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DOI: 10.3217/978-3-85125-855-4-16

# Borderland Encounters—Evolving Professional Identities Between Human and Machine Learning Processes

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**Abstract.** Nowadays, the ability to take initiative and to assert oneself, but also to care for others and show empathy, are considered as essential requirements in many professional settings. Those abilities have become part of the professional identity of many team leaders or department heads, as well as of collaborators in organizations with less hierarchical structures. Like other specialized skills, they are object of training and upskilling measures. As the approach to professional training has been changing significantly, more and more offers for experience-based, interactive and playful forms of training have been created. Recent years have seen an increase in the use of interactive training applications based on virtual reality (VR) and artificial intelligence (AI) technologies for developing social skills, such as public speaking, interpersonal communication abilities and so on. Considering that social and interactive skills are seen as distinctive human traits, the AI-powered digital space may constitute a borderland in which human and machine learning processes intertwine. Still, whereas machine learning processes function exclusively on the basis of pattern recognition, human learning and interaction is characterized by an openness that includes breaches, failures, external appraisal, critical reflection, and other forms of transformation. Using the case of an interactive VR environment for the training of social skills, we outline a new theoretical approach for mapping the borderland between human and machine learning processes in the field of social skills training. We discuss the case within the framework of Gabriel Tarde's concepts of invention, imitation and desire.

## 1 Introduction

In many professions, it has become crucial to develop a set of interpersonal skills, such as assertiveness or empathy. These skills are deemed important requirements in many occupational settings (Kanning 2009). In addition, interpersonal skills are considered as something one can train and develop with the appropriate learning and training measures. This has led to an increasing offer of courses, workshops and other forms of training dedicated to the development of interpersonal (also called soft or social) skills (Nangle et al. 2020).

While in the past, the formal activity of learning was confined to institutions of schools, universities or vocational training, over the past few decades it has been diffusing beyond these institutions and transformed into something that spans individuals' entire life. In other words, learning is no longer referred to primarily as the

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formal education one receives in childhood and early adulthood in a pedagogical form. Rather, it now refers to the knowledge acquired on an ongoing, self-directed and voluntary basis motivated by personal development, employability or social inclusion. Further education, formation, professional training, coaching and so on have been evolving constantly, not only within the public education system but also as an important branch of the service sector. Apart from this shift in how we perceive and approach learning, there has been also a shift in the learning and teaching techniques, with the emergence of a field of learning forms that are subsumed under the concepts of playful learning or edutainment. Nowadays, many organizations are engaged in offering their staff not just courses or seminars, but 'playful' forms of 'experiential learning'.

The paradigm shift is also reflected in the technologies used for learning. While in the past, learners were provided with course materials in form of books and followed the lessons in a standardized way, nowadays learning has become much more interactive, with didactical forms that invite learners to participate, but also with new technologies that allow to establish a constant exchange between teachers and learners. The technological advances in virtual reality (VR) and artificial intelligence (AI) have also permeated the field of learning and teaching. There are multiple applications based on these technologies meant to help individuals developing social skills, such as public speaking, interpersonal communication abilities and so on. However, social and interactive skills are fundamentally human traits. They help us make friends, create a network of people, work together towards a common goal and so on. So, in an activity that involves the teaching and learning of these skills, how do the technological, AI-based processes of machine learning and the human processes of socializing twine together?

The empirical background of this theoretical paper is the ongoing transdisciplinary research project Virtual Skills Lab.[1] Its aim is the development of a research prototype for a Virtual Reality (VR) based social skills training. The story line for the VR scene has been developed, on the basis of a participatory approach, in collaboration with mid-level managers in an international corporation based in Austria. In the scene, the player takes over the role of a team manager sitting in their office. A virtual agent named Mira Horvath (Fig. 1), who is introduced as a collaborator of the player's fictitious team, steps in, expecting her superior (the player) to start a scheduled meeting with her. She wants to present her team leader a template she has been working on. Suddenly, a message pops up, reminding the team leader to attend another meeting of higher priority. The task for the player is now to "say no in an appreciative way", i.e., to postpone the meeting with Mira again.

[1] https://projekte.ffg.at/projekt/3254984 (accessed 31st of May 2021)

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**Fig. 1. Still of the interactive VR scene developed for the research project Virtual Skills Lab.**

Against the background of this project that deals with the question how VR could be effectively used in the context of professional training, we aim to present a sociological account of 'learning' as a constitutive element of professional identity and its relation to technologies based on 'machine learning' (AI). We explore the space of encounter and interaction between humans and machines by drawing on Gabriel Tarde's concepts of invention, imitation, and desire. Although Tarde published most of his works at the end of the nineteenth century, scholars recently have referred to his theoretical concepts in order to analyze the innovation brought about by new technologies, scientific knowledge and sociocultural movements (Borch/Stäheli 2009, Candea 2010, Latour 2014, Latour/Lépinay 2009, Lazzarato 2002). Especially his theory on the "laws of imitation" (1890) contains concepts that are appropriate for analyzing characteristic phenomena of the digital societies, such as social media like Facebook or Twitter. The socio-technical dynamics constituting these communication spaces can be described by applying Tarde's concepts of invention, imitation, and desire. We first discuss Tarde's theory of invention and imitation and examine, within this framework and compared to other theoretical approaches, the concepts of learning, playful self, and professional identity. We follow with a discussion of these concepts as applied for leader social skills training and examine the role of VR/AI technologies in the diffusion of social skill knowledge. We then draw on Tarde's understanding of the notion of desire in order to grasp the conceptual difference between human and machine learning processes. In conclusion, we outline the

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implications of our study for future empirical research of technology-based leadership training.

## 2 The Social as Inter-Activity, Not Inter-Connectedness

Tarde analyzes the emergence of social facts out of actions (taken consciously or unconsciously), whereby these actions express ideas deriving from specific convictions or desires. He considers the innovativeness of ideas and their diffusion as a driving moment of social exchange and progress (Tarde 1893). Like waves of light in the physical space or the procreation of life in the evolution of nature, social facts emerge and expand via the repetition of original, inventive actions (Tarde 1890). The type of repetition that distinguishes social facts is termed by Tarde as imitation. Many of the sociocultural forms and practices characterizing modern societies function like that, for example the changing of clothing styles, or musical preferences, or ways of speaking in diverse sociocultural contexts. Their diffusion has accelerated enormously with mass production and especially commercial mass communication during the 20th century. Recently, the diffusion mode has shifted from serial to interactive, with the rise of social media, communication spaces where images and texts are posted and reposted millions of times. The 'seriality' (Sartre 1991) of classical mass communication via press or television is more and more replaced by the re-activity and inter-activity of communicating via social media.

This technologically-mediated interactive character can be well analyzed by applying the concept of imitation, as it was conceived of by Tarde, and later by philosophers like Deleuze (1994). In Tarde's view, an idea, conviction or desire emerges and diffuses by imitation, but it also changes in the process. In other words, a fact that has been diffused is never exactly the same as the original. In this sense, inter-activity describes a process of diffusion in which ideas are not merely reproduced, but also altered, combined and even get into conflict with each other. While the nature of imitation, its fundamental tendency, is infinite progression (Tarde 1890), the process of diffusion unfolds as a plurality of variations and conflicts between opposing ideas and desires, as well as of combinations. There are no preliminary social structures that bind these forces together. Rather, there are many modes of associating and dissociating, that is, of constituting emerging structures and of dissolving them. It is the inter-activity of these processes that forms the social (Latour 2005).

Hence, Tarde looks at the inventive character of imitation. He suggests that invention can be based on imitation, e.g., when an innovation emerges from the crossing of different imitative streams, or from a variation of an imitative practice. Thus, according to Tarde there is a basic inter-activity that forms society and that can be more or less

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dynamic according to how the processes and practices of invention and imitation are shaped and how they evolve. It is not a basic constraint that transforms a human expression into a social fact, but rather the (conscious or unconscious) desire to imitate and, by taking up an idea or a conviction, to vary, change or oppose this idea.

In the following sections, we show how Tarde's conception of a dynamic, inter-active emerging of social facts via invention and imitation applies to the realms of professional training in general (section 3), to professional identity conceived of as a continuously evolving and 'learning' self (sections 4-5), and to social skills training in particular (section 6). We then proceed to analyze how technologies like VR and AI can be used to create playful training experiences for an evolving professional self (sections 7–8).

In this context, i.e., social interaction in professional settings, besides the dialectic of invention and imitation, it is particularly Tarde's concept of desire that allows for comparing human interaction to human-machine interaction, as well as the respective learning processes. VR environments in which humans engage in interactions with AI-based virtual agents constitute a borderland in which these two learning processes encounter (Pan/Hamilton 2018, Asada 2015). The question is if these encounters are based on, or will lead to the constitution of, a common ground (section 9). In other words, are the patterns that emerge from human as well as from machine learning processes the same, or do they differ essentially?

This question regards human-machine interaction in many different aspects and realms, such as the possibility of designing services in a way that customers have the illusion to interact with a human while interacting with a computer. In this paper, we aim to address it from the specific angle of our research project, i.e., the training of social skills in VR environments by referring to Gabriel Tarde's concept of desire. When humans train their social skills, their desire to learn is not limited to their own behavior and to the question how to improve it. It is also directed towards an interaction partner to which they attribute the same desire, i.e., to understand the other and, according to the specific situation, to cooperate or to compete, as well as to establish a relationship characterized by sympathy, trust, appreciation or other socio-emotional qualities.

A peculiarity of simulations of social interaction in VR is that humans have the possibility to interact with computer-controlled agents as if they were real human persons. Apart from the technological preconditions that render the illusion of interacting with a real human more or less perfect, the question is if human users (players) of such VR environments can, or need to, attribute the desire of mutual understanding to their computer-controlled interaction partners. While we will not give a definitive answer to the question if machines will ever develop the desire of mutual understanding, we will use Tarde's perspective to show that even if we assume a fundamental difference between human and machine learning processes, there is an ever-growing intertwining between these processes.

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Learning as a *human activity* has become inter-active in terms of didactics, and this is due to specific socio-cultural processes as well as technological evolutions. Furthermore, the *subject of learning* (the learning self) has become inter-active in that it has to assume different roles, especially in professional settings. The latter are much less hierarchical and open to a certain variety of interpreting roles and tasks than in the past. Therefore, they are associated with processes of personal change and growth. Also in this area, the area of professional identity (as a fundamental component of personal identity), interactive technologies are of growing importance. Finally, *human-machine interaction* has an increasing impact in the shaping of organizational processes as well as professional relationships. Thus, social interaction should not be analyzed detached from the various forms of human-machine interaction that co-shape human communication. From a sociological point of view, our way of interacting with others cannot be fully understood if we are not able to account for the technologically-mediated character of this inter-activity (Latour 2005). This is the reason why, in our view, it is helpful to analyze how social interaction emerges by invention, imitation, and the desire to understand the other in reference to Gabriel Tarde's conception of those terms.

## 3 Learning: from Limited Activity to Pervasive Inter-Activity

How is Tarde's position linked to the field of education and professional training? We have previously discussed that 'learning' as an institutionalized activity had longtime been restricted to certain time (childhood) and space constraints (in schools, universities or vocational training institutes). It was institutionalized as a sequence of educational levels and passages, from early childhood to early adulthood. Learning was essentially designed as a preparatory (and in this sense a non-productive) activity: for professional life as well as for the diverse roles people had to take over in private and public life. The skills acquired in the context of professional life for a long time were associated with terms like 'practical experience' or 'tacit knowledge'. Conversely, learning is nowadays something that we are supposed to do on an explicit, ongoing, voluntary and self-directed basis. This has led to the development of an important segment of the services sector, focused on learning outside of the credit and degree attainment model (e. g. the emergence of MOOCs—open online course providers, or professional training services providers).

In Tarde's terms, by overcoming the limited forms and institutions of education, the desire to learn and train oneself has been obeying to the fundamental law of imitation, that of an infinite progression. Education, once confined to public institutions and

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professional associations, has been transformed into a globally available (and allegedly accessible) service, a commodity.

The extension of the activity of learning has been interpreted as an imperative that characterizes the societies of control as opposed to the disciplinary societies (Deleuze 1992). In the societies of control, 'learning' becomes an ongoing pursuit of knowledge, whereby individuals are not educated by an external authority through surveillance or sanctioning. In Deleuze's terms, individuals in the societies of control 're-request apprenticeships and permanent training' (Deleuze 1992). Consequently, 'learning' and 'training' have become techniques of an evolving self, based on intrinsic motivation. One sociological perspective on this transformation and the new forms of learning and training that have been emerging is to conceive of 'learning' as a form of subjectivation, a form of self-government, in line with a Foucauldian approach (Bröckling 2007). A central concept for the institutionalization of learning as an activity that pervades all periods and aspects of life is the notion of 'competence' (Gelhard 2011). All disciplines, curricula or subjects are centered on defining and operationalizing basic or advanced competences into small learning goals.

## 4 The Playful Self—Enacting and Interpreting Professional Roles

The fact that people claim to be continuously motivated to further training (Deleuze 1992) is reflected by the emergence and diffusion of a field of learning techniques that are subsumed under the concepts of 'playful learning' or 'edutainment'. While in the past, the activity of playing was banned from formal education, it has first been adopted by alternative or reformatory pedagogy as a critical approach to traditional educational techniques. Subsequently, it became—in Tarde's terms—a fashion, conquering many areas of education and training. These techniques have also been adopted by organizations, as a means to help employees in developing their creative skills.

Nevertheless, the more the ideas of 'edutainment' and 'playfulness' diffuse, the more technology takes over a crucial role in the design of learning activities. It is especially in the context of technology-based learning and training that these activities are denominated 'experiences'. In terms of the development of new forms of training, the borders between the industry of gaming on the one side and education technology on the other become blurred. In the context of professional training, playful learning fulfils individuals' desire to experience work not only as a useful, but as a satisfying and meaningful activity. This makes learning even more pervasive and even more apt for diffusion by imitation.

To summarize, activities identified and denominated as learning experiences have been diffusing enormously and span all realms of society as well as all periods of life.

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On the one hand they are designed as meaningful and playful activities. On the other hand, they become increasingly mediated by technological interfaces, devices and diverse forms of human-machine interaction. Because of the important role of technology in learning, a Foucauldian or Deleuzian perspective centered on subjectivation are not sufficient. Any analytical framework needs to account for the role the technology plays in learning. It has to account for the processes of diffusion of knowledge across the interfaces. We propose that a suitable framework for understanding the human and AI/VR-based processes in learning is the theory based on the notions of invention, imitation, and desire introduced by Gabriel Tarde. Tarde's theory enables us to account for the concrete actions taken in the process of professional training and learning. We do not limit our approach to the critical stance of analyzing subjectivation and control regimes made effective by the desire to undergo continuous training processes. We aim to describe the desires underlying training processes, how they are transformed into ideas and convictions and how the respective ideas compete, combine and diffuse (Tarde 1890). Since the diffusion process involves more and more learning technologies, we also have to consider how these two fundamentally different learning processes (human and machine learning) relate to each other. How are ideas translated into data?

## 5 The Learning Self and Professional Identity

We have stressed that learning has transformed from an activity that once was conceived as "education", as a prerequisite for professional upward mobility, to "continuous training" conceived as an interactive process that takes place throughout life. Learning becomes a fundamental characteristic of professional identity, so that identity itself is more and more seen as a process that has to be subject to continuous training. This resonates with theories of personal identity that stress the evolving character of the self (Mead 1934, Erikson 1968). Professional identity, seen as a central component of personal identity, is something one develops over time and involves learning processes. It is developed through regular interactions with the environment, or more specifically, in organizational settings that are based on social interaction.

As a reflection of these interactions and social encounters, the self-concept can be seen as an organized representation of beliefs about ourselves (McCormick/Pressley 1997). In this sense, identity is not a fixed attribute of a person, but a phenomenon embedded in relations and interactions (Gee 2001). In their extensive literature review, Pratt and colleagues (2006) propose a circular model of identity construction whereby individuals' learning about the work, receiving social validation for their performance

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and identity formation interact in a reinforcing loop meant to construct, shape and adapt one's professional identity. Professional identity is, thus, an ongoing process of becoming and interpreting oneself as a certain kind of person and having this self-concept validated by others.

In times of digitization, the process of developing one's professional identity has become even more interactive and technology-driven. Social interaction in organizations has shifted to virtual space, as we communicate via instant messaging platforms, emails and so on. Furthermore, the sources for constructing and reflecting professional identity nowadays include social media and platforms such as YouTube, Xing or LinkedIn, where continuously leadership styles are presented and reflected. These styles are invented and imitated, adopted to new contexts or contested. Social networks and media can be understood, in Tarde's terms, as communicative spaces where ideas and convictions on professional identities, especially the relational identity of 'leaders', emerge and diffuse.

## 6 Leadership Skills—Social Rather than Executive

How is a 'leader' expected to be like? What defines their identity? These questions are no longer restricted to certain private circles, nor are they implicit in the concept of leadership. They are discussed publicly and inter-actively on the social media platforms. The assumption that a leader's identity is fundamentally relational is not new. In a managerial context, the processes of professional identity formation and identity strengthening have longtime been characterized as relational (Mintzberg 1973). According to many scholars, managers and leaders need to be recognized formally and informally as the leader by their followers (Bass 1990). In the words of Pratt and colleagues (2006), they need to receive social validation in order to be able to exercise influence and provide direction (Wolff et al. 2002). Meindl et al. (1985) suggest that managers and leaders need to have certain social skills in order to be able to inspire followers to pursue a common vision. Mintzberg (1973) suggested that the ability to establish and maintain social networks, the ability to deal with subordinates or the ability to empathize with top-level leaders are some of the key interpersonal skills that are critical for managerial effectiveness (Riggio/Reichard 2008).

What new technologies add to these characterizations of a leader's social competences is the growing inter-activity of the emergence, construction and diffusion of ideas and convictions. Identity appears as a process of continuous being-in-touch, being accessible and accountable for one's own ideas and actions. With the rising openness and complexity of roles and functions in organizations, the development of

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professional identity turns into a never-ending story of personal challenges, ruptures, passages and reinventions of the self, that can be publicly reflected on and discussed, via social media and their opportunities to shape and design narratives. The ability to not only recognize complex frames in interactions (Goffman 1959, 1974), but also to explore the opportunities and restrictions connected to an organizational function is nowadays seen as a fundamental competence, especially of leaders. Yet, this competence, which is better characterized as a bundle of skills, is that of a self in interaction with others, hence, a social or interpersonal competence. In this sense, interpersonal skills are not only a prerequisite for a determined position or task within an organization, but also a narrative or an imperative, a responsibility to further evolve the relational self. It is the self that, in everyday interaction, becomes a crucial entity when it comes to keep up with the challenges of organizational and especially leadership tasks. To play a role in an organization is connected with multiple learning processes. From a sociological perspective, social competences are characterized as strategic action skills that allow to shape or change a specific field, such as an organization (Fligstein/McAdam 2012).

Originally, the terms ‘social skill’ or ‘social competence’ had been coined in the contexts of clinical psychology and of developmental psychology (Kanning 2009). In the realm of clinical psychology, social skills training measures were developed and applied especially for clients suffering from social phobia or autism, in order to strengthen their self-assertiveness and support them to face everyday situations, e.g., going to public places such as supermarkets. In the realm of developmental psychology, social skills are regarded as necessary for developing the ability to cooperate with others by taking their perspective, recognizing their needs and to connect one’s own goals and interests with those of other people.

Social skills as a topic of courses and seminars entered the stage of professional training in the 1990s. Skills such as self-assertiveness, the ability to deal with conflicts or decisiveness, but also perspective-taking, pro-sociality and the ability to listen, have been considered more and more as crucial in work contexts. The tendency, with respect to the reorganization of structures and processes, towards flat hierarchies, greater autonomy and higher responsibility has led to a rising focus on the communicative aspects of cooperation and, especially, of leading teams. Generally, communication is nowadays considered as an integral component that shapes organizational processes and structures (Taylor/Van Every 2000). While once leaders focused on establishing strategic aims and breaking them down to projects, in the last decades the job of leading, especially at the middle management level, has turned into a much more interactive task involving communication, motivation and negotiation that helps getting things done. Ideal leaders today are often depicted as not only assertive and strong, but also as appreciative and empathic towards their collaborators

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(Bröckling 2017). This has created a rising demand for training interventions that focus on strengthening the ability of team and department leaders to skillfully interact with collaborators, colleagues and cooperation partners. Leaders are trained to be more assertive and decisive in meetings as well as to be more empathic, to listen carefully and to be able to compromise.

## 7 How to Train Social Skills: Experiential, Playful, Inter-Active

Previously, we emphasized the central role of inter-activity in the process of invention and imitation in Tarde's theoretical perspective. Using a symbolic interactionist approach, we also discussed how the professional identity of leaders is increasingly more akin to communication. This implies that leadership nowadays includes a variety of performative acts, or symbolic interactions with others. In the words of Goffman (1959, 1974), functions and roles undergo a perpetual process of (re)interpretation and change in private, public and organizational life. This implies that there is not a specific, well-defined professional leader identity. Instead, there are multiple styles, behaviors and ways of interacting.

That is the reason why social skills training has become an essential part in the formation of leaders, an activity which has changed substantially over the years. While there are diagnostic instruments like self-assessment surveys or 360°-feedback (Kanning 2009), social skills training can be delivered in the form of simulations, such as role plays. Experience-based types of learning have been characterized as particularly effective by neurobiological research (Ciompi 1997). These insights have been used to legitimate playful, experiential learning as a fully recognized didactical form also in professional training (Beard/Wilson 2002). For neurological processes of learning and memory to be triggered, individuals need to emotionally experience things. This can be achieved by letting participants assume a role and act out in simulated critical interactions. These simulations can be filmed and analyzed by the trainer together with the participants afterwards. The analysis and discussion on the simulation is meant to guarantee the transfer of knowledge to the trainees.

## 8 Interactive Technologies in Social Skill Training

Still, experience-based interactive learning is not limited to role plays and video but can also be realized by drawing on technologies such as virtual reality (Bombari et al. 2015, Gillies/Pan 2019, Schmid Mast et al. 2015). The degree of trainee emotional arousal triggered by simulated experiences is considered as a criterion for the design

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of effective VR/AI–based social skills training programs. While interactive forms of inventing, imitating and diffusing ideas on leadership via social media create a reflective or discursive space where the building blocks of professional identity are exchanged and negotiated, the VR/AI technologies promise to create an entire experiential environment in which interaction in the narrow sense of the term can be trained in a playful way.

There are already several solutions commercially available. Besides applications in which the avatars are controlled by human beings, there are also applications in which a human player interacts with a virtual agent controlled by a computer. Technically, the reactions of the virtual agent are generated by speech recognition and conversational AI as mediators of the human-computer interaction. If this type of training environment is combined with technologies like the tracking of eye movement, detection of facial landmark for emotional (micro-)expressions (Gebhard et al. 2018) or the measurement of physiological markers such as skin conductance, machines can appear as emotionally intelligent entities that aptly capture the cognitive and somatic state of the human trainee (Schoeller et al. 2019). From the perspective of the player, it is possible to develop feelings of 'empathy' or other socio-emotional attitudes towards their virtual interlocutors and perceive their reactions as 'empathic' towards them (Allen et al. 2020, Bailenson 2018, Bertrand et al. 2018, Loon et al. 2018, Louie et al. 2018, Troeger/Tümler 2020). With the evolving of the conversation, the player experiences not only cognitively, but also emotionally, an interaction that he or she symbolically frames as if it were an interaction with a human person. Furthermore, the VR technology triggers the feeling of being present in the computer-mediated environment, although the player is aware of the fact that he or she is wearing a headset (Waterworth and Riva 2014). Interacting in a VR environment is thus not only a cognitive and emotional, but a bodily experience.

## 9 Patterns: Human Versus Machine Learning

Socially skilled interaction includes many layers of human expression, from spoken and written language to gestures and facial expressions; it also includes psychological dimensions such as the cognitive and emotional experiencing of interactive situations. It includes symbolic forms and institutions like rituals, the expression and recognition of sociocultural differences (habitus), the formal and informal relationships between interaction partners. In this sense, even though 'assertiveness' or 'empathy' are generally considered as social competences, these competences can assume a variety of forms according to the context, the sociocultural setting and the individuals participating in a concrete interaction (Kanning 2009). If a certain behavior, and attitude

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or a verbal expression is perceived as assertive or empathic is, thus, always a question of interpretation and context.

Yet, the respective behaviors, perceived as more or less socially skilled in a concrete interaction or context, as subtle as they may be, more often than not evolve in a pattern-like manner. And this is the borderland where humans and machines seem to encounter in their learning efforts. The question we ask is thus, are we humans closer to machines than we would like, even when it comes to behaviors that are supposed to distinguish us more than anything from other forms of life? Should it not be possible to model any of our expressive forms in order to design algorithms and forms of machine learning that make machines capable of maintaining any spontaneous interaction with us (Pan/Hamilton 2018)? Can this borderland of human and machine learning be described by applying Tarde's concepts of invention, imitation and diffusion as social facts and practices? Can machines learn to behave like humans in terms of sociality? In the case of VR, the question is whether virtual characters can function as representing empathic machines.

The issue of empathy in machines has been raised in previous studies on the field of affective computing (Rust/Huang 2021) which stress the importance of realizing authentic communication and affectivity in human-robot interaction. This is all the more important and relevant in artificial intelligence tasks with applicability in healthcare and mental well-being (Inkster et al. 2018; Kerasidou 2020). While there is a consensus on the fact that the state of AI research and work in creating mathematical models that can help robots emulate the complex social dynamics in a believable manner is far from reality (Leite et al. 2013; Banerjee 2020), there have been notable advances in conversational AI and robotics fields that show promising results. Some examples are the affective developmental robotics models (Asada 2015) computational model of empathy (Yalcin/DiPaola, 2018) or empathy-driven Wysa conversational model (Inkster et al., 2018). Therefore, there is reason to be confident that modelling empathetic traits and emotional intelligence in robots may not be an impossible task as originally thought. By means of pattern recognition, machines could learn to integrate signals and expressive forms that are perceived by their human interaction partner as socially skilled. This would not be restricted to empathy. Machines might also learn to be assertive, decisive or know how to manage conflicts.

Taking up the considerations made at the end of section 2, we would like to return to the theoretical perspective we propose in this paper in order to stress its value for finding an answer to this question. Attributing to imitation the fundamental quality of social action, Tarde seems to lay the basis for a converging vision of human and machine learning processes. As actions emerge and diffuse, they assume the form of recognizable and reproducible patterns. This allows to transform those actions into data that serve as a starting point for machine learning. Still, Tarde's sociology is not

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only a sociology of imitation, but also a sociology of desire (Borch/Stäheli 2009). In order to learn, humans do not only invent and imitate ideas and convictions, they also respond to specific needs. Humans desire to learn for many different reasons. In the case of social skills training, these desires and ideas refer to a type of human cooperation that is based on processes of negotiation in which these skills are indispensable in order to attain pre-established aims. In other words, humans are driven by the desire to grasp the other's perspective and at the same time to impose their own view, and these two desires do not necessarily contradict or exclude each other. From a Tardian perspective, the ability to assert oneself is related to empathy in that assertiveness depends on the desire to understand, to take the other person's perspective. Vice versa, the ability to behave in an empathic way depends on the desire to reach one's goals in a given interaction. The strength of Tarde's position is that he is able to give a sociological account of psychic processes and properties such as desires, because via the concepts of invention and imitation he conceives of these processes not as intra- but as inter-psychological (Borch/Stäheli 2009).

The question of sociological relevance is thus how imitation is shaped and transformed by means of technology. Which ideas and desires diffuse and how is their diffusion amplified, curbed or altered by technology? In this sense, machine learning and human learning intertwine, not only in an intersubjective, but also in an inter-objective space, i. e., in a technologically designed space in which humans interact with each other and with machines, and in which machine learning gains more and more agency (Latour 2005).

## 10 Future Research Directions

In this sense, a sociology of transforming professional identities (learning self, playful self) can be enriched by drawing on Tarde's sociology and his concepts of invention and imitation. The concepts could be operationalized by a mixed methods approach. This could consist of a discourse analysis (Bröckling 2017) of ideas on leadership in a certain field that reconstructs the diffusion of determined leadership concepts and literature and the exchange on these concepts between leaders via social media, as well as qualitative interviews that allow to reconstruct the relation between leadership ideas and their manifestation in everyday interaction. Only by reconstructing how leadership concepts are applied on a micro level it is possible to show that diffusion by imitation unfolds as a process in which those ideas are varied and appropriated in very diverse ways. These analyses could be completed with the study and critical appraisal of algorithms and machine learning processes working and developing in the background of social media and communication tools (Mühlhoff 2019).

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Such an analysis could be combined with a critical appraisal of the possibilities of simulating diverse leadership styles in VR. As outlined, the crucial point is to make a clear distinction between behavioral patterns and the technical forms of pattern recognition and reproduction, and this points to the underlying desire, embedded in the activity of learning. If the purpose is to align human behavior to calculable, machine-like modes of dealing with each other, the outcome of such a training will constitute an expertise that is artificial, inflexible and which lacks spontaneity regarding human interaction in workplace environments. If the desire, on the contrary, is to playfully try out different styles of addressing a situation and to strengthen the reflexive capacity of leaders, such immersive training forms can be useful.

## Acknowledgments

This work has been conducted in the project “Virtual Skills Lab” (Grant Nr. 872573), funded by the Austrian Research Promotion Agency (FFG) in the funding program “Ideen Lab 4.0”.

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