancement of Science, an independent, nonprofit research organization. The Max Planck Institutes carry out basic research in the natural sciences, life sciences, and social and human sciences.

Center for Adaptive Rationality

Director: Prof. Dr. Ralph Hertwig

The world we live in is complex and constantly changing. Every day, we are faced with an onslaught of information to be considered and decisions to be made, both large and small. In order to be able to cope with this uncertainty, people have acquired simple decision-making strategies—rules of thumb called "heuristics." These heuristics help people to make decisions, even when they don't have time to carefully consider all the available options. In contrast to what was previously believed, complex problems do not require complex cognitive strategies and algorithms. Indeed, the results of the Center for Adaptive Rationality, which was founded in 2012, show that simplicity and accuracy are not mutually exclusive when it comes to making decisions.

In which (social) environments can simple heuristics outperform complex decision-making strategies, and when do they lag behind? This is the question at the core of the research group's work. The research focus is on processes of information search, evaluation, and decision making. At the same time, the researchers are interested in whether and how decision strategies change across the lifespan. Informed by insights from their research, they propose heuristics and environmental changes that can empower citizens, patients, doctors, and policy makers to make better decisions.

1

The psychologists, computer scientists, biologists, neuroscientists, philosophers, and physicists in the group address these questions using a variety of methods, including behavioral experiments, surveys, computer simulations, and neuroscientific tools, such as measuring brain activity.

Center for the History of Emotions

Director: Prof. Dr. Ute Frevert

Feelings such as hate, fear, joy, envy, and pride are deeply personal human experiences. They are powerful forces driving our behavior. And not only do emotions change over the lifespan, they also have a history of their own: Feelings are learned and cultivated. And exactly which feelings are acceptable at any given time in history is subject to cultural and societal processes. Family, school, and the world of work play a role here, as do institutions such as state and church. Of course, these contextual conditions have changed over time. Two hundred years ago, people's emotional lives were different than they are today. Whereas people often used to be frightened of witches, for example, we are now afraid of climate change and terrorism. How people express their emotions also changes over time.

Not only do emotions have a history, moreover, they also make history. Emotions have been aroused, manipulated, and instrumentalized since time immemorial—in private as well as in public life, and in the context of both culture and consumption. Wars, revolutions, and even day-to-day politics would be unthinkable without them.

Since 2008, the researchers of the Center for the History of Emotions have been investigating the emotional structures of the past and present. The historians work closely with psychologists, ethnologists, sociologists, and with scholars of literature, art, education, and music to uncover the traces of change in emotions over the course of history. They focus on the 18th to 20th centuries, comparing western European and south Asian societies, with a focus on India.

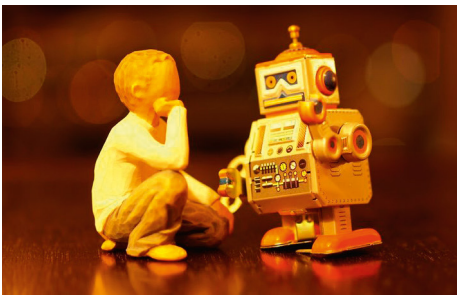
Center for Humans and Machines

Director: Assoc. Prof. (MIT) Iyad Rahwan, Ph.D.

Intelligent algorithms have radically changed the way we think, learn, work, play, and live our lives. They determine which news items we see in our social media feeds. They decide which products we are shown in online shops. They translate texts, trade stocks, steer cars, and control machines. These changes pose major challenges for both individuals and societies—challenges that cannot be solved by computer science alone.

The Center for Humans and Machines, which was founded in 2019, takes an interdisciplinary approach to understanding how machines are shaping human society today and how they may continue to shape it in the future. Researchers from fields such as mathematics, computer science, economics, machine learning, political science, psychology, and physics work with collaborators from media, arts and humanities to understand the digital revolution, predict upheavals, and shape change.

The researchers are primarily concerned with how algorithms and intelligent machines are changing humans and the environments around them. How do search engines influence our behavior? How does social media change politics and governance? Can intelligent decision aids make our lives easier?



3

Information technologies can help to make the world a better place, but they can also limit people's ability to make decisions freely. Against this background, the Center for Humans and Machines aims to provide society with a scientific foundation for the discussion and negotiation of rules for dealing with algorithms.

Center for Lifespan Psychology

Director: Prof. Dr. Ulman Lindenberger

Conceptions of behavioral development across the lifespan have undergone profound changes in the history of psychology. In recent decades, narrow views that define development as a sequence of universal and irreversible stages toward some ideal end state have given way to the broader view that development is malleable within individuals, variable across individuals, and does not follow a masterplan. For instance, it is now understood that normal aging is an open process that is shaped by physical and social factors. Based on this broader view of individual development, the research program of the Center for Lifespan Psychology addresses three key questions: How do individual differences in behavior and brain emerge through the interplay of maturation, learning, and aging? Which theories and methods can be used to assess and explain individual development across different functional domains (such as cognition and emotion), timescales (from milliseconds to decades), and levels of analysis (such as brain and behavior)? How do people make use of developmental opportunities?

4

To address these key questions, the researchers integrate tools and insights from multiple disciplines, such as psychology, cognitive neuroscience, and computer science. They perform experimental and longitudinal studies to investigate mechanisms related to perception, attention, memory, motor control, and interpersonal action coordination. The research findings provide insights into differences in developmental potential. One research question of particular interest is how cognitive abilities can be maintained in old age.

Architecture—Working in a Work of Art

Researchers need peace and quiet for individual reflection but also space for interaction and exchange. This was the principle guiding the architects Hermann Fehling and Daniel Gogel when they designed the Institute building. They conceived the building from the inside out—its shape and structure were determined by the needs of the people working in it. Small offices and laboratories with windows looking over tranquil, leafy courtyards and doors opening onto quiet connecting corridors enable concentrated work. At the same time, generously dimensioned open spaces and communal areas encourage contact and communication. The wings of the building, at differing levels and with differing story heights, are arranged around a central axis. Angular lines, transparency and light, surprising perspectives that are clearly functional and ascetic but that convey an organic dynamism, structured wall surfaces, and the lightness of the sail-like ceiling design underscore the special character of the building. The garden surrounding the Institute is home to a wealth of ornamental and edible plants and has, over the years, grown into a thriving habitat for a great variety of wildlife.

5

6

www.fehling-gogel.de

Lise Meitner Group for Environmental Neuroscience

Research Group Leader: Prof. Dr. Simone Kühn

How does the environment we live in affect our brain and mental health? Are there differences between city-dwellers and the rural population? And how does the brain react to life in extreme environments, such as the Antarctic or space?

The effects of the environment on the human brain are as yet largely unexplored. The Lise Meitner Group for Environmental Neuroscience, which was founded in 2019, aims to close this knowledge gap.

Using georeferencing methods, the scientists can objectively describe the surrounding environment. In combination with behavioral experiments, functional and structural magnetic resonance imaging, and other brain imaging methods, the researchers seek to identify the impact of environmental factors on people's cognition and mental health. Their focus is on the effects of urban life on the human brain. This work will be complemented by observations and measurement of humans in various environments—walking in the woods,

7

navigating virtual spaces, and coping with extreme environments. In laboratory studies, the researchers will observe the brain activity of participants exposed to pictures or videos of natural environments, as well as to natural sounds and smells.

The research group's aim is to advance the understanding of the relationships between the environment and the human brain, making it possible to develop evidence-based measures for the design of urban living environments with positive long-term effects on people's wellbeing, cognitive functioning, and mental and physical resilience.

MPRG iSearch | Information Search, Ecological and Active Learning Research With Children

Research Group Leader: Prof. Dr. Azzurra Ruggeri

As soon as they are born, humans begin to explore and engage with the world around them. Toddlers are already able to use various different strategies depending on the situation at hand: They may touch objects and people, interact with them, or consciously avoid them. Later, they begin to ask questions and to investigate the many new phenomena that they encounter every day of their young lives.

The MPRG iSearch, which was founded in 2016, analyzes how children between the ages of two and twelve actively search for information in their physical and social environment. The researchers use experiments and observational studies to investigate the effectiveness of the various strategies that children apply. The focus is on the concept of "ecological learning"—that is, how flexibly and dynamically children adapt their strategies of exploring the world to different learning situations.

The research group is also interested in identifying the cognitive mechanisms—such as language or memory skills—underlying developmental changes in the use of these strategies.

8

The group takes a multidisciplinary approach, drawing on methods and theories from developmental and cognitive psychology, philosophy, educational science, statistics, as well as computer modeling. This work is conducted in the laboratory, as well as in collaboration with Berlin-based educational institutions and museums. By providing new insights into the benefits of active learning, the researchers hope to support education experts in developing novel approaches to classroom learning.

MPRG Naturalistic Social Cognition

Research Group Leader: Dr. Annie E. Wertz

9

Infants aged between 6 and 18 months respond to plants in specific ways. They are initially more reluctant to touch plants than man-made objects such as lamps or spoons. However, infants overcome this hesitancy by learning from what other people do. For example, infants quickly learn which plants are edible by watching which plants adults put in their mouths.

The researchers in the MPRG Naturalistic Social Cognition believe that children's understanding of plants is a function of human evolution: Across evolutionary time, learning which plants could be eaten and which were toxic would have been critical to human survival. Within this new field of study, the research group investigates which selective social learning strategies humans use over the course of their development to acquire information about plants.

Employing a combination of laboratory studies with infants and observations of parent–child interactions, the research group, founded in 2015, examines how these social learning strategies function at the earliest stages of the lifespan and whether there are cross-cultural differences in people's dealing with plants. To this end, they integrate theories and methods of cognitive science, developmental psychology, evolutionary biology, and biological anthropology.

Their research provides a window into the complex interplay of evolutionary and developmental factors that allow human beings to accumulate cultural knowledge. It is thanks to this kind of intergenerational knowledge transfer that humans are able to survive and thrive in environments across the world.

MPRG NeuroCode | Neuronal and Computational Basis of Learning, Decision Making, and Memory

Research Group Leader: Dr. Nicolas Schuck

10

Chocolate or vanilla ice cream, the job in Munich or the one in Berlin, sneakers or boots: People make hundreds of decisions every day—some trivial, some complex—and try to predict the influence those decisions will have on their lives. The deciding brain refers back to earlier experiences and, at the same time, learns something new with each decision.

Since fall 2017, a team of researchers has been examining the interplay of learning, memory, and decision-making processes. They are interested in identifying the algorithms the brain uses to make decisions on the basis of previous experience. In other words, how are experiences stored in the brain so that they can be retrieved efficiently when decisions need to be made? Does the brain recall individual experiences or does it just determine how well a certain option worked in the past? The researchers want to understand exactly how memory storage and recall works. They hope that these insights will also help to understand what happens to memory as people get older.

The NeuroCode team addresses these research questions by conducting behavioral experiments and using functional magnetic resonance imaging, a technique that makes it possible to measure brain activity while people are making decisions. The researchers analyze the data collected using state-of-the-art statistical methods and compare their results with the predictions of mathematical models. This combination of methods is part of the classic repertoire of a young research discipline: computational cognitive neuroscience.

Contact

Max Planck Institute for Human Development
Lentzeallee 94
14195 Berlin

Phone: +49 30 82406-0
E-mail: info@mpib-berlin.mpg.de
Internet: www.mpib-berlin.mpg.de/en

Further Information:
Research: www.mpib-berlin.mpg.de/research
Events: www.mpib-berlin.mpg.de/seminars-and-events
Careers: www.mpib-berlin.mpg.de/career
Study Participation: www.mpib-berlin.mpg.de/research/study-participation

This brochure is published by the Max Planck Institute for Human Development for public relations purposes. It is provided free of charge and is not destined for resale.
Editor: Max Planck Institute for Human Development
Lentzeallee 94, 14195 Berlin
Phone: +49 30 82406-0
Internet: www.mpib-berlin.mpg.de/en
E-mail: presse@mpib-berlin.mpg.de
Responsible according to German press law: Kerstin Skork

Copy editing, design, and production: Artur Krutsch, Sarah Otterstetter, Svenja Schulz, Nicole Siller, Kerstin Skork
Translation: Susannah Goss
Printed by: LASERLINE
Photos: Cover M. Kißler, 1 Ryoji Iwata – Unsplash, 2 INFINITY – Fotolia.de, 3 Iyad Rahwan, 4 Robert Kneschke – Fotolia.de, 5 K. Bartel & R. Brauner, 6 M. Kißler, 7 Collage using Etty Fidele and Trent Szmolnik – Unsplash, 8 Gesine Born, 9 Martinan – Fotolia.de, 10 FotografiaBasica – iStock

Last updated: January 2020