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Relational Engineering: Necessary and Sufficient Relations and the Case of Generative AI

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> Abstract • We describe a theoretical framework for defining necessary and sufficient technical relations. We posit that perception consists of perceiving what affects our faculties of perception or, in other words, identifying the co-constitution of point of view and lifeworld. We propose to distinguish relations according to the user's ability to examine the discretizations that underlie these relations.

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« 1 » In their target article, Olivier Gapenne, François Marès, Claire Littaye, Cléo Collomb, and Bruno Bachimont explain the theoretical framework of relational engineering, which they describe as "enaction design" (§1). They define four relations to model the technical constitution of human experience: supplementing, substituting, instructing, and assisting. They specify four regimes of experience: constituting, delegating, elucidating, and regulating. These authors claim that these four relations are necessary and sufficient (§3).

« 2 » To discuss the authors' claim, we draw on the theoretical framework proposed by Charles Lenay (2006). He emphasizes that exploration is inherent in perception. We propose to distinguish between different types of technical relations in terms of mastery of this exploration, based on the concept of discretization (Stiegler 2005). This approach may help clarify the constructivist challenge of relational engineering.

« 3 » Our commentary has two goals.

a We propose an enactive theoretical framework and explain how we can deduce necessary and sufficient technical relations from it. These relations stem from two points defined in the theoretical framework: (i) a technical relation involves perceiving, that is, co-constituting the point of view and the lifeworld through successive approximations (Lenay 2006), and (ii) mastering a technical relation implies being able to *rediscretize* the flow of experience (Stiegler 2005), i.e., to reflectively or pre-reflectively interrogate the patterns characterizing the co-constitution of point of view and lifeworld.

b We highlight the limits of our approach in the case of technical relations involving generative AIs.

« 4 » Let us start with an example, i.e., using a GPS for hiking in the mountains, that will make it easier to understand our rather theoretical contribution. Traditionally, a GPS is designed to provide directional indications within a limited geographical context. Lenay's theoretical framework highlights that the movement to orient the GPS and the path to be taken co-constitute each other. The hiker moves the GPS and simultaneously identifies cues in the terrain. Stiegler's theoretical framework, by contrast, emphasizes that the hiker questions the cues provided by the GPS. The relevant cues for hiking might be outside the geographical context highlighted by the GPS. Hiking involves not only navigating but also choosing a route based on topography, shade, and ease of orientation. A hiker co-constitutes the movement of the GPS (their point of view) and the path (their lifeworld), potentially considering other cues beyond those provided by the GPS.

Lenay's approach of enaction

« 5 » We adopt the theoretical framework proposed by Lenay (2006), which highlights how the perception of depth involves progressively co-constituting a point of view and a lifeworld. In other words, he highlights that in spatial perception, depth is actively constituted by the movements of a viewpoint, and vice versa. He points out that "perception is necessarily a synthesis of successive actions and sensations" (Lenay & Sebbah 2001) and that –

"[Perception] only seems to be achieved when the subject can combine the micro-scanning gesture with that of a dynamic sequence of strokes reproducing the overall outline" (Lenay 2006, our translation).

« 6 » This highlights the *diacritical* nature of perception (Merleau-Ponty 2011). Perceiving consists of exploring one's lifeworld by successive approximations because perception proceeds through discrepancies. It compensates for the tensions between the anticipated exploration of the lifeworld through movement and the subsequent gaps that are revealed through this very movement.

Relations and regimes of experience

« 7 » To distinguish between different types of technical relations and the corresponding regimes of experience, we propose to focus on mastering this exploration by drawing on Bernard Stiegler's (2005) concept of *discretization*. By this, he highlights that the user of a technology must be capable of questioning, thoughtfully or pre-reflectively, the segmentation of the flow of experience induced by the use of the tool, that is, the categories that allow them to experience the co-constitution of their points of view and their lifeworld. In the absence of this ability, the user becomes a "proletarian," that is, a worker subject to the constitutive power of the technology, unable to escape the categories that constrain their activity. This ability to re-discretize the flow of experience is inseparable from the diacritical nature of perception. Therefore, mastering discretization is a relevant criterion for defining types of technical relations.

« 8 » Taking the above as our theoretical framework, we propose four relations:

- Mastering: Carrying out one's own discretizations without the aid of technology.
- Supplementing: Questioning the discretizations induced by the use of technology.
- Exploring: Building up discretizations induced by the use of technology.
- Delegating: Undergoing the discretizations induced by the use of technology.

We hypothesize that these four proposed relations are necessary and sufficient to account for perception conceptualized as enaction within the framework of relational engineering. They are necessary because they follow from the theoretical framework we have posed, and they are sufficient because they account for all the cases of discretization that follow from our framework.

« 9 » This proposition implies two remarks. Firstly, we reiterate that the diacritical character is inherent in perception. Appropriation, which is also the result of successive approximations, is however linked to the integration of artifacts into an actor's lifeworld, body, and culture (Poizat 2014), and to the transparency–non-transparency dynamic[1] of the artifacts in constituting the user's experience (Lenay & Sebbah 2001). Secondly, the relations between instructing and assisting remain relevant. However, referring to Lenay (2006), we believe they consist in modifying the user's environment rather than increasing empowerment or supporting this process of increasing empowerment (§3). This difference is significant in our experience as teacher trainers. One of the challenges of training is to enable learners to re-discretize the flow of their experience, that is, to question the categories induced by training situations. In this case, the relations between instructing and assisting should be rediscovered by the learner.

Discussion

« 10 » Our proposal leads us to discuss three points. Firstly, Gapenne et al. posit that the supplementing relation is primary and, referring to Martin Heidegger, that the technical object is grasped transparently, as opposed to other relations yet to be analyzed where the technical object is perceived as an object (§3 and Footnote 12). We reiterate that perception as enaction implies successive approximations. These are inherent in the coupling, in the co-constitution of engagement and appreciation of the effects of this engagement (§3). We propose, however, that the exploring relation that enables discretizations does not signify that the technical object has become an entity of its own rather than remaining a tool. Gapenne et al. focus on the mode of technical relation that can be described as *Zuhandenheit* in Heidegger's terms. We propose instead to examine the *Zuhandenheit–Vorhandenheit* relation[2] without opposing these two terms, as Hatab (2018) suggests. Therefore, we are committed to an approach similar to that of Gapenne et al.'s enaction design, but our educational commitment leads us to adopt a learner-centered approach, focusing on the micro-ruptures inherent in the co-constitution of their point of view and lifeworld.

« 11 » Secondly, the case of generative AI raises questions about the conditions that enable the co-constitution of commitment and the appreciation of the effects of this commitment. Based on the work of Xabier Barandiaran and Lola Almendros (2024), we can specify three points:

a It is difficult for the user to make sense of the functional decomposition that follows their prompt. Indeed, it is very challenging to understand how a particular text is generated by an AI starting from the entered prompt. Moreover, one and the same prompt can generate different texts.

b The user does not specify actions with the prompt, but instead communicates an intention to the AI. For example, we ask the AI to generate a summary without concerning ourselves with the underlying processes it uses. We can do this without knowing the characteristics of a summary and without mastering this type of text.

c The user takes charge of the dance constituted by the partial acts characterizing languaging such as question and answer, request and precision (Cuffari, Di Paolo & De Jaegher 2015). They ar-

1| Meaning that sometimes it is the embodied tool that constitutes the experience, sometimes it is the tool that is experienced as an external object.

2| Lawrence Hatab (2018: 1f) succinctly describes this relation as follows: "*Zuhandenheit* is illustrated by tool use, which is not a reflective transaction between a knowing subject and an external object, but a field-phenomenon of engaged performance. A breakdown or disruption of this practice-field generates the *vorhanden* viewpoint of regarding the tool or environment in the more objective sense of things and properties that call for examination because of the disturbance."

ticulate their prompts and thus the text generated by the AI, especially when every effort is made to ensure that the text generated by the AI is as close as possible to what the user would have written.

In these three cases, it becomes increasingly difficult for the user to rediscretize the generated text. Perception as enaction is profoundly transformed. The co-specification of the point of view and lifeworld becomes difficult to control.

« 12 » Thirdly, the case of generative AI invites us to clarify the *instructing* and *assisting* relations proposed by Gapenne et al. It encourages us to better articulate what is meant by (a) achieving a goal and knowing the underlying technical aspects (§19), (b) the state of a technical resource and the environment (§21), and (c) the state and progress of the action (§29). More generally, one should think of relational engineering as a helping relation, because it enables the user to retain control of their activity. It is thus possible to enable the user to understand the instrumented situation and to make the necessary decisions themselves (Theureau & Filippi 1994).

« 13 » We do not claim that our way of defining technical relations is better than that proposed by Gapenne et al. We have tried to define them in a manner that elucidates how we can assume that they are necessary and sufficient. This approach has enabled us to clarify an enactive theoretical framework that is relevant to the implementation of enaction design in education. We have also identified the limitations of this theoretical framework by analyzing the case of generative AI. This approach highlights the constructivist challenge involved in using this technology in general, and in the field of education in particular.

« 14 » Since we propose an alternative theoretical framework to the one developed in the target article, it would be particularly insightful to know more about how the technical relations that Gapenne et al. identify are necessary and sufficient. Q1

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