

**ERC Starting Grant 2014
Research proposal [Part B2]**

**Minor Powers:
Biodigital Citizenship, Agent-based Models, and Governance in a
ScienceCraft Era**

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Part B.2. The Scientific Proposal

a. State-of-the-Art-and-Objectives

The project, that is proposed here, is very ambitious.

It aims at evolving both a policy-analytical perspective and a practice-oriented empirical mixed-method for STS in creating an integrative interdisciplinary conversation between recent innovative turns in STS, sociology of embodied cognition, and political psychology. It deploys and tests its proposed methodology on three research sites, which were chosen because they share an undergirding frame in culture and cognition, accessible via an STS perspective. Three sites is the minimum number to allow for a sufficiently ‘thick comparison’ and triangulation to create agent-based policy models. The sites were chosen, in part, because research undertaken on each of them has the potential to deliver outcome-oriented data-points, regardless of the success of the general objective, minimizing the risks entailed in any research involving new methodological development. The methodology has so far been developed and was successfully applied by the PI, limited to genealogical work in university archives (Harvard Fatigue Research and Social Relations history), the analysis of discourses on the development of diagnostic criteria (e.g. ADHD), analysis of transmedial discourses (e.g. images of Otherness in Western and non-Western film and tv), and ethnographic observations (gastronomy labor, internal martial arts). To develop its potential as a method and tool for empirical research and deliver results pertinent for policy-analysis, a more comprehensive approach is necessary, involving a dedicated team of interdisciplinary researchers. This cannot be accomplished without a major research grant, for which the PI is applying herewith. The following pages, aiming to explicate and justify the scope of the project and the importance of the grant applied for, will obviously have to cover and connect a lot of territory both with necessary comprehension and sufficient clarity. With this goal in mind, the PI has prepared this proposal, seeking to explicate the importance and innovative nature of this research, to the best of his ability.

Objective: The Politics and Poetics of Culture and Cognition in the ScienceCraft Era

It was, until fifteen years ago, a largely uncontroversial statement *that the core family represents the lifeworld wherein those attitudes and orientations are performed that express the personal feelings of its members [...], a process of autonomization that transports the moral problems of the family from the outside to the inside.*¹ This statement is no longer valid, if it has ever been.

Research and scholarship into so-called affective ecologies, digital cultures, techno-biomedical imaginaries, and techno-scientific governance have changed the game of how the politics and poetics of culture and cognition, that constitute *autonomy*, are performed. Autonomy, a prerequisite for participation in political and public life, is dependent on the techno-scientific condition as a cognitive idea, judged as normatively appropriate, and is subject to social pathologies. This project undertakes a novel effort of creating a theoretical and an empirical social research agenda that enables integrative interdisciplinarity in the study of culture, cognition, and the practices of political imagination that bridges the two.

In this research, which aims to ‘think STS together with Sociology of Embodied Cognition and Political Psychology’, the PI and his team will investigate *biological citizenship* in the context of techno-scientific governance, which is considered the systematic condition that pervades the lifeworlds and ecologies that afford *biodigital citizens* agency: Where does the concept of the *biodigital citizen* really fall empirically between heuristic extremes of the active, participative citizen-consumer and passive consumption. What type of political imagination characterizes this *biological citizenship*, i.e. what are the *enablements* and *constraints* of forming publics and conceiving ‘the political’, what political practices are considered possible, and what competencies are required to generate the notion of autonomy in decision-making? How do normalization processes and social pathologies affect and co-produce *biodigital citizens*? Can social transformation and policy reform, that require public support and participation be accounted, evaluated, and projected for in societies that are characterized by the *biodigital condition* (cultural dimension)? Can individual participation in techno-scientific regimes of (health) care be

¹ Honneth, A. *Das Andere der Gerechtigkeit*. Frankfurt aM: Suhrkamp, 2000: 194f.. A continuously updated bibliography for this project can be found at: http://alexstingl.webs.com/MinorPowers_Biblio.pdf

invoked to counter disorders, which have strong social pathological links (such as ADHD) and also grave consequences for individual decision-making capacities (cognitive dimension)?

Given these concerns, we require adequate agent-based models in social and policy analysis. Such models should be created in STS, because agents, situations, and institutions (as variables in decision-making models) are necessarily determined by techno-scientific governance. Additionally, research methods must take into consideration that agency cannot be reduced and limited to any of the prevalent ‘individualistic’ research paradigms – neither representationalist models of ‘mental states’ nor alternatives that consider passive observation of behavior reducible to ‘brain states’, etc. Instead, the state of the debate on social cognition suggests that agents’ decision-making must be understood as an ongoing, dynamical process of participatory sense-making and mutual incorporation: Agent-based models of decision-making in the algorithmic architectures of techno-scientific governance regimes describe a *dynamical agentive systems* point of view as an interaction and coordination of embodied agents that are intercorporeal (Merleau-Ponty). Furthermore, methods deployed in the field, such as institutional ethnography, discursive institutionalism, situational mapping, and semantic qualifying, must account not only for ‘thin concepts’, which constitute semantics of simple binary opposition that can be applied to any object and are typical of methodological individualism, but also for ‘thick concepts’, which are ‘world-guided’ multi-valued, and further account for the possibility of dynamic agent development and change².

The suggestion here is that an STS-based investigation of the emerging *biodigital citizenship* and its roots in techno-scientific governmentality, which also takes seriously that research should be outcome-oriented in political terms, can and must align with methodological approaches that account for culture and cognition. In awareness of the state-of-the-art in the relevant fields and on the basis of his past theoretical-methodological and his collaborative research, the PI is proposing such an alternative, which he, along with a team, aims to develop further empirically in the terms of this project.

State of the Art: From Techno-science to ScienceCraft

What is at stake is the investigation of the dynamic process of autonomization and, subsequently, the development of potentials and pathologies of the (*biodigital*) political imagination that is embedded in life-worlds that are inherently governed by techno-scientific regimes. Many standard accounts of political and/or moral agency, economy, and imagination, remain rooted in methodological individualism, ‘thin’ concepts, and ‘single out one section only of the whole circle of organism–environment interaction’ (De Jaegher). Instead, in *Worlds of ScienceCraft* (Restivo/Stingl/Weiss), these stakes were problematized by a ‘brain-mind-*Umwelt*’ model, the figure of the *modest cyborg*, and *science-civics*, i.e. the requirement of empathic decision-making in publics and polities emerging in biomedical contexts.

STS scholarship has created profound inquiries into the role that technoscientific imaginaries play in these terms for both scientific communities as well as society at large in recent years. For example, in her book, *Crafting Science* Joan Fujimura described the representational work of biological scientists as researchers crafted and recraft theories along the path of links to problems of many different scientific worlds. In a recent contribution, she investigated techno-biological imaginaries and ‘the role of mechanistic models and principles in modeling living organisms [...] use of metaphors and languages taken from engineering models of the complex systems of automobiles, airplanes, and robots to study complex living systems [, and the] outcome of a series of movements back and forth across the machine–living organism border. Analogous movements can be seen in various “systems approaches” across the environmental sciences, including climatology, soil science, and ecology [...], the question of what is lost in translation at these border crossings.’³

² Abend, G. “Thick Concepts and the Moral Brain.” in: *European Journal of Sociology / Archives Européennes de Sociologie* 52/1, 2011: 143–172.; De Jaegher, H., and T. Froese. “On the Role of Social Interaction in Individual Agency.” in: *Adaptive Behavior* Vol. 17/5, 2009: 444–460; De Jaegher, H. “Rigid and Fluid Interactions with Institutions.” in: *Cognitive Systems Research* 25-26, 2013: 19–25. Barrett, L. F. “Emotions are real.” in: *Emotion*, 12, 2012: 413-429

³ Fujimura, J. “Technobiological Imaginaries: How Do Systems Biologists Know Nature?” In: *Knowing Nature: Conversations at the Intersection of Political Ecology and Science Studies*, Edited by M.J. Goldman, P. Nadasdy, and M.D. Turner. Duke

This direction of research is not limited to an imagination and discourse that is only linguistic; it extends to embodied cognitions and practice interrelations of several kinds, which Myers and Dumit have shown in an exemplary paper on *haptic creativity*: Researchers display modes of embodiment in the form of movements, gestures, and physical practices, that shape and are shaped by the ‘responsive media’ of scientific action. Researchers, they argue, ‘transduce these affects through their body-work and propagate these gestures through performative articulations that excite others into action. In this sense, entire research collectives become excitable media with the capacity to collect up and relay nuanced molecular affects. And as we turn our attention to the visualization practices of geologists and cell biologists, we learn new things about excitability and embodiment in experimental practice.’⁴

In Restivo/Weiss/Stingl, another provocation was created, interrogating the *massively multiplayer online role-playing game* (MMORPG) *World of Warcraft*, which signals concerns with drawing out the implications of gaming for re-thinking the nature of the self in relation to others and to science and technology. In *ScienceCraft*, the PI and collaborators argued for a comprehensive mode of integration within a complex brain-mind-*Umwelt* model, that is at the same time pluralistic (→agency), democratic (→economy), and autonomous (→imagination): Techno-scientifically embedded communities develop their *individuated* integrities while remaining able to communicate and cooperate with each other in the form of *practices* – both linguistic and not. It is this level of integrity and communication that was described as *ScienceCraft*. In order to understand this communication, to study as a social phenomenon as well we achieve a multicultural mode of integration within the techno-scientific community itself, science and scholarship have to solve four crucial problems, that were identified by the PI and Weiss in their autonomously written conclusion for *Worlds of ScienceCraft*. For techno-science itself, the transformation becomes tangible in the figuration of an ‘*emergent Third*, which we see figured in the *Three Es*: encoding, embodying, and enacting the *modest cyborg*. [...] It presents an alternative, potentially postcolonial, and epistemically disobedient way of framing participants in the activity of science, recognizing that many configurations of people, cultures, and technology are both possible and valuable. The boundaries of expertise and culture become leverage points rather than polarizing filters; this diffraction splits the combined scientific activities into a spectrum of diverse perspectives.’ (Stingl/Weiss in: Restivo/Weiss/Stingl). For society at large, the PI (forthcoming publications) has further established that this figuration is found encoding, embodying, and enacting a particular type of citizenship and political participation – in a wider, Pragmatist understanding of political⁵ – that is structured by biopolitics and digital culture, however not in an *associative* fashion, but in a highly *integrative* fashion with interdependencies regulated by a singular algorithmic architecture: Citizenship, as the form of participation in a public, is not biomedical *and/or* digital, but *biodigital*.

The empirical investigation of this fact will be conducted in three sites that the PI has chosen, where problems of decision-making, participation, pro-social behavior, and imaging alternatives (politics/poetics) are always at stake. All three sites allow the interrogation of perceptions and transformations of (a) *self-agency*, a dynamic understanding integrated in any subjective formation, that describes to which degree one is initiating, executing, and controlling their own actions, influences their own bodies, understands affordances provided to them by the different ecologies (including digital culture and avatars) they engage, and the limits of their influence on the practices they are entangled with; secondly, (b) the measures of *empowerment, enablement and constraints* that people can conceive and experience; finally, the level of (c) *health-related quality of life* (HrQoL) that they experience and can plan to possibly attain, which influences decisions about life-course trajectories (which includes actions under the label of *e-health*). These three factors are interdependent, and influence over them is limited by their inherent algorithmic architecture and the regime of techno-scientific governance. Political reforms,

University Press, 2011; also: Fujimura, J. *Crafting Science: A Sociohistory of the Quest for the Genetics of Cancer*. Cambridge, MA: Harvard University Press, 1996;

⁴ Myers, N. and Dumit, J. “Haptics: Haptic Creativity and the Mid-Embodiments of Experimental Life”, in: Mascia-Lees, : F. E. ed., *A Companion to the Anthropology of the Body and Embodiment*. Oxford, UK: Wiley-Blackwell, 2011

⁵ Dewey, J. *The Public and its Problems*. University Park: Penn State UP, 2012; Mackey, S. ‘A semiotic view of Dewey’s times and Habermas’s lifeworlds’ in: *cosmos&history*, Vol. 5/2, 2009: 178 – 190

such as (mental) health care reform, and other political transformations have to take these interdependencies into account: In short, to participate politically means to incorporate mixed moral, political, and attention economies, as well as navigate a plurality of ecologies. To create robust models for STS-based policy-analysis, one must begin by mapping those economies and ecologies, and re-conceptualizing agents as 'dynamical agentive systems embedded in embodied and meaningful interactions' (De Jaegher). Measurements are to be taken using, not 'thin' concepts and binary opposites, but 'thick' concepts (Abend) and meaning (Barrett), as well as documenting the extent of non-textual, meaningful practices (*semantic agency*). This requires an innovative methodology.

STS & the Sociology of Embodied Cognition: The Developmental Dynamics of Biodigital Citizenship

The research perspective that can deliver empirically resilient research in sociology, moral psychology, ethics, political economy, and public health will draw the scope of such an approach positively located in the realm of studies in Science, Technology & Society (STS) and, also, in a new kind of sociology: There is, says Dirk Baecker in his recently published *Neurosociology*,⁶ 'no sociology of the brain as of yet'. He emphasizes the need for this kind of *involvement* that has been taken up so far, however, only in Anglo-American social science in its study of the relations between culture and cognition (Cerulo & co.). An STS investigation into culture and cognition of techno-science governance regimes both demands but also enables an understanding of the conditions of possibility for decision-making and (active) participation in general. Biological psychiatry, neurocognitive research, and developmental systems biology have opened productive lines of questioning and created fertile opportunities for intervention. But in working in isolation from the humanities and social sciences, they have squandered potentials: An influential 'Memorandum towards reflexive neuro-sciences',⁷ asserts that the paradigm of pure neuro-research has failed to deliver any of the promised results in research, diagnostics, and therapy advancement. Yet, the actual potential of the neuro-sciences and the prerequisites for developing it into programmatic efforts for research and applications, are imbricated with social consequences: *It is*, the authors state, *always the person as a whole who perceives, considers, decides, remembers, and so on, and it is not 'a' neuron or 'a' cluster of molecules*; this kind of reductionism as well as any merely *associative interdisciplinarity*, stands against the idea of *transdisciplinarity*, of a *discursive and reflexive neuro-science, that is able to critique its own premises and recognizes its limits*. As a consequence, it is suggested that we need an *integrative interdisciplinarity* that requires both *scholars from the humanities and social sciences to be open to empirical sciences and brain researchers to let go of any trace of disrespect for non-experimental sciences*. STS, sociology of embodied cognition, and political psychology can enter such a relation in the development and deployment of this new method in the social studies of science, but this aims to go further, in developing a research agenda to respond in an integrative fashion to four interrelated challenges for empirical and theoretical social sciences: the challenge of a sociology of culture and cognition⁸, the *new empiricism* and affective turn in sociology,⁹ the enactive turn,¹⁰ and post-foundationalist political theory.¹¹ These questions are inter-related because of the acceleration of the processes configured on the one hand between biomedicalization¹², biopoliticization¹³ and proliferation of

⁶ Baecker, D. *Neurosoziologie*. Berlin: Suhrkamp, 2014..

⁷ <https://www.psychologie-heute.de/home/lesenswert/memorandum-reflexive-neurowissenschaft/>

⁸ Cerulo, K. A. 2002. *Culture in Mind: Toward a Sociology of Culture and Cognition*. New York: Routledge, 2002; Holland, D. C. . *Identity and Agency in Cultural Worlds*. Cambridge, MA [etc.]: Harvard University Press, 1998; Martin, J. L. "What Do Animals Do All Day? On the Totemic Logic of Class Bodies." *Poetics* 27, 2000: 195 – 231; Martin, J.L. "The Formation and Stabilization of Vertical Hierarchies among Adolescents: Towards a Quantitative Ethology of Dominance among Humans." *Social Psychology Quarterly* 72, 2009: 241 – 264.

⁹ Clough, P. T. "The Affective Turn Political Economy, Biomedicine and Bodies." *Theory, Culture & Society* 25/1, 2008 : 1–22; Clough, P.T. "The New Empiricism Affect and Sociological Method." *European Journal of Social Theory* 12/1, 2009: 43–61. Parisi, L. *Contagious Architecture: Computation, Aesthetics, and Space*. Cambridge, MA: The MIT Press; 2013

¹⁰ Noë, A. *Out of Our Heads*. New York: Hill and Wang, 2010; Fuchs, T., H. De Jaegher. "Enactive Intersubjectivity: Participatory Sense-Making and Mutual Incorporation." *Phenomenology and the Cognitive Sciences* 8.4 (2009): 465–486.

¹¹ Marchart, Oliver. 2007. *Post-Foundational Political Thought*. Edinburgh: Edinburgh University Press.

¹² Clarke, A. et al, eds. *Biomedicalization*. Durham, NC: Duke UP, 2011; Clarke, A.E. *Situational Analysis*. London: Sage, 2005

techno-scientific imaginaries, and on the other between contagion-like digitalization¹⁴ and techno-somatic involvement in the form of body-screen couplings¹⁵. They are united by a complex and transformative process, an underlying algorithmic architecture (Parisi) that is not *either* biological *or* digital nor merely associative but deeply integrated¹⁶. *Biopolitical citizenship* describes a social ontology and actually practiced power relations that bring forth and govern biodigitality as an *extended subjectivity* of sorts. 'I think', says cognitive researcher Andy Clark, 'the real attraction of the extended mind story is that the activity upon which mindfulness depends is much more spread out than we thought. Maybe our ongoing use of things like [smartphones] and other sorts of external structures is really part of creating a web of activity, where mind is what happens when that web happens'¹⁷.

Instead of webs of activities, terms such as relational ecologies or affective ecologies seem, however, more appropriate and attuned to recent scholarship, for they apply from interfacial modalities and somatic incorporations that derive in body-technology relations (Richardson) to the technologies of attention 'described as both cultural and cognitive technologies [...] called the science and technology of the digital, the coupling between societies, technologies, bodies and psychic apparatuses becomes a common question for most of the disciplines, which concern themselves with all kinds of social agents'¹⁸, or relations and networks rather than individuals and wholes¹⁹, and affective relationalities in communities of organisms in communication with one another²⁰. Media-theorist Erich Hörl²¹ suggests to study this as a *general ecology* in the form of a *Third Cybernetics*. The PI has suggested, along with his junior colleague Weiss (BMBF *Klausurwoche*), utilizing ideas about the figuration of the *Third* from Michel Serres²², Gesa Lindemann²³, and the notion of empathy as a three-person model by Fritz Breithaupt²⁴, to establish the notion of a general ecology as a *cybernetics of Thirdness* instead. This is relevant to STS and, as Weiss and the PI have argued, it matters for outcome-oriented policy-making, for example in (mental) health care reforms, digital privacy protection, as well as interdependent zones such as biobanking. Outcome-orientation requires that political actors, including affected populations obtain (a) conceivability of the scope and possible outcome of policy-measures and (self-) agentic potentials within that scope (i.e. political imagination), (b) individual decision-making for/against participation, and (c) an understanding of the indicators of positive outcome for individual participation (e.g. Well-being, HrQoL), and (d) a complex notion of responsibility for (a)-(c). For the emerging paradigm for a sociology

¹³ Petryna, A. *Life Exposed: Biological Citizens After Chernobyl*. Princeton University Press, 2002; Rabinow, P. "Artificiality and Enlightenment: From Sociobiology to Biosociality." In: Inchausti, J.X., ed. *Anthropologies of Modernity*, 2008 179–93. Blackwell; Rose, N.. *The Politics of Life Itself: Biomedicine, Power, and Subjectivity in the Twenty-First Century*. Princeton; Oxford: Princeton University Press. 2007.

¹⁴ Parikka, Jussi. 2007. *Digital Contagions: A Media Archaeology of Computer Viruses*. New York: Peter Lang. Han, B.-J.; *Im Schwarm. Ansichten des Digitalen*. Matthes & Seitz Berlin 2013

¹⁵ Richardson, I. "Faces, Interfaces, Screens: Relational Ontologies of Framing, Attention and Distraction." *Transformations* 18, 2010: http://www.transformationsjournal.org/journal/issue_18/article_05.shtml.

¹⁶ Chowdhury, F. and K. Joyce. "Pushing the Boundaries of Transdisciplinary Science Through Cyber-Enabled Research," *American Journal of Preventative Medicine*, 40(5S2), 2011: S103–S107.

¹⁷ Interview w. A.Clark and D.Chalmers in: *New Philosopher*, February 2014, at: <http://www.newphilosopher.com/articles/interview-david-chalmers-and-andy-clark/>

¹⁸ Stiegler, Bernard. "Relational Ecology and the Digital Pharmakon." *Culture Machine* 13, 2012

¹⁹ Aitken, Stuart C., and Li An. 2012. "Figured Worlds: Environmental Complexity and Affective Ecologies in Fanjingshan, China." *Ecological Modelling* 229 (March): 5–15

²⁰ Fuchs, T. "Ökologie Des Gehirns: Eine Systemische Sichtweise Für Psychiatrie Und Psychotherapie." *Der Nervenarzt* 76.1 (2005): 1–10; Fuchs, T. "The Phenomenology and Development of Social Perspectives." *Phenomenology and the Cognitive Sciences* 12.4 (2012): 655–683. Hustak, C. Myers, N. "Involuntary Momentum: Affective Ecologies and the Sciences of Plant/Insect Encounters" in: *differences*, 2012 Volume 23, Number 3: 74–118

²¹ Hörl, E. "Luhmann, the Non-Trivial Machine and the Neocybernetic Regime of Truth." *Theory, Culture & Society* Vol. 29/3, 2012: 94–121

²² Serres, M. *The Parasite*. Minneapolis, MN: Minnesota UP, 2007; Serres, M. *Atlas*. Paris: Flammarion, 1997

²³ Lindemann, G. "Medicine as Practice and Culture: The Analysis of Border Regimes and the Necessity of a Hermeneutics of Physical Bodies." In: *Biomedicine as Culture: Instrumental Practices, Technoscientific Knowledge, and New Modes of Life*, Routledge, 2007: 6 - 47

²⁴ Breithaupt, F. "A Three-Person Model of Empathy." *Emotion Review* Vol.4 /1, 2012: 84–91.

of extended&embodied cognition to matter politically, it must, therefore, create an understanding of decision-making and political imagination, and the tools to study them.

Impact

The PI (and his team) will be enabled, beyond this project, to create an independent leadership position in an integrative, interdisciplinary area of study, opening avenues for future research – and a career outside of his native country Germany but still within Europe. The project, suggested here, will be opening a network capillary into the arena of policy analysis and governance. Advancing this research methodology enables future designs and collaborations for research, involving, for example, even larger research populations and health policy analysis of biostatistical and epidemiological relevance, and to collaborate with a greater range of partners in public health research and in the policy arenas, such as originally intended in the European Core Health Indicators (ECHI) project.

The applicable techniques developed in the *semantic agency tool (sat)* are intended to be deployed in the transfer of knowledge in information streams between science experts, their publics, and policy-makers. Here, the team will create a core of proficiencies for social scientific use of biostatistics, epidemiology, and comparative public health: Outcome-oriented analysis in health care policy and implementation of innovative technologies, for example in e-governance, depends on predicting which factors affect participation. Here, the team will expand on its host's (VUB CWLF) main area of research application, i.e. the creation of agent-based simulations that allow the modeling and evaluation of such factors. Ongoing conversations with American partner institutes, such as STS Drexel, will allow for transatlantic differences to be accommodated in such models. This deployment will allow the PI and his team to occupy a position of leading expertise on the long-term effects of e-governance and transatlantic (e)merging of markets and research areas in health care policy, biomedical innovation, and consumer citizenship. Herein, the PI will create a team that can serve in health and research policy analysis and consulting for projects supported by organizations such as the EU Social Fund, specifically for in-depth evaluation of projects that involve small grants that require effective planning, which include diversity perspectives in e-health, ageing, gender, disability, and health-promotion funding. Another aim is the design of modular systems that can be adapted to teaching standards required for non-traditional student populations, such as for example nurse practitioners, and tie these to research policy reform and research evaluation platforms connecting health care practitioners and policy-makers internationally in a Governance 3.0 digital ecology, integrating public outcome and individual health-related quality of life. The PI plans for such a project to be developed as one outcome of this project, which could take the form of an iSchool for Public Health and Care and could initially find funding as a Helmholtz Virtual Institute. The establishment of a European iSchool for Public Health and Care, bundling both standardized education for care practitioners and of research data, is a plan currently developed by the PI, with the intention of implementation within the next 5-10 years. This would be an innovative contribution to the European Research area and European Health Care Systems and Biomedical Research, beginning with a modest financing to set up an information architecture and open access education and research infrastructure. Collaborative projects that will become feasible with the instruments and perspectives developed in this project are further research designs for 'social contagion' models, e.g. the autism-ADHD link. Another line of investigation are 'diffractive body perspectives', which the PI has begun in dialog with European and American junior colleagues. This deals with the question how care industries, care systems, and care&research ethics must be designed in order to avoid the so-called ableism-bias, i.e. how not to conceive severe mental and physical differences, from a perspective of normality, as 'disabilities' but to create 'different/diffracted by design' high-tech/low-tech techno-scientific and ethical practices.

Practical core objectives of this project focus on the development of the PI and team into experts in these areas, adapting to the practical requirements of issues of governance and the recalcitrant challenges for policy-making that will occupy researchers, and European policy-makers and publics alike. Through web-based information campaigns, such as initiatives that exist at VUB in CROSSTALKS or the VUB Technology Interface, the PI aims to create awareness for policy issues such as standardization, education and integrative perspectives in health care, pharmaceutical and complementary and alternative

medicine research and markets, which include e-governance/governance 3.0 architectures for health care consumers: Explanations of how participation and decision-making in health care are constituted and link to outcome is an important aspect in increasing overall EU competitiveness. Competitiveness via cost effectivity means to be able to better understand the role of patients in biomedical research and health care markets, to evaluate the effects of innovation, and to consider the development of children's perspectives on their future health. These issues can be identified in three areas in particular:

(a) The rising costs of care are correlated with innovation in high-tech biomedical practices. Challenging Western medicine, variously understood as academic or high-tech, a growing movement supports a vast field of Complementary and Alternative Medicine (CAM), which includes, however, both effective as well as sham practices. There are yet few resilient standards for research and/or practitioner training on CAM. This 'medical sociology' dimension of the agenda offers a methodological alternative, suggesting that a shift to a perspective of integrative medicine, conceiving of practices falling in a high-tech/low-tech spectrum, making room for increased standardization and scientific evaluation in research and care practice, and including the aspect of participation and consumer citizenship in health care systems. This is suggested by recent research in cognitive studies (micro-perspective) and outcome-orientation in health care systems analysis (macro-perspective). This project promotes the integration of these research modes (macro-micro-macro model) to create a robust and rigorous fundament for understanding improvement and participation in care systems, one of the key challenges for European governance and competition (for example with an ageing population/work force) of the 21st century.

(b) For this purpose, it is imperative to better train and prepare not only doctors – and herein certainly not only specialists but primary physicians²⁵ -, but the growing work-force of care practitioners, in particular nurses, who are required to participate in a work environment with increasing technological and human interaction challenges. They represent a non-traditional student population for whom specialized training at higher education institutions requires further development. An outcome of this project is the contribution to the development of concise European education concept for these audiences, based not only on a methodology to study decision-making and participation in daily interactions between actual patients and gatekeepers in care systems but also techno-scientific practices regimes as the affective ecologies that afford decisions. This is understood as participatory sense-making (De Jaeger).

(c) With increasing costs not just for health care but also research, questions have been raised how research costs can be dealt with more efficiently, for example through small projects that contribute to 'Big Science' in co-opting large data sets²⁶ while upholding research ethics. The research, the PI and team will conduct, enables accessible guidelines for the creation of research of this kind.

On a smaller scale and more immediately, contributions to the VUB Technology Transfer Interface can directly affect local care markets, through courses and workshops for nurses and practitioners by engaging agencies like the European Public Health Alliance (EPHA), the European Confederation of Care Home Organizations (ECHO), European Academy of Childhood Disability, or the European Federation of Nurse Associations.

b. Methodology

Research Sites

(i) Attention-Deficit-and-Hyperactivity-Disorder (ADHD) is a prevalent diagnosis in Western societies, often treated with medication, sometimes with behavior therapies. The PI has argued, that, as a diagnostic concept, ADHD is a result of social pathologies, which are characteristic for techno-scientific societies that redescribe individuals as 'neuro-chemical selves'. However, instead of espousing a fashionable anti-science criticism, he has claimed that part of the problem is that we have not taken both the possibilities and limits of neuro-science more seriously. ADHD is a condition that is entangled with cognitive

²⁵ The PI serves, for example, as consultant for the Inst. for General Medicine, FAU Erlangen and Prof. Th. Kühlein.

²⁶ Vermeulen, N. *Supersizing science; On building large-scale research projects in biology*. Maastricht: Maastricht University Press, 2009; Vermeulen, N., et al 'Big, Small or Mezzo?: Lessons from Science Studies for the ongoing debate about 'Big' versus 'Little' Science.' *EMBO Reports*, 11, 2010, 420-423; Parker, J.N, et al. *Collaboration in the New Life Sciences*. Farnham: Ashgate, 2010

development in complex attention economies and ecologies, that present as techno-scientific governmentality. Attention and other important cognitive elements are dependent on the so-called *executive functions* (EFs). These are essential for any number of positive markers in individual life-courses as well as social cohesion: From mental and physical health to success in school and in life. They involve cognitive, social, and psychological development, as well as decision-making, but also the potential for experiencing happiness. The so-called core EFs are '*inhibition [response inhibition (self-control – resisting temptations and resisting acting impulsively) and interference control (selective attention and cognitive inhibition)]*, *working memory*, and *cognitive flexibility (including creatively thinking "outside the box," seeing anything from different perspectives, and quickly and flexibly adapting to changed circumstances)*'.²⁷ From these core EFs, higher order EFs derive, including reasoning, problem solving, and planning. EFs make it possible that people have the ability for mentally playing with ideas, for taking the time to think before acting and to be able to meet unanticipated challenges, in other words to conceive of decision options, to focus on decision-making process, which are otherwise²⁸ described as cognitive policies and political imagination.

ADHD is a research site, which will be studied in pediatric practices, child psychiatry clinics, and schools. It is understood here differently from general medical sociology. Instead of a critique of (bio)medicalization or the study of dyadic doctor-patient interaction, the focus is directed on the dynamic participative sense-making and how participants, particularly children as patients, describe self-agency, power-relations, and health-related quality of life-course trajectories under thick conditions of mutual incorporation. This information will provide an understanding of how children as biodigital citizens conceive their possible political participation in the situation of interacting with a biomedical setting. Unlike simplified accounts of doctor-patient interaction and of binary-like passive/active patient-consumers, this project addresses complications that are constitutive of developing the political imagination and *executive functions* in regimes of techno-scientific governance. For starters, the interactive situation is highly complex: Doctors, parents, and underage patients form a *triadic* dynamic system embedded in biodigital economies and ecologies, which exceed the classic doctor-patient model by far. Surprisingly little research has been conducted on this *triad*. Secondly, binary oppositions and 'thin' concepts do not describe the different dynamic view points of the involved parties, decisions are not just made for/against diagnosis, for/against a therapy regime (pharmacological, behavior therapy, or alternative). Decisions involve practical regimes, life-course trajectories, techno-scientific imaginaries. For example, clinical therapy options are often understood as low-tech or high-tech interventions: prescribing a drug to intervene into a neurochemical system appears high-tech, whereas the suggestion to try martial arts might be seen as a low-tech option – however, low-tech vs. high-tech is often semantically re-qualified in 'thin concepts' to mean 'low tech = no-tech' (bad) vs. high-tech (good). However, low-tech is not the opposite of high-tech; both, like e.g. analog/digital, are two very different modes of techno-scientific intervention. This kind of meaning-making does influence development in general and, in particular, the technoscientific and political imagination on a profound level, which requires to be studied further. This will be conducted in the form of analyzing the process and structure of meaning-making in the first phase in 5-8 institutions²⁹ (depending on size and access), where ADHD-related interactions between doctors, children, and parents occur, such as pediatric practices or child psychiatric clinics, and 5 schools. For the test of questionnaire-material, Emotional scale, and Likert-scale semantic qualifying tool, the scope will be expanded. This depends on the final composition of the team regarding language competencies, for now, focus is on Belgium, Germany, and the Netherlands (same for Site ii).

²⁷ Diamond, A. (2013). Executive functions. *Annual Review of Psychology*, 64, 135–168. Also: the PI's publications on ADHD.

²⁸ Shadlen, Michael N, and Adina L Roskies. "The Neurobiology of Decision-Making and Responsibility: Reconciling Mechanism and Mindedness." *Frontiers in neuroscience* 6 (2012): 56; Schmidt, V. "Analyzing Ideas and Tracing Discursive Interactions In Institutional Change: From Historical Institutionalism to Discursive Institutionalism." *Open Forum CES Paper Series #3*. eds. Gregorz Ekiert and Andrew Martin

²⁹ Numbers of locations indicate a minimum, which can and will be extended, if possible.

(ii) Adele Diamond points out that non-competitive martial arts have proven effective for EF improvement³⁰. Therefore, non-competitive martial arts are a low-tech biopolitical intervention in terms of empowerment and political imagination. While having conducted exploratory ethnographic research in a German Taekwondo dojo and a mixed-martial arts studio, the PI could observe the social effects of non-competitive martial arts on children, adolescents, and grown-ups.

For once, Diamond emphasizes the importance of non-competitiveness for EF efficacy. Aikido, on the other hand, is non-competitive by design. Secondly, reviewing resources and academic and semi-academic publications by therapists, clinicians, sociologists, etc. who also work as aikido teachers, collected by an international organization such as Aiki-Extensions,³¹ provides overwhelmingly rich anecdotal evidence for the efficacy of aikido in dealing with various behavior and social pathologies. Thirdly, renowned sociologist Donald Levine has created conceptual matrices that allow for a transduction between sociological and psychological theories and methodologies with the conceptual *uke-nage* framework of Aikido.³² In addition, Levine, as a former dean of the College of the University of Chicago, has used the framework of aikido in a robust redesign of the Liberal Arts curriculum at UChicago.³³ Fourth, aikido, as has been shown by D.M. Foster, does not have class, race, ethnicity, gender, or age biases. Instead, unlike other martial arts, it attracts a heterogeneous participant population,³⁴ reflecting the heterogeneity of society at large. This contradicts Bourdieu's 'thinner' notion of the progress of sports *producing binary oppositions for similar practices, such as aikido vs. wrestling* (R.Schmidt). In **Step 1** and **4**, the focus will be on 5 aikido dojos and 3 taekwondo dojos.

(iii) Adele Diamond, Manfred Spitzer, Peter Paulus and others have emphasized the positive and/or negative influences that computer games and internet use have on the development of EFs. Consequently, games social media, and discussion forums are not only inherently techno-scientific, they are the exemplary interface of digital culture and embodied cognition. To understand the scope of the political imagination that becomes involved in computerized and non-computerized games and learning, involving above all serious and non-serious games, one research site looks largely at what is widely known as *gamer culture*. *Games* are used both in neurocognitive research as well as in agent-based models (e.g. for decision-making) as templates and study sites³⁵, not to mention the ongoing coupling of digital screens and bodies, and *gamification* of the lifeworld.³⁶ In the course the project, not only will *gamer cultures* of one MMORPG and three popular games be the subject of research, digital cultures

³⁰ Diamond, A. 'Activities and programs that improve children's executive functions.' in: *Current Directions in Psychological Science*, 21, 2102 335-341; Ratey, J. *A user's guide to the brain: Perception, Attention and the 4 theaters of the brain*. Vintage, 2002; Ratey, J. *Spark: The revolutionary new science of exercise and the brain*. New York: Little&Brown, 2013

³¹ <http://www.aiki-extensions.org/publications.asp>

³² Levine, D. "Social Conflict, Aggression, and the Body in Euro-American and Asian Social Thought." *International Journal of Group Tensions* Vol. 24/3, 2004: 205-17.

³³ Levine, D. *The Powers of the Mind: The Reinvention of Liberal Learning*. Chicago: Chicago UP, 2006.

³⁴ Foster, D.M. "Aikido as Somatic Program: Progressing Bourdieu's Sociology of Sport" Paper presented at the Annual Meeting of the American Sociological Association, New York, 2013. Farrer, D.S., Whalen-Bridge, J. eds. *Martial Arts as Embodied Knowledge Asian Traditions in a Transnational World*, Albany: SUNY Press, 2011; Loic Wacquant: *Body and Soul: Notebooks of an Apprentice Boxer*. Oxford University Press, 2004; Siegel, A. *Women in Aikido*. North Atlantic Books, 1993.

³⁵ Bryson, J. J., and E. Y. Bann. "Measuring Cultural Relativity of Emotional Valence and Arousal Using Semantic Clustering and Twitter." *Proceedings of Cognitive Science*. N. p., 2013; Gaudi, S., J. J. Bryson, and S. Davies. "Behaviour Oriented Design for Real-Time-Strategy Games An Approach on Iterative Development for STARCRAFT AI." *Foundations of Digital Games (FDG), Chania, Crete 14-17 May 2013*. Herrmann-Pillath, C. "Institutions, Distributed Cognition and Agency: Rule-Following as Performative Action." *Frankfurt School Working Paper Series.157*, 2011: 1 – 33

³⁶ Bogost, I. *How to do things with videogames*. Minneapolis: Minnesota UP, 2011. Nolan, J., MacBride, M. "Beyond gamification: reconceptualizing game-based learning in early childhood environments" in: *Information, Communication, & Society*, online first; Frost, J. L. *A history of children's play and play environments*. New York, NY: Routledge, 2010; Marsh, J. 'Young children's play in online virtual worlds' in: *Journal of Early Childhood Research*, Vol. 8/1, 210: 23 –29.; Marsh, J., Brooks, G., Hughes, J., Ritchie, L., & Roberts, S. *Digital beginnings: Young children's use of popular culture, media and new technologies*. Sheffield: University of Sheffield, 2005; Stevens, R., Satwicz, T., & McCarthy, L. 'In-game, in-room, in-world: Reconnecting video game play to the rest of kids' lives.' In K. Salen, ed., *The ecology of games: Connecting youth, games and learning*. Cambridge, MA: MIT Press, 2008

investigated will involve the emergence of digital publics on news and comment forums (involving power-relations and agency in online-genderbending, trolling, privacy, online-bullying³⁷).

Methodology beyond the practice turn

Biologist and science historian Hans-Jörg Rheinberger, in a warning statement, has argued that the focus on micro-(his)stories has come at the price of forgetting about developments and effects that have a (long) duration³⁸. With regard to *dynamic agentive systems*, the focus on micro-perspectives (and methodological individualism) must be viewed equally critical. A middle-range, grounded approach cannot exchange micro for macro, and so on. To do so would run the danger of an *uncontrolled universalization of the researchers' particular perspectives, imputing them into the mental spaces of research subjects, which are then no longer viewed as 'involveds in practice regimes' but as 'deficient theorists of their own practices'* – paraphrasing Robert Schmidt³⁹ on the praxeological approach. The methodological discourse of this project can be considered to be part of the *practice turn*, which is also an *empirical turn*, according to Robert Schmidt – but it is a turn that would do well to take into account the *affective turn* (Clough), embodied cognition (Noë, Pitts-Taylor), and general ecology (Parisi, Hörl).

With R. Schmidt, the PI takes seriously praxeology as including sport activities, screen activities, and workplace activities, united by the idea that practices involve bodily *and* mental practices to allow creation of an alternative to a dichotomy of body and mental space; also, practices are inherently public practices in this perspective. But against this prevalent mode of praxeology, an STS perspective, particularly one that aims to be politically relevant, must extend its methodological scope further, which is reflected in the four-step process of the project. The successive movement from macro to micro, from a *'synoptic view-from-above to a micrological look at the details'* (R.Schmidt) is not enough. To draw political (durational) consequences, we must make a move back to a higher macro-level. After the synoptic view and the micro-stories (both important steps), we need a step back onto the level of political analysis, which the PI understands not as a speculative step or as abstraction, but – attuned to Critical Realism – as a move undertaken through abductive reasoning on a methodological level.

Hence, after focused institutional ethnography of the research sites in **Step 1**, the creation of semantic maps and an innovative semantic qualifying tool in **Step 2**, which will then be applied to create data points for analysis and integrated agent-based models as **Step 3**, the move to **Step 4**, testing the validity of the models in the field prepared in **Step 3**, is the move described as abductive or triangulative. In short, the agent-based models created are intended to be tested, not only *in-and-for* each micro-sphere but also *for* a macro-level of policy-outcome and public political participation.

Potential risks

There are certain aspects to be mindful of in the progress of this project. To begin with, there are ethical issues to consider (see also Ethics Self-Assessment in the Extra Annex), because children and adolescents are involved in this project. They, along with parents, health professionals, teachers, and martial arts will be observed, interviewed, and presented with questionnaires and rating scales. This creates sensitive issues, for which information sheets and informed consent forms must be created for all involved parties. Data protection is, obviously, important, as is privacy, which can be a critical issue in regard to online behavior (site 3). The hired postdoctoral researcher will have to have expertise in conducting digital research and proven competence in research ethics in this area. Identifying clinics, practices, schools, dojos that are willing to participate, including respective individuals, is also an important concern for any research that depends on voluntary cooperation in the field. Individually, *focused* institutional ethnographies (in itself a somewhat novel combination of qualitative methods) for each site will yield

³⁷ Michael von Grundherr (LMU Munich), at the BMBF *Klausurwoche* and the PI discussed a cognitive link between ADHD, school-bullying, and online cultures. It is too soon to speak of collaborations, but the PI and von Grundherr have begun talks.

³⁸ Rheinberger, H.-J. *Epistemology of the Concrete*. Durham, NC: Duke UP, 2010

³⁹ Schmidt, R. *Soziologie der Praktiken*. Berlin: Suhrkamp, 2012; also: Knorr-Cetina, K. Schatzki, T., v. Savigny, e. eds. *The Practice Turn in contemporary Theory*, London: Routledge, 2001; Schmidt, R. "Re-describing social practices" in: Niewöhner, J. Scheffer, Th. *Thick Comparison*. Leiden: Brill, 2010.

interesting data points and deliver outcome-oriented results. For example in/for micro-spheres, sub-hypotheses connecting two sites could be created and tested, such as ‘Socio-economic status influences decisions on ADHD therapy regime and definitions of low-tech interventions, such as trying a martial arts program’. The actual risks lie in the methodologically innovative steps of the integration of methods, and integration of the integrated data into models and abductive conclusions. The step of transforming semantic data collected in the field into clusters that can be used in item batteries and analyzed with quantitative means in cluster- and multivariate analyses is an innovative and critical step, taking the cue from *sequence analysis*⁴⁰; but here risks involved are also typical for mixed-methods approach that aim to connect qualitative and quantitative methods. While generally knowledgeable in quantitative methods, the PI seeks to hire a PhD-student specializing in quantitative methods and agent-based simulations, to anticipate and resolve any issues more effectively. The abductive step, creating ‘thick’(!) agent-based models and develop a frame for policy-analysis is a genuine team-effort, where competencies need to be brought together, involving a second PhD student, with expertise in relevant policy-issues and –analyses.

From ‘thin’ to ‘thick’ practices is still parsimonious

In general, practice theories and methodologies assume ‘that practices are assessable ways of acting that involve the participation of multiple individuals’⁴¹. Practices are being performed, standard approaches suggest ‘well or badly, correctly or incorrectly’ and ‘[a]ccordingly, these activities are evaluable in terms of their appropriateness, effectiveness, and the like: Practices are ways of acting in relation to which it makes sense to ask whether the action was appropriate and/or effective’(Zahle). In other words, prevalent accounts generated in terms of the *practice turn* evaluate practices on the basis of ‘thin’ concepts. The methodological approach in this project works on the basis of ‘thick’ concepts and practices instead. While a practice approach can be parsimonious, as in the adoption of a parsimonious concept of narrative such as B.Tversky’s, it must still obtain sufficient ‘thickness’ to allow for descriptions that account for the realistic occurrence of productive misunderstandings, malappropriation, and contingency of practices that lead creative change, as well as the solution of unexpected problems, not to mention deal with the embeddedness in complex economies and ecologies (e.g in terms of the *affective turn*) in the real world, and actors characterized as dynamic participative systems.

Discursive Institutionalism, Institutional Ethnography and Situational Analysis

Political and scientific imaginaries are ways of knowing that enable us to navigate complex ecologies and moral, political, attention economies. People experience the opportunities for decision-making that political imaginaries and affective ecologies afford us as constituted by techno-scientific governance, or - to paraphrase Andy Clark - as webs of techno-scientific activities. As such they embody interrelated value-spheres (*Wertsphären* in Max Weber’s terminology), semantic maps (Grossi et al⁴²), cognitive ideas (V.Schmidt), or cognitive policies (Shadlen), but also regimes of paternalistic epistemic authority – i.e. the Western colonial matrix of power (in economy, authority, gender and sexuality, and knowledge/subjectivity)⁴³. Reflexive reconstructions of empirical relations (Bourdieu) lead us to understand these as the product of a genealogy of ‘a history of multiple and incommensurable presents that overlap and overspill with the presence of ghosts of the past as well as the conjured ghosts of the near future [...] for today’s reformulation of governance, the platform for the extension of biopolitics beyond itself.’⁴⁴ Methodology, therefore, cannot be produced in any classic frame of description from the point of view of methodological individualism in the sociology of institutions or the sociology of knowledge, or in

⁴⁰ King, Th. “A framework for analyzing social sequences” in: *Quality and Quantity*, Vol. 47, 2013:167–191

⁴¹ Zahle, J. ‘Practices and the direct perception of normative state – part 1’ in: *Philosophy of the Social Sciences* Vol. 42/4, 2012: 493 - 518

⁴²Grossi, E. Compare, A., Buscema, M. “The concept of individual semantic maps in clinical psychology: a feasibility study on a new paradigm” in: *Quality and Quantity* Vol. 48, 2014 :15–35

⁴³ Quijano, A. “Coloniality of Power, Eurocentrism, and Latin America.” in: *Nepentla: Views From the South* Vol. 1/3, 2000: 533-580; Lugones, M. “Heterosexualism and the Colonial/Modern Gender System.” in: *Hypatia* 22/1, 2007: 186-209

⁴⁴ Clough, P., Willse, C. "Introduction" to *Beyond Biopolitics*. Durham, NC: Duke, UP. 2011:2

policy analysis.⁴⁵ Instead, methodology must account for the relational aspects of political imaginaries that emerge between cognitive ideas and techno-normative appropriateness⁴⁶. These are investigated in the three research sites, this project seeks out, identifies, and interrogates in the three following dimensions of *narrative events*:

- windows of opportunity [*enablements*]
- core beliefs that can be made explicit [*statements/assemblies*]
- implicit programmatic patterns [*constraints*]

The two values or variables that come under investigation, which construct the *figured worlds* that an agent can conceive himself/herself as embedded in and afforded with opportunities, are *cognitive ideas/cognitive policies (ci/cp)* encoded as ‘thickness’ and *normative appropriateness (na)*, i.e. ‘thinness’.

The units of study for the inquiry into applications of *ci/cp* and *na* are, therefore, leading away from methodological individualism and from top-down accounts, and instead to the investigation of *situations* and *relations* of concrete practices and concrete forms of agency. To quote Vivien Schmidt’s critique of classic institutionalism: ‘Agency is *historical institutionalism’s Achilles’ Heel*.’ In context, this is understood to mean that empirical studies and policy analysis using classic institutionalism or actor perspectives have, even after the ideational turn, until now generally accounted binarily for *micro-stories (of the agency of individual actors)* versus *macro-patterns (structures)*. With a relational approach, it becomes possible to account for *agency* realistically as bound only by key-concepts such as *mutual incorporation, affordance*, etc., and not reduced to methodological individualism. Situational analysis, devised as an extension of Grounded Theory by Adele Clarke,⁴⁷ offers analytic potentials to reconstruct the relational topography of decision-makers and their contexts, in other words, it is a tool for situational map-making. In the areas of concern, publics can engage these (conceptual and methodological) premises performatively and relationally through affective-expressive figurations: For example, parents converse about ‘the ADHD’ of *their* child in blogs, aikido utilizes the *uke-nage* structure of learning, game forums utilize emoticons transmedially from different cultures and media, and so on.

Iterated Semantic Qualifying Analyses

‘The map is not the territory’, goes Alfred Korzybski’s famous saying. And before creating semantic maps, which will be used for collecting data on vectors and clusters, this project begins with ‘getting closer to the territory’ in a first step, a *focused institutional ethnography*, a combination of *discursive institutionalism (DI)* and *situational analysis (SitA)*. The second step, involves mixing qualitative semantic qualifying or latent semantic pattern analysis in an iterated version to combine with a quantitative measuring through scales that allow to account for multivariate factor- and cluster- strengths.

Iterations to semantic qualifying involve two developments: First of all, semantics is used in the way it is defined in *semantic agency theory*, extending further towards an inclusion of non-textual/non-linguistic practices, and incorporating concepts such as self-agency. Self-agency can be qualified using linguistic descriptors, but this project will also use visual descriptors, including non-verbal pictorial assessment items, such as the International Affective Picture System (IAPS) and the Self-Assessment Manikin (SAM).⁴⁸ Subsequently, semantic variables will not(!) be coded through binary oppositions. Binary coding of variables, such as in prevalent semantic qualifying studies of power relations, arrived at research results that amount to the evaluation of only ‘thin concepts’ instead of ‘thick ones’. ‘Thin’

⁴⁵ Weiss, S., Restivo, S.M., Stingl, A. I. *Worlds of ScienceCraft*. Farnham: Ashgate, 2014; Rowland, N. J., Passoth, J.H. "Actor-Network State" in: *International Sociology* Vol. 25 no. 6, 2010: 818-841

⁴⁶ Barthélémy, J.H. "Genesis, History and Technical Normativity", Simondon and Digital Cultures Workshop at Leuphana University, Workshop Proceedings at: <http://digitalmilieu.net/simondon/>, 2013; Bora, A. "Technoscientific Normativity and the "Iron Cage" of Law" in *Science Technology Human Values* vol. 35 no. 1, 2010: 3-28; Habers, H. ed. *Inside the Politics of Technology: Agency and Normativity in the Co-Production of Technology and Society*. Amsterdam: Amsterdam UP, 2005

⁴⁷ Clarke, A.E. *Situational Analysis*. London: Sage, 2005

⁴⁸ Bradley, M. M., & Lang, P. J. Measuring emotion: The self-assessment manikin and the semantic differential. *Journal of Behavioral Therapy and Experimental Psychiatry*, Vol. 25, 1994, 49-59; Lang, P.J., Bradley, M.M., & Cuthbert, B.N. International affective picture system (IAPS): Affective ratings of pictures and instruction manual. Technical Report A-8. University of Florida, Gainesville, FL, 2008

concepts are not *world-guided*, ‘that is, the empirical world does not guide their application[...]. Differently put, if you say this action is permissible, or that that action is wrong, you are not providing any further information about these actions (other than their being according to you permissible and wrong, respectively). By contrast, thick concepts evaluate an object, but also simultaneously describe it, or tell you something about the nature of that object; they are ‘at the same time world-guided and action-guiding’⁴⁹ Conceiving thus of semantic/propositional spaces through agency and practices in general, rather than limiting semantics to linguistic/verbal utterances, allows for a more comprehensive solution to the so-called *Plato Problem*⁵⁰, the starting point for any latent semantic analyses and semantic qualifying methods; namely, the problem that people seem ‘to know a lot of things based on very little information’, - for example, pupils are able to use more new words with the correct meaning than they should, given the amount of information they were exposed to. The PI⁵¹ has extended this perspective to practices in general, not just linguistic practices, stating that people participate in more complex practice regimes than they have the information to do so. Learning is, therefore, a dynamic cognitive process of inference that involves decisions on the correct dimensionality of techno-scientific governmentality. A dimensionality that represents the similarity between narrative events and practice regimes: learning about the similarity of the meanings of practices, by connecting practices into sequences successfully (i.e. generating sets [Th.King]) does produce sufficient enhancement of knowledge to bridge the gap between the information available in local contiguity and what people know after large amounts of experience. The notion of *semantic space* or *semantic wave*,⁵² describes the semantic similarity between two practices (i.e. narrative events): The smaller the distance, the greater the similarity. We may then obtain an initial estimate of the relative similarity of practices, by observing the relative frequency of their joint occurrence in *windows of opportunity* and *implicit grammatic patterns* by measuring the factor-strength and vectors for semantic qualifiers that *assemble* core beliefs. To research this we require, however, a concept of ‘information as meaningful’⁵³ and Ron Eglash’s⁵⁴ analog/digital distinction. According to Eglash, digital representation is an arbitrary mapping between physical structure and information structure, and requires a dictionary, a code-book, the genetic code, i.e. a manual that tells you what each symbol means. Analog representation functions in establishment of parametric relationships between physical structure and information structure (such as proportionality). Eglash points out that this formulation enables an advantage in obtaining empirical prediction: While digital representation of information, such as the linguistic component of speech, being physically arbitrary will produce white noise; analog representation of information, on the other hand, such as the paralinguistic emotional component of speech, effectively changes in proportion to the information it represents. In the case of cyclic changes of information, it will produce cyclic waveforms, which the PI understands as semantic waves or as circumscribing semantic space. Semantic events that are encoded narratively in a parsimonious⁵⁵ view, so that ‘narrative is the sequentialisation of (at least two) events in time.’

⁴⁹ Abend G. ‘Thick concepts and the moral brain’ in: *European Journal of Sociology*, Vol. 52/1, 2011: 143-172.

⁵⁰ Landauer, T. K., and S. T. Dumais. ‘A Solution to Plato’s Problem: The Latent Semantic Analysis Theory of Acquisition, Induction, and Representation of Knowledge.’ in: *Psychological review*, 1997: 211–240;

⁵¹ The PI argues that semantic takes on the meaning of a *mantics de se*, in: Stingl, A.I., Weiss, S.M. ‘Making Trouble: Mindfulness is Care’ in: Proceedings BMBF Klausurwoche, Wrobelki/Brand, eds. Wiesbaden: Springer.

Stingl, A.I. ‘Sociology of Embodied Cognition’, in: Stapelton/Byers, eds., *Biopolitics and Utopia*, accepted; Stingl, A.I., Weiss, S.M. ‘Keep Calm and Maintain Homestasis: How sociology just got more complicated thanks to bodyliness, social guts, and leaky companion bodies’, Presentation at Mini-Conference on Sociology of the Body (organized by V.Pitts-Taylor), 2014, Baltimore, MD, publication pending. The PI also has begun talks with Ron Eglash about collaboration on this view.

⁵² Maton, K. Making semantic waves: A key to cumulative knowledge-building, *Linguistics and Education*, 24/1, 2013: 8-22.

⁵³ MacKay, D. M. *Information, Mechanism and Meaning*. MIT Press, 1969; Janich P.. *Was ist Information? Kritik einer Legende*. Frankfurt am Main: Suhrkamp, 2006; Hayles, N. Katherine. *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*. University of Chicago Press, 2008. Print.

⁵⁴ Eglash, R. *African Fractals: Modern Computing and Indigenous Design*. New Brunswick, N.J.: Rutgers UP, 1999

⁵⁵ Tversky, B. ‘Narratives of Space, Time, and Life.’ *Mind and Language* 19/4, 2004: 380 – 392. see also: Ponti, M.’

Uncovering Causality in Narratives of Collaboration: Actor Network Theory and event Structure Analysis” in *Forum für Qualitative Sozialforschung* Vol.13/1, 2012; Heise, D. R. ‘Event structure analysis: A qualitative model of quantitative research.’ In: Fielding, N., R. Lee, eds., *Using computers in qualitative research*. Newbury Park, CA: Sage, 1991: 136 - 163

A practice is political, *when* it involves actual decision-making, and it is dynamic, participative, meaningful *because* it is imbricated with material cultures, affective ecologies, moral and attention economies, and so forth, involving different cultures, environments, interests, etc. Semantic spaces must be (re)constructed in both their vertical and horizontal dimensions, and also be able to account for temporal dynamics. Consequently, the complex social situations this project investigates are inherently political: Situations of deciding on diagnosis and therapy for an underage patient, situations ‘on the mat’ and their priming (empowering) effects on situations ‘off the mat, or enunciations ‘through’ an avatar in digital publics/game spaces. These evoke the political imagination and power relations.

Towards confirming the PI’s approach, Bartos et al⁵⁶ have created an exemplary study in methodical terms, measuring ‘personal power’ that health practitioners perceive in their workplace, but they still deploy ‘thin’ binary oppositions, neglect participative sense-making, and do not establish (cognitive) policy-relevant result or suggestions. As a consequence, the PI proposes to research practices in the field as ‘thick’ *political practices*, conceptualized relationally as *meaning-making*, which we have come to understand to involve higher EFs – that means future study of EFs, their development and their pathologies, must begin with material, social, and affective ecologies to understand both decision-making processes and the development of EFs and their pathologies. These present in the form of ontologies of (meaning) production. This dimension is seen as an important propaedeutics for future cognitive studies. Lisa F. Barrett, for example, insists that, ‘[t]he meaning-making process must also be understood and measured’.⁵⁷

That means to go beyond even sophisticated reductionist models of agent behavior that ‘build on regularized causal interactions between internal neuronal mechanisms and external facts, which are shared in a population of agents. [...] The central idea of a distributed cognition approach to economics [and other fields] is to state that individual agency emerges at the interface of two ontological levels, namely the level of neuronal processes in the brain, embedded into its body, and the level of external physical facts with which the brain interacts in a regularized and systematic way’.(Hermann-Pillath) Most of these models conceive static, individual agents and are limited in their predictive capabilities. At times, dynamic framework models are then deployed, such as by Masahiko Aoki⁵⁸ or others, that describe ‘the status of *reality* in the ontological sense, thus transcending the purely inferential approach in standard game theory. The objective of this analysis is to grasp the complexity of the interaction between individual decisions and institutions. On the one hand, individual decisions are the drivers of social action, including the emergence of institutions (e.g. in social contract theories). On the other hand, institutions are constraints on individual decisions.’ (Hermann-Pillath). Their ability to measure thicker vectors and factor strengths, and conceptualize participative agent dynamics – in this project named *enablements* (windows of opportunity), *statements as assemblies* (core beliefs that can be made explicit) and *constraints* (implicit programmatic patterns) in their imbrications in *affective ecologies*, in the form of variables of the *political imagination* – is, however, severely limited⁵⁹.

The proposed project has the objective to create STS-based models and frameworks for outcome-oriented policy analysis, that can account for dynamics of public/political participation in techno-scientific governmentality, and understand *dynamic agent systems as biodigital citizens*.

⁵⁶ Bartos, C., et al "Development of an Instrument for Measuring Clinicians' Power Perceptions in the Workplace" in: *Journal of Biomedical Informatics*. Vol. 4/6, 2008: 1041–1049

⁵⁷ Barrett, Lisa F. 'Emotions are Real', in: *Emotion*, Vol. 12/3, 2012: 413 – 429

⁵⁸ Aoki, M. *Toward a Comparative Institutional Analysis*, Stanford: Stanford University Press, 2001 G. Hofstede and G.J. Hofstede. *Cultures and organizations: Software of the mind*. McGraw-Hill London, 2005; G.M. Hodgson and J. Calatrava. ;What are institutions.’ in: *Journal of Economic Issues*, Vol. 40/1, 2006.

⁵⁹ Ghorbani, A., Dignum, V., Dijkema, D. ‘An Analysis and Design Framework for Agent-Based Social Simulation’ in: *Advanced Agent Technology Lecture Notes in Computer Science*, Volume 7068, 2012: 96-112; Salamon, Th. *Design of Agent-based Models*. Repin-Zevonin: Tomas Brucker, 2011; Meyer, K. Lorscheid, I. Troitzsch, K.G. ‘The Development of Social Simulation as Reflected in the First Ten Years of JASSS’ in: *Journal of Artificial Societies and Social Simulation*, Vol. 12/4, 2009

c. Resources

Cost Category		Total in Euro	
	Personnel	PI	354,250.00
		Senior Staff	0.00
		Postdocs	389,700.00
		Students	393,900.00
		Other	0.00
	<i>i. Total Direct costs for Personnel (in Euro)</i>		1,137,850.00
	Travel		32,500.00
	Equipment		0.00
	Other goods and services	Consumables	0.00
		Publications (including Open Access fees), etc.	0.00
Other (please specify)		20,000.00	
Direct Costs[1]	<i>ii. Total Other Direct Costs (in Euro)</i>		52,500.00
A – Total Direct Costs (i + ii) (in Euro)		1,190,350.00	
B – Indirect Costs (overheads) 25% of Direct Costs[3] (in Euro)		297,588.00	
C1 – Subcontracting Costs (no overheads) (in Euro)		12,000.00	
C2 – Other Direct Costs with no overheads[4] (in Euro)		0.00	
Total Estimated Eligible Costs (A + B + C) (in Euro)[5]		1,499,938.00	
Total Requested EU Contribution (in Euro)⁶		1,499,938.00	

The Principal Investigator will **commit 80%** of his time to the research project.

Team members

The research team will consist of the principal investigator, one postdoctoral researcher (4 years), and two PhD students (4 years each). The PI will supervise all team members and the research in all three research sites, as well as the development of methodology. In other word, the PI creates, supervises and integrates the research agenda of *biodigitality in culture and cognition*, and takes lead on the biomedical cultural axis, the postdoctoral researcher takes the lead on the axis for *digital culture*. The postdoctoral researcher recruited on a competitive basis will be an outstanding international scholar. It would be advantageous, if an excellent non-European scholar of high excellence and promise could be welcomed into the European research area: Future intercultural adaptations of the tool would be facilitated greatly by someone who spoke a non-European language, such as Japanese, Korean, or Chinese. PhD students will be recruited from outstanding academic schools in Europe and selected on a competitive basis. One PhD student will have excellent quantitative research competencies, experience with agent-based simulations, and, ideally, will have some background in psychology/neurocognitive science. The second PhD student should be an STS or sociology of science/medicine researcher with excellent knowledge of European health care policy and policy-analysis. Knowledge of qualitative methods and/or agent-based models would also be considered an advantage. Team composition will reflect cultural and linguistic diversity.

Budget justification

Personnel costs include salaries and are based on VUB projections for salary development. Travel costs are intended to cover trips of the team-members to targeted case study sites, and for travel to academic conferences. Other Costs covers the organization of two international conferences the team will organize in the second and fifth year. Subcontracting covers the EC required external audit for every 375.000 Euro budget slice.