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Editorial

Cognitive Innovation: From Cell to Society

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Living in a constantly changing world, dynamically shaped by natural and social forces, presents people with many challenges, both personal and societal. We address these challenges by finding new and innovative solutions to problems, new ways to think about things. The importance of fostering and utilising creative leaps of the imagination is nowhere more recognised than in the European Horizon 2020 flagship initiative, Innovation Union. Innovation Union views technological and social innovation as key to the future economic success of Europe and an education that promotes creative thinking as fundamental for progress. It is seen as essential to develop a strategy for nurturing highly creative researchers who have the intellectual depth and breadth to become productive and insightful innovators, able to proactively seek out new solutions to problems and transform their ideas into utilisable products and effective social innovations.

The terms creativity and innovation are often used with different overtones, associated respectively with artistic and economic activities, thus acquiring negative connotations from those situated in other fields. However, both creativity and innovation clearly stem from a common "exploratory-curiosity-manipulatory" (Hebb, 1955) drive, which is essentially and intrinsically human. It is this drive that causes us to constantly seek new stimulation, learn new skills, and acquire new knowledge in the process of constructing and adapting the self; whether that 'self' be an individual or a social group. We call this holistic view of creativity and innovation “cognitive innovation”. Cognitive innovation is an integrative concept that recognises the fundamental links between the innovator, the innovation, the contextual challenges and consequential reverberations through society. Cognitive innovation consists of an endless cycle of exploration, exploitation and explanation; an exploratory process of probing boundaries, selecting which of the countless ideas to exploit and develop further, synthesizing the resulting new insights into explanations of how things are, generating new challenges and questions. One can see this in the growing arsenal of skills and knowledge of the developing child as well as in the development of a company from nascent idea to fully fledged corporation.

Describing, understanding, and fostering cognitive innovation is at the heart of CogNovo, a new multi-national doctoral training network funded by the EU Marie Curie Initiative and led by the Cognition Institute at Plymouth University. Inspired by Marie Skłodowska-Curie, the only woman to have won two Nobel prizes (and in different disciplines!), the European Marie Curie programme provides generous funding to help researchers enrich their early research experience. CogNovo is a transdisciplinary programme, based around 25 PhD research fellows, that not only aims to provide cutting-edge research training but also draws substantial support and input from the private sector. In CogNovo, scientific, technological and artistic explorations of cognitive innovation, underpinned by insights from a humanities perspective, are closely intertwined with the fellows' training programme. Thus, on the one hand, each PhD project will advance our understanding of cognitive innovation and identify potential applications of innovative evidence-based solutions for the private sector. On the other hand, the latest scientific insights into creativity and cognitive innovation will inform the training initiatives designed to foster creative thinking on the part of the CogNovo fellows.

In CogNovo we seek to forge a unitary cognitive innovation framework from a comprehensive multi-disciplinary collaboration, drawing together fellows and faculty from cognitive neuroscience, cognitive robotics, computational modelling, creative arts, experimental psychology, healthcare, the humanities, and medicine. The great strength of CogNovo lies in its commitment to permeate disciplinary blinkers and push towards a broad understanding of cognitive innovation. CogNovo presents a unique opportunity to conceptualize cognitive innovation from cell to society (Keating & Hertzman, 1999), from the micro to the macro, from individual to swarm, from past ideas to future memes. Projects in the CogNovo canon range from developing plausible neurocomputational models of mind-wandering and creativity, exploring the neurophysiological basis of creative processes (cell), implementing algorithms for innovation generation in artificial systems, describing the physiological, psychological, developmental, and social processes of cognitive innovation in humans, creating innovative interventions for cognitive and behavioural change, exploring the emergent innovation in processes of social groups and swarms, to charting the influences of technology, communication, and cultural memes on the conceptualization of cognitive innovation in the past and future (society). In that sense, CogNovo's approach to cognitive innovation puts to empirical test existing frameworks of (distributed) creativity (Glăveanu, 2014) in which creative action is located in the triadic relationship between actor (both human and artificial), audience, and artefact, nested within social, material, cultural, and temporal resources.

CogNovo fellows don't just work in parallel within their own discipline, specialization, language, or sphere of expertise. Each of the individual research projects is supervised by a *multidisciplinary* team of experts, offering fellows the opportunity to integrate knowledge, methods and skills from multiple disciplines in order to formulate and explore truly *interdisciplinary* research questions. We believe that this juxtaposition of disciplines and research topics with overlapping strands will lead to interesting new insights that could not have been foreseen or conceived within single specific disciplinary contexts, and in this sense we expect CogNovo to be truly *transdisciplinary*. CogNovo offers a wide-ranging curriculum designed to nurture curiosity beyond conventional discipline boundaries, including a rigorous Humanities training, with a particular focus on the human values important for sustainable innovation. In addition, more generic training aimed at strengthening an outward-looking contextualisation of specific research discoveries will be provided by workshops in entrepreneurship and public engagement.

In 1879 William James bemoaned the "desire on the part of men educated in laboratories not to have their physical reasonings mixed up with such incommensurable factors as feelings" and while the creation of disciplinary silos has undoubtedly resulted in significant scientific progress, there is nevertheless a pressing need to bridge

the disconnect between disciplines; a need clearly recognised in the Innovation Union. James argued that the organ of consciousness gives individuals the power to help shape their futures, selecting, often unpredictably, from the "theatre of simultaneous possibilities" the course that best suits their needs and desires. Similarly, we need to find ways to evolve an effective 'social consciousness' that is able to generate, select and nurture the innovative ideas that will bring benefit to society as a whole. We hope in CogNovo to contribute towards this endeavour.

To learn more about CogNovo, see cognovo.eu

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