Mathematisation in environments of Big Data –

Implicit mathematics revisited

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Three decades ago Davis and Hersh (1986)[i] called attention to the political and ethical dimensions of processes of mathematisation in search for a "philosophy of computation". In taking Descartes' *mathesis universalis* as the symbol of a universal and unified method based on the capacity of reasoning by sets of rules for analysis and synthesis – modelled by mathematics, Davis and Hersh were concerned with the impact of applying mathematics in an increasing speed to the social and physical worlds, and how these applications are effected by the computer, a "marvelous mathematico-logical engine"[ii] or "a mathematical instrument *par excellence*"[iii]. While they saw an emerging "mathematisation of our intellectual and emotional life", Davis and Hersh did not envisage the expansion of psychometrics in environments of Big Data, when stating that such mathematisations that intend to capture the human mind "fall over their own absurdity and pomposity", even though they imagined a society "in the grips of the symbol processors and the number crunchers."[iv]

Meanwhile, speedy computations with massive data (often unwittingly contributed by users) are increasingly used in applied psychometrics, accompanied by a discourse about the capacity of computerized algorithms to complement, augment, replace or bypass (allegedly imperfect) human judgement and decision-making.[v] Examples range from recommendation and filtering systems (news feeds, academic repository platforms, search engines etc.) to offer personalised content, online dating sites to optimize partner matching, credit screening to decide on the creditworthiness of individuals, to high-frequency stock trading beyond human response time. In the context of centralized institutional surveillance, data capturing and profiling includes recognition (for example of faces, voices, DNA patterns, retina, nose shapes, ear shapes) by comparison and matching with vast biometric data repositories, capturing of health-related data, and mapping of criminal activity hotspots. In these examples, the mathematical algorithms are particular strategies for constructing or recognising relationships and patterns across vast and complex sets of data (including Data Mining and Machine Learning). Their application constitutes a social process of mathematisation by feeding back the measures of the individual into the social organization of the practice in which the individual participates. At the same time, this process supports the development of new mathematical strategies for describing or predicting the behavior of the systems so constituted.

Based on these examples, I will venture to investigate the continuities and discontinuities in the functioning of the process of "mathematisation and demathematisation" as discussed by Jablonka and Gellert (2007)[vi]. For this purpose, I will explore the productivity of the notion of *governmentalité algorithmique* used by Rouvroy and Berns (2010)[vii] for capturing the

discontinuities. I will also argue that the new strategies for mathematical analyses are at odds with the model of rationality conveyed in the process of mathematisation as a pedagogic strategy in the mathematics classroom.

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[i] Davis, Philip J., & Hersh, Reuben (1986/ 2005). Descrates' dream: the world according to mathematics. Mineola, NY: Dover Publications.

[ii] Ibid., xii.

[iii] Ibid., 11.

[iv] Ibid., 13-16.

[v] See, for example, Youyou, Wu, Kosinski, Michal, & Stillwella, David (2015). Computer-based personality judgments are more accurate than those made by humans. Proceedings of the National Academy of Sciences of the United States of America, 112(4), 1036–1040, doi:10.1073/ pnas.1418680112

[vi] Jablonka, Eva, & Gellert, Uwe (2007). Mathematisation - demathematisation. In U. Gellert & E. Jablonka (Eds.), Mathematisation and demathematisation: Social, philosophical and educational ramifications (pp. 1-18). Rotterdam: Sense Publishers.

[vii] Rouvroy, Antoinette, & Berns, Timothy (2010). Le nouveau pouvoir statistique. Ou quand le contrôle s'exerce sur un réel normé, docile et sans événement car constitué de corps numériques. Multitudes, 40(1), 88–103.