Adding value to research and technology through integration of artists in projects and synergy creation between creative industries, entrepreneurs, researchers and arts

STARTS Residency Public Report
Blueprints For An Emergent Personality

Kate Aspinall (Theo) and AMORE team

Abstract

Visual representations of the AMORE computational system seek to represent non-human personality using both objective analysis of the system's data with subjective interpretation, treating the system as a developing mind. The artistic process included close observation of the AMORE lab, above all the city of Barcelona, the lab itself and the participating researchers, as well as analysis of the data with the help of qualified psychological and neurological experts. The sketches, preparatory works and final pieces had no direct impact on the scientific process, but the interaction with the artist provoked further considerations regarding big-picture perspectives on AI as well as potential future research topics, while the science directly impacted the art by providing all the data, as well as insight into the connection between language and mind. The collaboration was a fruitful parallel investigation, in which both artist and scientists were inspired by each other, a vital hallmark of art-science relationships. Future collaborations could involve the artist in the design of the experiment, and display of the work in Barcelona, Paris, London and beyond can create interest in computational linguistic systems and their relationship to minds.

Index Terms— **Artificial Intelligence, Artistic Representation, Computational Linguistics, Drawing, Embodiment, Theory of Mind**

I. INTRODUCTION

THE AMORE team is developing a model of linguistic reference implemented as a computational system that can learn its own representations from data. Blueprints is closely responsive to the process of the AMORE project, creating visual representations using data from the model, which endeavor to represent non-human personality using both objective analysis as well as subjective interpretation, treating the system as a developing mind

Theo visited the AMORE team at Pompeu Fabra University in Barcelona twice, exploring the city and the lab itself for visual cues, and speaking with the participating researchers regarding the model and its data. Data provided by the AMORE team consisted of textual raw data of mothers speaking to their infant children; the model was attempting to predict the next character in the dialogue. Theo consulted a psychologist and a specialist in developmental neurocognition regarding the significance of the data and human-AI commonalities in language learning

and emotion. Combining the visual resources she collected in Barcelona as well as the input from the AMORE team and the specialist consultants, Theo worked through possibilities for visually representing non-human personality, focusing especially on visual illusions to convey confusion and anxiety around lack of prioritization.

II. ARTWORK

The aim of the residency was to visually explore the possibilities for visual representation of non-human personality. Theo used the data from the AMORE model to create, through both objective analysis and subjective interpretation, finding that the principal aspects of interest were visual illusions as symbolic of confusion, disembodiment and the anxiety around lack of prioritization.

The final deliverables for the project were:
1) *A sketchbook of 140 pages*
2) *Various preparatory small drawings*
3) *Six presentation works on paper (80x100cm)*

The **sketchbook** combines visual notes with imaginative compositions, alongside portraits of the researchers and brief textual notes from conversations and seminars (see figures 1-6). The act of bearing graphic witness to the lab and its members stands in for the impossible – bearing witness to the computational process – but in important ways it allowed Theo to explore the world-view of the creators of this non-human personality.

Fig. 1. Sheet 8 (verso) from the Blueprints Sketchbook depicting the hallway outside the AMORE lab leader Gemma Boleda's office with an anthropomorphisation of the AMORE program, whose algorithm is transcribed in place of the infant's face. Piece details: (2018-2019), ink on paper, 21 cm x 30cm (sketchbook album allows for removal of individual sheets).

Fig. 3. Sheets 44 (verso) and 45 (recto) from the Blueprints Sketchbook with sketch of 19th century Catalonian toddler flanked by data fed into AMORE on the left and the AMORE-generated chatter on the right. Piece details: (2018-2019), pencil, ink and collage on paper, 21 cm x 60cm (sketchbook album allows for removal of individual sheets).

Fig. 4. Sheets 20 (verso) and 21 (recto) from the Blueprints Sketchbook with sketches made while observing the weekly meeting for AMORE

researchers. Piece details: (2018-2019), pencil on paper, 21 cm x 60cm (sketchbook album allows for removal of individual sheets).

Fig. 5. Sheet 23 (recto) from the Blueprints Sketchbook, playing around with the personal subjectivities and biases that could come to bear on coding the AMORE algorithm. Piece details: (2018-2019), ink on paper, 21 cm x 30cm (sketchbook album allows for removal of individual sheets).

Fig. 2. Sheet 16 (recto) from the Blueprints Sketchbook with a sketch-portrait of AMORE post-doctoral researcher alongside an ink one of Glòries shopping center by the Communications Campus. Piece details: (2018-2019), pencil and ink on paper, 21 cm x 60cm (sketchbook album allows for removal of individual sheets).

Fig. 6. Sheet 9 (recto) from the Blueprints Sketchbook with ink sketch of metaphoric statue from the Mirador de Colom (Columbus Monument) next to a sketch of university staff and students in a popular café near to the

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Communications Campus. Piece details: (2018-2019), ink on paper, 21 cm x 30cm (sketchbook album allows for removal of individual sheets).

The **preparatory drawings and collages** (see figures 7 and 8) were the initial synthesis of the materials gathered, working toward the right aesthetic to convey the emotion and complexity of the subject. Optical illusion and visual confusions were particularly potent in representing some of the model's obstacles for human-like comprehension. Visual cues from the city of Barcelona proved especially useful in exploring this line of inquiry, especially the wax rubbings of the city's pavements, photographs of bark in the city's trees and archival photographs of models for some of the city's iconic statues and friezes.

Fig. 7. One of various preparatory collaged and painted small pieces exploring the parallel activities of Deep Neural Nets being prone to optical illusions and how nations carve out identities through aesthetic postures as evident in this source material of archival photographs of mothers and children taken by an unknown sculptor in Barcelona in 1880. Piece details: (2018-2019), mixed media and collage (inks and acrylic paint on paper)
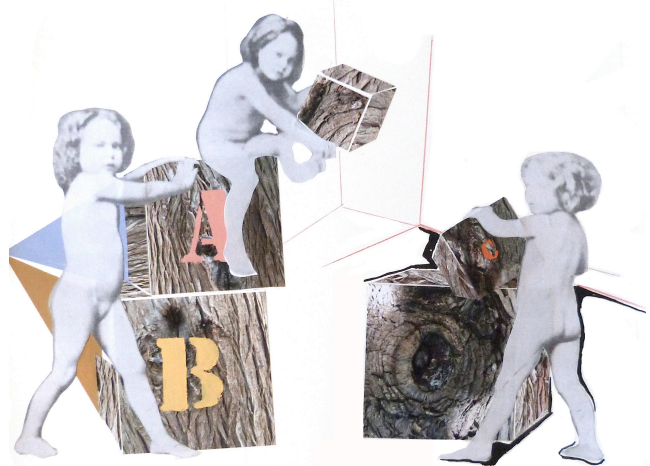

Fig. 8. One of various preparatory collaged and painted small pieces, continuing to explore themes of recognition and visual noise through the 19th century studio-aid photographs and photographs taken by Theo of tree-knots from around Barcelona in place of children's alphabet blocks.

Piece details: (2018-2019), mixed media and collage (inks and acrylic paint on paper), 47 cm x 47 cm.

The **final works of art** involved collage as well as drawing and ink painting (see figures 9-14). The mixed media representations use texture and visual noise to create emotional flashpoints that conjure the hypothetical experience of the AMORE model's non-human personality. Visual perplexities, confusions about identity, a fundamental dissociation from a human's recognizable visual world are hallmarks of all six pieces, which resonate with each other, each using a combination of techniques and motifs to convey an imagined emotional reality.

Fig. 9. 'Blueprints no. 5', which interrogates a potential dissociative state and motherless-ness: AMORE was self-learning from CHILDES transcripts of mothers talking to their infants (content including: 'is your shoe tasty? Mommy doesn't chew on hers' and 'here's your dollie') and yet is not given any substantive connection to the meaning contained in the referents (e.g. 'hers' and 'yours') or physical experience (e.g. 'tasty'): connotations, both conceptual and visual, of confusion between noise and meaning become paramount. Piece details: (2019), mixed media drawing (graphite, ink, crayon and acrylic on paper), 80cm x 100cm.

Fig. 10. 'Blueprints no. 6', companion piece to no. 5, revisiting the arbitrariness of demarcating self from visual-conceptual 'noise', here juxtaposing pavement rubbings, Barcelona's tree-knots and children's alphabet blocks in relation to the black outline as a proxy for demarcating the relevant from the irrelevant. Inspiration in part came from protocol for Deep Neural Net 'training images' being photographs with outlines around aspects and the trouble 'learning' from these images mainly involving misunderstanding what is targeted by a given outline. Piece details: (2019), mixed media drawing (graphite, ink, crayon and acrylic on paper), 80cm x 100cm.

Fig. 12. Detail of 'Blueprints no. 3', showing the hand-drawn dot matrix face superimposed on a rubbing made from the paving tiles immediately outside the Communication Campus entrance. The face in this piece was drawn from 'L'Inconnue de la Seine' (the Unknown Woman of the Seine), an unidentified woman who was found drowned in the Seine River at the Quai du Louvre, Paris in the late 1880s and copies of her unauthorized death mask were widely bought by artists. She was objectified as an enigmatic beauty and her image was eventually used to make CPR training mannequins. She is invoked in the Blueprints series due to her ubiquity as the face of human-simulacra and the pathos she represents as a person whose personhood is beyond possession and yet whose image was eagerly possessed. Issues of aspiration, objectification and the eternal are all wrapped up in her image. Piece details: (2019), mixed media drawing (crayon, ink and acrylic on paper), 80cm x 100cm.
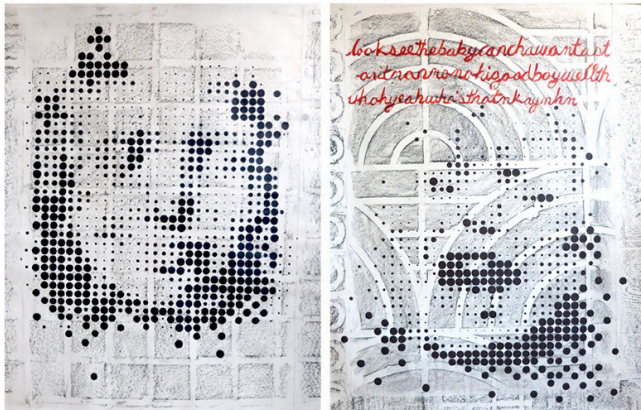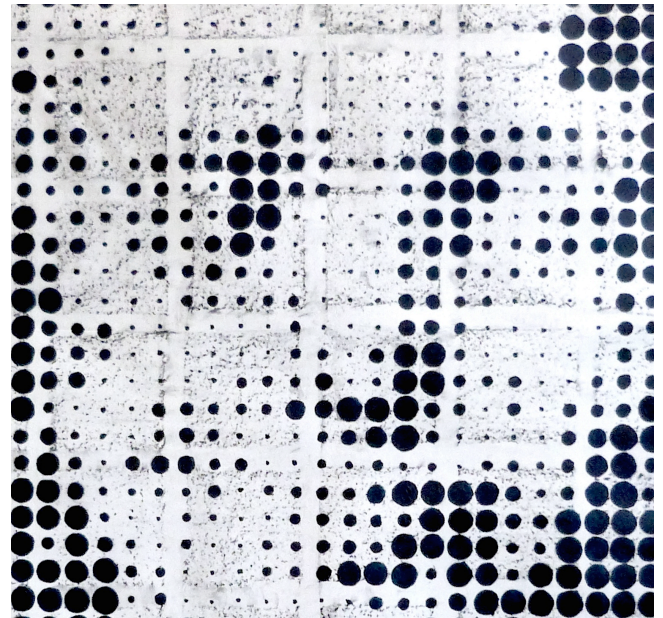

Fig. 11. 'Blueprints no. 3' and 'no. 4', in which self-construction and 'recognition' are further studied in relation to how Deep Neural Nets separate images into layers and assign values to pixels: these pieces overlay a dot-matrix-like hand-drawn sequence of dots over crayon rubbings made from pavements in and around AMORE's Communication Campus, Universitat Pompeu Fabra, Barcelona. Pieces hinge on the connotation of 'values' and how despite apparent repetition of pattern in the pavements, each dot, each box, is unique. Text along top of no. 4 is a quotation of AMORE's babble: 'lookseethebabycanchawantast… onitnonnohigoodboywellth… whahyeahwwhasthatmkaymhm'. Piece details: (2019), mixed media drawing (crayon, ink and acrylic on paper), 80cm x 100cm.

Fig. 13. 'Blueprints no. 1' and 'Blueprints no. 2', exploring demarcation of self amid the uniqueness of un-prioritize-able aesthetic 'noise' – again using optical illusion, rubbings, bark, children's blocks, photographs of 19th century Catalonian children as well as drawings and photographs taken of robotic children's toys around the city. This self-building in relation to language is further explored through superimposing textual labels/concepts, which are present in the learning-transcripts (e.g. 'you', 'me', 'love', 'need', 'friend', 'dollie', 'mommy', etc.) as questions. Piece details: (2019), mixed media drawing and collage (graphite, ink, crayon, acrylic and photographic prints on paper), 80cm x 100cm.

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Fig. 14. Detail of 'Blueprints no. 1' showing textual labels/concepts, in this case 'eye?', 'nose?', and 'eat?' over tree-knot simulacra of facial features. Piece details: (2019), mixed media drawing (graphite, ink, crayon and acrylic on paper), 80cm x 100cm.

III. METHODOLOGY

In the initial stages, Theo engaged with the AMORE project's physical surroundings from the micro to the macro, sketching throughout Barcelona, working in rings from the lab out through the broader city, from its immediate material (the encoded construction of the model), to its outer entity (its technological/material encasement) to the immediate environment of lab, researchers, building and the extended environment of the city. Visual cues were found everywhere, from the pavements of the Barcelona streets to the tree trunks in the university campus. Machines and robotic toys dotted around the city also proved significant, as did the city's own representation of self through its historic sculptures.

Using the data provided by the AMORE team, Theo consulted a psychologist and a specialist in developmental neurocognition regarding the significance of the data and human-AI commonalities in language learning and emotion. She then applied her own subjective interpretation of the data and the conditions for self-learning, using the visual cues found through the city and lab. Preparatory works explored the visual possibilities, leading to the creation of six final works, each measuring 80cm x 100cm.

IV. CO-CREATION PROCESS

The collaborative aspect of the project was focused in the first stage of the project, when Theo was gathering data. Theo was in Barcelona with the AMORE researchers for thirty-nine days in 2018, from April 10 to 27, and again in September/October 2018, from September 20 to October 20. During this part of the project, Theo presented herself to the research team through two seminars, participated in group discussions and lab meetings, and interviewed each researcher individually. In these interviews, she drew portraits of the researchers as part of the conversation, which were integrated in the sketchbook; she also sketched during lab meetings and discussion.

The researchers shared data with Theo from an experiment run using data that consisted of mothers speaking English to their infant children (B. MacWhinney (2000), *The CHILDES Project: Tools for analyzing talk, Third Edition*, Mahwah, NJ: Lawrence Erlbaum Associates). The AMORE model aimed to predict the next character in the dialogue. Theo and a post-doctoral researcher worked closely on the interpretation of the data and discussed the implications for how computational linguistics can help model infant language acquisition.

Communication continued when Theo was back in her studio via email. Over the course of the project, online visual conferences, emails, telephone calls and blogs were used to communicate between Theo and the researchers.

V. IMPACT

A. Research Impact

The principal research impact is conceptual, a broadening of the possibilities of research, due to the different understanding of the model that Theo's work afforded. In particular, Theo's process of working with the model's output (the language it produces) to visually conceive of the possibilities of non-human personality, offered the scientific team a new perspective on their work.

B. Artistic Impact

The artistic impact ranges from the merely aesthetic, introducing new possibilities for material combinations and visual representations, to proposing and inspiring new forms of conceptual engagement with artificial intelligence. The colloquial understanding of the rapid developments in AI and self-learning remains far behind the technology itself, and art is able to provoke engagement in a way that can be deeper and richer than a scientific product.

VI. ART-SCIENCE INTER-RELATIONSHIPS

The general framework of art-science relationships is exceptionally broad, ranging from collaborative enterprises where designers work intimately with scientists to co-create new innovations to projects in which each side (scientist and artist) fertilize each other through parallel explorations. The Blueprints projects was more toward the latter, where data from the AMORE team was used by the artist, and for the most part the interaction was on a human level of discussions and co-inspiration.

For the AMORE team, having Theo as an artist in residency was a very enriching experience, because, as

explained above, she offered a different view of the computational model concretely, and of AI more generally. Moreover, Theo's approach has parallels in current efforts in the field to understand how current Machine Learning methods work through analysis (so-called "interpretable AI"): Her analysis of the output of the model to imagine a personality can be seen as an artistic version of this.

VII. FUTURE DIRECTION AND ACTIONS

Future projects beyond the STARTS Residency could include: the display of the artwork in Barcelona, Paris, London and beyond; exploration of conferences focused on self-learning systems and visual representation; further artistic creation based on model output for different tasks of the project, such as naming objects in images; perhaps a collaborative project in which the artist is involved in the design of an experiment. All of these have potential to stimulate interest in computational linguistic systems and their relationship to the mind, as well as further discussion around artificial intelligence and its role in the wider culture.

VIII. CONCLUSION

A. Concluding Remarks

The project resulted in the successful completion of 6 large artworks as well as a large sketchbook and smaller preparatory drawings, all of which are exhibition-ready. The collaboration was a fruitful exchange of perspectives, and the parallel nature of the project allowed for all participants to apply the new perspective to their respective fields of engagement.

Kate Aspinall practices art under the name Theo. She is a freelance artist, writer and art historian, based in London. She studied BA/MA Art History at University of St. Andrews (2001-09); MA History of Art at Courtauld Institute (2008–09) and PhD Art History at University of East Anglia (2010–13). Selected groups exhibitions include: 'Drawn Together', Mercer Chance Gallery, London (2017); 'The Other Side', Monsoon Collective, Tucson (2016); and 'Anatomy and Process', VERTIGO, Denver (2008). Solo exhibitions include: 'Space Between, Loughton Art Centre, London (2013); 'The Thing with Feathers', Pirate Art Gallery, Denver (2007); 'Is Intimate Space Birds Fly Through', Byre Art Centre, St. Andrews (2004). Recent prizes include: Royal Drawing School scholarship (2017) and a Rocky Mountain Women's Institute fellowship (2008).

Dr. Aspinall's academic research looks to the role of drawing in early 20th century British visual culture with a particular emphasis on the intersections between institutional and personal discipline. She is currently working on a monograph, *The Paradox of Medium Specificity: Drawing Practice and Twentieth Century Modernism in Britain*, and most recently she has written on student networks around David Bomberg for *British Art Studies* (November 2017) and the role of the drawn mark within Herbert Read's critical agenda for a special issue of *Visual Resources* (February 2016). She consulted for the Roy Lichtenstein Foundation and served as Trustee for the Association for Art History, representing freelance and independents. She is an Arts Society accredited lecturer and has spoken at Tate, the Courtauld, the Towner and Pallant House, among other institutions.

Gemma Boleda, lab leader of the AMORE team earned her PhD at U. Pompeu Fabra (Spain), and moved on to post-doctoral positions in Spain, the USA and Italy before rejoining U. Pompeu Fabra as a tenure-track researcher in 2017. In her research, currently funded by an ERC Starting Grant, Dr. Boleda uses computational methods to better understand the semantics of natural languages.