
Spacio-temporal movements in communities of practice, in which human beings and autonomous systems participate

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Abstract

Any two systems in motion will synchronize and adapt to each other and develop a shared language and/or taxonomy, according to the latest research of Luc Steels at Sony Research Labs in Paris. This happens between human beings as well as between non-human systems. In this position paper I argue, inspired the work of Luc Steels and by Thomas Kuhn's last writings, that in the interaction between human beings and autonomous systems it is necessary to pay attention to the incommensurability that is part of this interaction. Human beings recognize spacio-temporal movements of each other, which create a ground for interaction. Autonomous systems can be defined in terms of spacio-temporal movements, but are hardly perceived as such by human beings. I argue that next to many other reasons, also the not-recognition of spacio-temporal movements between human beings and autonomous systems causes serious flaws in understanding and communication. To be able to address this issue I take the position that both human beings as well as autonomous systems participate in the specific community in which they are located and interact. Being participant in a community involves making contributions to the community, taking responsibility and being part of the evaluation of cause and effect in this community. Being a participant in a community one contributes to the language and concepts a community shares. However, when things go wrong between human beings in a community the self-correctional dynamics that evolve are based on guilt and shame, while an autonomous system provides a 'no match'. Human drivers like hope, solidarity, compassion and love are not recognized as such by autonomous systems. Nevertheless, human beings are bound to attribute a variety of feelings to autonomous systems because they perform tasks, give feedback and are capable of evaluating formulated intentions. Human beings

can perceive autonomous systems as participants in a community in their own right.

Keywords

Witnessed presence, incommensurability, man-machine interaction, taxonomy, spacio-temporal movements, human potential, guilt, shame, no-match, presence

ACM classification words

H5M. Information Interfaces and presentation (e.g.HCI): miscellaneous

1. Introduction

In a community people who are involved in social interaction can be understood as actors, who are following social rules [1]. An actor 'thinks' through the clash between intention and realization and this clash happens on the physical, the emotional and the cognitive level as well [2]. Also autonomous systems function in a community, follow rules and operate on different levels, yet these are not psychologically and/or sociologically defined. The clash between intention and realization is important for autonomous systems, which is why they can 'learn'. However, its physical condition can be hard to perceive and is of a different nature which only few human beings who are participating in a community will be able to understand and act upon. The emotional clash between intention and realization of an autonomous system is absent, even though some systems are designed to provoke the attribution of feelings in fellow human participants in a specific community. Such attributed feelings can be highly complex, but they do not affect internal functioning of the system. A 'cognitive clash' may happen provided the rationality of the autonomous system is accepted as such. This clash will generate a 'match' or 'no-match' in the first place, but can lead to apparently complex behaviour since the processing time of autonomous systems is often beyond human perception. And this may inspire more processes of emotional attributions, which will influence how the evolution of the community with all its participants, human and non-human, will occur.

Through interactions participants shape the community they are part of. A participant in a community, who is involved in collaboration, will have an image of the other collaborating actors. Whether it is informed by curiosity and attention, or whether it is just an uninformed stereotypical image, human beings judge each other's presence in relation to their own presence. The witnessed presence of others and the awareness of being witnessed 'tune' the presence of the people involved. This 'tuning' deeply influences how interactions after will proceed. It can be argued that an autonomous system has witnessed presence as well; it is capable of witnessing others and can be engineered to notice when it is being witnessed. When an autonomous system evaluates formulated intentions before it executes the next act, it can learn fast and actually, one can argue, will develop its own 'tuning' mechanisms. The question appears to be how the 'tuning capacity' of an autonomous system will be perceived in order to have its witnessing and witnessed presence be accepted or not.

2. Communities of practice

Inspired by the way the evolutionary process develops Thomas Kuhn argues, that every specialty functions in a 'niche', which is perceived as the world. For people, or actors, the niche that they form part of, 'is' the world. It is where communities live. Lexicons evolve between different individuals and all contribute to a deeper structure of taxonomies that characterize that specific community. The structure of lexicons of individual participants in a community do not have to be identical, but "mutually congruent ones", as Kuhn suggests. Such a congruent structure of a conceptual framework has to be shared to enable people to understand each other. Kuhn argues that lexicons and taxonomies evolve from communities that interact and can only be fully understood "as grounded in the community it serves" [3].

Research by Luc Steels and colleagues [4-5] also suggests that language evolves from interaction between any two systems in which processes of attribution, synchronization and adaptation take place. Such systems can consist of human beings only or include human-machine interactions as well. Steels research suggests that also technological

systems amongst themselves will synchronize and adapt to each other, provided certain rules are in place. This implies that in the clash between intention and realization, witnessed presence between any two participants in a community generates significant input. Also autonomous systems witness, interact and in doing so they contribute to lexicons and taxonomies in the community they function. This perspective leads to the conclusion that when focusing on an autonomous system, we actually have to consider this autonomous system as a full participant in the community of actors in which it functions.

Being part of a community means one is not ruling the community, but like any other member one can be touched, moved and changed by the events that occur in that community. The community is able to change the actors involved and being able to change requires a certain vulnerability and openness as well as a certain dependency on the community one is involved. The dependency of an autonomous system towards a community is different from the dependency a human being will have, just as is the openness an autonomous system can perform is different from the openness a human being can have. Nevertheless human beings and autonomous systems both participate in communities in which they interact with each other.

To be able to interact, Kuhn argues, members of the community have to share certain concepts or no interaction would be possible. This accords with the perception that collaborating actors share terrains of commensurability and also terrains of incommensurability, otherwise they could not collaborate. How to understand where one shares concepts with an autonomous system and when not? And how will the autonomous system recognize another actor's concepts? When analyzing how interactions between human participants with not identical lexicons happen, Kuhn makes a remarkable analysis and discards the notion of true and false when discussing the contributions of human beings to communities' practices. "The ways of being-in-the-world which a lexicon provides are not candidates for true/false", he writes [3].

Transposing his suggestion to autonomous systems, may shed some light on why autonomous systems can be accepted as participant in a community at all. Actors develop their lexicons and taxonomies, and their deeper structures for these, in the communities they operate in. They do this as 'thinking' actors, through the clash between intention and realization, in order to make things work, to communicate, to find common ground and to share knowledge and create new things. The way they do this is via taxonomies that are grounded in communities and can only be understood in relation to these communities. The question for the actor is not whether something is true or false, but whether it works and taxonomies serve this need for things to work.

When considering that an autonomous system fully participates with its presence in a community, Kuhn's notion that communities in their niches create taxonomies, which help actors to be-in-the-world, opens up perspectives for understanding the significant role that autonomous systems and their mediated presence's already play in our daily lives. Whether we discuss the social functioning of a car, an ATM machine or a smart database, it is actually amazing how easily people accept autonomous systems in their day-to-day lives. This acceptance originates from the fact that the system works and delivers, and doing so it contributes to the living practice of a community. There is no concern with the question whether they are true or false, they act.

The more the presence of an autonomous system is accepted, the more it functions in a community as part of its reality. It will be a contributing factor to the taxonomies that this community develops. Taxonomy involves hierarchies, grammar, concepts and words. Literal action and words of the autonomous system will contribute, but also the underlying formats of interaction and concepts of for example 'cause and effect' influence how the community develops and its participants change. In this process however, a major distinction between human beings and an autonomous system are the dynamics that regulate how mistakes and faults are allowed to influence the system. In human communities shame and guilt are major drivers of

self correctional behaviour, while autonomous systems offer a 'no-match'. The no-match is a very different ontological position from guilt or shame. The latter induce trajectories of new behaviour in which intentions to self correct and obtain forgiveness dominate. No-match seems to be a neutral state, nothing more than a consequence of a yes and no choice. However, no-match can have great impact on other participants as well as on the community as such. This impact does not guide new internal actions of the system, even though other participants may be capable to 'set the system free'. The implications of the dynamic of self correctional behaviour between shame and guilt versus no-match as a driver for adaptation, require further research.

3. Tracing spatiotemporal trajectories

The big hurdle to establish meaningful interactions between participants in a community is to overcome incommensurability - the fundamental not sharing of an understanding - between human beings, between human beings and autonomous systems as well as between different autonomous systems.

The judgement of other participants presence's, whether well-informed or full of prejudice, or not, influences the interaction between different actors. Thomas Kuhn, in his last writing, explores the notion of incommensurability. He never managed to finish his book before he died in 1996, so we can only guess where his argument might have led. However, Kuhn's suggestion resonates with the latest insights in brain research by scientists like Antonio Damasio [6-7] and Luc Steels [4-5], and it resonates with the proposed understanding of the sense of presence of Riva, Waterworth and Waterworth as well. [8]

"A final remark will close this sketch of my current views on incommensurability. I have described those views as concerned with words and with lexical taxonomy, and I shall continue in that mode: the sort of knowledge I deal with comes in explicit verbal or related symbolic forms. But it may clarify what I have in mind to suggest that I might more appropriately speak of concepts than of words. What I have been calling a lexical taxonomy might, that is, better be called a conceptual scheme, where the 'very notion' of a

conceptual scheme is not that of a set of beliefs but of a particular operating mode of a mental module prerequisite to having beliefs, a mode that at once supplies and bounds the set of beliefs it is possible to conceive. Some such taxonomic module I take to be prelinguistic and possessed by animals. Presumably it evolved originally for the sensory, most obviously for the visual, system. In the book I shall give reasons for supposing that it developed from a still more fundamental mechanism which enables individual living organisms to reidentify other substances by tracing their spatiotemporal trajectories." [3].

Witnessing the presence of others informs us about the identity of others and these identities are, among other things, formed by 'conceptual schemes'. This quote from Kuhn has inspired me to reflect upon the effect of performing a practice over time and how this performing of a practice will actually change the structures in the brain, even the conceptual structures in the brain that influence perception and behaviour. What is the difference between doing the dishes every day or loading and emptying the dishwasher? If people work with hard materials like stone, steel or wood using their hands, how does it influence their conceptual framework? Does a nurse have a very different brain structure to a composer of music or a London cab driver? Brain research suggests that our actions continually influence how our neurons develop, and not only in childhood. Older people's brains also continue developing according to the actions they perform.

Brain structures, together with other input, influence the images we have of ourselves and others, including the images we have of autonomous systems with which we interact. Damasio points out that scientifically we do not know how we go from sensory input to conceiving images, even though the fact that we conceive images is well-established [7]. And from the perspective of the autonomous system, how will it be affected by its actions? Will it change and will this change be perceivable? And human beings, can they recognize the change of identity in a system? Can the system decide upon wanting to change its identity for example?

Kuhn's idea that a fundamental mechanism "enables living organisms to reidentify other substances by tracing their spatiotemporal trajectories" may be proven to be very worthwhile because it would explain how we often 'recognize' other actors intuitively before we know how our communication with this person and/or system will work out. Kuhn's words can be understood as an insight into witnessed presence. This may also imply that when confronted with incommensurability, the clash between intention and realization does not only occur cognitively, but physical and emotional input may also 'shape' the actor as much as the cognitive clash does.

What would this mean when being involved with an autonomous system? How will we recognize its spatiotemporal trajectory? How can such a spatiotemporal trajectory be perceivable? When most of its output and input is not perceivable for us, could a representation of a process be perceived as a genuine spatiotemporal trajectory? When this autonomous system is distributed, how can its 'footprint' be perceived? How will the clash between intention and realization happen, if at all, when no conceptual framework has been collaboratively developed between the system and other human participants?

How does seeing a result of an interaction with an autonomous system, whether successful or not, influence our consciousness? How does acquired technological or editorial skill influence our way of thinking? And how do processes of attribution influence a possible emotional experience in the clash between intention and realization between a human being and an autonomous system?

Kuhn's suggestion does resonate with the experiences of online collaborations between human beings. It is very difficult to technologically mediate the possible pre-linguistic conceptual frameworks that characterize a human being, and which are perceived by other actors. The limited sensorial repertoire of mediated presence limits communication on very fundamental levels. Just as context is extremely difficult to mediate, up to the logical point where it is impossible, any conceivable inner pre-linguistic

conceptual frameworks face the same (impossible) challenge.

When being involved with an autonomous system the clash of presences seems to be only more intense. The time frame and experience of a system as well as its spatial presence, including its possible real-life-footprint, are of a different order. It's strength, length of life and vulnerability as well. It's sense of life, even though it is designed by people to act, needs very different ingredients to survive and be well than most actors will be aware of. Nevertheless many actors can communicate with it, will attribute qualities to it and will eventually synchronize and adapt to it.

Incommensurability is a significant hurdle that has to be tackled in the collaborations between actors. The suggestion that we may identify a deeper structure of thinking, a conceptual framework that is reflected in a lexical taxonomy, could add to the understanding of why certain actors work well together while others do not. To mediate nuances of enacted identities is difficult and may even be impossible. When being involved with an autonomous system, it has to provide appropriate actions. More and more these systems now engage in a personalized way with the human being it is involved with. For an autonomous system to fully function in the community it participates, it has to make up for the lack of recognition of its spatiotemporal trajectory or find ways to convey this.

4. Discussion

Only when we perceive the human being as not being part of the autonomous system, incommensurability between human beings and autonomous systems can be addressed. Also, when making the distinction between the human being and the autonomous system, this provides us with the opportunity to judge possible interactions from the perspective of safeguarding human dignity as well. Doing so, it is possible to maximize the mobilization of the human potential to act towards survival and well-being, in which the essence of presence is to be found.

When human beings are confronted with the presence of an autonomous system, processes of attribution have great impact and are easily perceived as a quality of the system itself. This confusion, which can result in a not appropriate perception of the environment and what happens in it, may lead to a confused steering towards well being and survival of the community as such.

Human beings are mortal beings and when the sense of presence is maximized, people's natural presence well being will ultimately determine what mediated and autonomous systems presence will be considered part of the community and which one will be discarded of. In the process of accepting an autonomous system as being participant in a community, the orchestration and design of its witnessing and witnessed presence is distinct. To be able to recognize spacio-temporal trajectories of other participants is a requirement 'tuning' participant's presence's, which is necessary for tackling incommensurability and being able to interact and contribute to lexicons, taxonomies and concepts participants in a community share.

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