From Artificial Intelligence to Humanistic Intelligence and then Extended Intelligence

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Abstract. In this paper we make the statement that a syllabus for teaching HCI for AI should focus on the collaborative aspects regarding the integration of AI agents in preexisting human teams. This entails abandoning traditional stances of cognitivism, which are intrinsically reductionist, to embrace the complexity of more phenomenology-oriented and ecological, naturalistic approaches. In so doing, scholars from both fields of HCI and AI need to explore other paradigms, which relate to how intelligent and knowledgeable behaviors are produced in the real world, outside the lab, that is in cooperative work arrangements.

Keywords: Humanistic Intelligence · Extended Intelligence

1 Statement

The idea of *Humanistic Intelligence* (HI) has been proposed within the wearable computing field, where visions and prospects of human-machine symbiosis are cherished the most. There, HI has been defined as "intelligence that arises because of a human being in the feedback loop of a computational process, where the human and computer are inextricably intertwined"[15]. For the argument of this contribution, let us take the broader meaning of this concept, which then denotes a kind of intelligence that emerges from the tight connection of a human intelligence and an artificial intelligence: intelligence from the *closed loop*, which is reified in the vision of the *centaur model* [5].

We advocate an alternative proposal that is close to the tenets of the recently proposed *Extended Intelligence* (EI). This understands intelligence as a fundamentally distributed phenomenon [11] and considers cognition as a collective process that is inseparable from human action and deeply situated in a social, cultural and physical context: intelligence emerging from the *opened loop*, reified in more holistic, organicistic and network-like metaphors, like those of the *joint cognitive system* [21, 22], that is a cognitive system formed by artifacts and human beings, the *cyber-human systems* where human and machine agents work together on the same problem [**?**], and the *cybork* [3], that is an hybrid community of human actors and computational agents that cooperate to have some work done.

The notion of Extended Intelligence requires scholars to abandon a reductionist approach, and see intelligence as something that cannot be expressed by machines (which rather are endowed with *capabilities*), in that intelligence emerges in "the

social, economic, political, and cultural systems [we would say the *socio-technical systems*] within which these tools are integrated". We cannot tell whether the EI proposal will receive the necessary systematization to attract more contributions, host complementary voices and then coalesce into a unitary field. However, the potential for multidiscplinarity is great: we observe strong affinities between EI and the more ecological streams of current cognitivism, especially the already mentioned *macrocognition* [13], which emphasizes the role of heuristics, biases, intuition and tacit knowledge in real-world collaborative settings; and the so called phenomenologically-situated paradigm of HCI. This latter paradigm is the third one recognized in current HCI by Harrison, Sengers and Tatar in [7], the others being the Human-Factors paradigm and the Classical Cognitivist one. According to the authors, this third paradigm is, in some way, the evolution of the former two, and its central focus is the human experience where meaning gets created, the artifact and its context are mutually defining and subject to multiple interpretations.

Now, the potential of new AI technologies suggests to explore a further possibility and fourth paradigm, an *interactionist HCI*, where also humans, and their experiences, are shaped by the network of relations that they develop, recognize, and maintain with other relation-creating nodes of an ever-changing network of irrepetible configurations [2]: this paradigm grounds on the concepts of *generalized simmetry* by Latour [14], i.e., the entanglement between human agencies and artificial ones, and their mutually defining relationships, and it stems from the recognition of the cultural nature of the former ones, as well as the material nature of the latter ones. According to this view, you cannot have humans without their tools, including language, and without what these tools allow them to connect and relate to: i.e. the meaningful and orderly part of the environment they inhabit and call *world*[1].

Therefore, to conclude, our point is that a human-centered AI requires to rethink what we want the *human* to be, before we create and design the artificial, going beyond naive conceptualizations that have been overtaken by decades of research in the psychological, anthropological and semiological fields. We subscribe to the remark by Thomas Malone, who recently claimed that "we should move from thinking about putting humans in the loop to putting computers in the group" [**?**].

To this aim, we advocate that the new generations of AI practitioners and professionals will also be taught a design approach that is "open to the world"; that takes human-machine cooperation in hybrid collectives as a primary concern; that develops and validates "AI capabilities" in the real *world* with an ecologic approach [4]; and, possibly, that relegates AI tools to being a peripheral, *adjunct* member of a human collective[2], with no active role in decision and sense making, that is in the interpretation of the situations where humans live and act: that is without delegating AI to create our human *worlds*.

[1] World is literally where the Human emerges and develops. From the Proto-Germanic *weraldi-, in its turn a compound of *wer 'man' and *ald 'span', 'life', from the PIE root *al- 'to grow, nourish'(Douglas Harper - Online Etymology Dictionary)

[2] See, for instance, Cabitza (2018) Debunking the AI augmentation myth `https://www.linkedin.com/pulse/debunking-ai-augmentation-myth-federico-cabitza/`.

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