

Human-Non-Human: the Speculative Robot

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ABSTRACT

In this paper we explore and unpack the implications and issues arising from our exhibition project *Technics and Touch: Body-Matter-Machine*, which tested the limits of human and robot proficiencies through a series of experimental scenarios. The project explored methods of producing feedback systems through perception and action cycles. The exhibition consisted of two parallel events: a laboratory space where the artists were “in-residence,” producing drawings in conjunction with the robot; and a procedural drawing exhibition in an adjoining space, where the outcomes of this human/non-human team were exhibited alongside the work of practitioners who have been exploring rule-based drawing for some time. The aim was to make and to discuss approaches to embodied, expanded and autonomous intelligent systems. Towards that end, we worked to articulate a range of ideas that emerged from the project: the expanded space of the robot, which includes a complex human-non-human set of relationships that imprint upon the newly created network of the human-non-human (a better if more cumbersome word for the expanded space we currently call “robot”) and, the notion that this expanded space of the “robot” introduces a set of response parameters that were not aimed at duplication or fabrication but at exceeding the critical frameworks that filter and reduce what counts as “real.” This makes the robot-system, Ela, a speculative robot, one that is thoroughly embedded in this process of co-creation.

KEYWORDS

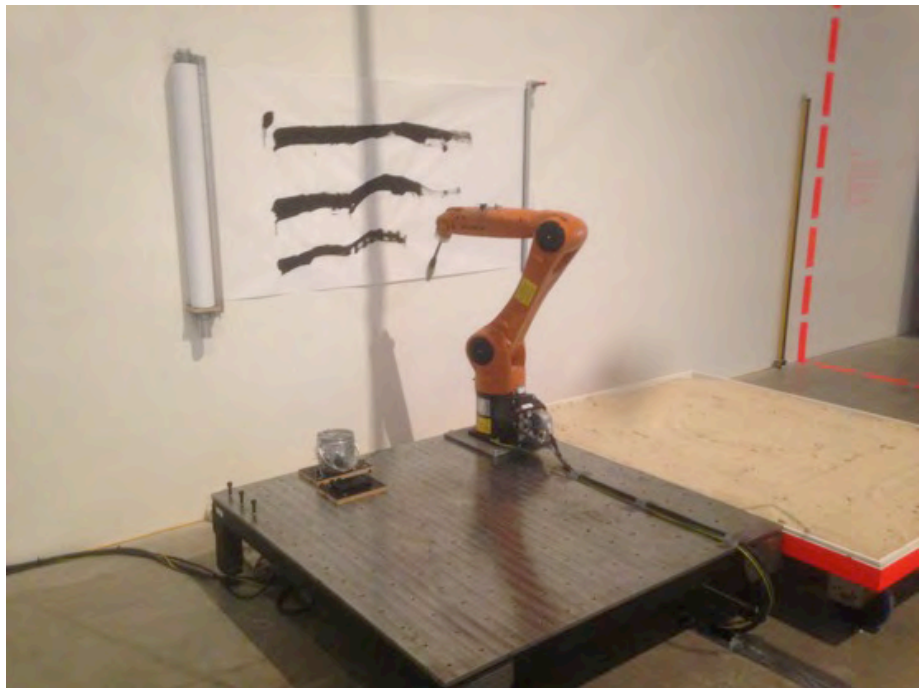
Robotic art, flat ontology, speculative design, creative collaboration, distributed cognition, feedback systems, procedural drawing.

Introduction

[1] For more on *Technics & Touch* see: <http://designhub.rmit.edu.au/exhibitions-programs/technics-touch>.

In this paper we explore the implications arising from our exhibition project *Technics and Touch: Body-Matter-Machine*, which tested the limits of human and robot proficiencies through a series of experimental scenarios.[1] We propose that what is under investigation here, in part, is what can be considered as the robot; what are its events and extents. By interrogating the emergent spatial and relational quality of the components involved in the operation of the robot, the social space of collaboration, its ebb and flow, becomes more apparent.

Fig. 1: Ela, the robot, responding to a drawn line.



The major part of the exhibition consisted of a *laboratory* space where the artists were “in-residence,” producing collaborative drawings with the robot, an industrial fabrication robot made by robotics company KUKA. In an adjoining space, a parallel *procedural drawing show* displayed the outcomes of this human-non-human team exhibited alongside the work of international practitioners who have been exploring rule-based drawing.

The work in social robotics, including work done under the banner of art projects, still seems mainly concerned with the creation of autonomous systems (autonomous robotic art work), sociability amongst (autonomous) robots, robots as “actors in social space” (Penny 103) or robots conjoined with humans mostly in what could at best be described as user orientated relationships. Even those who articulate more of a dialogic and less of a stimulus-and-response relationship still tend to institute a divide between human and robotic (systems). Even Penny in discussing his *Petit Mal* project, while noting his desire for an “ongoing conversation” that eschews a

Pavlovian relationship, still formulates this exchange as being “between system and user” (103).

In contrast, the work of *Technics & Touch* worked against the notion of making systems and users communicate but instead conceived of the system itself as being always already a conversation between human and non-human (HNH). [2] It is precisely the entanglement/s of HNH that constitutes the system. Where this places any so called “user” is thus somewhat more difficult to discern! Indeed, who or what is a “user” in the human-non-human system is exceedingly ambiguous. In the experimental project, and in our larger ongoing collaboration, whatever “the system” is, it does not stand external to a user. The system is understood as that which emerges in and from an entanglement of the human-non-human. Such a system is fundamentally speculative in its operations and definitely uninterested in any form of teleological relationship.

Similarly, while this shares some similarities with other recent projects which arise from “artistic” practices and are similarly “concerned with subtle and evocative modes of communication rather than pragmatic goal based functions” (Penny 103), it is more useful to consider the speculative robot that appears in *Technics & Touch* as an emergent practice collaboratively interlacing disciplinary approaches and agendas to the materiality of data systems. [3]

The aim of presenting collaborative drawing sessions as conversations with the robot and with a viewing public, was to induce, entice or cajole into existence an emergent human-non-human creative space. The question behind the setup of the elements and players was to ask what it means to think of agents as embodied and autonomous intelligent systems or as expanded, contiguous, asymmetrically intelligent networks. While both notions of agency are inherently social, the latter (expanded assemblage) is an outcome of the social while the former (autonomous system) might be understood as a condition of the social. Trying to determine the limits and boundaries of the robot drew attention to ways in which these distinctions were constituted.

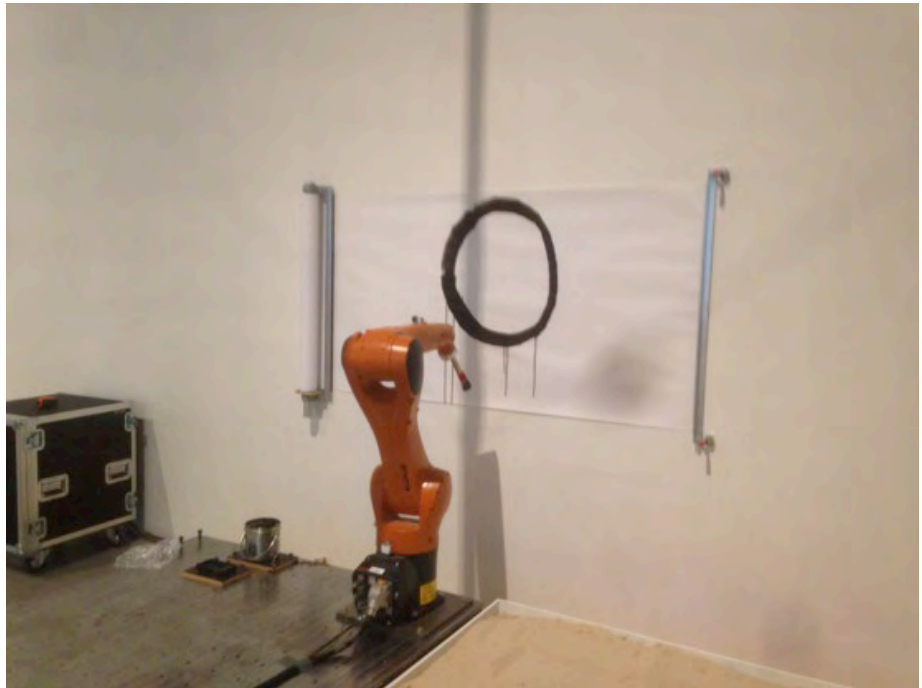
It is well known that the term Robot was introduced by Karel Capek whose brother suggested the Czech term, *robota*, for his 1920 play, *R.U.R* (or “Rossum’s Universal Robots”) instead of the Latinate word *labori*. The meaning of the Czech word is servitude, forced labour or drudgery linked to slavery or at least serfdom. [4] It is time for the robot, as an expanded system, to reclaim this derogatory name. In a move similar to the one represented by Duchamp’s declaration that “painting is washed up ... I want something where the eye and the hand count for nothing” and “I want to put art back in the service of the mind” (Rosenthal), we propose that the speculative robot relieves the enslaved robot from its servitude to functionality and, in its renewed human-non-human form, puts the “robot” back in service of material processes and collective intelligence.

[2] Although the term human-non-human has been in currency for some time, it is theorists such as Bruno Latour, (Latour *Science in Action; We Have Never Been Modern*; “Politics of Nature”) who has deployed the term to draw attention to the “proliferation of [H-N-H] hybrids” (*We Have Never* 1-11) and the assemblage of associations of which it consists and whose instability requires constant remaking. It is this use of the term that has informed our discussions.

[3] Herath & Kroos, in their preface to *Robots and Art* discuss the intertwining and interdisciplinary collaborations in robotics. In Christian Kroos’s essay from the same collection, “Art in the Machine,” he makes a distinction between robots that make art and robots that *are* art (19). While our work in *Technics & Touch*, ironically resembles the first approach using robots to make art, our intention is to go beyond the second and address a constitution of the social that is not instrumental but speculative in nature.

[4] It is clear that, drawing on literary models of Frankenstein or legendary models of the golem of Prague, the robots in Capek’s play have a greater resemblance to androids and the character of the Swedish TV show *Real Humans* (remade in the UK as *Humans*) rather than steel clad mechanical creatures that appear life-like and indistinguishable to their creators. See <http://www.sciencefriday.com/segments/science-diction-the-origin-of-the-word-robot/> for more information and varying accounts of the translation.

Fig. 2: Ela responding to a drawn circle.



The practical and applied goal of the exhibition was to contribute to an understanding of real-time feedback systems, which still eludes programmers, designers and fabricators of highly adept robotic systems for fabrication. In contrast to robots made as social companions for humans, who must move and communicate using human modalities (movement, language, gesture recognition and exchange), fabrication robots are designed to complete tasks in a well-defined workspace moving at extreme speed and precision with no obligation to make themselves understood in any other way than through their efficacy. In this project, the robot's capacity for repetition and precision appealed to the artists who have made numerous series of drawings of lines based upon rules for each next line. For humans, drawing sets of lines is both parameter-based and sensory feedback dependent, posing an intriguing problem for robots and their programmers.

[5] Here, touch is understood through research on haptics and also as an alternative modality that breaks with identity politics; both have implications for a discussion of the "social." See Derrida's book *On Touching - Jean-Luc Nancy*, which explores the dissolution of the body afforded by Nancy's notion of touch; Nancy's book, *Corpus*, which sets out the body as the architectonics of sense (Nancy 25) and Michel Serres's *The Five Senses*, which connect sense into the constructs of belief. Erin Manning's *Politics of Touch* offers a way touch might be considered as a modality that evades the paralysing forces of institutional politics. These investigations point to further work on the impact of social robotics on the social which may reinforce and resist the imperceptible capture of the senses.

The issue of real-time sensory feedback has been elusive for researchers and developers of robotic systems because, in addition to the logistical software-hardware issues, the aspiration of real-time sensory feedback in robots raises all the same fascinations and interests that notions of "touch," empathy, sympathy, joint attention and affect raise for humans. Sensory feedback combines perceptual and conceptual processing that constrains the parameters of meaningful exchange and, more interestingly, the possibilities for collaborative creative production. Touch, for the purposes of this paper, is considered in relation to the problems of real-time feedback, and to sensitivity as it pertains to tolerances regarding parametric constraints that determine interpretative stances. These values affect the relation and ultimately, the emphasis of a particular scale, type of correspondence or degree of fidelity from which to take collaborative action. [5]

Fig. 3: The feedback system, robot perception via camera and visual information run through software to set parameters for Ela's work-space and work task.



If robots and humans are to collaborate (the new trend in car manufacturing) then the structure of the laboratory, public fora and an exhibition platform affords access to different scales of the social, degrees of sociability and modalities of reassembling the social. These modalities are in search of ways to optimize what each element, component, agent and network does best. And instead of unifying these capacities within one regime of knowledge and understanding, the alternative is to show, tell and learn. By focusing on the agencies and material forces at work in an affective field, such as a confined workspace or a social field, it becomes possible to examine the complexity of the human-non-human and propose an expanded space that we would call the *speculative robot*.

Flat ontology and robot borders

What does it mean for a robot to be speculative? Is it just another anthropomorphism and projection onto that-which-we-cannot-know, in order to domesticate it and reify our identity? Shusku Arakawa, conceptual painter and protégé of Duchamp, collaborated with artist and wife Madeline Gins for 40 years, focussing on reconfiguring the relationship across the organism-person-environment and using the built environment to prompt an *organism that persons* to become an *architectural body* (Gins and Arakawa 2). In their 1987 book *To Not To Die* they propose that continuity and discontinuity are dependent on the forming of self, which is a creative fiction, a “blank” (Arakawa and Gins 8, 10) ready to be redistributed and recast (36-38, 58). This suggests that one of the functions of the feedback networks we designate “person,” is to select/co-select how things separate from and join with their environment (to cleave, hence bioscleave). The process of selection co-composes the environment and determines continuity and discontinuity. One of the primary goals of Arakawa and Gins’ forty-year project was to utilise the connections across the body-environment to reconfigure both separable entities. By focusing on the way the environment

would trigger and prompt changes in selection, the two artists posited a way around the problem of self, ego and anthropocentric determination of material agency. Paradoxically it is precisely the encounter with the materiality of the environment, and the co-selection process that is initiated, that enables the singular and separable entities to develop in unanticipated ways and, potentially, to flourish.

During a conversation at their Architectural Body Research Foundation offices in New York, Arakawa commented that the cultural notion of robots has allowed cognitive scientists to push farther and farther with their research. Arakawa's comments link the idea of active formation with a social image of the unknown. He speculated that in ancient times when a person would come to feel themselves as expanded or would sense an expanded self, that is perhaps what was meant by the idea of a ghost, concluding that the sensation of an expanded self might just as easily have meant the idea of a robot. In Japan a ghost is sensed by a gigantic silence. A perspective such as this on what the notion of a robot can mean suggests that in our time, the robot is an open space of possibility and potentiality. While the ghost connects the unknown with the past, the robot connects the unknown to the virtuality of the future. Any movement that splits or disperses the continuity of self becomes a strategy for moving towards the human-non-human and a more inclusive activation of the social formation of knowledge. [6]

The notion that speculation comes from the gradual unfolding from within a proposition itself is crucial to the way speculation has developed since Hegel [7] and appears ubiquitously in various guises in contemporary practices as, for example, speculative fiction, speculative realism and speculative pragmatism. Speculation, as it is combined or even co-opted by various inquiries and projects, sets out a process through which the event (the meaningful sequences and consequences) has not happened yet. The overlap between this notion of the social space of the robot, and the speculative space of unfolding event aligns well with practice-led emergent processes associated with creative collaborations.

In a configuration where the human and non-human are understood in a "flat ontology" [8], the space that emerges will have a different overall quality. The egalitarian structure of flat ontology does not preclude that emphases arise as a function of specific configurations for specific tasks. Debates on the issue of scale in regards to flat ontology point to the two camps of thought on the nature of objects: the speculative realism of Object Oriented Ontology (OOO), and Relational or Process-philosophy. The division hinges on the scale of the object and its constituent parts, and for the purposes of this essay relates to the status of an object once its boundary identity has been established. Graham Harman in *The Speculative Turn* replies to Steven Shaviro's evaluation of OOO's realism arguing that the difference between OOO and process philosophy as characterized as becoming and stasis, is better understood as the difference between (Whitehead's) turning of entities into a cluster of relations versus (Harman's) non-relational model of objects (Harman 291). This determination is

[6] Paraphrased from Arakawa's conversation with Jondi Keane in residence at *Architectural Body Research Foundation*, 124 Houston Street, NY on March 20, 2007.

[7] Hegel proposed a speculative philosophy to escape Kant's critical philosophy. The difference rests in the distinction between "predicative propositions" that externally attached predicates to a fixed subject, and "speculative propositions," in which predicates unfold gradually from the concept of the sentence's subject (see Malabou 134-137; Benson)

[8] Current uses of flat ontology can be traced back to DeLanda (58) and Latour's Actor-Network-Theory (although Latour never uses the term directly; see Callon and Latour). Both theorists are often cited in OOO texts and in process-philosophy to describe the status of objects as autonomous or mutually constituted. In his essay "The other face of God" Levi Bryant give a useful summary of flat ontology: "Drawn from the work of Manuel DeLanda, flat ontology is the thesis that all beings equally exist, even where they do not exist equally. While flat ontology recognizes that entities exist at different levels of scale ranging from the smallest quark to the largest galaxy, it refuses that gesture that would treat any of these entities as more ontologically *real* than others.... However, flat ontology above all rejects the existence of *sovereign* entities that *condition* all other entities without themselves being conditions." (Bryant 94).

complicated more by Deleuzian and Whiteheadian notions of actual and virtual, in which potential qualities are drawn into the constitution of an object. In an article critiquing the notion of scale for flat ontology, Chris Collinge acknowledges that in order for complex systems to “generate both systematic ordering and open creative events” the solution would be to:

Invent new spatial concepts to address the materialities and singularities of space, the localized and non-localized event-relationships productive of “event-spaces” (Marston et al. 424). A flat ontology must be rich enough to account for the socio-spatiality without reproducing static conceptual categories of “bordered zones” that require “higher” spatial categories bound to them (Marston et al 425). (Collinge 247)

How long is a piece of string, are events co-extensive with an object’s extent, and where does the robot system begin and end? To determine the sociality of our social robot, the question of molecular events, collaborative tasks and social engagement overlap. Our project tends towards phenomena that do not have a prior existence and are not autonomous but come together and hold together as the very quality of a conversation.

The notion of flat ontology has influenced both “object-oriented” and event-based accounts of the real which have flow-on affects that condition and constitute propositions regarding the social. While this discussion is outside the scope of this paper, it is important to note that Latour considers the embedded or encapsulated nature of actors within actors to be a hybrid. This is especially so when applied to the notion of social relations where this relationality is always and only in process, having to be constructed and performed constantly and continuously without ever really settling into a formation that could be called an object. Latour’s description of hybrids stands in stark contrast to OOO’s conception of the social, in which the non-relation of objects to each other would leave them to encounter each other cold rather than acknowledge and recognize the mutual constitution of objects.

A creative proposal might solve the impasse between those who would claim a realism as their banner. The proposal stems from the experience of creative practice, interaction, collaboration and encounters with opacity to suggest that objects are always being performed and mutually constituted but are sensitive to context, circumstance and situation; able to join and separate from their surroundings they are a function of their ultimate relationality. This approach might be called ROO – robot oriented ontology – if “robot” is understood as an expanded human-non-human assemblage that reclaims the ethos of being in the service of the HNH collective.



Fig. 4. Ela responds.

The ephemeral nature of conversational configurations makes room for collaborative work and event spaces that take on a specific, utilitarian task. This places the *Technics & Touch* project at the cusp of pure and applied research, where the indirect approach to specificity is sometimes the most direct path. This is another way of saying that practice-led research sets up conditions, which guide and constrain possible outcomes, in order to encourage emergent properties and relationships. The trajectory of our research is the practicality of the non-instrumental and the benefits gleaned from misaligning closed systems. The creative collaborations that arise in such circumstances can reveal the assumptions of each agent and provide genuinely novel applications.



Fig. 5. Humans respond to Ela's line.

Because the project explored methods of producing feedback systems through perception and action cycles, the question of precisely what that would mean for an HNH system became the first issue to tackle. In meeting with the programmer of the fabrication robot, which came to be known as *Ela*, and the programmer of the software that allowed the visual system to feed into and guide the task-oriented movements of the robot, we quickly came to realize that we were working on a form of robot interpretation. For the most part, fabrication robots like *Ela* do exactly what they are asked to do and are given very precise workspace parameters and coordinates for their movements in space which are carried out at any speed desired. However, there were tempos and degrees of resolution that were more conducive for *Ela* to conduct the task of drawing a line without either reaching a singularity (where all the axes of the robots arm align and too many options are present, shutting down the system) or where the amount of times the visual system and the onboard regulatory system refreshes do not produce glitches – what the programmer preferred to call errors but which the artists liked to call emergent behaviour.

The things that could not be programmed and which were left to *Ela* to find the best and most efficient way to complete, led to the types of feedback that proved to be provocative from a research point of view and expressive from a human onlooker's point of view. Originally we thought the project was addressing the virtuosity or fidelity of the collaboration across the digital and material environments but we quickly understood that the project was about behaviours.

The speculative robot and the social assemblage

In light of these meditations we are compelled to ask: In what way is robot *Ela*'s activity, in which there is no direct interaction with the public, social? And in what sense can the robot (even our expanded notion of robot, *Ela*), be speculative?

Listening to the voice of the new system, we propose a new line of thinking that recognizes the human-non-human system's attention and interest (from here on we can call the robot face of the new system: *Ela*) [Electronic Liaison Assemblage]. In producing collaborative drawings using real-time feedback systems via a visual relay, we discovered that what was social about *Ela* was defined by the relationships that humans could establish solely by virtue of the desire to enter into the expanded system of engagement – through any means, in this case through empathy and anthropomorphism (versus anthropocentrism).

Our study of the social space that *Ela* made possible by being a robot is not a scientific study. Rather it is composed of the “anecdotal” (a derogatory term often used in science to refer to the affective anecdotal data used in the Humanities) precisely because we are interested in the indirect and non-

quantifiable tonality and inflection of filigree movements-within-movements inside the social (affective) field.

Complexity is amplified by the number of meaningful consequences that one element/component/molecule of collaborative activity generates. That is to say, in the social (affective) field actions, inter-and intra-actions and objects exceed them and the relationships that form and dissipate and cannot be determined in advance. Consequently, the flickering of possibility and position within the social space of the robot, *Ela*, became an integrated circuit of connection across the HNH (a new molecule in the social network). Addressing the social robots theme through an expanded sensibility and HNH understanding unfolded in a number of ways, raising numerous questions.

Fig. 6. Procedural conversation and public forum. *Ela* listening from her work station.



First, the social aspect of *Ela* was comprised of the way participants and visitors/viewers would, to varying degrees, attribute values such as expression and indifference (indicators of emotion) to the system and the outcomes (drawings). It was indeed quite common for visitors to the project to exclaim that the drawings generated through *Ela* were more “expressive” than those produced by humans alone which seemed by comparison to be somewhat lifeless or without character. This led to some ongoing musing on the nature of expression, control and indifference, and maybe even interiority and intention. How could the *Ela* drawings be expressive? Expressive of what?

An expressive line is said to possess character, to be expressive of feeling of thought, so what is *Ela*’s line expressive of? One response to this is, in contrast to the human drawings, which demonstrate expertise in the coordination of fine and gross motor skills and exquisiteness in sensitivity to materials, responsiveness to changing environment etc., to see *Ela*’s drawings as a function of indifference – an indifference to the relationship between action and outcomes of the action. That is, a consequence of a lack of

feedback between its internal systems, environment, and materiality, a lack of sensitivity or touch, leading to what is considered a lack of control.

Is the perception of expressivity from the robot a function of “dumbing down” and infantilizing the robot? Does the personification of the robot in a little, young or adolescent stage of development lead onlookers to perceive human characteristics of expression?

This seeming paradox, in which the lack of touch produces seemingly great sensitivity to touch, can be understood as “stigmergy.” Is Ela (an HNH assemblage) indeed a stigmergic system? That is, “a mechanism of indirect coordination in which the trace left by an action in a medium stimulates subsequent actions.” Such a process “enables complex, coordinated activity without any need for planning, control, communication, simultaneous presence, or even mutual awareness” (Heylighen 4). [9]

[9] For an expanded discussion of stigmergics, robotics and volatile materiality see Snooks & Jahn “Stigmergic Accretion.”

The principle is that the trace left in the environment by an action stimulates the performance of a subsequent action, by the same or a different agent. In that way, subsequent actions tend to reinforce and build on each other, leading to the spontaneous emergence of coherent, apparently systematic activity. Stigmergy is a form of self-organization; it produces complex, seemingly intelligent structures without need for any planning, control, or even direct communication between the agents. As such it supports efficient collaboration between extremely simple agents which lack any memory, intelligence or even individual awareness of each other.

This lack of control and consequent emergent line seems to suggest that what is in effect occurring *is* design / creation, i.e., a speculative activity. Ela as an extended assemblage and a social field of interactions is indeed a speculative robot.

Social choreography and procedural conversations

Another aspect of the expansion of the social through Ela could be seen in the choreography of the human and the robots in the working system as it developed through the hybridisation of conversational modes of enquiry and discovery.

The act of (design) drawing can be understood as a fundamentally conversational and even dialogic activity. To draw a line (any line) is to ask oneself or an interlocutor the question, “what if this?” Which draws forth another drawing responding, “then this; what if the consequence is this?” And so on back and forth, with what could be called the “line-thinking” emerging from the discourse – through the hither and thither of the conversation. In this way there is no thinking “behind” the drawing, rather the thinking emerges with the unfolding of the drawing.

This call and response / conversational relationship was the initial structuring principal of the relationship between human and robotic actors; one party would draw (“what if this?”) to which the other would respond with a “then this” etc.

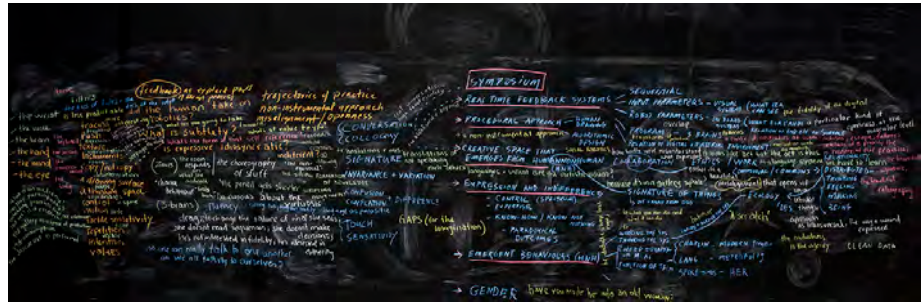
This conversational back and forth is of course an embodied and performative process. In the case of Ela this performativity can be understood as an extended or distributed choreography that is enmeshed within a coordinated movement between drawing stations, a walking to and fro between computer interface and robot server controls, sequenced actions of standing, watching, waiting, walking (and at times running!), of button pushing, crouching, typing, cutting, tearing, sticking, etc. Indeed, it was not lost on us that in this human-non-human performance, as with Charlie Chaplin in *Modern Times*, we were being performed by the system as much as “the robot” was being performed by us.

Part of this performative repertoire were the bodily movements of the programmers themselves when discussing the observed behaviours of the robot when drawing. The performative, transformational and interpretive behaviours of the robot involved extensive discussions between the programmers and human drawers. To fully understand the movement behaviour of the robot, the programmers frequently/compulsively thought through the coding, movement, and spatial orientation of the robot through enacting the coding “instructions” through their own bodily actions. Notably this was not a case of humans mimicking the robot but rather a thinking through by putting oneself in the place of the robotic system, in some way *being* the robot rather than being *like* a robot.

What emerged from both the overall performative conversational system and the localized exploratory discussions was an understanding of what could be called a notion of not just a refinement of procedural drawing techniques but the development of a procedural conversation and a notational system for developing a choreography of expanded / distributed cognition.

Other issues that arose during the exhibition that support our speculation on the nature of Ela as a social and speculative robot, were highlighted by the public forums held each week and the closing symposium. As the conversation between Ela, the artists, programmers and public evolved, it became clear that the new human-non-human system raised more issues than it answered and evoked a profound reconsideration of agency on the part of the human players. From the simple task of drawing lines and circles together and in response to each other, the expanded speculative robot was in a position to ask several new questions which stemmed from the importance of real-time feedback and the use of perception and action cycles to investigate the space of the creative collaboration.

Fig. 7. The speculative robot - procedural conversation score.



Human-robot communication and machine embodiment

In the lead up to the exhibition many trials were run to develop the grasshopper definitions in order to effectively communicate with the KUKA fabrication robot. These trials were focused on trying to establish a set of behaviours that could be run and repeated. Given budget and time constraints it was decided to work through a 2D image recognition system rather than a 3D movement recognition system. However, the ways in which Ela could understand the pixel image of a line presented challenges even for this seemingly simple task of perceiving a line and drawing an offset line that followed the initial line with a given set of parameters. The information received about a human line captured as pixels from the low-resolution web camera was converted into a movement task within the KUKA workspace. The speed of the movement, the resolution of Ela's response (how many points along the line Ela would use to match the line) and the refresh rate of the visual system that runs parallel to the refresh rate of the on-board monitoring of the movement-task – all of these factors contributed to Ela's computational approach to solving the assigned task. To complicate the activity further, the robot could be told where to move from two distinct spatial reference systems: one that tells Ela the degree and direction of rotation and extension for each of six axis joints, and the other that gives coordinates in space to locate the end point of Ela's arm as seen from an outside, exterior vantage point. To the artists' delight, when attempting to figure out how the robot might move from a reset starting point, the programmer, Jules, would position himself and find Ela's movement through his bodily gestures. It was the moment of cross over among material limitation, mathematical / geometric consideration and scripting/coding of a task. The rule set for Jules' bodily calculations had enough overlap with Ela's to find a way into the solution through Ela's on-board brain (as opposed to her external supplementary brain and her relational social brain).

Jules' embodied thinking prompted the use of the x, y, z axes and the rotation and transposition of activities in space to augment the *Procedural Conversations* project that emerged from the exhibition. These conversations afforded ways of extracting from human conversations, phrases that could become algorithms, instructions or procedures, which would be completed by the ensemble of "performers" and enacted or turned into movement phrases. Although not robotic, *Procedural Conversations* uses the indifference

of the algorithm to amplify the meaningful consequences for humans. It is a point of potential knowledge transfer from robots to human.

Towards a post-human event-space

There is an important difference between a *social* robot and a *collaborative* space in which robotic mechanisms organise the other components. This expanded consideration of the event-space, which we associate with the expanded definition of robot, includes the inter- and intra- actions, the architectural program and the behavioural habits of loosely configured and fixed systems along with their subsequent encounters. This expanded description allows for a social field to emerge as well as, but not necessarily consistent with, the creative forces which move through the relationship and emerge from novel activities prompted by encountering systems of otherness whether organizational structures, material processes or immaterial gestures. Ultimately as with any collaboration the aim is to learn and achieve what one cannot do separately. In other words, what human-non-humans do well, autonomous entities do not.

To the mutually conditioning entities of DeLanda's flat ontology and the reciprocal sensitivities within Latour's ANT can be added Bennett's vibrant materiality (Bennett) and the event-based provocations of new materialism (Coole and Frost; Dolphijn and Van der Tuin) – all of which contribute to current understandings of the post-human. These configurative propositions diminish the efficacy of distinctions that separate human from non-human and instead, join all entities in co-selecting and co-constructing the social space of common concerns. For humans, the anthropomorphic tendency provides a mode of engagement and relationship that relies more upon empathy than upon the domineering effects of anthropocentrism, of which there is much more to be said particularly in regard to the “social” that might emerge from stances on realism within our era and stances on the constitution and consequences of an Anthropocene. The implications of this larger context is the subject of future work beyond the current discussions here, but the creation of situations and modalities (Wark; Latour “Anthropology”; Haraway) [10] that point to new configurations that may arise and play out their mutual and oppositional interests together, is part of the vitality of which so many humans observe we are now in great need.

[10] Donna Haraway's most recent book, *Staying with the Trouble*, suggests another term for the era in which we are implicated and entangled with the nonhuman. She suggests: “Maybe, but only maybe, and only with intense commitment and collaborative work and play with other terrans, flourishing for rich multispecies assemblages that include people will be possible. I am calling all this the Chthulucene – past, present, and to come ... [with] diverse earth-wide tentacular powers and forces and collected things. (Haraway 160)

Fig. 8. Procedural conversation – performing the score (video still).



Conclusion: a robot speculates on the Anthropocene

At the beginning of this essay we proposed to examine the implications arising from our exhibition project – especially the limits of human and robot proficiencies through a series of experimental scenarios. Our approach has been to use notions of collaboration and collectivity to suggest that once the boundaries between human-non-human intelligence and knowledge begin to erode and evade human discernment, a creative space opens up from which emerges another kind of technical and social system.

In the *Technics & Touch* laboratory/exhibition/experiment, the expanded space of the “robot” was asked to go against its functional remit and introduce a set of response parameters aimed at exceeding the critical frameworks that filter and reduce what counts as “real.” This makes the robot-system, *Ela*, a speculative robot, one that is thoroughly embedded in this process of co-creation; a proposition in which the action arises from the conditions of the question. The conversation across the human-non-human boundaries allowed the position of each questioner to shift and change through the act of engagement. Current discourse on the Anthropocene and the impact of humans on the geological time of the planet has had the benefit of re-focusing the desire and need to address the non-human collective and material agency.

In our practice-led investigation, we were intrigued by the scales of time consciousness that come into play during conversations and collaboration with the robot; in particular, the confines of what might be considered the immediate – as the short duration of which we are immediately and incessantly sensible [11] played a primary role in the robot team’s discussion of networks and was a topic of great interest in the public forums. If the specious present gathers together all the processes and actions currently in-play then the present moment (any present moment) is a function of concurrent sequences and consequences of ongoing processes brought

[11] See William James’ development of E. Robert Kelly’s notion of the specious present and time consciousness in *Principles of Psychology* (608)

together and held together in what might be called moments of poise. The awareness of a present moment is always subject to radical destabilization and reconfiguration. Working with a robotic system that has the capacity to refresh every 4 milliseconds and refresh input every 100 milliseconds means that the time of the network collaboration has a drastically attenuated shape that distorts the meanings of human concepts such as awareness, feedback and event.

Time on the small and large scale (the one-thousandth of a second to refresh a system or the Anthropocene) and space on the small and large scale (the molecule of a data point, the miniscule movement of touch or the emergence of a social field) are both highlighted by human-non-human systems that exceed themselves through encounter and interaction.

Specifically, the performative and interactive installation *Technics & Touch*, in which the operations of art and media practices were applied to engineering, robotics and computer scripting for fabrication, plays with the conditions of felt perception and how relationality *comes to experience* in the public sphere in a social assemblage of direct and indirect interactions. If art practices play with the conditions of experience and evoke new conversations, then the paradoxes that arise in the way one experiences concepts can turn the lived experience of abstraction into an immediating practice. It is these transitions and transductions to which our human-non-human discussions aim to contribute.

Through the discussion of our work, we aim to articulate how the expanded notion of the robot promoted an alternative notion of the social through the production of a creative event-space. This spatial proposition (the work space of the robot), immediately draws into the mix the temporal, that is to say potential aspects of the system. In the act of expanding a new set of relationships, Ela's work-space activated the conversational character of creative and collective labour / collaboration.

The social robot speculates in the public sphere, theorizing within the situations that arise, and ethical know-how is understood as a function of enacting a world that is co-selected, co-composed and co-constructed. It is the foregrounding and enhancement of this process that our project, *Technics and Touch*, emphasized and attempted to develop in the public forum of the gallery-laboratory.

It is precisely these public forums, or what developed into our *Procedural Conversations* project – the embodied, notated, scored and improvisational explorations of distributed cognition – that proved to be simultaneously reflective and speculative events. As such we argue that the *Procedural Conversation* provides a genuinely richer more promising research modality / method than the focus group of the social sciences. Indeed, as implicitly argued through this paper, a focus group by definition is doomed to precisely miss the point when it comes to exploring the expanded social field of knowledge creation and the situated spaces generated in creative

collaborations. In this way the group that comments and provides feedback is self-organising public participation that feeds-forward from within the event.

We have argued that the expanded space of the robot *is* a creative collaborative space (serious play of lab and the creative play of parts practices/ processes); one which requires the reconfiguration of the complex human-non-human relationships that imprint upon the newly created network of the human-non-human. Our human-non-human conversation ends with another question regarding the role Ela may play both as a social robot and as creative event-space to speculate upon the expanded and distributed cognition.

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