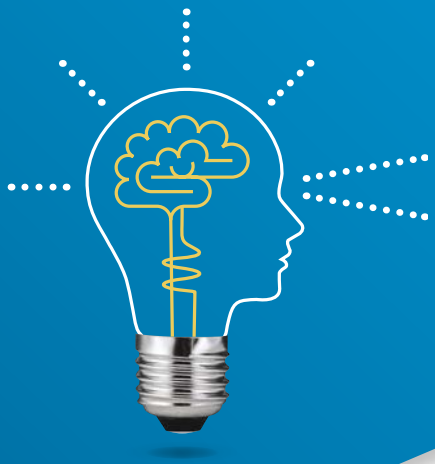

CONFERENCE STATEMENT

JULY 2019

Brain Power for Sustainable Development

The Cognitive Preconditions for a Successful Sustainability Transition

Executive Summary

Brain power comprises the competences, abilities, traits and motivational skills that enable people to make sound decisions and adapt their behavior. Brain power is a key prerequisite for a successful transition towards sustainability. Individual brain power develops out of a continuous, lifelong interaction between genetic dispositions, maturation processes, environmental conditions and social experience. The most obvious way to strengthen brain power is to provide positive supportive environmental conditions in early childhood, both formal and informal high-quality education as well as lifelong learning. Furthering general cognitive and motivational competences proves to be more effective than specialized programs.

Brain power helps to enhance the capabilities of people and societies to move towards the implementation of the 2030 Agenda and the SDGs. It has the potential to become one of the most important drivers for inclusive and people-centered sustainable development: (1) It empowers people to better help themselves and has direct effects on health, poverty reduction and economic prosperity. (2) It enables people and communities to better adapt to unavoidable changes and increases resilience to climate change and natural disasters. (3) It can help to advance relevant technological, medical and socio-economic innovation in cutting edge scientific research. (4) It enhances the possibility for global collective action and improves institutional settings to address the challenges towards a successful sustainability transition. Science and the interdisciplinary collaboration between neuroscientists, psychologists and social scientists is of critical importance for sustainable development.

Background

The Secretary-General of the United Nations has mandated an Independent Group of Scientists (IGS) to draft the quadrennial Global Sustainable Development Report 2019 and provide scientific guidance on the state of global sustainable development. In collaboration with the IGS, the German National Academy of Sciences Leopoldina organized a symposium entitled “Brain Power for Sustainable Development” in Berlin on 13 June 2018 to explore how new insights in cognitive neuroscience, psychology and social science can contribute to a better understanding of the cognitive and motivational preconditions for sustainable development and the implementation of the Sustainable Development Goals (SDGs). For further information, please visit www.leopoldina.org/brainpower.[1]

The adoption of the 2030 Agenda for Sustainable Development in September 2015 was a landmark achievement for the United Nations. The scale and ambition of the 17 Sustainable Development Goals (SDGs) is unprecedented and their implementation requires new and innovative approaches. While the different SDGs are interdependent and, at times, contradictory, all of them require urgent action by all countries – poor, rich and middle-income – to promote inclusive economic growth and social development while protecting the planet.[2]

The SDGs and the targets of the Paris Agreement can only be achieved if individual and collective behavior change fundamentally. Human behavior is highly adaptive and has overcome a myriad of challenges during its evolutionary history. Today, however, humans face a profoundly different situation: The transition towards sustainability is not an adaptive response to already manifest negative experiences as in earlier major transformations such as the industrial revolution. Instead, it is based on *anticipated* trends and scientific findings about future consequences of current individual and collective behavior. Thus, an essential prerequisite for a sustainable development is cognition-based reasoning, based on insight, prudence and foresight,[3] which will enable humans to adapt their behavior, making a successful transition towards sustainability possible. Understanding what drives human behavior, both at the individual and the societal level, will be a key to implementing the 2030 Agenda and the SDGs in a coordinated manner.

Brain Power – Central Elements

"Brain power" describes the cognitive dimensions that underlie individual and group behavior. It summarizes the competences, abilities, traits and motivational skills that enable people to make informed behavioral choices and adapt their behavior. These competences and skills are like tools that can be applied to all kinds of situations over the whole lifespan. In scientific disciplines such as developmental psychology, cognitive neuroscience and behavioral economics, various essential cognitive and motivational competences have been identified, e.g. general intelligence, self-regulation, abstraction and planning skills, rational decision-making, complex problem solving, goal-directed behavior as well as organization and integration of experience.

Brain power develops from a continuous interaction between genetic dispositions, brain maturation processes, environmental conditions and social experience. These manifold interactions provide the basis of *lifelong* neurocognitive development.[4] The most sensitive and critical window of opportunity to strengthen brain power is in early childhood: The plasticity of the brain is extremely high in the first years of life and positive supportive environmental conditions can boost genetic predispositions to set free the full potential of the brain. On the other hand, negative environmental conditions like poverty or insufficient schooling can limit the unfolding of brain power competences. Early influences have lifelong consequences: The cognitive skills developed in childhood and early adolescence lay the basis for easier learning in later life stages. Therefore, the creation of positive supporting environments based on age-adequate educational intervention strategies is essential not only at school age, but even earlier. It has been shown conclusively that such environments enhance the cognitive development through increasing the synaptic density in relevant parts of the brain. In this context, the quality of such educational interventions is more important than merely extending the duration of formal schooling. At the same time, basic education that ensures general literary skills is essential for the lifelong positive effects of brain power.

While cognitive functions, which rely on the speed of processing (fluid intelligence), decrease with increasing age, knowledge-based competences (crystallized intelligence) increase with progressive age. Even though this makes learning, in general, more effortful and less permanent, educational programs are also crucial in later life. Older people can still learn and change their behavior if they get proper and convincing information about risks and hazards. In this respect, non-coercive interventions are of paramount importance to boost people's competence to make their own choices.[5] Moreover, risk-taking behavior shows an age trend too, with young adolescents being more prone to sensation-seeking behavior than older adults. Such trends support the notion that the collective brain power of a society will profit from the individual brain power of all age groups, from the younger, being faster and more curious to give new ideas a chance, as well as from the older, being more restrained and knowing about obstacles and risks.

Brain Power – Transformative Impact and Effects

Brain power can be influenced and furthered over the whole lifespan. This is key to a successful sustainability transition. There is ample scientific evidence about the interconnection between enhanced cognitive and motivational competences and sustainable development in all its dimensions. Moreover, there is a strong indication that **furthering general cognitive and motivational competences proves to be more effective than specialized, goal-specific programs.** The following examples illustrate the close interrelation of brain power and sustainable development:

Brain Power and Health

Improved cognitive competences lead to reduced morbidity and later mortality as well as more conscious choices of health-related behavior. This is especially true with regard to the avoidance of risk factors, such as unhealthy diets or the abuse of substances such as tobacco and alcohol.[6] Moreover, cognitive capacities affect the ability of patients to find relevant information and navigate the health system, thereby increasing access to healthcare and benefits of treatment. It has also been shown that an increased level of education especially of women, together with access to reproductive health services, leads to a lowering of birth rates – particularly in high fertility countries. This is because women and couples become more rational in their choice of family size, see the economic and health advantages of fewer births and find better access to means of limiting family size.

Brain Power, Poverty and Economic Prosperity

Various dimensions of poverty (nutritional deficiencies, lack of access to basic healthcare, low cognitive stimulation by parents) affect schooling outcomes in children – both with regard to educational achievements and structural differences in the development of certain brain areas. This will have negative consequences over the entire life span. Ensuring that underprivileged children have access to positive supporting environments is a promising way for them to lead a better life in the future. At the macroeconomic level, education expansions, which boost cognitive competences and thus improve productivity, technology adoption and innovation, have been robustly related to increases in the growth rate of average income per capita. Brain power promotes economic prosperity at both the aggregate and the individual level. It is evident that cognitive skills strongly correlate with individual economic success. Experimental economic studies demonstrate causal effects of interventions for fostering cognitive competences and show a favorable cost-benefit ratio, i.e. high social returns, especially for those targeting children from disadvantaged backgrounds.

Brain Power and the Environment

Brain power plays a vital role in enhancing the adaptive capacity to climate change and reducing the vulnerability to natural disasters. There is consistent scientific evidence that countries, communities, households and individuals with higher average levels of education experience lower vulnerability to natural disasters. Not only are educated individuals more likely to survive and have a lower risk of injuries, communities and countries with higher average levels of education also experience much lower losses in human lives from climate-related disasters and recover faster from catastrophic shocks. Individuals equipped with well-developed cognitive and problem-solving skills and the ability to think in terms of counterfactuals, even in the absence of disaster experience, exhibit a higher level of disaster preparedness regardless of their economic situation. Moreover, sustainability motivation can be increased by nature-based environmental education that focuses on both knowledge transfer and fostering of fascination.

Brain Power and Good Institutions

Good and effective institutions (ranging from legal to political and cultural norms and settings) are essential factors in generating and maintaining peace and prosperity and will also be crucial for a successful sustainability transition. Good institutions have been created over time and have been improved through cognitive processes, conscious learning from experience and best practice examples. Developing and maintaining the quality, effectiveness and reliability of institutions – and thus ensuring public support for the transition towards sustainability even if it could imply temporary costs (loss of benefits) – will be key for sustainable development. Reliable institutions also contribute to ensuring social justice and help address new and emerging challenges.

References

1 This conference statement builds on the proceedings of the symposium as well as on the informative abstracts of the speakers. It was compiled by the conference organizers, i.e. Leopoldina members Prof. Dr. Wolfgang Lutz, Director of the Wittgenstein Centre for Demography and Global Human Capital (IIASA, VID/ÖAW, WU) and Prof. Dr. Frank Rösler, Senior Professor for Biological Psychology and Neuropsychology at the University of Hamburg, as well as Dr. Ruth Narmann, Deputy Head of the International Relations Department of the Leopoldina, and Christian Weidlich, Senior Officer at the International Relations Department of the Leopoldina.

2 Science for Sustainable Development, Policy Brief by the Scientific Advisory Board of the UN Secretary-General, 5 October 2016.

3 World in Transition – A Social Contract for Sustainability, German Advisory Council on Global Change (WBGU), Flagship Report 2011, p. 5.

4 German National Academy of Sciences Leopoldina, Socialization in Early Childhood: Biological, psychological, linguistic, sociological and economic perspectives (1. Ed.). Statements for policy advice. Berlin: Mediabogen, 2014.

5 Ralph Hertwig and Till Grüne-Yanoff, Nudging and Boosting: Steering or Empowering Good Decisions, Perspectives on Psychological Science, 2017, Vol. 12(6), pp. 973-986.

6 At the same time, many obvious health benefits, healthier lives and longevity will pose other challenges that need to be addressed in this context, including the worldwide epidemiological transition from infectious to chronic diseases or the challenges related to an aging society.

7 World Commission on Environment and Development, Our Common Future. Oxford: Oxford University Press, 1987.

8 International Council for Science (ICSU), A Guide to SDG Interactions: from Science to Implementation, International Council for Science, 2017.

9 Karl Halvor Teigen and Wibecke Brun, Responsibility is Divisible by Two, But Not by Three or Four: Judgments of Responsibility in Dyads and Groups, Social Cognition, 2011, Vol. 29(1), pp. 15-42.

Brain Power – In a Nutshell

Brain power enables inclusive and people-centered sustainable development. It enhances the capabilities of people and societies to move towards the implementation of the 2030 Agenda and the SDGs and has the potential to become one of the most important drivers for a successful sustainability transition in different ways:

- It empowers people to better help themselves and the people they care about. This includes direct effects of brain power on health, child survival and overcoming poverty.
- It empowers people and communities to better adapt to unavoidable changes including environmental hazards and other partly anthropogenic changes through better information, longer planning horizons and a better understanding of possibly new and not yet experienced dangers.
- It helps to advance relevant technological, medical and socio-economic innovation in cutting edge scientific research and will also provide the necessary societal, economic and political support and appreciation for such research by an enhanced understanding of its value and functioning.
- It can enhance global collective action and improve institutional settings in order to meet the needs of the present generation without compromising the right of future generations to meet their own needs,[7] through insight, prudence and foresight – both through individual behavioral choices as well as through institutional and regulatory changes.

Brain Power – Research Gaps

Science is of critical importance for sustainable development. It provides the necessary knowledge as well as new and innovative technologies to address global challenges. As it helps to analyze and understand the psychological, neurocognitive and social processes that underlie individual and group behavior, it determines whether humans will adapt in a way that is conducive to sustainable development. However, recent assessments of the SDGs and their interactions often ignore the role of education and cognitive development as relevant drivers for sustainable development or consider it to be non-essential.[8]

To further the understanding of brain power at the individual and the collective level, the following research gaps need to be addressed through the collaboration of neuroscience, psychology, economics, sociology, education, and other disciplines:

- Research on the development and evaluation of adaptive educational programs, which increase brain power and which meet the specific needs of groups differing in age, skills and competences or of nations differing in economic development.
- Research on *windows of opportunity* for optimal development of different brain functions and their susceptibility to supportive or adverse environmental factors such as nutrition, parental behavior, infections or pollution.
- Research on behavior modification strategies, such as *boosting* and *nudging*, and on their implementation in order to promote SDG compatible behavior at the individual and group levels.
- Research on how collective brain power of a society emerges out of individual brain power.
- Research on how collective problem solving, decision-making and self-regulation can be optimized and how possible disadvantages of group actions can be minimized, e.g. diffusion of responsibility.[9]

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