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Abstract: “Real Abstraction and Digital Cognition: Implications for Explainable AI”

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This paper develops a theory of digital cognition informed by critical theorist Alfred Sohn-Rethel’s notion of “real abstraction.” I begin by considering the argument that digital data now function as a form of financial capital. This claim has been made by contemporary critical scholars (e.g., Jathan Sadowski and McKenzie Wark) in addition to technology advocates (e.g., Erik Brynjolfsson). As I explain, the majority of these researchers conceive “data capital” in literal rather than metaphoric terms. I substantiate this view by identifying an empirical link between data and financial currency: insofar as data are constituted by standardized units of computation (i.e., computable bits and bytes), they comprise a universal medium between all phenomena which permit representation in digital formats, including financial value. To proclaim the effective unity of data and capital is to therefore indicate that the former does not symbolize so much as constitute the latter, and that processes which yield digital information simultaneously yield financial value. As such, I suggest that data capitalism unifies the economic functions of use and exchange as originally conceptualized by Karl Marx.

I then turn to Sohn-Rethel’s book *Intellectual and Manual Labor*, which departs from Marx’s claim that the capacity of abstraction is not the exclusive province of thought, but also belongs to the activity of economic exchange. According to Marx, the process by which financial value is extracted from labor — in other words, the process by which various types of goods and services attain universal exchangeability — can be thought of as a kind of abstraction. Sohn-Rethel proposes that this form of abstraction (which he calls “the exchange abstraction”) necessarily precedes the human cognitive function of abstraction. Rejecting the Kantian principle of *a priori* modes of categorical thought, he argues that all categories of conceptual reasoning follow from the exchange abstraction.

Sohn-Rethel’s proposition rests on the assumption that, for practical reasons, processes of use and exchange may never occur at the same time. As he indicates, the act of exchange renders commodities useless throughout its entire duration, since they cannot be utilized while in the midst of changing ownership. “Use and exchange are not only different and contrasting by description, but are mutually exclusive in time,” he writes; for this reason, commodity exchange always and only takes place “in effective 'abstraction' from use,” or temporally removed from it. He adds that this abstraction occurs “not in mind, but in fact,” and should henceforth be considered “real.”

This is the point at which I intervene. If the production and circulation of data unifies use and exchange, the latter cannot be said to occur at any degree of temporal removal from the former. Thus data capitalism vanquishes the exchange abstraction, which, crucially, Sohn-Rethel claims to be a necessary predicate of cognition/thinking. Along these lines, I argue that digital processes may be incapable of cognition/thinking in general. To develop this argument, I examine philosophical and scientific literature which observes the importance of categorical abstraction to human cognition. I also draw on philosopher Michel Foucault’s exploration of reified epistemological categories in his book *The Order of Things*. Foucault writes that the

logico-formal schemas which stabilize and self-reflexively legitimize various forms of knowledge (in particular, scientific knowledge) have no basis in what is conventionally understood as natural or intrinsic reality. They are epistemologically valuable only to the degree that they are internally consistent, for if they were to permit self-contradictions, the concepts and methods to which they give rise would be absurd or illogical. Human cognition proceeds from the exchange abstraction as a mechanism which always comes before and enfolds thought. As Sohn-Rethel maintains, this external referent gives cognition its formal order. By contrast, digital functions have no epistemological origin; they may only abstract in accordance with an internal order programmed into them. This is not a "real abstraction," but rather an artificial abstraction which accommodates internal contradictions and paradoxes. Digital functions can never replicate human cognition, I write, but may only project a false appearance of it (e.g., in artificial intelligence).

Following this claim, I consider its implications for machine learning. Here, I draw on philosopher M. Beatrice Fazi's consideration of representation learning, a form of machine learning frequently invoked in the development of artificial intelligence. In her article "Beyond Human: Deep Learning, Explainability and Representation," Fazi cites computer scientist Yoshua Bengio's definition of machine learning as "the automated discovery of abstraction" and LeCun, Bengio and Hinton's explanation of representation learning as "a set of methods that allows a machine to be fed with raw data to automatically discover the representations needed for detection or classification." Throughout "Beyond Human," Fazi seeks to show that such representations cannot be translated in such a manner as to be intelligible to human beings (e.g., they cannot be depicted in language or numbers). She ends by speculating that, although automated representations are incommensurate with human cognitive schemas, there may be another way to understand them. She suggests that this is an avenue for further research. I write that these representations defy human categorical reasoning for the reasons elaborated throughout my paper, which may be a useful place to take up Fazi's speculation. I conclude by restating the major points of my paper and returning, at the very end, to the usefulness of Sohn-Rethel's work when it comes to questions regarding explainability and AI.